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THE ANALYSIS OF 15μ INFRARED HORIZON RADIANCE PROFILE VARIATIONS OVER A RANGE OF METEOROLOGICAL, GEOGRAPHICAL, AND SEASONAL CONDITIONS

by John R. Thomas, Ennis E. Jones, Robert O'B. Carpenter, and George Ohring

Prepared by
HONEYWELL INC.
Minneapolis, Minn.
for Langley Research Center

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Prepared under Contract No. NAS 1-6010 by
HONEYWELL INC.
Minneapolis, Minn.

for Langley Research Center

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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FOREWORD

This report documents the first phase of An Analytical and Conceptual Design Study for an Earth Coverage Infrared Horizon Definition Study performed under National Aeronautics and Space Administration Contract NAS 1-6010 for Langley Research Center.

This study provides for delineation of the experimental data required to define the infrared horizon on a global basis and for all time periods. Once defined, a number of flight techniques are evaluated to collect the experimental data required. The study includes assessment of the factors which affect the infrared horizon through statistical examination of a large body of meteorological information and the development of a state-of-the-art infrared horizon simulation.

The contractual effort was divided into numerous subtasks which are listed as follows:

Infrared Horizon Definition - A State-of-the-Art Report

Derivation of a Meteorological Body of Data Covering the Northern Hemisphere in the Longitude Region Between 60°W and 160°W from March 1964 through February 1965

The Synthesis of 15μ Infrared Horizon Radiance Profiles from Meteorological Data Inputs

Analysis of 15μ Infrared Horizon Radiance Profile Variations Over a Range of Meteorological, Geographical, and Seasonal Conditions

Derivation and Statistical Comparison of Various Analytica Techniques Which Define the Location of Reference Horizons in the Earth's Horizon Radiance Profile

The 15μ Infrared Horizon Radiance Profile Temporal, Spatial, and Statistical Sampling Requirements for a Global Measurement Program

Evaluation of Several Mission Approaches for Use in Defining Experimentally the Earth's 15μ Infrared Horizon

Evaluation of the Apollo Applications Program Missions for an Earth Coverage Horizon Measurement Program in the 15μ Infrared Spectral Region

Computer Program for Synthesis of 15μ Infrared Horizon Radiance Profiles

Compilation of Computer Programs for a Horizon Definition Study

Compilation of Atmospheric Profiles and Synthesized 15μ Infrared Horizon Radiance Profiles Covering the Northern Hemisphere in the Longitude Region Between 60°W and 160°W from March 1964 through February 1965 - Part I

Compilation of Atmospheric Proflies and Synthesized 15μ Infrared Horizon Radiance Profiles Covering the Northern Hemisphere in the Longitude Region Between 60°W and 160°W from March 1964 through February 1965 - Part II

Horizon Definition Study Summary - Part I

Honeywell Inc., Systems and Research Division, performed this study program under the technical direction of Mr. L. G. Larson. The program was conducted during the period 28 March 1966 through 10 October 1966.

The study results from the first five subtasks listed previously are of considerable interest and warrant wide distribution to the scientific community. It is anticipated that the results of the last eight subtasks are of limited interest to the general scientific community; therefore, distribution is provided to U. S. Government Agencies only.

Acknowledgment is extended to GCA Corporation and Barnes Engineering Company for their contributions on atmospheric physics/meteorology and locator identification respectively. The contributions on profile synthesis by Dr. J. C. Gille of Florida State University and on statistical analysis by Dr. J. H. Parks, Jr. of the University of Minnesota are also gratefully acknowledged.

Gratitude is extended to NASA/Langley Research Center for their technical guidance, under the program technical direction of Mr. L. Keafer and direct assistance from Messrs. J. Dodgen, R. Davis and H. Curfman, as well as the many people within their organization.

CONTENTS

	Page
SUMMARY	1
INTRODUCTION	3
PROFILE STATISTICS	4
Selection of Sets and Subsets	5
Diurnal Effects	9
Seasonal Effects	9
Seasonal/Latitudinal Effects	11
Latitude Effects	11
Longitude Effects	15
Temperature Identifiers	15
Lapse Rate from 500 mb to Tropopause	23
Lapse Rate from Tropopause to 10 mb	23
Lapse Rate from 10 mb to Stratopause	23
Land/Sea	23
Circulation Regimes	27
Reference Subset	27
Results	28
Diurnal Effects	28
Seasonal Effects	28
Seasonal Effects with Latitude	28
Latitude Effects	37
Longitude Effects	37
Tropopause Temperature	37
10 Millibar Temperature	37
Stratopause Temperature	43
Lapse Rates	43
Conclusions	43
EMPIRICAL CURVE FITTING	48
Identification of Functions	48
Curve-Fitting Techniques	52
Mathematical Background	53
The Linear-Programming Approach (Tchebychev Approximation)	54
The Differential Correction Approach (Least Squares)	58
Comparison of the Methods of Linear Programming and Differential Corrections	61
Functions Investigated	62
Function 1	62
Function 2	65
Function 3	72
Function 5 and 6	75

Function 7 75
Functions 8-16 87
Functions 17-23 95
Results of Fitting Twenty Profiles 99
Conclusions and Recommendations 103

PHENOMONOLOGICAL CURVE FITTING 119

Conclusions 129

CONCLUDING REMARKS 130

APPENDIX A PROFILE STATISTICS

APPENDIX B POLYNOMIAL FUNCTION FITTED TO 20 RADIANCE PROFILES

APPENDIX C TRIGONOMETRIC FUNCTION FITTED TO 20 RADIANCE PROFILES

ILLUSTRATIONS

Figure		Page
1	Input Data Locations	6
2	Diurnal Effects Subsets	10
3	Seasonal Effects Subsets	12
4	Latitude/Season Effects Subsets	14
5	Latitude Effects Subsets	16
6	Longitude/Season Effects Subsets	17
7	Longitude Effects Subsets	18
8	Mean Radiance Versus Tangent Height, Diurnal Subsets	29
9	Mean Radiance Versus Tangent Height, Seasonal Subsets	30
10	Radiance Standard Deviation Versus Tangent Height Seasonal Subsets	31
11	Mean Radiance Versus Tangent Height Season/Latitude Subsets	32
12	Mean Radiance Versus Tangent Height, Seasonal Effects at Low Altitude	33
13	Radiance Standard Deviation Versus Tangent Height Season/Latitude Subset	34
14	Mean Radiance Versus Tangent Height, Seasonal Effects at Middle Latitudes	35
15	Mean Radiance Versus Tangent Height, Seasonal Effects at High Latitudes	36
16	Mean Radiance Versus Tangent Height, Latitude Subsets	38
17	Radiance Standard Deviation Versus Tangent Height, Latitude Subsets	39
18	Mean Radiance Versus Tangent Height, Longitude Subsets	40
19	Radiance Standard Deviation Versus Tangent Height, Tropopause Temperature Subsets	41

20	Mean Radiance Versus Tangent Height, 10 mb Temperature Subsets	42
21	Mean Radiance Versus Tangent Height, Stratopause Temperature Sheets	44
22	Mean Radiance Versus Tangent Height, 500 mb/ Tropopause Lapse Rate Subsets	45
23	Mean Radiance Versus Tangent Height, 500 mb/ Stratopause Lapse Rate Subsets	46
24	Radiance Standard Deviation Versus Tangent Height, Tropopause/10 mb Lapse Rate Subsets	47
25	Speed-Torque Curve Resembling a Radiance Profile	66
26	Atmospheric Models A, B, C and D (Radiance versus Altitude, 14.29 to 16.0 Microns)	67
27	Atmospheric Models E, F, G and H (Radiance versus Altitude, 14.29 to 16.0 Microns)	68
28	Curve Fit, Function 2	69
29	Coefficient Variation Over Tangent Height Regions, Function 2	70
30	Ratio of Two Polynomials Curve Fit, Profile No. 843	73
31	Ratio of Two Polynomials Curve Fit, Profile No. 1023	74
32	Curve Fit Results for Function 4, Wark's Atmosphere A	76
33	Curve Fit Results for Function 4, Wark's Atmosphere F	77
34	Synthesized Waveform from Radiance Profile	80
35	Trigonometric Series Curve Fit to Profile 1023	81
36	Trigonometric Series Curve Fit to Profile 843	82
37	Residual, $N_{calc.} - N_{meas.}$ versus Tangent Height Radiance Profile No. 843	83
38	Residual, $N_{calc.} - N_{meas.}$, versus Tangent Height Radiance Profile No. 1023	84
39	Log N versus h, Mean of 839 Profiles	85
40	Log N versus Log h, Mean of 839 Profiles	86

41	Radiance, N. versus Reciprocal of Tangent Height, h, for Mean of 839 Profiles	88
42	$\frac{h}{N}$ versus h for Mean of 839 Profiles	89
43	Log $\frac{\Delta N}{\Delta h}$ versus h for Mean of 839 Profiles	90
44	Log $\frac{\Delta N}{\Delta h}$ versus Log h for Mean of 839 Profiles	91
45	Log $\frac{\Delta^2 N}{\Delta h^2}$ versus h for Mean of 839 Profiles	92
46	Log $\frac{\Delta^2 \text{Log } N}{\Delta h^2}$ versus h for Mean of 839 Profiles	93
47	$\frac{N_k+2}{N_k}$ versus $\frac{N_{k+1}}{N_k}$ for Wark's Profile A	94
48	Plot of Integral of Radiance versus Tangent Height	95
49	Typical Amplitude Response of Second Order Linear System	97
50	Typical Phase Angle for Second Order Linear System	98
51	Curve Fit Results Comparison, Profile No. 843	101
52	Curve Fit Results Comparison, Profile No. 1023	102
53	C_o versus Latitude for Each Season	104
54	C_1 versus Latitude for Each Season	105
55	C_2 versus Latitude for Each Season	106
56	C_3 versus Latitude for Each Season	107
57	C_4 versus Latitude for Each Season	108
58	C_5 versus Latitude for Each Season	109
59	D_4 versus Latitude for Each Season	110
60	D_6 versus Latitude for Each Season	111
61	D_8 versus Latitude for Each Season	112
62	A_1 versus Latitude for Each Season	113
63	A_3 versus Latitude for Each Season	114

64	A_5 versus Latitude for Each Season	115
65	A_7 versus Latitude for Each Season	116
66	A_9 versus Latitude for Each Season	117
67	Comparison of Estimated Horizon Radiance Profile Calculated by Honeywell Profile Synthesizer Program for Climatological Temperature Profile No. 8	122
68	Effective Emission Altitude as a Function of Tangent Height	123
69	Variation of $[1-\tau(h)]$ with Tangent Height for the Standard Atmosphere and Climatological Temperature Profiles Nos. 5 and 15	126
70	Correlation of $[1-\tau(h)]$ at 30 km Tangent Height with the Height of 10 mb Surface	127
71	Comparison of Computed and Estimated Horizon Radiance (615 cm^{-1} to 715 cm^{-1}) Profiles for Climatological Profile No. 15 (July, 75°N, 90°W)	128

TABLES

Table		Page
1	Profile Analyzer Statistics Subsets	7
2	Space Groupings - Latitude Only Synoptic Profiles	13
3	Number of Profiles in Various Latitude Bands	13
4	10 MB Temperature Distribution	19
5	Atmospheric Identifier Subsets	20
6	Tropopause Temperature Distribution	21
7	Stratopause Temperature Distribution	22
8	500 MB/Tropopause Lapse Rate Distribution	24
9	Tropopause/10 MB Lapse Rate Distribution	25
10	10 MB/Stratopause Lapse Rate Distribution	26
11	Data Transformations	51
12	Successive Differences	52
13	Functions Identified for Empirical Curve Fitting	63
14	Variation of Coefficients, Function 2	71
15	Function 4 Curve Fit Maximum Residuals	78
16	Maximum Residual Magnitude for Twenty Profiles	100
17	h' as a Function of Tangent Height h for the Standard Atmosphere	124

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SUMMARY

Three approaches were used in this study to determine significant variations in the complete horizon-radiance profile caused by variations in geographical, temporal, and meteorological conditions.

In the statistical approach, mean value and standard deviation of radiance and normalized radiance were calculated over 99 different subsets selected from the population of 839 synthesized radiance profiles covering four seasons and the Northern Hemisphere over longitudes from 60°W to 165°W. The other approach was curve fitting in which there was a dual objective. First, the existence of a closed form function of only tangent height for use in accurate calculations of radiance profiles was determined. The functions of interest were those in which the coefficients (including exponents, if any) exhibited systematic behavior with time and space. Radiance profiles then could be synthesized independently of meteorological input data, and the coefficients could be analyzed to quantitatively determine profile variations. The second curve fitting objective was to determine a simple closed form function of only a few key atmospheric variables also for use in accurate radiance profile calculations. This would reduce the present dependence on extensive meteorological input data. Also, insight may be gained in the inverse problem of determining the magnitude of key atmospheric parameters from radiance profiles.

In profile statistics studies, the expected systematic behavior of the complete profile with season and latitude was observed. In addition, a significant new result was obtained; the nearly linear variation of radiance (at a given tangent height) with temperature at the 10 mb altitude. This fact could be pursued to possibly obtain a simple and fairly accurate method of calculating radiance profiles with only the 10 mb temperature as input data.

The two approaches to curve fitting, empirical and phenomenological, each resulted in equations capable of achieving accuracies of from two percent to six percent in calculating radiance profiles with a possibility of obtaining one percent accuracy. In the phenomenological approach, four coefficients are required with the independent variables being temperature as a function of tangent height and the 10 mb altitude. A trigonometric series with five coefficients, in which the five coefficients exhibited systematic behavior with time and space, produced an accuracy of five percent of peak radiance with

the possibility of reaching an accuracy of one percent with the addition of only one more term. The systematic behavior of the coefficients is very significant, suggesting that the coefficients could be formulated with respect to time and space, leading to an equation for the radiance profile which would be independent of meteorological input data; radiance would then be a function of only three variables; tangent height, time, and location.

INTRODUCTION

Definition of the Earth's horizon radiance profile in the 15μ carbon dioxide absorption band requires knowledge of the variations of the profile over the Earth's surface and over time. The purpose of this study was to determine the effects of any factors which cause significant changes in the magnitude and shape of the profiles. Effects of these factors, such as latitude, longitude, and time, must be displayed, undistorted, over the entire tangent height range of the horizon radiance profiles.

Previous investigations have been severely limited due to the lack of a comprehensive body of data. During this study, a total of 839 different radiance profiles were used to define 99 separate subsets. Statistical variations of all the subsets were calculated to determine the effects of various temporal, spatial, and atmospheric phenomena variations.

Two separate analysis efforts were used in the study to accomplish the profile variations description. The first analysis effort was to calculate the statistical parameters and extremes of each set of radiance profiles as a function of tangent height. These data separate the effects of each of the pertinent factors so that each may be assessed independently.

The second analysis effort determined, by curve fitting, a closed form function which adequately fits the radiance profiles. Coefficients and exponents of the closed form function were then analyzed to determine their spatial and temporal variations. Two approaches were used to determine the closed form function.

In one approach, the physics of the problem were used as a basis in determining key atmospheric parameters. A functional relationship was found between these key parameters and the radiance profile. This relationship became the independent variable in describing the profile. A selected set of conditions was then used to calculate several radiance profiles by both the closed form phenomenological function and by a numerical integration program. Thus, estimates of the accuracy of the closed form over a variety of conditions were obtained.

In the other approach, the objective was to empirically determine a closed form function of only one independent variable, tangent height. The selection of functions was based on standard curve fitting techniques, e. g., various polynomial forms from knowledge of different functional forms which result in curves resembling a radiance profile, and on the technique of plotting particular characteristics of radiance versus tangent height by transformation of variables until a recognizable form is obtained.

The functions representing the best compromise between simplicity and accuracy of fit were fitted to 20 of the climatological radiance profiles representing five latitudes and four seasons, and the coefficients were examined to determine their variation.

PROFILE STATISTICS

To determine variations in the magnitude and shape of the Earth's 15μ CO_2 band, horizon radiance profiles resulting from systematic perturbations in geographical, temporal, and meteorological conditions, mean value and standard deviation of radiance and normalized radiance were calculated over 99 different subsets selected from a population of 839 synthesized radiance profiles. These profiles covered one year in time and the Northern hemisphere over longitudes from 60°W to 165°W. Each of the available synthesized profiles was identified by 12 different identifiers which describe the time, location, and meteorological and atmospheric conditions of the input data from which the profiles were synthesized. These identifiers were examined to determine the range and distribution of their magnitudes to provide a basis for grouping the profiles into subsets for calculation of statistics. All profiles associated with a particular value (or values) of an identifier comprised one subset. Within each subset, values of all the other identifers vary, but effects of these other variations are averaged out when the subset consists of a sufficiently large sample. Differences between mean and standard deviation among like subsets is then caused only by the systematic differences in the identifier magnitudes which define the subsets.

Because of the nature of the input data, it was sometimes necessary to average over a number of values of the factor of interest in order to obtain a significant sample size, and, on occasion, the sample size even then was small as shown in the discussion of the subsets.

The factors and/or effects examined are listed below, together with the applicable identifier mentioned above:

1. Diurnal effects (local time, identifier 4)
   a. overall
   b. varying seasons and latitudes
2. Seasonal effects (date, identifier 3)
   a. over latitude
   b. over longitude
   c. overall
3. Latitude effects (latitude, identifier 1)
4. Longitude effects (longitude, identifier 2)
5. Atmospheric identifier effects (identifiers 6 to 12, respectively)
   a. 10 mb temperature
   b. tropopause temperature
   c. stratopause temperature
   d. 500 mb to tropopause lapse rate

e. tropopause to 10 mb lapse rate
f. 10 mb to stratopause lapse rate
g. circulation regime

6. Topographical effects (topography, identifier 5)

SELECTION OF SETS AND SUBSETS

The times and locations for which input data was available and from which sets and subsets were determined is summarized below for complete understanding of the selection process. Table 1 contains a list of all 99 subsets selected.

Case 1 - Cape Kennedy Cross Section. -- Soundings began at 1200 GMT March 1, 1964, with three-day resolution for one year.

Case 2 - Fort Churchill Cross Section. -- Soundings began at 1200 GMT October 1, 1964, with three-day resolution with the last sounding at 1200 GMT February 13, 1965.

Case 3 - Cape Kennedy Cross Section. -- Soundings began at 0000 GMT May 21, 1964, with 12-hour resolution with the last sounding at 1200 GMT May 28, 1964.

Case 4 - White Sands Cross Section. -- Soundings began at 0000 GMT November 18, 1964, with 12-hour resolution with the last sounding at 1200 GMT November 25, 1964.

Case 5 - Cape Kennedy Cross Section. -- Soundings began at 0000 GMT December 7, 1964, with 12-hour resolution with the last sounding at 1200 GMT December 10, 1964.

Case 6 - Cape Kennedy Cross Section. -- Soundings began at 0000 GMT February 8, 1965, with 12-hour resolution with the last sounding at 1200 GMT February 17, 1965.

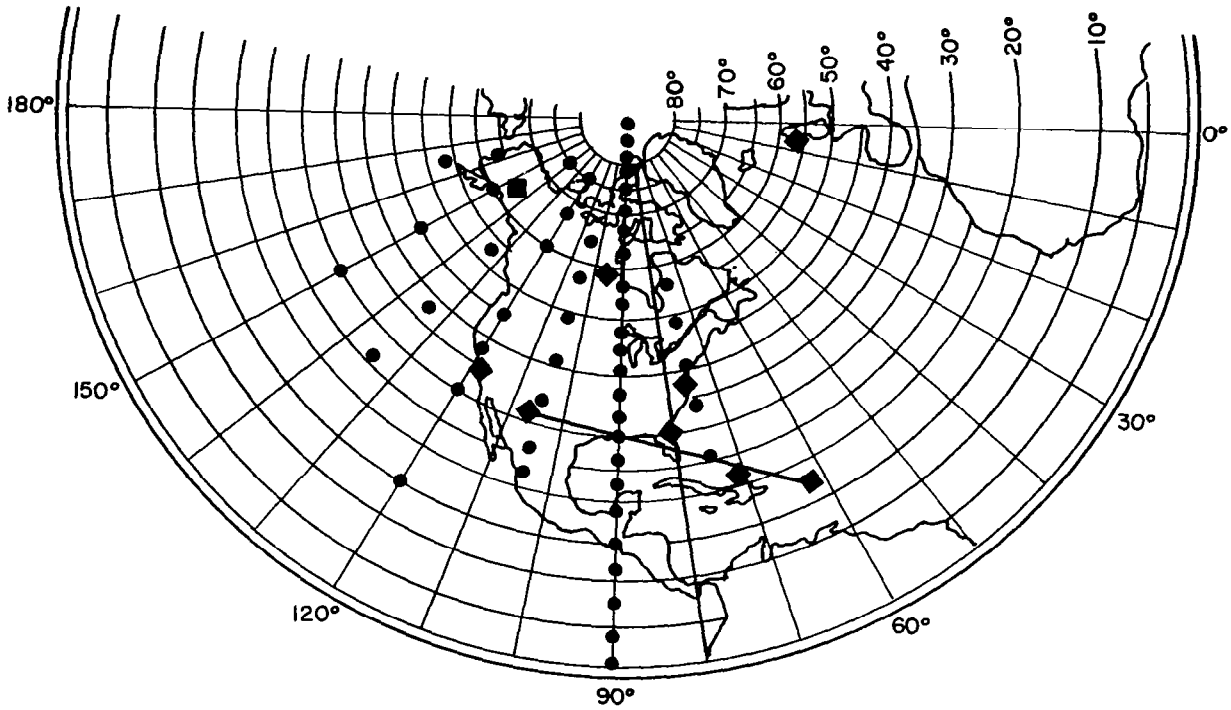
Case 7 - White Sands Missile Range (WSMR) Cross Section. -- Soundings began at 0000 GMT February 7, 1964 with four-hour resolution with the last sounding at 2000 GMT February 9, 1964.

Case 8 - Fort Churchill Cross Section. -- Soundings began at 1200 GMT March 1, 1965, with 24-hour resolution with last sounding at 1200 GMT March 31, 1965.

Case 9 - Synoptic Data. -- Fifty-six locations, as shown on Figure 1, for each of the following dates at 1200 GMT.

April 8, 1964	November 13, 1964
June 3, 1964	December 9, 1964
August 12, 1964	January 20, 1964
October 21, 1964	February 10, 1965

Case 10 - White Sands to Antigua Cross Section. -- Fifty-seven locations, approximately one degree apart from White Sands to Antigua, as on Figure 1 for both October 28, 1964 and February 24, 1964.



◆ MRN stations, cases 1 - 8

● Synoptic, case 9

—— White Sands to Antigua section, case 10

Figure 1. Input Data Locations

TABLE 1. - PROFILE ANALYZER STATISTICS SUBSETS

Subset no.		No. of profiles	Remarks
1	Cape Kennedy spring day	8	7 P.M. local time, 5/21 - 5/28/64
2	Cape Kennedy spring night	8	7 A.M. local time
3	Cape Kennedy winter day	10	7 P.M. local time, 12/7 - 12/10/64
4	Cape Kennedy winter night	10	7 A.M. local time, 2/8 - 2/17/65
5	White Sands fall day	8	4 P.M. local time, 11/18 - 11/25/64
6	White Sands fall night	8	4 A.M. local time
7	Overall diurnal day	26	Subsets 1, 3, and 5 averaged
8	Overall diurnal night	26	Subsets 2, 4, and 6
9	Cape Kennedy spring	31	Cape Kennedy 1 year cross section, 7 A.M. local time, every 3 days
10	Cape Kennedy summer	31	
11	Cape Kennedy fall	30	
12	Cape Kennedy winter	30	
13	Fort Churchill fall	21	6 A.M. local time, 11/1/64
14	Fort Churchill winter	25	2/13/65 every 3 days
15	Cape Kennedy May	16	Subsets 1 and 2, end of spring
16	Cape Kennedy February	20	Subsets 3 and 4
17	Season 1 spring	47	Subsets 9, 15
18	Season 1 summer	31	Subset 10
19	Season 1 fall	51	Subsets 11, 13
20	Season 1 winter	75	Subsets 12, 14, 16
21	Space cross section fall	57	10/28/64 White Sands to Antigua
22	Space cross section winter	57	2/24/64 White Sands to Antigua
23	Synoptic 0 lat 30 spring	16	4/8/64
24	Synoptic 0 lat 30 summer	32	6/3/64, 8/12/64
25	Synoptic 0 lat 30 fall	32	10/21/64, 11/13/64
26	Synoptic 0 lat 30 winter	48	12/9/64, 1/20/65, 2/10/65
27	Synoptic 31 lat 59 spring	22	
28	Synoptic 31 lat 59 summer	44	Latitude limits are
29	Synoptic 31 lat 59 fall	44	inclusive
30	Synoptic 31 lat 59 winter	66	
31	Synoptic 60 lat 90 spring	18	
32	Synoptic 60 lat 90 summer	36	
33	Synoptic 60 lat 90 fall	36	
34	Synoptic 60 lat 90 winter	54	
35	Synoptic spring	56	
36	Synoptic summer	112	
37	Synoptic fall	112	
38	Synoptic winter	168	
39	Synoptic 0 lat 15	24	
40	Synoptic 16 lat 30	80	
41	Synoptic 31 lat 45	96	
42	Synoptic 46 lat 59	101	
43	Synoptic 60 lat 75	83	
44	Synoptic 75 lat 90	64	
45	Synoptic spring 165 longitude 135	9	
46	Synoptic spring 120 longitude 105	14	
47	Synoptic spring 90 longitude 90	24	
48	Synoptic spring 75 longitude 60	9	
49	Synoptic summer 165 longitude 135	18	
50	Synoptic summer 120 longitude 105	28	

TABLE 1. - PROFILE ANALYZER STATISTICS SUBSET - Concluded

Subset no.		No. of profiles	Remarks
51	Synoptic summer 90 longitude 90	48	
52	Synoptic summer 75 longitude 60	18	
53	Synoptic fall 165 longitude 135	18	
54	Synoptic fall 120 longitude 105	28	
55	Synoptic fall 90 longitude 90	48	
56	Synoptic fall 75 longitude 60	18	
57	Synoptic winter 165 longitude 135	27	
58	Synoptic winter 120 longitude 105	42	
59	Synoptic winter 90 longitude 60	72	
60	Synoptic winter 75 longitude 60	27	
61	Synoptic 165 longitude 135	72	
62	Synoptic 120 longitude 105	112	
63	Synoptic 90 longitude 90	192	
64	Synoptic 75 longitude 60	72	
65	Atmos ID 6 197 T10mb 202	16	Population from which samples
66	Atmos ID 6 208 T10mb 212	25	are taken for all atmopsheric
67	Atmos ID 6 218 T10mb 222	81	identifiers excludes only the
68	Atmos ID 6 228 T10mb 232	285	climatological data
69	Atmos ID 6 238 T10mb 242	45	
70	Atmos ID 7 194 TTrop 196	66	
71	Atmos ID 7 204 TTrop 206	103	
72	Atmos ID 7 214 TTrop 216	49	
73	Atmos ID 7 224 TTrop 226	47	
74	Atmos ID 8 253 TStrat 255	19	
75	Atmos ID 8 263 TStrat 265	68	
76	Atmos ID 8 273 TStrat 275	167	
77	Atmos ID 8 283 TStrat 285	46	
78	Atmos ID 9 -8.4 LR 500 mb/Trop -7.5	41	
79	Atmos ID 9 -6.4 LR 500 mb/Trop -5.5	326	
80	Atmos ID 9 -4.4 LR 500 mb/Trop -3.5	80	
81	Atmos ID 9 -2.4 LR 500 mb/Trop -1.5	28	
82	Atmos ID 10 0.5 LR Trop/10mb 0.7	73	
83	Atmos ID 10 1.1 LR Trop/10mb 1.3	51	
84	Atmos ID 10 1.7 LR Trop/10mb 1.9	95	
85	Atmos ID 10 2.3 LR Trop/10mb 2.5	91	
86	Atmos ID 11 1.5 LR 10mb/Strat 1.7	22	
87	Atmos ID 11 2.3 LR 10mb/Strat 2.5	178	
88	Atmos ID 11 3.1 LR 10mb/Strat 3.3	109	
89	Atmos ID 11 3.8 LR 10mb/Strat 4.2	16	
90	839 profiles	839	
91	Sea	286	
92	Land 1	529	Surface height = 0 - 2 km
93	Land 2	24	Surface height = > 2 km
94	Circulation: no feature	268	
95	Circulation: jet	183	
96	Circulation: trough	174	
97	Circulation: ridge	147	
98	Circulation: jet and trough	56	
99	Circulation: jet and ridge	11	

Diurnal Effects

Examination of the times and locations of profiles shows that diurnal effects can only be determined from a relatively limited number of cases. However, some estimate of the variation of diurnal effects with season and latitude can be made. The following groups are suggested by the data.

(1)	Case 3, May	8 day, 8 night	Cape Kennedy
(2)	Case 6, February	10 day, 10 night	Cape Kennedy
(3)	Case 4, November	8 day, 8 night	White Sands
(4)	Overall: cases 3, 6, 4	26 day, 26 night	

Sets and subsets used are shown in Figure 2.

Seasonal Effects

The high-resolution Cape Kennedy and Fort Churchill profiles were used to obtain seasonal estimates with latitude and longitude fixed. The following groupings are suggested by the data.

Seasonal; low latitude effects, longitude fixed. --

Case 1:-- 122 profiles from March 1 to March 1, group by season.

• Group 1	March, April, May	31 profiles	Cape Kennedy
• Group 2	June, July, August	31 profiles	
• Group 3	Sept., Oct., Nov.	30 profiles	
• Group 4	Dec., Jan., Feb.	30 profiles	

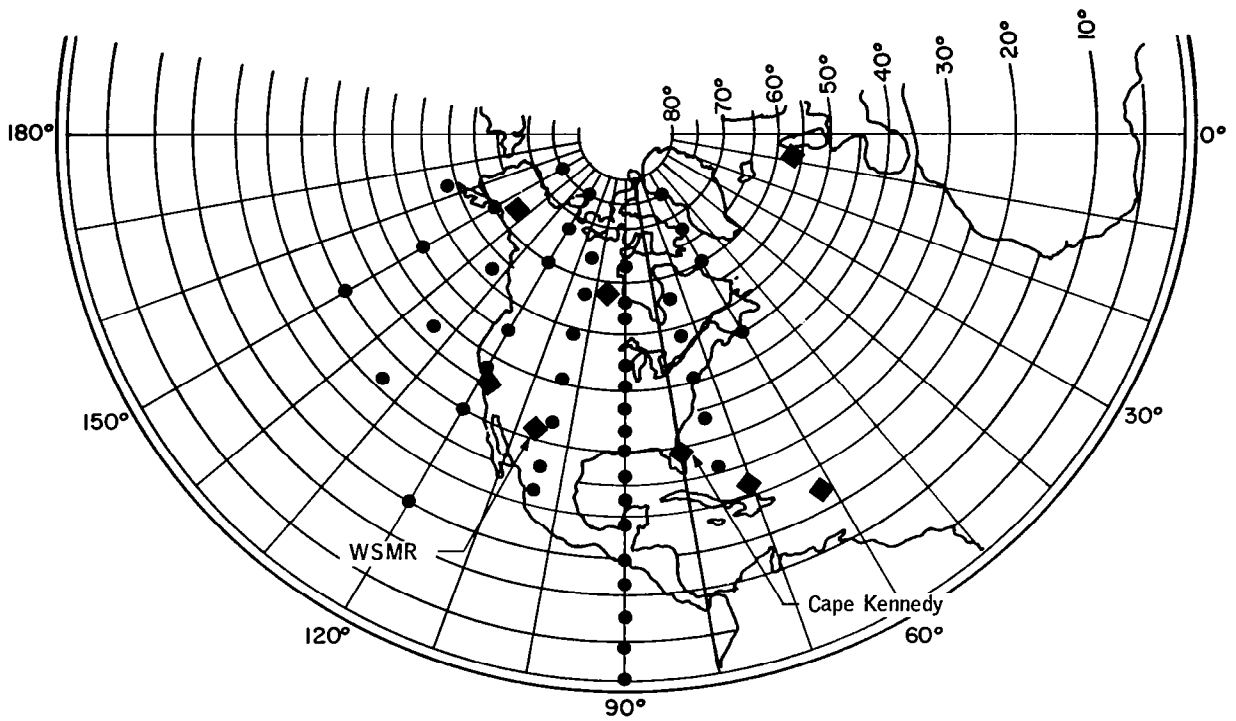
Case 3:-- 16 profiles, May, Cape Kennedy - check on group 1, case 1 above.

Case 6:-- 20 profiles, February, Cape Kennedy - check on group 4, case 1 above.

Seasonal; high latitude effects, longitude fixed. --

Case 2:-- 46 profiles, October to February 15, every three days

• Group 1	----	Fort Churchill
• Group 2	----	
• Group 3	Oct., November	
• Group 4	Dec., Jan., Feb.	



Subset no.	Identification		No. of profiles	Remarks
1	Cape Kennedy,	spring day	8	7 PM local time 5/21 - 5/28/64
2	Cape Kennedy,	spring night	8	7 AM local time
3	Cape Kennedy,	winter day	10	7 PM local time 12/7 - 12/24/64
4	Cape Kennedy,	winter night	10	7 AM local time 2/8 - 2/17/65
5	White Sands,	fall day	8	4 PM local time 11/18 - 11/25/64
6	White Sands,	fall night	8	4 AM local time
7	Overall diurnal	day	26	Subsets 1,3 and 5 averaged
8	Overall diurnal	night	26	Subsets 2,4 and 6 averaged

Figure 2. Diurnal Effects Subsets

Seasonal; high and low latitudes combined. --

Cases 1, 2, 3, and 6 grouped:

- Group 1 March - May
- Group 2 June - August
- Group 3 September - November
- Group 4 December - February

Seasonal; low latitudes, latitude and longitude varying. --

Case 10: 57 profiles varying from 32.4°N, 106.6°W to 17.2°N, 61.8° at two times, October 28 and February 24, 1964.

- Group 1 ----
- Group 2 ----
- Group 3 October 28
- Group 4 February 24

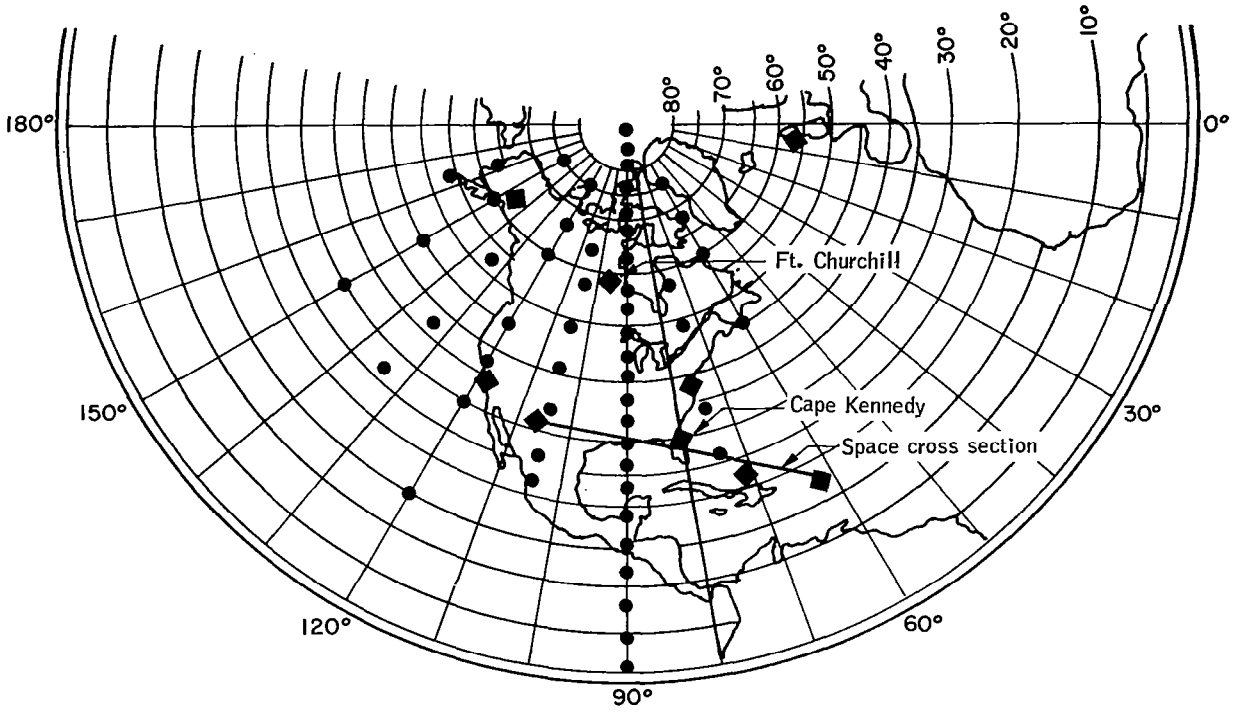
Subsets based on the above groups are shown in Figure 3.

Seasonal/Latitudinal Effects

Synoptic data were grouped into season and latitude sets, averaged over longitude. To determine latitude bands giving significant sample size, a listing of profiles by latitude was prepared as shown in Table 2. From this table, histograms for various latitude bands were determined as in Table 3. The band size given includes the lower limit but excludes the upper limit, e.g., band size from 15° to 30° includes all profiles from and including 15° to but excluding 30°. Thirty degree bands are necessary to obtain a significant sample size, and the sample size for each band is more nearly constant by using slightly more or less than 30 degrees as shown in the last two columns of Table 3. Subsets selected are shown in Figure 4..

Latitude Effects

Certain of the latitude effects are obtained, obviously, with certain of the above subsets. To obtain an overall latitude effect, with nothing else held constant, the synoptic profiles were grouped by latitude with season varying as shown in the set below.



Subset no.	Identification		No. of profiles	Remarks
9	Cape Kennedy,	spring	31	Cape Kennedy 1 year cross section, 7 AM local time, every 3 days
10	Cape Kennedy,	summer	31	
11	Cape Kennedy,	fall	30	
12	Cape Kennedy,	winter	30	
13	Ft. Churchill,	fall	21	6 AM local time, 11/1/64 through 2/13/65 every 3 days
14	Ft. Churchill,	winter	25	
15	Cape Kennedy,	May	16	Subsets 1 and 2, end of spring
16	Cape Kennedy,	Feb.	20	Subsets 3 and 4
17	Season 1,	spring	47	Subsets 9 and 15
18	Season 1,	summer	31	Subset 10
19	Season 1,	fall	51	Subsets 11 and 13
20	Season 1,	winter	75	Subsets 12, 14 and 16
21	Space cross section,	fall	57	10/28/64 White sands to antigua
22	Space cross section,	winter	57	2/24/64 White sands to antigua

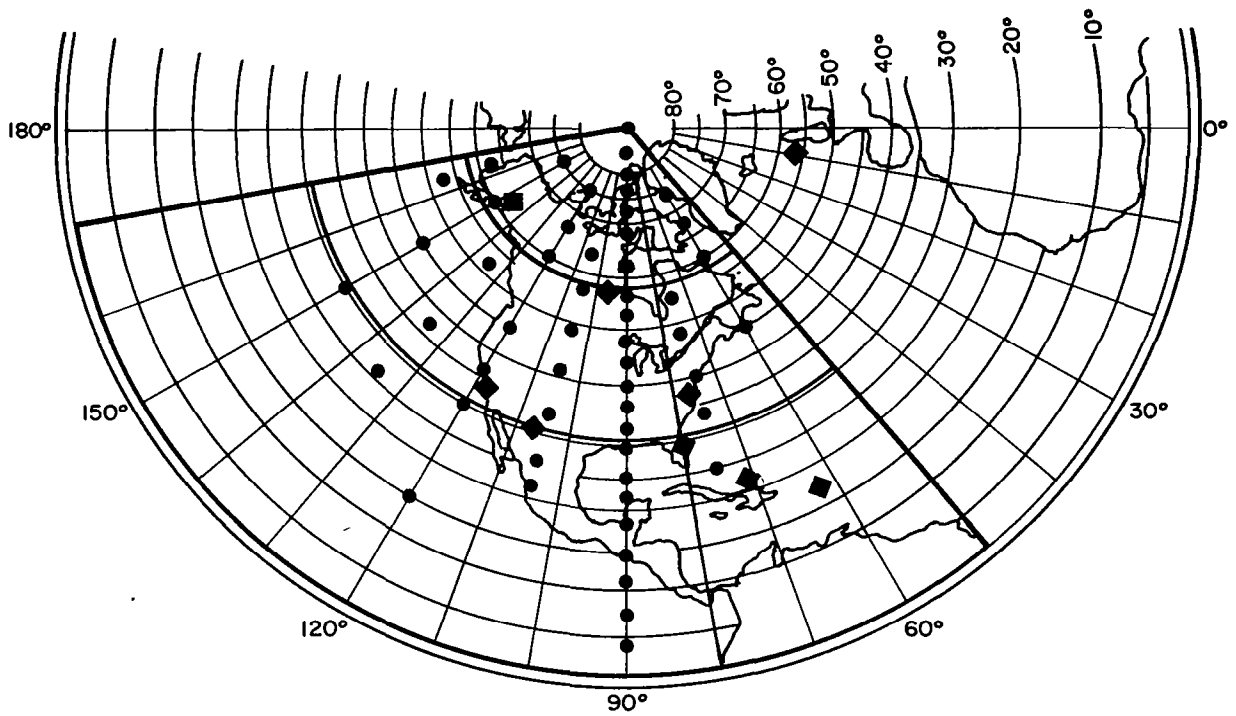
Figure 3. Seasonal Effects Subsets

TABLE 2.- SPACE GROUPINGS - LATITUDE ONLY, SYNOPTIC PROFILES

Lat	Long.	Lat	Long.	Lat	Long.	Lat	Long.	Lat	Long.
0	90	26.25	135	41.25	105	56.25	90	75	150
3.75	90	30	150	45	150	56.25	105	75	120
7.5	90	30	120	45	120	60	150	75	90
11.25	90	30	90	45	90	60	120	75	60
15	90	33.75	75	45	60	60	60	78.75	90
15	120	33.75	90	48.75	75	63.75	90	82.5	90
18.75	90	33.75	105	48.75	90	63.75	105	86.25	90
22.5	90	37.5	135	48.75	105	63.75	165	90	
22.5	105	37.5	120	52.5	165	67.5	120		
26.75	90	37.5	90	52.5	135	67.5	90		
26.75	75	41.25	90	52.5	90	67.5	60		
26.75	105	41.25	75	56.25	75	71.25	90		

TABLE 3.- NUMBER OF PROFILES IN VARIOUS LATITUDE BANDS

Lat	No. of profiles	Lat	No. of profiles	Lat	No. of profiles	Lat	No. of profiles	Lat	No. of profiles
0-5	2	0-10	2	0-15	3	0-30	13	0-31	16
5-10	0								
10-15	1	10-20	4						
15-20	3			15-30	10				
20-25	3	20-30	7						
25-30	4								
30-35	6	30-40	9	30-45	12	30-60	25	31-59	22
35-40	3								
40-45	3	40-50	10						
45-50	7			45-60	13				
50-55	3	50-60	6						
55-60	3								
60-65	6	60-70	9	60-75	10	60-90	11	59-90	18
65-70	3								
70-75	1	70-80	6						
75-80	5			75-90	8				
80-85	1	80-90	3						
85-90	2								



Subset no.	Identification	No. of profiles	Remarks
23	Synoptic 0 Lat 30 spring	16	4/8/64
24	Synoptic 0 Lat 30 summer	32	6/3/64, 8/12/64
25	Synoptic 0 Lat 30 fall	32	10/2/64, 11/13/64
26	Synoptic 0 Lat 30 winter	48	12/9/64, 1/20/65, 2/10/65
27	Synoptic 31 Lat 59 spring	22	Latitude limits are inclusive
28	Synoptic 31 Lat 59 summer	44	
29	Synoptic 31 Lat 59 fall	44	
30	Synoptic 31 Lat 59 winter	66	
31	Synoptic 60 Lat 90 spring	18	
32	Synoptic 60 Lat 90 summer	36	
33	Synoptic 60 Lat 90 fall	36	
34	Synoptic 60 Lat 90 winter	54	
35	Synoptic spring	56	
36	Synoptic summer	112	
37	Synoptic fall	112	
38	Synoptic winter	168	

Figure 4. Latitude/Season Effects Subsets

Latitude band	No. of profiles
$0 \leq L_1 < 15$	24
$15 \leq L_2 < 30$	80
$30 \leq L_3 < 45$	96
$45 \leq L_4 < 60$	104
$60 \leq L_5 < 75$	80
$75 \leq L_6 < 90$	64

Subsets selected are shown in Figure 5.

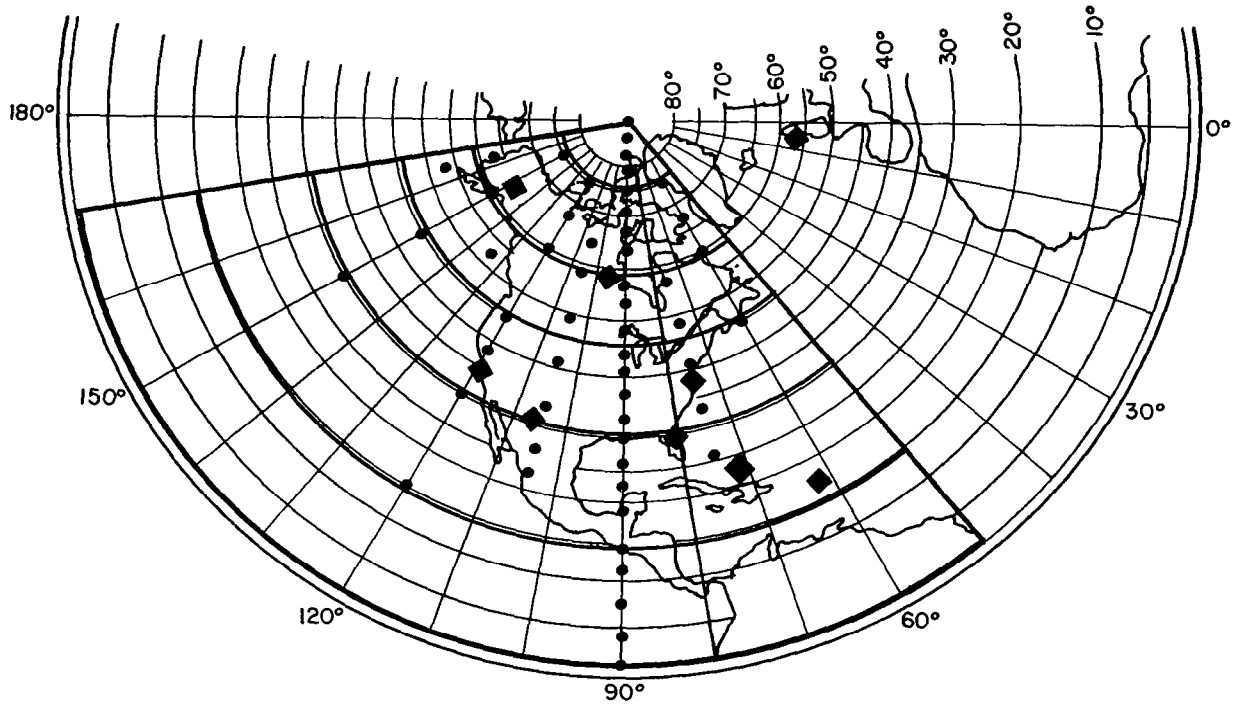
Longitude Effects

The synoptic data was broken down into longitude grouping by season, similar to the manner described above. Subsets selected are shown for longitudinal effects by season in Figure 6 and for overall longitude effects in Figure 7.

Temperature Identifiers

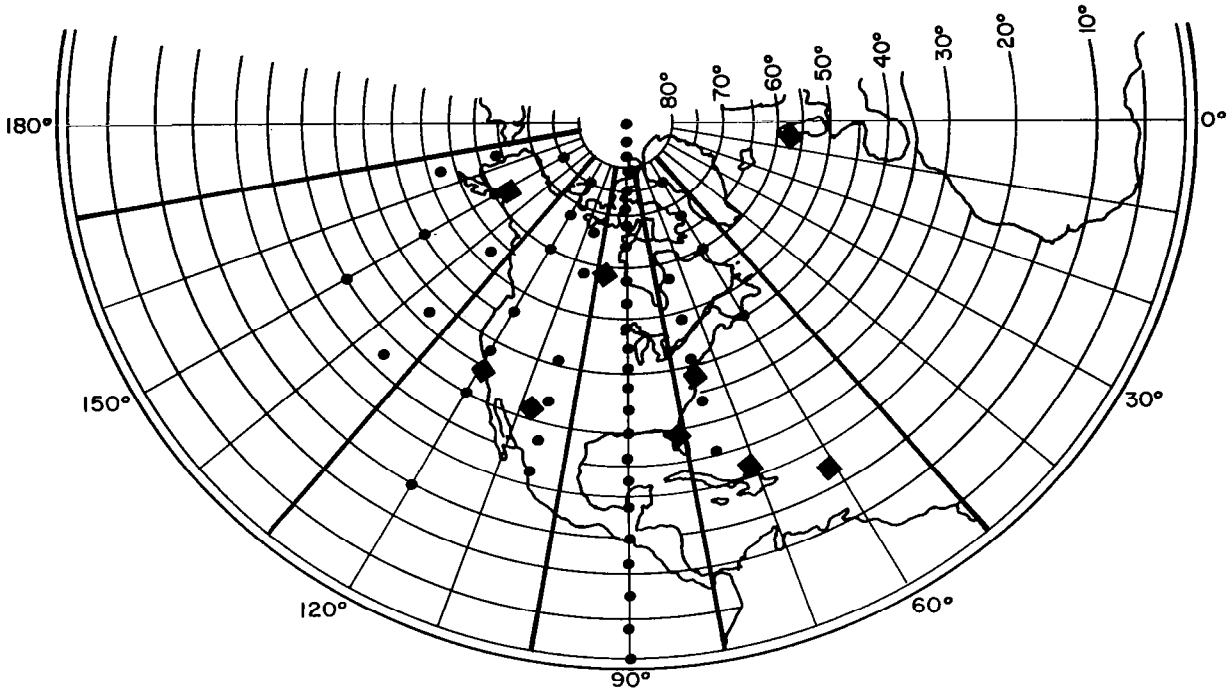
A histogram of 10 mb temperatures was prepared as shown in Table 4. The histogram showed that, to obtain a significant sample size, several temperatures must be used to make up one subset. It also showed that the temperatures are sufficiently distributed; thus, the temperature grouping selected can be relatively widely separated to enhance any effect which might exist. Also, because of the distribution and the desire to use the same number of temperatures in each subset for consistent content of subsets, the sample size varies considerably. The subsets selected (subset nos. 65 to 69) are shown in Table 4 along with the average temperature for that subset and in Table 5 which lists all atmospheric identifier subsets.

The same approach was used in selection of tropopause and stratopause temperature subsets. The applicable histogram for tropopause temperature and the selected subsets (subset nos. 70 to 73) are shown in Table 6 and listed in Table 1. Table 7 shows the applicable histogram and subsets (subset nos. 74 to 77) for stratopause temperature with subsets also listed in Table 1.



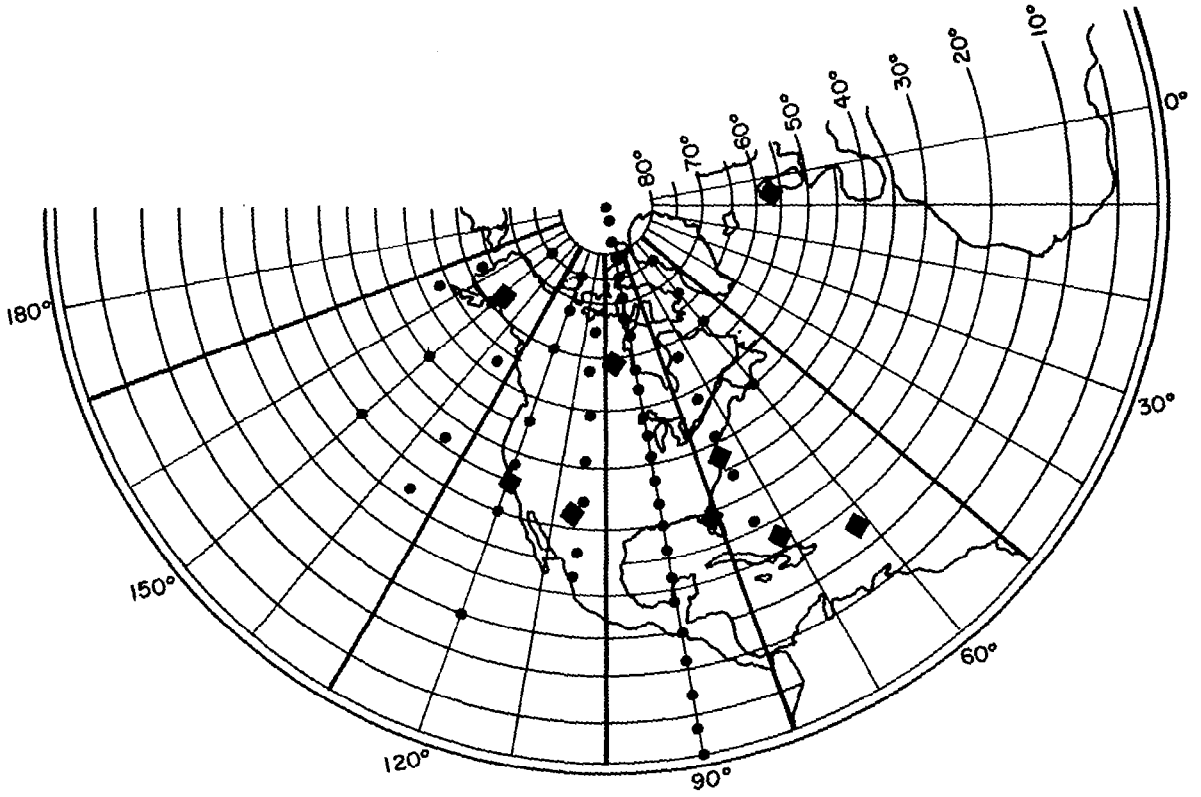
Subset no.	Identification	No. of profiles	Remarks
39	Synoptic 0 Lat 15	24	Latitude limits are inclusive
40	Synoptic 16 Lat 30	80	
41	Synoptic 31 Lat 45	90	
42	Synoptic 46 Lat 59	101	
43	Synoptic 60 Lat 75	83	
44	Synoptic 75 Lat 90	64	

Figure 5. Latitude/Effects Subsets



Subset no.	Identification	No. of profiles
45	Synoptic spring 165 long 135	9
46	Synoptic spring 120 long 105	14
47	Synoptic spring 90 long 90	24
48	Synoptic spring 75 long 60	9
49	Synoptic summer 165 long 135	18
50	Synoptic summer 120 long 105	28
51	Synoptic summer 90 long 90	48
52	Synoptic summer 75 long 60	18
53	Synoptic fall 165 long 135	18
54	Synoptic fall 120 long 105	28
55	Synoptic fall 90 long 90	48
56	Synoptic fall 75 long 65	18
57	Synoptic winter 165 long 135	27
58	Synoptic winter 120 long 105	42
59	Synoptic winter 90 long 90	72
60	Synoptic winter 75 long 60	27

Figure 6. Longitude/Season Effects Subsets



Subset no.	Identification	No. of profiles
61	Synoptic 165 long 135	72
62	Synoptic 120 long 105	112
63	Synoptic 90 long 90	192
64	Synoptic 75 long 60	72

Figure 7. Longitude/Effects Subsets

TABLE 4.-10 mb TEMPERATURE DISTRIBUTION

T 10 mb	No. of profiles		T 10mb	No. of profiles	
197	1		223	19	
198	2		224	10	
199	2	16 $\overline{T}$ = 200.4	225	18	
200	1		226	22	
201	5		227	37	
202	5		228	40	
203	1		229	53	
204	0		230	82	285 $\overline{T}$ = 230.0
205	3		231	60	
206	2		232	50	
207	4		233	63	
208	4		234	47	
209	2		235	31	
210	10	25 $\overline{T}$ = 210.2	236	40	
211	3		237	40	
212	6		238	25	
213	8		239	8	45 $\overline{T}$ = 238.8
214	7		240	8	
215	9		241	2	
216	11		242	2	
217	10		243	0	
218	19		244	0	
219	19		245	1	
220	14	81 $\overline{T}$ = 219.8			
221	14				
222	15				

TABLE 5.- ATMOSPHERIC IDENTIFIER SUBSETS

No.	Identification	No. of profiles	Remarks
65	ATMOS ID 6 197 T10 mb 202	16	Population from which samples are taken for all atmospheric identifiers excludes only the climatological data.
66	ATMOS ID 6 208 T10 mb 212	25	
67	ATMOS ID 6 218 T10 mb 222	81	
68	ATMOS ID 6 228 T10 mb 232	285	
69	ATMOS ID 6 238 T10 mb 242	45	
70	ATMOS ID 7 194 TT rop 196	66	
71	ATMOS ID 7 204 TT rop 206	103	
72	ATMOS ID 7 214 TT rop 216	49	
73	ATMOS ID 7 224 TT rop 226	47	
74	ATMOS ID 8 253 TStrat 255	19	
75	ATMOS ID 8 263 TStrat 265	68	
76	ATMOS ID 8 273 TStrat 275	167	
77	ATMOS ID 8 283 TStrat 285	46	
78	ATMOS ID 9 -8.4 LR 500 mb/Trop -7.5	41	
79	ATMOS ID 9 -6.4 LR 500 mb/Trop -5.5	326	
80	ATMOS ID 9 -4.4 LR 500 mb/Trop -3.5	80	
81	ATMOS ID 9 -2.4 LR 500 mb /Trop -1.5	28	
82	ATMOS ID 10 .5 LR Trop /10 mb .7	73	
83	ATMOS ID 10 1.1 LR Trop /10 mb 1.3	51	
84	ATMOS ID 10 1.7 LR Trop /10mb 1.9	95	
85	ATMOS ID 10 2.3 LR Trop /10mb 2.5	91	
86	ATMOS ID 11 1.5 LR 10 mb/Strat 1.7	22	
87	ATMOS ID 11 2.3 LR 10 mb/Strat 2.5	178	
88	ATMOS ID 11 3.1 LR 10 mb/Strat 3.3	109	
89	ATMOS ID 11 3.8 LR 10 mb/Strat 4.2	16	

TABLE 6.- TROPOPAUSE TEMPERATURE DISTRIBUTION

T TROP	No. of profiles			T Trop	No. of profiles		
192	2			213	28		
193	11			214	17		
194	29			215	15	49	$\overline{T}$ = 215.0
195	17	66	$\overline{T}$ = 194.9	216	17		
196	20			217	18		
197	21			218	31		
198	32			219	28		
199	32			220	25		
200	38			221	13		
201	42			222	22		
202	39			223	26		
203	45			224	18		
204	39			225	19	47	$\overline{T}$ = 224.6
205	38	103	$\overline{T}$ = 204.9	226	10		
206	26			227	7		
207	10			228	5		
208	24			229	1		
209	20			230	2		
210	18			231	0		
211	18			232	2		
212	13						

TABLE 7.- STRATOPAUSE TEMPERATURE DISTRIBUTION

T Strat	No. of profiles			T Strat	No. of profiles		
247	1			273	86		
248	0			274	35	167	$\overline{T}$ = 273.8
249	0			275	46		
250	0			276	37		
251	0			277	17		
252	1			278	41		
253	5			279	46		
254	2	19	$\overline{T}$ = 254.4	280	37		
255	12			281	38		
256	4			282	14		
257	7			283	23		
258	6			284	13	46	$\overline{T}$ = 283.7
259	3			285	10		
260	4			286	12		
261	7			287	9		
262	5			288	8		
263	20			289	5		
264	19	68	$\overline{T}$ = 264.1	290	4		
265	29			291	3		
266	14			292	1		
267	27			293	0		
268	45			294	0		
269	42			295	0		
270	46			296	0		
271	40			297	0		
272	19			298	0		
				299	0		
				300	1		

Lapse Rate from 500 mb to Tropopause

The approach discussed above was also used here. However the distribution necessitated including a larger number of lapse rates in each subset than the number of temperatures used above. The average lapse rates sought within the subsets were -8, -6, -4, and -2, but because of the distribution as shown in Table 8, the resulting averages were -7.85, -5.93, -4.06, and -1.93; therefore, the interval between the averages deviates slightly rather than being constant.

Subsets (nos. 78 to 81) are indicated in Table 8 and listed in Table 1.

Lapse Rate from Tropopause to 10 mb

The distribution shown in Table 9 contains negative lapse rates, some of which were questionable at the time of subset selection. The selection was consequently made without considering the negative lapse rates; sample sizes were considered to be sufficiently large such that omission of some profiles which might have erroneously been included under negative lapse rates would not affect the result. Later it was determined that there was no error in the negative lapse rates, but subsets had already been selected and the statistics calculated. It was decided not to include negative lapse rates in a special auxiliary run since qualitative estimates of the effect of this factor could be made with the subsets previously selected. Subsets (nos. 82 to 85) are indicated in Table 9 and listed in Table 1.

Lapse Rate from 10 mb to Stratopause

The approach used here was the same as for the other identifiers. The nature of the distribution necessitated one subset to be taken over a larger number of lapse rates than the other three, as shown in Table 10. Subsets (nos. 86 to 89) are also listed in Table 1.

Land/Sea

All input data were identified as belonging to one of three land/sea categories, which became three subsets, as listed below:

Subset No.	Characteristic
91	Sea
92	Land, surface height ≤ 0.5 km
93	Land, surface height > 2 km

TABLE 8. - 500 mb/TROPOPAUSE LAPSE RATE DISTRIBUTION

LR	No. of profiles		LR	No. of profiles		LR	No. of profiles	
-9.1	1		-6.0	23		-2.9	1	
-9.0	0		-5.9	30		-2.8	1	
-8.9	0		-5.8	40	326 $\overline{LR}$ = -5.93	-2.7	4	
-8.8	0		-5.7	37		-2.6	1	
-8.7	0		-5.6	41		-2.5	1	
-8.6	2		-5.5	30		-2.4	3	
-8.5	5		-5.4	23		-2.3	3	
-8.4	2		-5.3	28		-2.2	0	
-8.3	4		-5.2	19		-2.1	3	
-8.2	1		-5.1	21		-2.0	2	28 $\overline{LR}$ = -1.93
-8.1	3		-5.0	21		-1.9	4	
-8.0	1	41 $\overline{LR}$ = -7.85	-4.9	10		-1.8	6	
-7.9	8		-4.8	11		-1.7	2	
-7.8	4		-4.7	23		-1.6	4	
-7.7	6		-4.6	5		-1.5	1	
-7.6	9		-4.5	7		-1.4	0	
-7.5	3		-4.4	18		-1.3	1	
-7.4	15		-4.3	7		-1.2	3	
-7.3	9		-4.2	9		-1.1	0	
-7.2	3		-4.1	10		-1.0	2	
-7.1	11		-4.0	12	80 $\overline{LR}$ = -4.06	-0.9	3	
-7.0	4		-3.9	7		-0.8	0	
-6.9	18		-3.8	3		-0.7	0	
-6.8	21		-3.7	3		-0.6	0	
-6.7	14		-3.6	7		-0.5	0	
-6.6	38		-3.5	4		-0.4	0	
-6.5	16		-3.4	3		-0.3	1	
-6.4	34		-3.3	8		-0.2	0	
-6.3	34		-3.2	2		-0.1	0	
-6.2	27		-3.1	2		-0.0	2	
-6.1	30		-3.0	3		- 70	2	

TABLE 9.- TROPOPAUSE/10 mb LAPSE RATE DISTRIBUTION

LR	No. of profiles			LR	No. of profiles		
-1.4	1			1.6	17		
-1.3	0			1.7	30		
-1.2	0			1.8	35	95	$\overline{LR}$ = 1.80
-1.1	0			1.9	30		
-1.0	1			2.0	49		
- .9	3			2.1	56		
- .8	7			2.2	49		
- .7	3			2.3	30		
- .6	4			2.4	41	91	$\overline{LR}$ = 2.39
- .5	13			2.5	20		
- .4	8			2.6	27		
- .3	14			2.7	7		
-	22			2.8	10		
- .1	18			2.9			
- 0	32			3.0			
.1	26						
.2	22						
.3	20						
.4	28						
.5	24						
.6	26	73	$\overline{LR}$=0.60				
.7	23						
.8	9						
.9	12						
1.0	14						
1.1	13						
1.2	24	51	$\overline{LR}$ = 1.20				
1.3	14						
1.4	31						
1.5	10						

TABLE 10.- 10 mb/STRATOPAUSE LAPSE RATE DISTRIBUTION

LR	No. of profiles		LR	No. of profiles	
1.2	2		3.6	5	
1.3	1		3.7	7	
1.4	3		3.8	4	
1.5	5		3.9	2	
1.6	8	22 $\overline{LR}$ = 1.62	4.0	1	16 $\overline{LR}$ = 4.01
1.7	9		4.1	6	
1.8	20		4.2	3	
1.9	34		4.3	3	
2.0	32		4.4	3	
2.1	47		4.5	1	
2.2	54		4.6	1	
2.3	66		4.7	0	
2.4	57	178 $\overline{LR}$ = 2.39	4.8	2	
2.5	55				
2.6	59				
2.7	42				
2.8	50				
2.9	67				
3.0	53				
3.1	41				
3.2	40	109 $\overline{LR}$ = 3.19			
3.3	28				
3.4	20				
3.5	8				

Circulation Regimes

Dominant features of the 200 mb circulation expected to exert an important influence on temperature profiles and, hence, on radiance profiles, are troughs, ridges, and jet streams. Consequently, each radiance profile was identified by the circulation regime existing in the vicinity of the temperature sounding. Six subsets resulted as shown below:

Subset no.	Circulation regime
94	No feature
95	Jet
96	Trough
97	Ridge
98	Jet and trough
99	Jet and ridge

Reference Subset

Subset 90 is the reference subset; it consists of 839 profiles representing the total Horizon Definition Study primary body of data, excluding the climatological set. The mean and standard deviation for this subset is the estimate of the total population mean and standard deviation to which all other subsets are compared to determine significant effects.

RESULTS

Results are displayed on X-Y recordings with each plot containing statistics of radiance or normalized radiance for several subsets to permit comparison of means and standard deviations over like subsets. Appendix A contains the complete 132 plots obtained.

Conclusions are presented below in the same order as the discussion of the selection of subsets; figures referred to are duplicates of those in Appendix A and are included in the text for ease of reference.

Diurnal Effects

The curves of Figure 8, which show mean radiance for a variety of day and night conditions, suggest that nighttime radiance is greater than daytime radiance. However, this conclusion is doubtful because of limitations in the input data. The number of soundings available for determination of diurnal effects was small which resulted in a small sample size. In addition, nighttime measured temperature profiles did not exist in a number of instances, and required temperature profiles were obtained by interpolating between two daytime soundings. Consequently, several radiance profiles, identified as nighttime radiance, reflect daytime conditions.

Seasonal Effects

Results of averaging all latitudes and longitudes by season are shown in Figures 9 and 10. Radiance is highest in summer and lowest in winter, as expected, but in spring, radiance is higher than in autumn. The difference between spring and summer mean is greater than the difference between fall and winter. Standard deviation is significantly greater in winter than in other seasons which do not exhibit consistent differences. At low tangent heights, standard deviation is lowest in autumn and increases in order of summer, spring, and winter. At higher tangent heights, standard deviation increases in order of seasons from a low in spring to a high in winter.

Seasonal Effects with Latitude

Seasonal differences are greater at higher latitudes as illustrated by Figure 11 which shows the difference between fall and winter profiles at Cape Kennedy and at Fort Churchill. Figure 12 shows that the lower latitudes do not exhibit the normal tendency for radiance to be higher in summer than in spring; radiance decreases in order of spring, summer, fall, and winter. Radiance at lower latitudes is, in every season, greater than the overall average. Lower latitudes also do not exhibit the same variation in standard deviation as the total population; summer, rather than winter, exhibits the largest standard deviation as shown in Figure 13. Middle and upper latitudes behave similarly to the population as shown by Figures 14 and 15. Comparison of Figures 13, 14, and 15 shows that seasonal differences are greatest at higher latitudes.

Subset curve	Identification	Remarks
1	Cape Kennedy spring day	7 PM local, 5/21-5/28/64
2	Cape Kennedy spring night	7 AM local, 5/21-5/28/64
3	Cape Kennedy winter day	7 PM local, 12/7-12/10/64, 2/8-2/17/65
4	Cape Kennedy winter night	7 AM local, 12/7-12/10/64, 2/8-2/17/65
5	White Sands fall day	4 PM local, 11/18-11/25/64
6	White Sands fall night	4 AM local, 11/18-11/25/64
7	Overall diurnal day	Subsets 1, 3, and 5 averaged
8	Overall dirurnal night	Subsets 2, 4, and 6 averaged

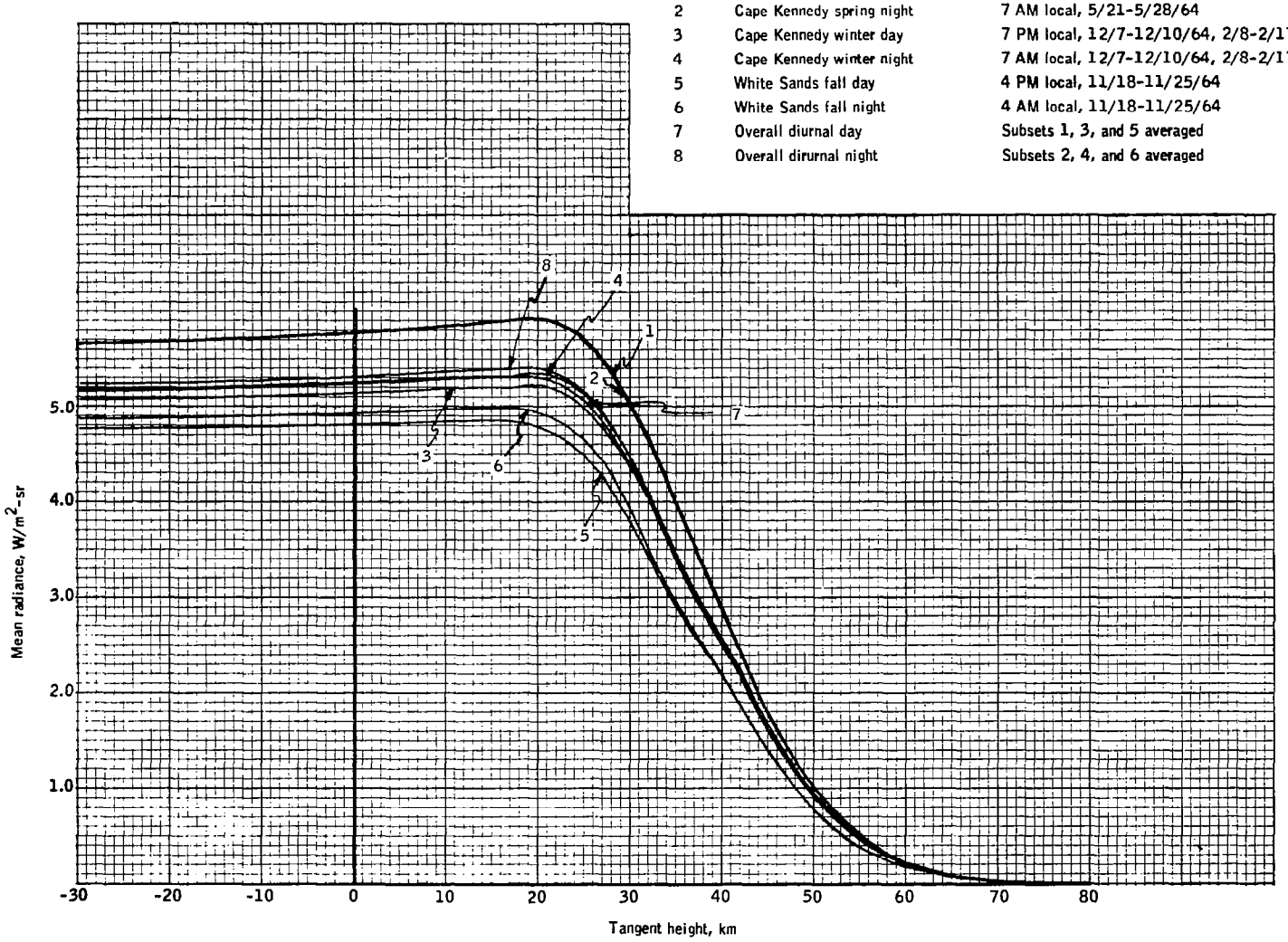


Figure 8. Mean Radiance Versus Tangent Height, Diurnal Subsets

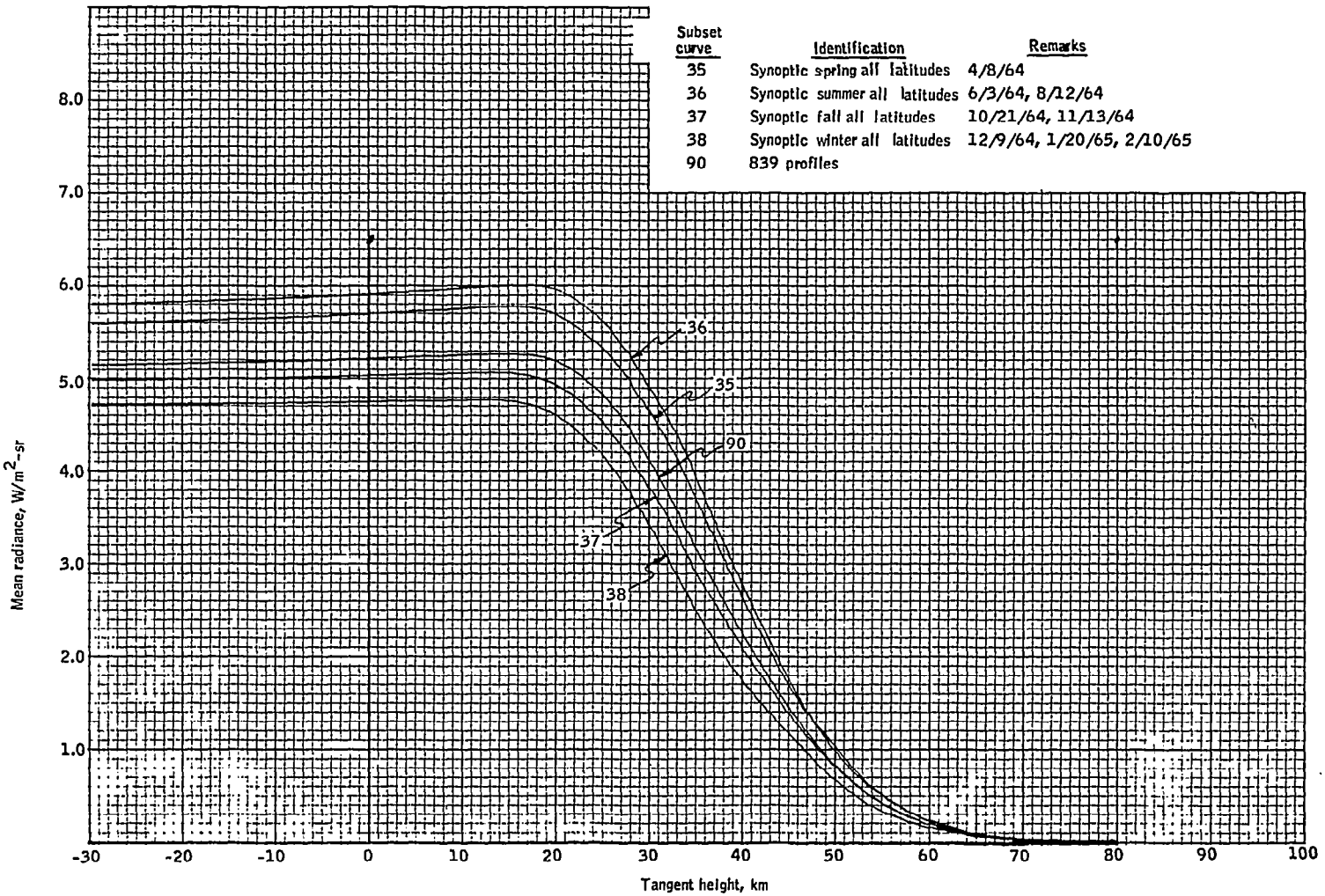


Figure 9. Mean Radiance Versus Tangent Height, Seasonal Subsets

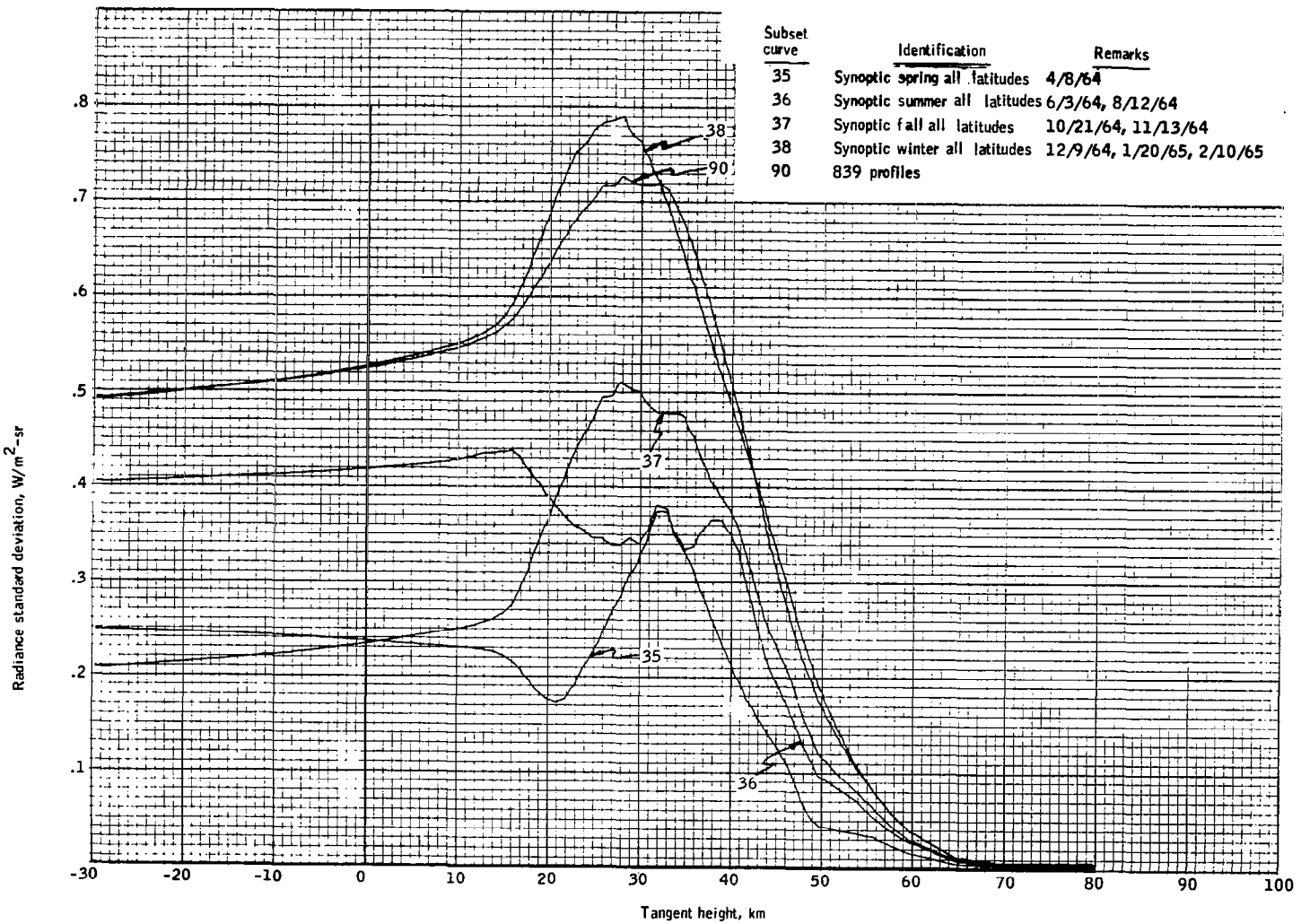


Figure 10. Radiance Standard Deviation versus Tangent Height, Seasonal Subsets

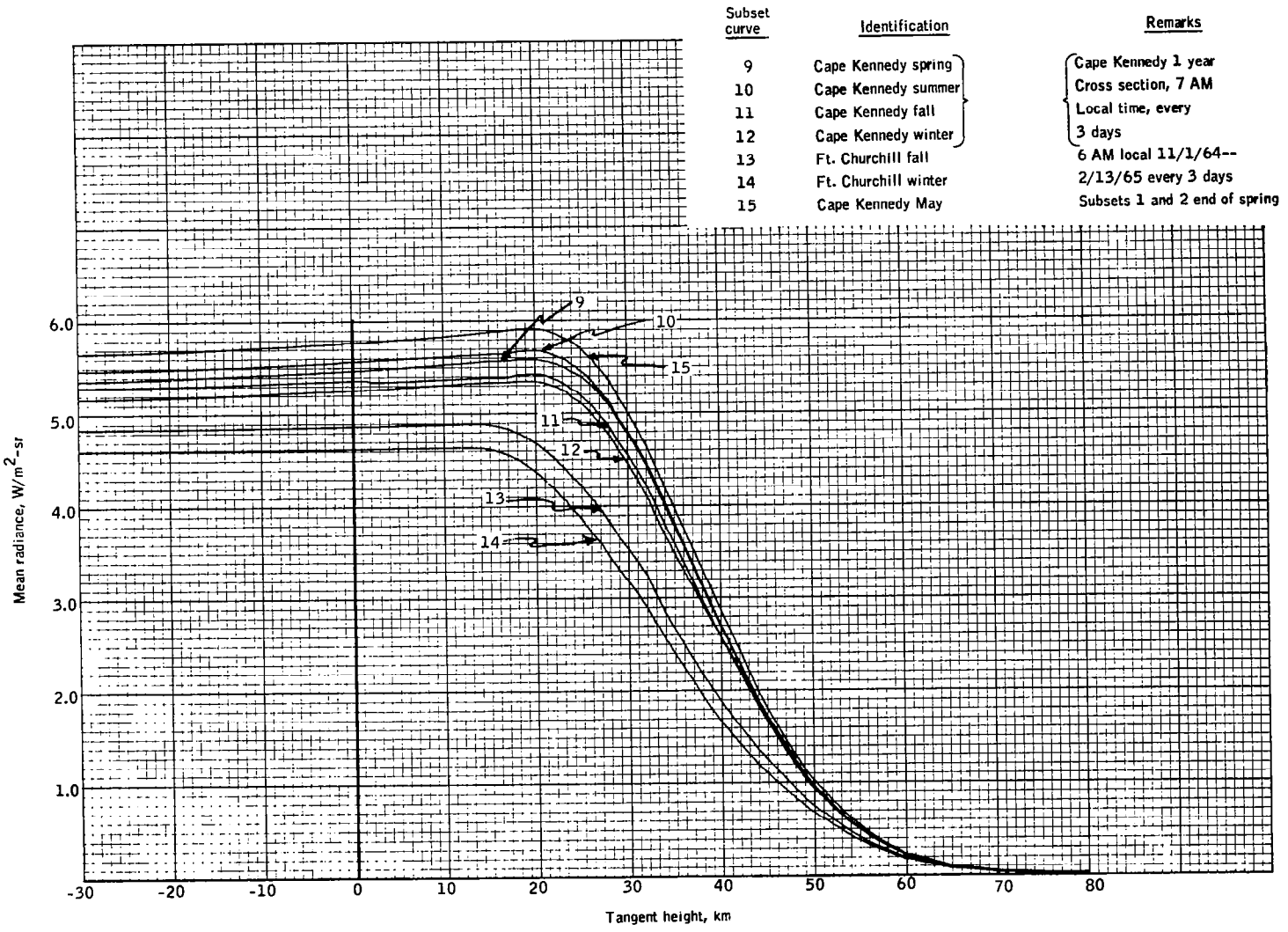


Figure 11. Mean Radiance Versus Tangent Height Season/Latitude Subsets

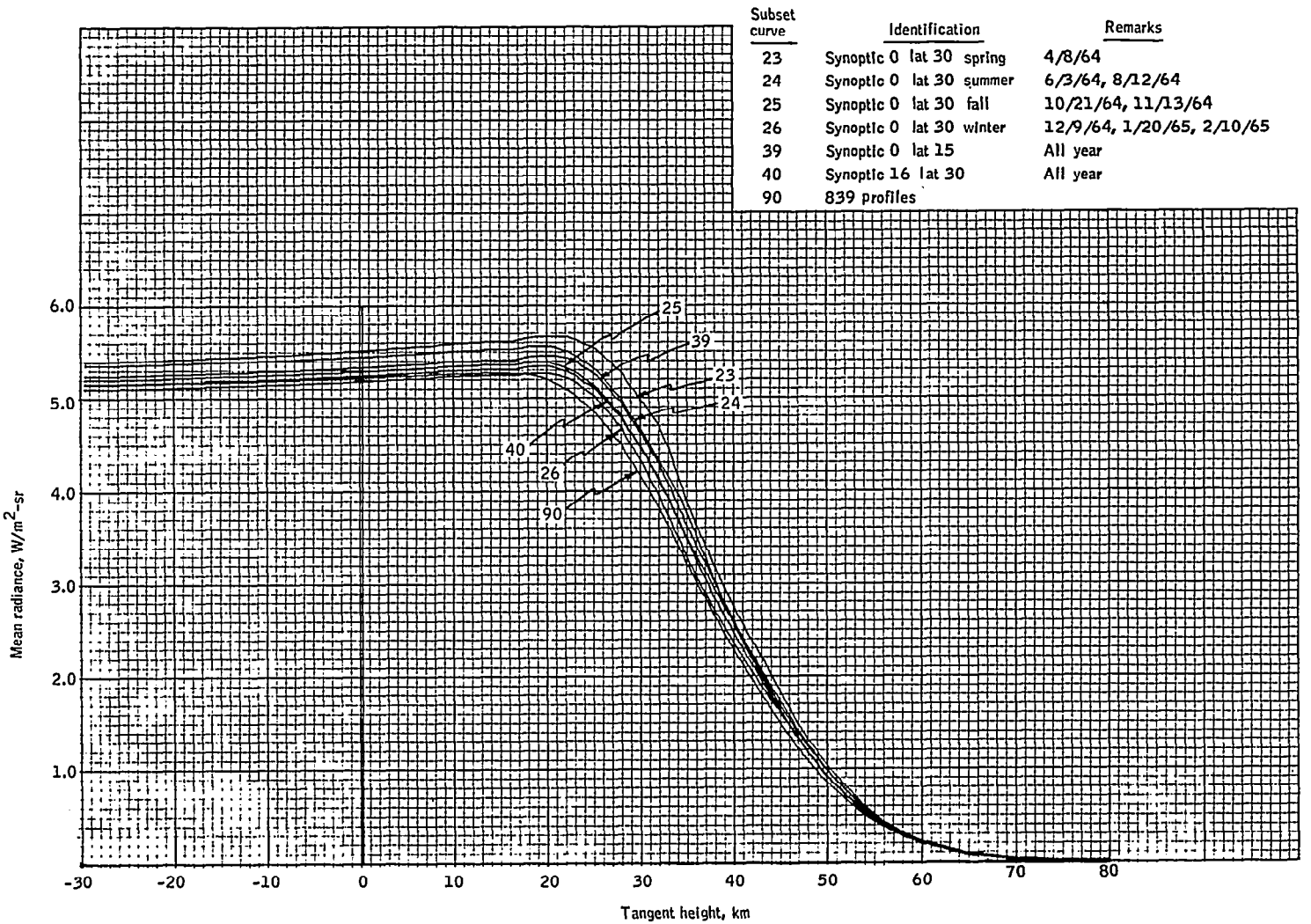


Figure 12. Mean Radiance Versus Tangent Height, Seasonal Effects at Low Altitudes

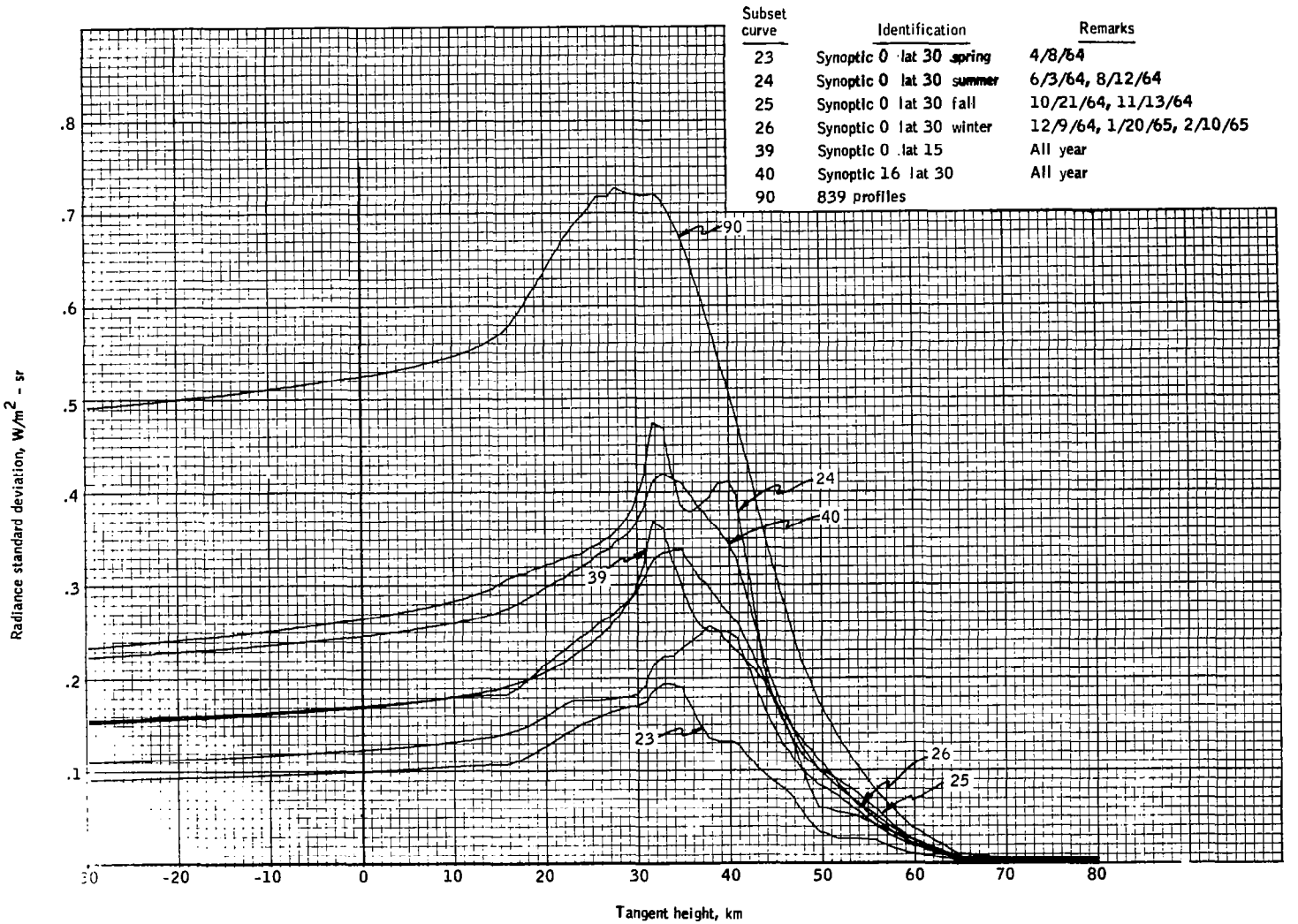


Figure 13. Radiance Standard Deviation versus Tangent Height Season/Latitude Subsets

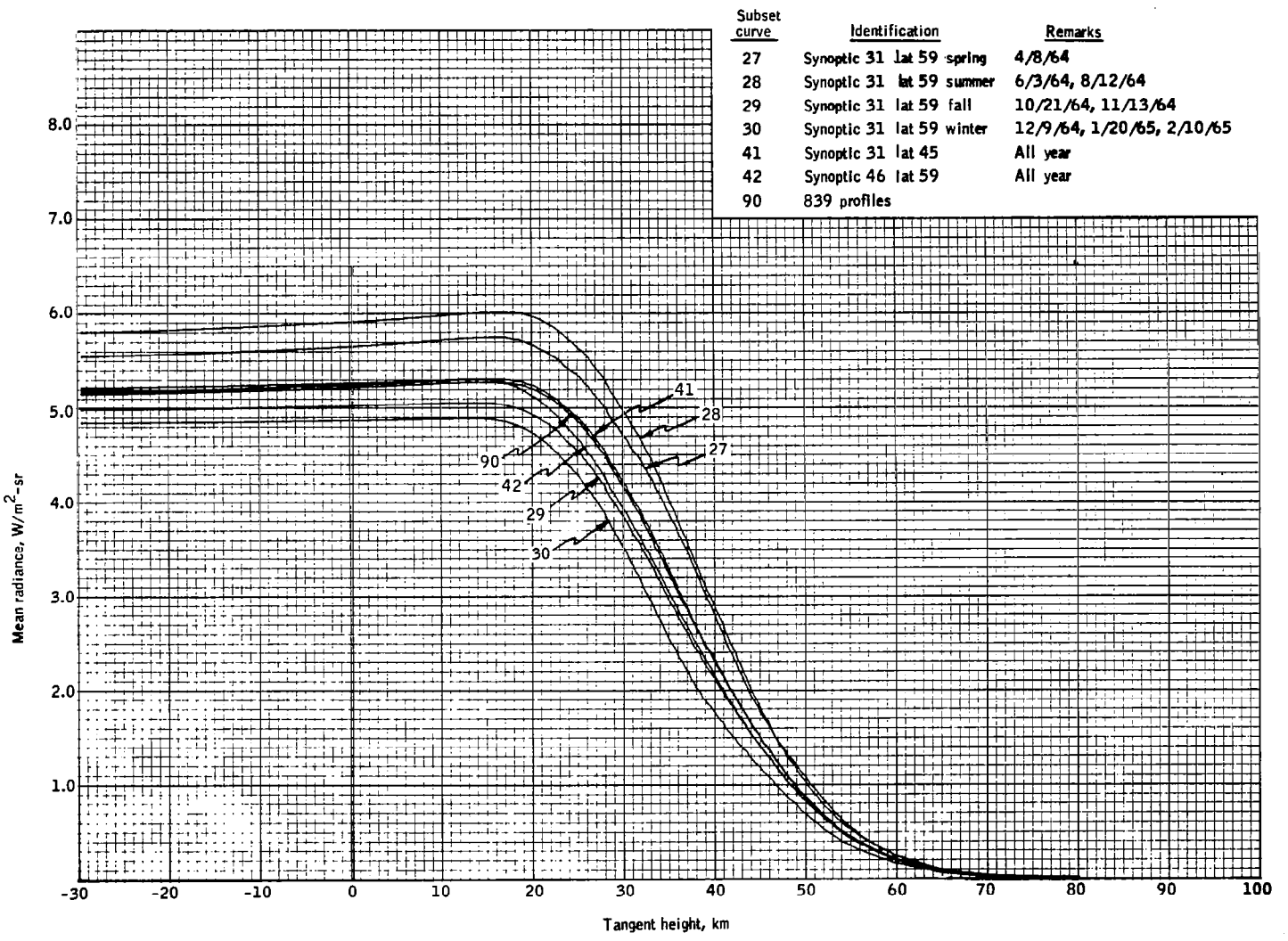


Figure 14. Mean Radiance versus Tangent Height, Seasonal Effects at Middle Latitudes

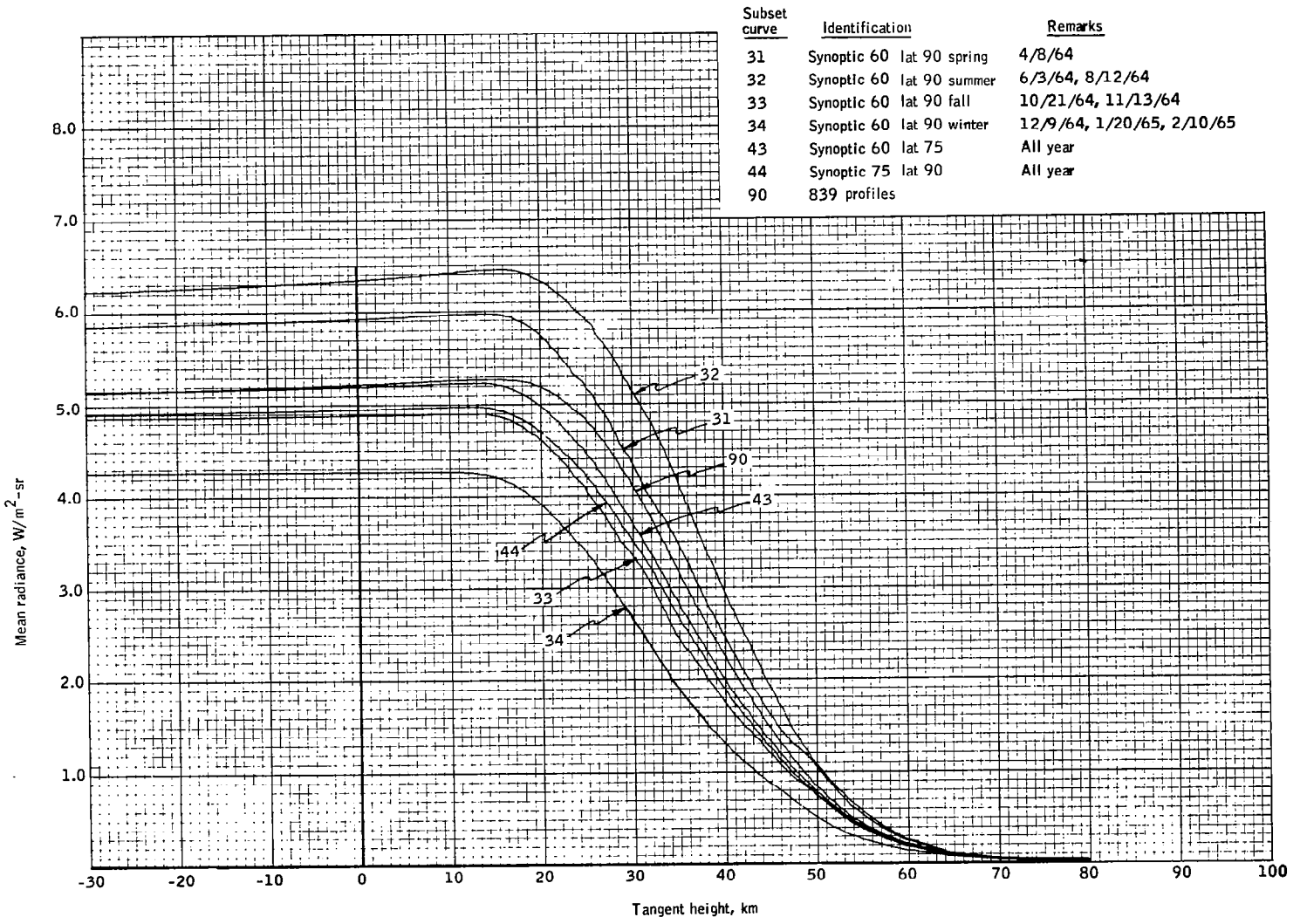


Figure 15. Mean Radiance versus Tangent Heights, Seasonal Effects at High Latitudes

Latitude Effects

For all tangent heights, radiance decreases with higher latitudes, as shown by Figure 16. Above about 30 km, the profiles in each latitude band are uniformly separated; below 30 km, radiance in the polar region is significantly below radiance in any of the other latitude bands for which the difference is small. Figure 17 shows a definite trend for standard deviation to increase with increasing latitude.

Latitude effects in each of the four seasons can be seen by referring to Figures A45 through A60 in Appendix A.

Longitude Effects

Figure 18 shows that small differences exist, but that a trend is shown for radiance to decrease as longitude varies from west to east. This effect is not expected to be caused by longitude itself since, unlike latitude for which a definite physical basis for the effects can be shown, no physical basis exists to explain any longitude variation. The effect is expected to be caused by either the general weather patterns which exist in the region for which input data is available or by the geographical pattern that exists, i. e., longitude bands used consist, generally, of pacific longitudes, North American Westerly, Central, and East Coast longitudes.

In Appendix A, seasonal effects in each longitude band are shown in Figures A65 through A80 and the longitude effects in each season are shown in Figures A81 through A96.

Tropopause Temperature

Radiance does not exhibit systematic behavior with tropopause temperature, but, as in Figure 19, standard deviation does show a definite trend to increase with increasing tropopause temperature.

10 Millibar Temperature

Figure 20 shows a pronounced systematic effect of 10 mb temperature. Near peak radiance, radiance is almost linearly related to temperature by:

$$N = 3.7 + 0.6 \left(T_{10mb} - 200\right) \qquad (1)$$

A similar relationship exists at other tangent heights, with slope and intercept in the above expression appearing to be some function of tangent height. It can be seen that 10 mb temperature affects limb brightening. At 210°K, neither brightening nor darkening exists; below that temperature limb darkening occurs, and above that temperature limb brightening becomes more pronounced with increasing temperatures. Standard deviation behaves erratically with 10 mb temperature.

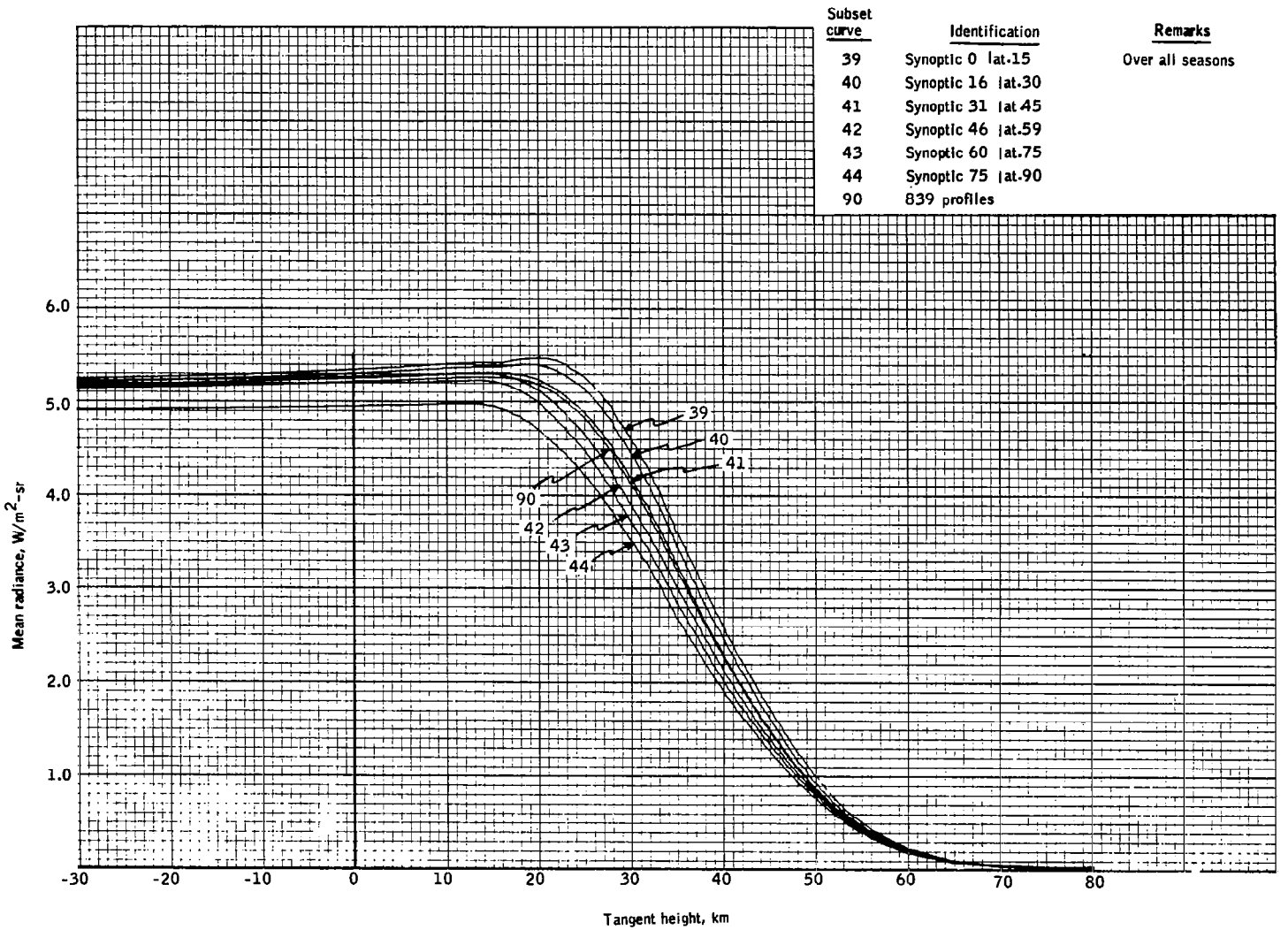


Figure 16. Mean Radiance versus Tangent Height, Latitude Subsets

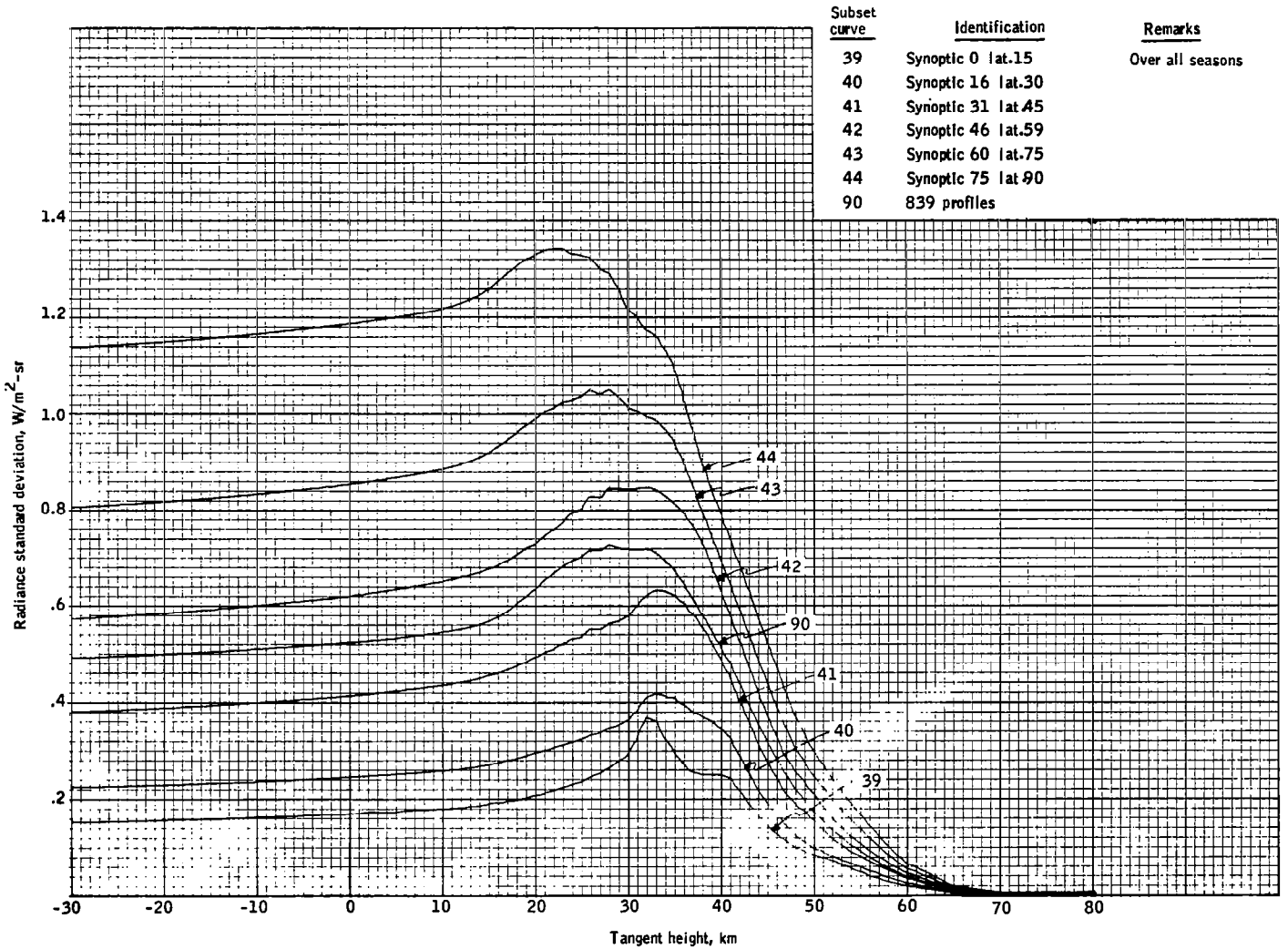


Figure 17. Radiance Standard Deviation versus Tangent Height, Latitude Subsets

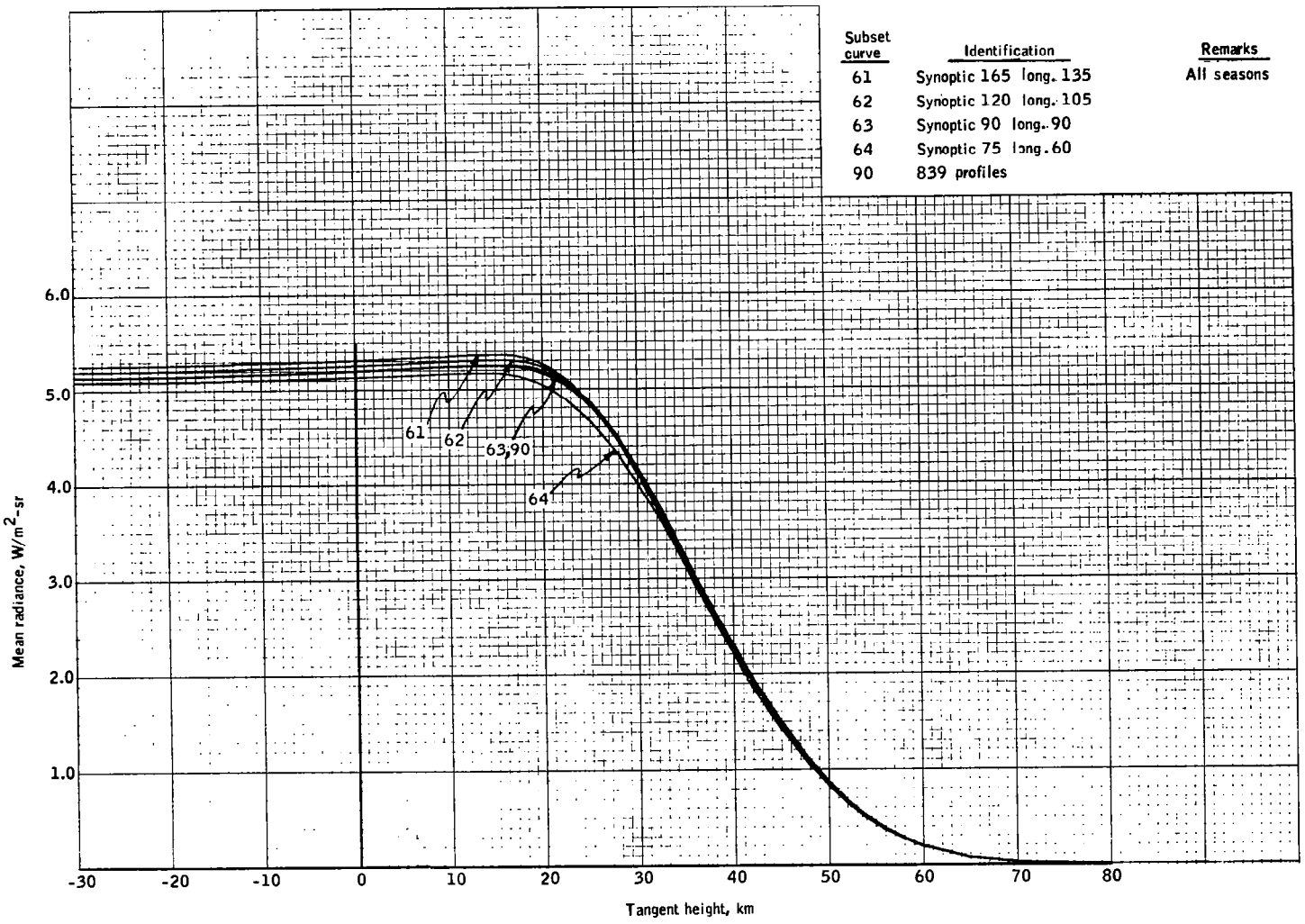


Figure 18. Mean Radiance versus Tangent Heights, Longitude Subsets

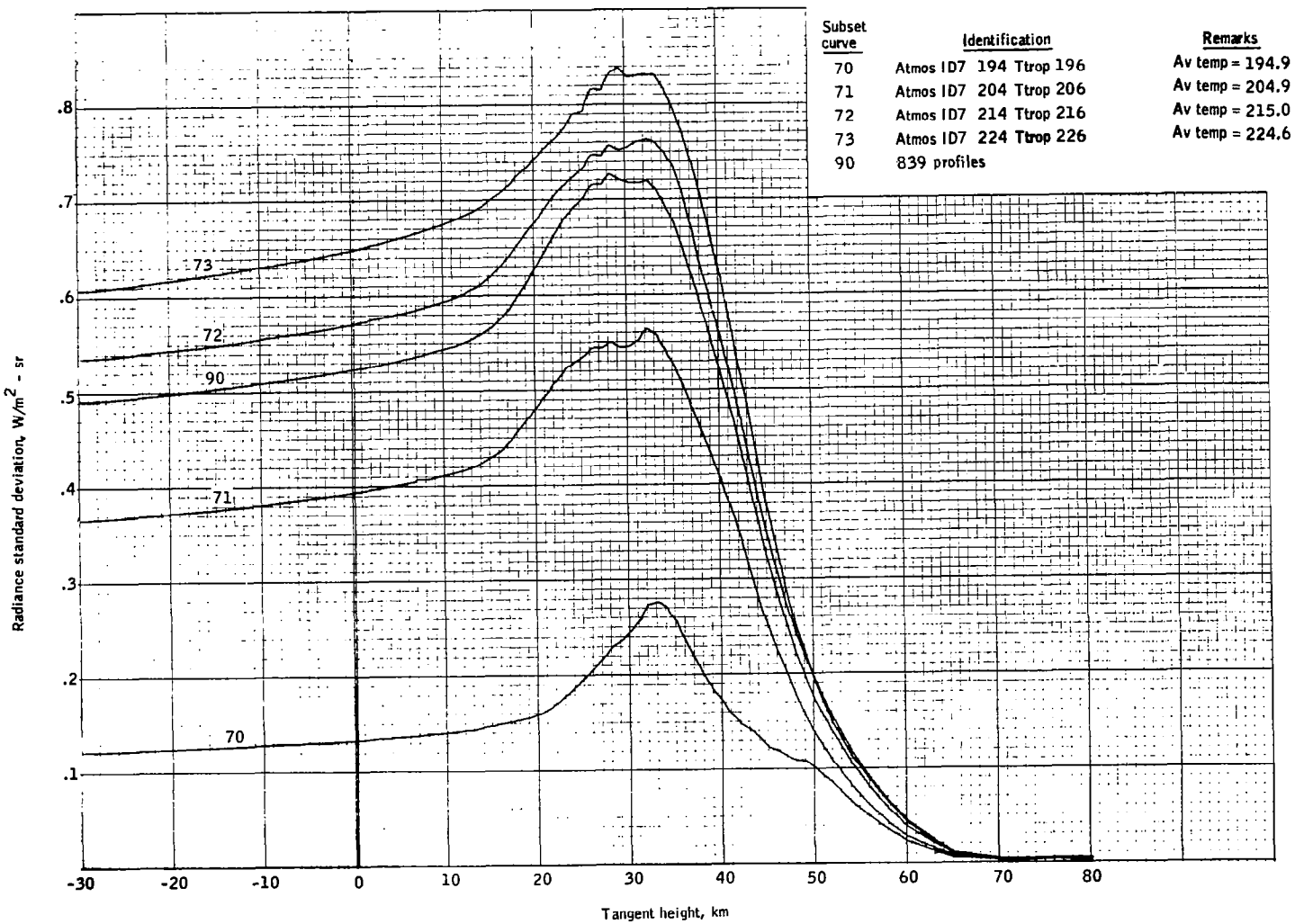


Figure 19. Radiance Standard Deviation versus Tangent Height Tropopause Temperature Subsets

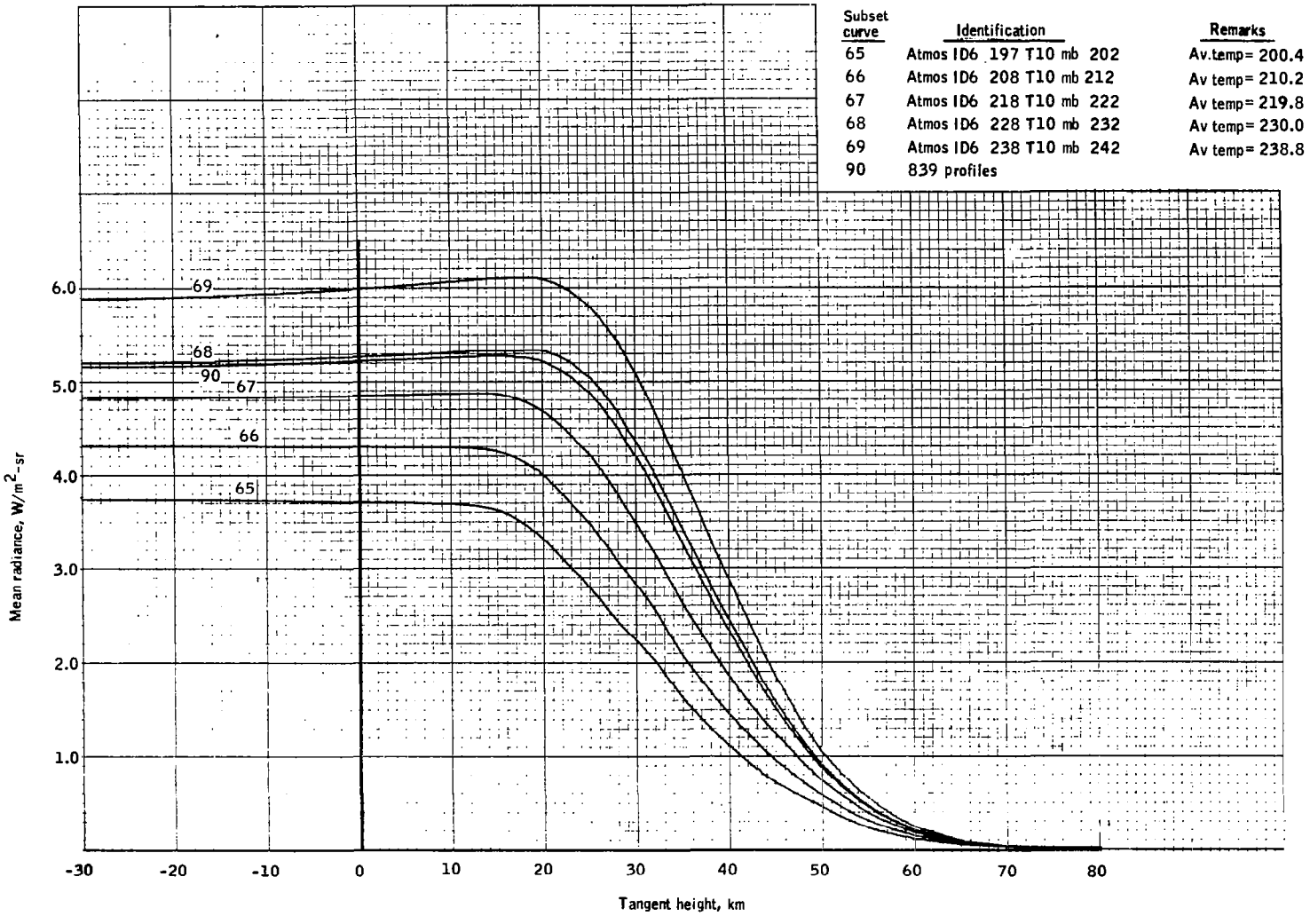


Figure 20. Mean Radiance versus Tangent Height, 10 mb Temperature Subsets

Stratopause Temperature

The curves of Figure 21 suggest a possible trend of increasing radiance with increasing stratopause temperature, although the two lower curves are nearly the same but significantly different from the two upper curves, which are nearly the same. Standard deviation does not exhibit systematic behavior with stratopause temperature.

Lapse Rates

Figures 22 and 23 show that radiance may be nonlinearly related to the 500 mb/tropopause lapse rate and the 10 mb/stratopause lapse rate. On each figure, radiance changes from one lapse rate to the next in successively large increments. No systematic variation of radiance with tropopause/10 mb lapse rate was found.

Only tropopause/10 mb lapse rate was found to affect radiance standard deviation. Figure 24 shows standard deviation decreasing in decreasing increments as lapse rate increases.

CONCLUSIONS

Profiles exhibit expected systematic variations with season and latitude; radiance varies from a high in summer to a low in winter and from a high in the tropics to a low at the poles. The magnitude of seasonal variations is greater in the polar regions. Profile shape and amplitude is not significantly affected by longitude, land mass, sea mass, or circulation regimes. Tropopause temperature variations do not cause systematic variations in radiance, but standard deviation does increase uniformly with increasing tropopause temperature. Apparent systematic variations in radiance are caused by 10 mb temperature, stratopause temperature, 500 mb/tropopause lapse rate, and 10 mb/stratopause lapse rate. Of these, the most significant is the nearly linear dependence of radiance on the 10 mb temperature which suggests the possibility of obtaining a simple, accurate method of calculating radiance profiles with the 10 mb temperature as the only required input data.

It must be remembered that the above specific conclusions result from the analysis of mean profiles determined from the subsets. Any single radiance profile may not exhibit the same characteristics as these mean data.

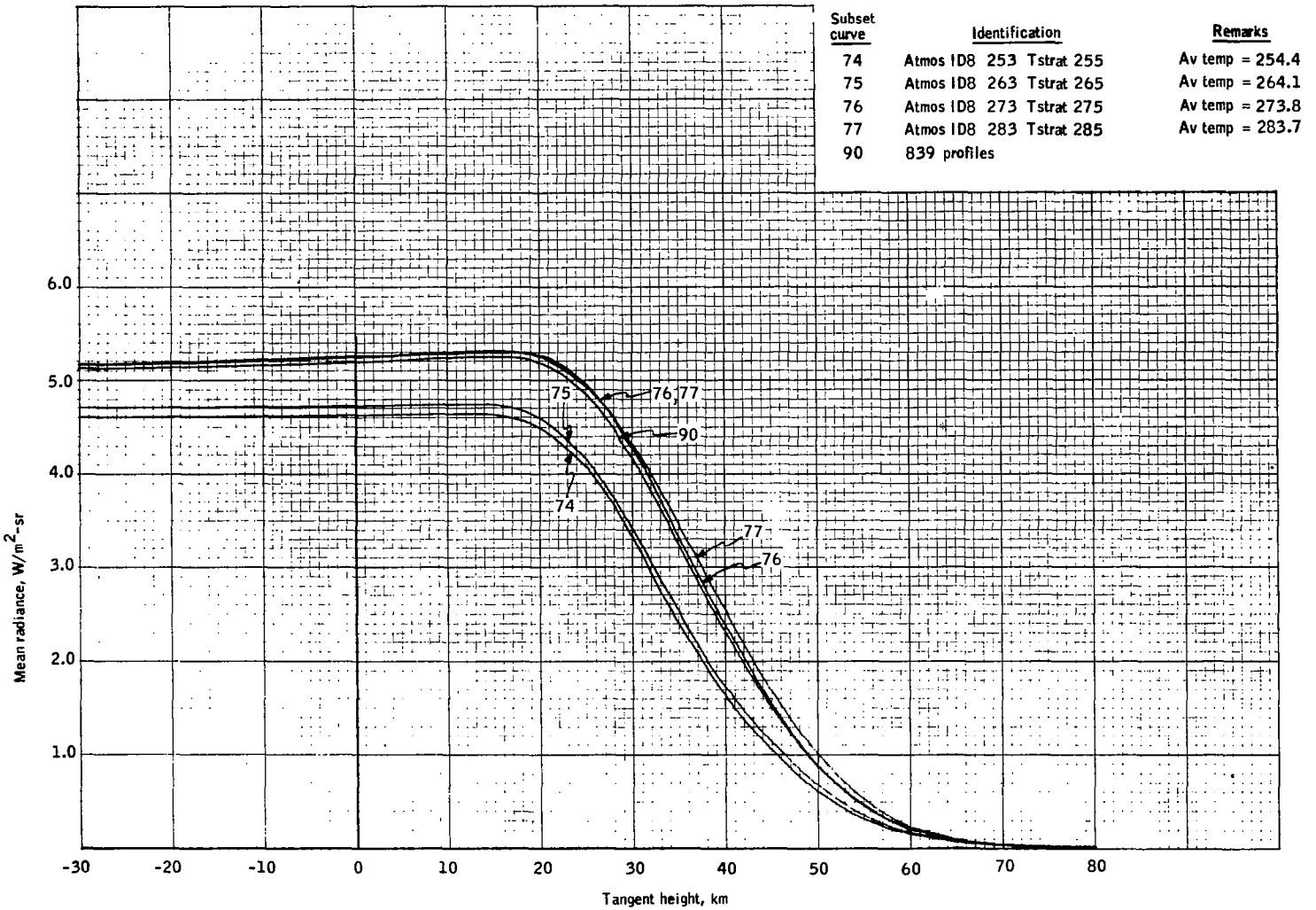


Figure 21. Mean Radiance versus Tangent Height, Stratopause Temperature Sheets

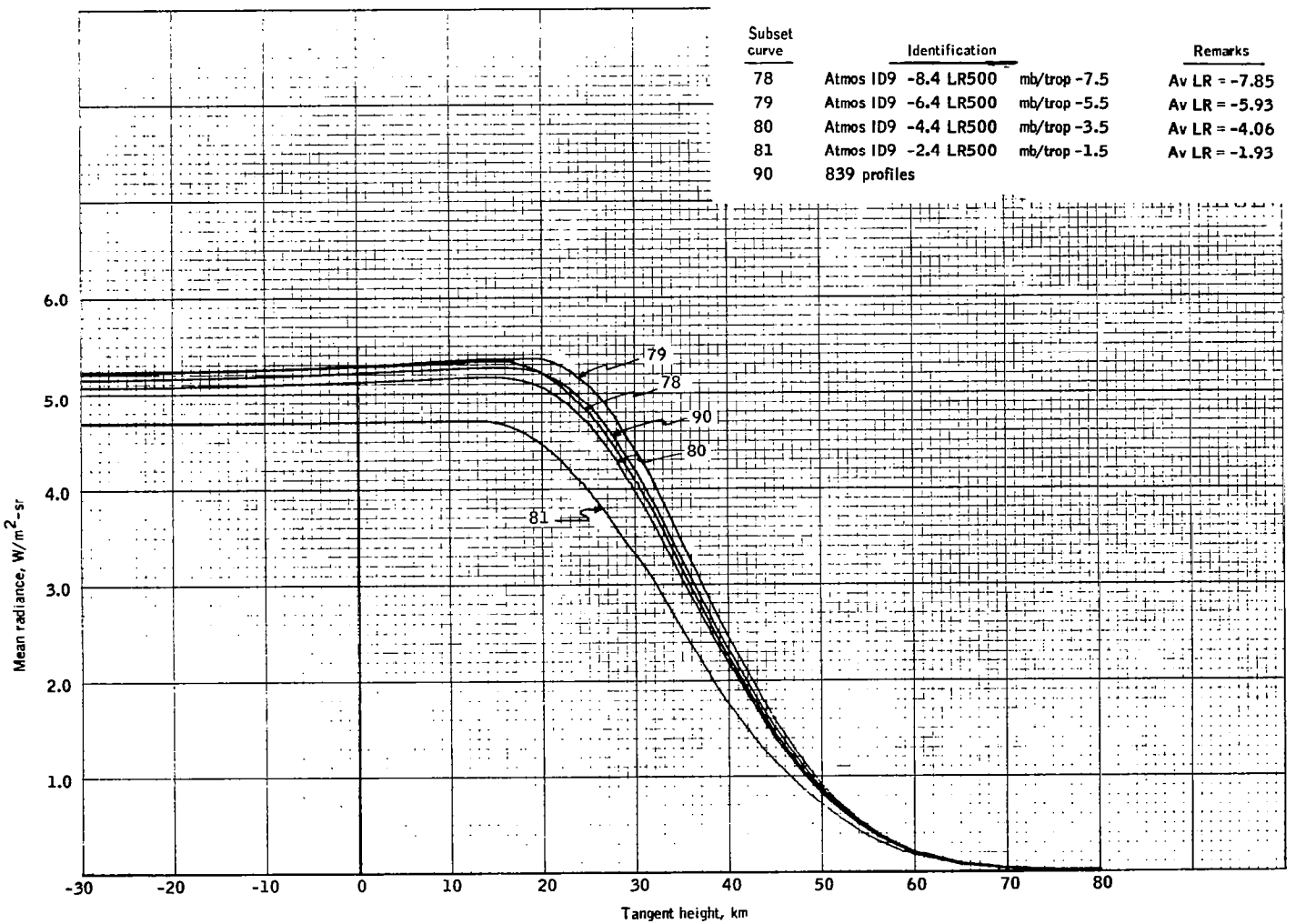


Figure 22. Mean Radiance versus Tangent Heights, 500 mb/Tropopause Lapse Rate Subsets

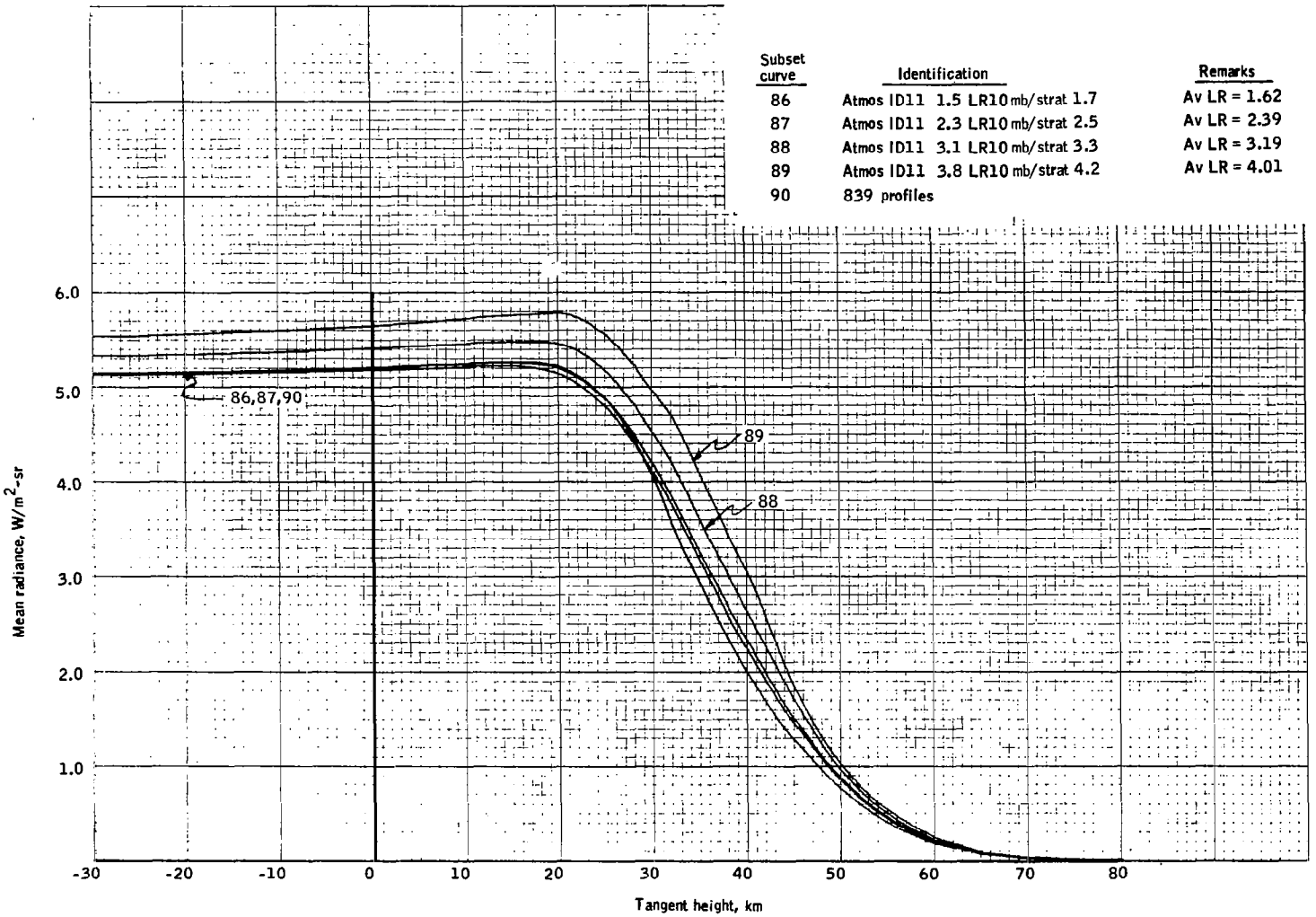


Figure 23. Mean Radiance versus Tangent Height, 10 mb/Stratopause Lapse Rate Subsets

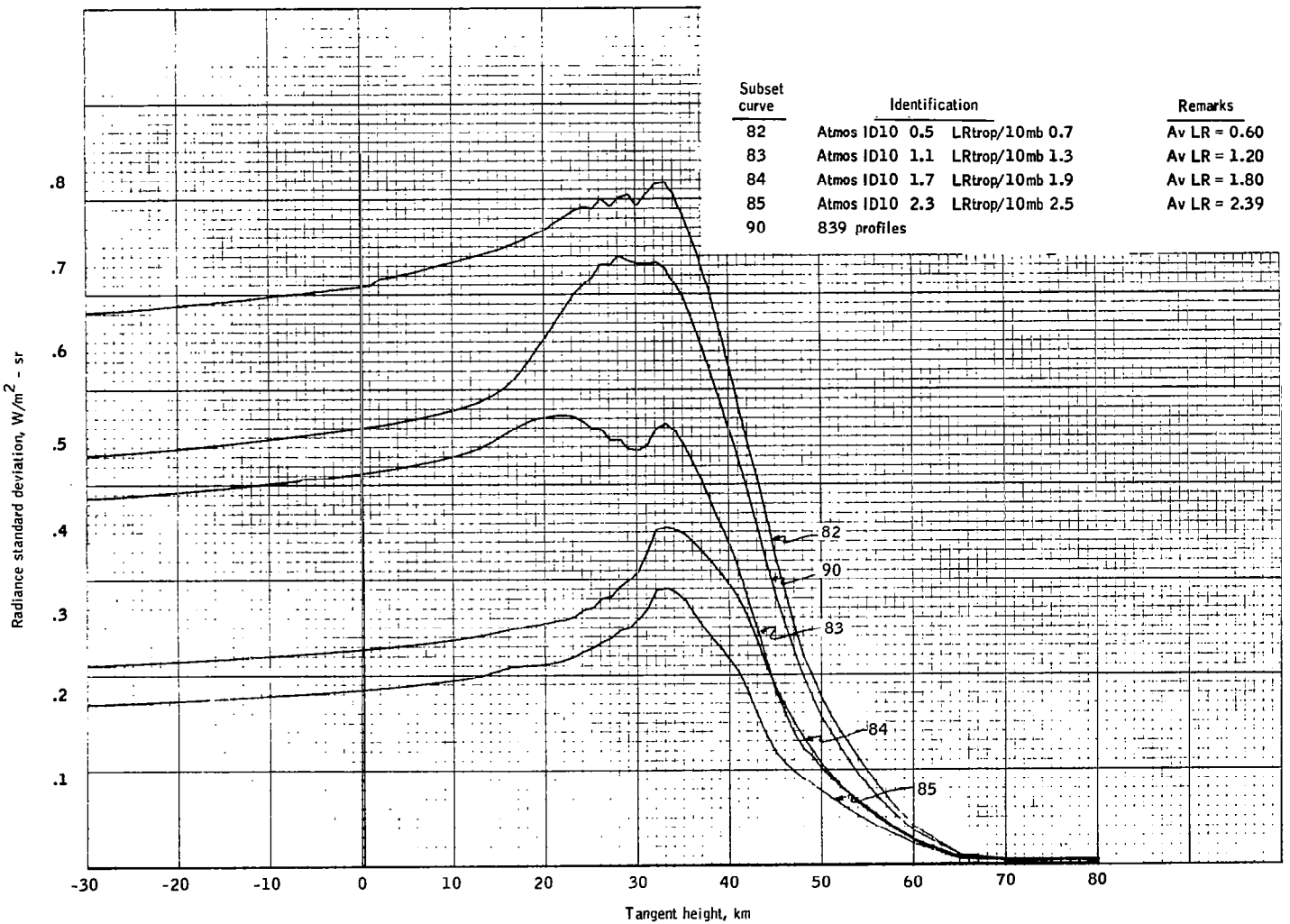


Figure 24. Radiance Standard Deviation versus Tangent Height, Tropopause/10 mb Lapse Rate Subsets

EMPIRICAL CURVE FITTING

An important part of the analysis of radiance profiles and their relation to the profile identifiers is fitting an appropriate mathematical function to the profiles and relating the coefficients in the function to appropriate identifiers. Two techniques were used to find closed form functions which fit the profiles. One technique discussed in detail in phenomonological curve fitting was based on the physics of the problem with the resulting functions containing key atmospheric parameters as independent variables. The other technique, discussed in this section, is empirical curve fitting in which the objective was to find a closed form function of only one independent variable, tangent height. With such a function, radiance profiles could be calculated without the necessity of depending on meteorological input data, provided that the dependence of the function's coefficients and exponents on time and space are adequately described.

Usually by curve fitting, a function is defined that adequately fits the data and is convenient for interpolation. It is possible to find a functional form, usually a polynomial, and concentrate on evaluating the coefficients for a best fit. The polynomial is frequently used for this purpose because of the relative ease in evaluating its coefficients. The present application of curve fitting, however, was considerably broader than interpolation. The goal was to find a functional form compatible with a large number of radiance profiles, so their differences can be reflected entirely by the variation of the coefficients. It was necessary, therefore, to examine many functional forms, choosing for further investigation only the most promising. Functional forms that survived this initial examination were tested further by fitting to selected climatological profiles and analyzing the variation of the coefficients with respect to such factors as latitude, time of year, and others. In subsequent paragraphs, following a description of the techniques used in both identifying and fitting potentially satisfactory functions, each functional form investigated during the study is discussed. Results of fitting certain of the better functions to 20 profiles representing tropical to polar latitudes for each of the four seasons are then shown.

IDENTIFICATION OF FUNCTIONS

The search for suitable functions employed two techniques, one involving exploration of the geometric properties of particular functions which were known to produce curves similar to radiance profiles and the other involving a transformation of variables to yield a straight line. As an example of the former technique, consider the following. Observation of many profiles shows that, depending on whether there is limb brightening, there may or may not be a maximum, and the number of points of inflection may be two or one. Finally, as the tangent height, h, approaches its largest practical

value (about 80 kilometers), the radiance N and the slope $\frac{dN}{dh}$ approach either zero or negligibly small values. Thus, any functional form must be adaptable to these geometric features of the profile while not introducing any unreal features in the range of values of tangent height. As an example, consider the function

$$N = ae^{-bh} - ce^{-dh} \tag{2}$$

where a, b, c, and d are positive. The slope is expressed as

$$\frac{dN}{dh} = abe^{-bh} + cde^{-dh} \tag{3}$$

Setting $\frac{dN}{dh} = 0$ yields the extremum with coordinates

$$h = \frac{1}{d - b} \log_e \frac{cd}{ab} \tag{4}$$

and

$$N = \left[\left(\frac{b}{c}\right)^b \left(\frac{a}{d}\right)^d\right]^{\frac{1}{d-b}} (d-b). \tag{5}$$

Whether this extremum is a maximum or a minimum is determined by examining the second derivative, which is expressed as

$$\frac{d^2N}{dh^2} = ab^2e^{-bh} - cd^2e^{-dh}. \tag{6}$$

At the extremum point we find that

$$\frac{d^2N}{dh^2} = -\left[\frac{(ab)^d}{(cd)^b}\right]^{\frac{1}{d-b}} (d-b). \tag{7}$$

For $d > b$, N is both positive and a maxumum. For $b > d$, N is both negative and a minimum. The case $b = d$ is of no interest. Since N is never negative, the extremum will always be a maximum. Therefore, it appears that the functional form for N is satisfactory. When, however, the second derivative is set equal to zero, there is only one point of inflection. Hence, this functional form for N can accommodate only radiance profiles with limb darkening. These results obviate the need for fitting this functional form to profile data, at least those characterized by limb brightening.

The technique of transforming the variables to yield a linear relationship is well known in certain instances, the commonest being the logarithmic transformation. There are few physical studies that do not provide examples of plotting data against either logarithmic or semilogarithmic coordinates. If a plot of log y vs x yields a straight line, that is,

$$\log y = mx + b, \tag{8}$$

it follows that

$$y = ac^x, \tag{9}$$

where c and a are constants related to the slope m and the intercept b on the vertical axis, respectively. Many functions yield readily to the technique of transforming the variables. Thirteen such functions, together with their appropriate transformations, are shown in Table 11 taken from reference one. It should not be assumed, however, that all functions are susceptible to this technique. In fact, a few attempts with several randomly chosen functions will make this fact clear, especially if there are many coefficients.

There are a number of identification techniques too specialized to be very useful. Only one such scheme warrants consideration in this document. The most frequently used functional form in curve fitting is the polynomial. An nth-degree polynomial has the unique property that the nth successive differences of ordinates of points with equally spaced abscissas are constant. Therefore, the appropriateness of a polynomial as a functional form can be found by means of a difference table. An example taken from reference two is shown in Table 12. The first two columns represent experimental data and the remaining columns successive differences of the ordinates. It may be seen that the third differences are reasonably constant and that, therefore, the relation between x and y is approximately of the form

$$y = a_o + a_1x + a_2x^2 + a_3x^3. \tag{10}$$

Application of this procedure to the radiance profiles showed that no particular ith difference would be constant; hence, it must be concluded that a polynomial cannot adequately represent a radiance profile. It may be argued that an nth degree polynomial can be made to fit exactly n + 1 data points, but it does not follow that such a fit would be appropriate. On the contrary, this polynomial would have n-1 maxima and minima, and the probability is very low that the correct number of each would fall in the range of interest.

TABLE 11.- DATA TRANSFORMATIONS

Functional form	Transformation to straight line	
	Abscissa	Ordinate
1. $N = A_0 + A_1 h$	h	N
2. $N = A_0 e^{A_1 h}$	h	$\log N$
3. $N = A_0 h^{A_1}$	$\log h$	$\log N$
4. $N = A_0 + \frac{A_1}{h}$	$1/h$	N
5. $N = \frac{h}{A_0 + A_1 h}$	h	h/N
6. $N = A_0 + A_1 e^{A_2 h}$	h	$\log (\Delta N/\Delta h)$
7. $N = A_0 + A_1 h^{A_2}$	$\log h$	$\log \lvert \Delta N/\Delta h \rvert$
8. $N = A_0 + \frac{A_1}{h - A_2}$	$h - h_0$	$\frac{h - h_0}{N - N_0}$
9. $N = A_0 + \frac{h}{A_1 + A_2 h}$	h	$\frac{h - h_0}{N - N_0}$
10. $N = A_0 + A_1 h + A_2 e^{A_3 h}$	h	$\log [\Delta^2 N/(\Delta h)^2]$
11. $N = A_0 A_1^h A_2^{A_3^h}$ or $N = A_0 A_1^h A_2^m$ (where $m = A_3^h$)	h	$\log [\Delta^2 \log N/(\Delta h)^2]$
12a $N = A_0 e^{A_1 h} + A_2 e^{A_3 h}$ 12b $N = e^{A_0 h} (A_1 \cos A_2 h + A_3 \sin A_2 h)$	$\frac{N_{k+1}}{N_k}$	$\frac{N_{k+2}}{N_k}$

TABLE 12. - SUCCESSIVE DIFFERENCES

x	y	Δy	$\Delta^2 y$	$\Delta^3 y$	$\Delta^4 y$
1	2.105				
		0.703			
2	2.808		0.103		
		0.806		0.081	
3	3.614		0.184		-0.002
		0.990		0.079	
4	4.604		0.263		-0.001
		1.253		0.078	
5	5.857		0.341		+0.003
		1.594		0.081	
6	7.451		0.422		-0.001
		2.016		0.080	
7	9.467		0.502		
		2.518			
8	11.985				

CURVE-FITTING TECHNIQUES

Once a particular functional form has been identified as meeting the minimal requirements for possibly representing a profile, the next logical step is to fit a set of actual data points and thus determine how good a fit is obtainable with this function.

If the function to be fitted is linear with respect to its coefficients, a number of schemes are available, (method of averages, method of least squares, method of moments, and others). Those schemes adopted in the present program are described below. If the function to be fitted is nonlinear with respect to its coefficients, special techniques are required to adapt the above schemes to this nonlinear situation. Special techniques adopted in the present program are also described below.

Mathematical Background

Suppose that a nonlinear function $f(c_1, c_2, \ldots, c_m; x)$ depending on m parameters $c_1, c_2, \ldots, c_m$, is to be fitted to a set of observed data (x_i, y_i), $i = 1, 2, \ldots, n$. In general $n \gg m$.

Mathematically speaking, this problem is equivalent to optimizing the m parameters c such that $|F(c) - Y|$ is least, where $F(c)$ is the vector $f(c;x_1), f(c;x_2), \ldots, f(c;x_n)$, and where Y is the vector $y_1, y_2, \ldots, y_n$.

It is frequently convenient to take as the norm of a vector $z = (z_1, z_2, \ldots, z_n)$ the L^p norm, which is defined as

$$\left(\sum_{i=1}^{n} |z_i|^p \right)^{\frac{1}{p}} .$$

Of these, the L^2 norm ("least squares") and the L^∞ norm ("Tchebychev") are the most often used.

Thus, for a least-squares approximation, the parameters c are optimized such that

$$\left(\sum_{i=1}^{n} |f(c;x_i) - y_i|^2 \right)^{\frac{1}{2}}$$

is least. For the Tchebychev type of approximation the parameters c are optimized such that

$$\max_i |f(c;x_i) - y_i|, \quad (i = 1, 2, \ldots, n)$$

is least.

Computer programs incorporating these two modes of optimization and one other mode were constructed.

The Tchebychev approximation is simply linear programming, which follows well established procedures but is limited in application to functions which are linear in the coefficients. Although the least-squares approximation is similarly limited in general practice, it is adaptable to functions nonlinear in

the coefficients. The third mode of optimization combines a random-search technique with parabolic interpolation. Each unknown coefficient is varied, in turn, in an effort to minimize the preselected L norm. The "general-purpose, multi-dimensional minimum finder", as this third mode computer program was called, proved rather awkward to use for Tchebychev type approximations. For least-squares approximations it worked better, but still too slowly to process the given radiation profiles efficiently. This approach was, therefore, abandoned in favor of the two other techniques, which are discussed in some detail in the next two sections.

The Linear-Programming Approach (Tchebychev Approximation)

The approach using the general-purpose minimum finder had the advantage of imposing no restriction whatever on the type of function $f(c;x)$ chosen to fit the given radiation profiles. The technique to be discussed now, on the contrary, is restricted to those functions $f(c;x)$ which give rise, in some manner or other, to a system of equations linear in the coefficients. A few examples of such functions $f(c;x)$ are as follows:

(1) Polynominals:

$$f(c;x) = \sum_{j=0}^{m} c_j x^j. \tag{11}$$

The Tchebychev approximation problem is to optimize the coefficients c_j such that $\max_i \left| \sum_{j=0}^{m} c_j x_i^j - y_i \right|$ (i=1, 2, . . . , n, where n is the number of data points) is least. This is equivalent to obtaining the best Tchebychev-type "solution" of the overdetermined system of linear algebraic equations (in the coefficients c_j):

$$\sum_{j=0}^{m} x_i^j c_j = y_i \qquad (i = 1, 2, \ldots, n). \tag{12}$$

(2) Rational functions:

$$f(c;x) = \sum_{j=0}^{r} c_j x^j \Big/ \sum_{j=0}^{s} d_j x^j. \tag{13}$$

The objective is to optimize the coefficients c_j, d_j such that

$$\max_i \left| \left(\sum_{j=0}^{r} c_j x_i^j \Big/ \sum_{j=0}^{s} d_j x_i^j \right) - y_i \right| \qquad (i = 1, 2, \ldots, n)$$

is least. This problem, as it stands, cannot be attacked directly by the linear-programming method (although it is susceptible to other techniques). To render linear programming applicable, consider instead the auxiliary problem obtained by multiplying the above expression by the denominator. The objective then is to optimize the coefficients c_j, d_j, such that

$$\max_i \left| \sum_{j=0}^{r} c_j x_i^j - y_i \sum_{j=0}^{s} d_j x_i^j \right| \qquad (i = 1, 2, \ldots, n)$$

is least.

The corresponding system of linear equations (in the c_j and d_j) is

$$\sum_{j=0}^{r} x_i^j c_j + \sum_{j=0}^{s} \left(-y_i x_i^j\right) d_j = 0 \qquad (i = 1, 2, \ldots, n) \tag{14}$$

(3) Reciprocals of square roots of polynominals:

$$f(c;x) = \left(\sum_{j=0}^{m} c_j x^j \right)^{-1/2}. \tag{15}$$

Instead of minimizing

$$\max_i \left| \left(\sum_{j=0}^{m} c_j x_i^j \right)^{-1/2} - y_i \right| \qquad (i = 1, 2, \ldots, n)$$

the auxiliary problem obtained by taking the reciprocal of the square is to optimize the coefficients c_j such that

$$\max_i \left| \sum_{j=0}^{m} c_j x_i^j - y_i^{-2} \right| \qquad (i = 1, 2, \ldots, n)$$

is least. The associated system of linear equations (in c_j) is

$$\sum_{j=0}^{m} x_i^j c_j = y_i^{-2} \qquad (i = 1, 2, \ldots, n). \tag{16}$$

An alternative auxiliary problem obtained by the additional operation of multiplying by y^2 is to minimize

$$\max_i \left| 1 - y_i^2 \sum_{j=0}^{m} c_j x_i^j \right| \qquad (i = 1, 2, \ldots, n)$$

The associated system of linear equations is

$$\sum_{j=0}^{m} \left(y_i^2 x_i^j\right) c_j = 1 \qquad (i = 1, 2, \ldots, n). \tag{17}$$

(4) Powers of rational functions:

$$f(c;x) = \left(\sum_{j=0}^{r} c_j x^j \Big/ \sum_{j=0}^{s} d_j x^j \right)^q, \tag{18}$$

where q need not be an integer. The auxiliary problem is to optimize c_j, d_j such that

$$\max_i \left| \sum_{j=0}^{r} c_j x_i^j - y_i^{1/q} \sum_{j=0}^{s} d_j x_i^j \right| \qquad (i = 1, 2, \ldots, n)$$

is least, with the corresponding system of equations

$$\sum_{j=0}^{r} x_i^j c_j + \sum_{j=0}^{s} \left(- y_i^{1/q} x_i^j\right) d_j = 0 \qquad (i = 1, 2, \ldots, n) \tag{19}$$

An alternative auxiliary problem is to minimize

$$\max_i \left| \sum_{j=0}^{s} d_j x_i^j - y_i^{-1/q} \sum_{j=0}^{r} c_j x_i^j \right| \qquad (i = 1, 2, \ldots, n)$$

with the corresponding system of equations

$$\sum_{j=0}^{s} x_i^j d_j + \sum_{j=0}^{r} \left(- y_i^{-1/q} x_i^j\right) c_j = 0 \qquad (i = 1, 2, \ldots, n) \tag{20}$$

(5) Arc tangents of rational functions:

$$f(c;x) = \arctan \left(\sum_{j=0}^{r} c_j x^j \Big/ \sum_{j=0}^{s} d_j x^j \right). \tag{21}$$

The auxiliary problem is to optimize c_j, d_j such that

$$\max_i \left| \sum_{j=0}^{r} c_j x_i^j - (\tan y_i) \sum_{j=0}^{s} d_j x_i^j \right| \qquad (i = 1, 2, \ldots, n)$$

is least. The associated system of equations is

$$\sum_{j=0}^{r} x_i^j c_j + \sum_{j=0}^{s} \left(- x_i^j \tan y_i \right) d_j = 0 \qquad (i = 1, 2, \ldots, n) \tag{22}$$

(6) Functions of rational functions:

$$f(c, x) = \phi \left(\sum_{j=0}^{r} c_j x^j \Big/ \sum_{j=0}^{s} d_j x^j \right) \tag{23}$$

Where ϕ possesses a unique inverse ψ.

The auxiliary problem is to minimize

$$\max_i \left| \sum_{j=0}^{r} c_j x_i^j - [\psi(y_i)] \sum_{j=0}^{s} d_j x_i^j \right| \qquad (i = 1, 2, \ldots, n).$$

The associated system of equations is

$$\sum_{j=0}^{r} x_i^j c_j + \sum_{j=0}^{s} \left\{ - [\psi(y_i)] x_i^j \right\} d_j = 0 \qquad (i = 1, 2, \ldots, n) \tag{24}$$

An alternative auxiliary problem is to minimize

$$\max_i \left| \sum_{j=0}^{s} d_j x_i^j - \frac{1}{\psi(y_i)} \sum_{j=0}^{r} c_j x_i^j \right| \qquad (i = 1, 2, \ldots, n).$$

The corresponding system of equations is

$$\sum_{j=0}^{s} x_i^j d_j + \sum_{j=0}^{r} \left[\frac{-1}{\psi(y_i)} x_i^j \right] c_j = 0 \qquad (i = 1, 2, \ldots, n). \tag{25}$$

This last example subsums all five preceding examples as special cases.

In all of the above examples except the first, it was necessary to make a transformation to obtain a set of equations linear in the coefficients. Consequently the minimization of the vector

$$|F(C) - Y|$$

is replaced by the minimization of the vector

$$|g[F(C)] - g(Y), |$$

where g is the transformation. In general, these two minima are not equal but often are nearly equal. Hence, it is necessary to provide an independent check on the results obtained by linear programming whenever such a transformation is used.

The Differential Correction Approach (Least Squares)

As noted previously, the least-squares approximation is adaptable to functions not linear in the coefficients. This fact is not generally known for two reasons. First, the very common use of the polynomial in curve fitting as implemented by the least-squares approximation entails only simultaneous linear equations in the undetermined coefficients; and second, the additional labor required to adapt the method of least-squares to a function nonlinear in the coefficients is seldom warranted by the advantage in accuracy gained in the use of this function over the use of a polynomial. Therefore, a brief description of the method of least-squares, particularly as it applies to functions nonlinear in the coefficients, is now given. It is desired to fit the function

$$y = f(x, c_j) \qquad (j = 1, 2, \ldots, m) \tag{26}$$

to a set of data points

$$(x_i, y_i) \qquad (i = 1, 2, \ldots, n).$$

It is assumed that $n > m$ so that the system is overdetermined. Let v_i be the residual or deviation of the computed value from the observed value of the ordinate; thus,

$$v_i = f(x_i) - y_i. \tag{27}$$

The method of least-squares requires that the coefficient vector c be so chosen that

$$S = \sum_{i=1}^{n} v_i^2 \tag{28}$$

shall be made a minimum. This requirement is met by setting the partial derivative of S with respect to each coefficient c_j equal to zero and solving the resultant set of m simultaneous equations for

$$c_j \; (j = 1, 2, \ldots, m).$$

Thus, we have

$$\frac{\partial S}{\partial c_j} = 2 \sum_{i=1}^{n} v_i \frac{\partial v_i}{\partial c_j} = 2 \sum_{i=1}^{n} \left[f(x_i) - y_i\right] \frac{\partial f_i}{\partial c_j} = 0 \tag{29}$$

$$(j = 1, 2, \ldots, m).$$

These equations are called normal equations. If $f(x)$ is linear in the coefficients, these normal equations will also be linear in the coefficients and, hence, easy to solve. If $f(x)$ is not linear in the coefficients, the normal equations may yet be easy to solve; in general, however, the solutions are difficult to obtain. Two approaches to solving these normal equations are described below. Both schemes are based on the Newton-Raphson method of solving one equation in one unknown and, hence, require good initial estimates of the unknowns. These estimates are "corrected" by means of increments computed on a differential basis; hence, the name "method of differential corrections" is applied to both schemes. In one approach these corrections are applied successively to each unknown in turn; in the other approach the corrections are applied simultaneously to all the unknowns. Both approaches can be iterated until the desired accuracy is achieved, provided the initial estimates are sufficiently good.

The computer program implementing the method of differential corrections consists of three different subprograms: a starting procedure, a procedure implementing the method of "successive differential corrections", and a procedure implementing the method of "simultaneous differential corrections."

The starting procedure is heavily dependent on the choice of the function $f(c;x)$ to be fitted. However, the methods of successive and simultaneous differential corrections can be described in general terms.

The quantity S (defined earlier) is a function of each coefficient c_j. It follows that

$$(\partial S) = \frac{\partial S}{\partial c_j} \, dc_j \; . \tag{30}$$

The method of successive differential corrections considers each c_j in turn and imposes on it the full responsibility for S being nonzero. Thus, combining this assumption with the use of the above exact differential relation as an approzimation for finite increments yields:

$$\Delta c_j \cong -S \frac{\partial S}{\partial c_j} \tag{31}$$

where Δc_j is the desired correction. Despite the coarseness of this approximation, its use for correcting the coefficients sequentially can be made to be a convergent process.

If the other parameters $c_1, c_2, \ldots, c_{j-1}, c_{j+1}, \ldots, c_m$ were already optimized, this would be the differential correction engendered by the Newton-Raphson process.

It is clear that the success of this scheme depends on the quality of the preceding starting procedure.

For the method of simultaneous differential corrections, the quantity $f(c, x_i)$, which is a function of all the coefficients, is expanded into a Taylor's series. For the purposes of this effort the series would be truncated beyond the linear terms. Taylor's expansion about the initial estimates of the coefficients is as follows:

$$f(c, x_i) = f(c_o, x_i) + \sum_{j=1}^{m} \left.\frac{\partial f}{\partial c_j}\right|_o (c_j - c_{jo}) + \ldots, \tag{32}$$

Then S is expressed as

$$S = \sum_{i=1}^{n} \left[f(c_o, x_i) + \sum_{j=1}^{m} \left(\frac{\partial f}{\partial c_j}\right)_o (c_j - c_{jo}) + \ldots - y_i \right]^2, \tag{33}$$

where the subscript zero means evaluated at $c_j = c_{jo}$ $(j = 1, 2, \ldots, m)$ and c_{jo} is the initial estimate of c_j. Let $c_j - c_{jo} = \Delta c_j$. Then

$$S \cong \sum_{i=1}^{n} \left[f(c_o, x_i) + \sum_{j=1}^{m} \left(\frac{\partial f}{\partial c_j}\right)_o \Delta c_j - y_i \right]^2 \tag{34}$$

Assuming that good initial estimates of the coefficients can be made, the problem of correcting these estimates can be transformed from one of solving simultaneous nonlinear equations in the unknown c_j's into one of solving simultaneous linear equations in the unknown Δc_j's. This is done by setting the partial derivatives of S with respect to Δc_j equal to zero. Then,

$$\frac{\partial S}{\partial(\Delta c_j)} = 2\sum_{i=1}^{n}\left[f(c_o, x_i) + \sum_{j=1}^{m}\left(\frac{\partial f}{\partial c_j}\right)_o \Delta c_j - y_i\right]\left(\frac{\partial f}{\partial c_j}\right)_o = 0 \qquad (35)$$

$$(j = 1, 2, \ldots, m).$$

These m equations in the unknown Δc_j's are called normal equations and are treated in references 1, 2, and 3. In the last reference this procedure is called the Newton-Raphson method for simultaneous equations. These equations, when solved, yield the correction terms needed to improve the estimates; thus,

$$c_j = c_{jo} + \Delta c_j \; (j = 1, 2, \ldots, m). \qquad (36)$$

The new values of c_j can, in like manner, be further corrected.

As an example of the computer implementation of differential corrections consider the function

$$y = \frac{c_1 + c_2 x + c_3 x^2}{\sqrt{1 + c_4 e^{c_5 x}}}, \qquad (37)$$

which is fitted by the procedures described in this section. The starting procedure is as follows. For positive c_5, an assumption which is likely to be satisfied (ref. 4), assume that $\exp(c_5 x)$ is negligibly small at the three leftmost points (x_1, y_1), (x_2, y_2), and (x_3, y_3). Then starting values for c_1, c_2, and c_3 can be found by fitting a parabola through these three points (x_1, y_1) $i = 1, 2, 3$. With these values of c_1, c_2, c_3, we can find values for c_4 and c_5 by fitting the function $f(c;x)$ through the last two points (x_{n-1}, y_{n-1}) and (x_n, y_n). This process is repeated until there is no further improvement. The computer program then proceeds to apply successive differential corrections. Finally, simultaneous differential corrections are made, and the final results printed out.

Comparison of the Methods of Linear Programming and Differential Corrections

The linear programming method is restricted to certain approximating functions which lead to linear systems of equations. However, for such functions this method works very well. Essentially the linear programming method is a finite algorithm which yields the best possible set of parameters in a finite number of steps. Thus it is very fast and highly efficient in actually locating the best possible set of parameters.

Moreover, changes in the type of approximating function can be implemented easily.

It is, therefore, felt that the linear programming method is a good exploratory tool, for the restricted set of approximating functions to which it is applicable.

On the other hand, the method of differential corrections, while able to handle all types of approximating functions, no matter how nonlinear and transcendental, suffers from the drawback that the method is iterative and, hence, possibly slow.

Also, the method fails to converge on the desired solutions if the initial estimates are not sufficiently good. This makes it very clear that this method is highly sensitive to the quality of the starting values. If these values are good, that is, near to the optimum, the method of differential corrections will converge to that optimum very fast. However, if the starting values are far from the optimum, this process breaks down and no improvement ensues.

FUNCTIONS INVESTIGATED

Functions identified by previously described techniques were examined for applicability to fitting radiance profiles by several methods. The resulting curve shape was analyzed through examination of derivatives and location of inflection point. Also, one or more profiles were fitted to the curves, and the residuals were analyzed. Finally, the transformed variables were plotted and analyzed. Initially, the profiles used for fitting were those of Wark, et al (ref. 5); later in the study, climatological profiles calculated by the horizon definition study radiance profile synthesizer were used. All functions which were considered are listed in Table 13. The basis for identification, the investigatory techniques used, and the results are discussed below. Function 3, ratio of two polynomials, produced the most accurate fit although 10 coefficients were required. Function 7, trigonometric series, produced nearly the same accuracy with only 5 coefficients. These functions were selected to be fitted to 20 profiles representing averages for polar to tropical latitudes for four seasons. The results are presented following the discussion of all functions considered.

Function 1

$$N = \sum_{k=0}^{n} A_k h^k$$

The polynomial approximation can be made to fit an arbitrary number of points exactly, provided that a sufficient number of terms are used. In this application, at least four terms must be used to provide the two inflection points characteristic of profiles which exhibit limb brightening. To satisfy the asymptotic

TABLE 13.- FUNCTIONS IDENTIFIED FOR EMPIRICAL CURVE FITTING

1.	$\sum A_k h^k$
2.	$\dfrac{A_0 (A_1 + h)}{h^2 + A_2 h + A_3}$
3.	$\dfrac{\sum_{o}^{r} C_j h^j}{1 + \sum_{1}^{s} D_k h^{2k}}$
4.	$\dfrac{A_0 + A_1 h + A_2 h^2}{\sqrt{1 + A_3 e^{A_4 h}}}$
5.	$(A_0 + A_1 h) e^{-A_2 (h - A_3)^2}$
6.	$A_0 + A_1 h + A_3 e^{-A_4 (h - A_5)^2}$
7.	$\sum_{m=1}^{n} A_{2m-1} \cos (2m-1)\theta$
8.	$A_0 e^{A_1 h}$
9.	$A_0 h^{A_1}$
10.	$A_0 + \dfrac{A_1}{h}$
11.	$\dfrac{h}{A_0 + A_1 h}$
12.	$A_0 + A_1 e^{A_2 h}$

TABLE 13. - FUNCTIONS IDENTIFIED FOR EMPIRICAL CURVE FITTING Concluded

13. $A_0 + A_1 h^{A_2}$

14. $A_0 + A_1 h + A_2 e^{A_3 h}$

15. $A_0 A_1^{h} A_2^{A_3^{h}}$

16. $A_0 e^{A_1 h} + A_2 e^{A_3 h}$

$e^{A_0 h}(A_1 \cos A_2 h + A_3 \sin A_2 h)$

17. $\dfrac{A_0(A_1 - h)}{\sqrt{A_2^2 + (A_1 - h)^2}}$

18. $A_0 \left[1 - e^{-(A_1 - h)/A_2}\right]$

19. $\dfrac{A_0 + A_1 h}{\sqrt{1 + A_2 h^2 + A_3 h^4}}$

20. $\dfrac{A_0 + A_1 \ln h}{\sqrt{1 + A_2 (\ln h)^2 + A_4 (\ln h)^4}}$

21. $A_0 \tan^{-1} \dfrac{A_1 + A_2 h}{1 + A_3 h + A_4 h^2}$

22. $A_0 \tan^{-1} \dfrac{A_1 + A_2 \ln h}{1 + A_3 \ln h + A_4 \ln^2 h}$

23. $\dfrac{A_0 e^{-A_1 h}}{h^2 + A_2 h + A_3}$

nature of the profile at large tangent heights, the additional constraints which drive both radiance and slope to zero at the applicable tangent height are required. Also, slope and curvature constraints must be imposed to insure reproduction of the profile shape in the vicinity of peak radiance. With these additional constraints, the coefficients of a four-term polynomial are overdetermined. Higher-degree polynomials are undesirable because of the requirement that no real roots exist in the applicable tangent height range and the lack of control over shape of the polynomial fit between points used to determine the coefficients. This functional form was not considered further.

Function 2

$$N = \frac{A_0(h+A_1)}{h^2+A_2h+A_3}$$

This function is a generalization of the torque-versus-slip characteristic of induction motors (see Figure 25). Coefficients were obtained by fitting three points, zero radiance, peak radiance, and radiance at zero tangent height, on the radiance profiles calculated by Wark et al., (ref. 5), see Figures 26 and 27, and imposing the condition that the slope be zero at the altitude of peak radiance. This condition on the derivative was imposed to ensure that limb brightening, as exhibited in all of Wark's profiles, would be reproduced by the function. The results, for Wark's atmosphere A are shown in Figure 28 which illustrates the poor fit obtainable by this function. Since the function produced a curve having nearly the correct shape, it appeared that a good fit could be obtained by minor modification to the functional form. To determine one such modification, several sets of the four coefficients were calculated using four points in different regions of one profile. The behavior of the coefficients, as the set of four points used was varied across the profile from lower to higher tangent heights, would determine whether the coefficients themselves were some function of tangent height which would lead to a modification of the functional form. However, as shown in Figure 29 and Table 14, the coefficients did not exhibit systematic behavior with tangent height.

A second modification, that of adding terms to both numerator and denominator, was tried as discussed under the next functional form.

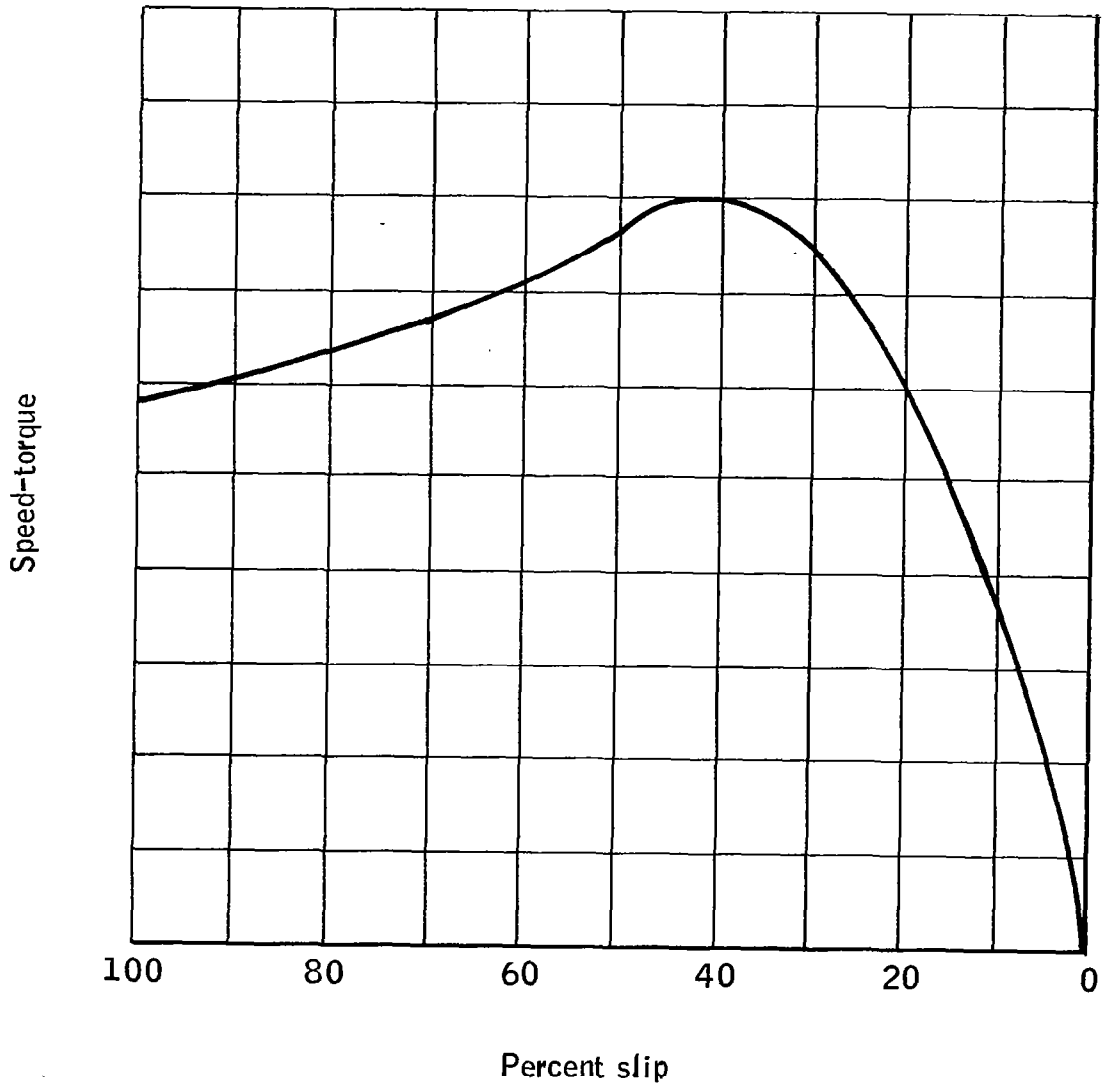
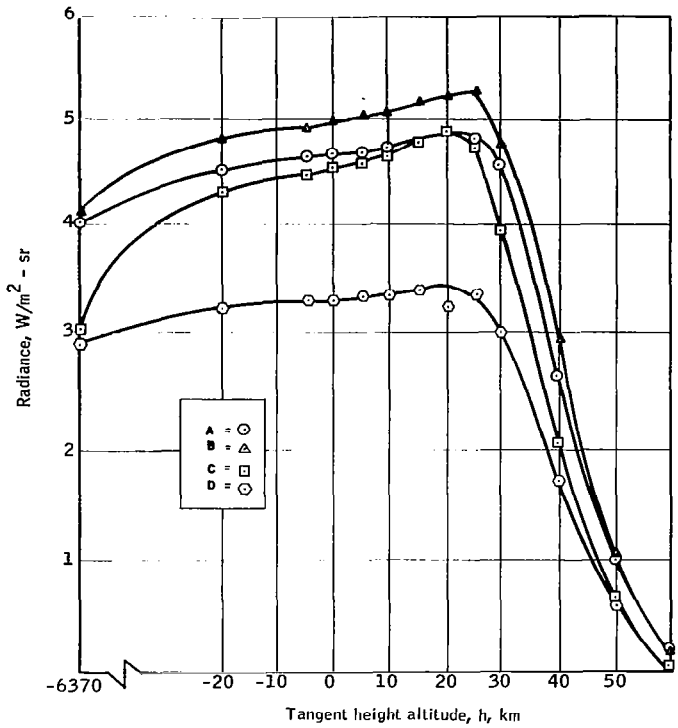
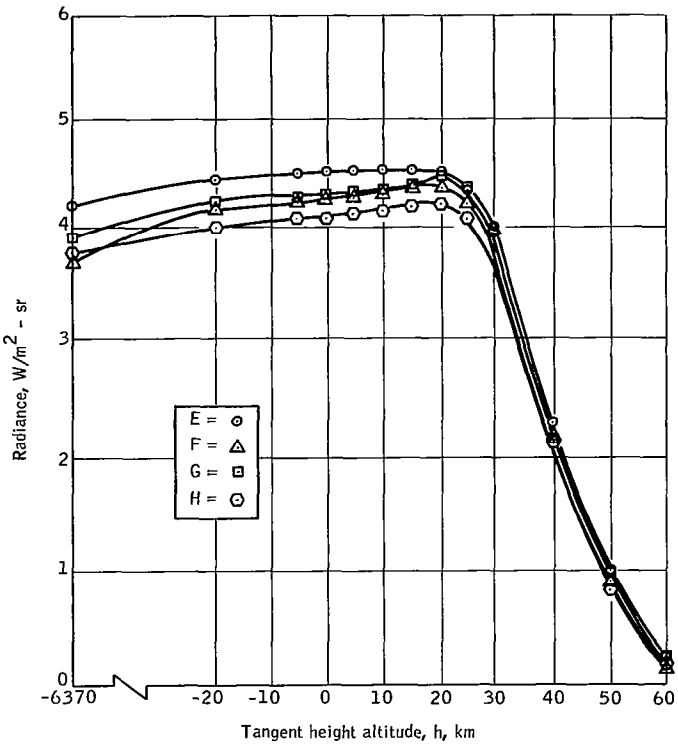


Figure 25. Speed-Torque Curve Resembling a Radiance Profile



Designation	Location	Weather conditions	Total water vapor g/cm^2	Total ozone content, cm-atmospheres	Date	Time of day, GMT hrs.
A	(ARDC. Standard)	Clear	1.334	0.435	1959	0000
B Summer Tropical	Albuquerque, New Mexico	Clear	1.363	0.289	7-11-58	1200
C Summer Tropical	Ponape, Caroline Islands	Undercast at 100 mb pressure	0.001	0.293	5-17-58	1200
D Arctic Winter	Resolute Northwest Territory	Undercast at 400 mb pressure	0.007	0.273	12-31-58	1200

Figure 26. Atmospheric Models A, B, C and D (Radiance versus Altitude, 14.29 to 16.0 Microns) [From ref. 5]



Designation	Location	Weather conditions	Total water vapor, g/cm^2	Total ozone content, cm-atmospheres	Date	Time of day, GMT hrs.
E Arctic Summer	Isachsen, Northwest Territory	Clear	0.265	0.255	9-29-58	1200
F Arctic Winter	Barter Island, Alaska	Clear	0.117	0.273	1-1-58	1200
G Tropical Summer	Kindley, Bermuda	Clear	5.078	0.255	8-1-58	1200
H	Thule, Greenland	Clear	0.159	0.254	10-20-58	0000

Figure 27. Atmospheric Models E, F, G and H (Radiance versus Altitude, 14.29 to 16.0 Microns)
[From ref. 5]

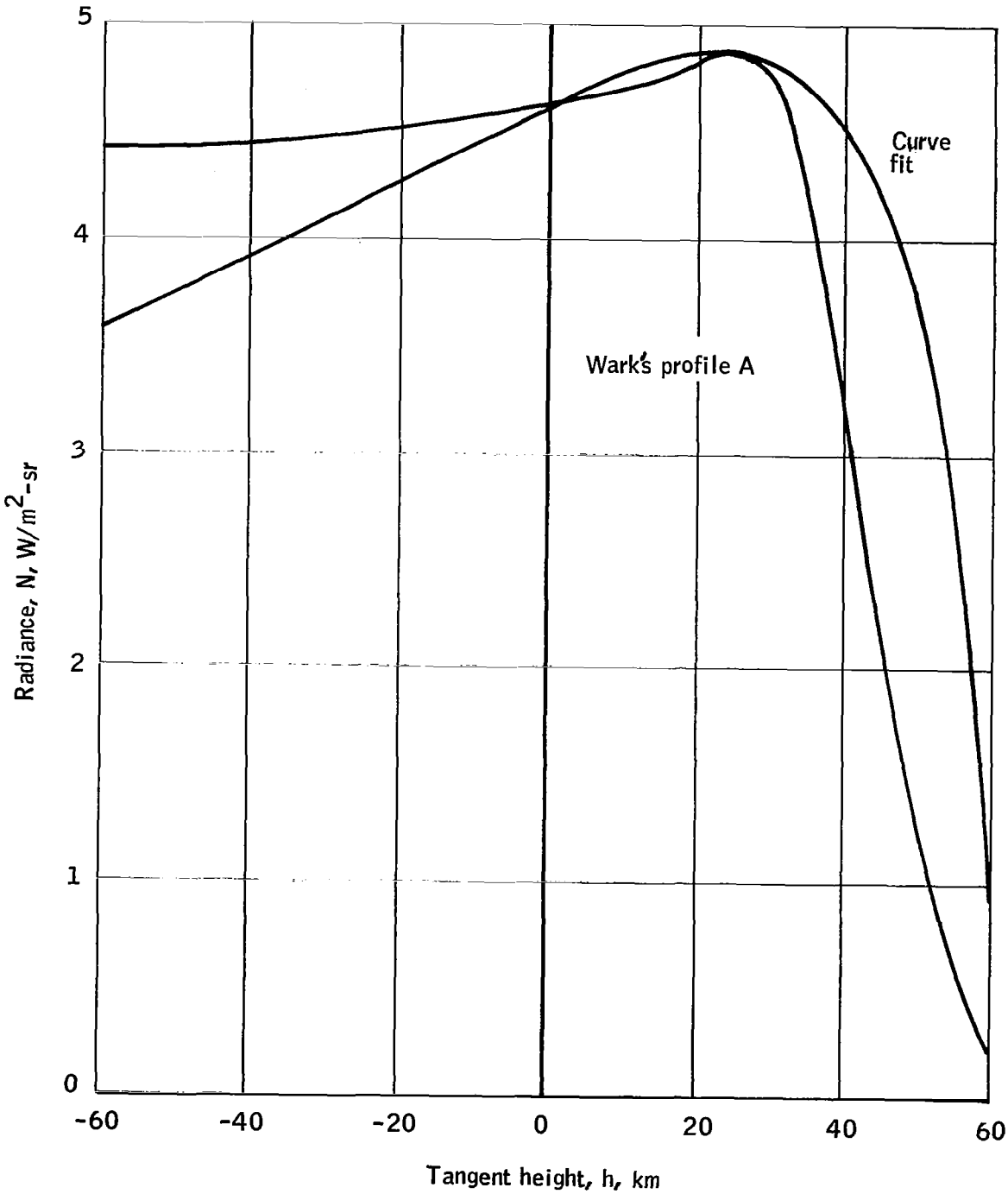


Figure 28. Curve Fit, Function 2

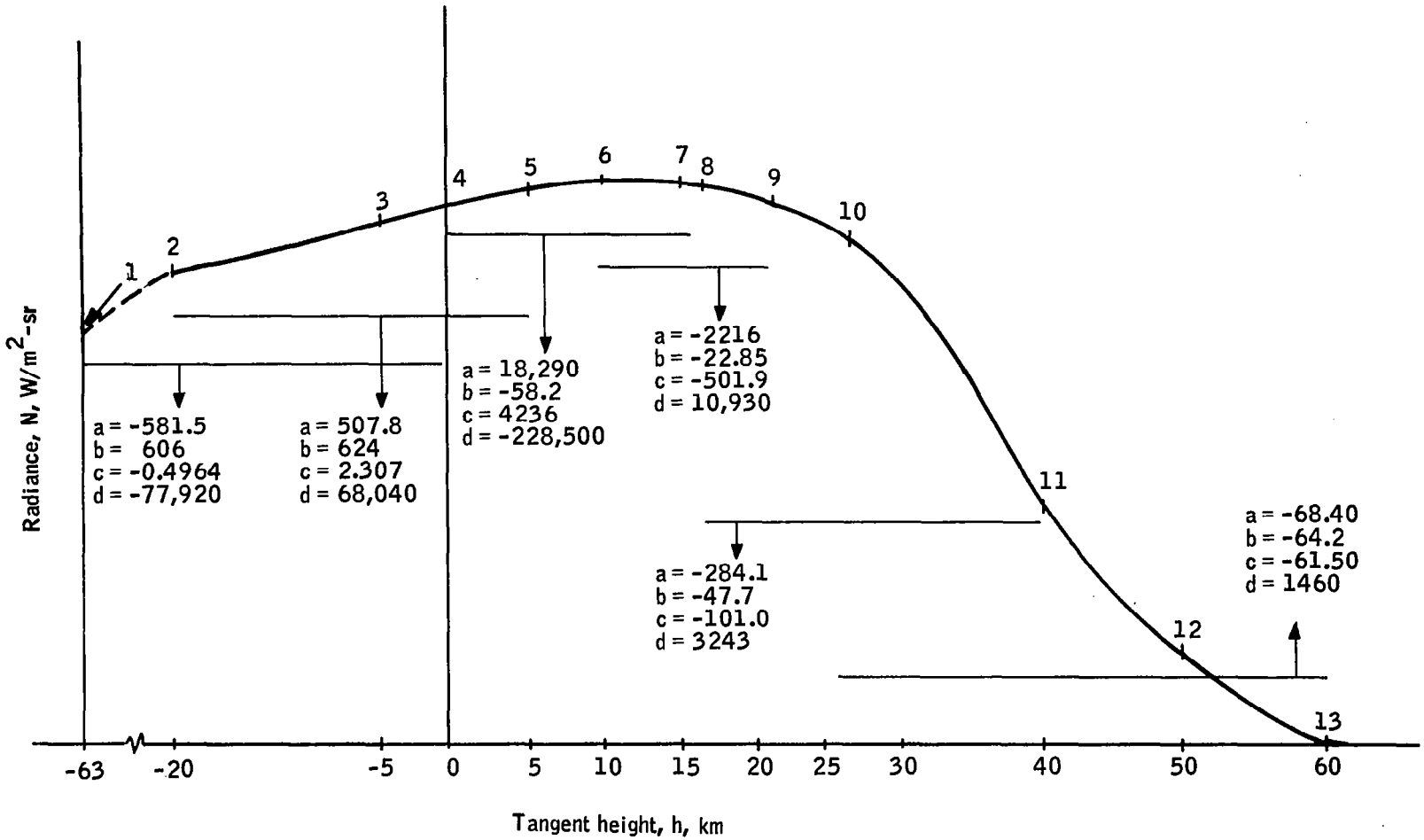


Figure 29. Coefficient Variation Over Tangent Height Regions, Function 2

TABLE 14.-VARIATION OF COEFFICIENTS, FUNCTION 2

Tangent heights fit, km	A_0	A_1	A_2	A_3
-63, -20, -5, 0	-5.815×10^{2}	6.06×10^{2}	-4.964×10^{-1}	-7.792×10^{4}
-20, -5, 0, 5	5.078×10^{2}	6.24×10^{2}	2.307×10^{0}	6.804×10^{4}
0, 5, 10, 15	1.829×10^{4}	-5.82×10^{1}	4.236×10^{3}	-2.285×10^{5}
10, 15, 20, 25	-2.216×10^{3}	-2.285×10^{1}	-5.019×10^{2}	1.093×10^{4}
20, 25, 30, 40	-2.841×10^{2}	-4.77×10^{1}	-1.010×10^{2}	3.243×10^{3}
30, 40, 50, 60	-6.840×10^{1}	-6.42×10^{1}	-6.150×10^{1}	1.460×10^{3}
	$N = \dfrac{A_0(A_1 + h)}{h^2 + A_2 h + A_3}$			

Function 3

$$N = \frac{\sum_{j=0}^{r} c_j h^j}{1 + \sum_{k=1}^{s} D_k h^{2k}}$$

Here the denominator was restricted to include only even powers to avoid the occurrence of real poles and then to fit, by linear programming, Wark's profile for various numbers of terms in numerator and denominator.

For this particular profile, the results shown below were obtained. Tabulated are values of the maximum residual, M, between Wark's profile A and the fitted profile for different combinations of r, the degree of the numerator polynomial, and s, the number of coefficients in the denominator polynomial.

r	s	M, W/m^2-sr
1	1	1.4964
4	3	0.1639
5	4	0.0217
6	5	0.0085

As expected, the residual decreases rapidly with increasing number of terms. This form with $r = 5$ and $s = 4$ was ultimately selected as representing the best compromise between accuracy of fit and number of terms. Twenty climatological profiles were fitted with this function, the complete results are presented in a subsequent paragraph. The resulting fits for two profiles are shown here for illustration in Figures 30 and 31.

Function 4

$$N = \frac{A_0 + A_1 h + A_2 h^2}{\left(1 + A_3 e^{A_4 h}\right)^{1/2}}$$

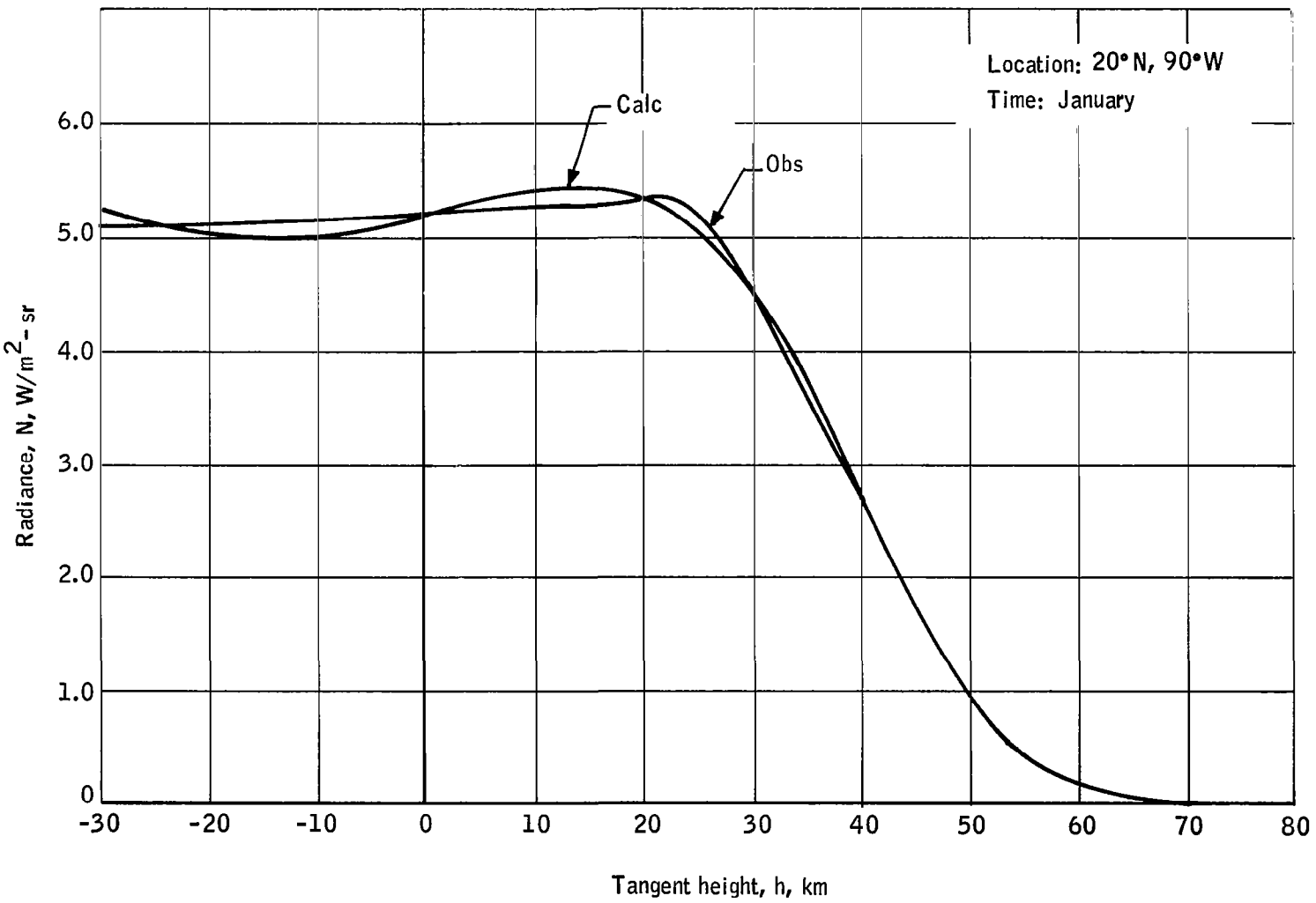


Figure 30. Ratio of Two Polynominals Curve Fit, Profile No. 843

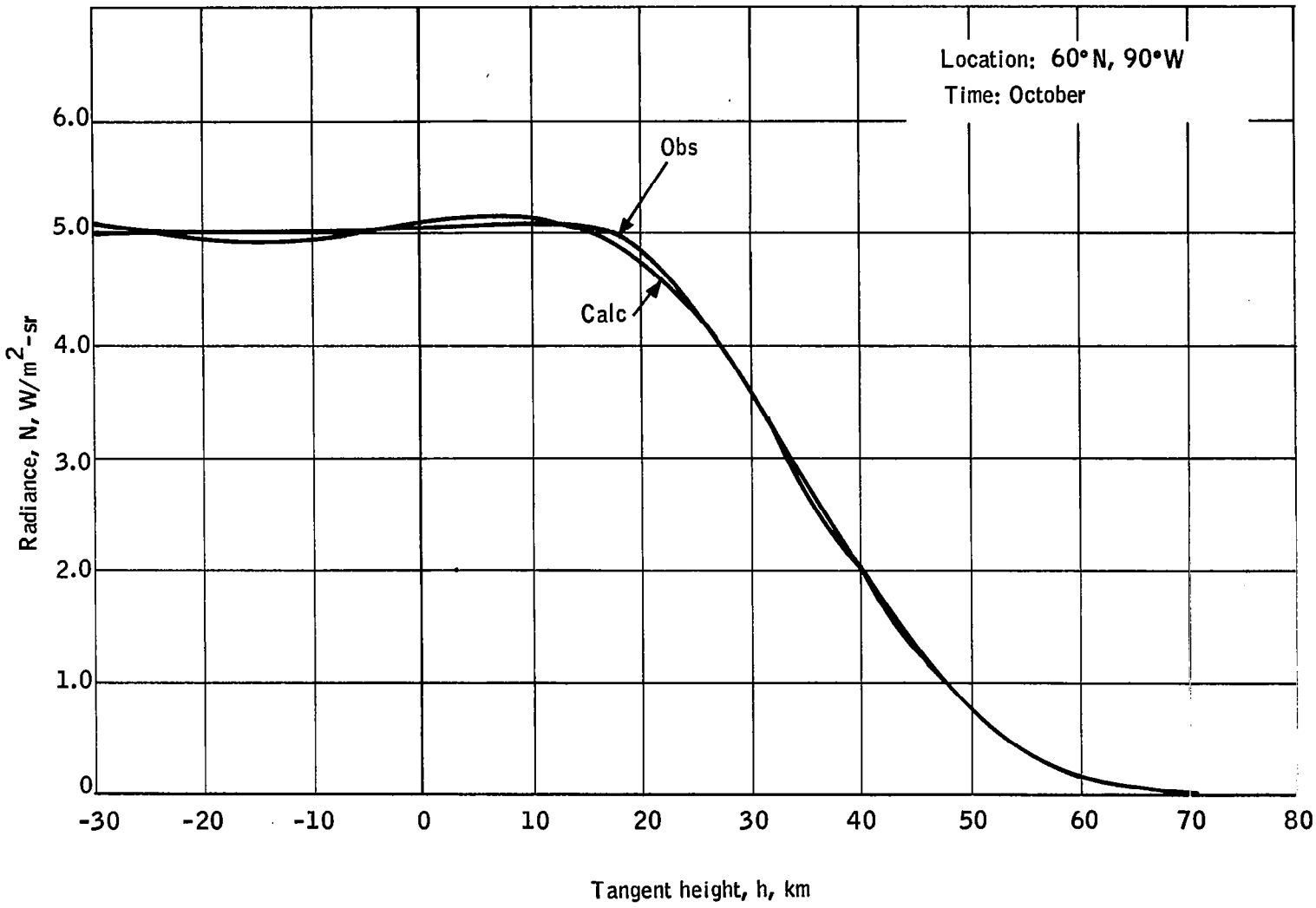


Figure 31. Ratio of Two Polynominals Curve Fit, Profile No. 1023

This function is a modification to increase generality of one previously analyzed in reference 4 . The function given there is

$$N = \frac{A_o}{\left(1 + A_1 e^{A_2 h}\right)^{1/2}} \tag{38}$$

which produced good results for an arctic winter profile but poor results for other profiles.

The modified function was fitted to Wark's eight profiles by the method of differential corrections using two different initial estimates. Each estimate of starting values of the five coefficients was based in fitting five points on the radiance profile. In the first estimate, radiance values at the three lowest and two highest available tangent heights from Wark's tabulation were used; in the second estimate, the two lowest and three highest available tangent heights were used. Results for two profiles are shown in Figures 32 and 33. Maximum residuals and the altitude of maximum residual for all eight profiles for each starting method are shown in Table 15.

This function was fitted again to Wark's eight profiles, but only for tangent heights greater than minus twenty kilometers, to determine any improvements resulting from omission of the very low tangent heights in some of Wark's tabulations. A slight improvement occurred in some cases, but larger residuals occurred in others.

Functions 5 and 6

The similarity between the shape of the Gaussian distribution curve and the radiance profile suggests that a modification of the error function might result in a good fit. Two such modifications were examined.

<u>Function 5.</u> -- $N = (A_o + A_1 h)\, e^{-A_2 (h - A_3)^2}$

<u>Function 6.</u> -- $N = A_o + A_1 h + A_3 e^{-A_4 (h - A_5)^2}$

For both functions, the first two derivatives show that neither can meet the requirement of high curvature and asymptotic type approach to zero radiance simultaneously.

Function 7

$$N = \sum_{m=1}^{n} A_{2m-1} \cos (2m-1)\, \theta$$

$$\theta = \frac{\pi (h - h_{min})}{2\,(h_{max} - h_{min})}$$

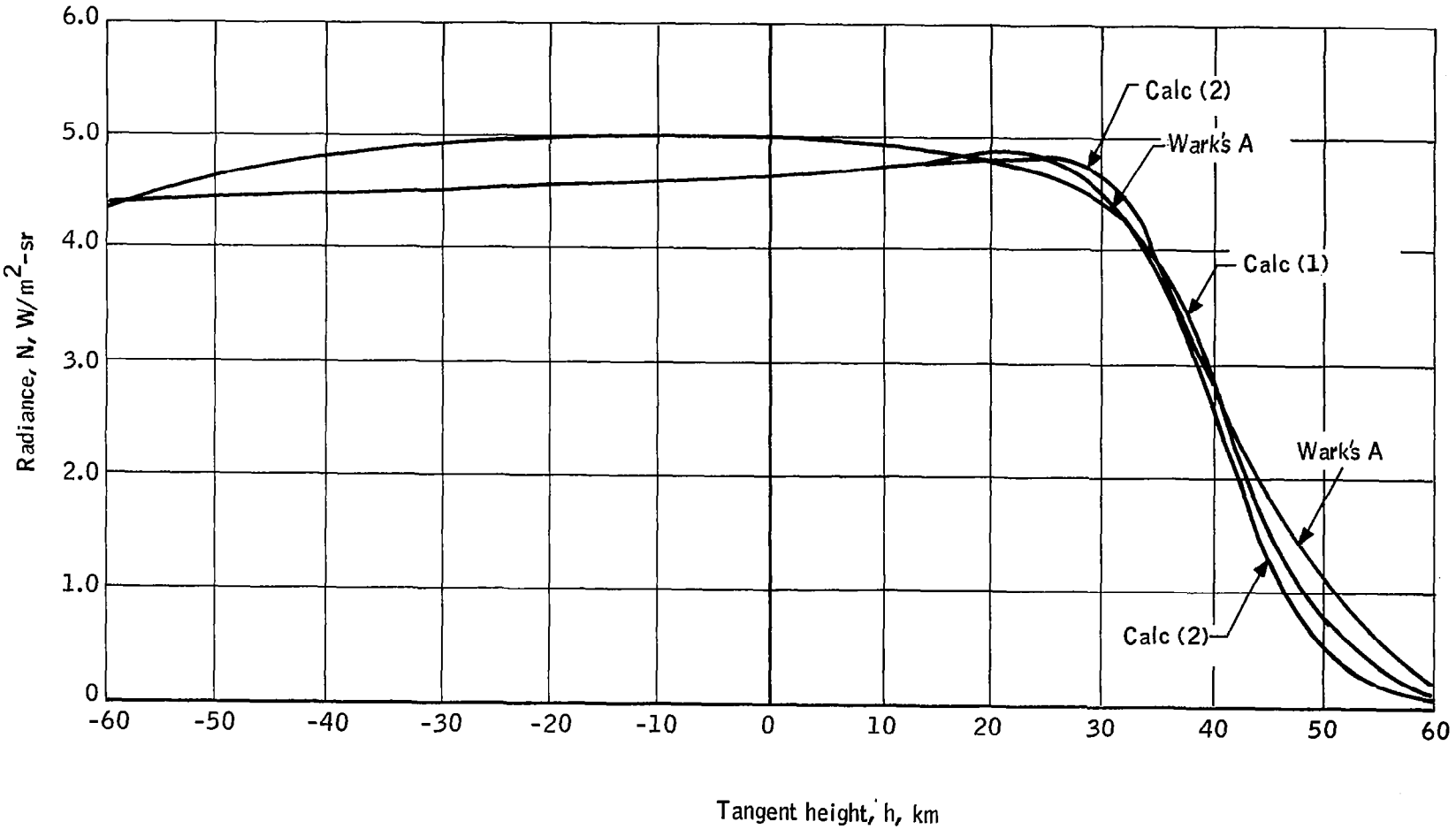


Figure 32. Curve Fit Results for Function 4, Wark's Atmosphere A

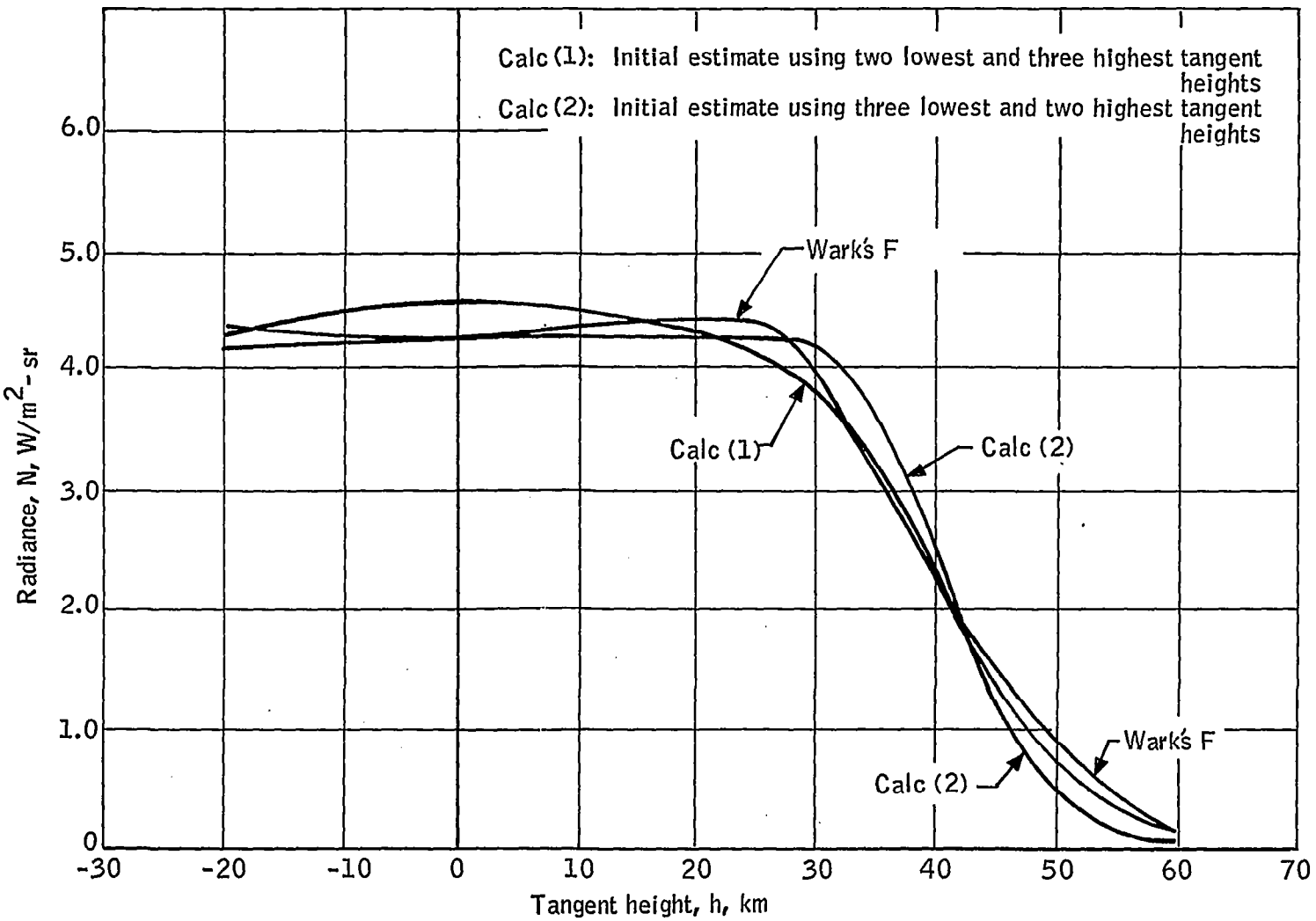


Figure 33. Curve Fit Results for Function 4, Wark's Atmoshpere F

TABLE 15.- FUNCTION 4 CURVE FIT MAXIMUM RESIDUALS

Profile no.	Initial condition 1		Initial condition 2	
	Tangent height altitude, km	Residual, W/m^2-sr	Tangent height altitude, km	Residual, W/m^2-sr
A	50	.5707	-20	.4493
B	50	.6045	-20	.5592
C	30	.8017	-20	.6750
D	50	.4770	40	.3220
E	50	.5435	40	.3719
F	50	.5892	50	.3870
G	50	.6586	25	.9112
H	50	.6212	20	.7271

A trigonometric series is suggested by the resemblance of the radiance profile, between zero and peak radiance, to a sine or cosine curve. In the tangent height range of -30 to +80 km, those profiles with limb brightening resemble one quarter cycle of a sine wave distorted by a symmetrically phased third harmonic. By constructing the proper images of the profile, as in Figure 34, a complete period of such a waveform was obtained which was subjected to Fourier analysis to determine the harmonic components. For the waveform of Figure 34, a series consisting of only odd harmonic cosine terms results leading to the form of the series given above.

Determination of five coefficients, i. e., through the ninth harmonic, was made for two of the climatological profiles. Excellent results were obtained as shown in Figures 35 and 36 for altitudes above the altitude of peak radiance, although near zero radiance the fit did go slightly negative for one profile. Examination of the residuals and further analysis of the function leading to an improved fit was done, but results were not available in time to obtain additional curve fits; the results must then be regarded as suggested improvements. Figures 37 and 38 show plots of the residual, i. e., difference between synthesized and fitted radiance vs tangent height for the two profiles of Figures 39 and 40. Note that the residuals exhibit a periodic component, the 11th harmonic, and, thus, would be significantly reduced by the addition of one more term to the trigonometric series. A second improvement can be made by removing the restriction, applied in the first approach, that radiance is zero at 80 kilometers. This restriction was initially applied to allow proper imaging of the profile to obtain one complete period for Fourier analysis.

The Fourier expansion as written always yields N=0 at 80 kilometers. Therefore, if the value of N at h=80 were subtracted from all the data values of N before the Fourier expansion is executed and, afterwards, added to all the computed values, the goodness of fit should be markedly improved.

Denote N at h=80 by N_r. Then the corrected Fourier expansion would be

$$N = N_r + \sum_{m=1}^{\infty} A_{2m-1} \cos (2m-1)\,\theta . \qquad (39)$$

The coefficients A_{2m-1} would be found from the integral expression

$$A_n = \frac{2}{h_{max}-h_{min}} \int_{h_{min}}^{h_{max}} (N-N_r) \cos \frac{n\pi\,(h-h_{min})}{2(h_{max}-h_{min})}\, dh \qquad (40)$$

where N= 2m-1. If the inclusion of one more harmonic and the constant term N_r should prove sufficient for achieving the desired accuracy, the Fourier series would require only seven undetermined coefficients as compared to ten by the rational polynomial for comparable and possibly better representation of a profile.

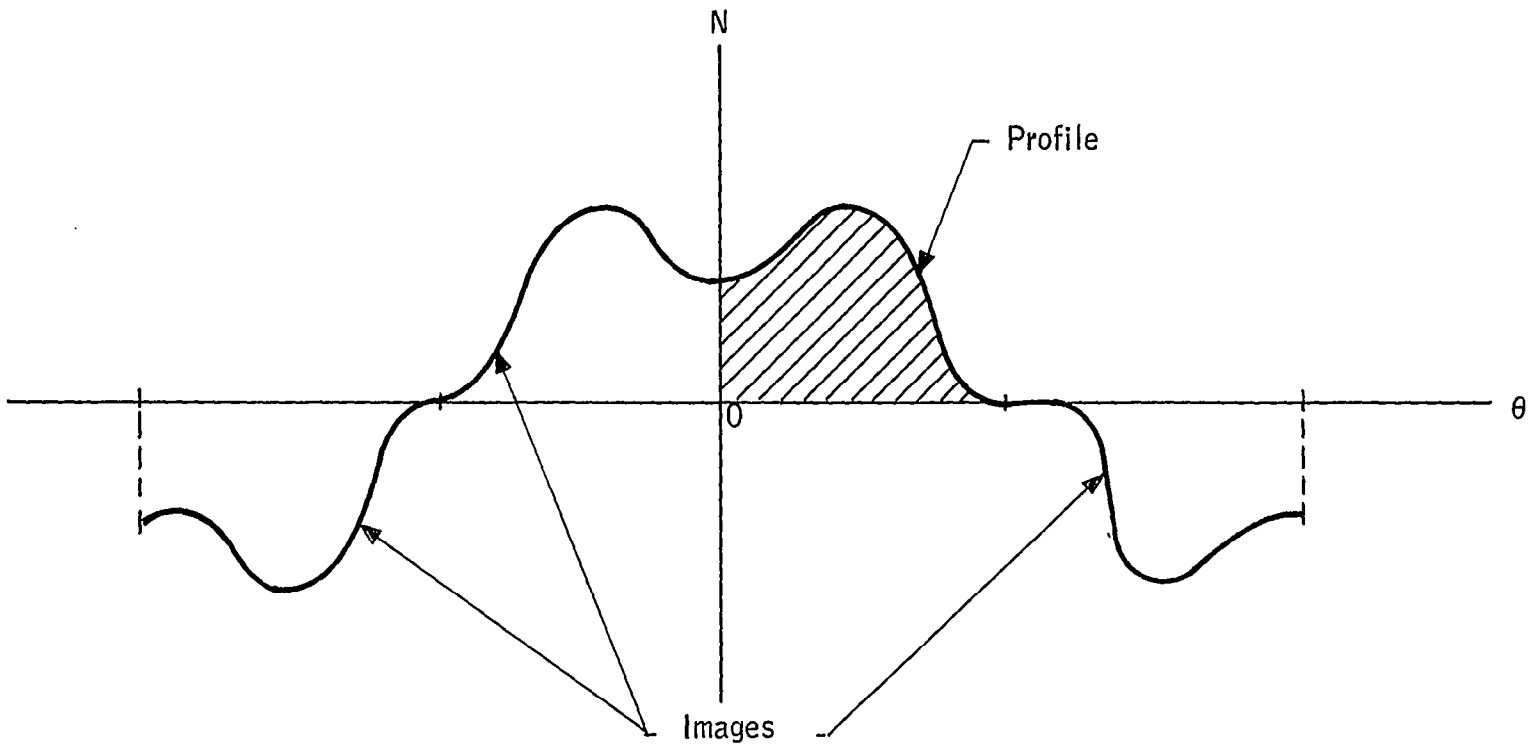


Figure 34. Synthesized Waveform From Radiance Profile

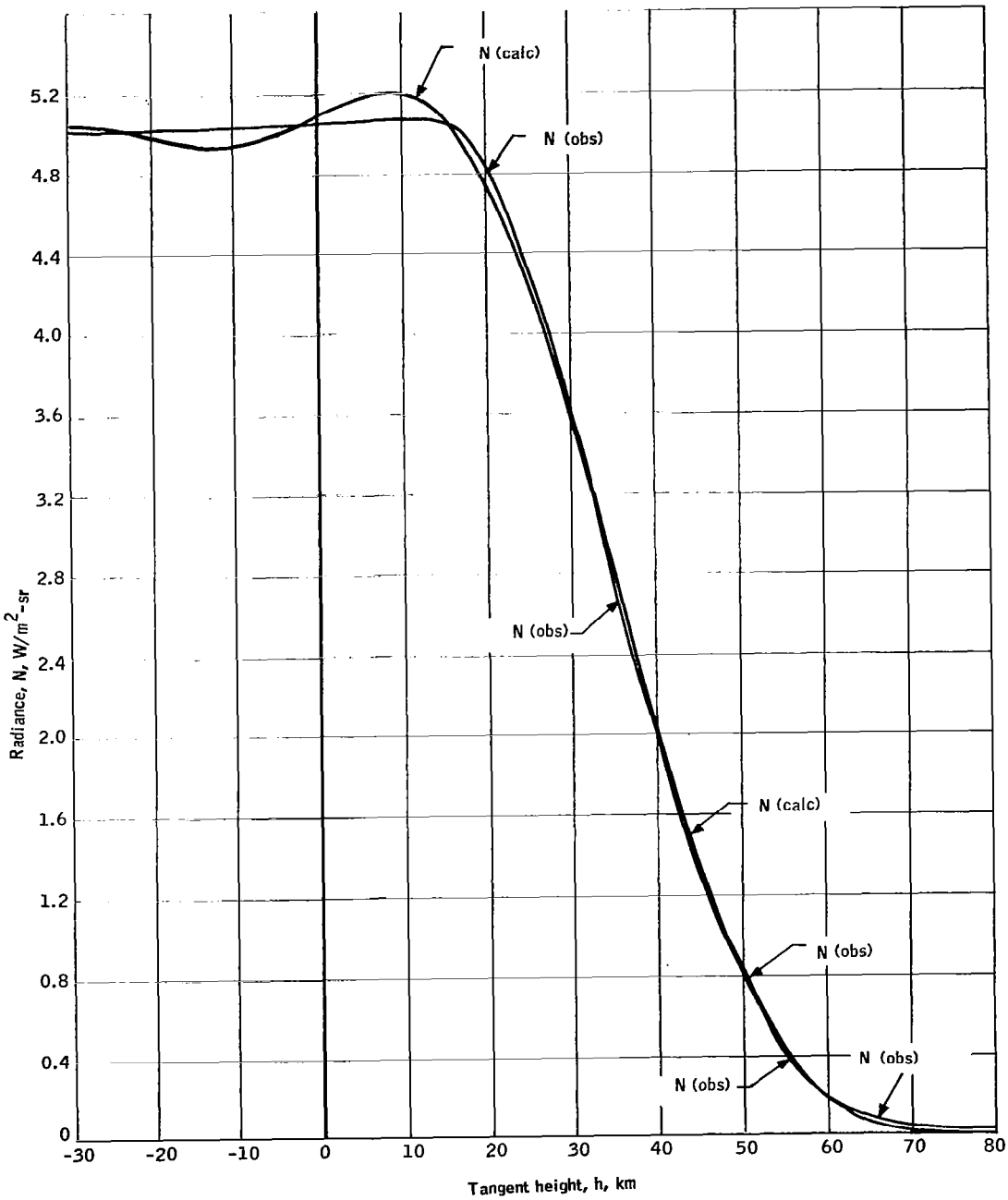


Figure 35. Trigonometric Series Curve Fit to Profile 1023

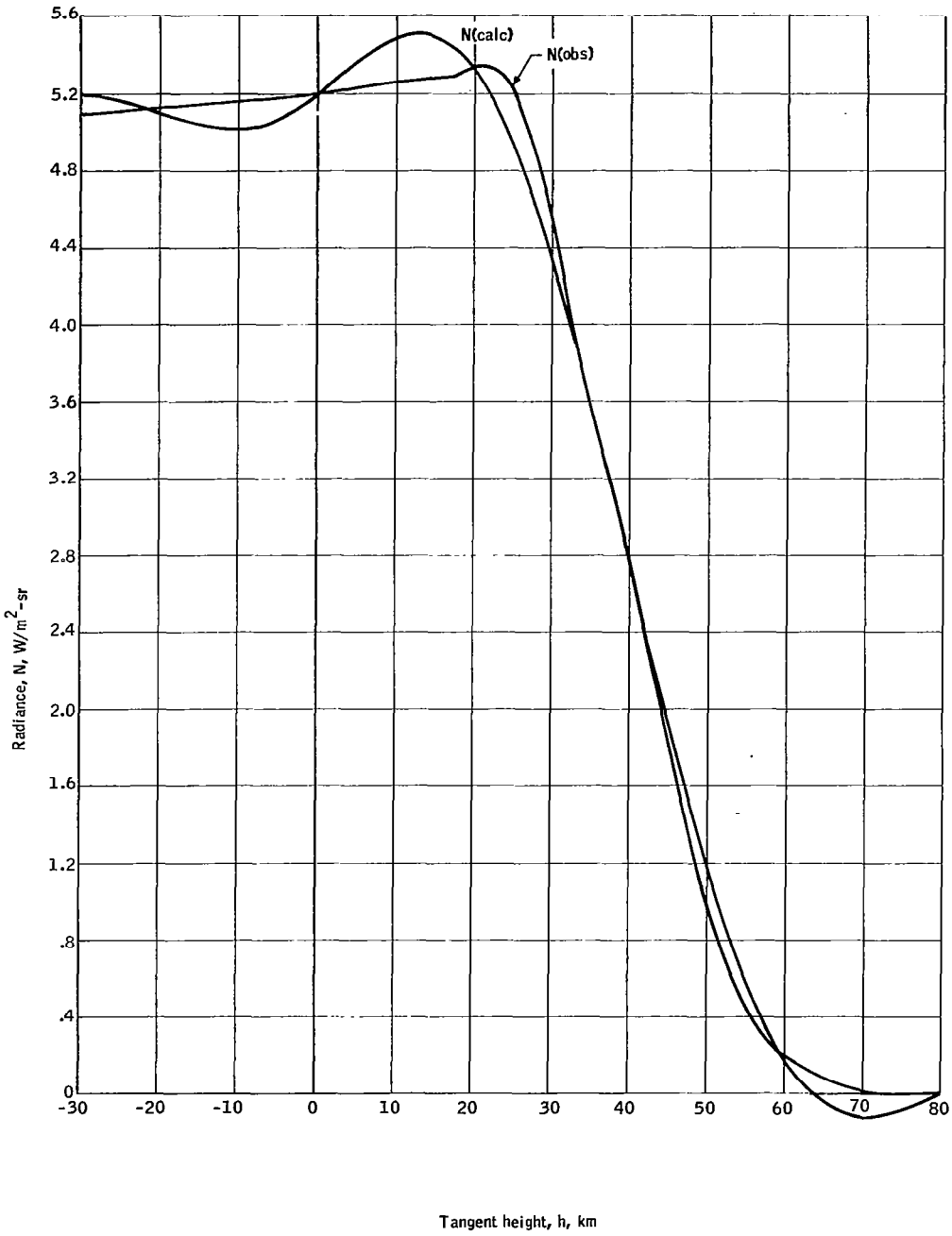


Figure 36. Trigonometric Series Curve Fit to Profile 843

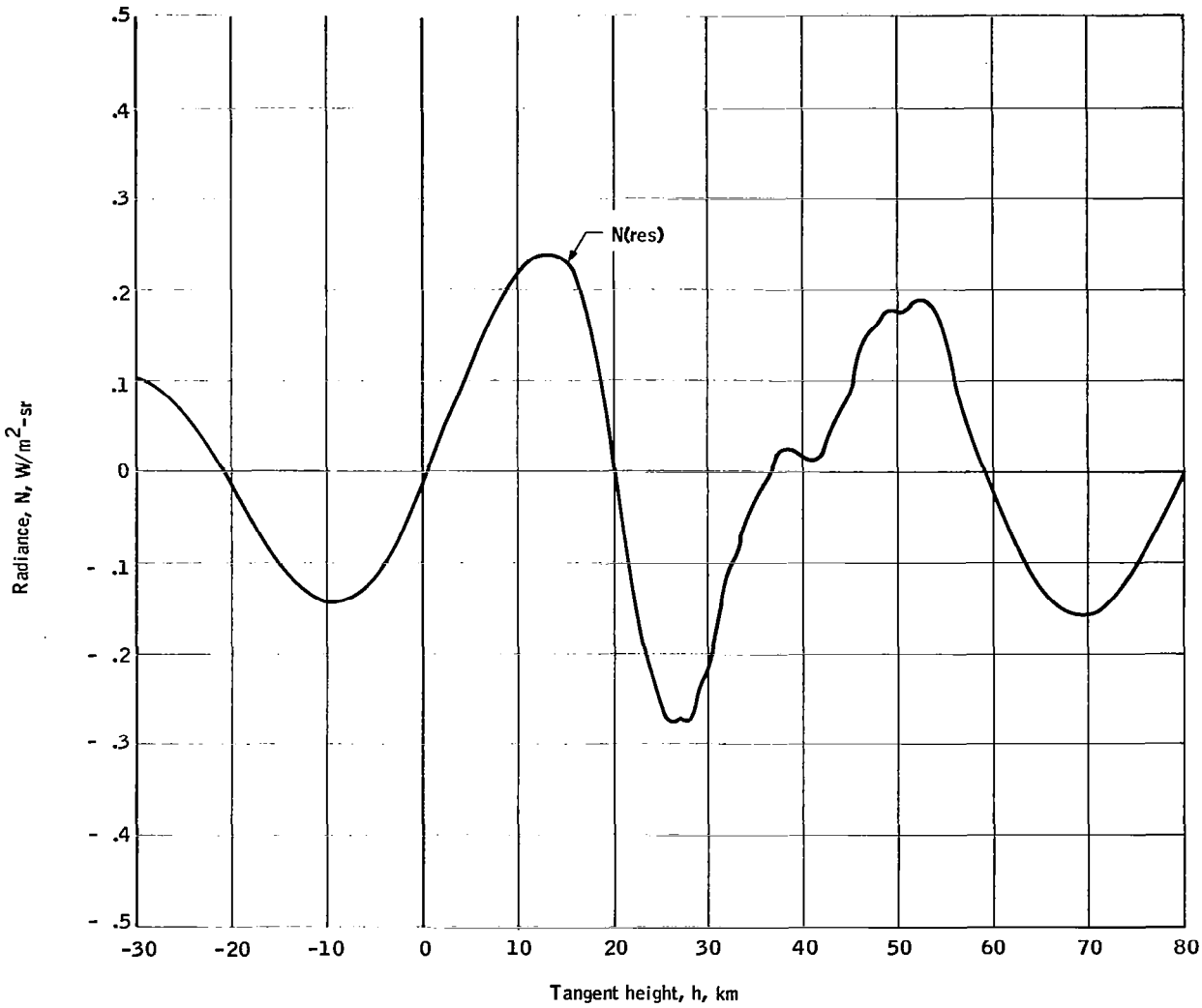


Figure 37. Residual, $N_{calc.} - N_{Meas.}$, versus Tangent Height, Radiance Profile 843

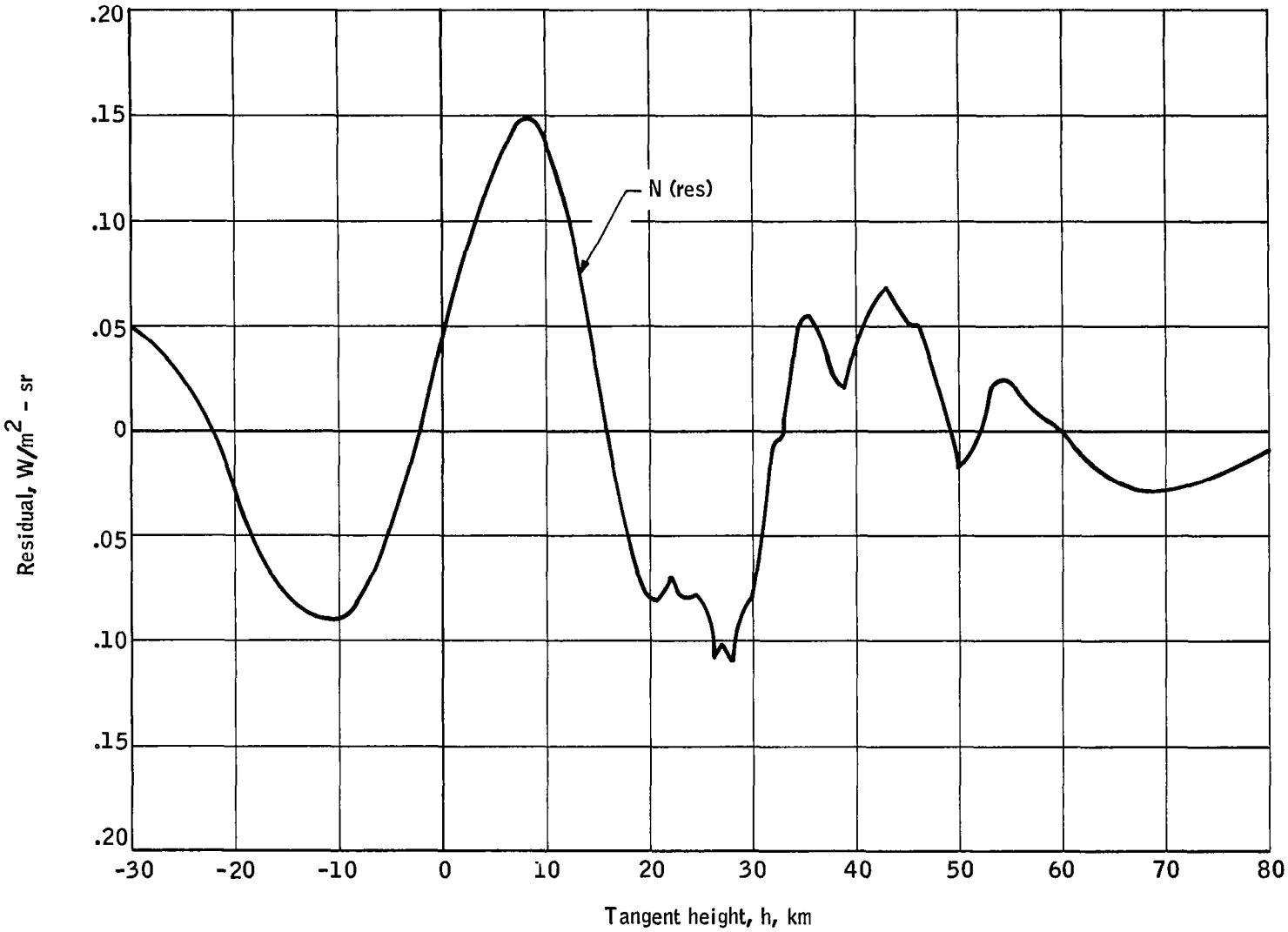


Figure 38. Residual, $N_{calc.} - N_{meas.}$, versus Tangent Height, Radiance Profile No. 1023

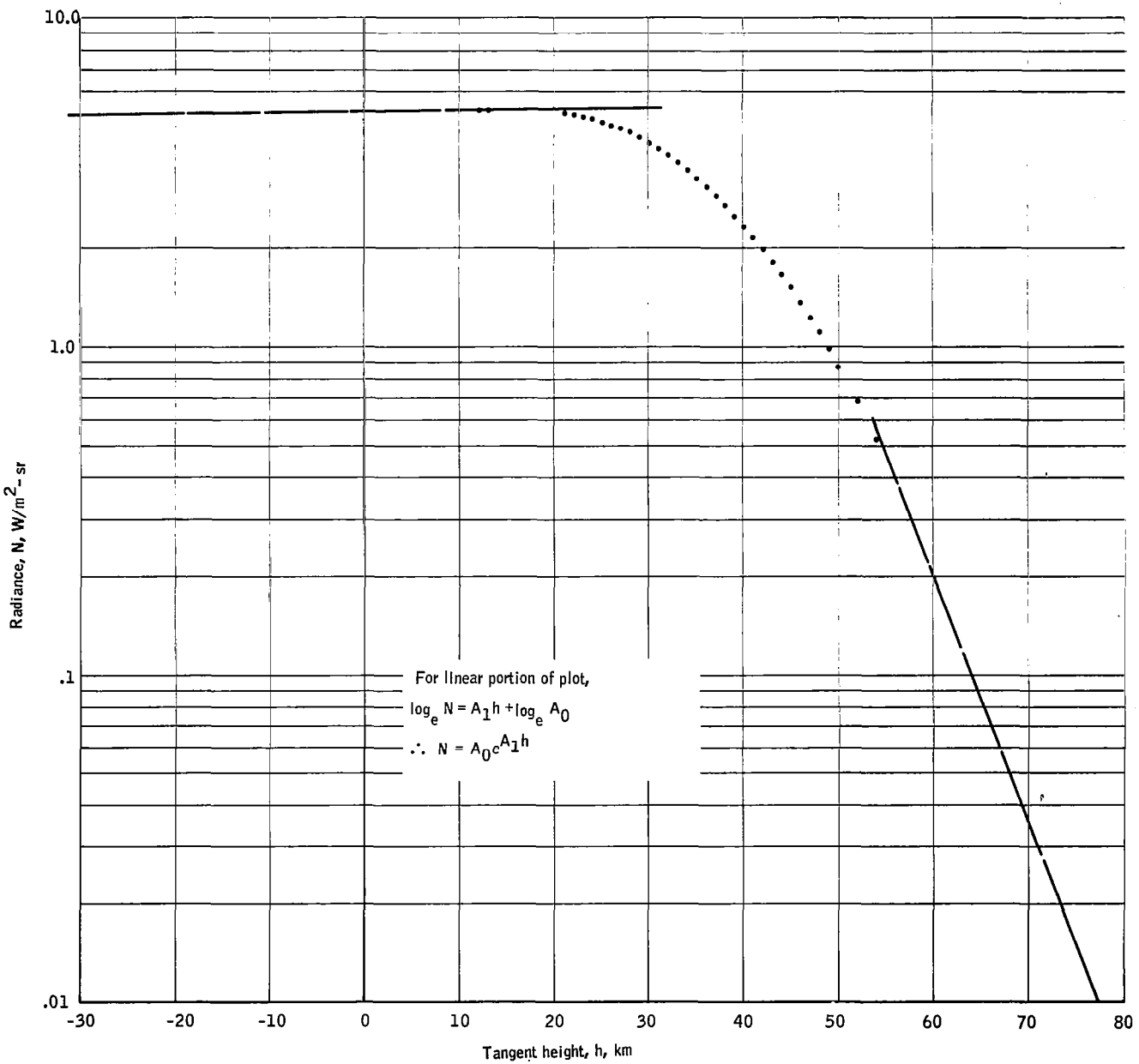


Figure 39. Log N versus h, Mean of 839 Profiles

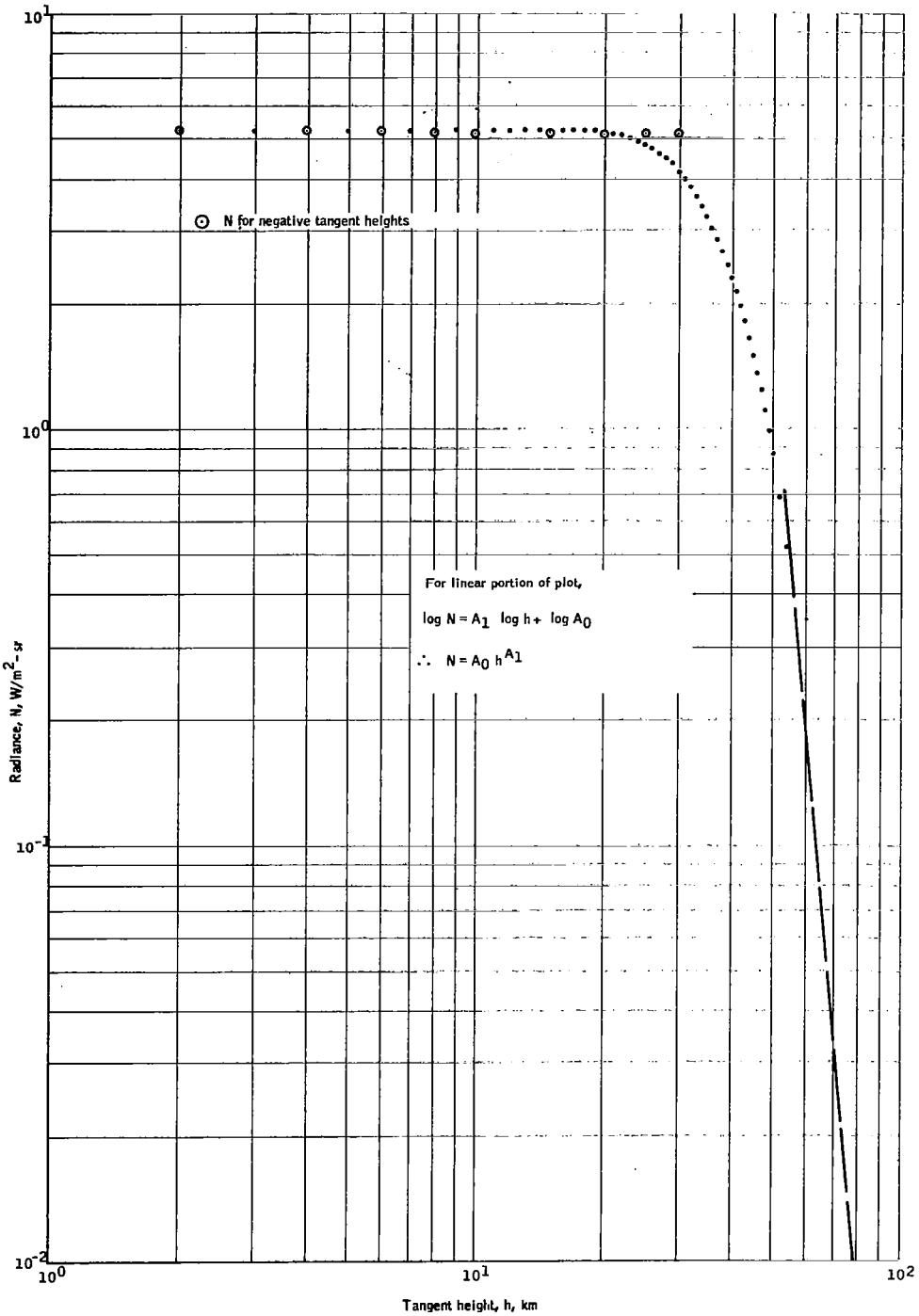


Figure 40. Log N versus Log h, Mean of 839 Profiles

Functions 8-16

These functions are the ones suggested by reference 1 and shown in Table 11. They readily lend themselves to determination of their applicability by plotting of transformed variables, shown in Table 11; if the plot of transformed data corresponding to a particular function is linear, then that function can be expected to be applicable to fitting the data. While it is obvious that certain of the functional forms listed cannot fit a profile over the complete range of tangent heights, plots were made for all functions suggested except the straight line to determine the applicability of each function to fit parts of the profile.

Function 8. -- $N = A_o e^{A_1 h}$ is examined by displaying the profile on semi-log coordinates, as shown in Figure 39. For tangent heights above about 55 km and below about 15 km, the plot is nearly linear, suggesting that an exponential form may adequately reproduce the profile only in those regions.

Function 9. -- Transformed data plot for Function 9, $N = A_o h^{A_1}$ is shown in Figure 40 which shows about the same linearity as Figure 39 above 55 km indicating applicability of Function 9 only in that region.

Function 10. -- $N = A_0 + \frac{A_1}{h}$ approaches infinity as tangent height goes to zero, but the linearity of the transformed data plot of Figure 41 shows that this function may be suitable from 80 to 25 km.

Function 11. -- $N = \frac{h}{A_o + A_1 h}$ avoids the discontinuity at zero tangent height of Function 10, but, as shown by Figure 42, the corresponding transformed data is not linear beyond about 20 km. The linearity below 20 km suggests that this function and Function 10, each fit to the proper parts of the profile, might produce an adequate fit.

Function 12. -- $N = A_o + A_1 e^{A_2 h}$ is the same as Function 8 with the addition of a constant term. The corresponding transformed data plot, Figure 43, exhibits no significant regions of linearity.

Function 13. -- $N = A_o + A_1 h^{A_2}$ is the same as Function 9 with the addition of a constant term. Figure 44, the corresponding transformed data plot, shows that this function is not applicable.

Transformed data plots for Functions 8 and 9 of Table 11, which would be next in the sequence being followed here, were not made since they would produce the same results as Functions 10 and 11 above.

Function 14. -- $N = A_o + A_1 h + A_2 e^{A_3 h}$, is the same as 12 with the addition of a linear term. The transformed data, shown in Figure 45, exhibits erratic rather than the desired linear behavior.

Function 15. -- $N = A_o A_1^{h} A_2^{A_3 h}$ would not produce a profile shaped curve as shown by the nonlinear nature of the transformed variables in Figure 46.

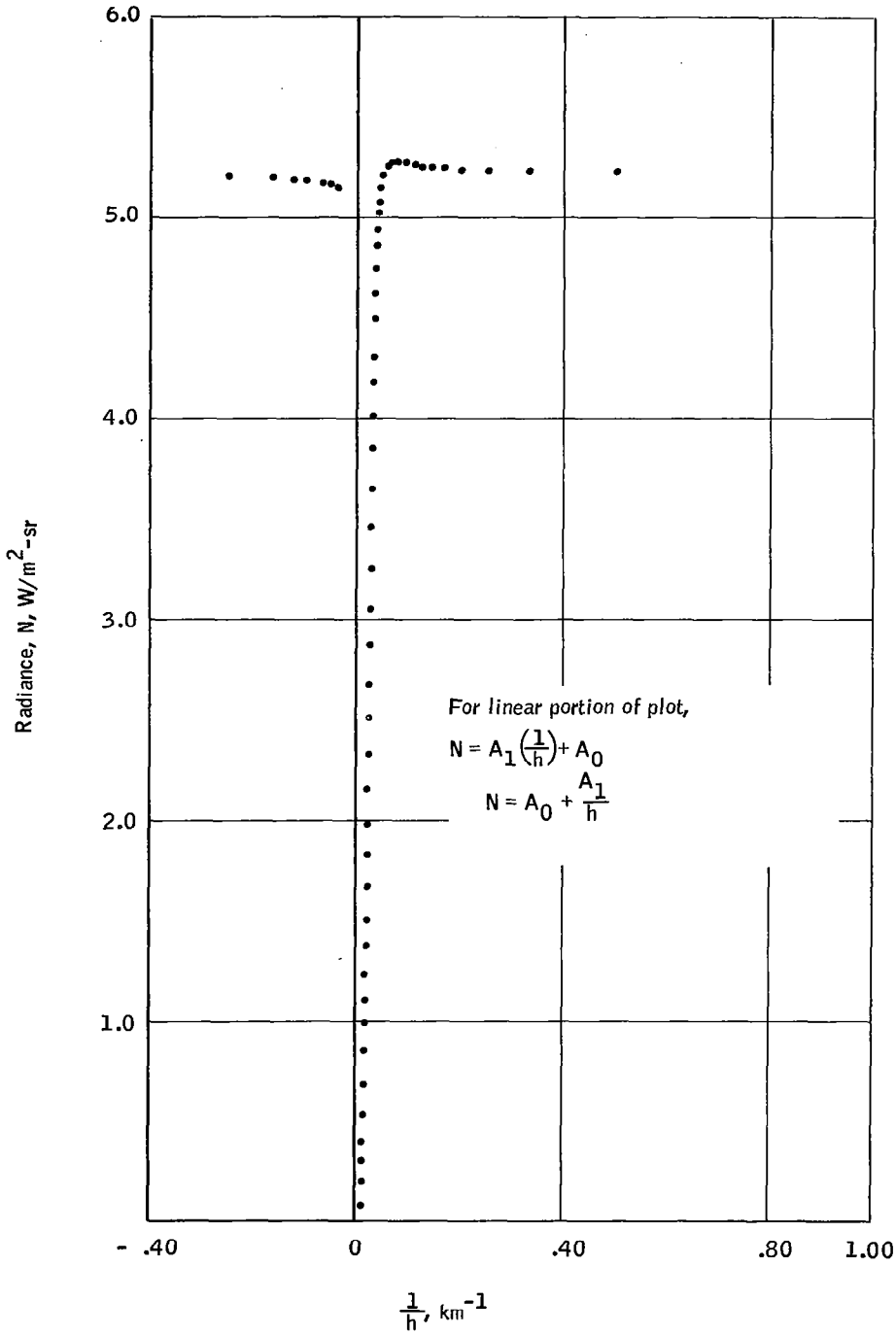


Figure 41. Radiance, N, versus Reciprocal of Tangent Height, h, for Mean of 839 Profiles

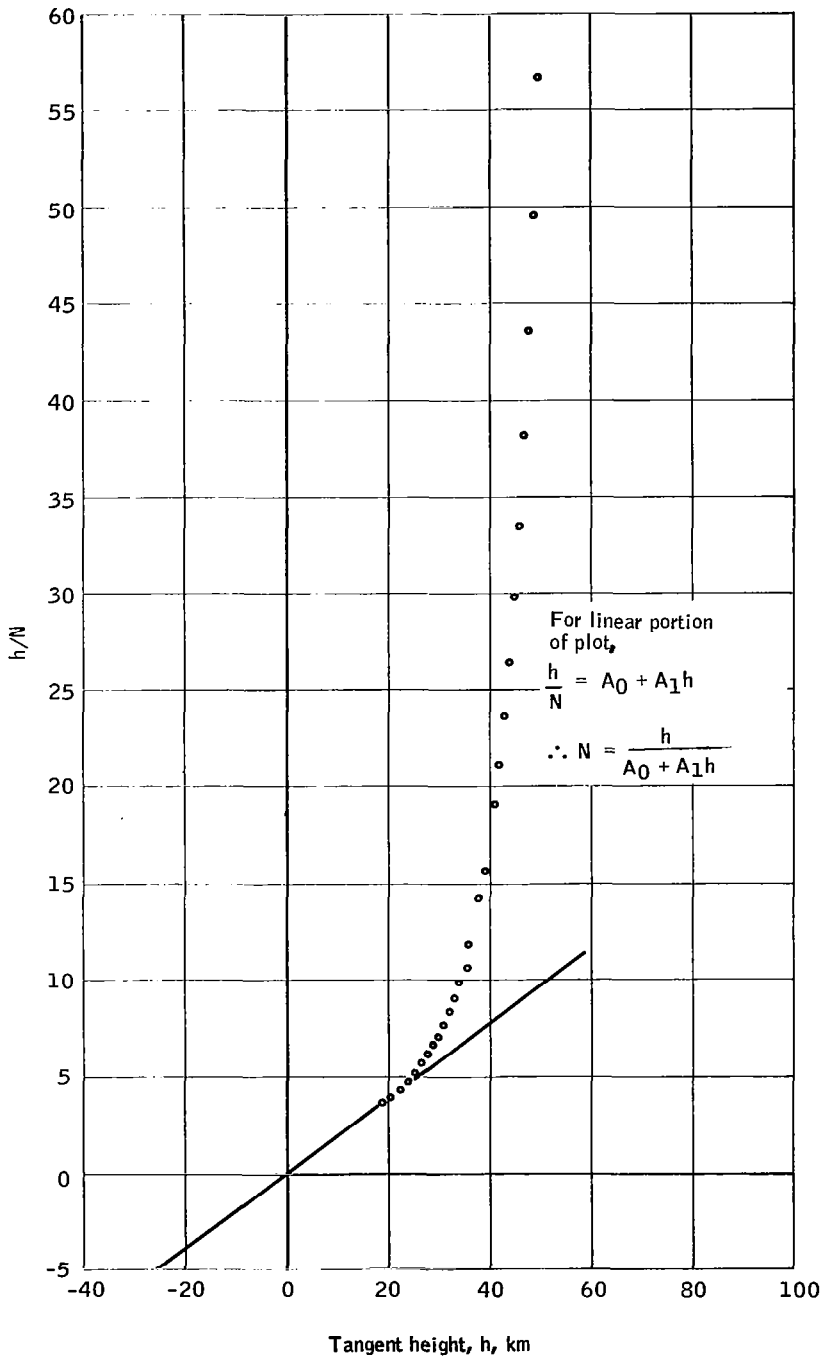


Figure 42. $\frac{h}{n}$ versus h, for Mean of 839 Profiles

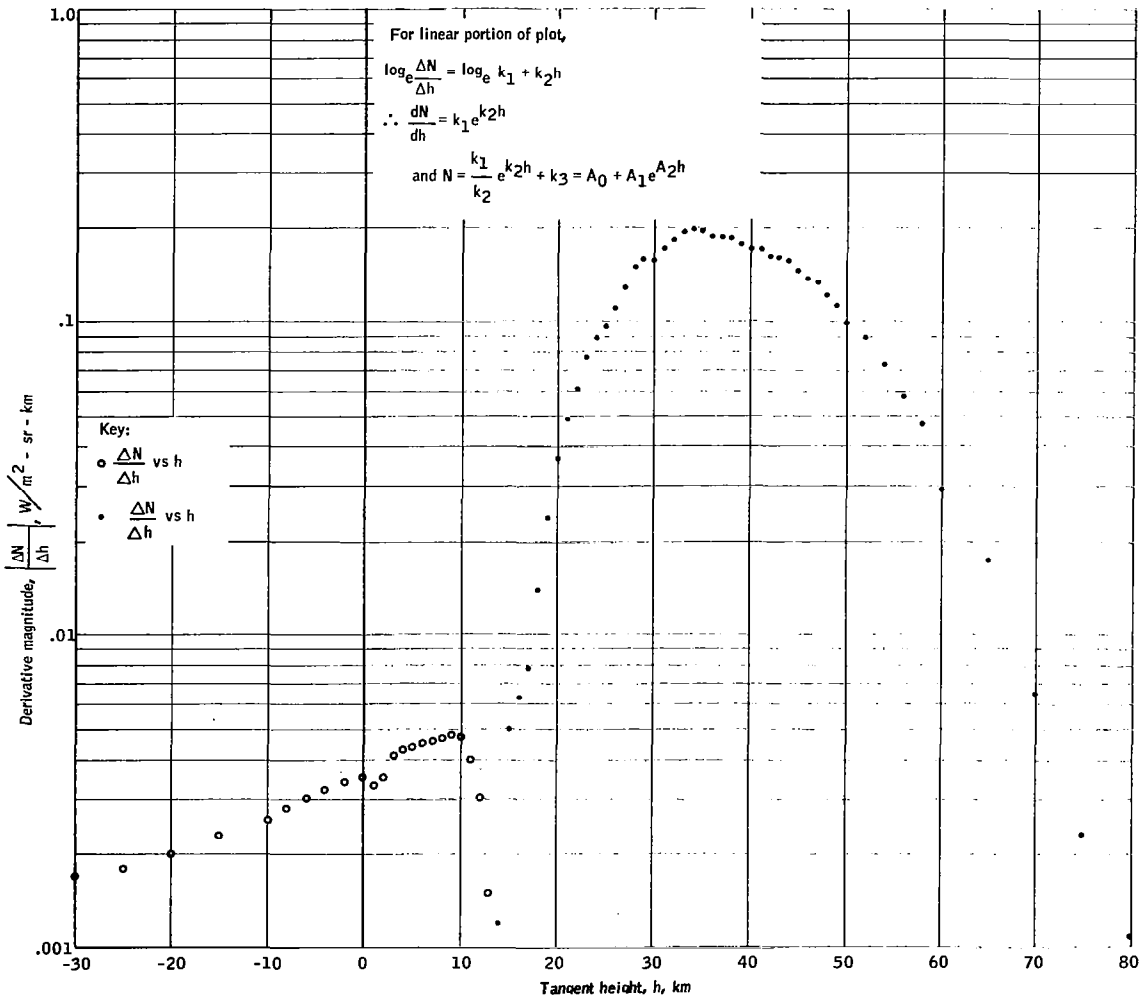


Figure 43. Log $\frac{\Delta n}{\Delta h}$ versus h, for Mean of 839 Profiles

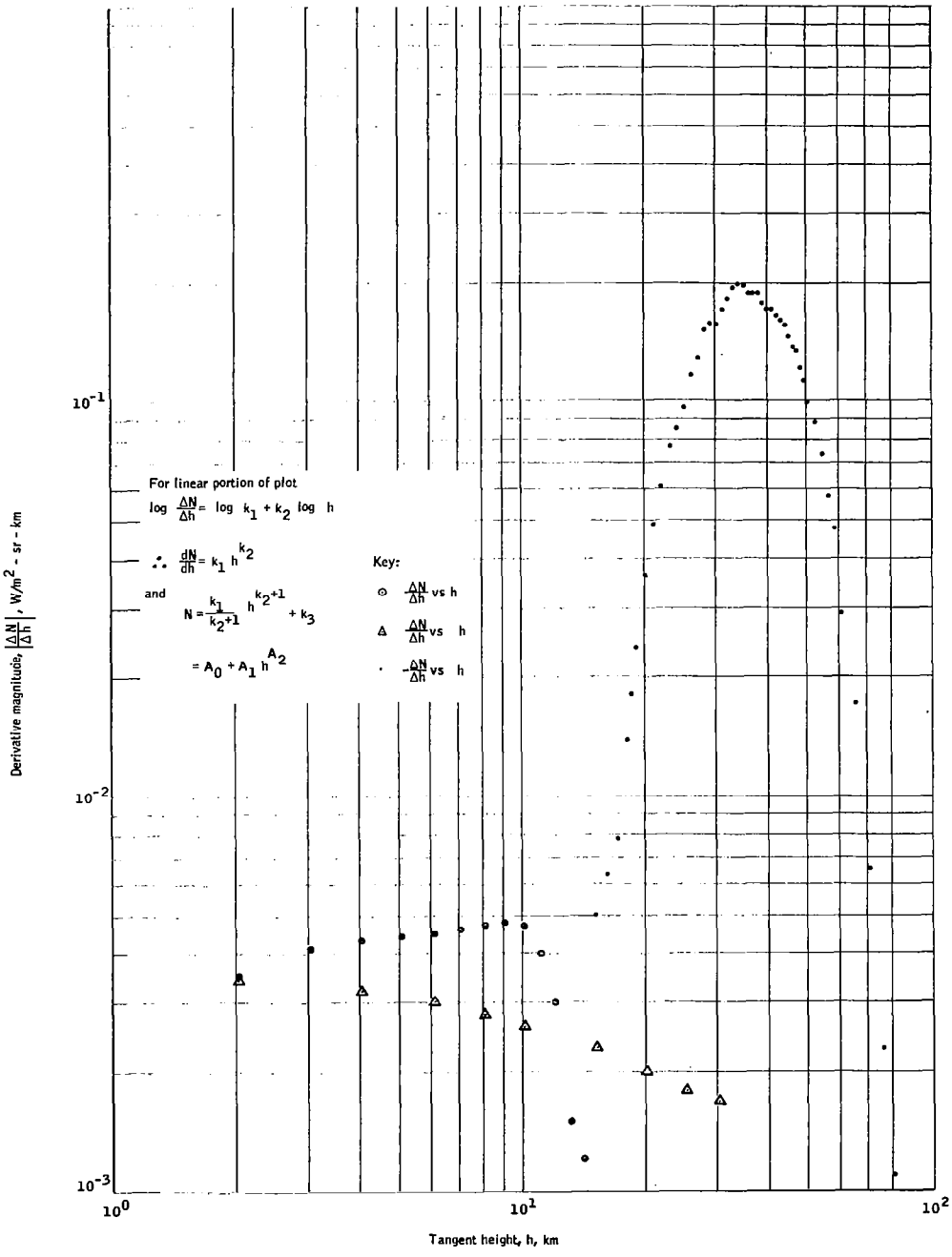


Figure 44. Log $\frac{\Delta n}{\Delta h}$ versus Log h, for Mean of 839 Profiles

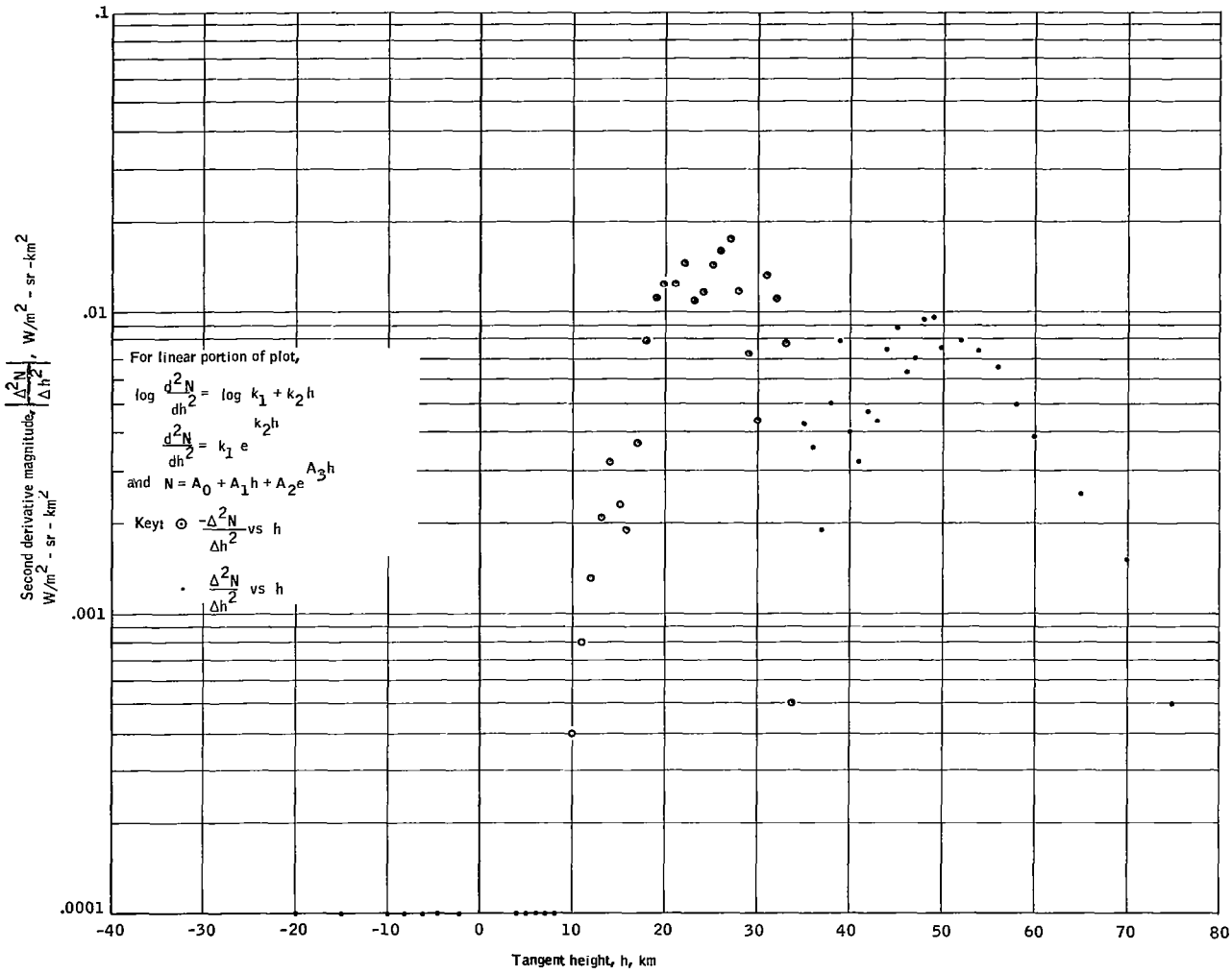


Figure 45. Log $\frac{\Delta^2 n}{\Delta h^2}$ Versus h for Mean of 839 Profiles

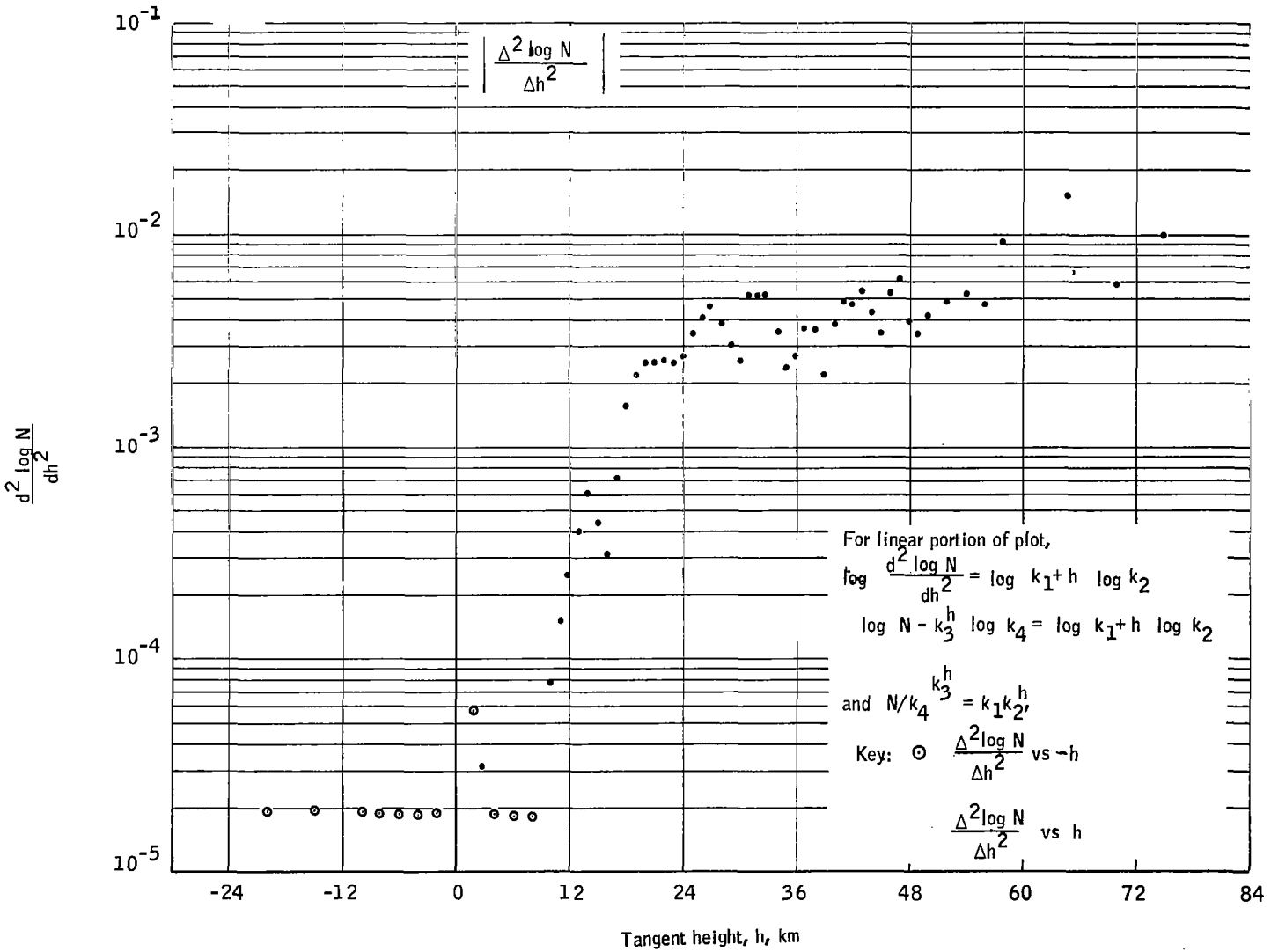


Figure 46. Log $\frac{\Delta^2 \text{Log } N}{\Delta h^2}$ versus h for Mean of 839 Profiles

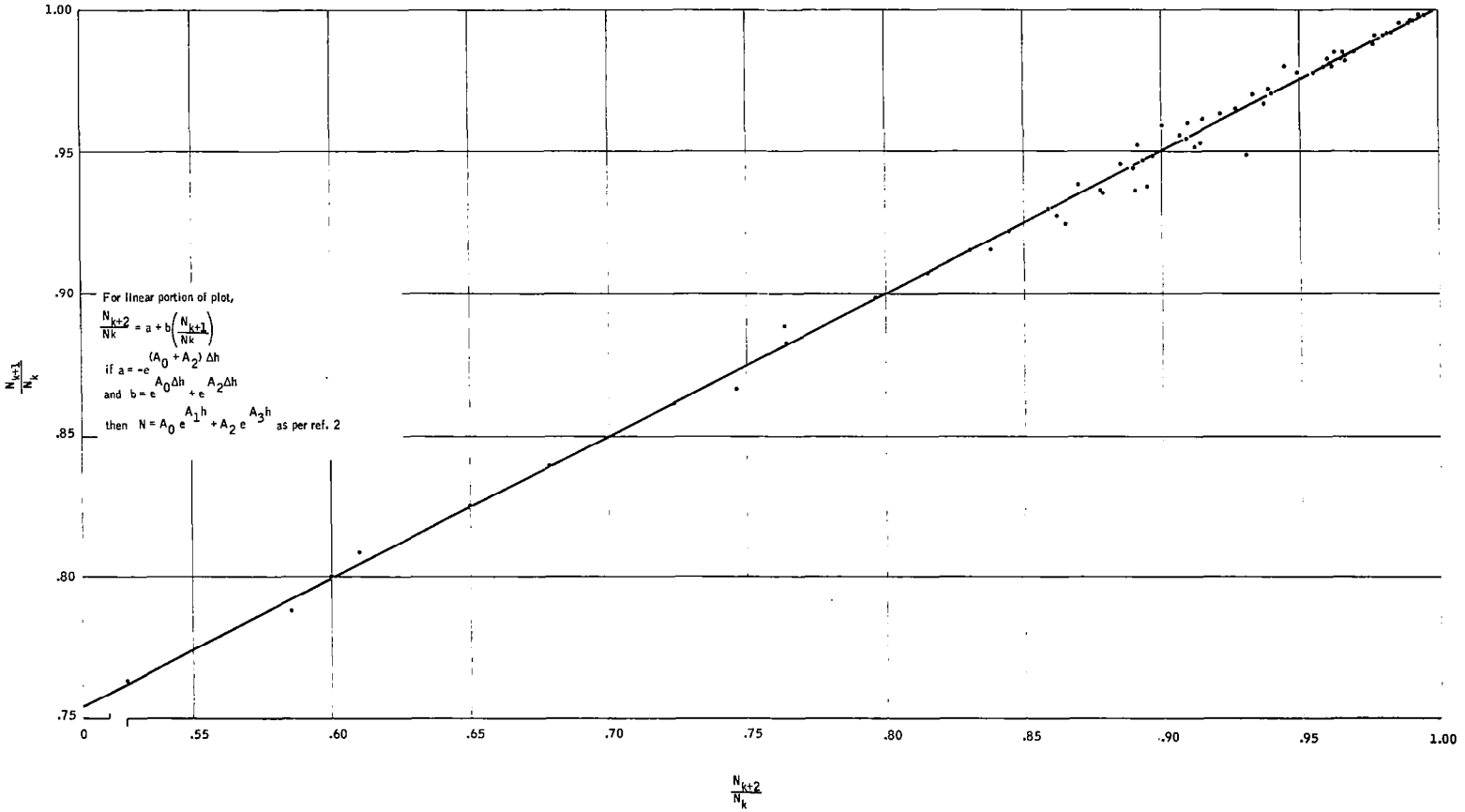


Figure 47. Log $\frac{N_{k+2}}{N_k}$ versus $\frac{N_{k+1}}{N_k}$ for Wark's Profile A

Function 16. -- Function 16 takes on one of two forms:

$$N = A_o e^{A_1 h} + A_2 e^{A_3 h} \quad \ldots \text{ 16a}$$

$$N = e^{A_o h} (A_1 \cos A_2 h + A_3 \sin A_2 h) \quad \ldots \text{ 16b}$$

The transformed data are nearly linear as shown in Figure 47, indicating that this function may be able to adequately fit profiles over the complete range of tangent height.

However, as shown in the example in the discussion of identification of functions, the first form of this function exhibits only one inflection point, whereas profiles with limb brightening have two inflection points. Thus, a discrepancy in curve shape would exist with the first form of this function. Neither form was considered further. However, since the magnitude of limb brightening is small and produces a weak inflection point and since this function is potentially applicable over a wide range of tangent heights, it should be considered in any future efforts on profile curve fitting.

Functions 17-23

Seven functions were identified for study but were not carried through actual profile fitting because of time limitations; they are included here for completeness and as suggestions for any future investigations which might be undertaken.

Functions 17 and 18. -- Examination of a plot of integral of radiance vs. tangent height, as shown in Figure 48, shows that the curve resembles a hyperbola.

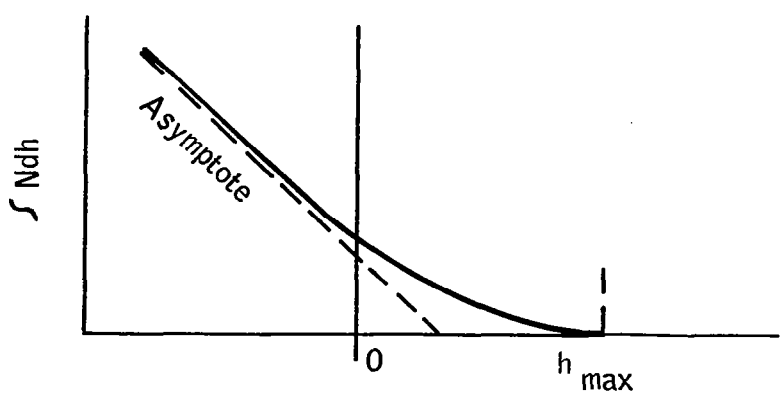


Figure 48. Plot of Integral of Radiance Versus Tangent Height

The corresponding equation is

$$\int_h^{80} N\, dh = A_o \left[\sqrt{A_1^{\,2} + (80 - h)^2} - A_1 \right] \tag{41}$$

for radiance being zero at h = 80 km. The equation for radiance is obtained by differentiating the equation for integral of radiance which results in Function 17.

$$N = \frac{A_o\,(80 - h)}{\sqrt{A_1^{\,2} + (80 - h)^2}} \quad .$$

An alternative form is obtained by representing the shape of the integral of radiance curve by

$$\int_h^{80} N\, dh = A_o \left\{ 80\text{-}h\text{-}A_1 \left[1 - e^{-(80-h)/A_1} \right] \right\} \tag{42}$$

Differentiation of the above expression leads to Function 18:

$$N = A_o \left[1 - e^{-(80-h)/A_1} \right]$$

By rearranging terms in Function 18, it can be rewritten as

$$N = B_o + B_1 e^{B_2 h} \tag{43}$$

which is the same as Function 12, discussed earlier.

<u>Functions 19-22.</u> -- The basis for functions 19-22 is the resemblance of the profile curve shape to the magnitude and phase of the complex frequency response of a second order linear system, as shown in Figures 49 and 50. The response magnitude equations lead to two suggested forms, Functions 19 and 20 below.

Function 19. --

$$N = \frac{A_o + A_1\, h}{\sqrt{1 + A_2\, h^2 + A_3\, h^4}}$$

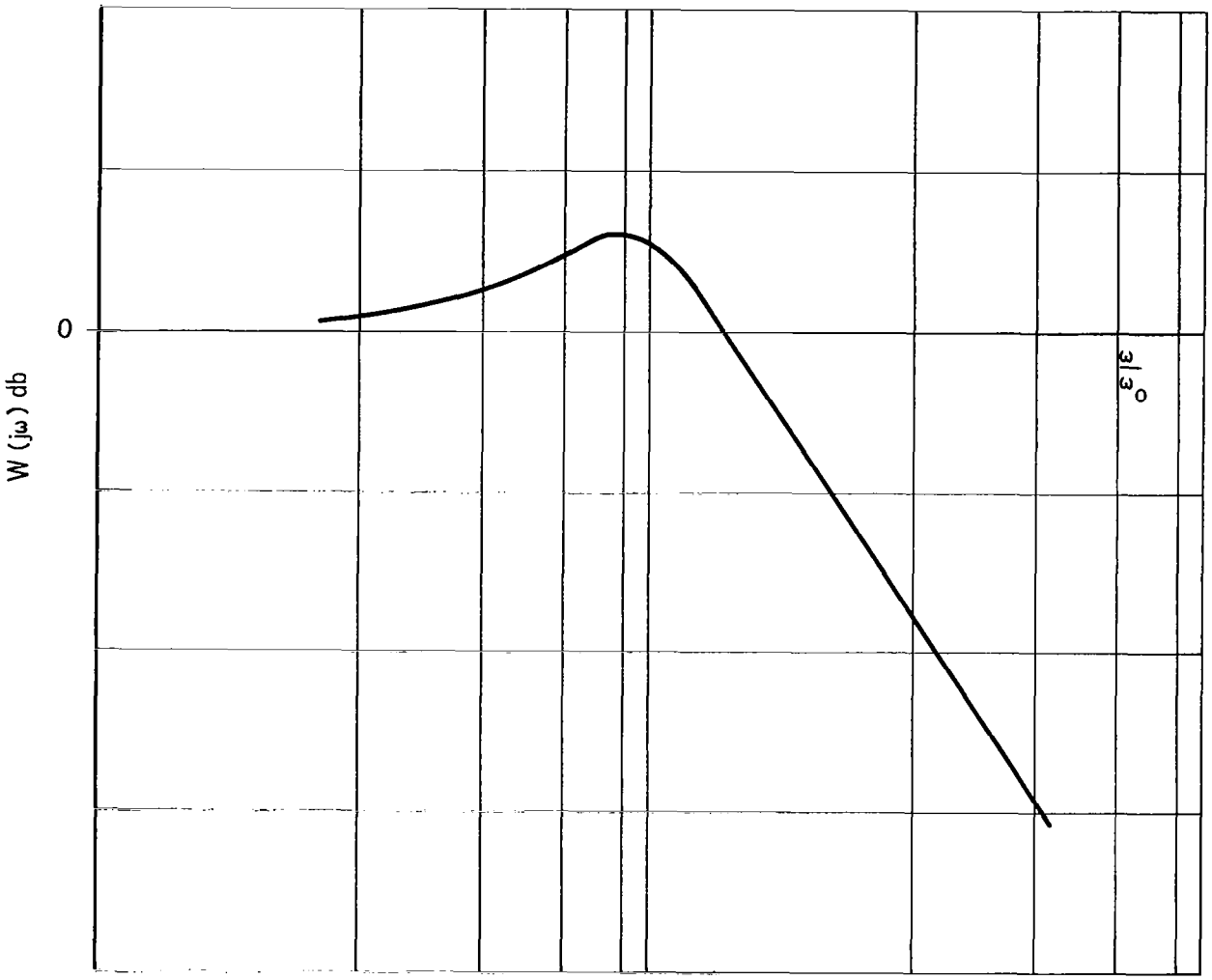


Figure 49. Typical Amplitude Response of Second Order Linear System

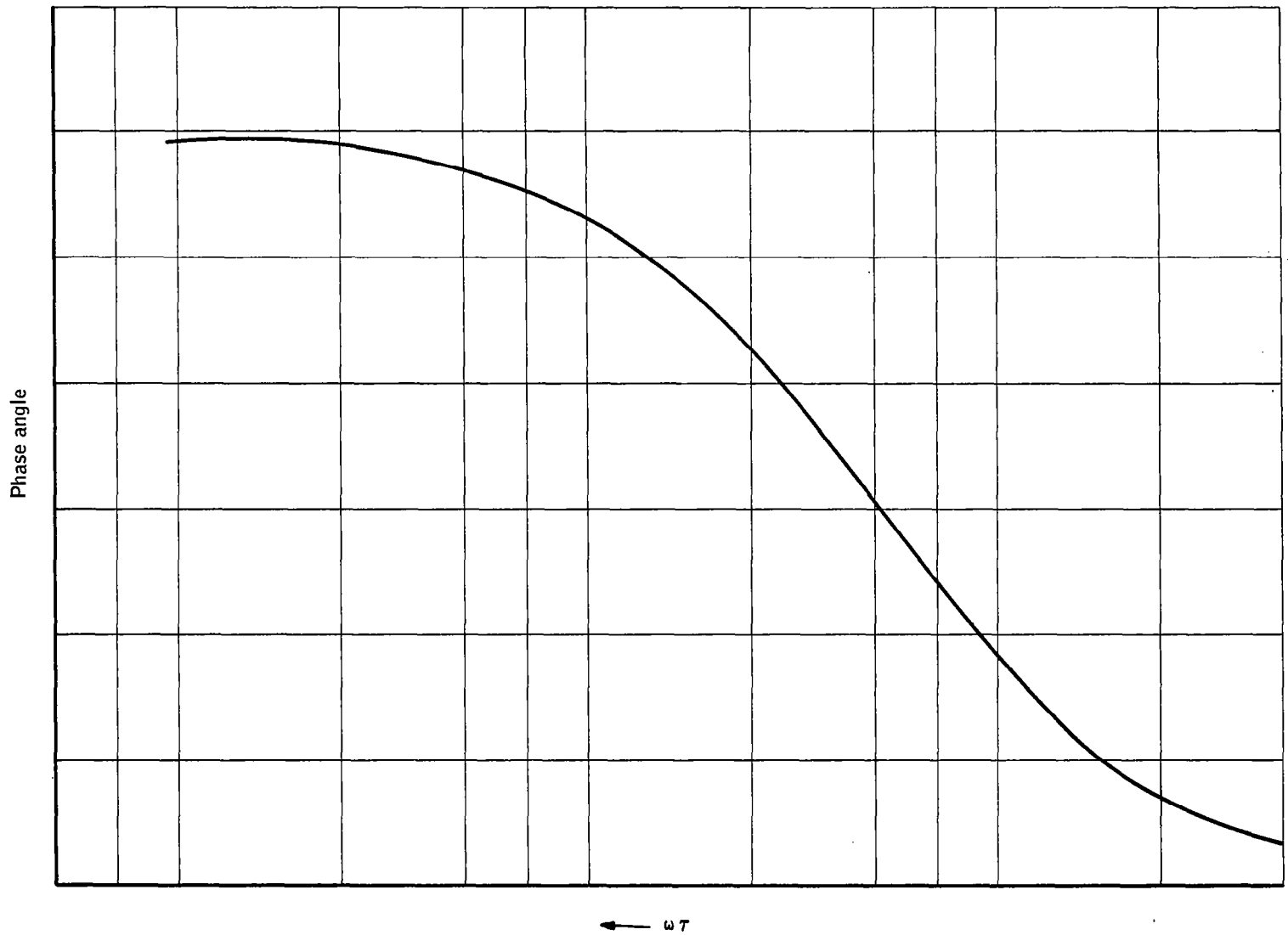


Figure 50. Typical Phase Angle for Second Order Linear System

Function 20. --

$$N = \frac{A_o + A_1 \log_e h}{\sqrt{1 + A_2 (\log_e h)^2 + A_3 (\log_e h)^4}}$$

The difference between Functions 19 and 20, using $\log_e h$ instead of h as the independent variable, is to steepen the slope for larger tangent heights and reduce the slope at smaller tangent heights.

The equations for phase angle similarly lead to functions 21 and 22, below.

Function 21. --

$$N = A_o \tan^{-1} \frac{A_1 + A_2 h}{1 + A_3 h + A_4 h^2}$$

Function 22. --

$$N = A_o \tan^{-1} \frac{A_1 + A_2 \log_e h}{1 + A_3 \log_e h + A_4 (\log_e h)^2}$$

Function 23. -- The last of the identified functions is a modification of Function 2; the intent of the modification is to improve the fit near the bottom knee of the profile by replacing the linear numerator with an exponential term. Thus, Function 23 is

$$N = \frac{A_o e^{-A_1 h}}{h^2 + A_2 h + A_3}$$

RESULTS OF FITTING TWENTY PROFILES

Twenty profiles representing four seasons and latitudes from tropical to polar were selected for curve fitting to obtain estimates of curve fit coefficient variation with time and space. The profiles were taken from the climatological data and represent mean conditions for one month at the location given. The twenty selected are for January, April, July, and October at 90° West longitude (East Central North American continent) and at North latitudes of 20°, 30°, 45°, 60°, and 75°.

Function 3, ratio of two polynomials with 10 coefficients, and Function 7, trigonometric series with five coefficients (odd series through 9th harmonic), were fitted to these twenty profiles. Complete tabulation of results is contained in Appendix B for Function 3 and in Appendix C for Function 7. Sample results for each function were shown in Figures 30, 31, 35, and 36, and those results are shown again in Figures 51 and 52, which illustrate the differences in the fit obtained with the two functions. Table 16 shows the maximum residual magnitude for each profile for both functions. For the

TABLE 16.- MAXIMUM RESIDUAL MAGNITUDE FOR TWENTY PROFILES

Curve no.	Time	Latitude	Maximum residual magnitude			
			Polynomial ratio		Trig. series	
			Residual	Tangent height, km	Residual	Tangent height, km
1	Jan.	20°N	.15554	-10	.27781	26
2		30°N	.12300	10	.27650	28
3		45°N	.11650	28	.27508	28
4		60°N	.18324	-6	.30443	29
5		75°N	.11586	52	.24992	28
6	Apr.	20°N	.12756	-10	.29632	31
7		30°N	.09204	-10	.26650	30
8		45°N	.06868	-10	.22542	30
9		60°N	.11822	75	.30792	33
10		75°N	.08685	6	.17352	33
11	July	20°N	.08549	15	.33628	30
12		30°N	.08008	-8	.29299	38
13		45°N	.07396	-10	.27124	48
14		60°N	.08929	7	.27715	48
15		75°N	.09396	-15	.29945	48
16	Oct.	20°N	.13005	-10	.23350	13
17		30°N	.12722	10	.22760	12
18		45°N	.12023	7	.20860	32
19		60°N	.09972	7	.14717	8
20		75°N	.11749	4	.13676	8

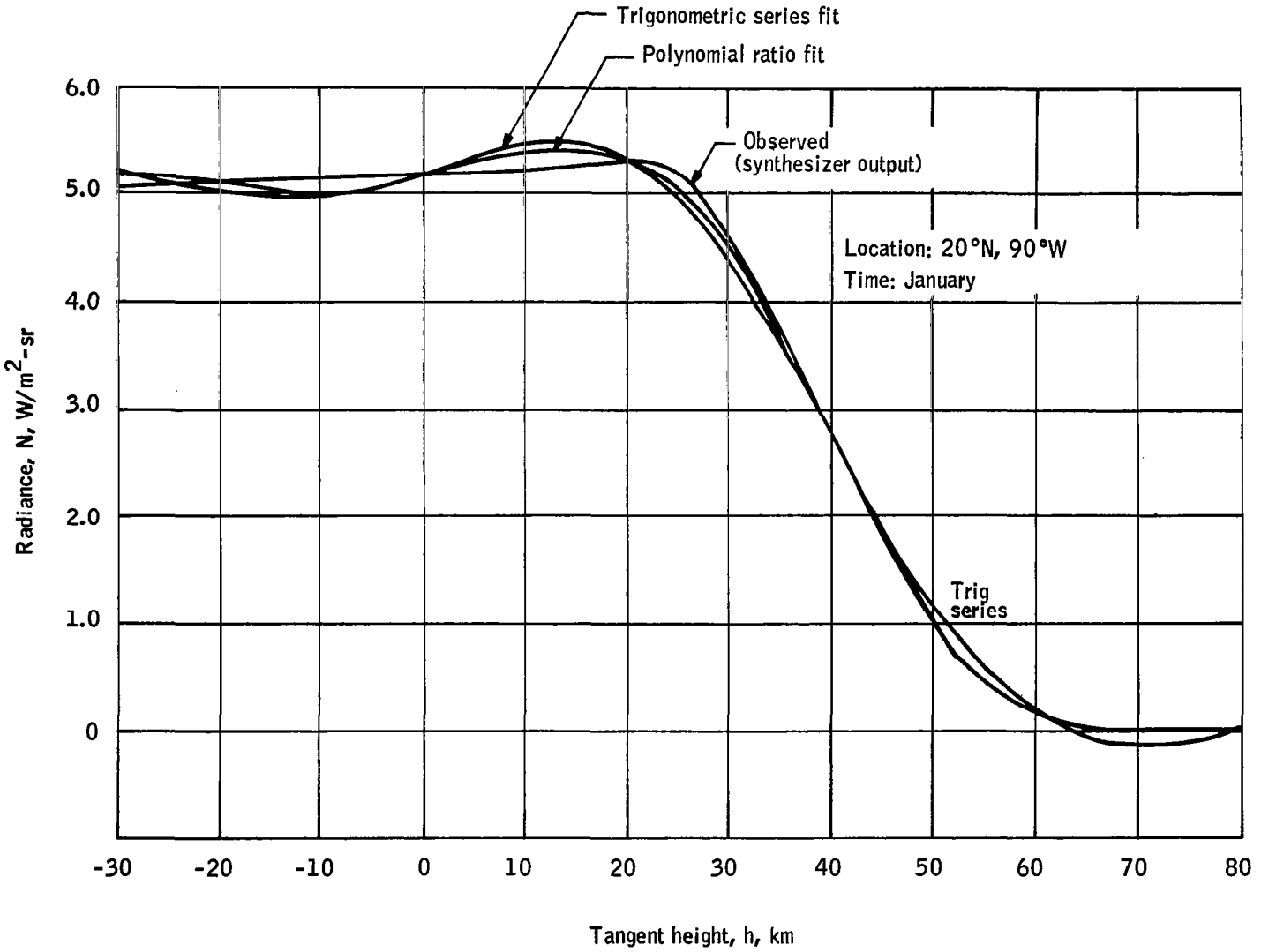


Figure 51. Curve Fit Results Comparison, Profile 843

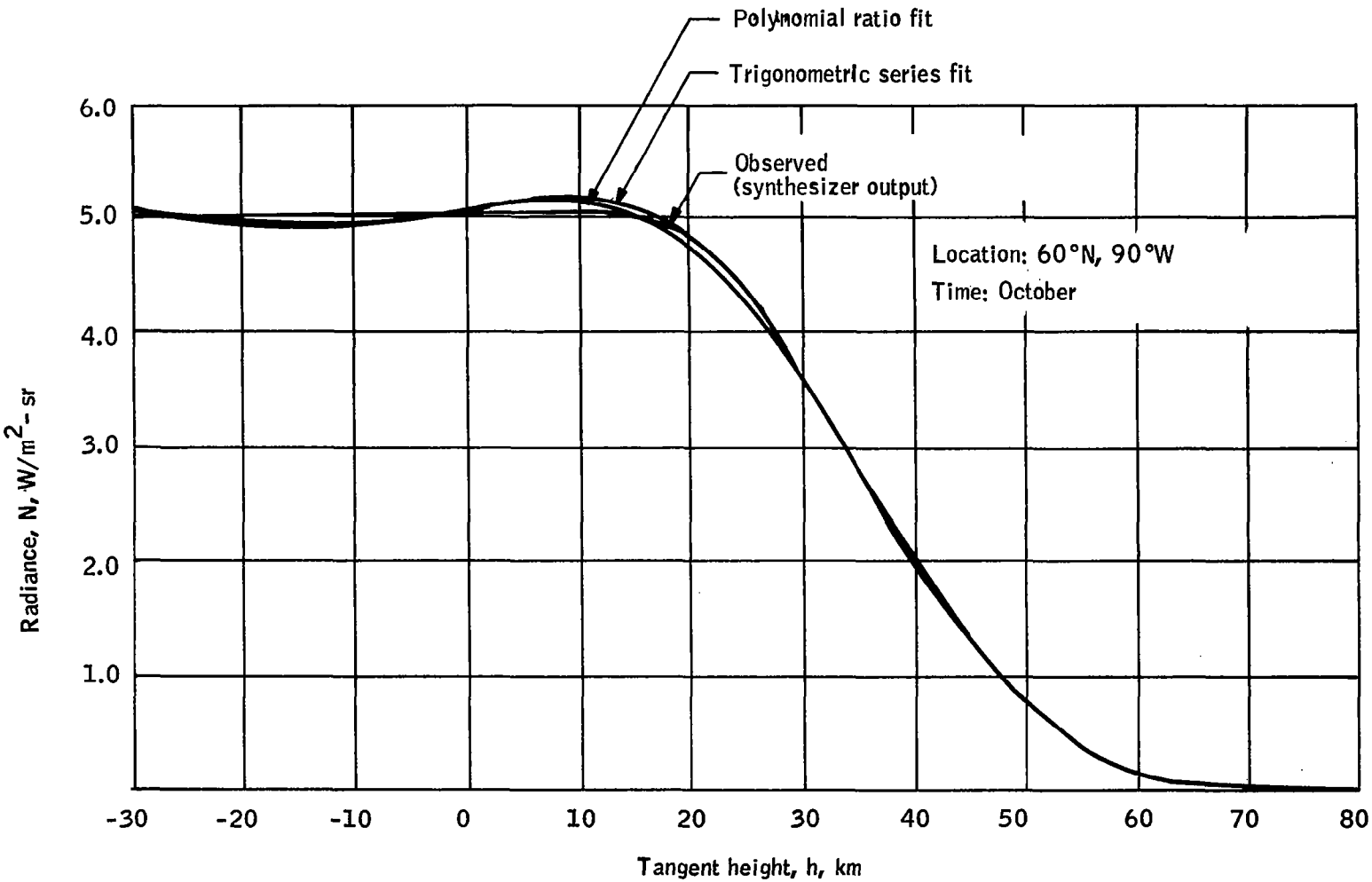


Figure 52. Curve Fit Results Comparison, Profile 1023

ratio of two polynomials, the residuals are greater than expected, compared to the result obtained earlier in fitting Wark's profile A; the maximum residual in that instance was 0.0217. However, the residuals in Table 16 represent an error of about only two percent and occur most often at altitudes below the altitude of peak radiance, indicating that the fit is very good in the steep part of the profile which is most applicable to horizon sensor applications.

Maximum residuals for the trigonometric series are greater by a factor of two to three compared to the ratio of two polynomials and generally occur in the steep part of the profile. However, only 5 coefficients are used compared to 10 for the polynomial ratio, and considerable improvement is expected, as discussed earlier, by the addition of only one more term to the trigonometric series.

The ten coefficients of the polynomial ratio are shown plotted vs latitude for each season in Figures 53 through 61. Only C_0, the constant term, which gives radiance at zero tangent height, exhibits any systematic behavior. The other nine coefficients exhibit nonsystematic behavior. The coefficients of the trigonometric series, however, behave in a systematic manner with both season and latitude. As shown in Figures 62 through 66, the data points describe smooth curves in latitude, and the curves for each coefficient follow the same pattern with season. The curves vary in sequence (increasing or decreasing, depending on the coefficients) of July, April, October, and January. This is the same sequence that mean radiance profiles exhibited when averaged over season, as shown in profile statistics; in summer, radiance is highest for all tangent heights, is lower in spring, still lower in fall, and least in winter.

The results displayed in Figures 62 through 66 are very significant. They suggest that each of the five coefficients of the trigonometric series can be formulated in terms of time and space only. The net result would be that calculation of radiance profiles to within a high degree of accuracy is possible for any desired time and location without requiring any meteorological input data.

CONCLUSIONS AND RECOMMENDATIONS

Twenty-three different functional forms were considered in a search to find a convenient equation, with only tangent height as the independent variable, for calculating radiance profiles.

For the equations considered, accuracy of fit is a strong function of the number of coefficients (and exponents); a minimum of five coefficients was required to obtain accuracy approaching an acceptable amount. Accuracy of $\approx \pm$ 2 percent of peak radiance was achieved, but this required 10 coefficients in a ratio of two polynomials.

The trigonometric series produced an accuracy of $\approx \pm$ 5 percent of peak radiance and the five coefficients used displayed smooth, systematic behavior

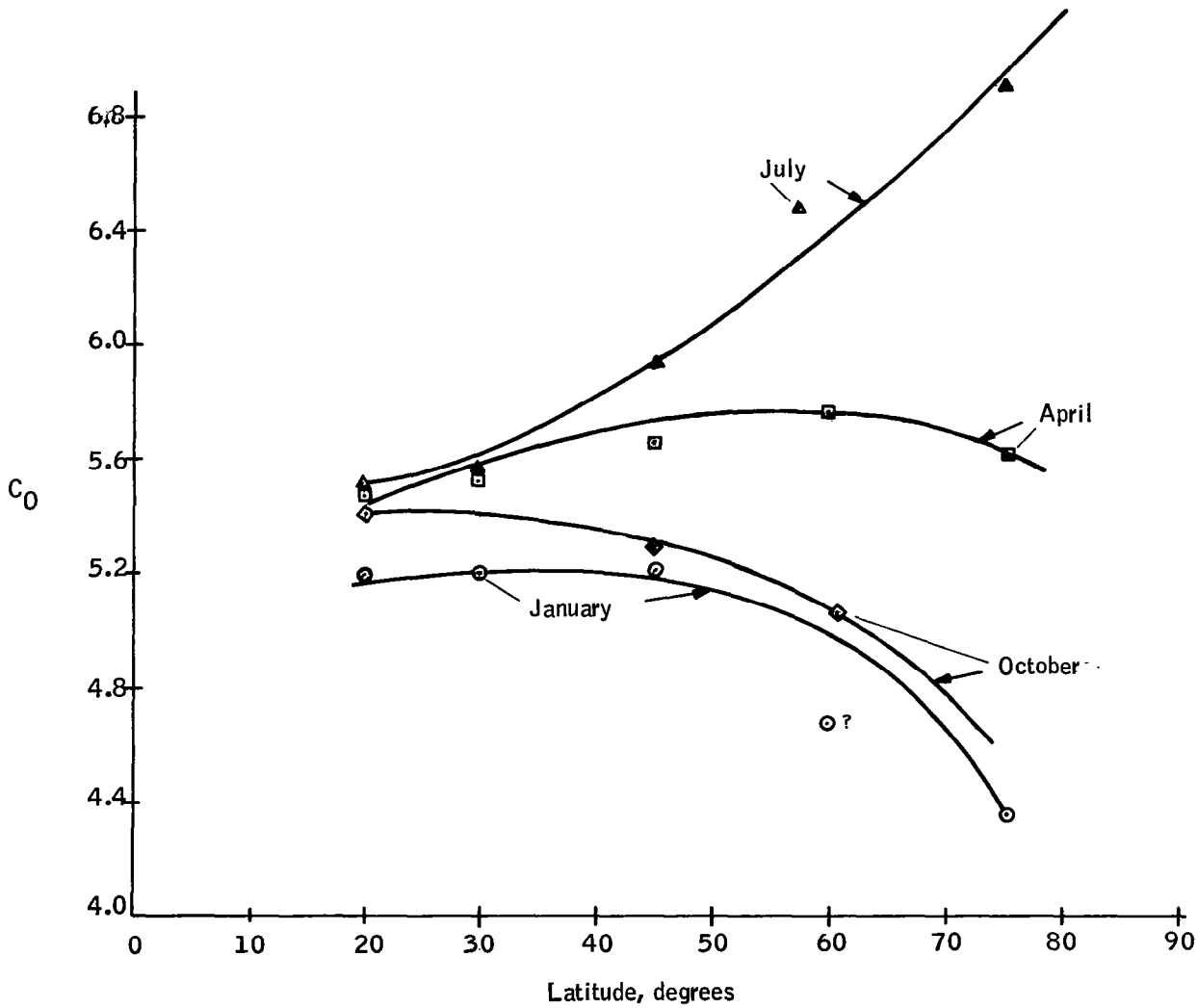


Figure 53. C_o versus Latitude for Each Season

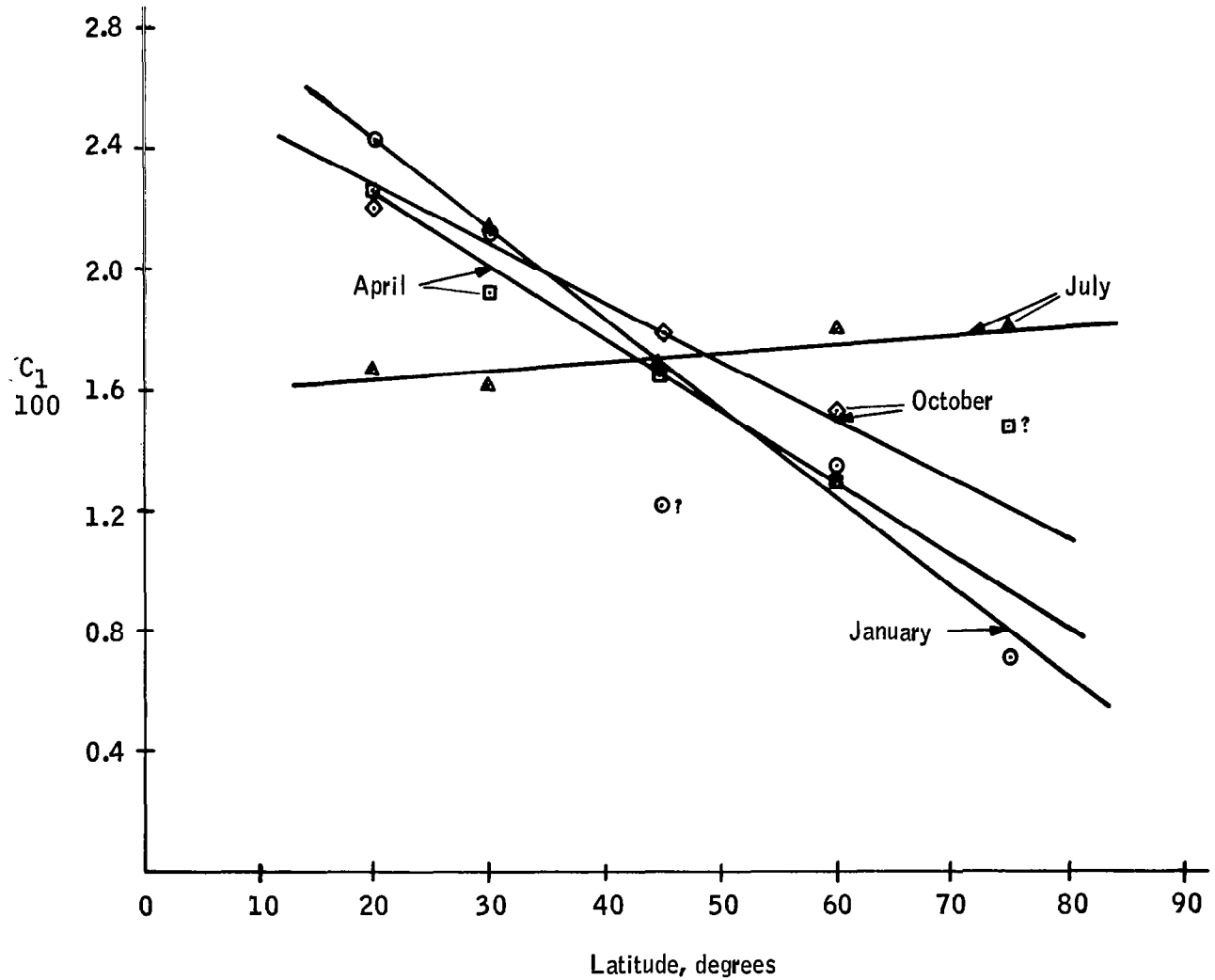


Figure 54. C_1 versus Latitude for Each Season

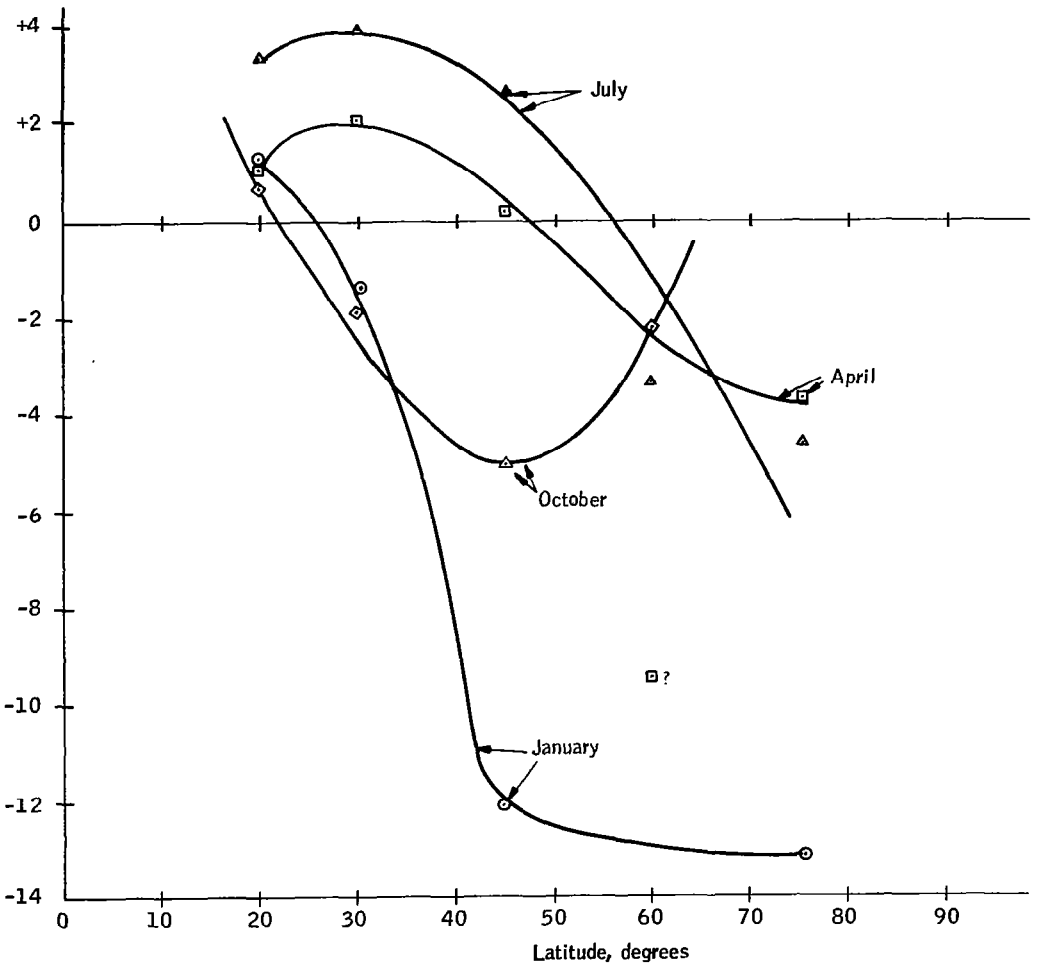


Figure 55. C_2 versus Latitude for Each Season

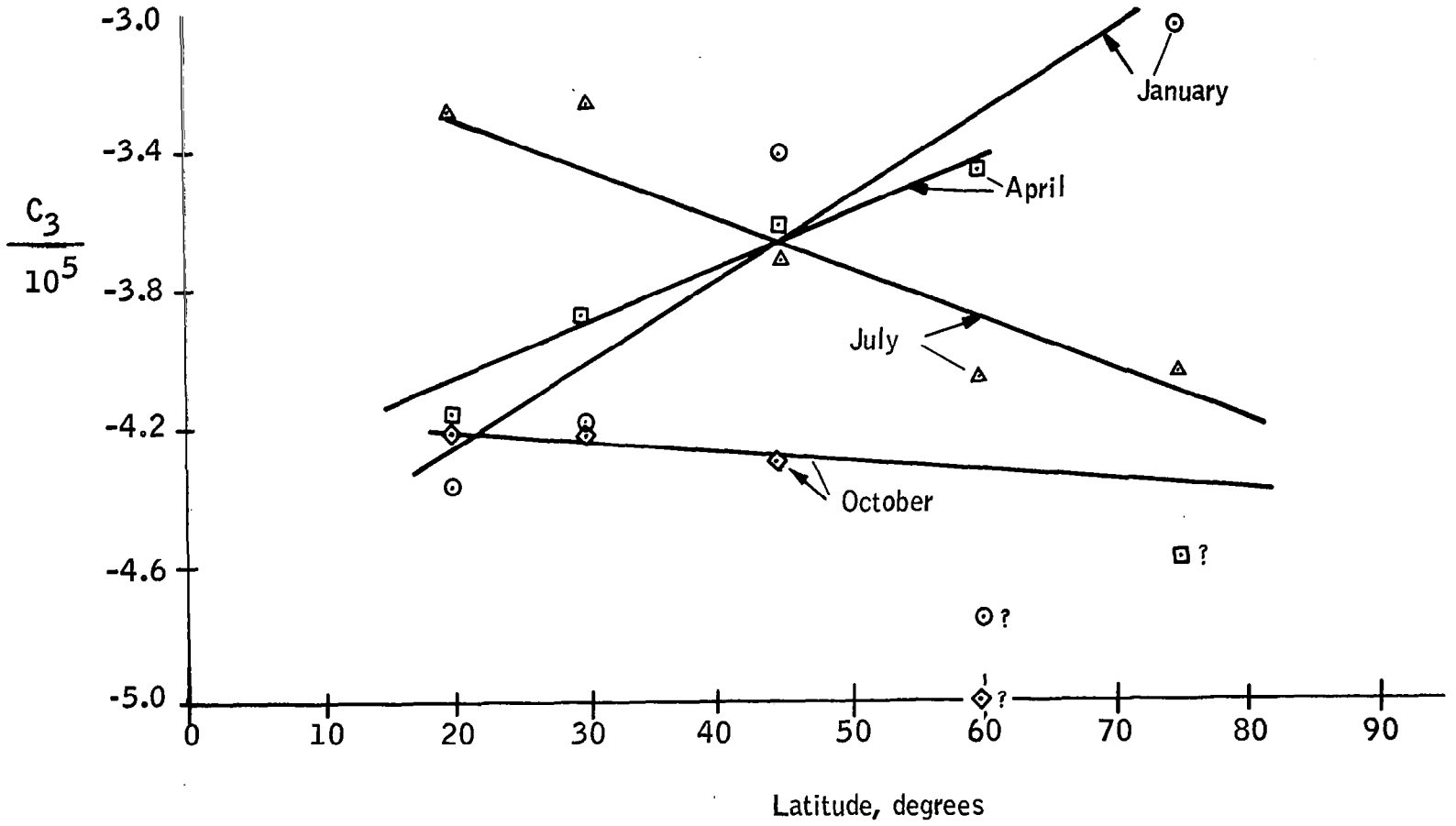


Figure 56. C_3 versus Latitude for Each Season

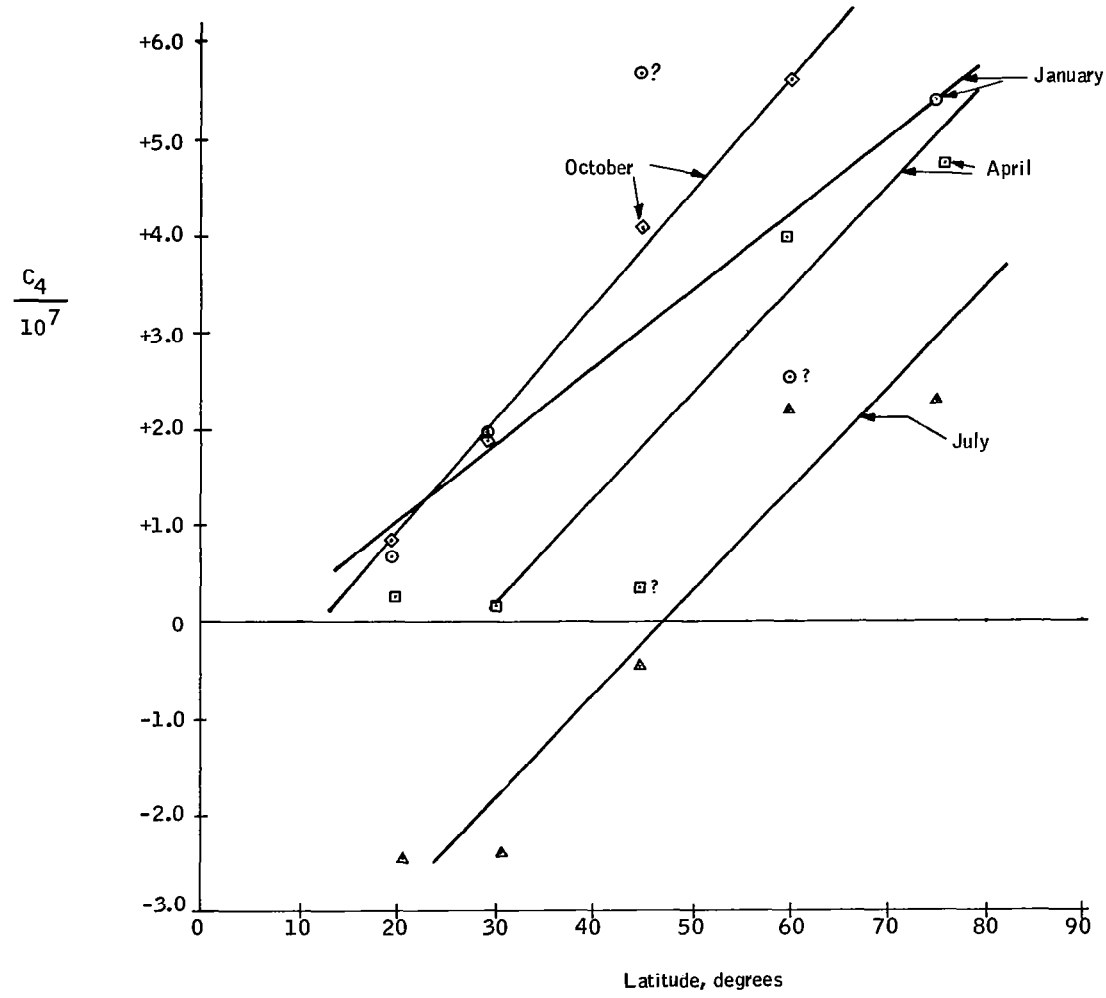


Figure 57. C_4 versus Latitude for Each Season

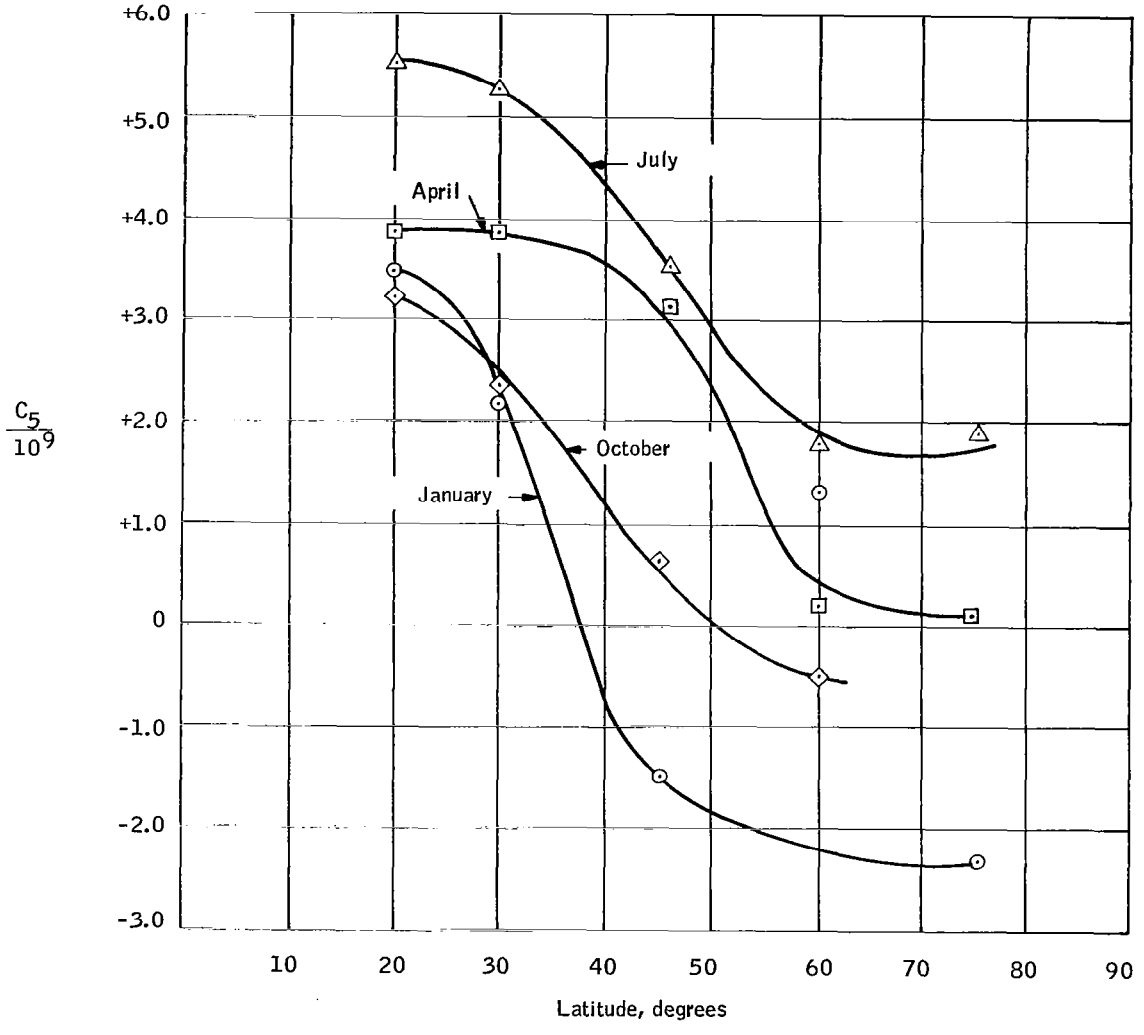


Figure 58. C_5 versus Latitude for Each Season

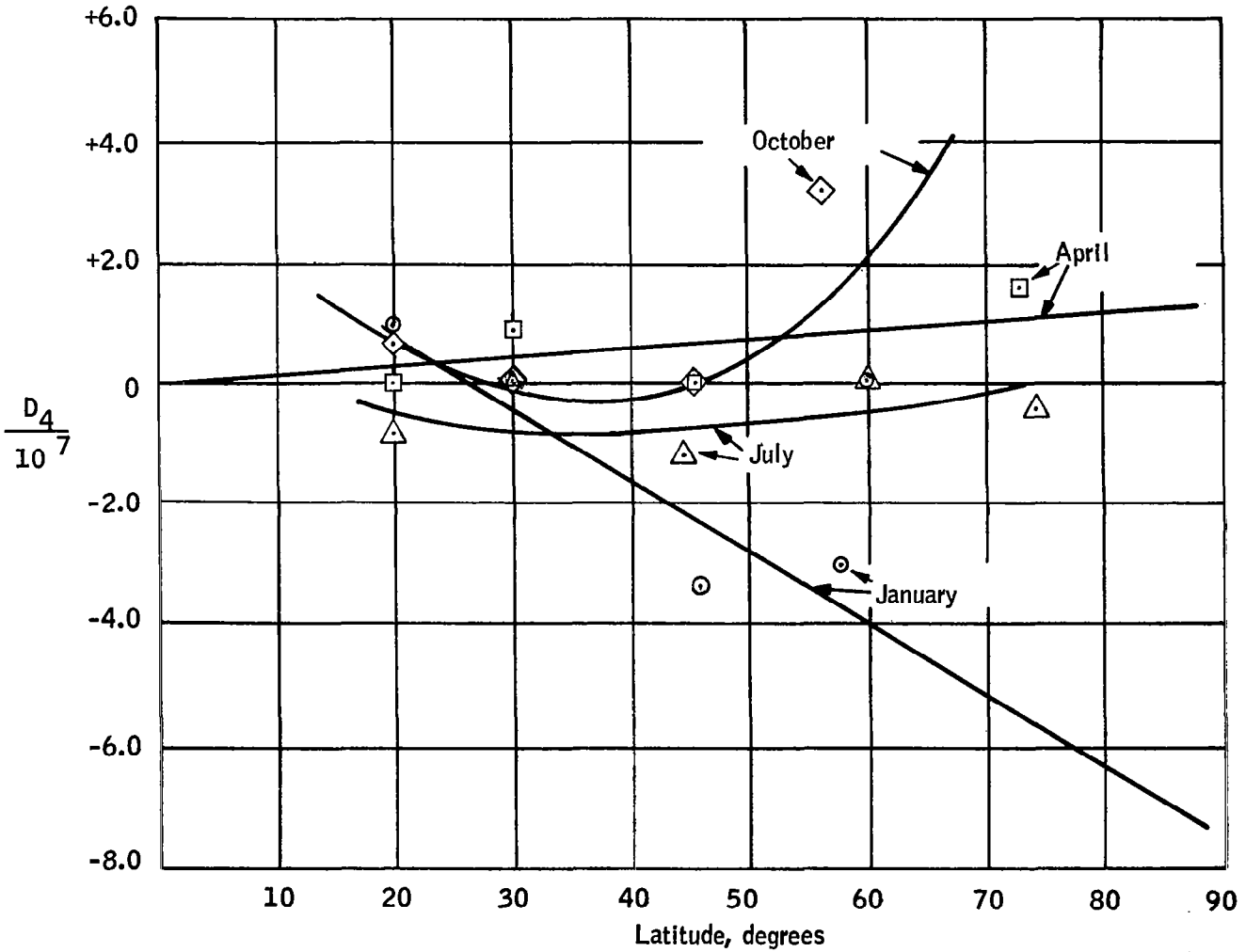


Figure 59. D_4 versus Latitude for Each Season

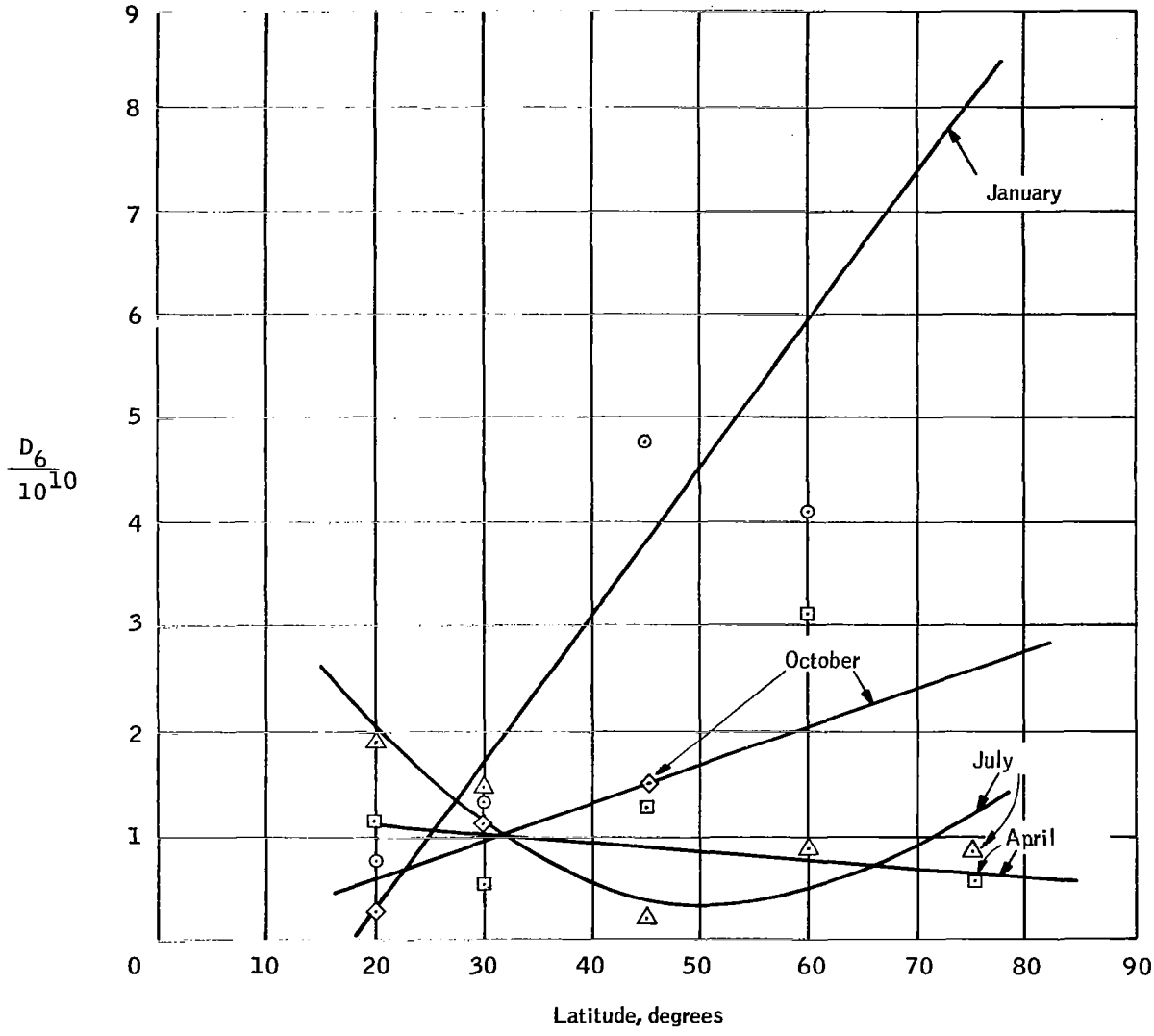


Figure 60. D_6 versus Latitude for Each Season

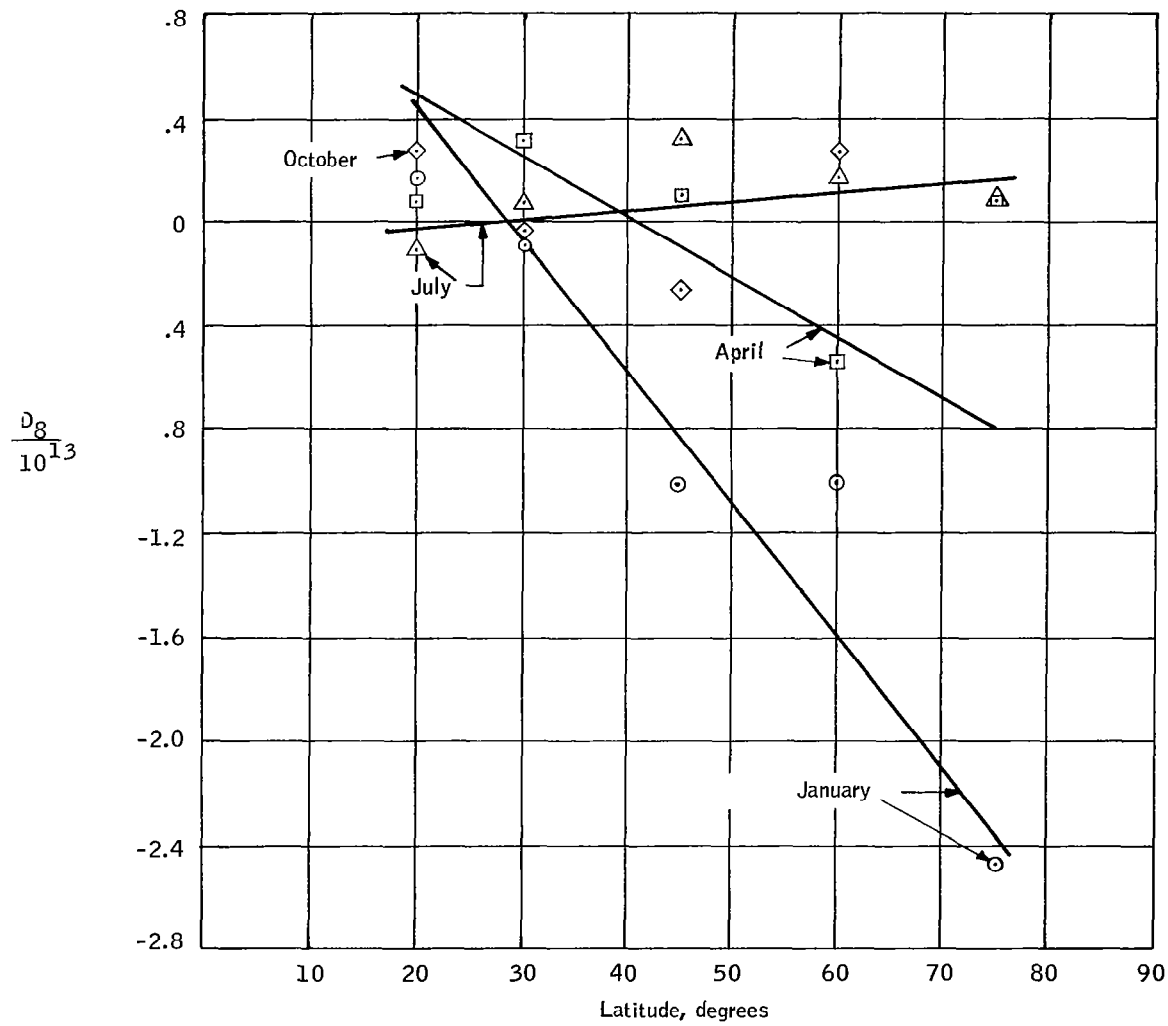


Figure 61. D_8 versus Latitude for Each Season

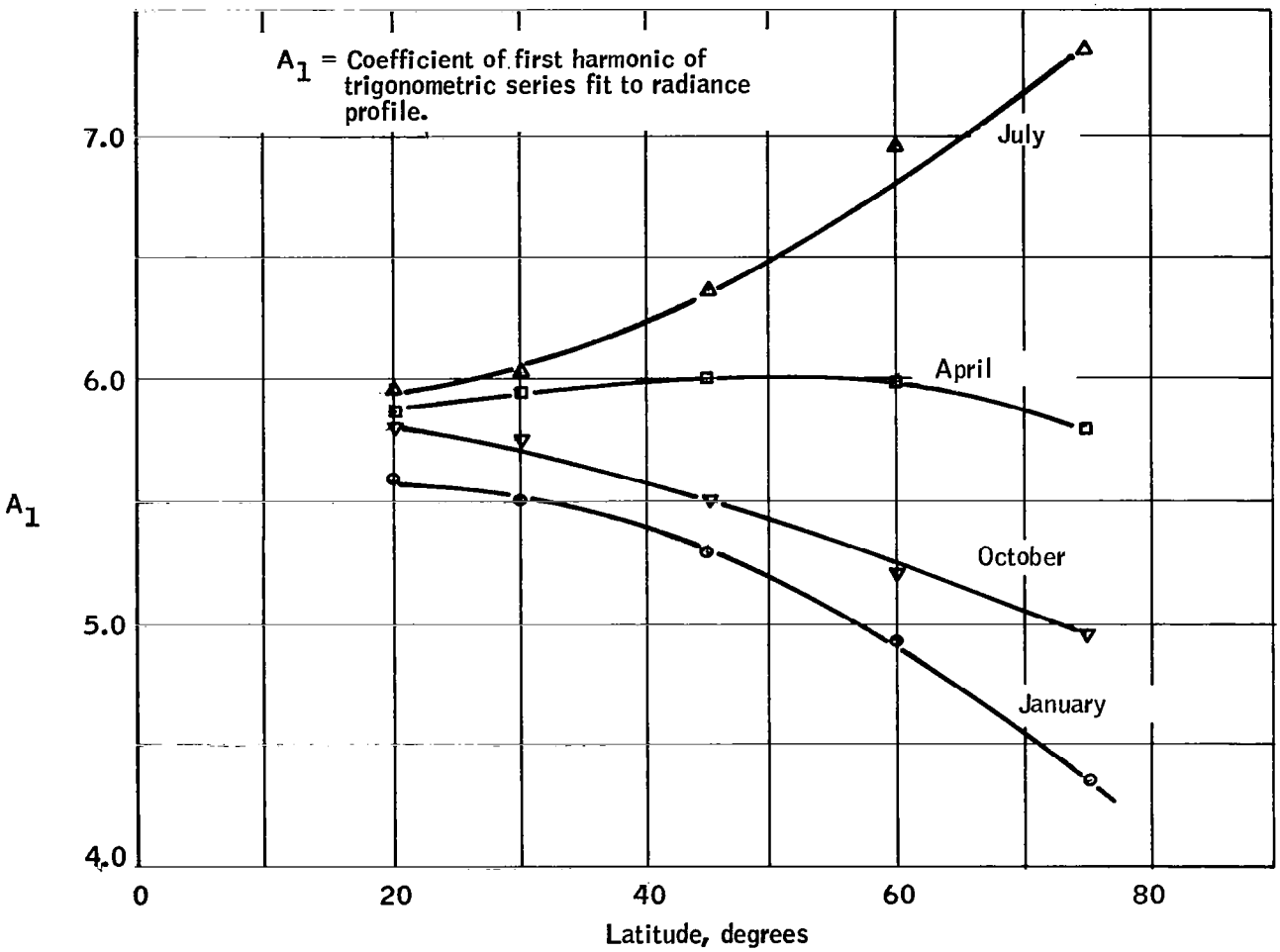


Figure 62. A_1 versus Latitude for Each Season

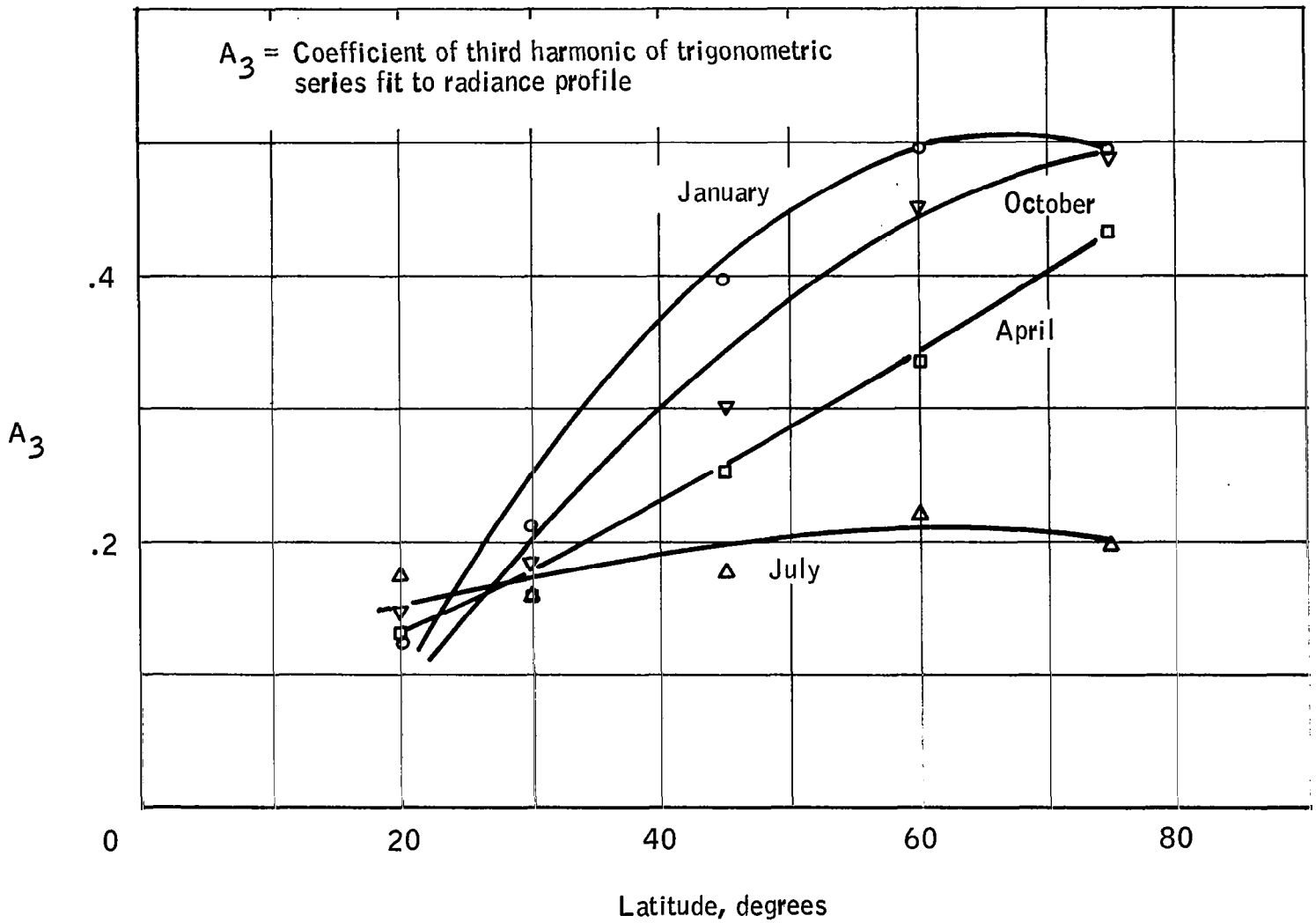


Figure 63. A_3 versus Latitude for Each Season

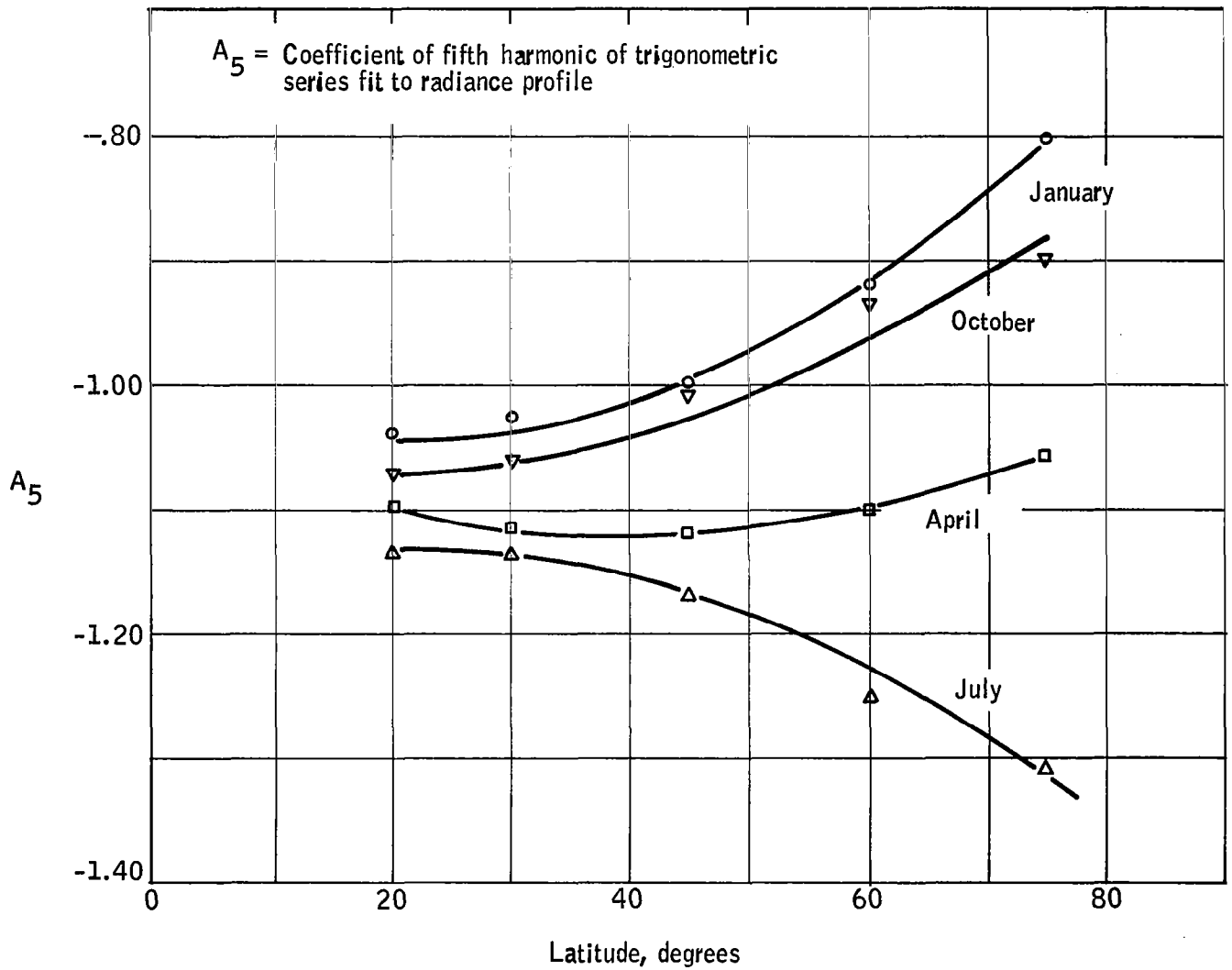


Figure 64. A_5 versus Latitude for Each Season

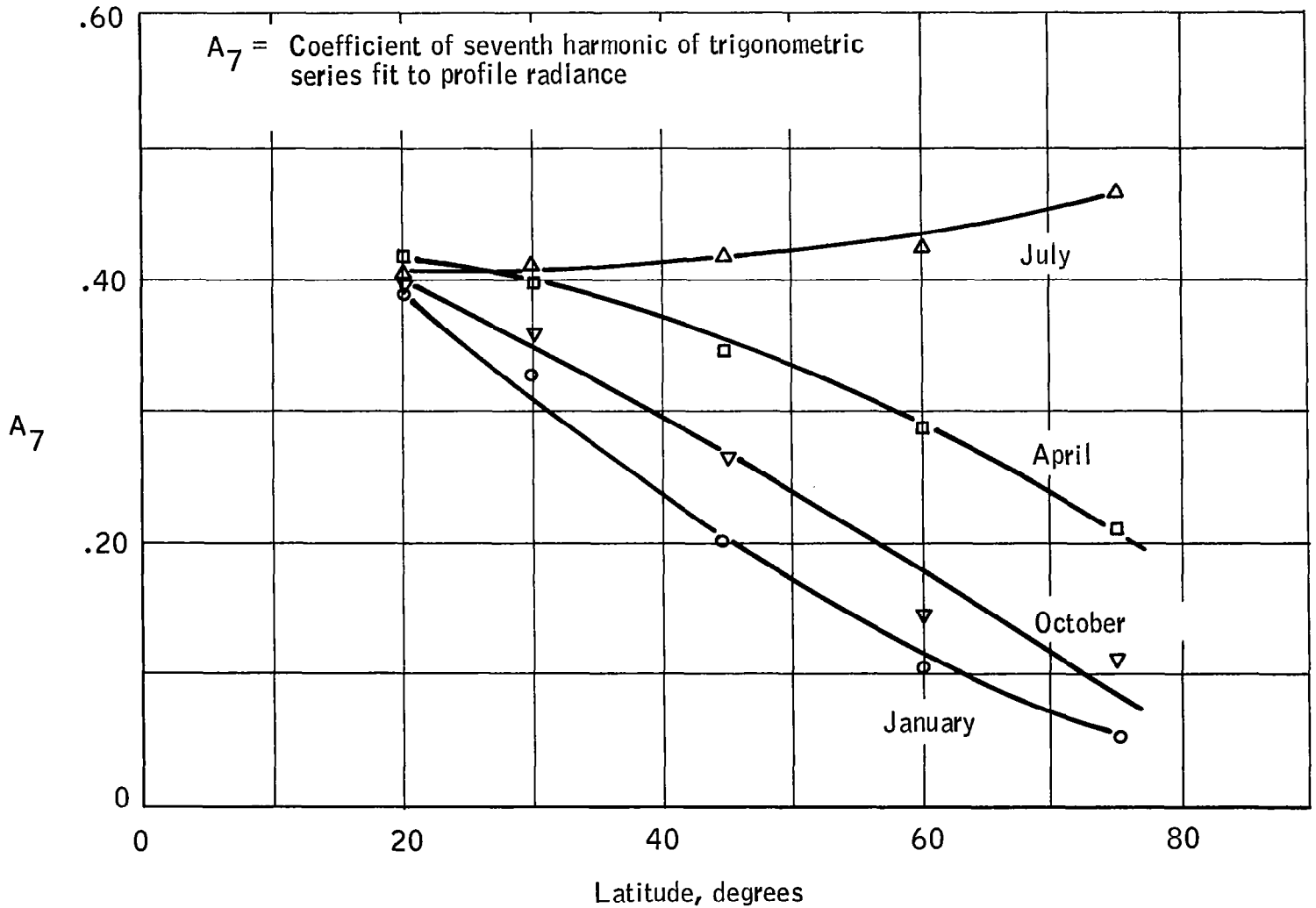


Figure 65. A_7 versus Latitude for Each Season

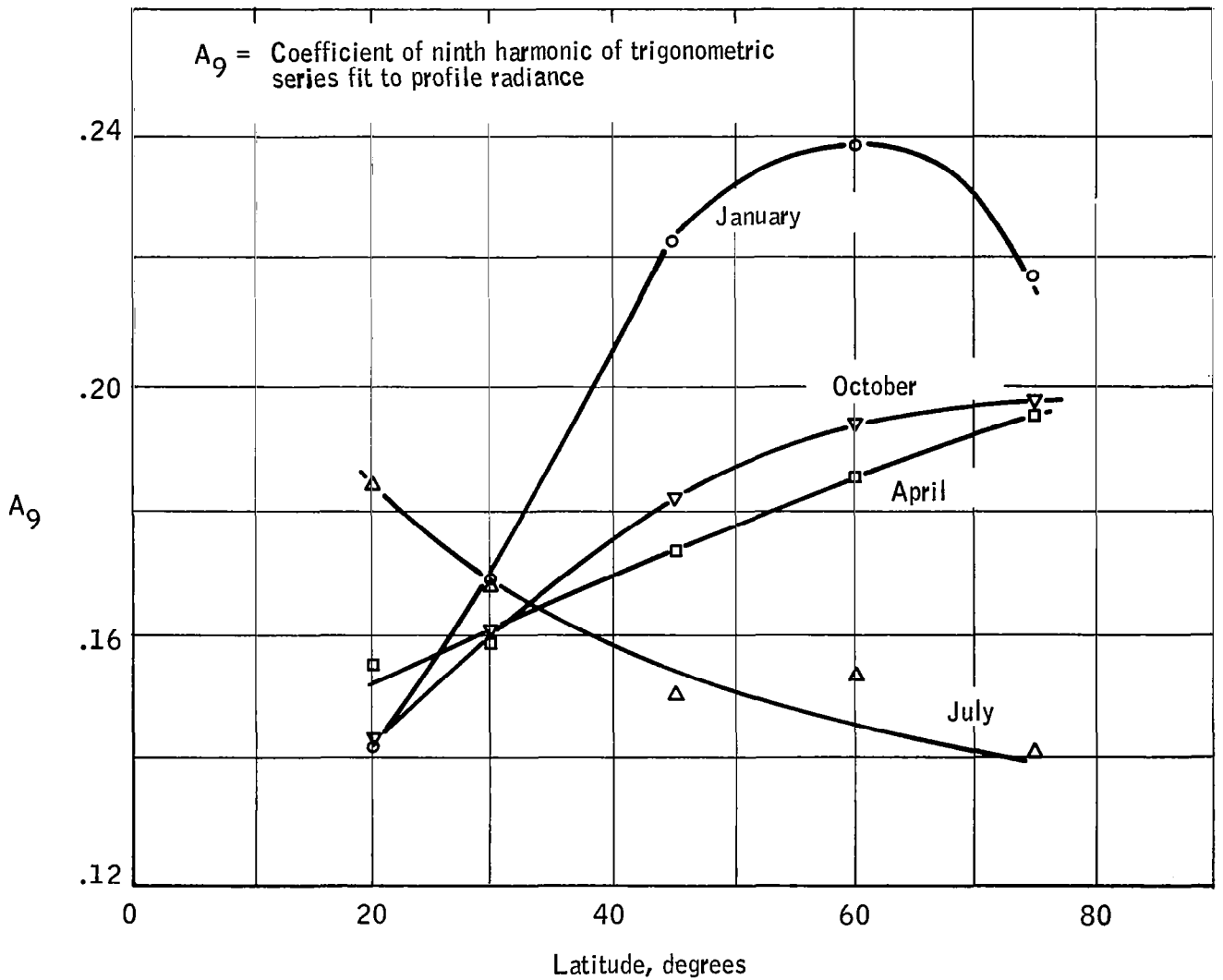


Figure 66. A_9 versus Latitude for Each Season

with both latitude and season. Addition of a sixth term is expected to reduce the error by a factor of from three to five.

The following recommendations are made:

- The Fourier expansion should be refined as indicated earlier. This would provide an alternative to the ratio of two polynomials and, thus, throw further light on profile variation with respect to latitude, time of year, and other physical factors.

- The curve-fitting computer programs should be made more efficient. With respect to the linear-programming method as applied to the ratio of two polynomials, the tangent height can be normalized by transformation into a non-dimensional variable x' such that $0 \leq x' \leq 1$ for all profiles of interest. Coefficients of powers of x' would be computed.

  With respect to the method of differential corrections, the results of the linear-programming method can be used as initial estimates in the former method. This would enhance the chances for rapid convergence of the differential corrections method, which, in turn, would improve these initial estimates and also check the validity of linearizing a function not already linear in its coefficients.

PHENOMONOLOGICAL CURVE FITTING

The purpose of this study was to develop the theory and computational techniques for relating 15μ CO_2 band horizon radiance profiles to key atmospheric variables. Once such relationships are established, they can be used to estimate horizon radiance profiles for any atmospheric conditions. The only input would be values of several key atmospheric variables. The advantages of such a technique are: 1) The radiative transfer equation to obtain an estimate of the radiance profile for a particular atmospheric profile does not have to be integrated, 2) Insight is gained on the physical relationships between radiance and atmospheric variables, and 3) The inverse of such a technique would allow inferences about atmospheric structure to be made from observations of horizon radiance.

The approach to the problem was to derive an approximate form of the basic radiative transfer equation that applies to horizon radiance calculations. With the approximate equation and with the standard atmosphere structure and radiance profile as a reference, the horizon radiance profile for any atmospheric structure can be estimated.

For tangent heights that do not intersect the Earth's surface, the horizon radiance in the 15μ CO_2 band at a tangent height h can be written as

$$N(h) = -\int_{1}^{\tau} B(T)\, d\tau \tag{44}$$

where B is the Planck function integrated over the band, τ is the transmissivity of the band, T is temperature, and $\tau(h)$ is the transmissitivity of the entire path that is tangent to the Earth's atmosphere at height h. If the atmosphere is isothermal, (44) becomes

$$N(h) = B(T)\,[1 - \tau(h)]\,. \tag{45}$$

If the atmosphere is not isothermal, (45) is still a good approximation to the horizon radiance since: a) $\tau(h)$ is relatively insensitive to temperature and, b) for any tangent height, most of the emitted energy emanates from a rather narrow height interval near the peak of the weighting function for that tangent height thus allowing B(T) to be approximated by $B[T(h')]$, where h' represents the height of the center of the emitting layer. Thus, for the standard atmosphere,

$$N_S(h) = B[T_S(h')]\,[1 - \tau_S(h)] \tag{46}$$

where the subscript s refers to standard atmosphere values, and h' is a function of tangent height h. Also, for any atmosphere,

$$N(h) = B[T(h')]\,[1 - \tau(h)] \tag{47}$$

It is assumed here that the weighting functions do not vary significantly with changes in atmospheric structure so that $h'(h)$ does not vary from atmosphere to atmosphere. The horizon radiance at tangent height h for any atmospheric structure can be obtained from that of the standard atmosphere by dividing (47) by (46) to obtain

$$N(h) = N_s(h) \times \frac{B\,[T(h')]}{B\,[T_s(h')]} \times \frac{[1 - \tau(h)]}{[1 - \tau_s(h)]} \tag{48}$$

Equation (48) forms the basis for estimating the horizon radiance profile for any atmospheric structure. For very approximate calculations of horizon radiance, (48) can be further simplified by assuming that: a) $\tau(h)$ does not vary from atmosphere to atmosphere - an assumption normally made for a uniformly mixed gas like carbon dioxide, and b) the ratio of the Planck functions for the 15μ band is equal to the ratio of the temperatures raised to the fourth power, or

$$\frac{B\,[T(h')]}{B\,[T_s(h')]} = \left[\frac{T(h')}{T_s(h')}\right]^4 \tag{49}$$

With these assumptions, (48) can be reduced to

$$N(h) = N_s(h)\left[\frac{T(h')}{T_s(h')}\right]^4 \tag{50}$$

The effective emitting heights $h'(h)$ can be determined once and for all from the centroids of the weighting functions computed for the standard atmosphere at various tangent heights. The standard atmosphere temperatures at the effective emitting heights h' are known, and the horizon radiance of the standard atmosphere $N_s(h)$ can also be computed once and for all. Thus, the only input variable necessary to estimate the horizon radiance at a tangent height h for any atmosphere is the temperature at the effective emitting height h'. The number of input temperatures required to specify a complete horizon radiance profile depends upon the tangent height resolution desired and the variation of h' with tangent height. For low tangent heights, <20 km

for example, $h'(h)$ is essentially constant, thus allowing the specification of the part of the profile below tangent heights of 20 km with the use of a single input temperature. As a test of this technique, the radiance profile for the 600 cm^{-1} to 725 cm^{-1} spectral interval for the climatological temperature profile for April, 45°N, 90°W (profile no. 913) was estimated from Equation (50). At the time of this preliminary test, values for the standard atmosphere radiance were not yet available, and, so, values of radiance and temperature for the climatological temperature profile for July, 75°N, 90°W (profile no. 983) were used as a reference rather than the standard atmosphere values. For this test, values of $h'(h)$ were estimated from plots of the weighting functions of the 625 cm^{-1} to 725 cm^{-1} interval. Figure 67 shows a comparison of the estimated horizon radiance profile with the horizon radiance profile calculated by the Honeywell profile synthesizer program for profile no. 913. For more accurate estimates of horizon radiance:

- Equation (48) can be used in its entirety if a simple technique can be developed for obtaining $[1 - \tau(h)]$ for any atmospheric structure profile.
- The ratio $\frac{B[T(h')]}{B[T_s(h')]}$ can be determined exactly from tables of Planck function versus temperature.
- $h'(h)$ can be determined very accurately.

These improvements were incorporated and tested in the basic model. The term, $h'(h)$, can be accurately computed by defining it as that altitude at which the integral of the weighting function

$$\int_h^{h'} \left[\frac{d\tau(h)}{dZ}\right] dZ$$

divides the transmission $\tau(h)$ into two equal parts, above and below h', after summing the two contributions to $\frac{d\tau(h)}{dZ}$ from the same altitude. Table 17 lists $h'(h)$ computed in this way from the standard atmosphere weighting functions for the 615 cm^{-1} to 715 cm^{-1} interval. To see if $h'(h)$ varied significantly with atmospheric structure, $h'(h)$ was also accurately computed for the extreme climatological temperature profiles from Jan., 75°N, 90°W (profile no. 883) and July, 75°N, 90°W (profile no. 983). The variation of h' with tangent height for the standard atmosphere and these two extreme climatological profiles is shown in Figure 68. At no tangent height does h' vary by more than one kilometer from that of the standard atmosphere. Thus, the values of h' for the standard atmosphere provide sufficient accuracy for use with any atmospheric structure.

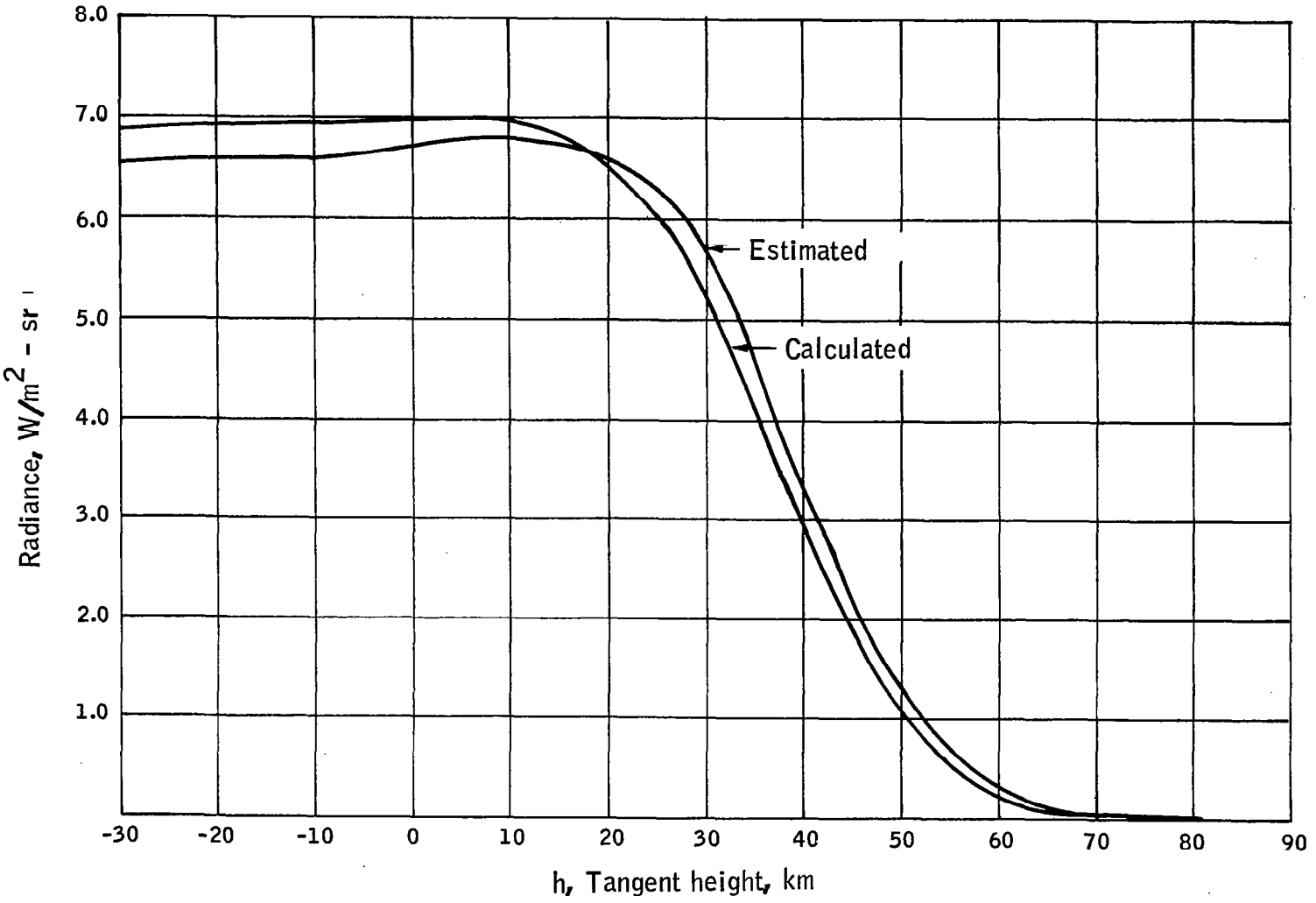


Figure 67. Comparison of Estimated Horizon Radiance Profile Calculated by Honeywell Profile Synthesizer Program for Climatological Temperature Profile No. 8

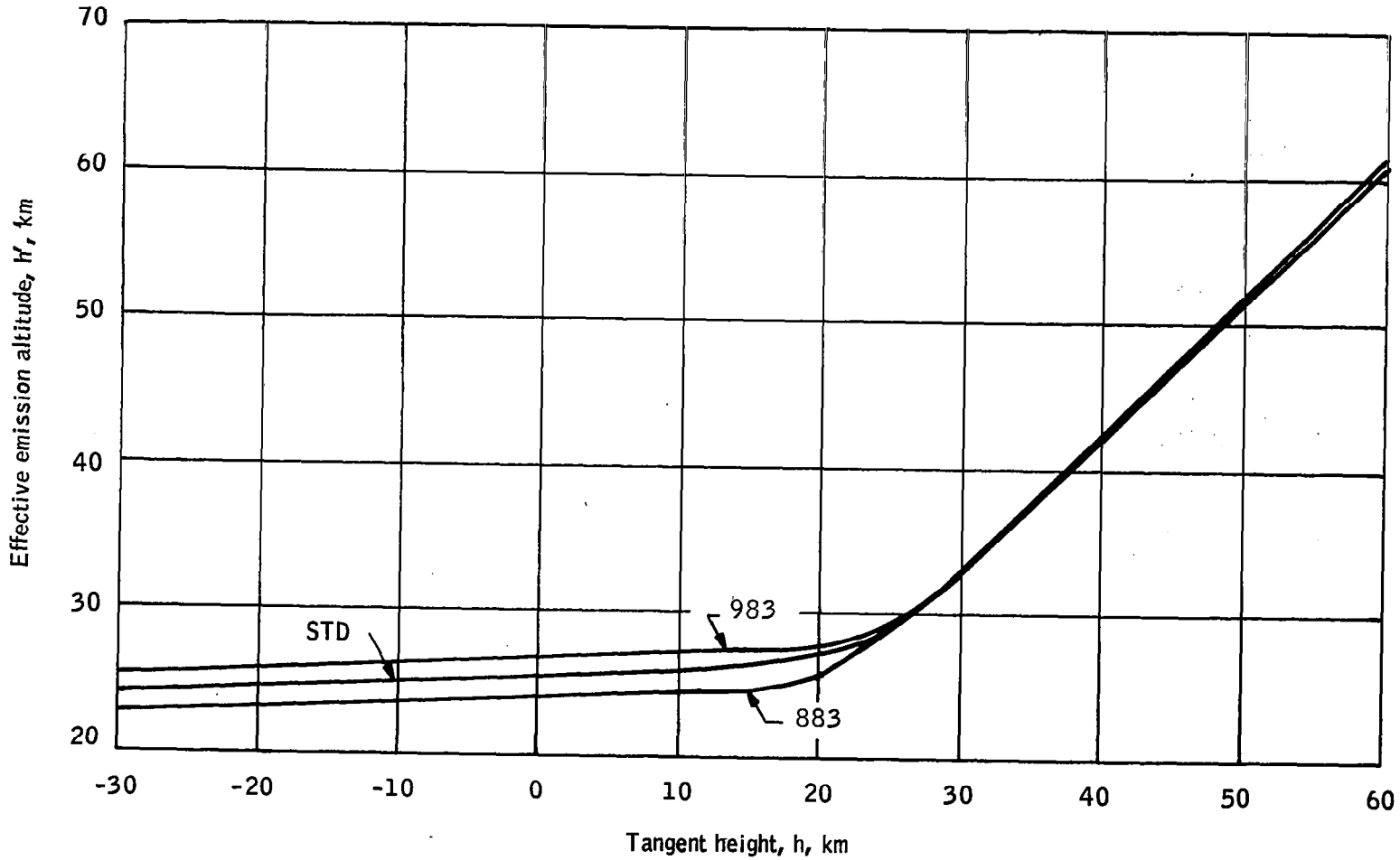


Figure 68. Effective Emission Altitude as a Function of Tangent Height

To estimate $[1 - \tau(h)]$ for any atmospheric structure, the following assumptions were made. The transmissivity at any tangent height h is proportional to the amount of carbon dioxide above the geometric altitude h; and, since carbon dioxide is uniformly mixed in the atmosphere, the amount of carbon dioxide above a geometric altitude h is proportional to the atmospheric pressure. Also, the effective pressure correction to the CO_2 amount is proportional to the pressure at geometric altitude h. Thus, the transmissivity, $\tau(h)$, is essentially proportional to the atmospheric pressure at geometric altitude h.

TABLE 17. - h' AS A FUNCTION OF TANGENT HEIGHT h FOR THE STANDARD ATMOSPHERE

Tangent height, h, km	h', km
-30	24.2
-15	24.8
0	25.4
10	26.0
20	27.0
25	28.5
30	32.8
35	37.0
40	41.7
45	46.5
50	51.4
55	56.4
60	61.3
65	66.3
70	71.3
75	76.3
80	81.3

Knowing the $\tau(h)$ for the standard atmosphere, it is possible to estimate $\tau(h)$ for any atmosphere by determining the variation of the pressure at a given height h from that of the standard atmosphere pressure at the same height. Basically, this is the approach used to correct for variations in $[1 - \tau(h)]$ from atmosphere to atmosphere. However, there are two modifications: (1) Rather than using variations at all heights, it is assumed that the departure at about 30 km is representative of all heights, and (2) rather than working with departures of pressure at a constant altitude, we formulate the technique for use with departure in altitude of a constant pressure surface. This latter modification is due to the fact that meteorological data are reported for constant pressure surfaces rather than for constant height surfaces in the atmosphere.

In Figure 69 are shown plots of $[1 - \tau(h)]$ versus tangent height for the standard atmosphere and for extreme climatological profiles nos. 883 and 983. When the standard atmosphere curve is translated in the tangent height direction, it agrees well with the actual curves for climatological profile nos. 883 and 983. This indicates that the $[1 - \tau(h)]$ curve for any atmosphere can be estimated by shifting the $[1 - \tau(h)]$ curve for the standard atmosphere by an appropriate height interval.

The correlation of $[1 - \tau(h)]$ at the 30 km tangent height with the altitude of the 10 mb surface is shown in Figure 70. The excellent linear relationship between the two is evident in the graph.

The term, $[1 - \tau(h)]$, may now be estimated for any atmosphere from that of the standard atmosphere. Define

$$\Delta h = Z\ (10\ \text{mb}) - 31.10\ \text{km} \tag{51}$$

where Δh is the departure of the 10 mb height from that (31.10 km) of the standard atmosphere.

The absorptivity at tangent height h for any atmosphere can be obtained from

$$[1 - \tau(h)] = [1 - \tau_s(h - \Delta h)] \tag{52}$$

where $[1 - \tau_s(h - \Delta h)]$ is the absorptivity of the standard atmosphere at tangent height $(h - \Delta h)$. Since the absorptivity of the standard atmosphere is computed only once, this technique is particularly convenient.

The basic equation for estimating the radiance profile now becomes

$$N(h) = N_s(h)\ \frac{B[T(h')]}{B[T_s(h')]}\ \frac{[1 - \tau_s(h - \Delta h)]}{[1 - \tau_s(h)]} \tag{53}$$

This technique was used to estimate the horizon radiance profile for the extreme climatological temperature profile no. 983. A comparison of the estimated horizon radiance profile with the exactly computed radiance profile is shown in Figure 71. To illustrate the possible variability of horizon radiance profiles, the computed radiance profiles for the standard atmosphere and the extreme climatological temperature profiles (Jan., 75°N, 90°W) are also illustrated in this figure. The agreement between estimated and computed profiles for this extreme case is very good, the maximum difference being about four percent of peak radiance.

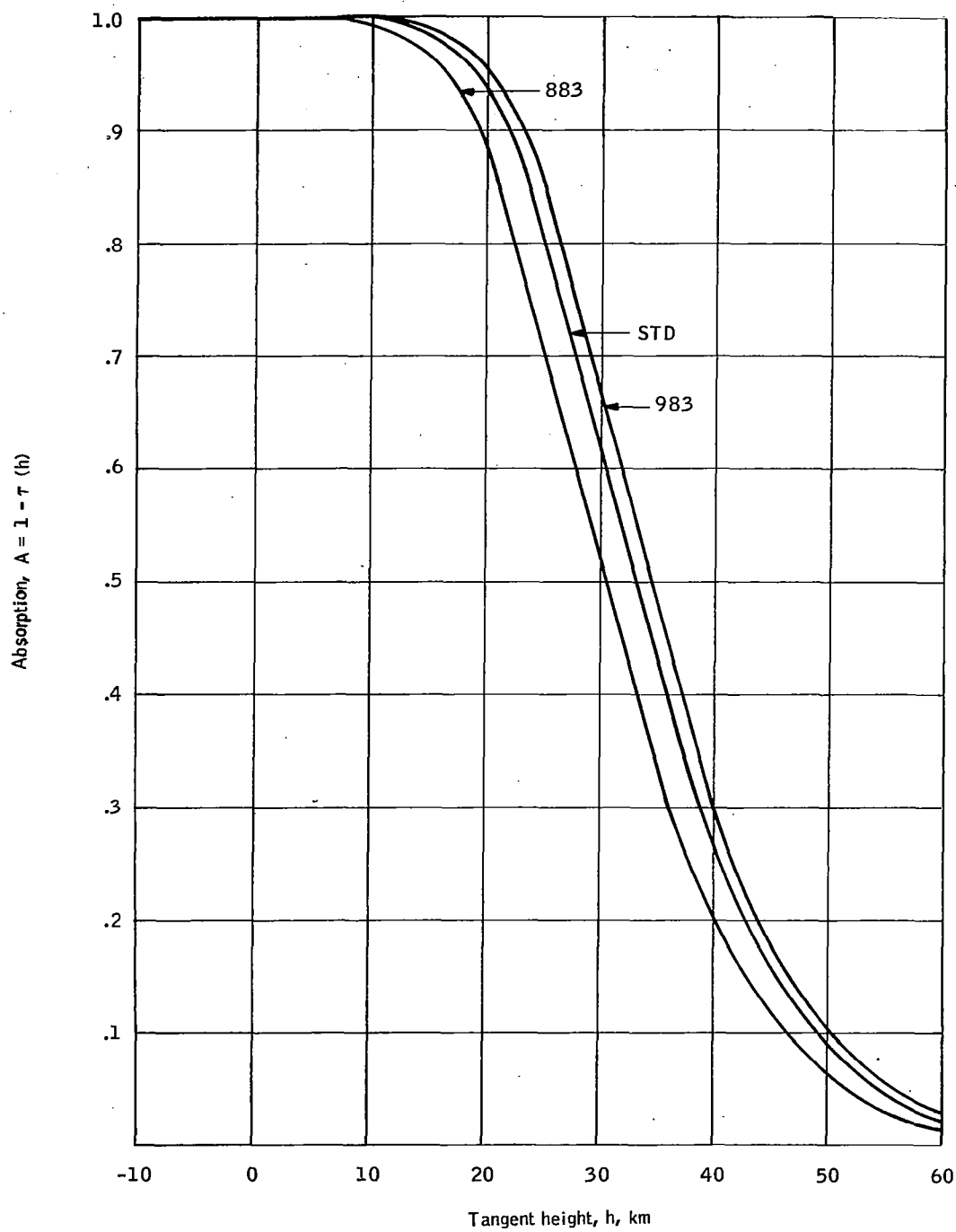


Figure 69. Variation of $\left[1-\tau(h)\right]$ with Tangent Height for the Standard Atmosphere and Climatological Temperature Profiles Nos. 5 and 15

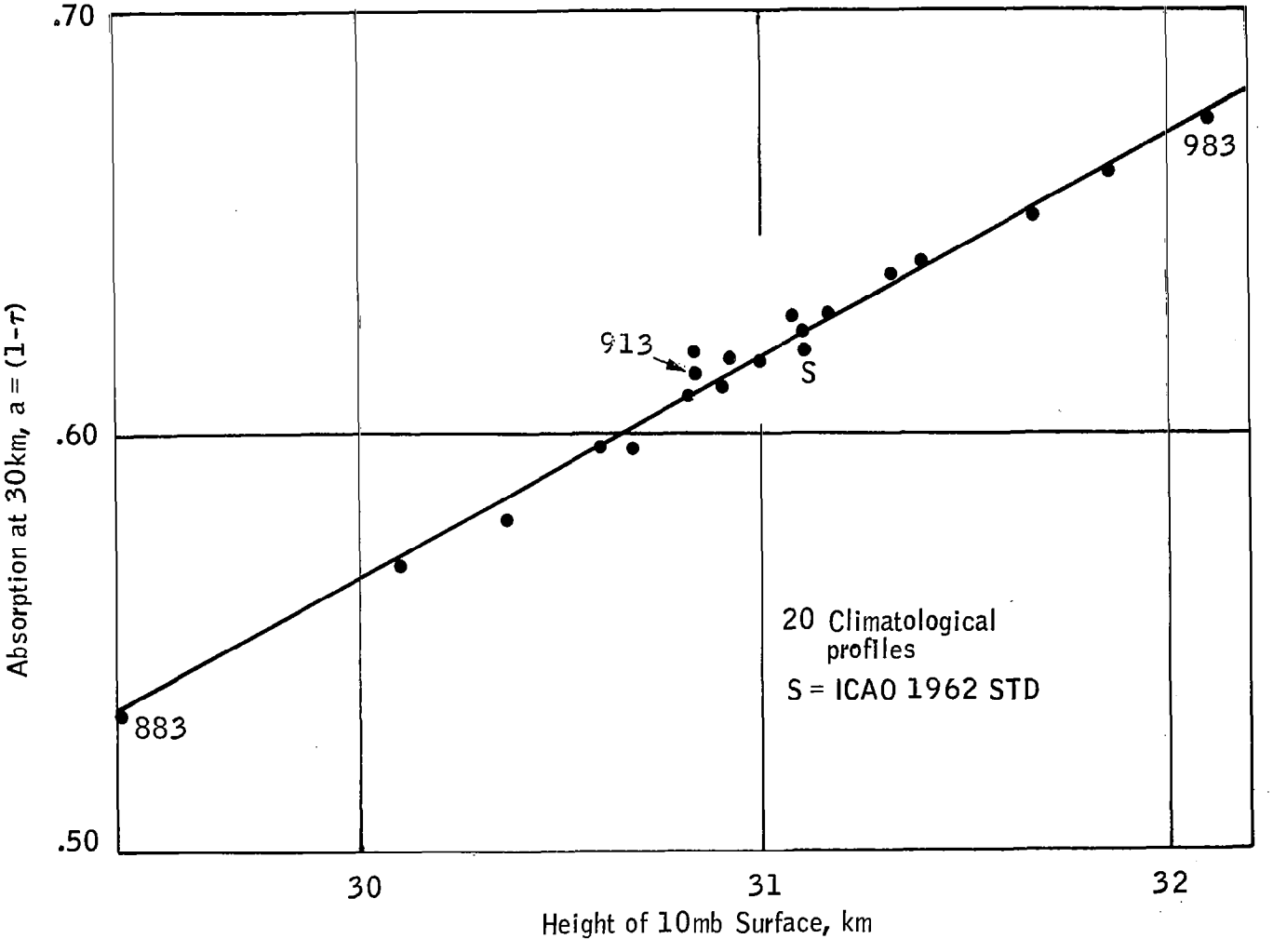


Figure 70. Correlation of $\left[1-\tau(h)\right]$ at 30 km Tangent Height with the Height of 10 mb Surface

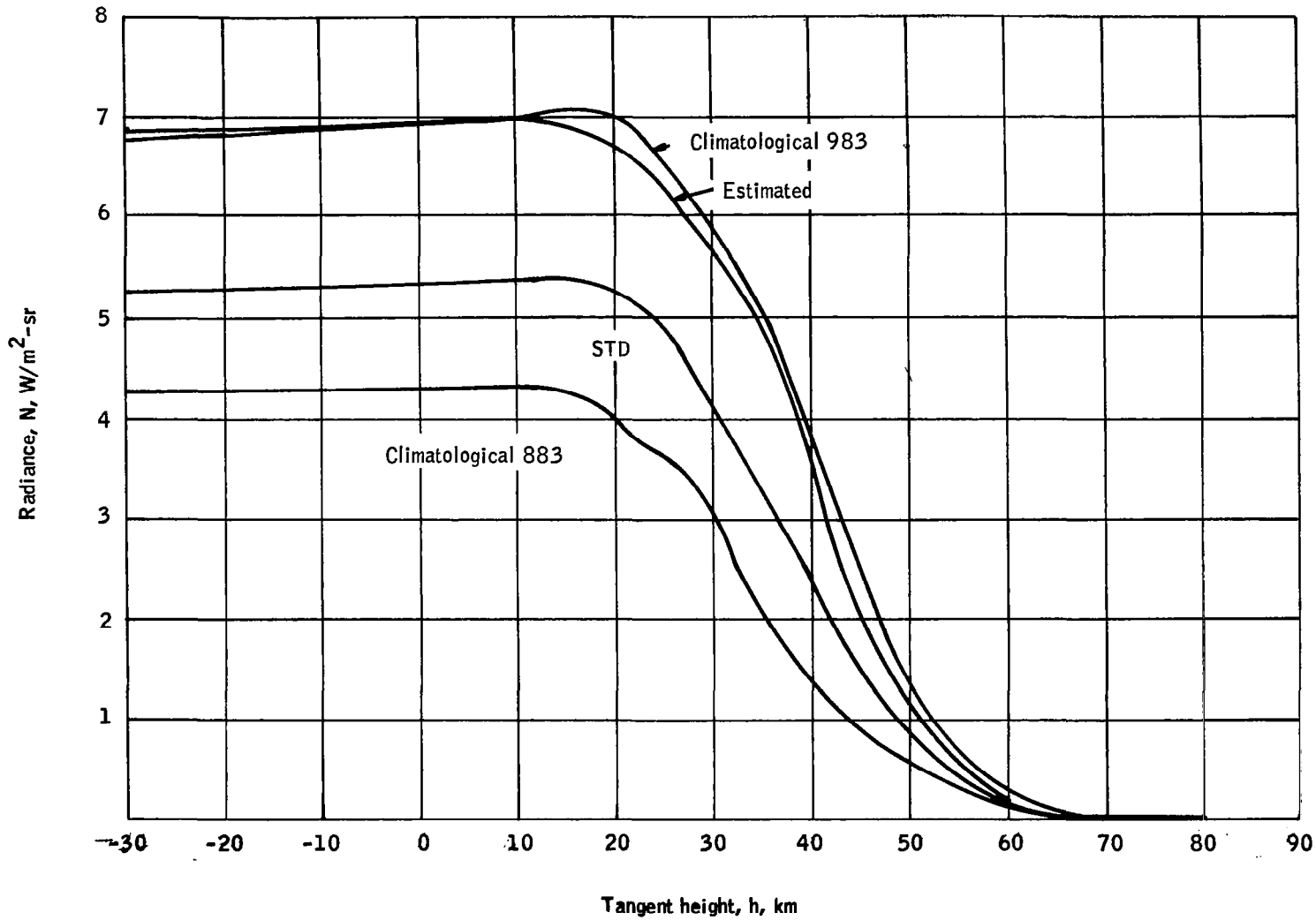


Figure 71. Comparison of Computed and Estimated Horizon Radiance, 615 cm^{-1} to 715 cm^{-1}, Profiles for C Climatological Profile No. 15, July, 75°N, 90°W

CONCLUSIONS

A simple technique (Equation 53) was derived for estimating the horizon radiance profile in the 615 cm^{-1} to 715 cm^{-1} spectral region for any arbitrary atmosphere. As input data, information on temperature above 20 km and the departure of the 10 mb height from that of the standard atmosphere are required.

The technique has been tested on extreme temperature profiles. Based on these tests, it is estimated that the radiance profile for any atmosphere can be reliably estimated to ±5 percent of peak radiance.

The tests used, as input data, nine values of temperature between 20 km and 60 km and the value of the departure of the 10 mb height from that of the standard atmosphere. It is believed possible to obtain a good approximation to a radiance profile with less input data. In particular, only four values of temperature - at 25, 30, 40 and 50 km - plus the 10 mb height departure should yield a reasonably accurate estimate of the complete horizon radiance profile.

CONCLUDING REMARKS

Three approaches to studying horizon radiance profile variations over the complete profile were discussed. In profile statistics studies, the expected systematic behavior of the complete profile with season and latitude was observed. In addition, a significant new result was obtained: the nearly linear variation of radiance (at a given tangent height) with temperature at the 10 mb altitude. This fact should be pursued to obtain, if possible, a simple and fairly accurate method of calculating radiance profiles with only the 10 mb temperature as input data. The strong dependence of the profile on 10 mb conditions was also observed in the effort on phenomenological curve fitting, in which the 10 mb altitude was determined to be one of the more significant input parameters for calculating phenomenological coefficients.

The two approaches to curve fitting, empirical and phenomenological, each resulted in equations capable of achieving accuracies of from two percent to six percent in calculating radiance profiles with a possibility of obtaining one percent accuracy with some additional effort. In the phenomenological approach, four coefficients are required with the independent variables being temperature as a function of tangent height and the 10 mb altitude. In the empirical curve fitting effort, a ratio of two polynominals with 10 coefficients produced an accuracy of two percent of peak radiance. A trigonometric series with five coefficients, in which the five coefficients exhibited systematic behavior with time and space, produced an accuracy of five percent of peak radiance with the possibility of reaching an accuracy of one percent with the addition of only one more term. The systematic behavior of the coefficients suggests that the coefficients could be formulated with respect to time and space leading to an equation for the radiance profile which would be independent of meteorological input data; radiance would then be a function of only three variables: tangent height, time, and location.

Further effort is thus recommended in the curve fitting area. Three approaches should be taken: one in empirical curve fitting to obtain a formulation of six coefficients in the trigonometric series, one in phenomenological curve fitting to further pursue the apparent linear dependence of radiance on the 10 mb temperature, and a combination of the above two which could lead to a more accurate equation for radiance with fewer coefficients than would be obtained from either the empirical or phenomenological approach.

APPENDIX A
PROFILE STATISTICS

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PROFILE STATISTICS

This appendix contains plots of mean radiance, radiance standard deviations, mean normalized radiance, and normalized radiance standard deviation for each of the 100 subsets shown in the text. Each figure contains plots for all subsets within a common set, according to the list of Table A1. Various subsets are shown on more than one figure because of the desire to obtain a cross-index of various effects, e.g., subset 23 is shown in Figure A39 which illustrates the seasonal effect at low latitudes and also in Figure A45 which illustrates the effects of latitude in one season.

TABLE A1. - COMPARISON PLOT SETS

Set	Subsets	Remarks	Plot nos.
1	1, 3, 5, 7, 90	Day and population	A1-A4
2	2, 4, 6, 8, 90	Night and population	A5-A8
3	1-8	Day/night	A9-A12
4	9-12, 90	Cape Kennedy season and population	A13-A16
5	17-20	Various seasonal and population	A17-A20
6	9-22	Various seasonal	A21-A28
7	23-26, 39, 40, 90	Synoptic season/0 lat 30	A29-A32
8	27-30, 41, 42, 90	Synoptic season/31 lat 59	A33-A36
9	31-34, 43, 44, 90	Synoptic season/60 lat 90	A37-A40
10	35-38, 90	Synoptic overall season	A41-A44
11	23, 27, 31, 35, 90	Synoptic latitude/spring	A45-A48
12	24, 28, 32, 36, 90	Synoptic latitude/summer	A49-A52
13	25, 29, 33, 37, 90	Synoptic latitude/fall	A53-A56
14	26, 30, 34, 38, 90	Synoptic latitude/winter	A57-A60
15	39-44, 90	Synoptic latitude only	A61-A64
16	45-48, 35, 90	Synoptic longitude/spring	A81-A84
17	49-52, 36, 90	Synoptic longitude/summer	A85-A88
18	53-56, 37, 90	Synoptic longitude/fall	A89-A92
19	57-60, 38, 90	Synoptic longitude/ winter	A93-A96
20	45, 49, 53, 57, 61, 90	Synoptic season/164 long . 135	A65-A68
21	46, 50, 54, 58, 62, 90	Synoptic season/120 long . 105	A69-A72
22	47, 51, 55, 59, 63, 90	Synoptic season/90 long . 90	A73-A76
23	48, 52, 56, 60, 64, 90	Synoptic season/75 long . 60	A77-A80
24	61-64 90	Synoptic longitude only	A97-A100
25	65-69, 90	10 mb temperature	A101-A104
26	70-73, 90	T Trop	A105-A108
27	74-77, 90	T Strat	A109-A112
28	78-81, 90	LR 1, 500 mb/Trop	A113-A116
29	82-85, 90	LR 2, Trop/10 mb	A117-A120
30	86-89, 90	LR 3, 10 mb/Strat	A121-A124
31	90-93	Land/sea	A125-A128
32	94-99	Circulation identifiers	A129-A132

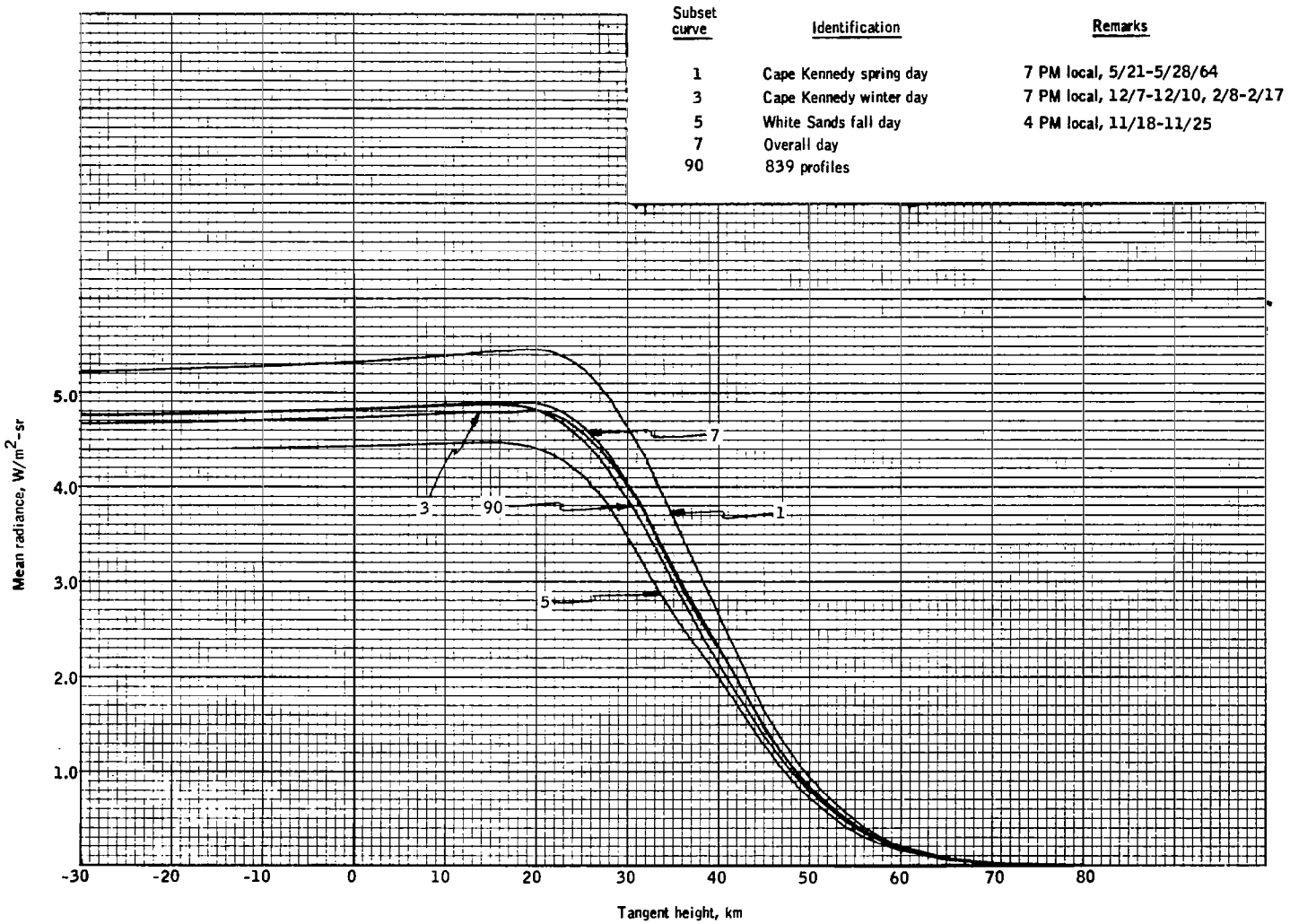


Figure A1. Mean Radiance versus Tangent Height, Set 1

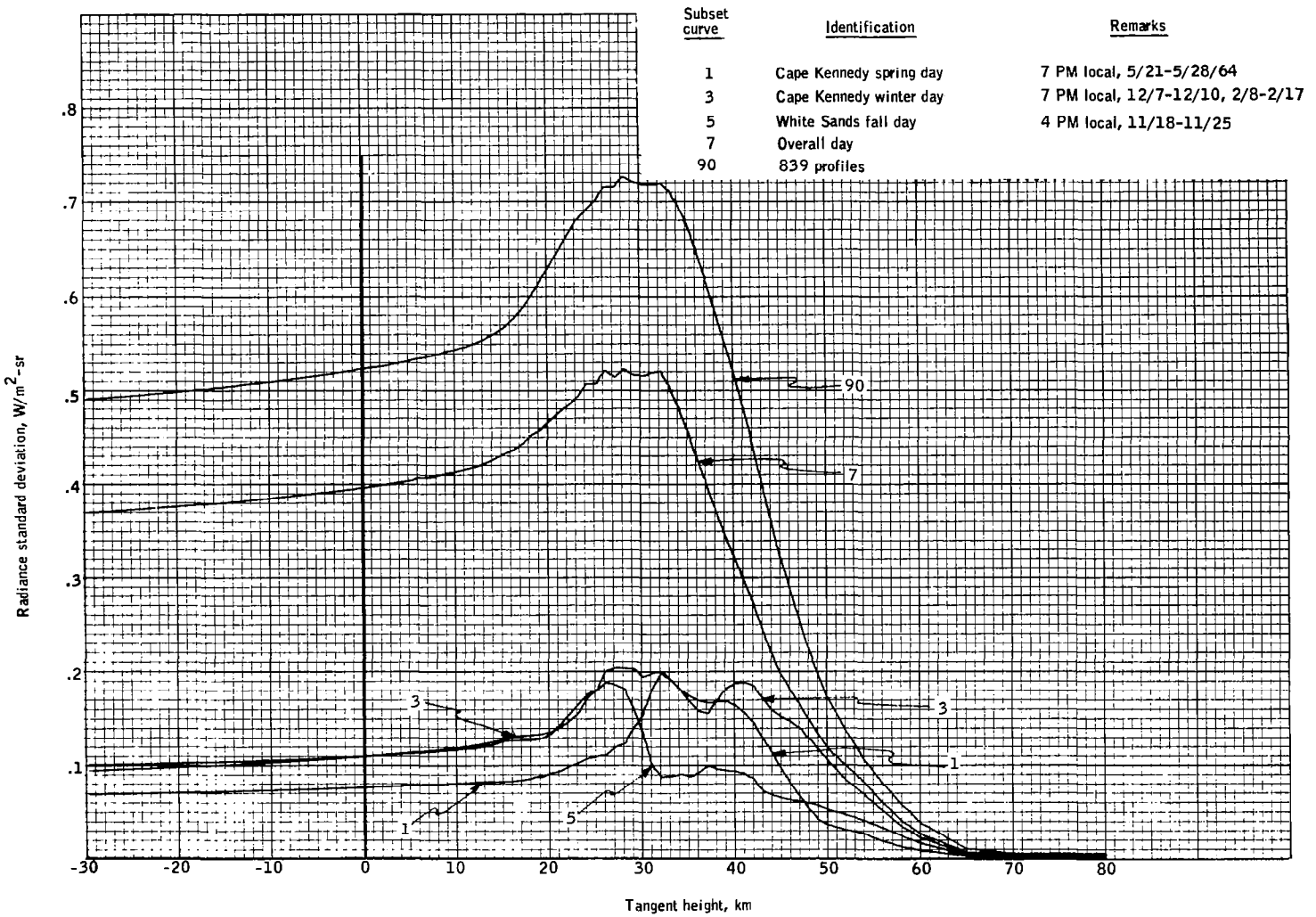


Figure A2. Radiance Standard Deviation versus Tangent Heights, Set 1

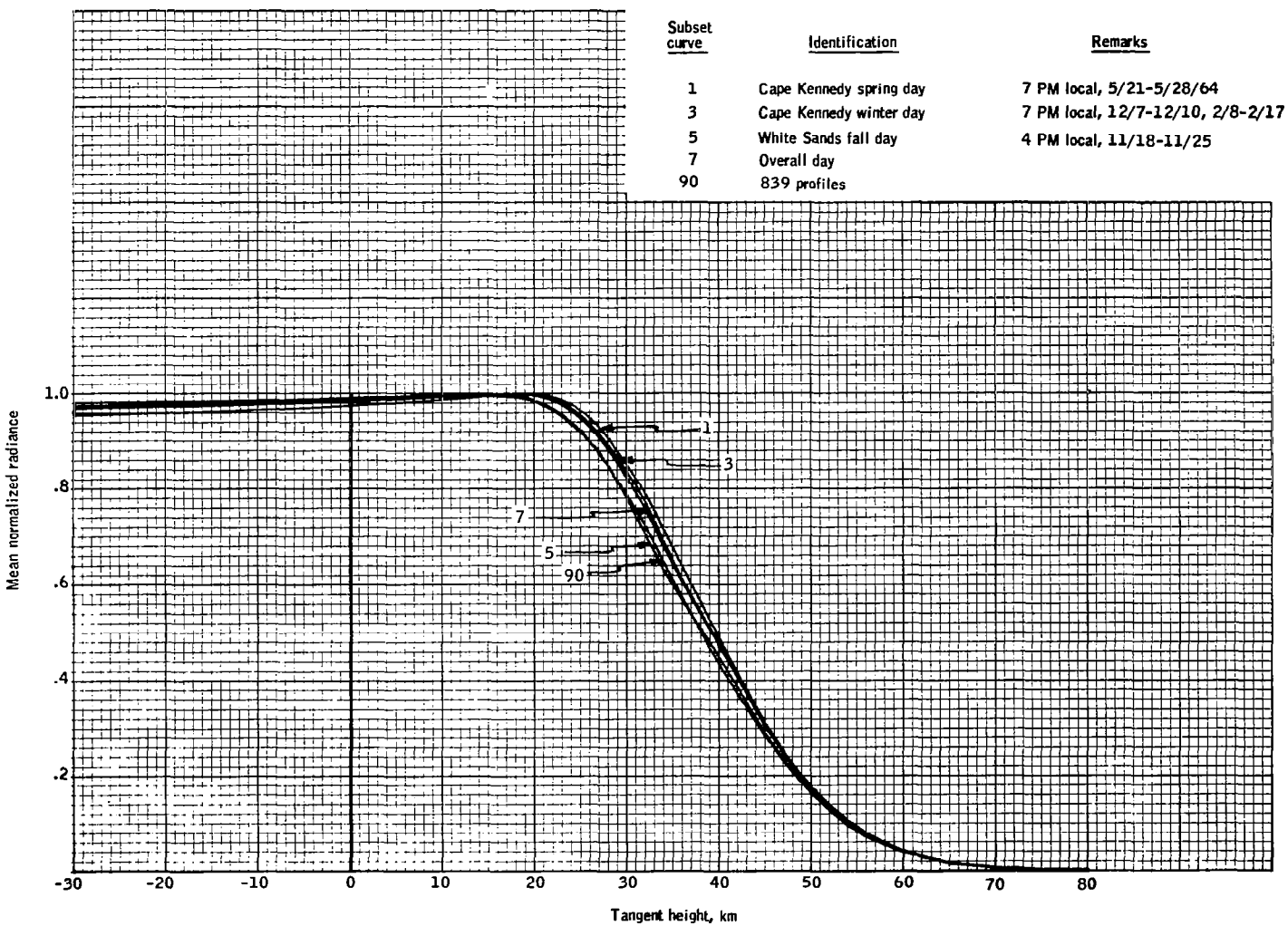


Figure A3. Mean Normalized Radiance versus Tangent Height, Set 1

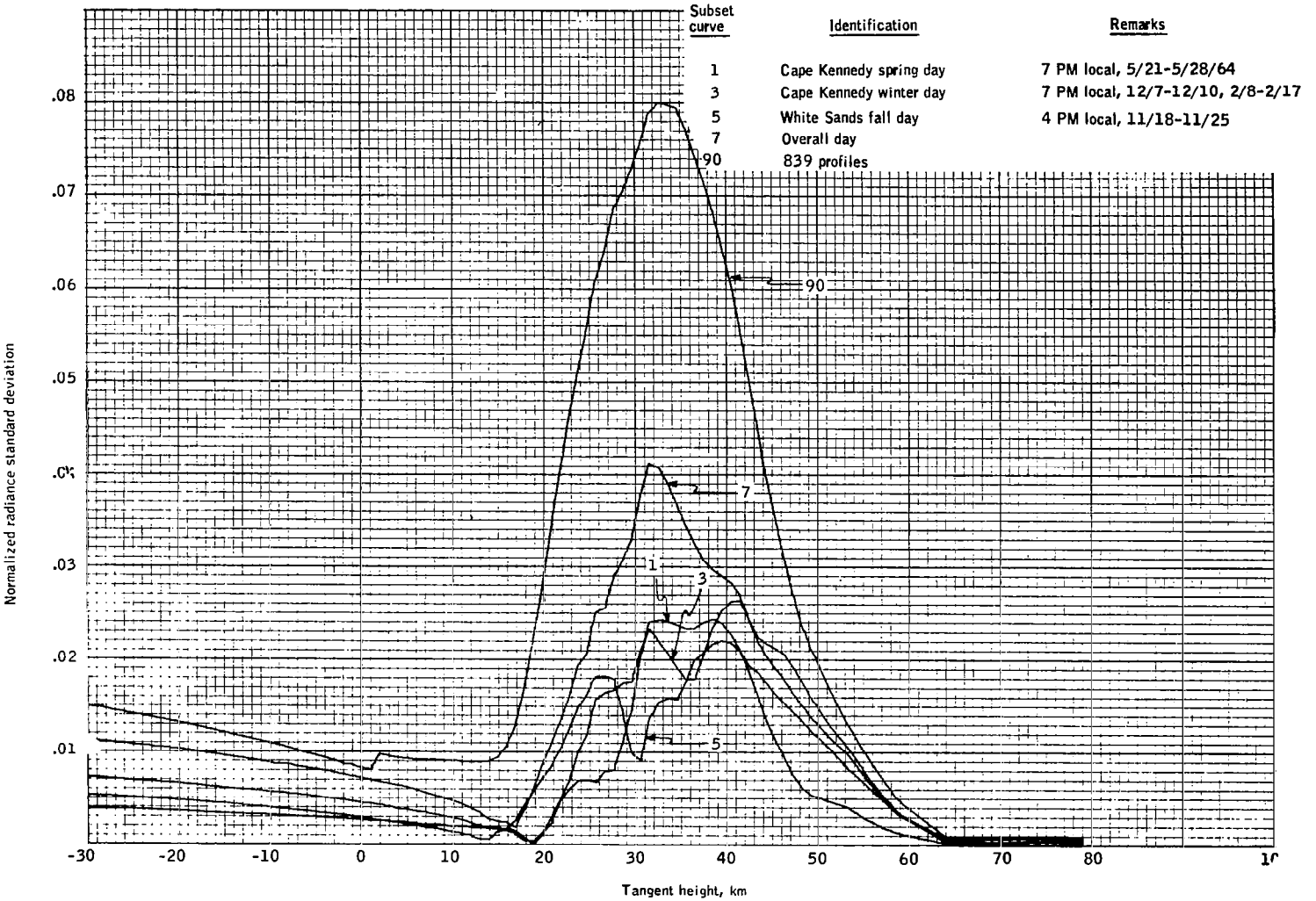


Figure A4. Normalized Radiance Standard Deviation versus Tangent Height, Set 1

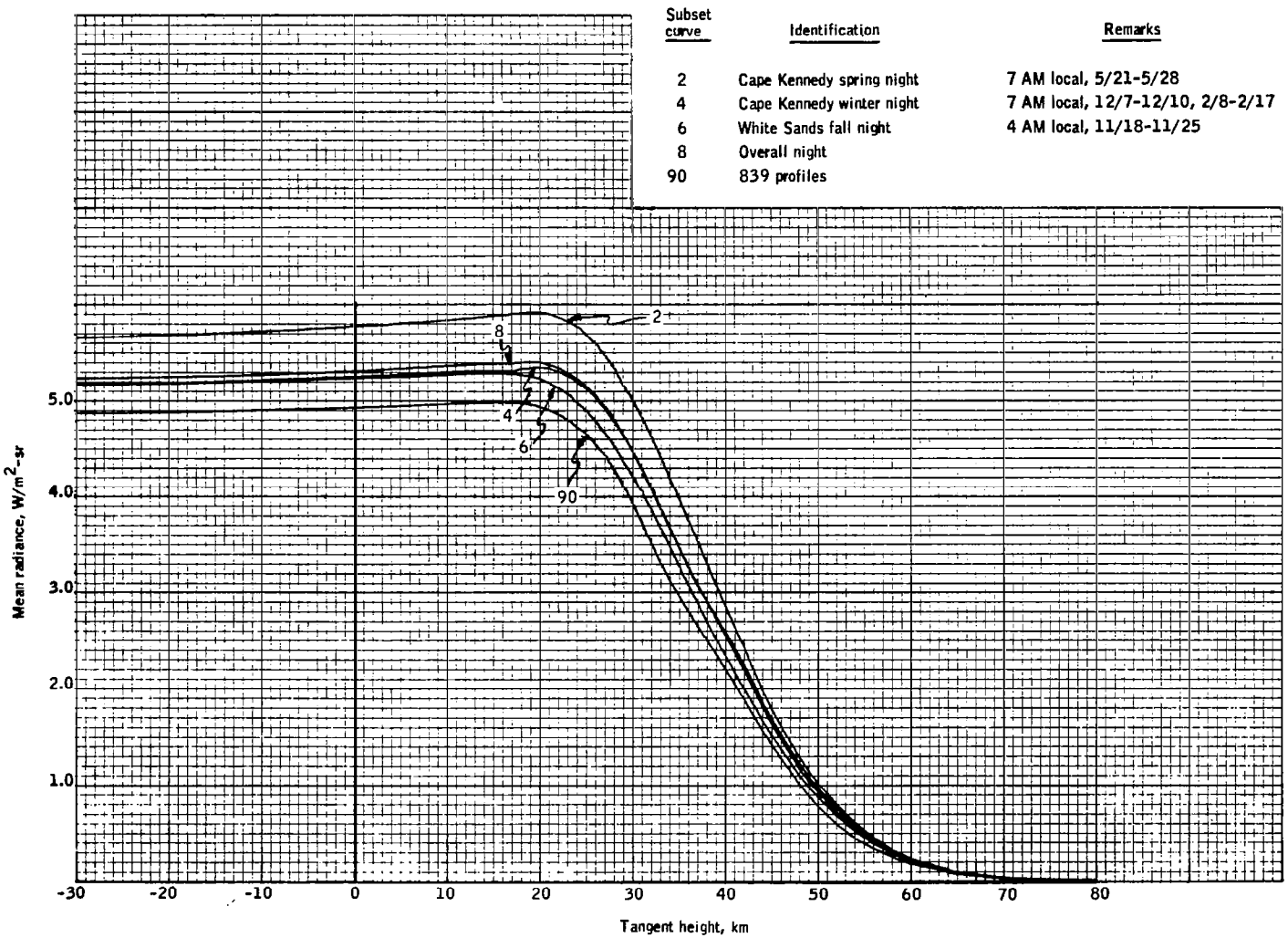


Figure A5. Mean Radiance versus Tangent Heights, Set 2

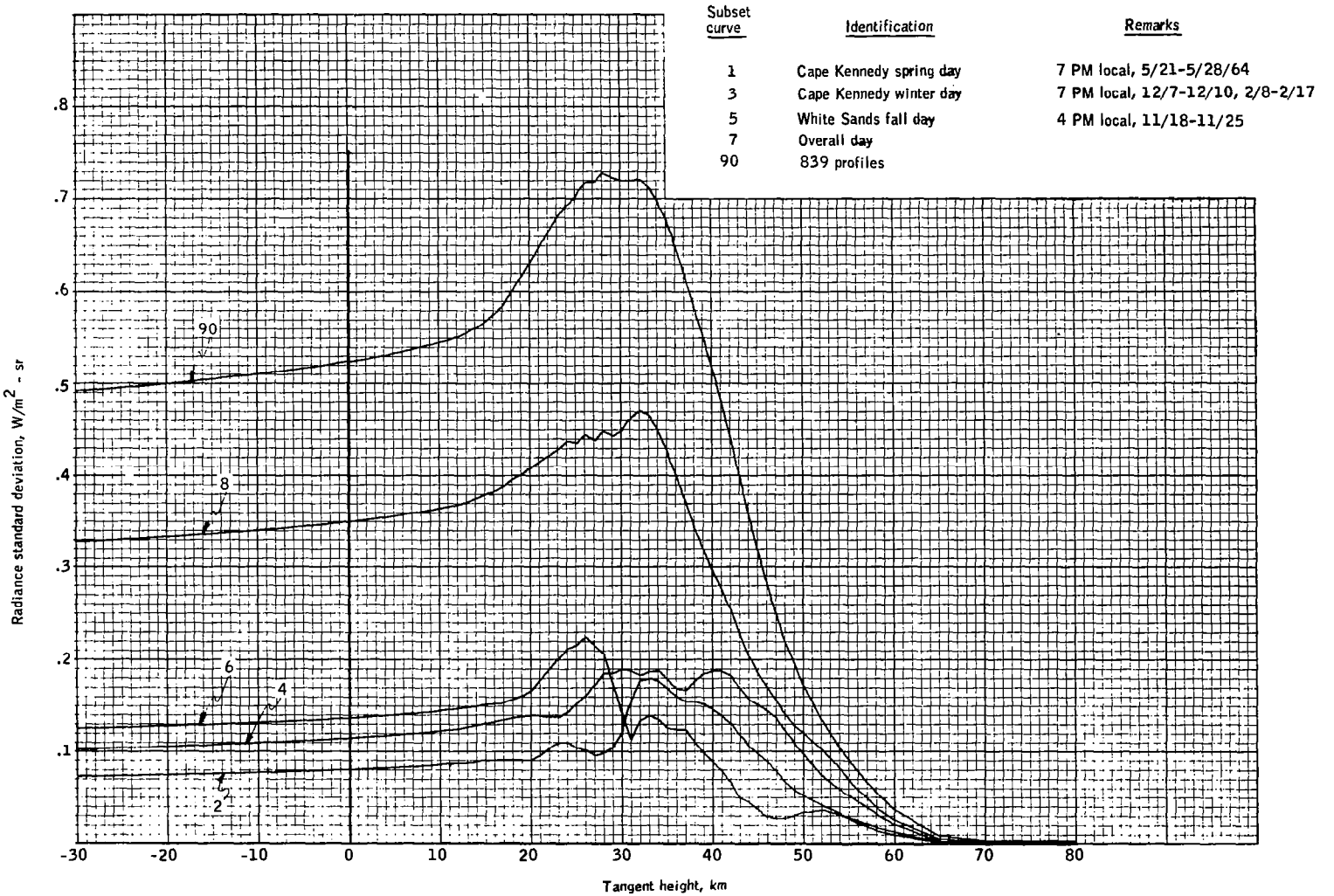


Figure A6. Radiance Standard Deviation versus Tangent Heights, Set 2

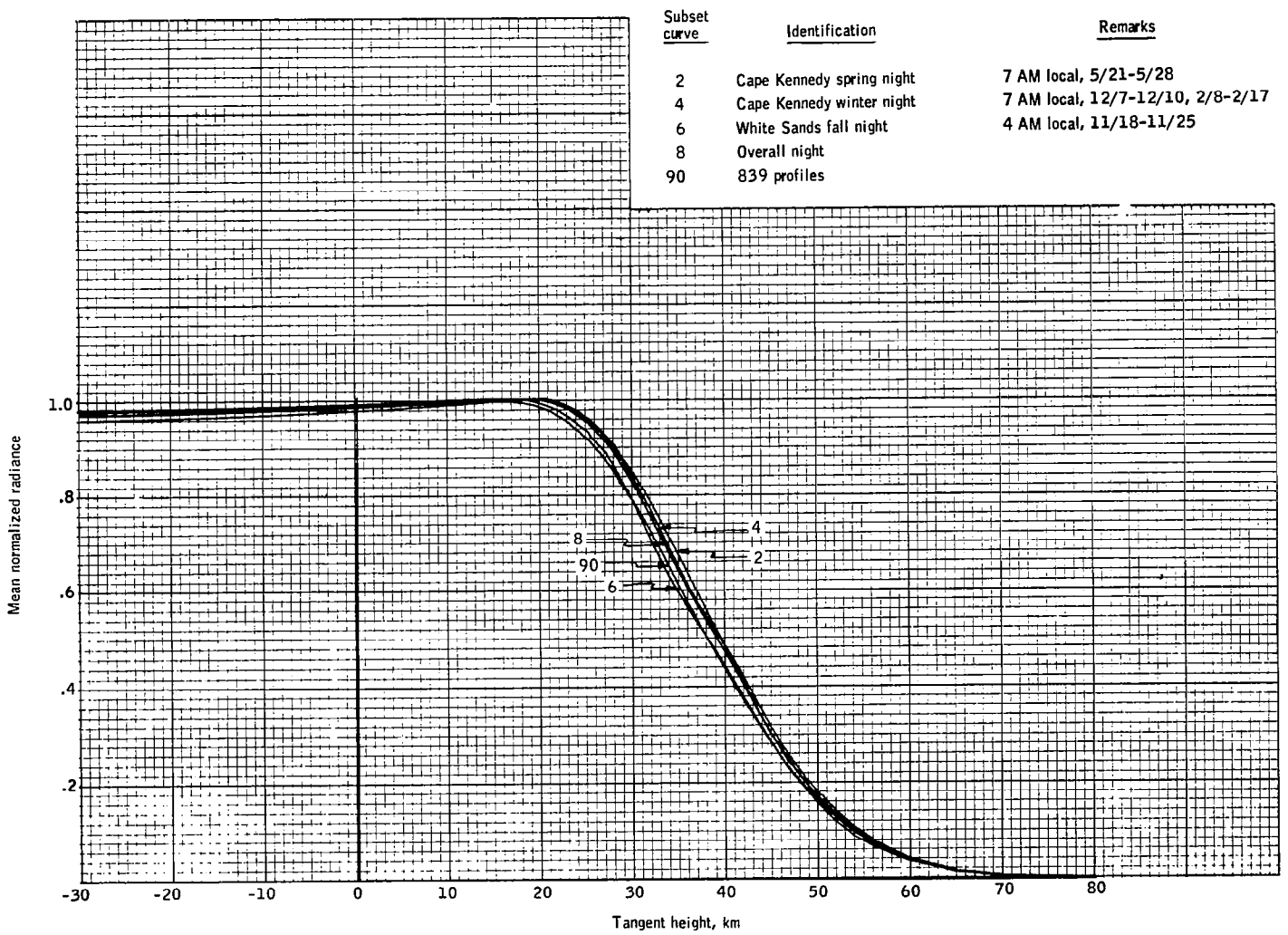


Figure A7. Mean Normalized Radiance versus Tangent Height, Set 2

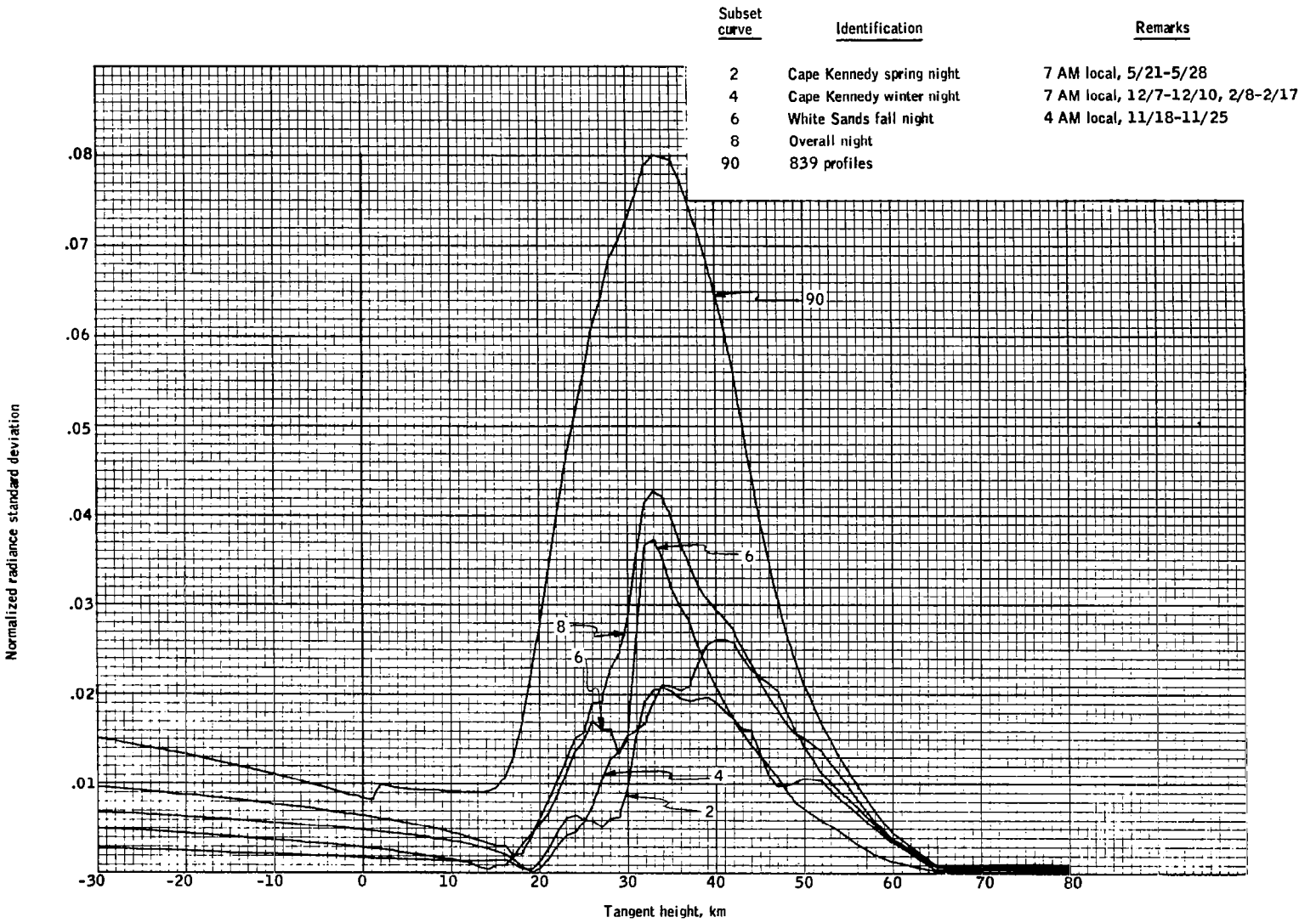


Figure A8. Normalized Radiance Standard Deviation versus Tangent Heights, Set 2

Subset curve	Identification	Remarks
1	Cape Kennedy spring day	7 PM local, 5/21-5/28/64
2	Cape Kennedy spring night	7 AM local, 5/21-5/28/64
3	Cape Kennedy winter day	7 PM local, 12/7-12/10/64, 2/8-2/17/65
4	Cape Kennedy winter night	7 AM local, 12/7-12/10/64, 2/8-2/17/65
5	White Sands fall day	4 PM local, 11/18-11/25/64
6	White Sands fall night	4 AM local, 11/18-11/25/64
7	Overall diurnal day	Subsets 1, 3, and 5 averaged
8	Overall dirurnal night	Subsets 2, 4, and 6 averaged

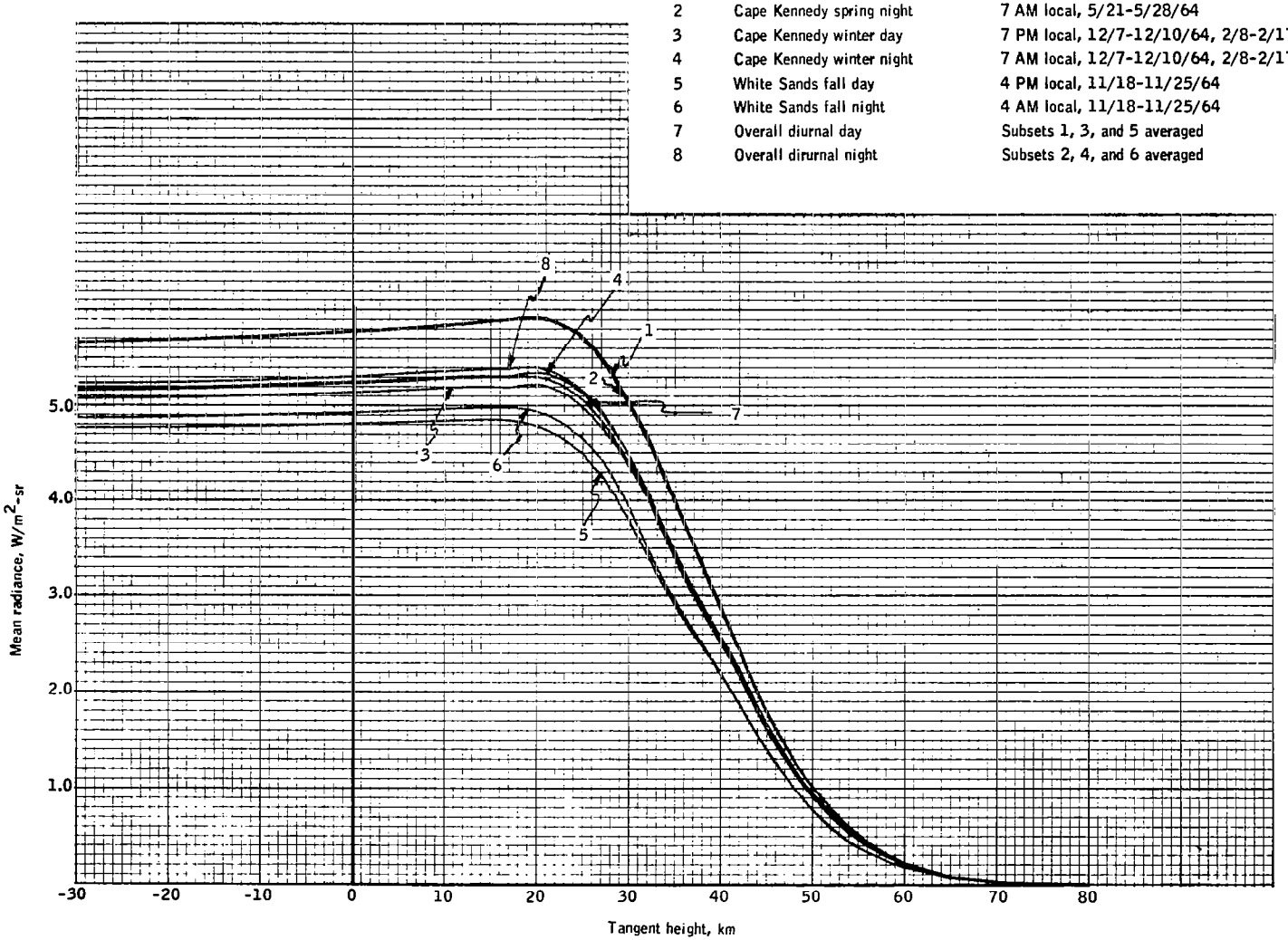


Figure A9. Mean Radiance Versus Tangent Heights, Set 3

Subset curve	Identification	Remarks
1	Cape Kennedy spring day	7 PM local, 5/21-5/28/64
2	Cape Kennedy spring night	7 AM local, 5/21-5/28/64
3	Cape Kennedy winter day	7 PM local, 12/7-12/10/64, 2/8-2/17/65
4	Cape Kennedy winter night	7 AM local, 12/7-12/10/64, 2/8-2/17/65
5	White Sands fall day	4 PM local, 11/18-11/25/64
6	White Sands fall night	4 AM local, 11/18-11/25/64
7	Overall diurnal day	Subsets 1, 3, and 5 averaged
8	Overall dirurnal night	Subsets 2, 4, and 6 averaged

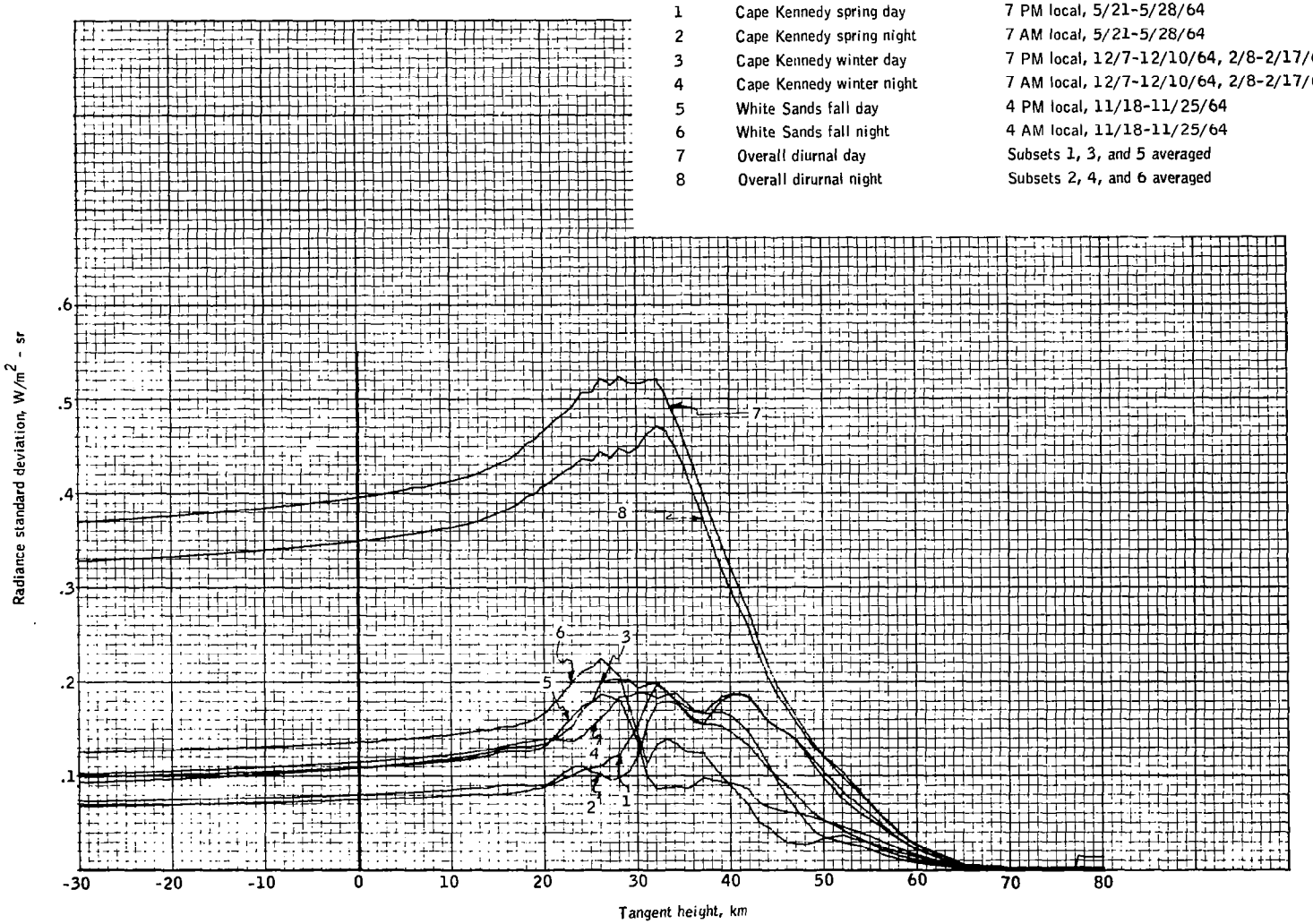


Figure A10. Radiance Standard Deviation versus Tangent Heights, Set 3

Subset curve	Identification	Remarks
1	Cape Kennedy spring day	7 PM local, 5/21-5/28/64
2	Cape Kennedy spring night	7 AM local, 5/21-5/28/64
3	Cape Kennedy winter day	7 PM local, 12/7-12/10/64, 2/8-2/17/65
4	Cape Kennedy winter night	7 AM local, 12/7-12/10/64, 2/8-2/17/65
5	White Sands fall day	4 PM local, 11/18-11/25/64
6	White Sands fall night	4 AM local, 11/18-11/25/64
7	Overall diurnal day	Subsets 1, 3, and 5 averaged
8	Overall dirurnal night	Subsets 2, 4, and 6 averaged

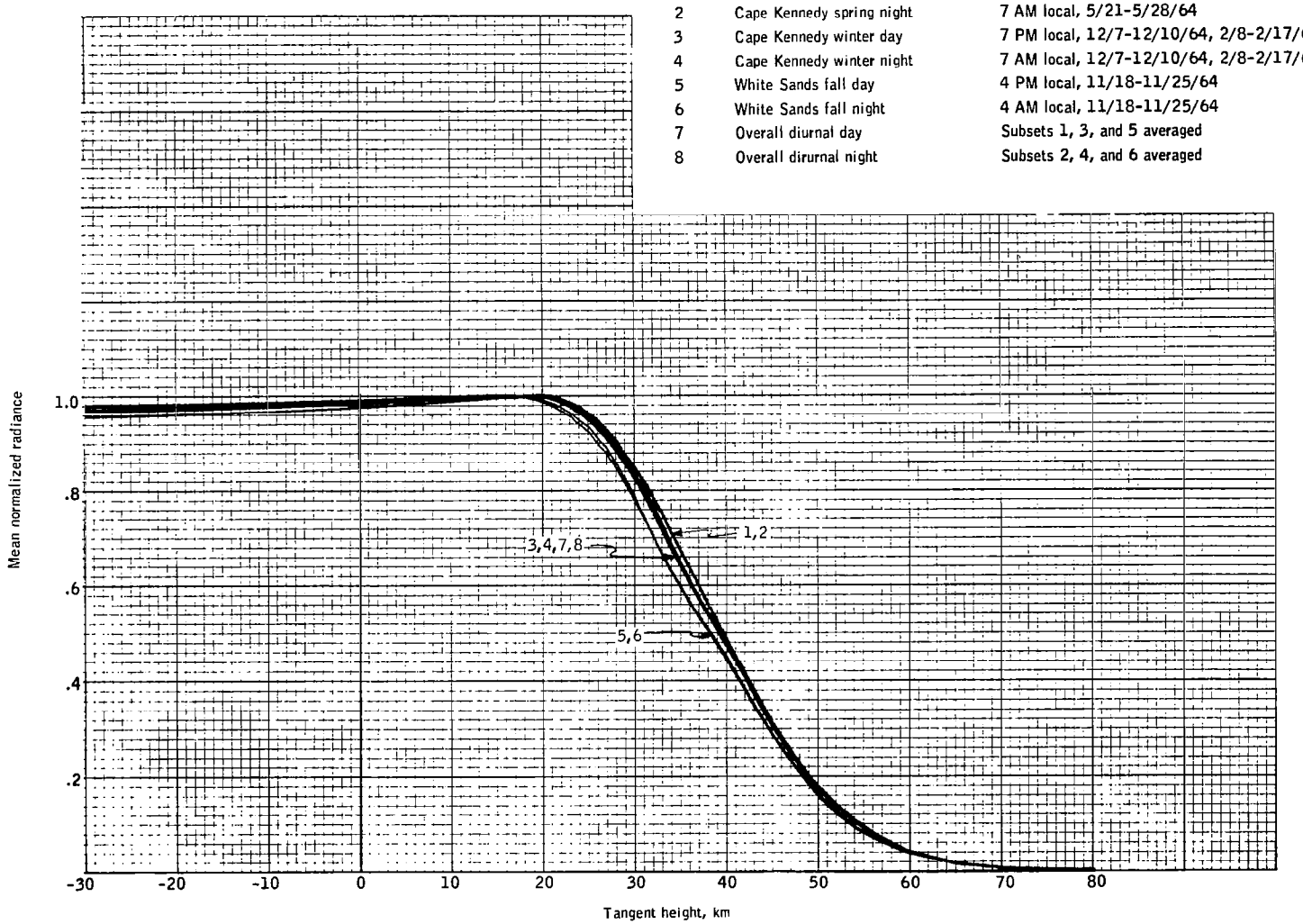
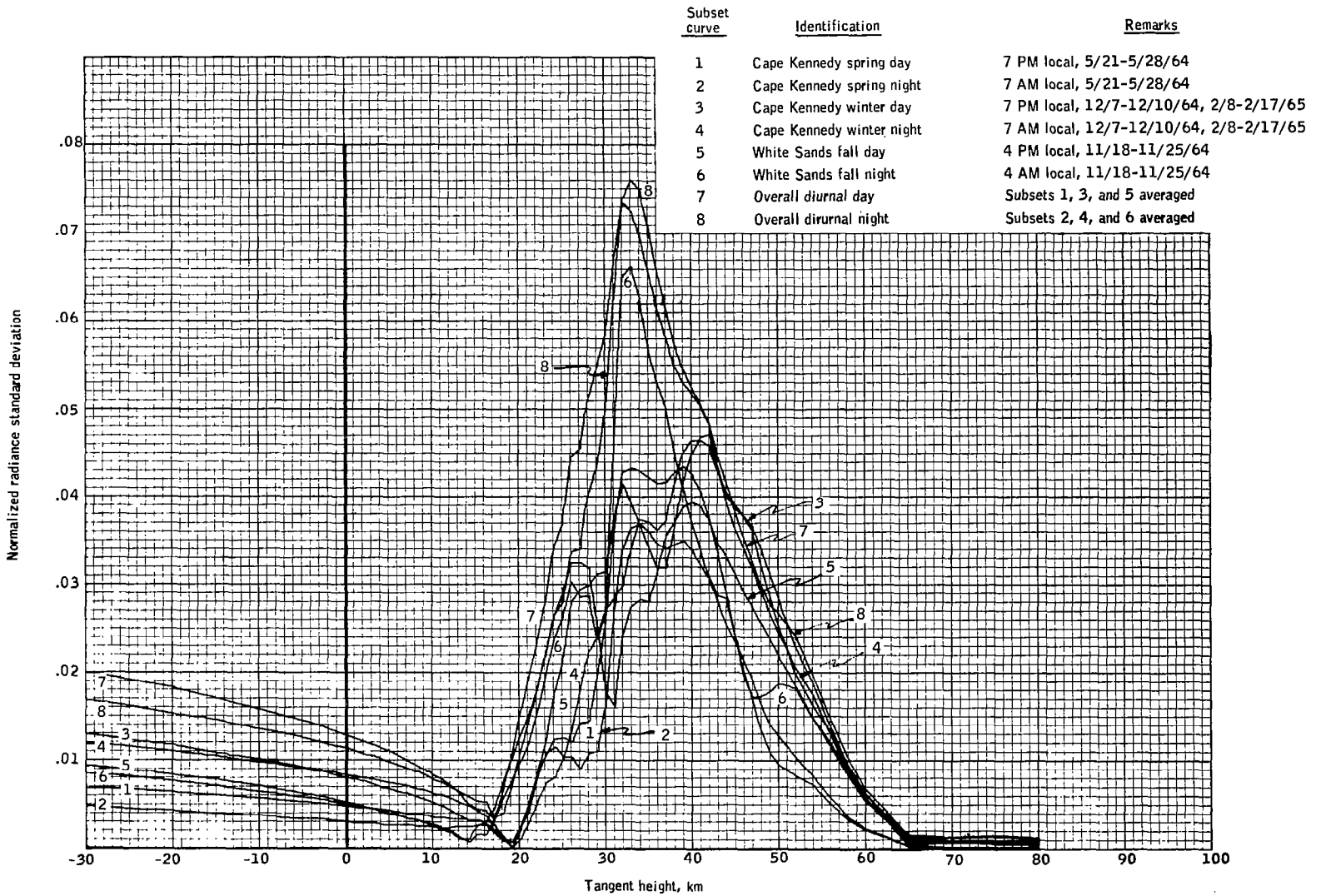


Figure A11. Mean Normalized Radiance versus Tangent Height, Set 3



Subset curve	Identification	Remarks
1	Cape Kennedy spring day	7 PM local, 5/21-5/28/64
2	Cape Kennedy spring night	7 AM local, 5/21-5/28/64
3	Cape Kennedy winter day	7 PM local, 12/7-12/10/64, 2/8-2/17/65
4	Cape Kennedy winter night	7 AM local, 12/7-12/10/64, 2/8-2/17/65
5	White Sands fall day	4 PM local, 11/18-11/25/64
6	White Sands fall night	4 AM local, 11/18-11/25/64
7	Overall diurnal day	Subsets 1, 3, and 5 averaged
8	Overall dirurnal night	Subsets 2, 4, and 6 averaged

Figure A12. Normalized Radiance Standard Deviation versus Tangent Height, Set 3

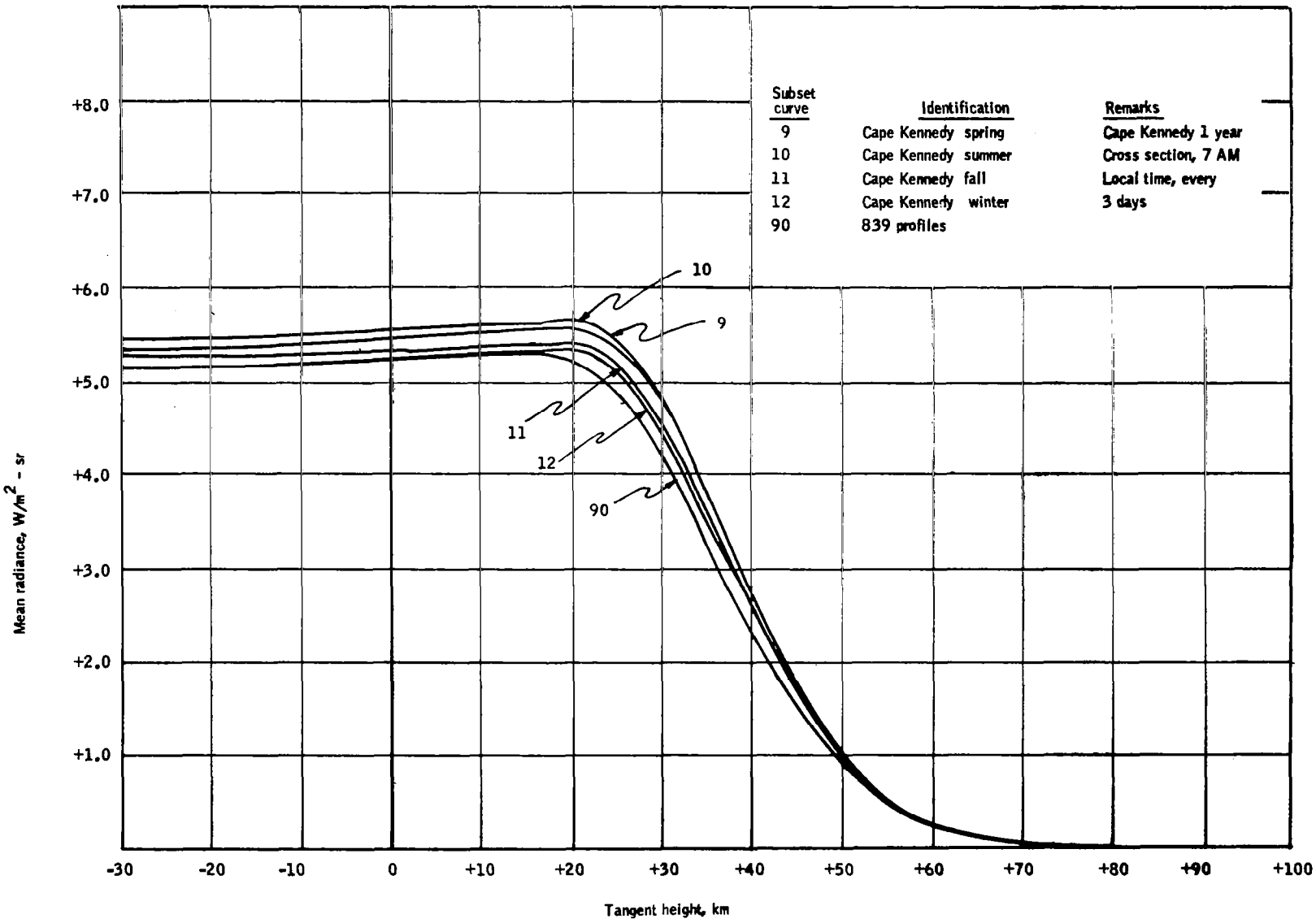


Figure A13. Mean Radiance versus Tangent Height, Set 4

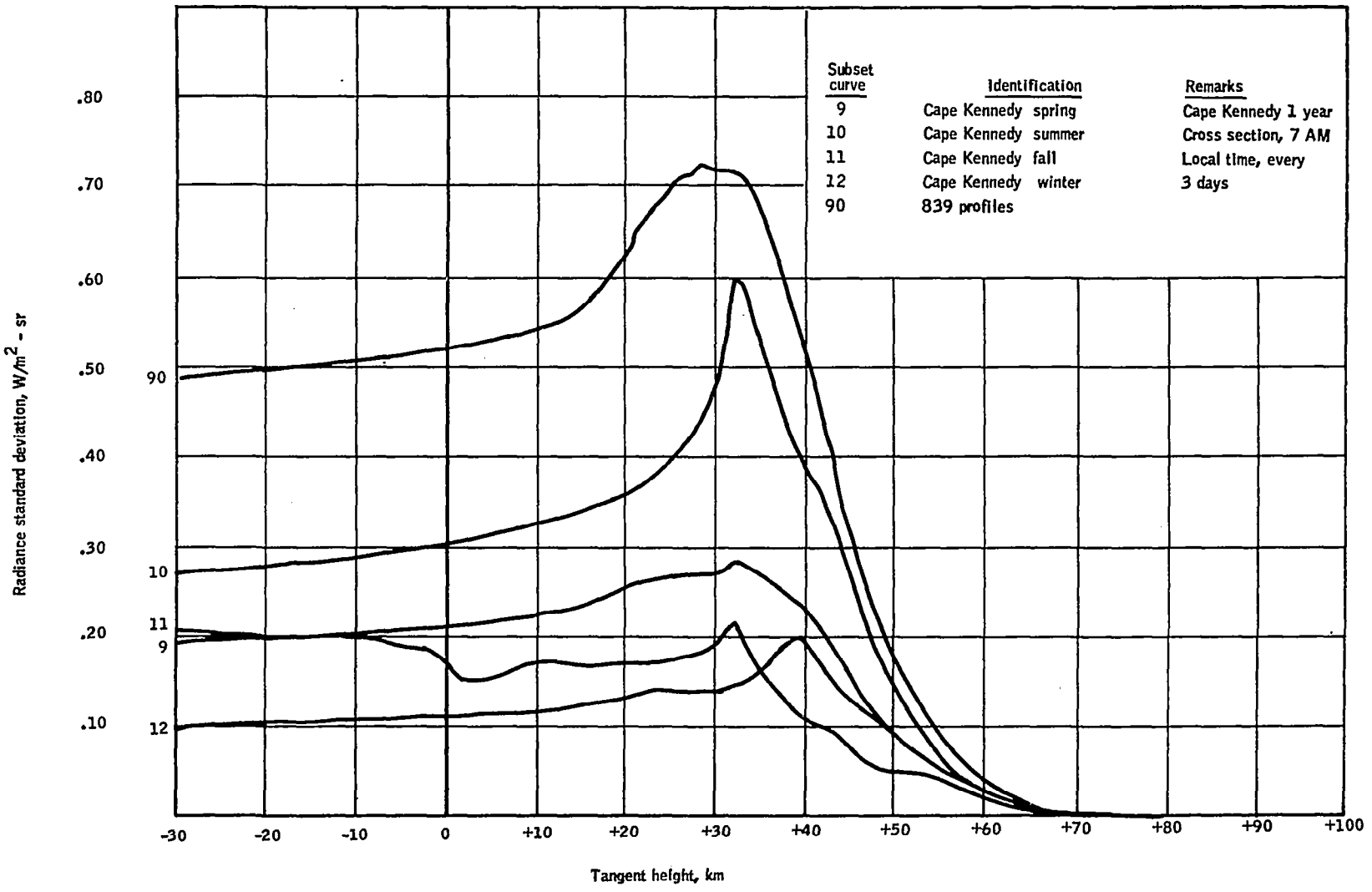


Figure A14. Radiance Standard Deviations versus Tangent Height

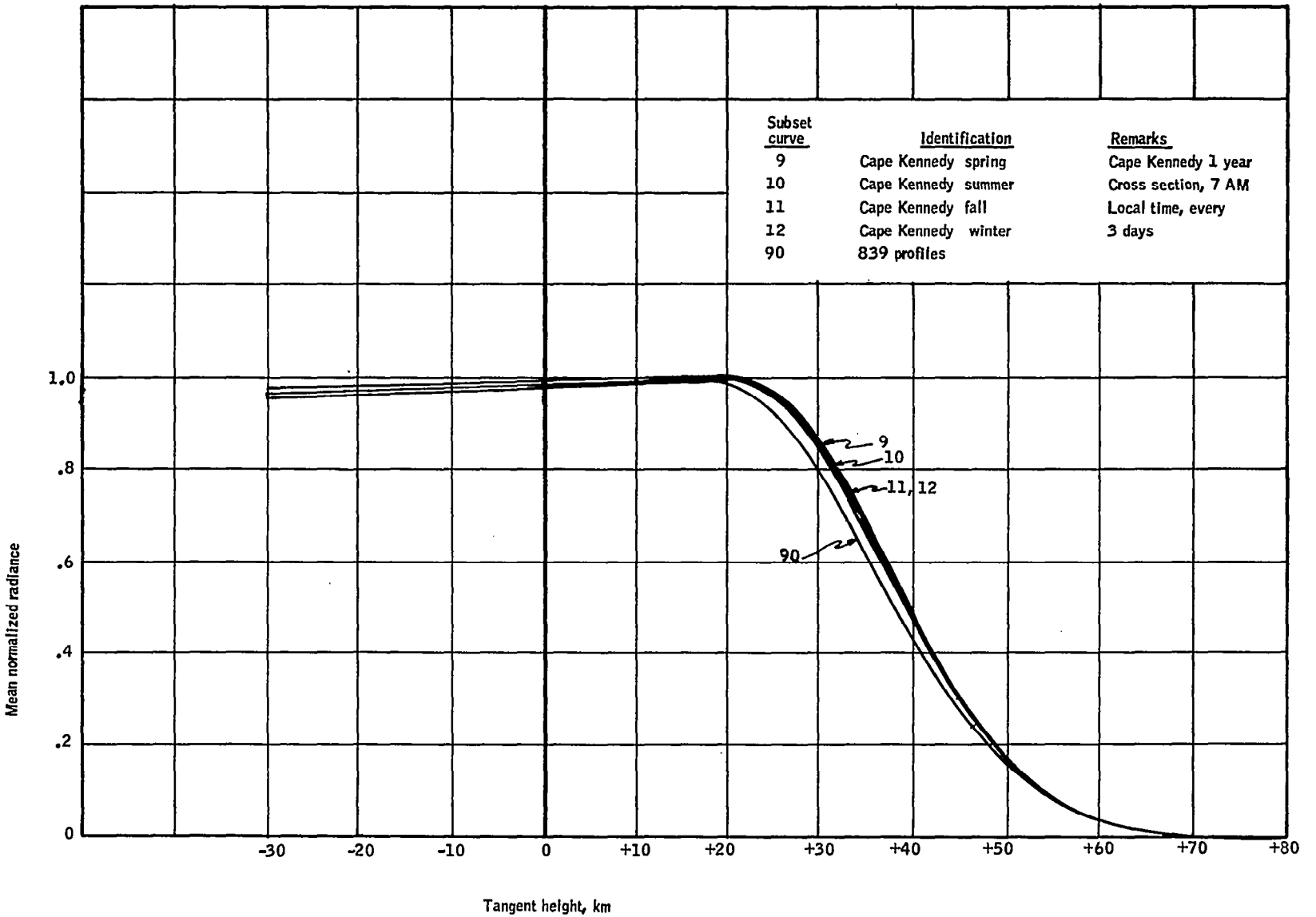


Figure A15. Mean Normalized Radiance versus Tangent Height, Set 4

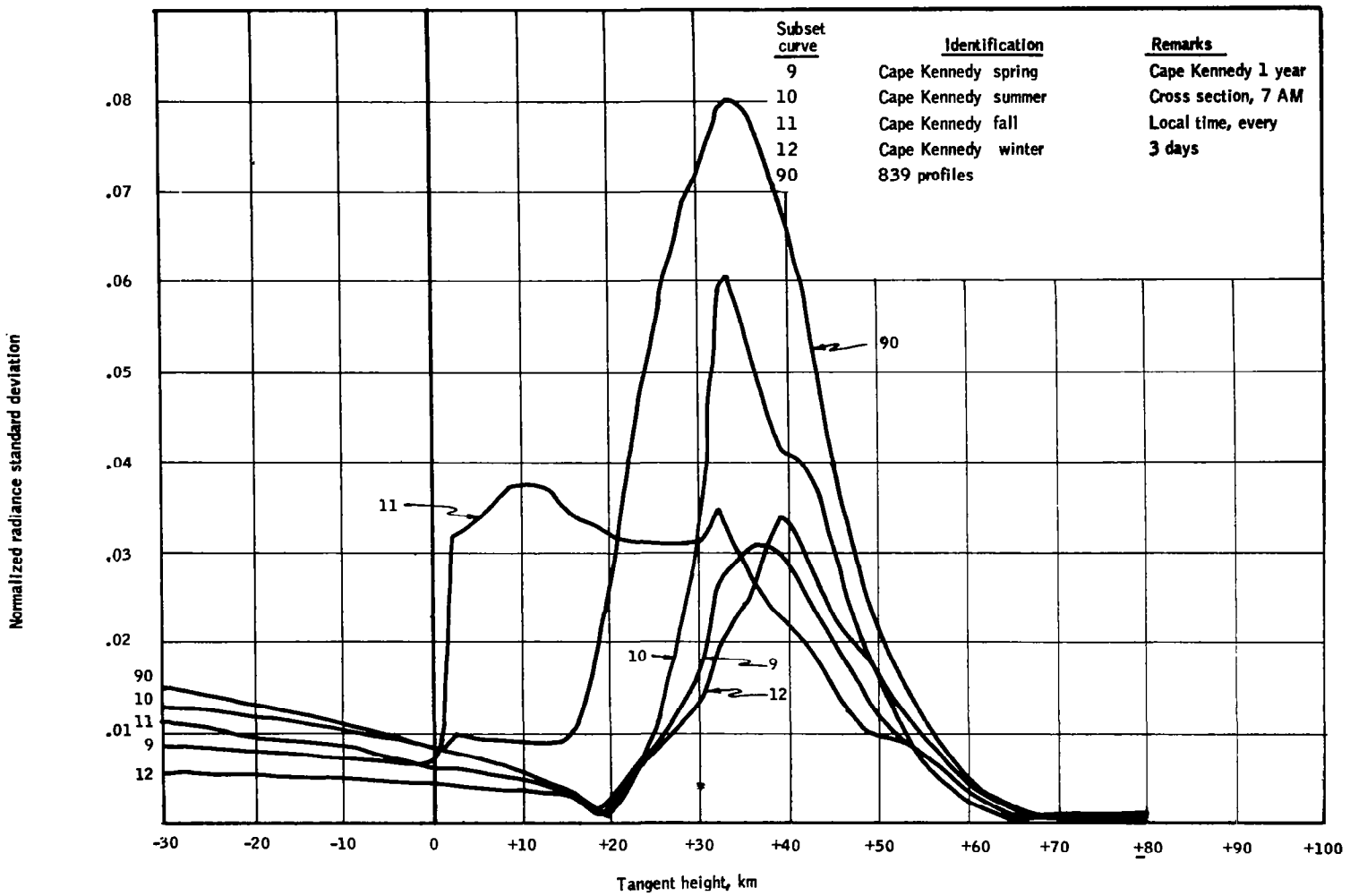


Figure A16. Normalized Radiance Standard Deviation versus Tangent Height Set 4

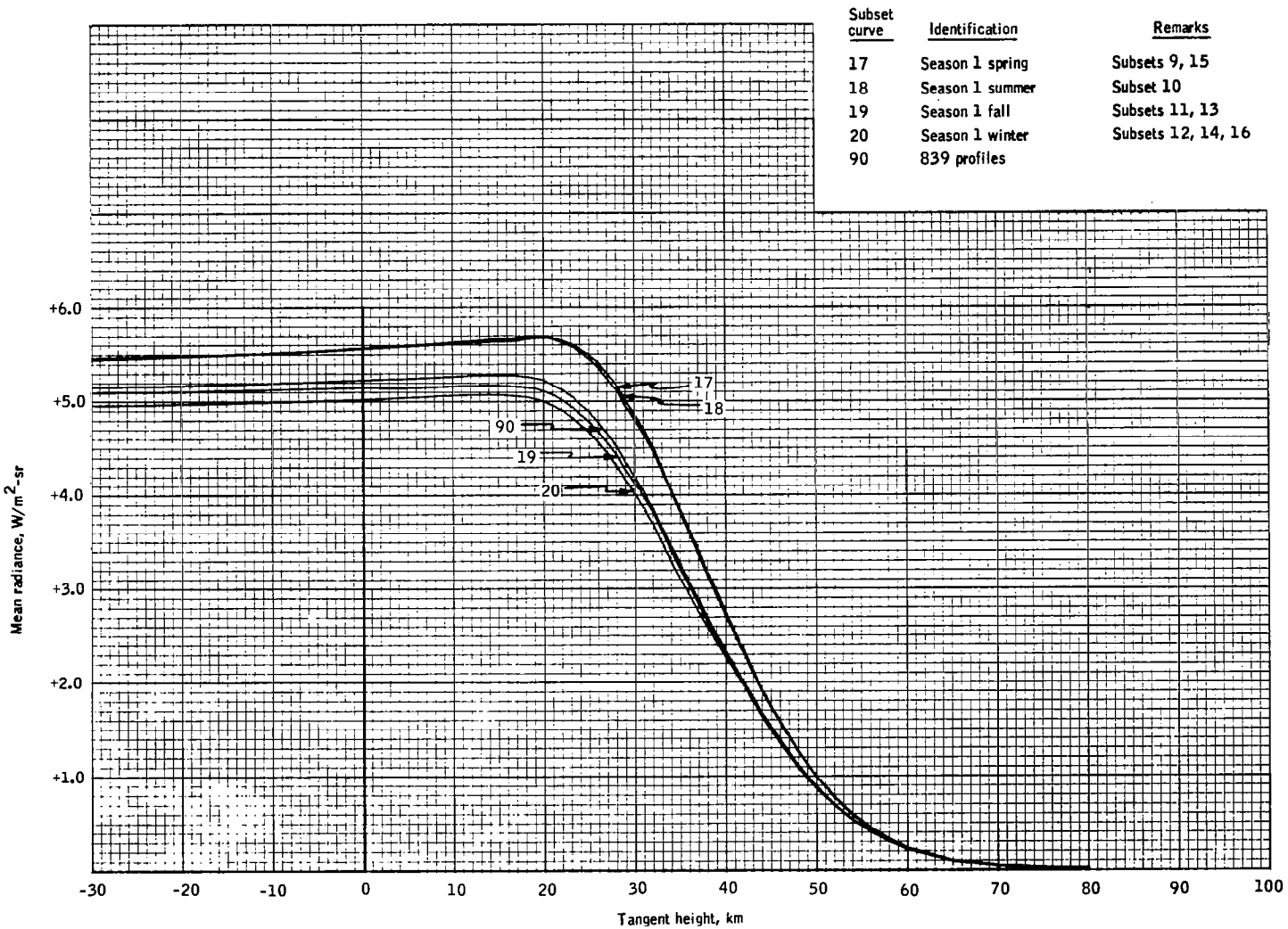


Figure A17. Mean Radiance versus Tangent Height, Set 5

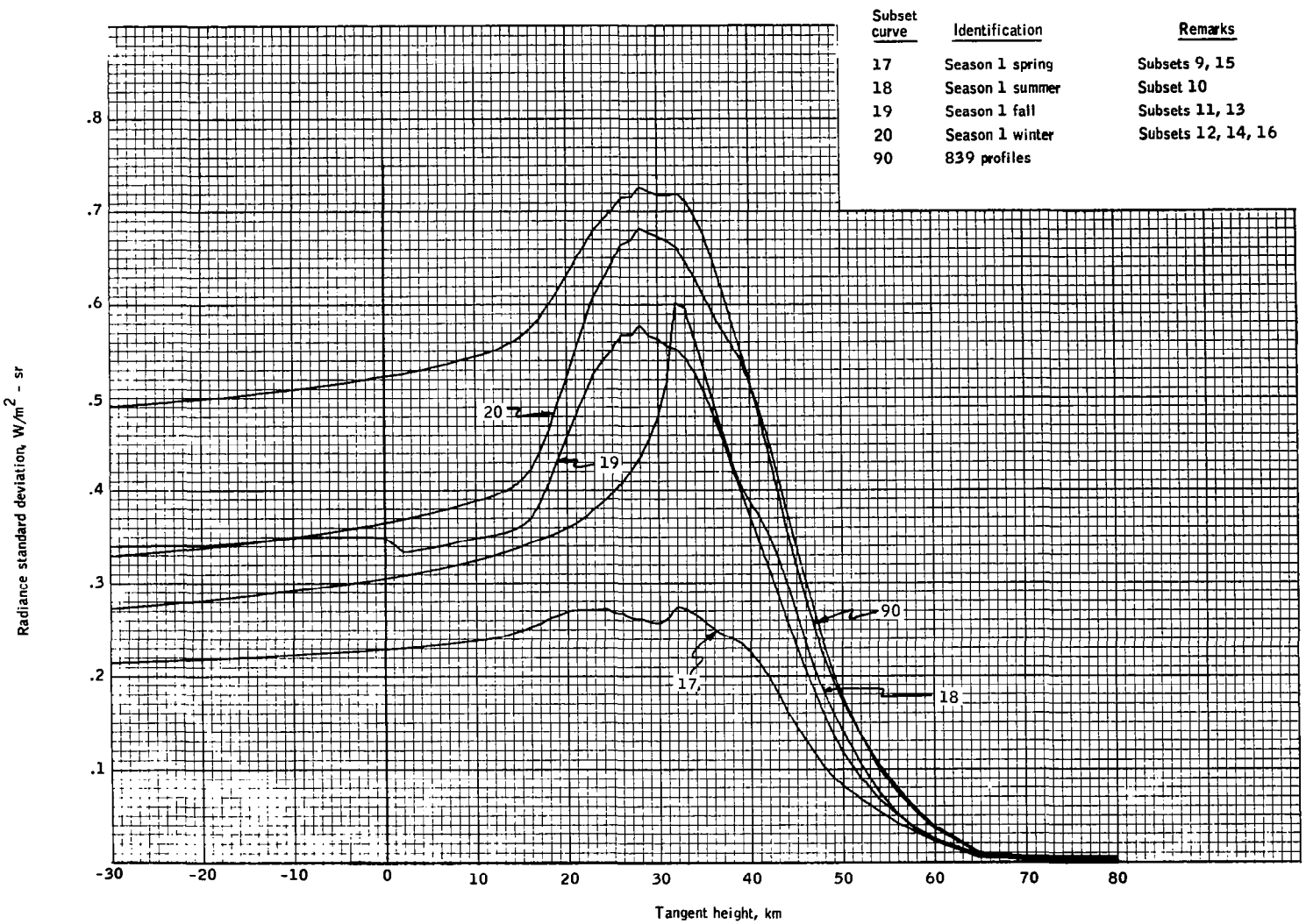


Figure A18. Radiance Standard Deviation versus Tangent Height, Set 5

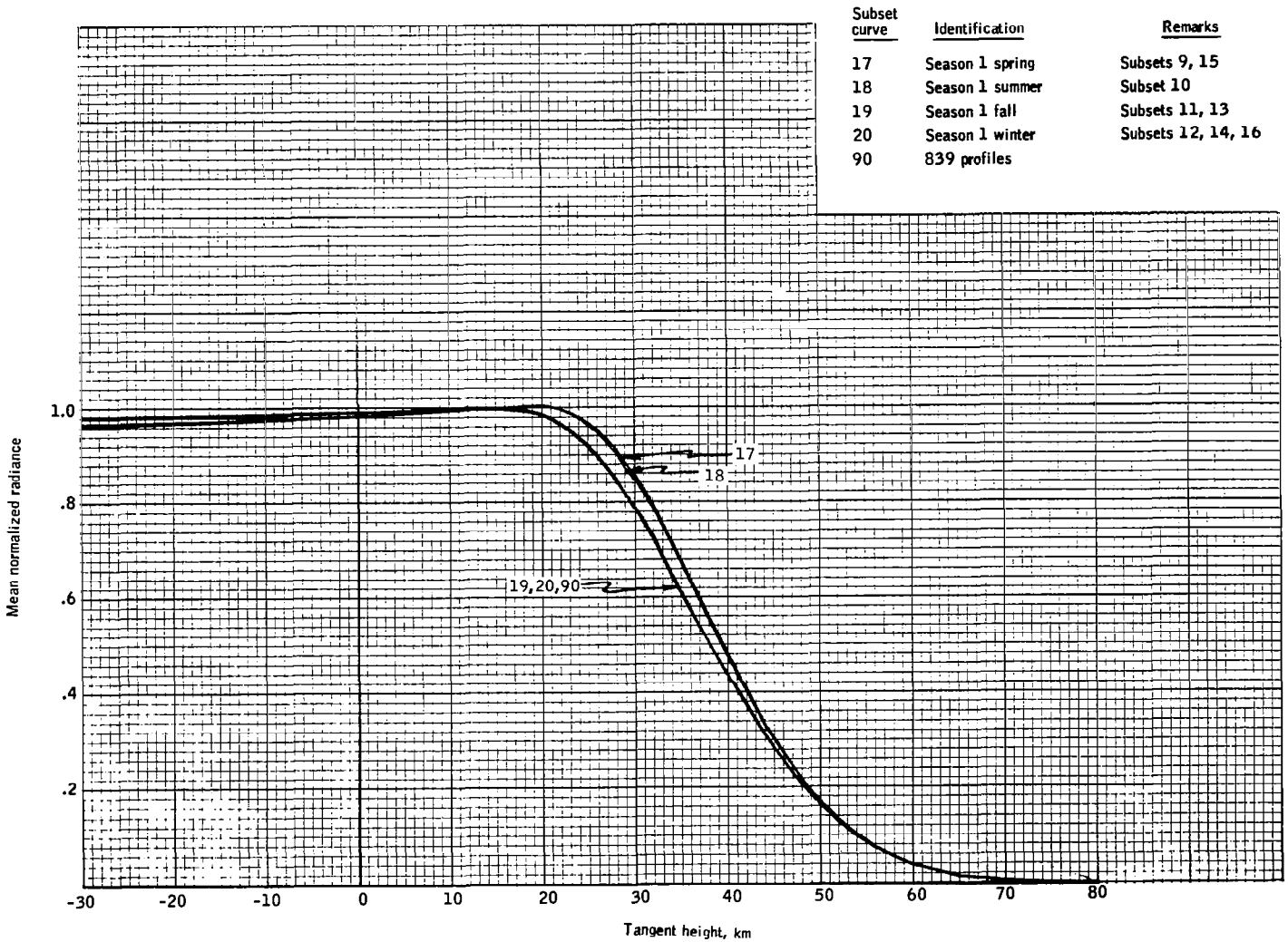


Figure A19. Mean Normalized Radiance versus Tangent Heights, Set 5

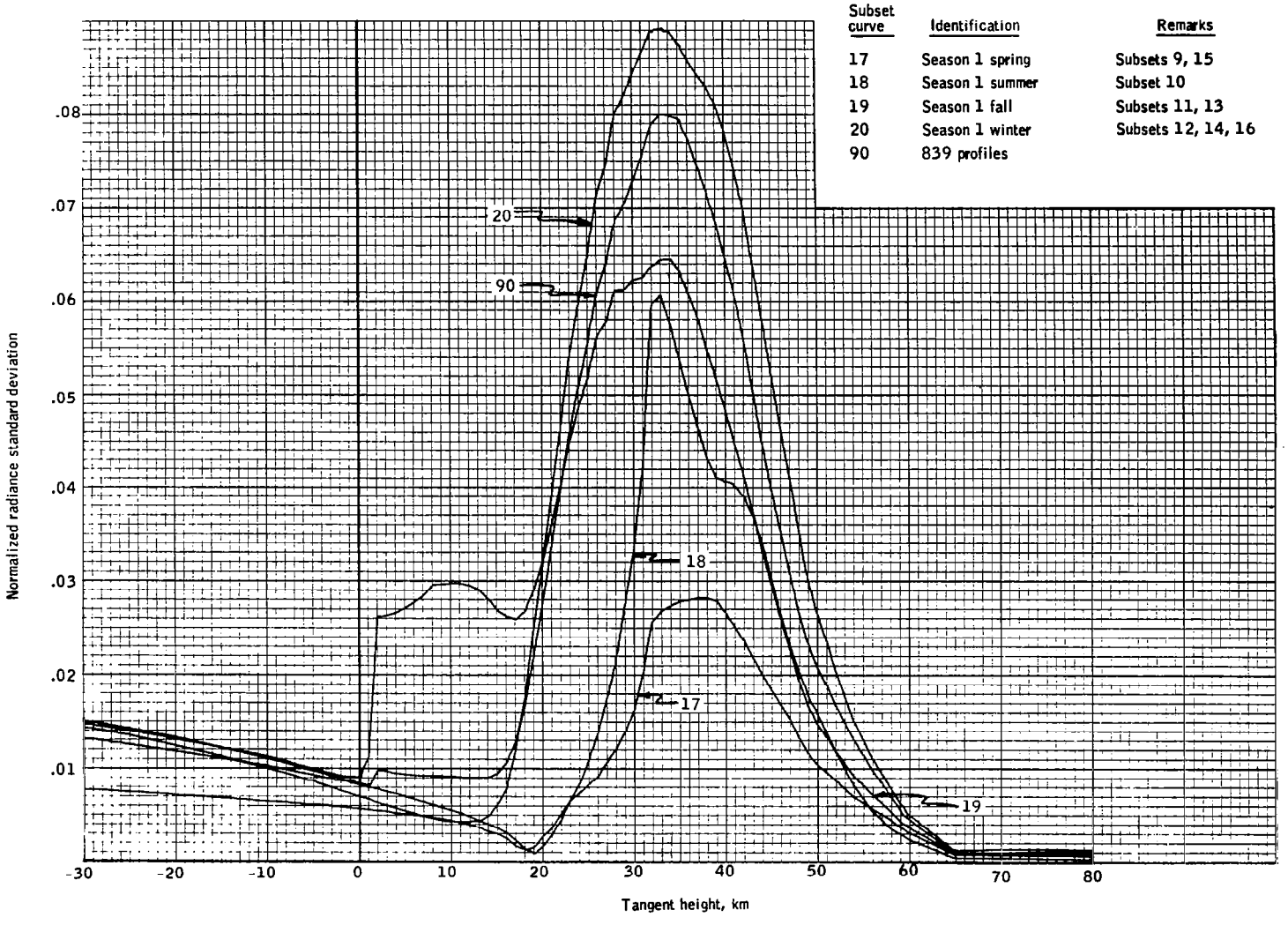


Figure A20. Normalized Radiance Standard Deviation versus Tangent Height, Set 5

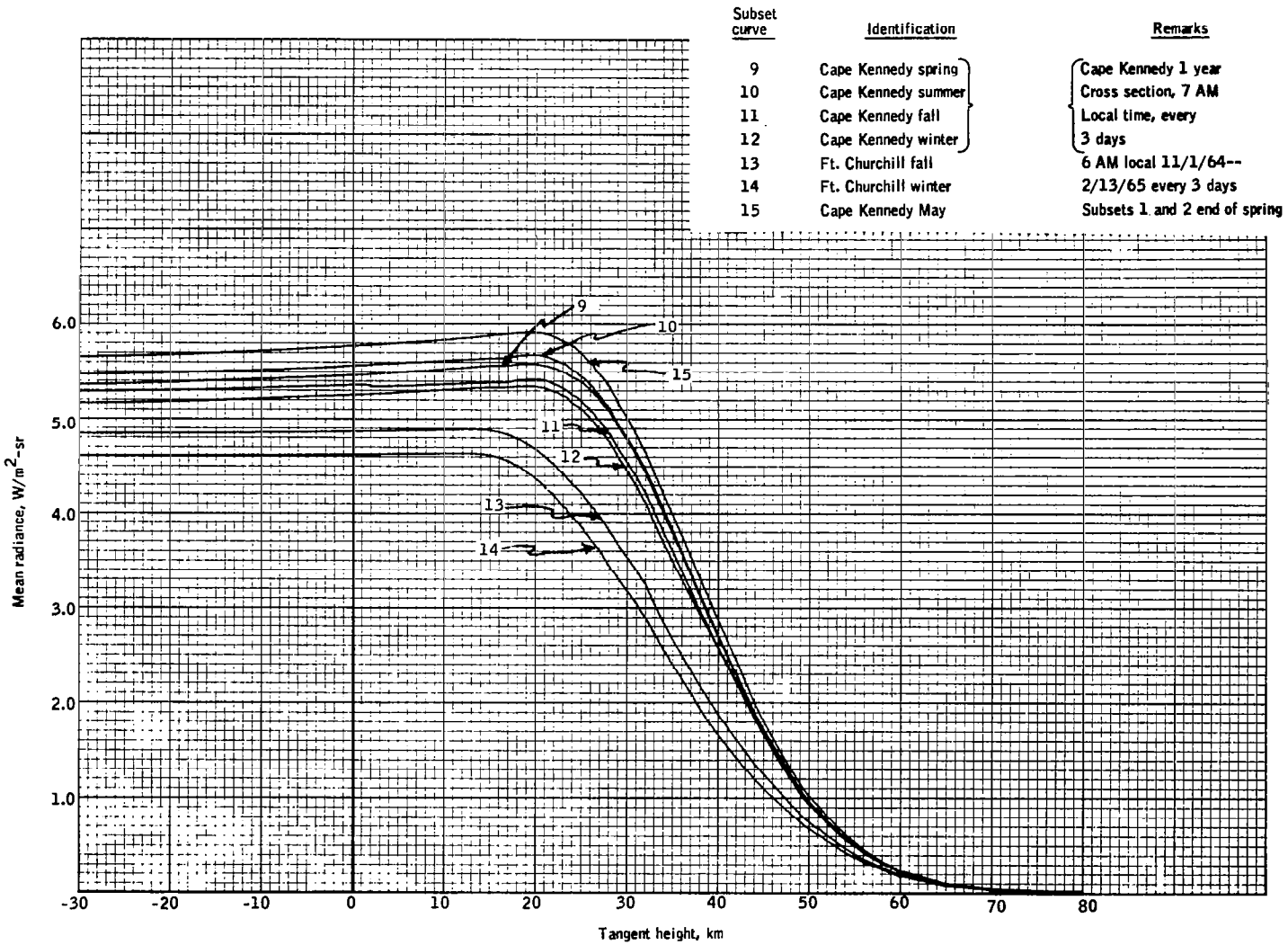


Figure A21. Mean Radiance versus Tangent Height, Set 6

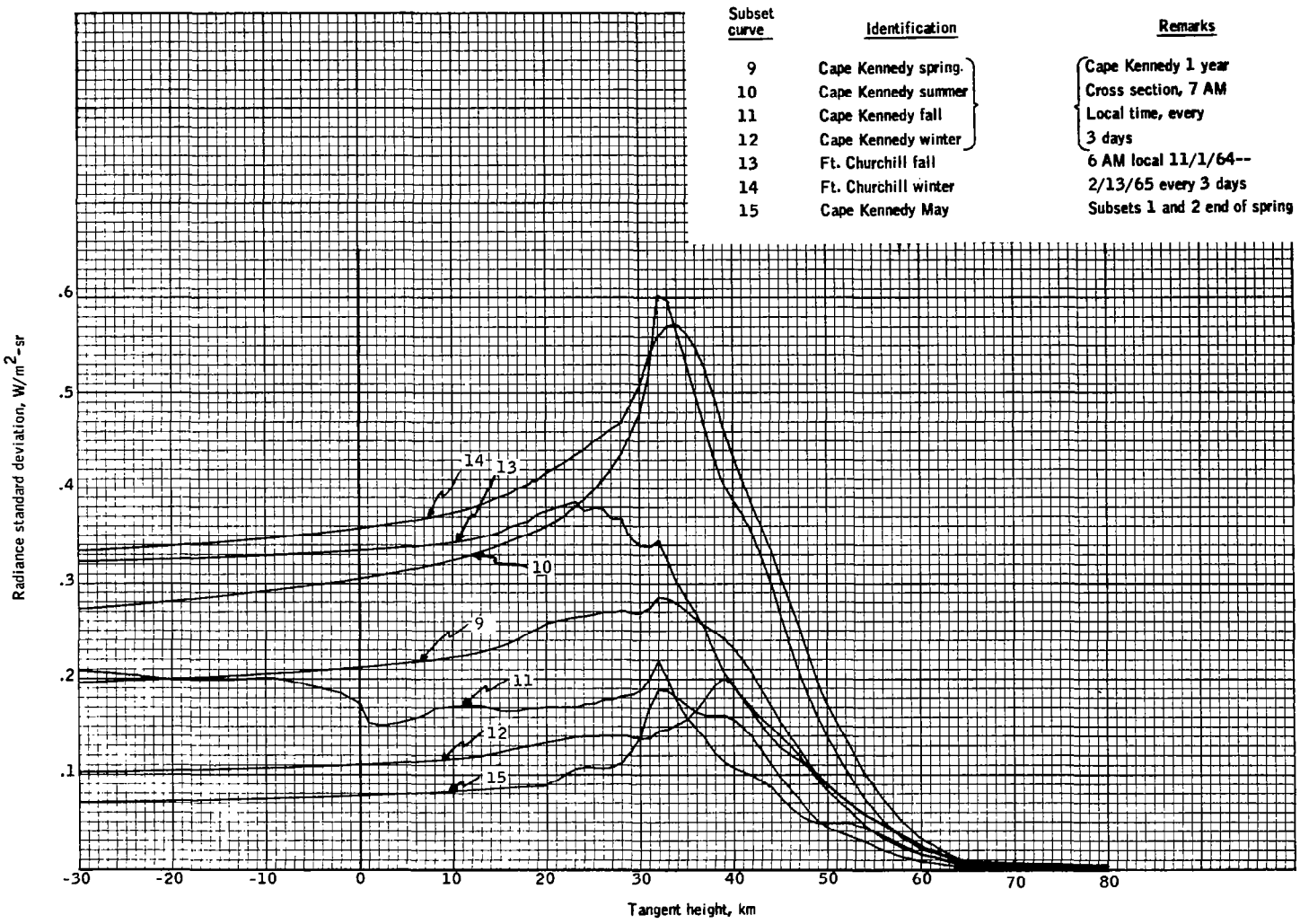


Figure A22. Radiance Standard Deviation versus Tangent Height, Set 6

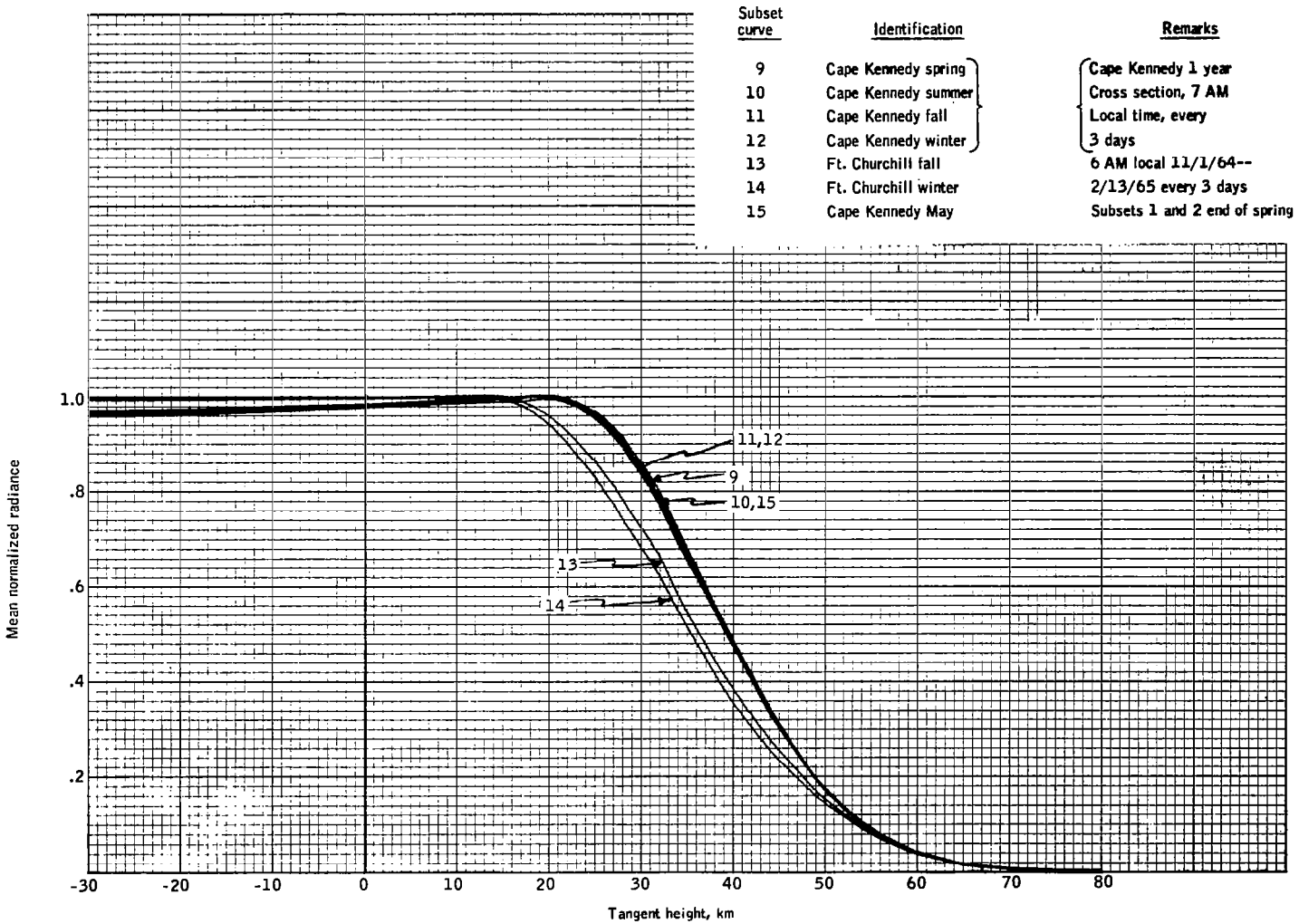


Figure A23. Mean Normalized Radiance versus Tangent Height, Set 6

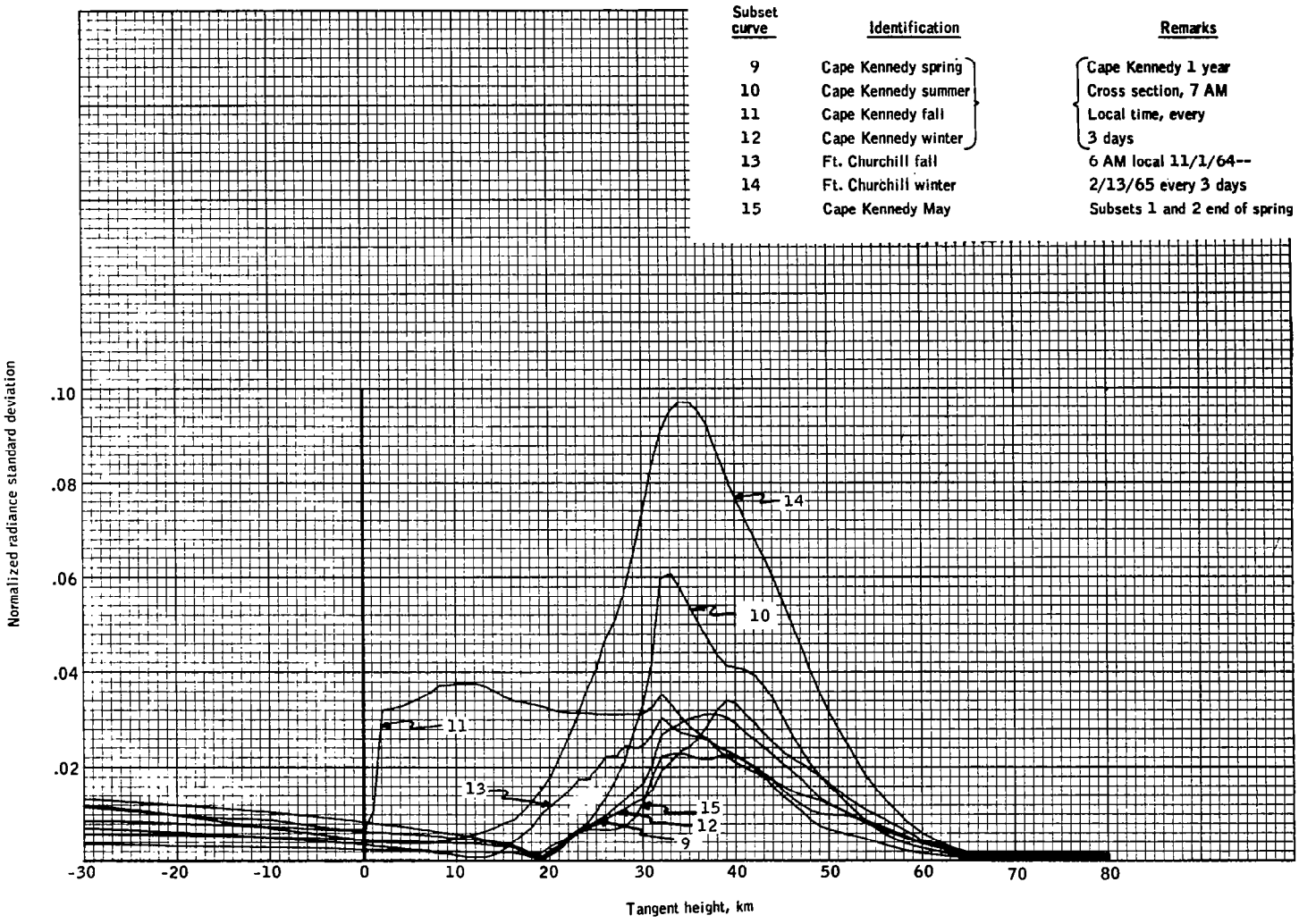


Figure A24. Normalized Radiance Standard Deviation versus Tangent Height, Set 6

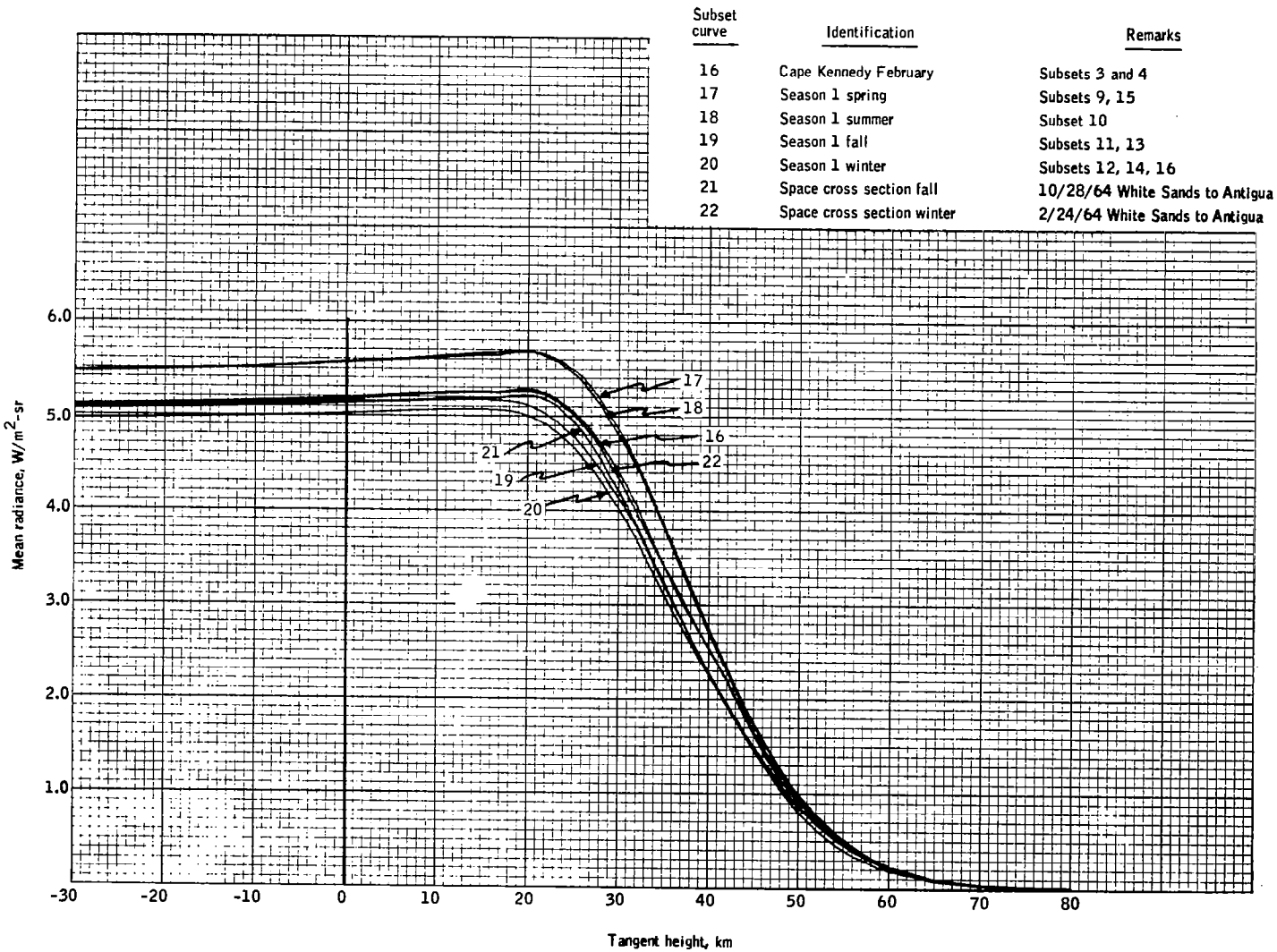


Figure A25. Mean Radiance versus Tangent Height, Set 7

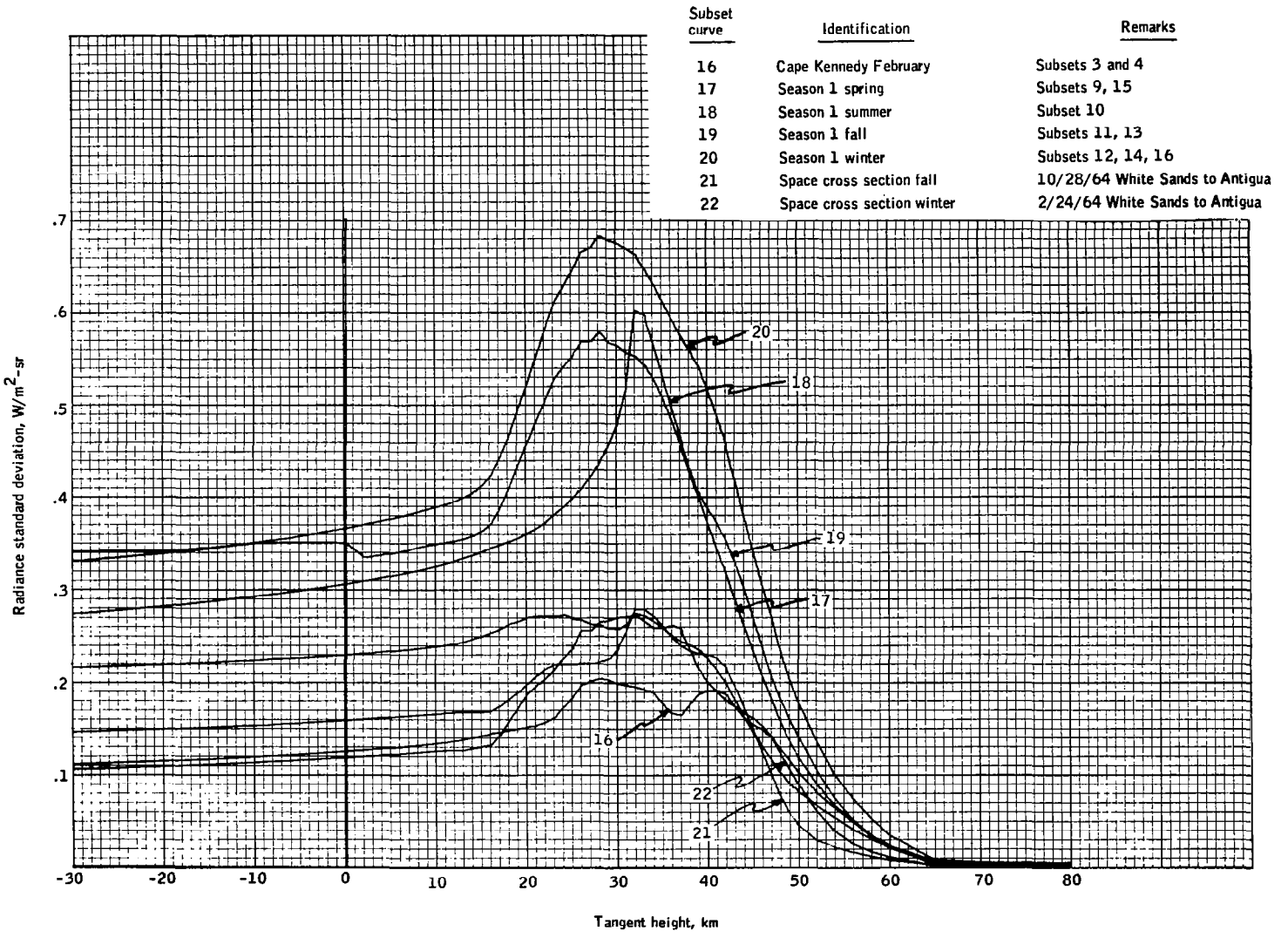


Figure A26. Radiance Standard Deviation versus Tangent Height, Set

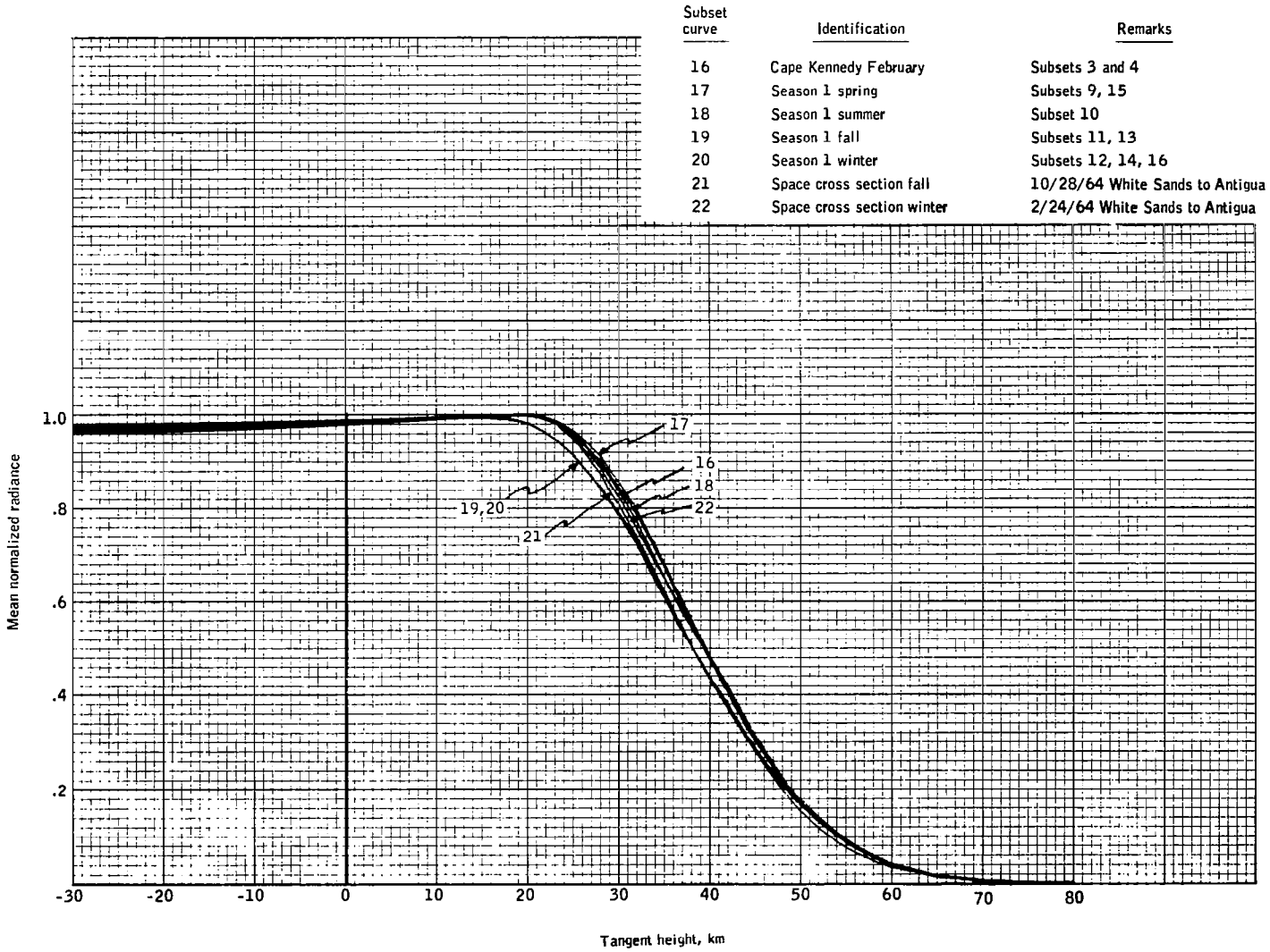


Figure A27. Mean Normalized Radiance versus Tangent Height, Set 7

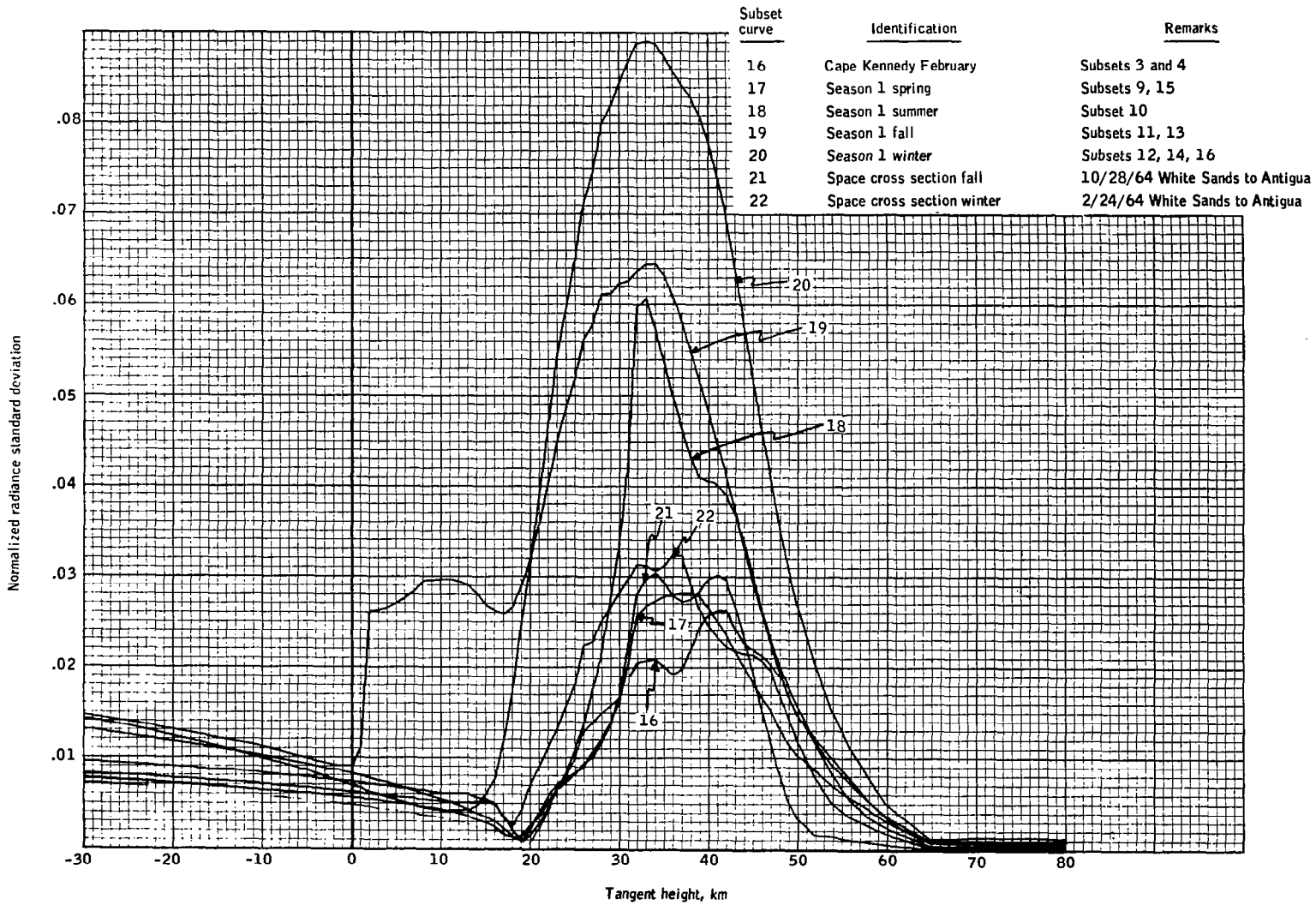


Figure A28. Normalized Radiance Standard Deviation versus Tangent Height, Set 7

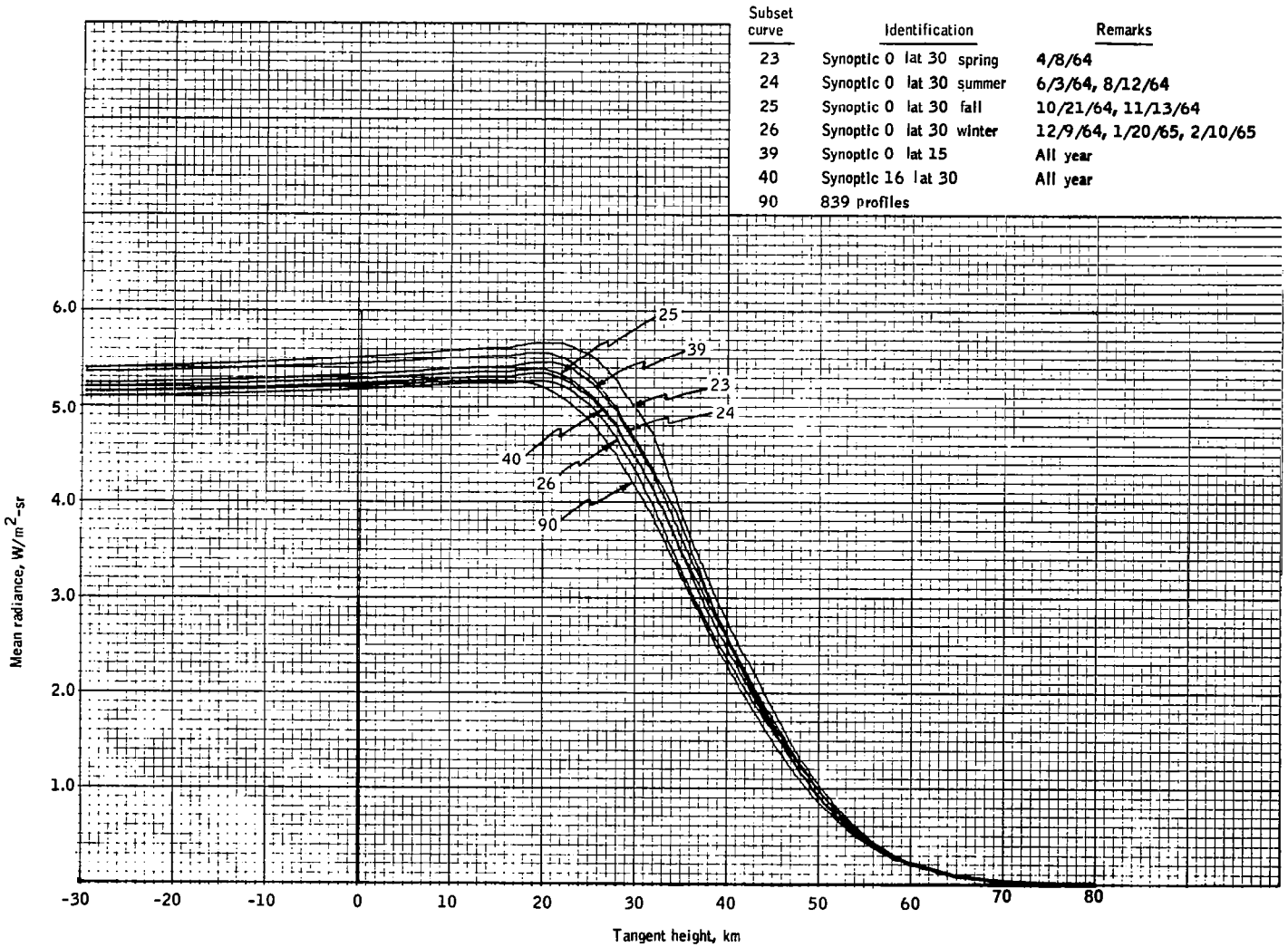


Figure A29. Mean Radiance versus Tangent Height, Set 8

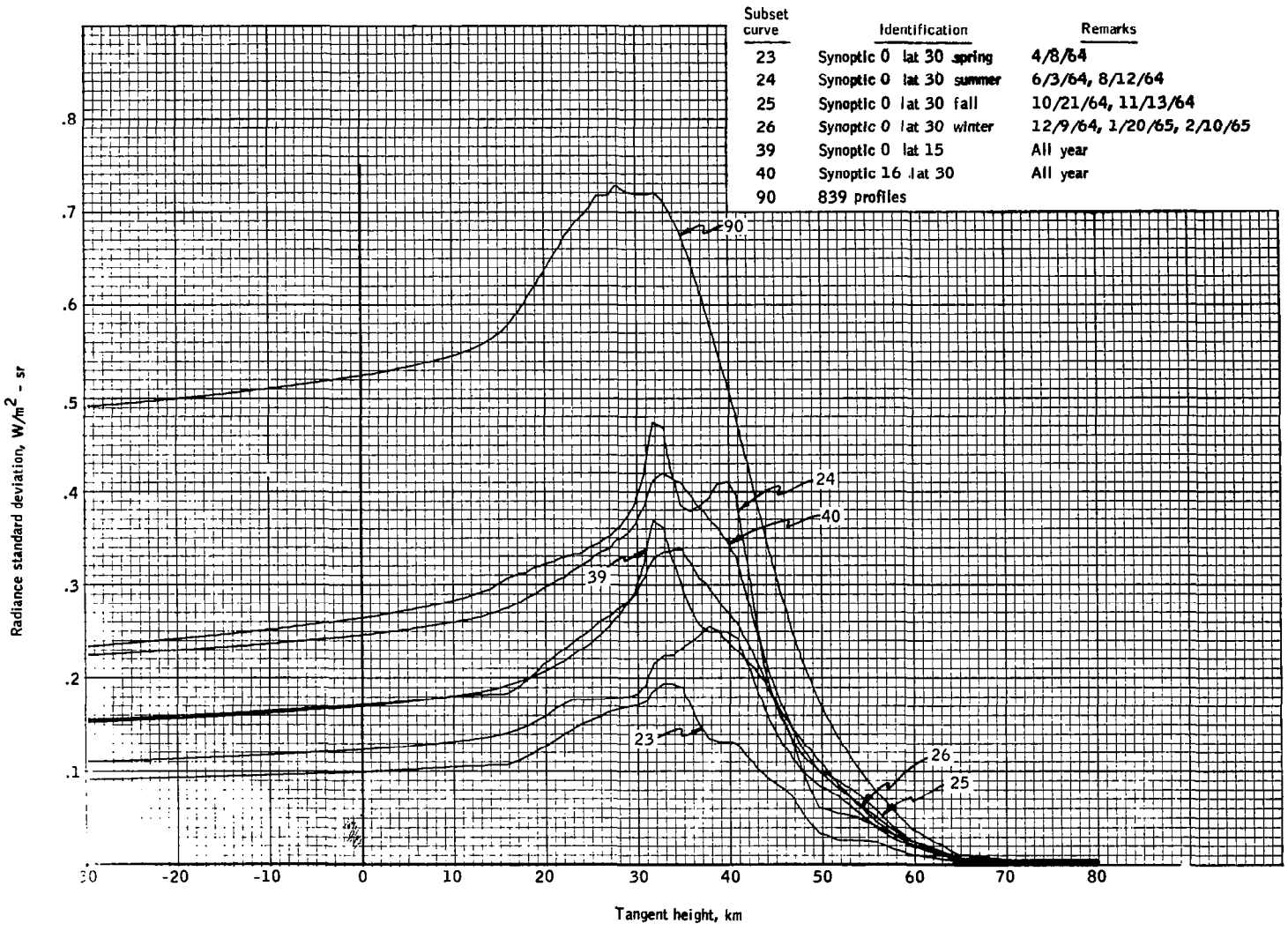


Figure A30. Radiance Standard Deviation versus Tangent Height, Set 8

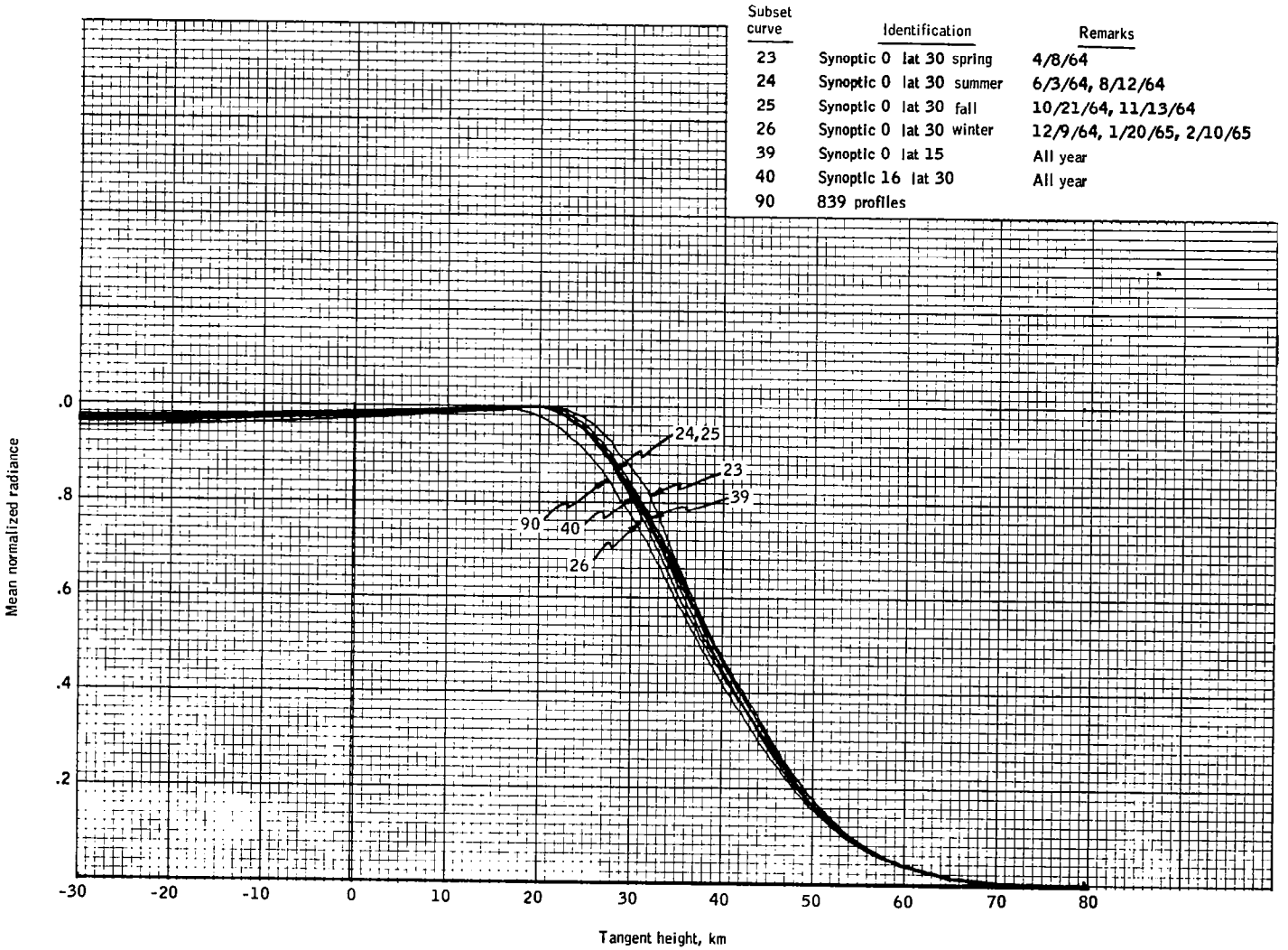


Figure A31. Mean Normalized Radiance versus Tangent Height, Set 8

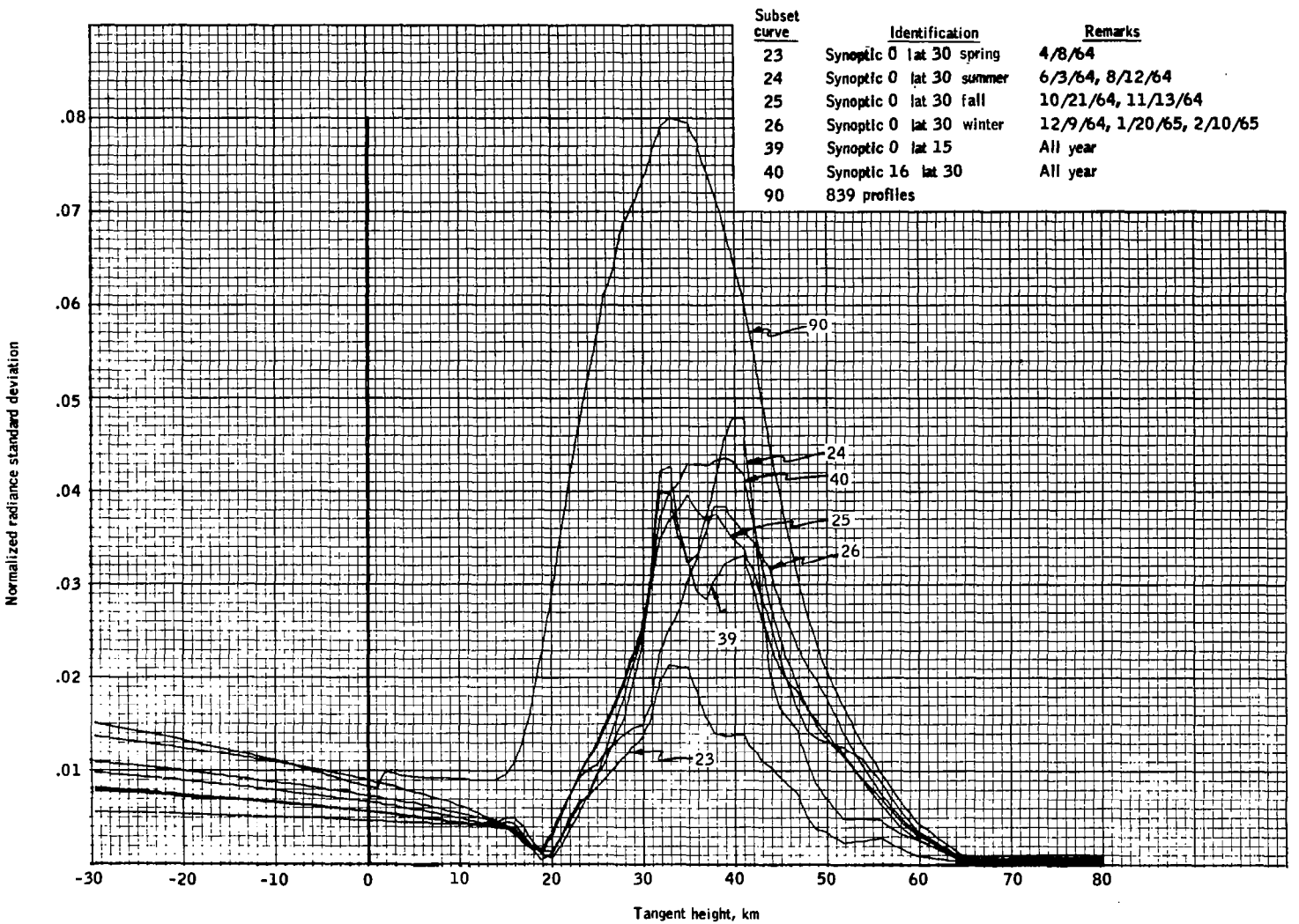


Figure A32. Normalized Radiance Standard Deviation versus Tangent Height, Set 8

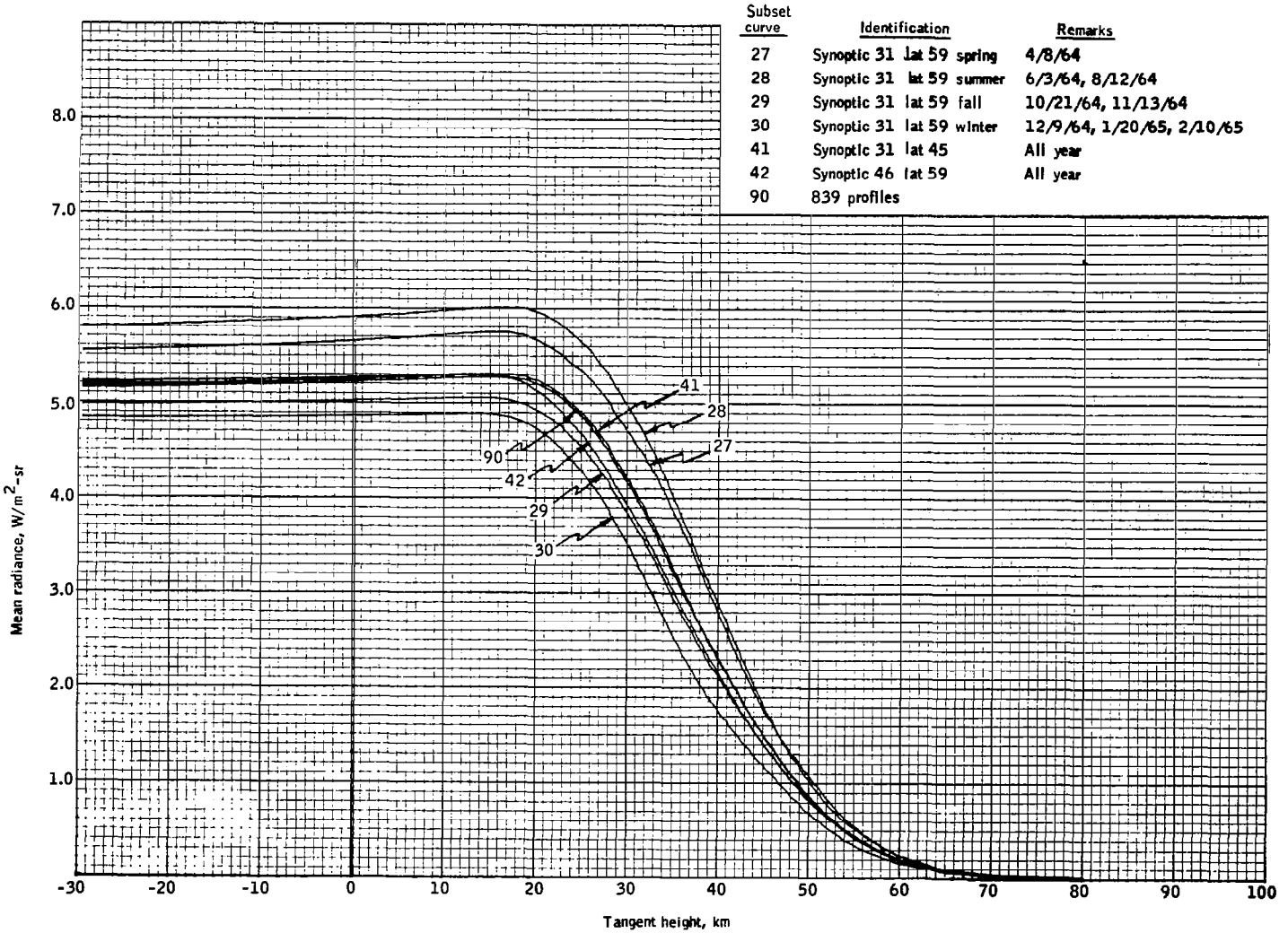


Figure A33. Mean Radiance versus Tangent Height, Set 9

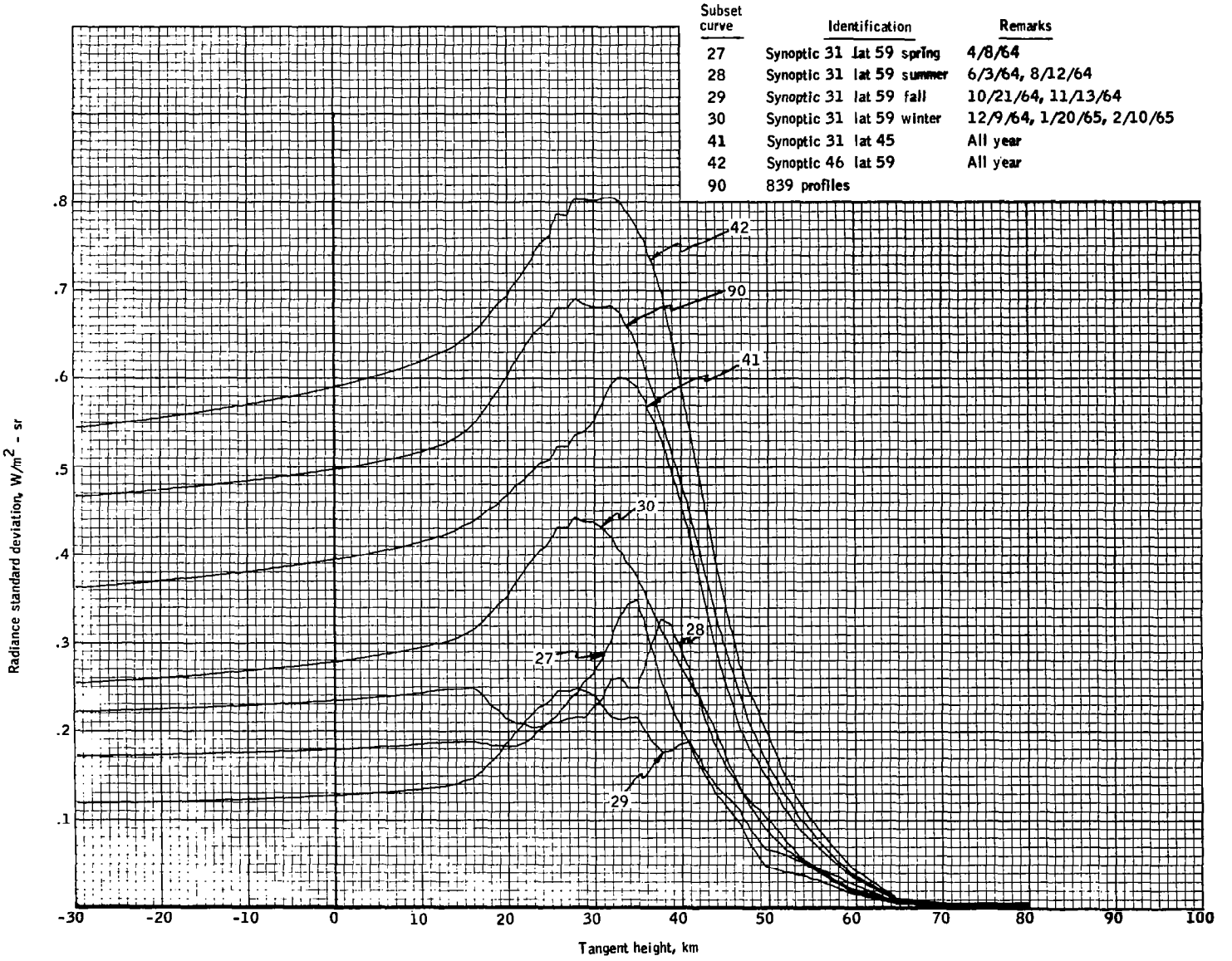


Figure A34. Radiance Standard Deviation versus Tangent Height, Set 9

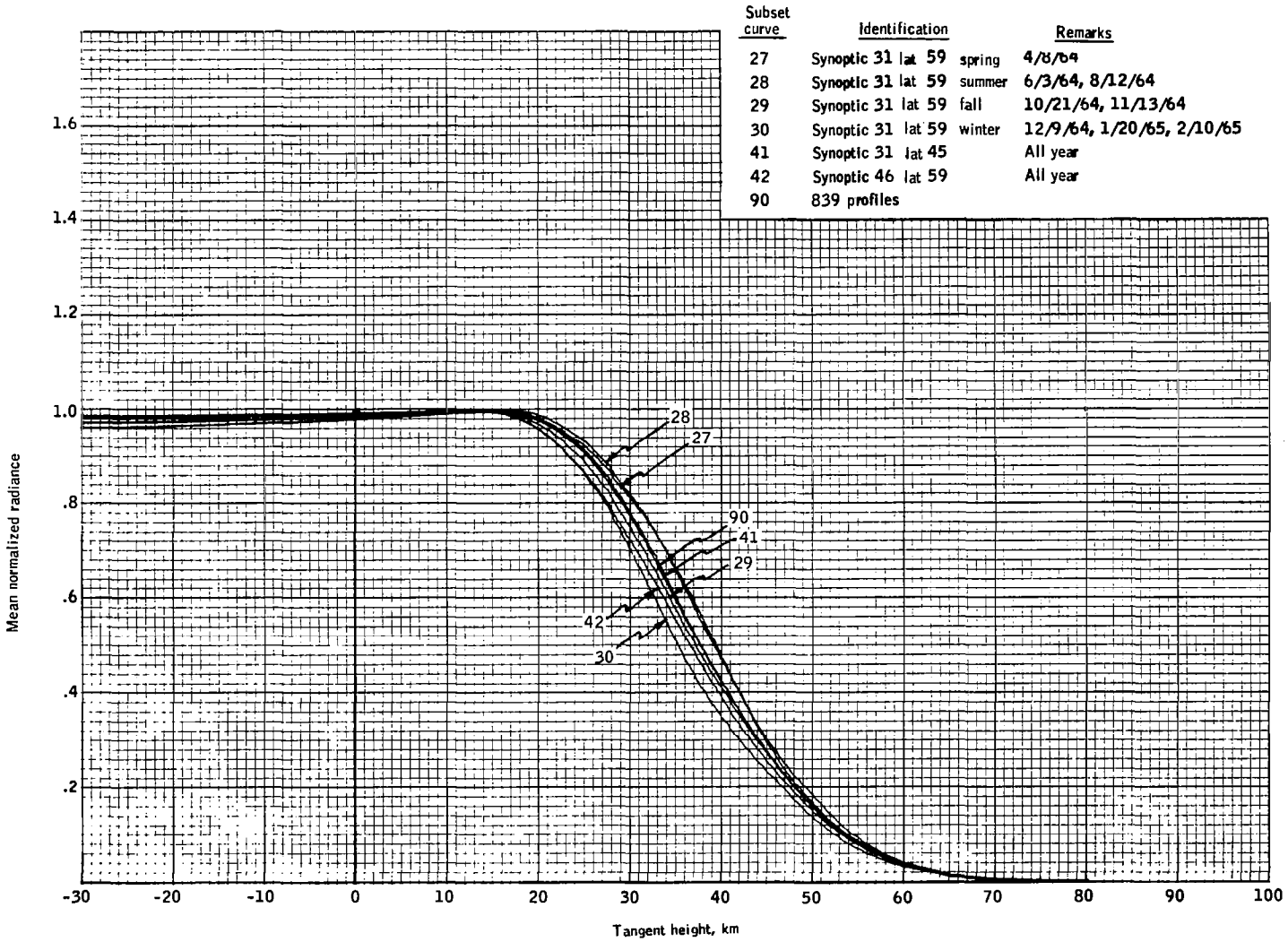


Figure A35. Mean Normalized Radiance versus Tangent Height, Set 9

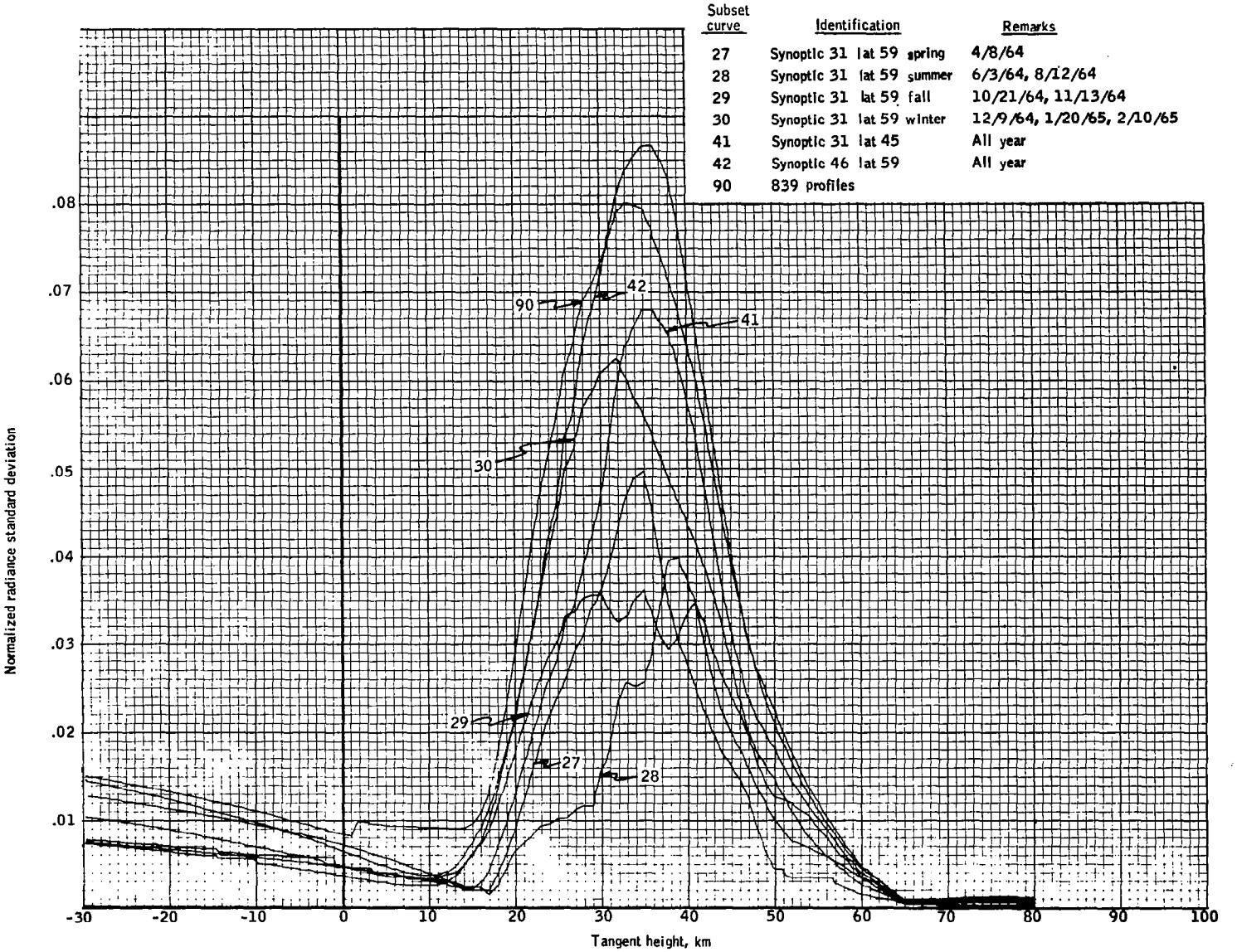


Figure A36. Normalized Radiance Standard Deviation versus Tangent Height, Set 9

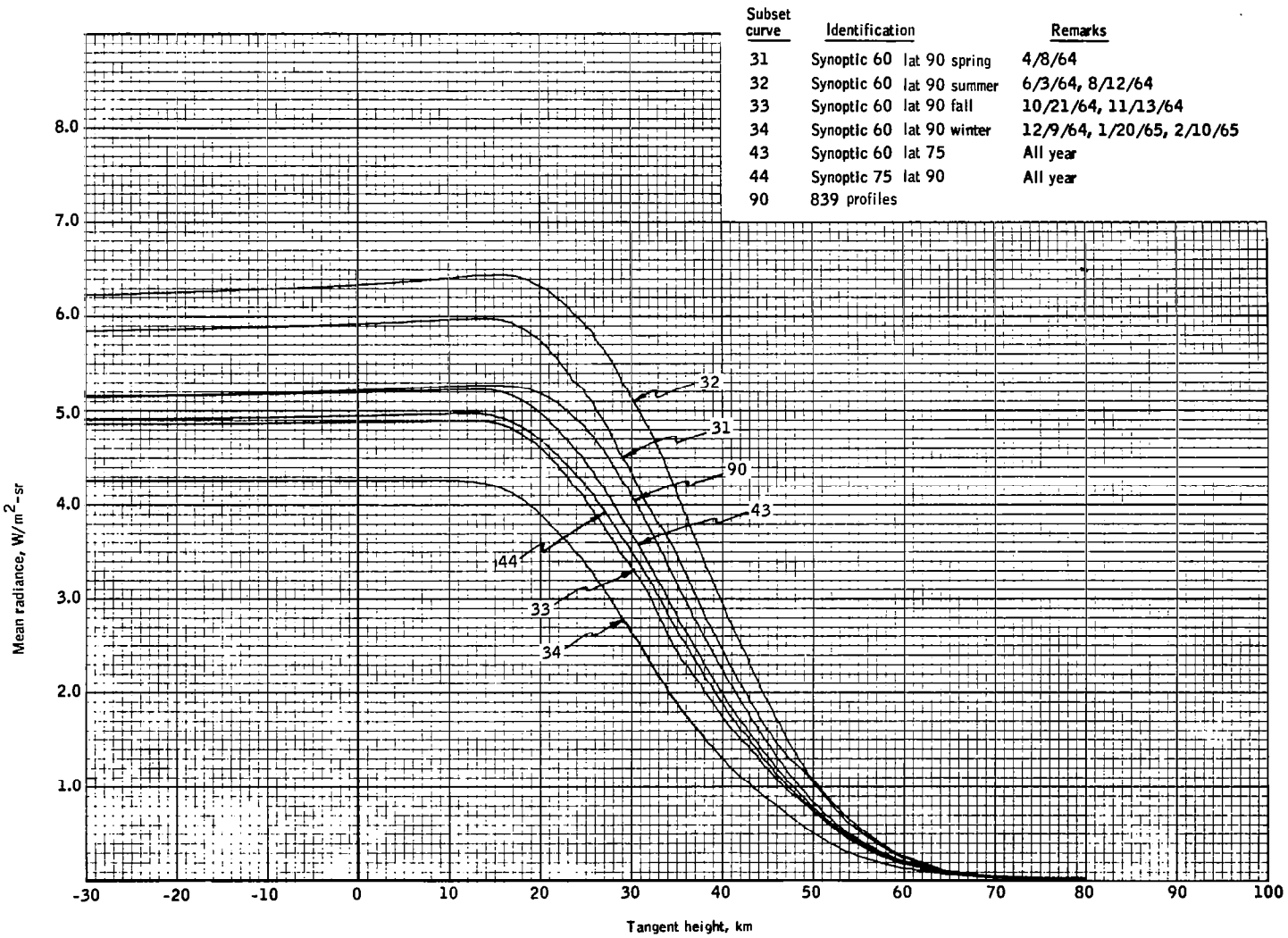


Figure A37. Mean Radiance versus Tangent Height, Set 10

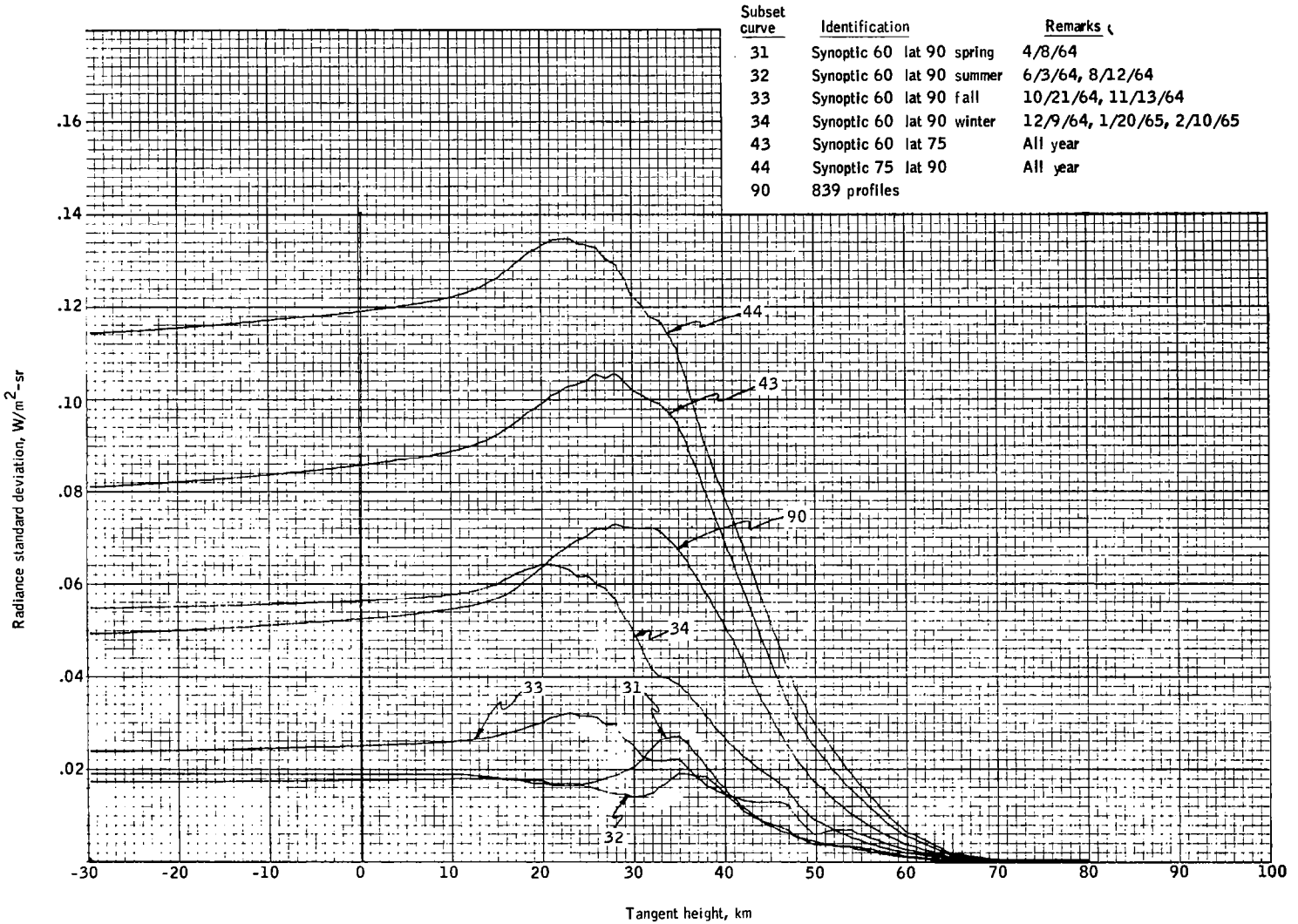


Figure A38. Radiance Standard Deviation versus Tangent Height, Set 10

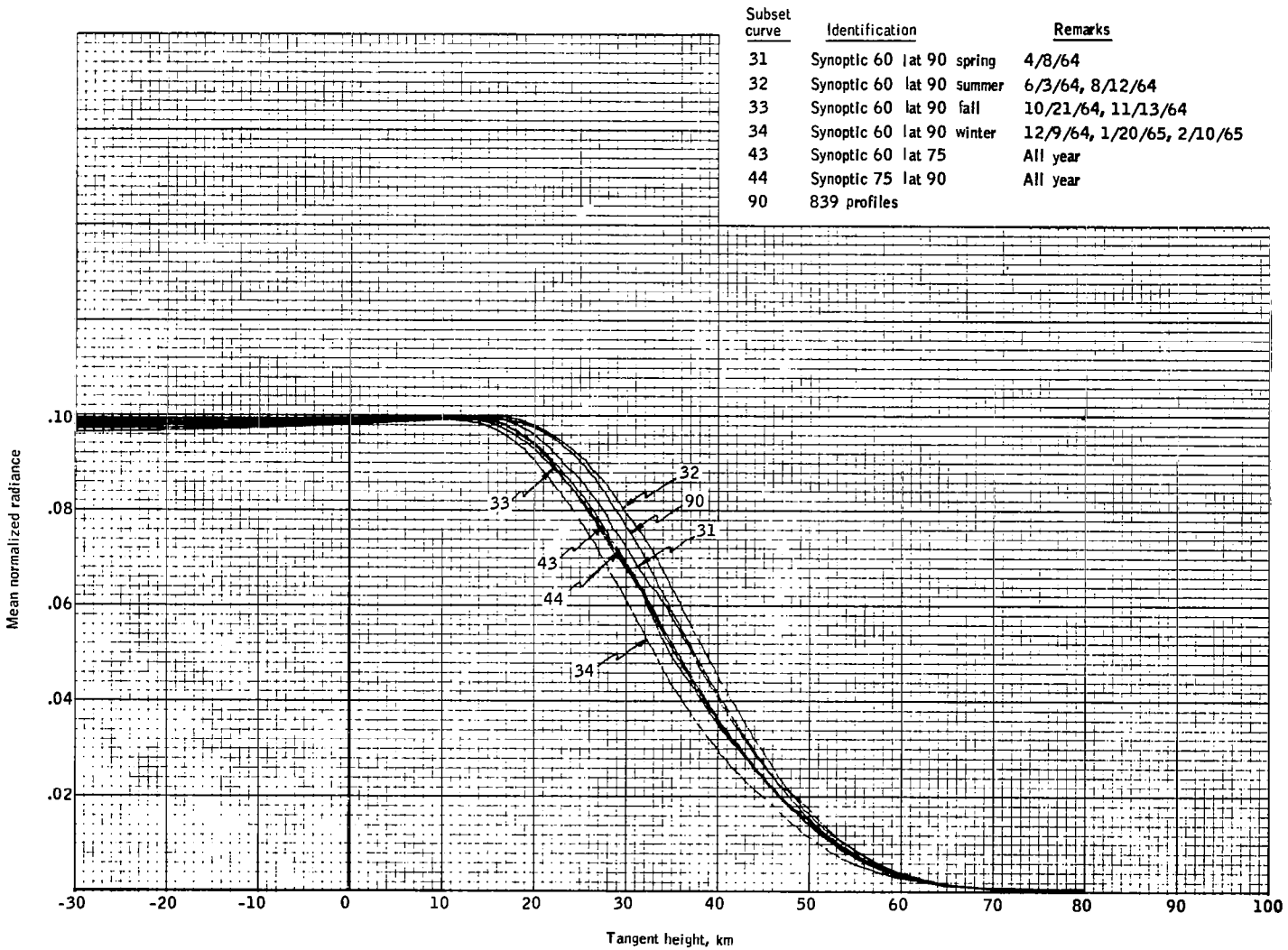


Figure A39. Mean Normalized Radiance versus Tangent Height, Set 10

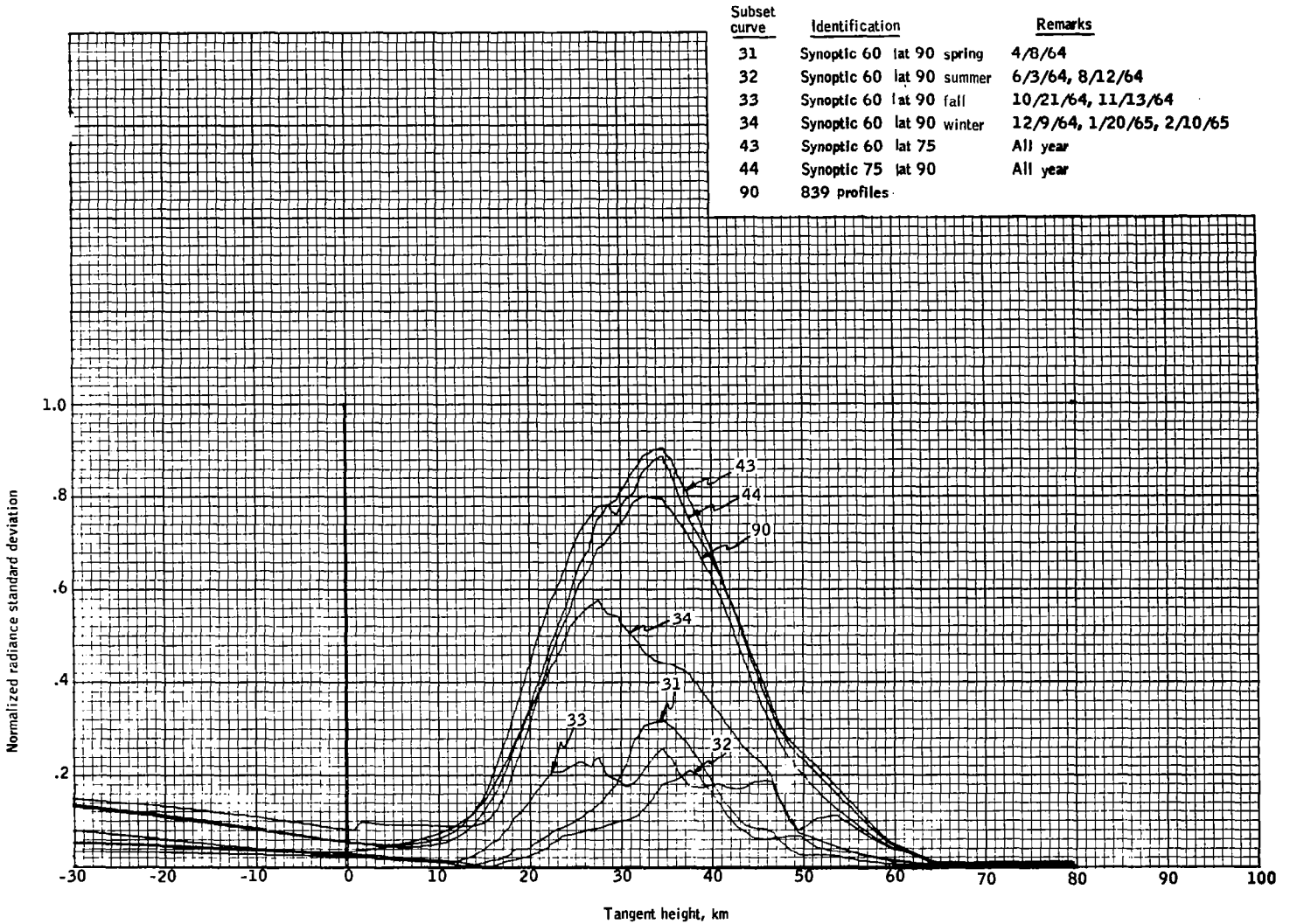


Figure A40. Normalized Radiance Standard Deviation versus Tangent Height, Set 10

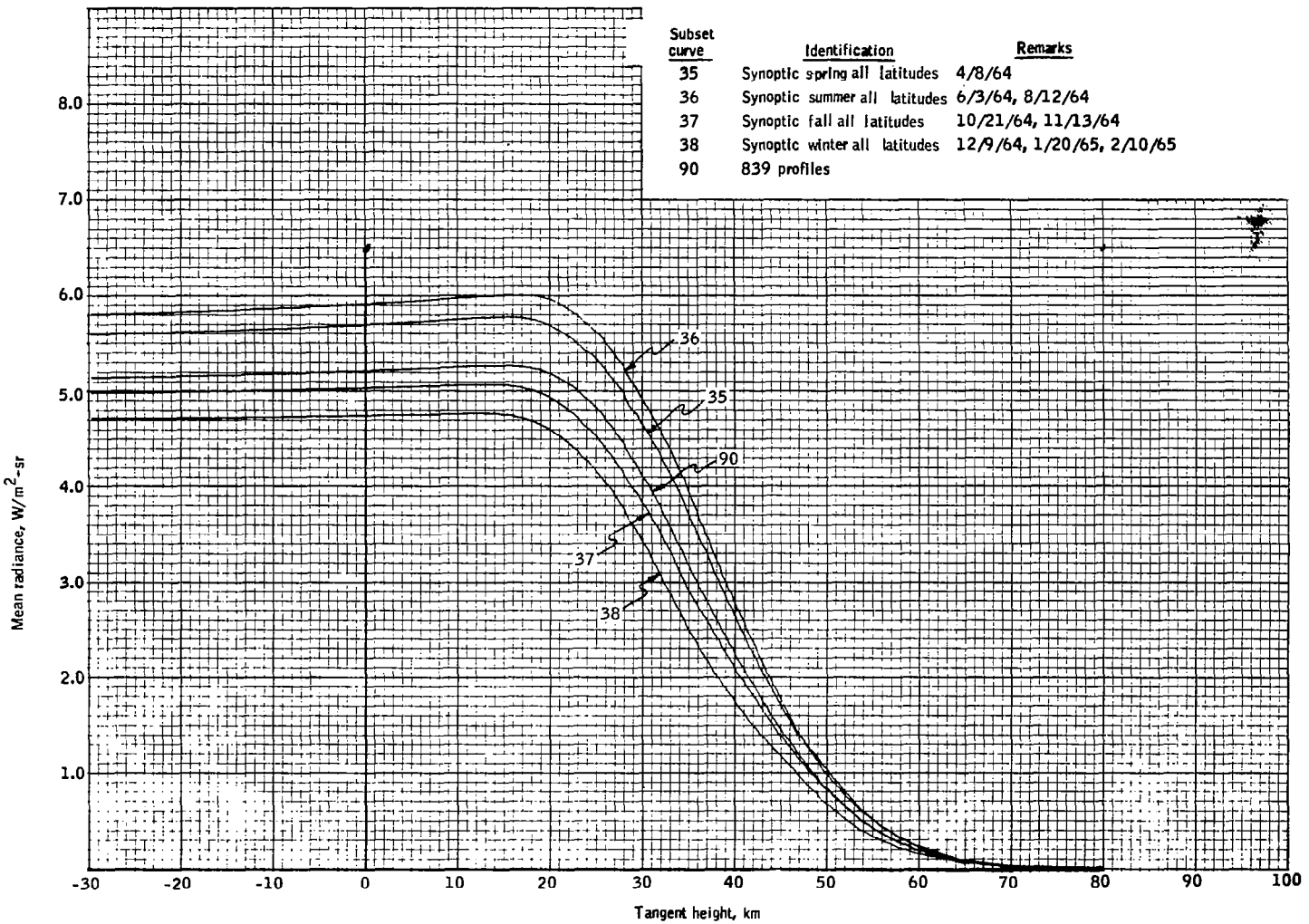


Figure A41. Mean Radiance versus Tangent Height, Set 11

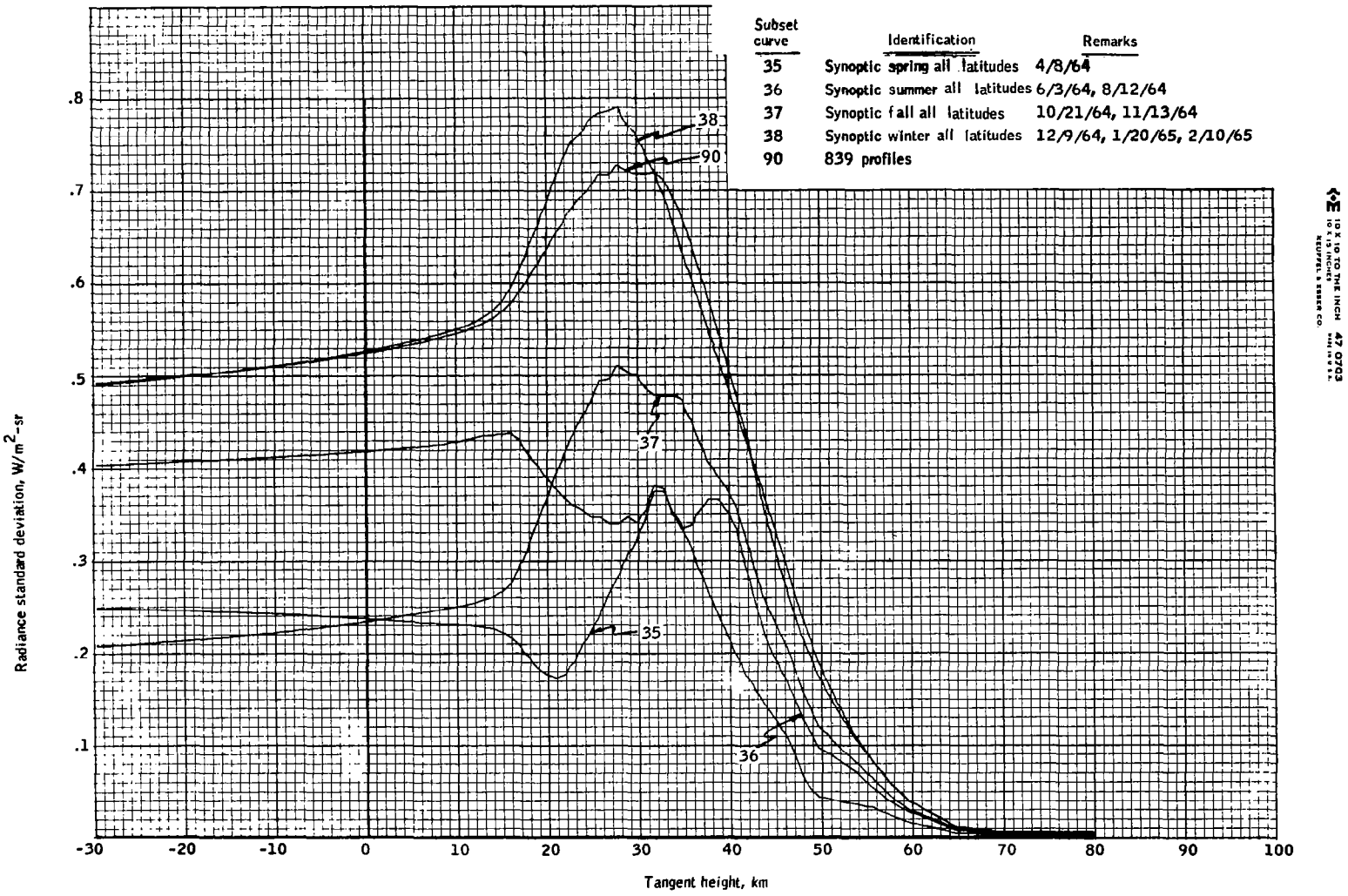


Figure A42. Radiance Standard Deviation versus Tangent Height, Set 11

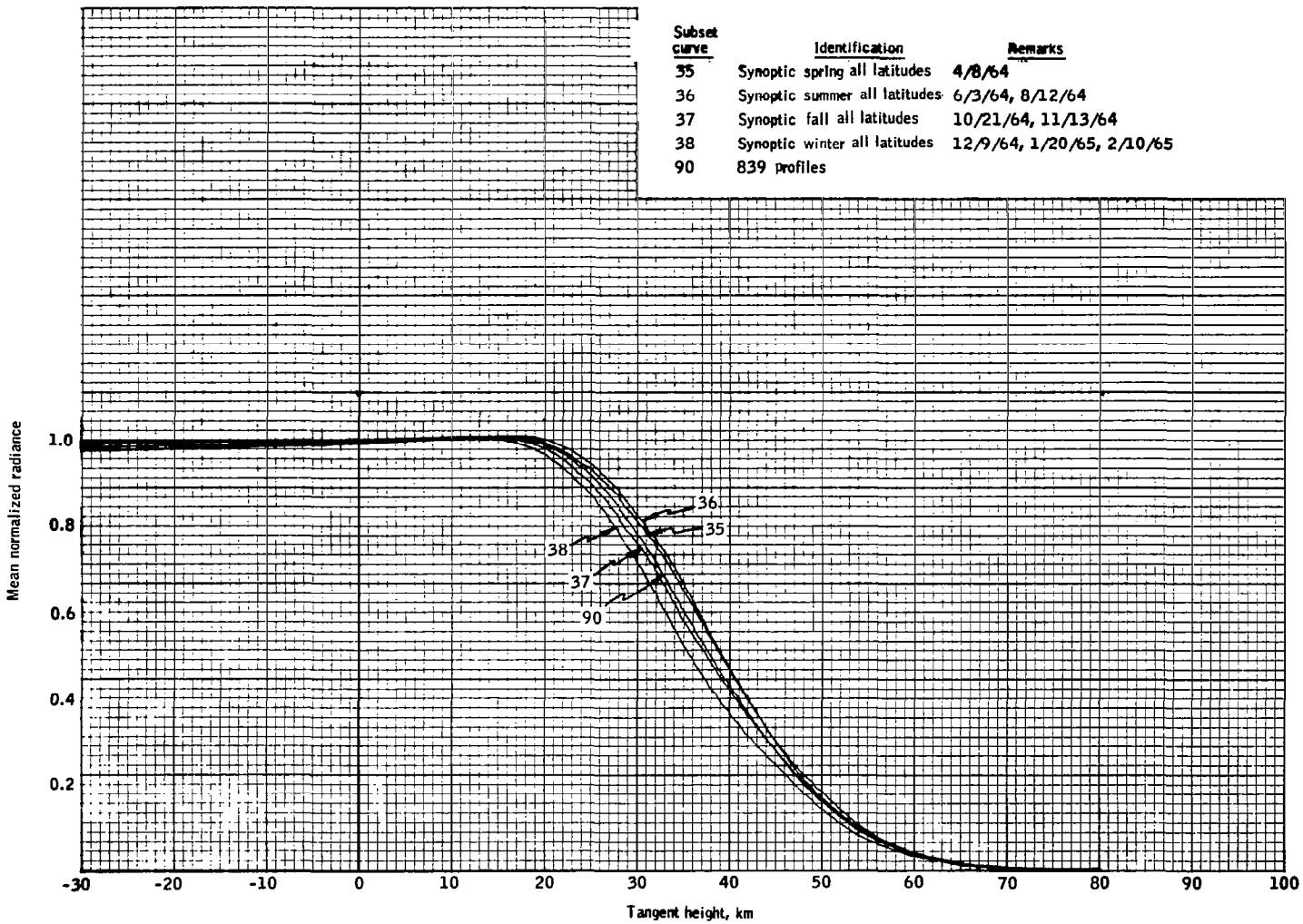


Figure A43. Mean Normalized Radiance versus Tangent Height, Set 11

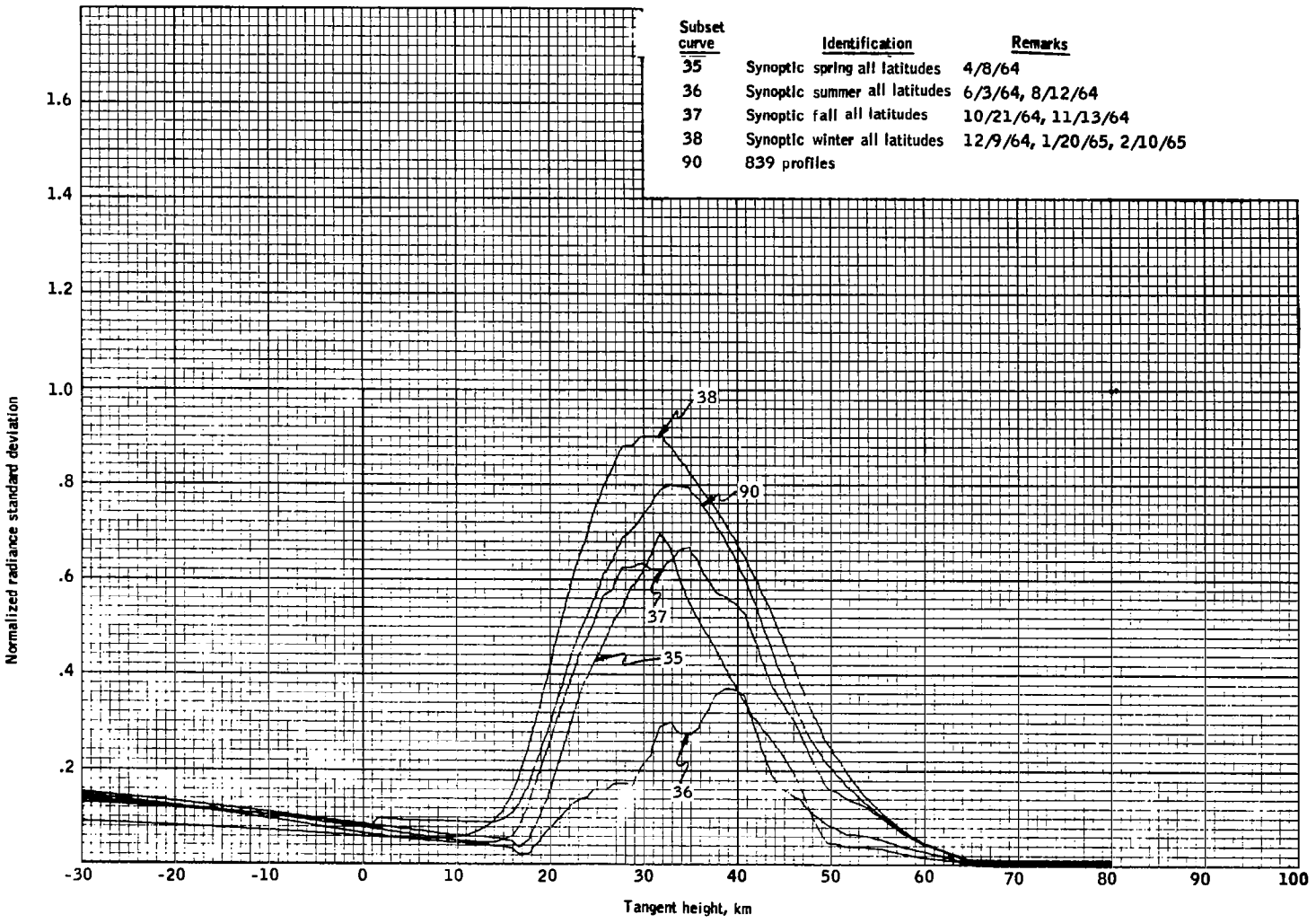


Figure A44. Normalized Radiance Standard Deviation versus Tangent Height, Set 11

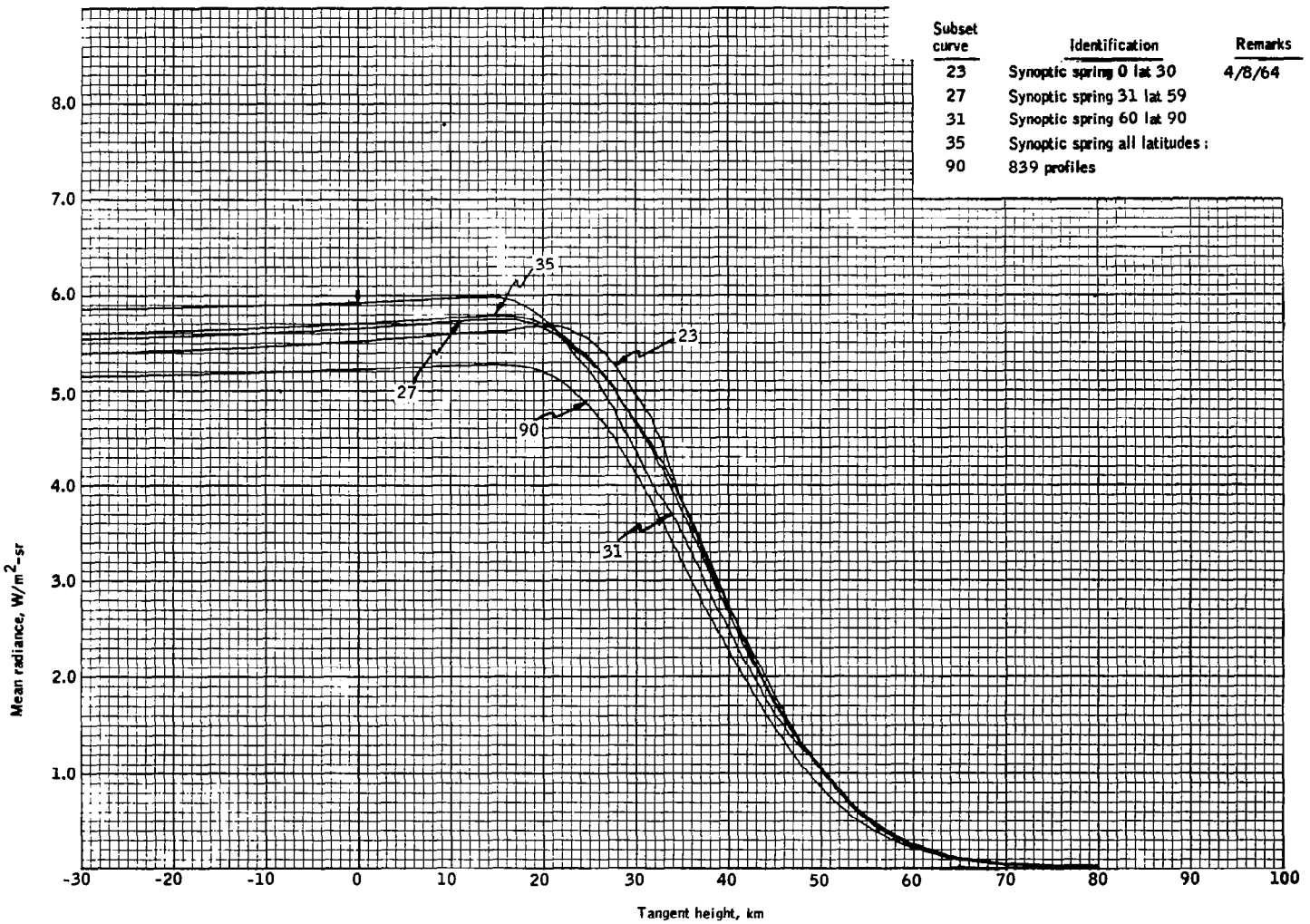


Figure A45. Mean Radiance versus Tangent Height, Set 12

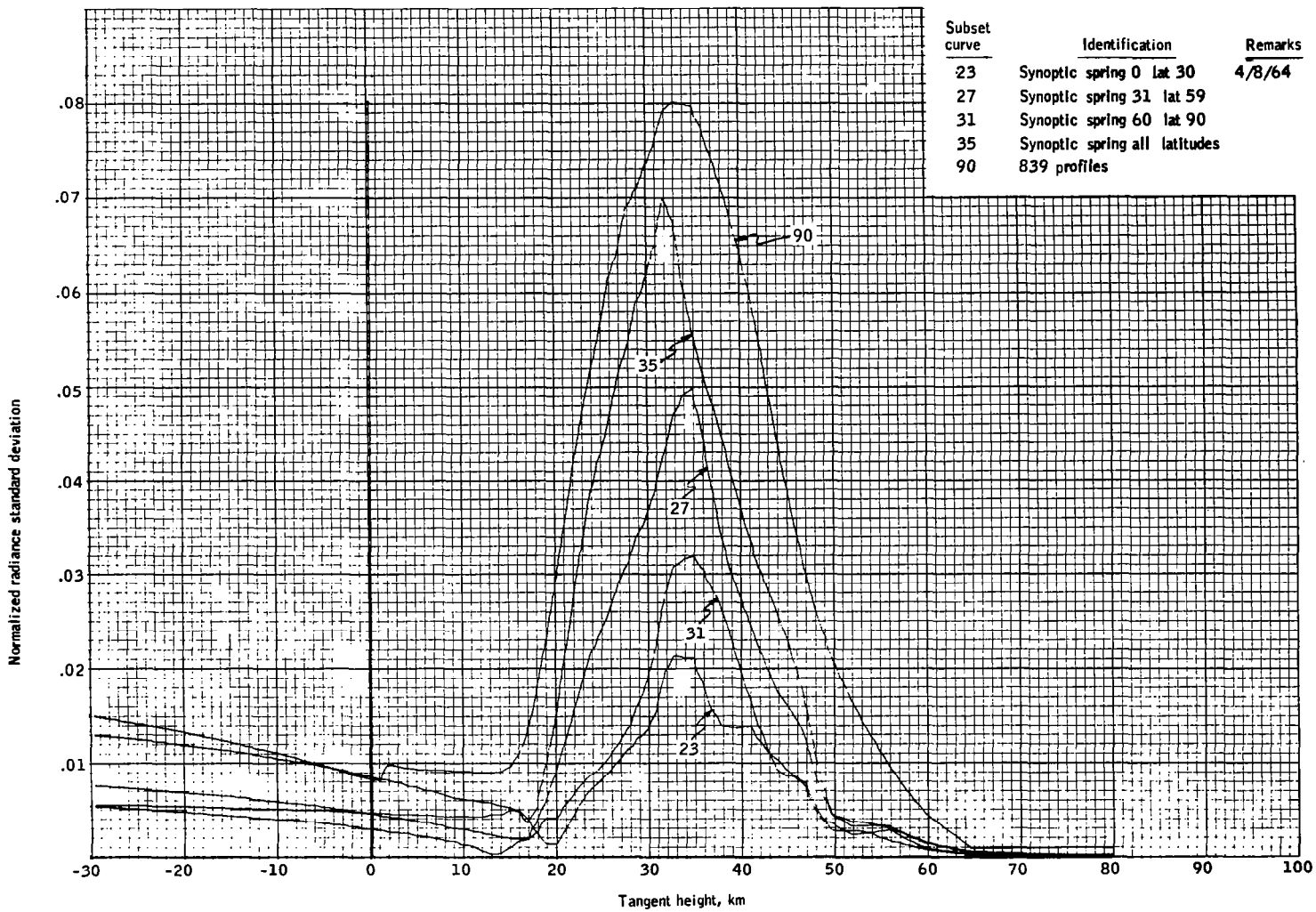


Figure A48. Normalized Radiance Standard Deviation versus Tangent Height, Set 12

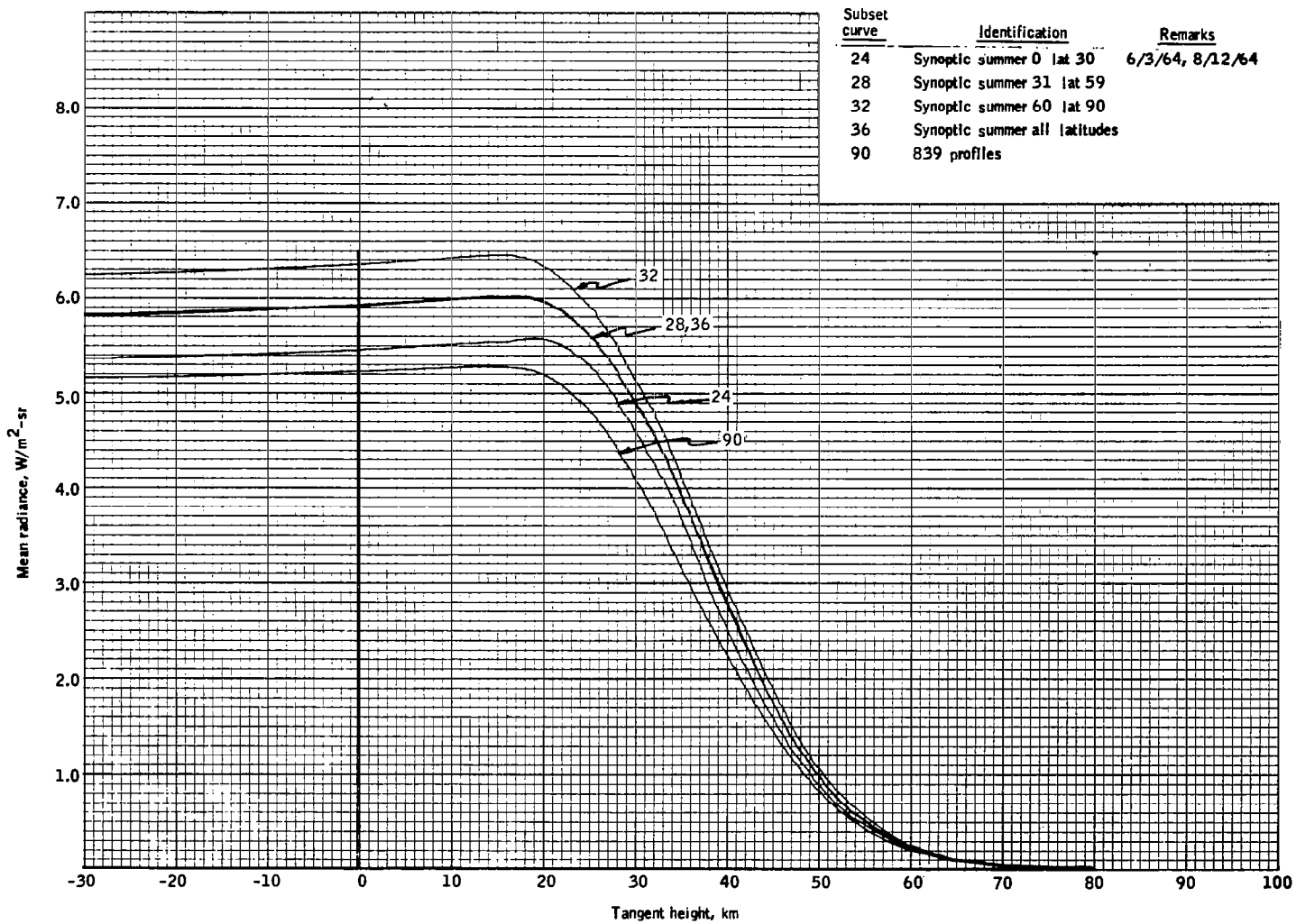


Figure A49. Mean Radiance versus Tangent Height, Set 13

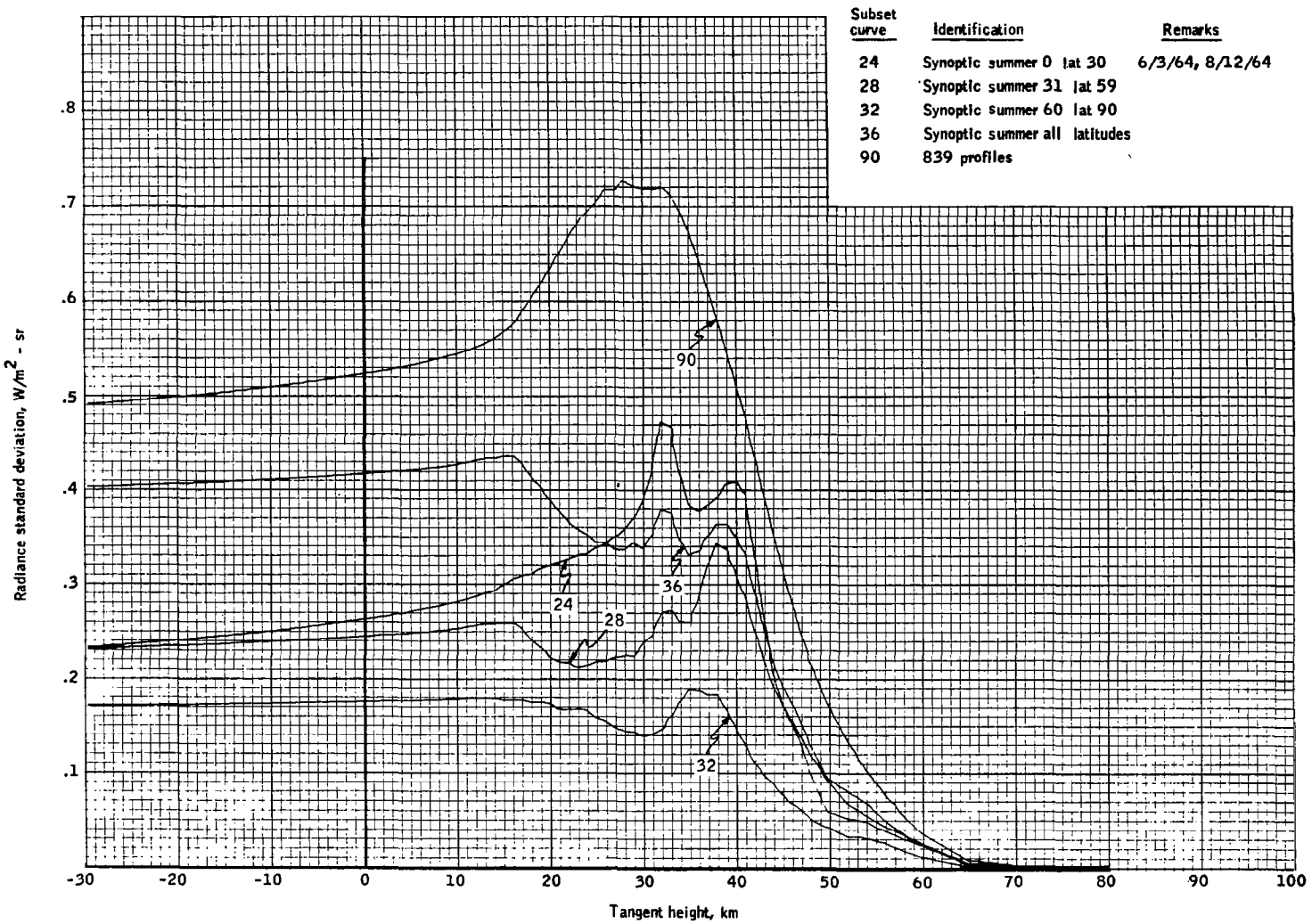


Figure A50. Radiance Standard Deviation versus Tangent Height, Set 13

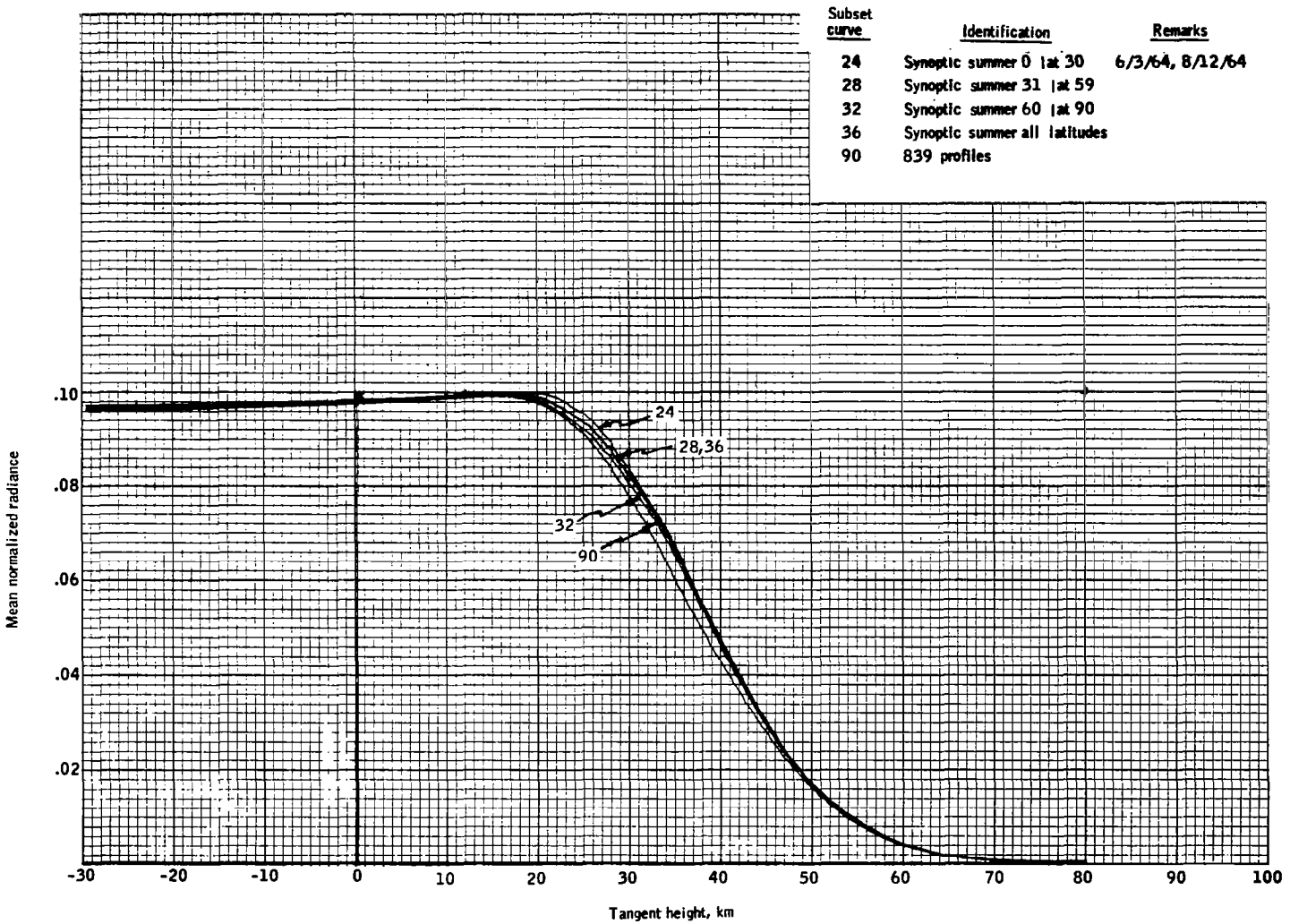


Figure A51. Mean Normalized Radiance versus Tangent Height, Set 13

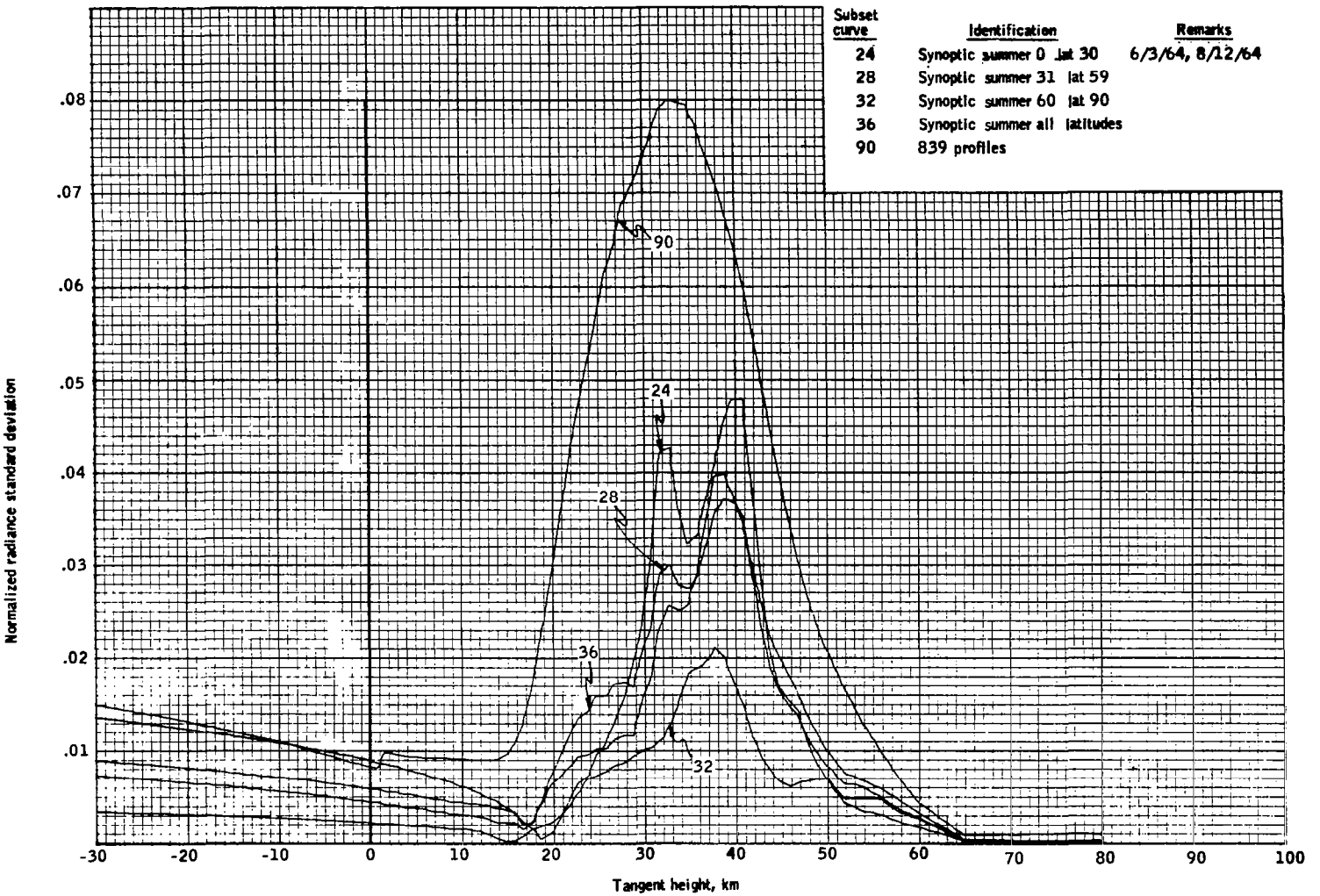


Figure A52. Normalized Radiance Standard Deviation versus Tangent Height, Set 13

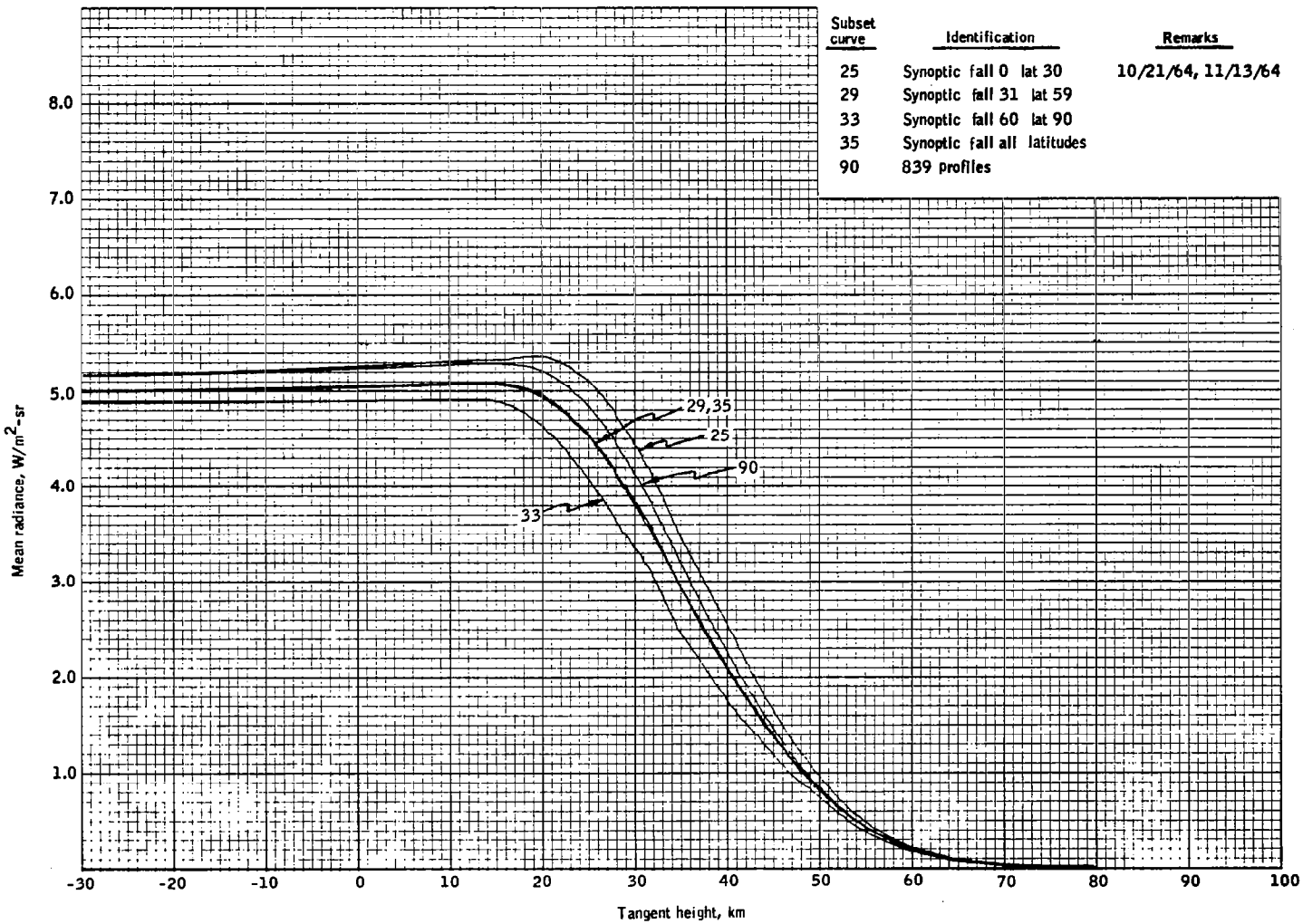


Figure A53. Mean Radiance versus Tangent Height, Set 14

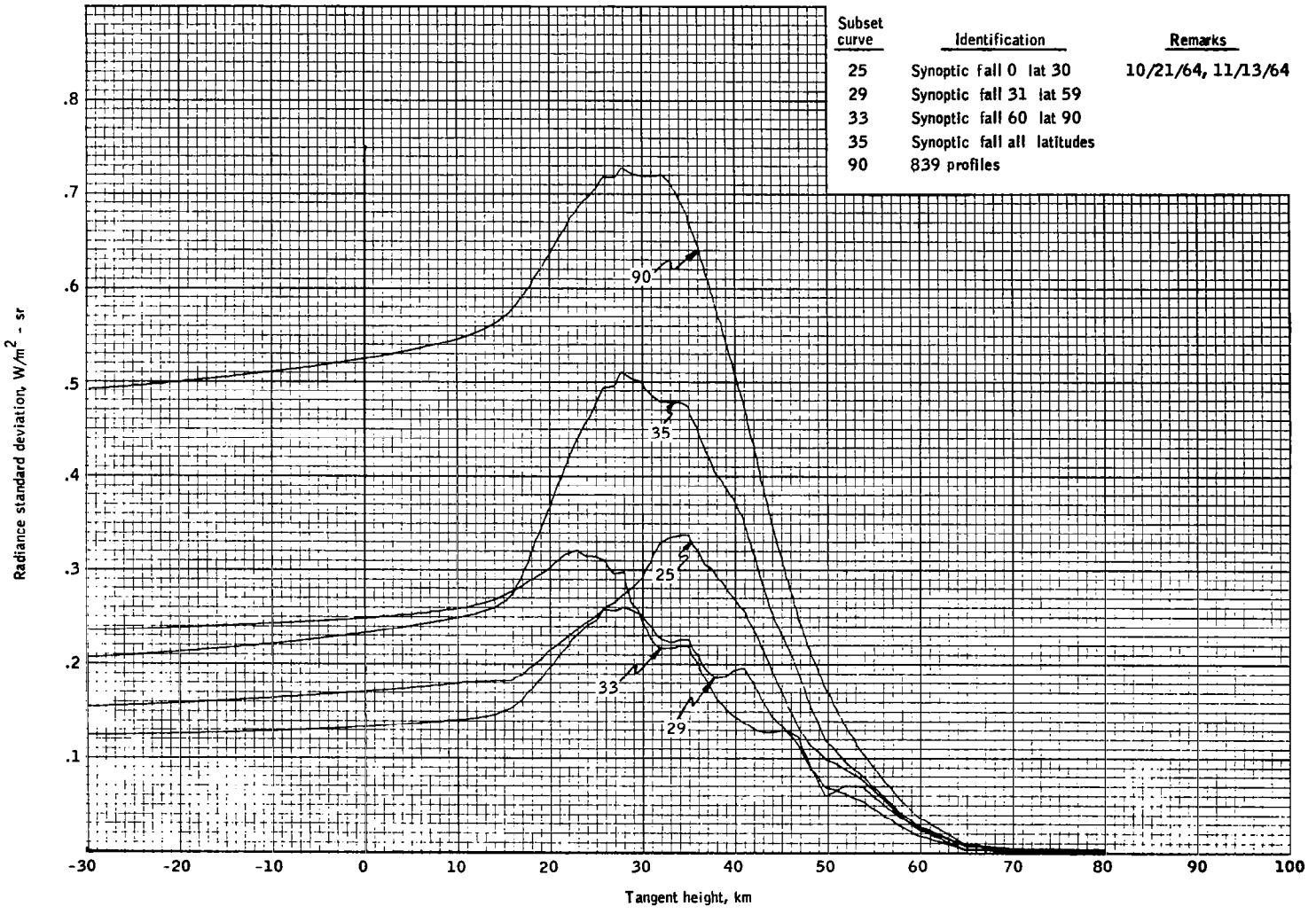


Figure A54. Radiance Standard Deviation versus Tangent Height, Set 14

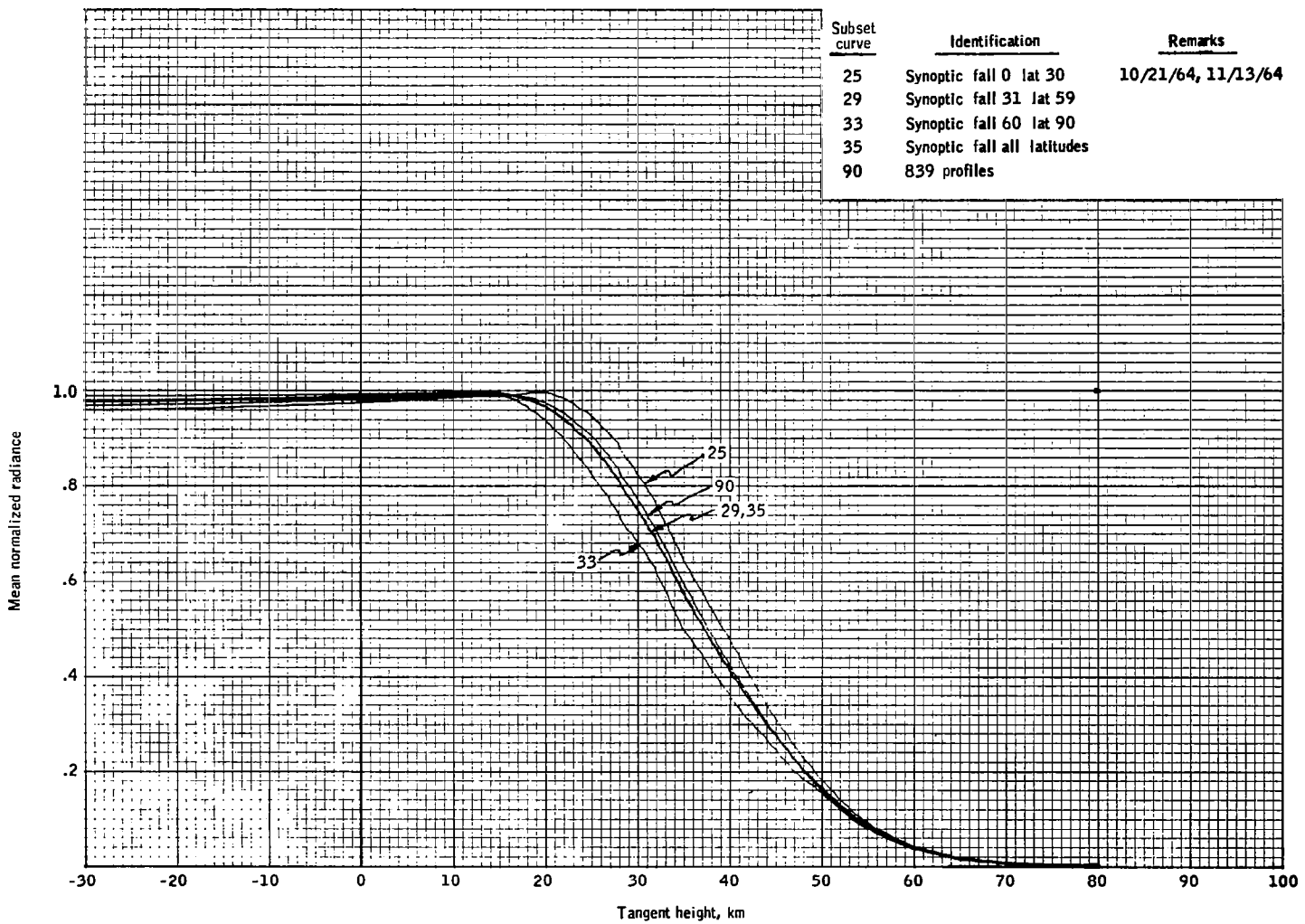


Figure A55. Mean Normalized Radiance versus Tangent Height, Set 14

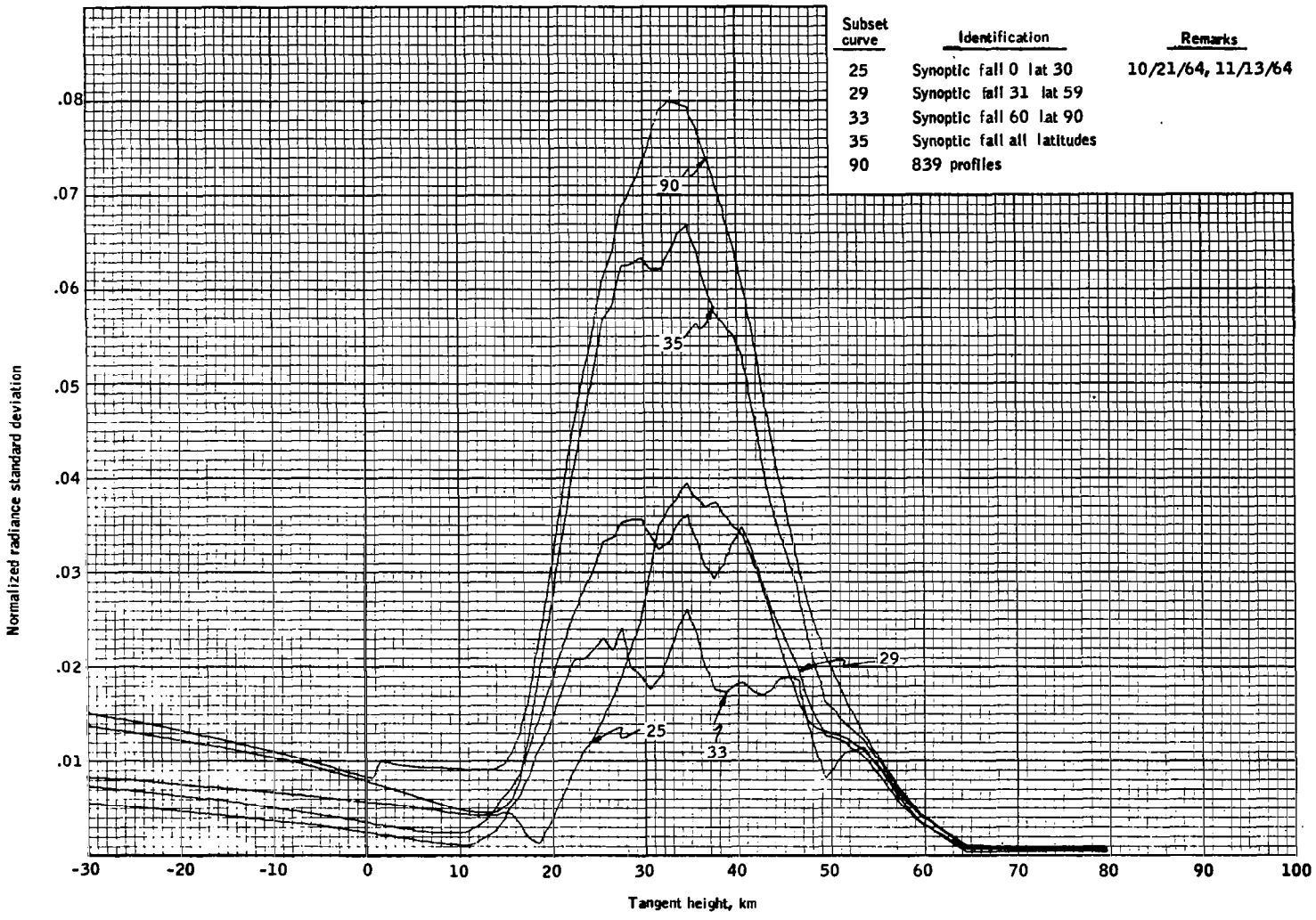


Figure A56. Normalized Radiance Standard Deviation versus Tangent Height, Set 14

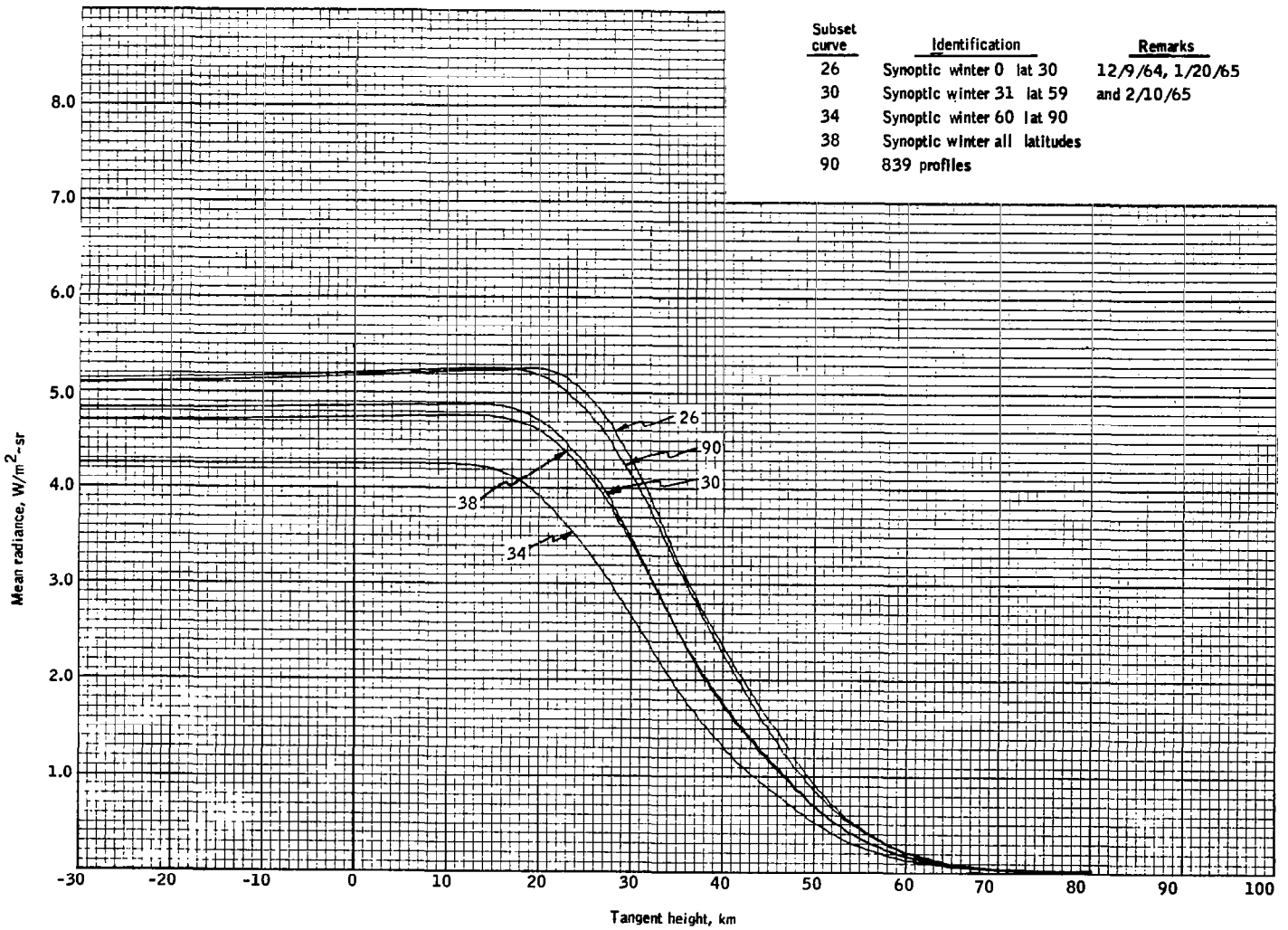


Figure A57. Mean Radiance versus Tangent Height, Set 15

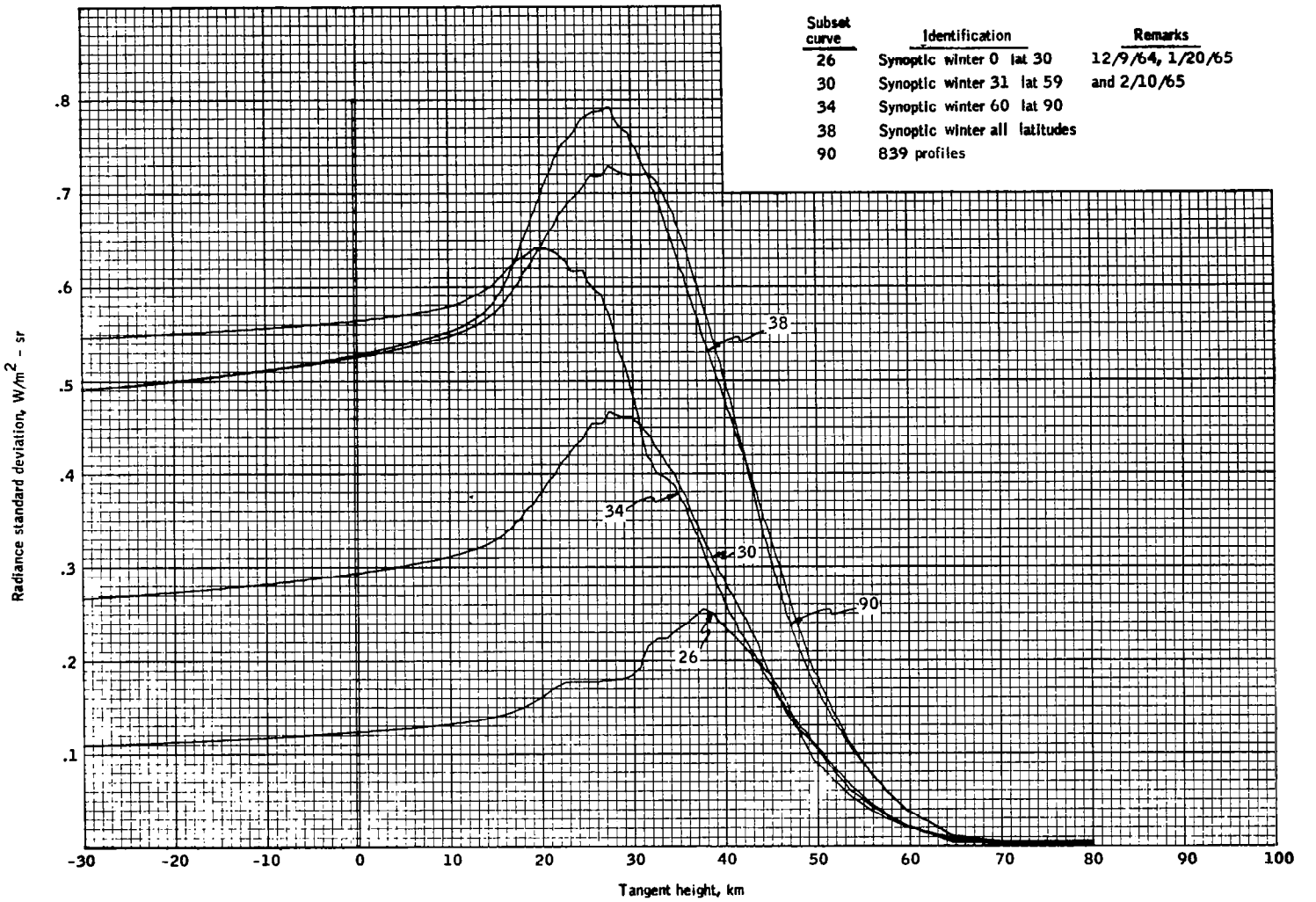


Figure A58. Radiance Standard Deviation versus Tangent Height, Set 15

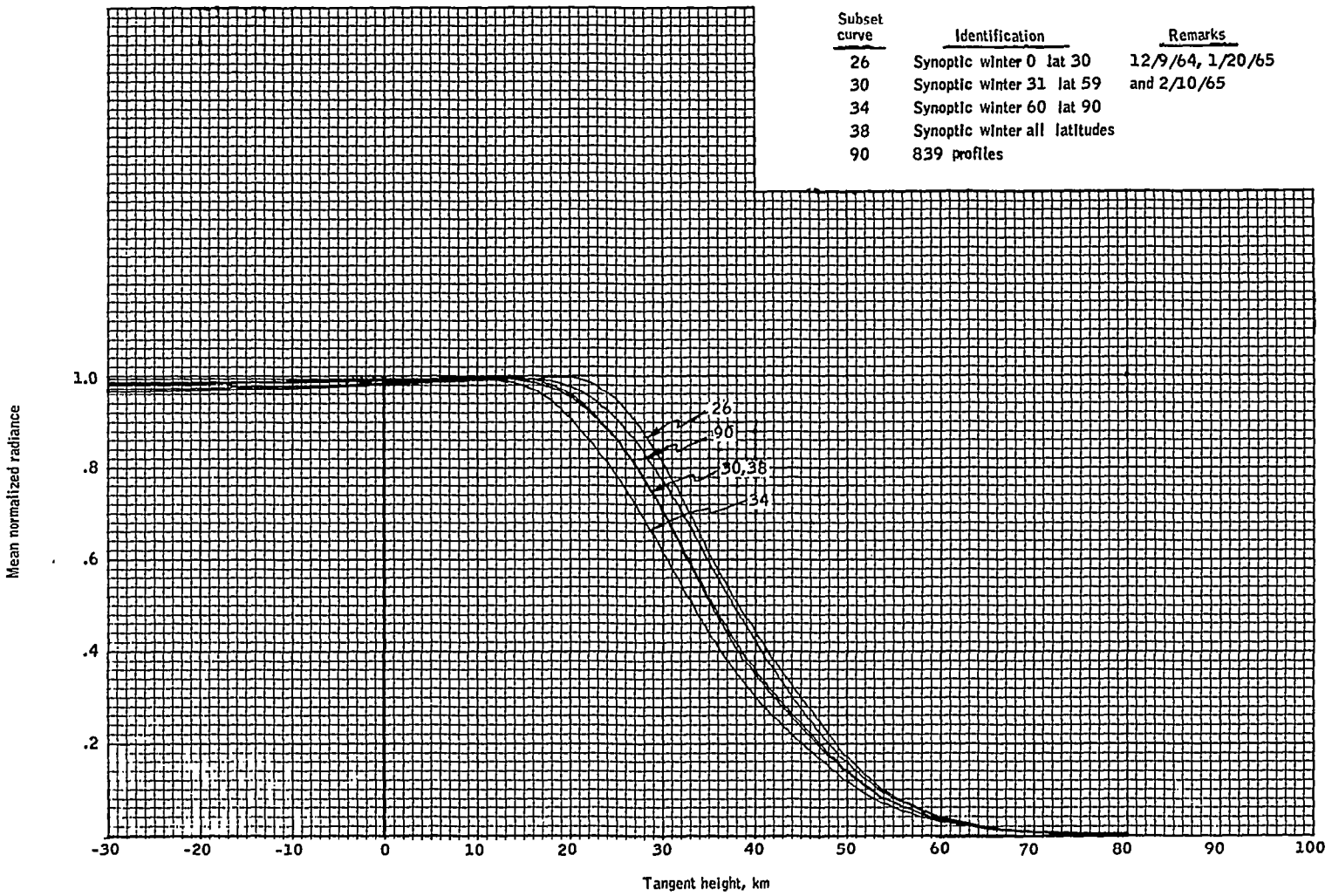


Figure A59. Mean Normalized Radiance versus Tangent Height, Set 15

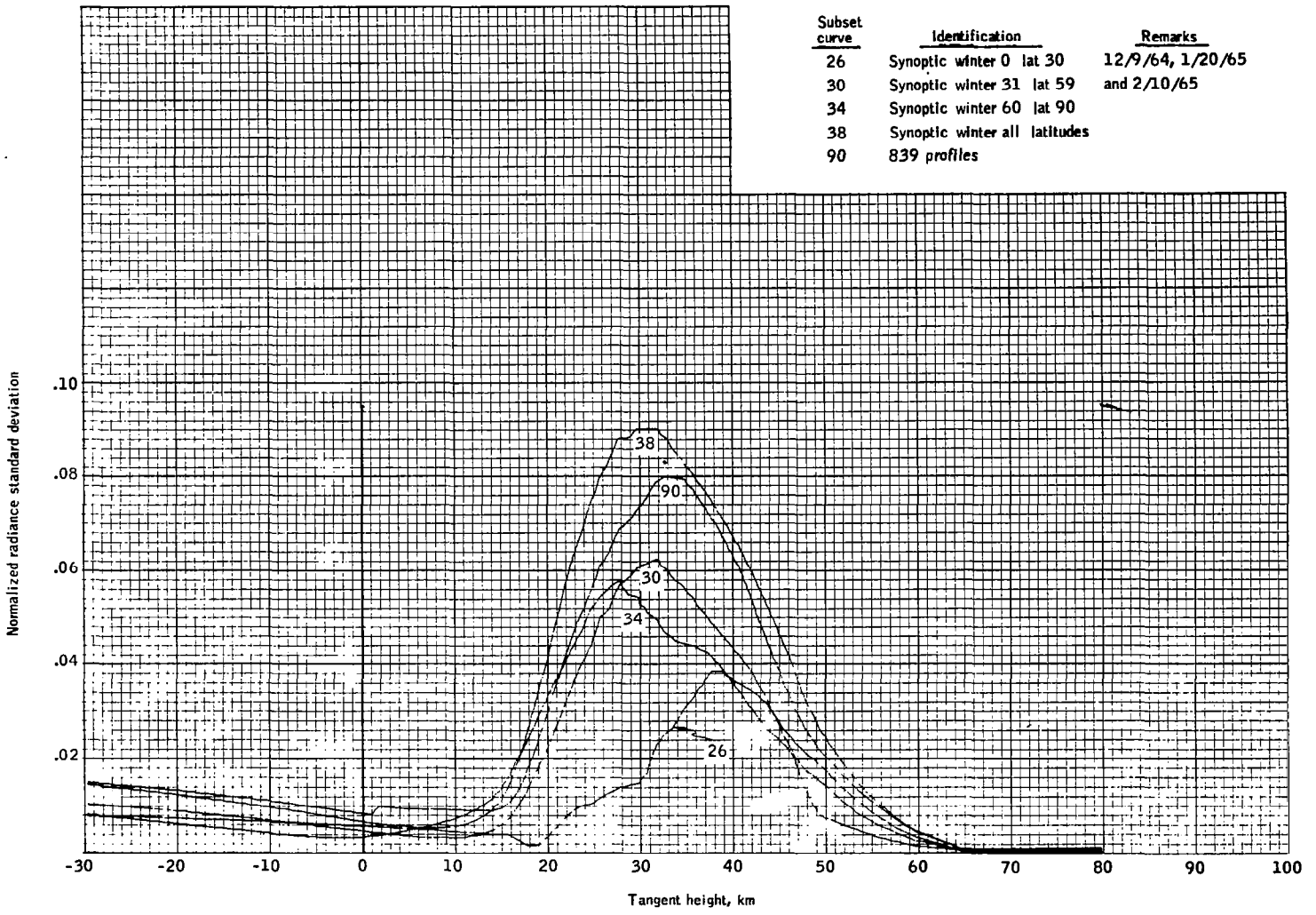


Figure A60. Normalized Radiance Standard Deviation versus Tangent Height, Set 15

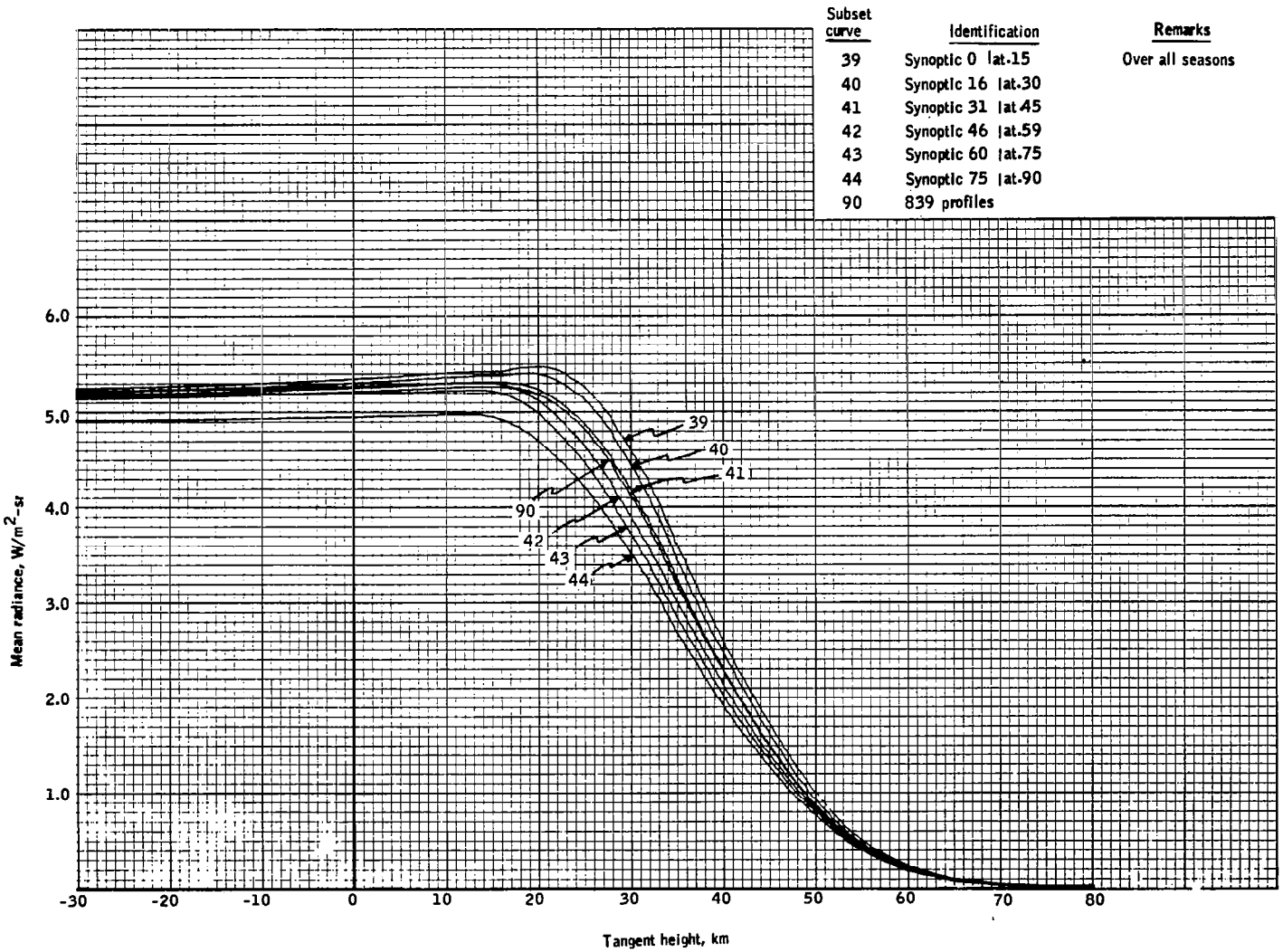


Figure A61. Mean Radiance versus Tangent Height, Set 16

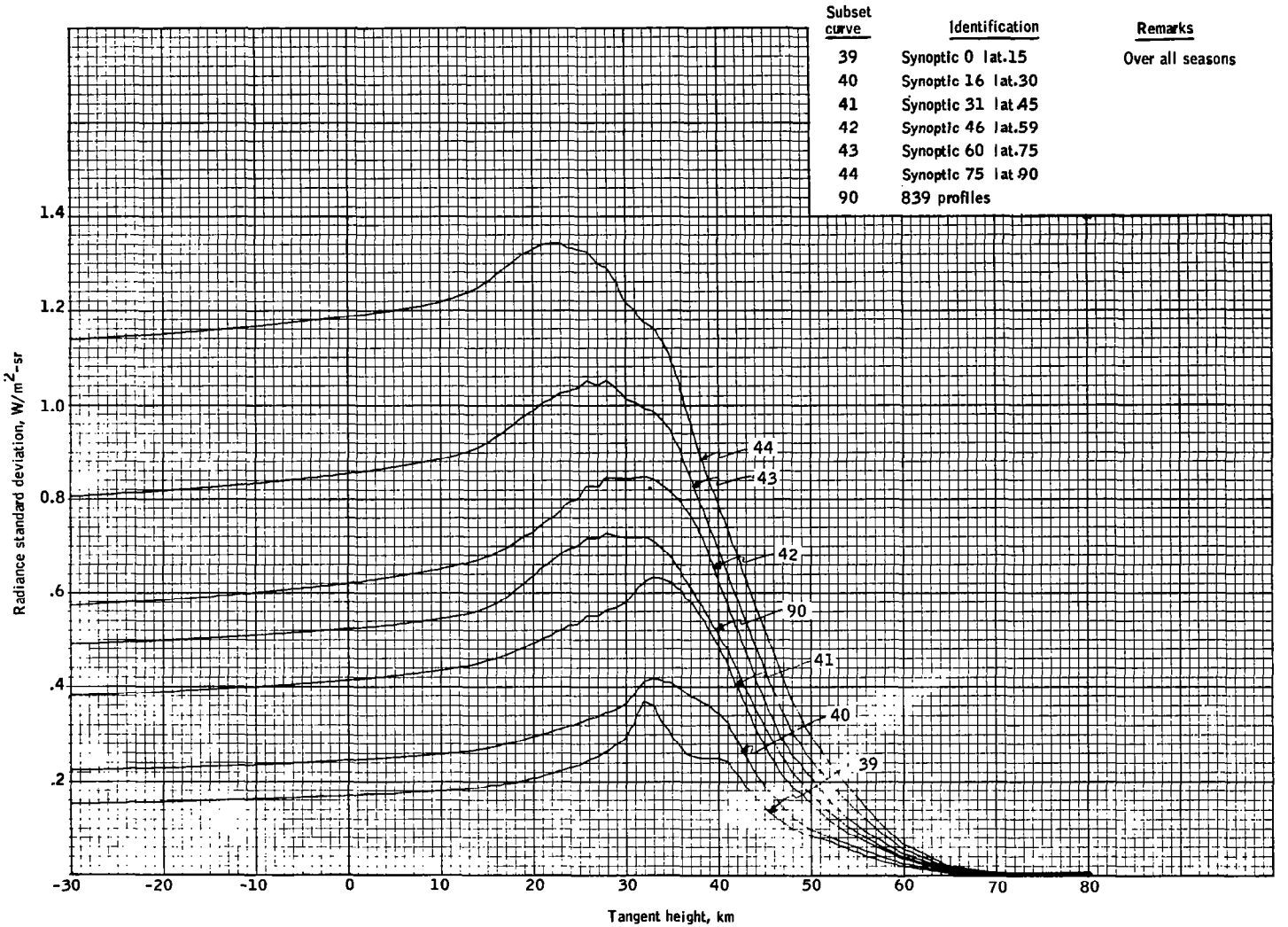


Figure A62. Radiance Standard Deviation versus Tangent Height, Set 16

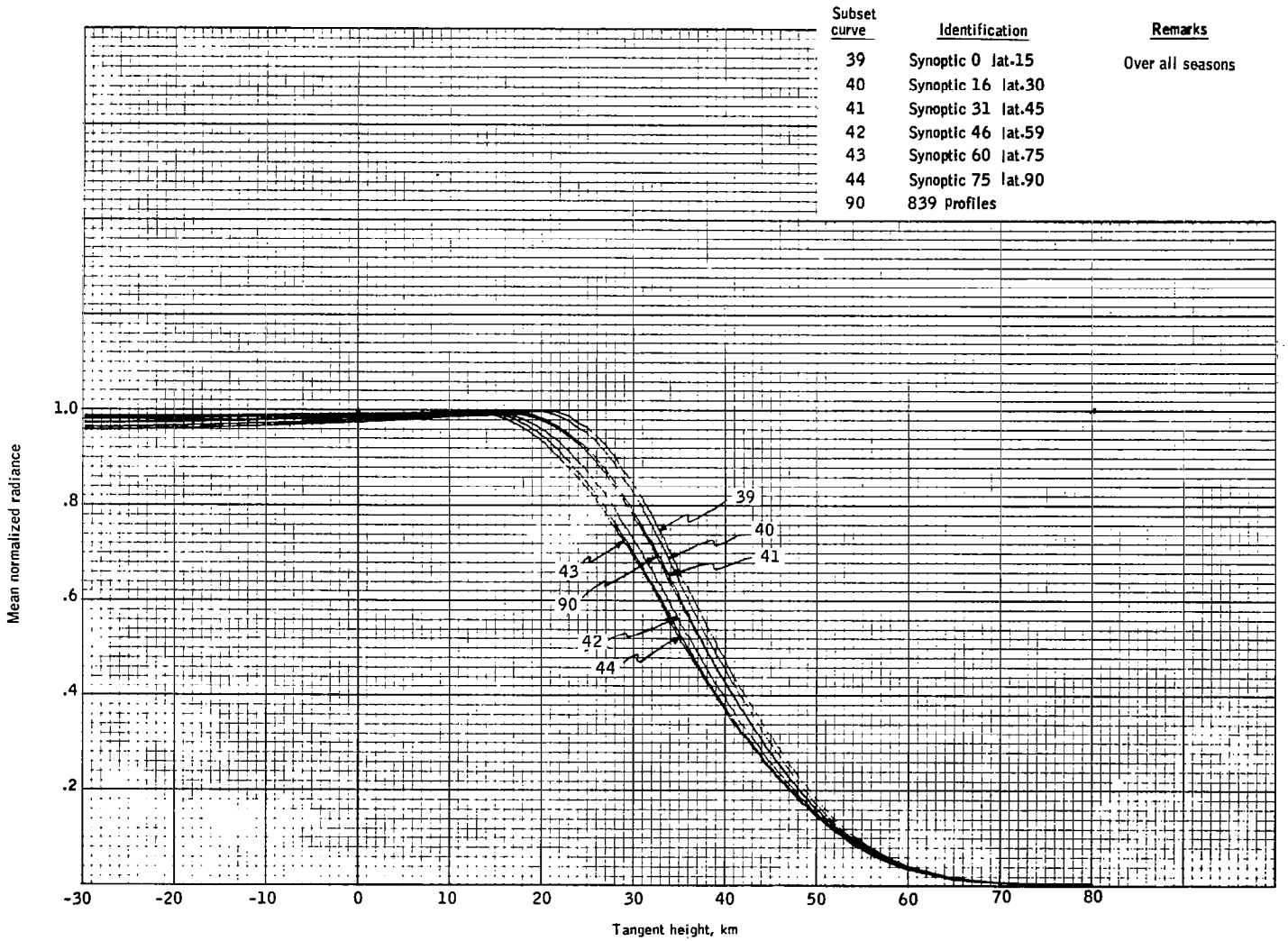


Figure A63. Mean Normalized Radiance versus Tangent Height, Set 16

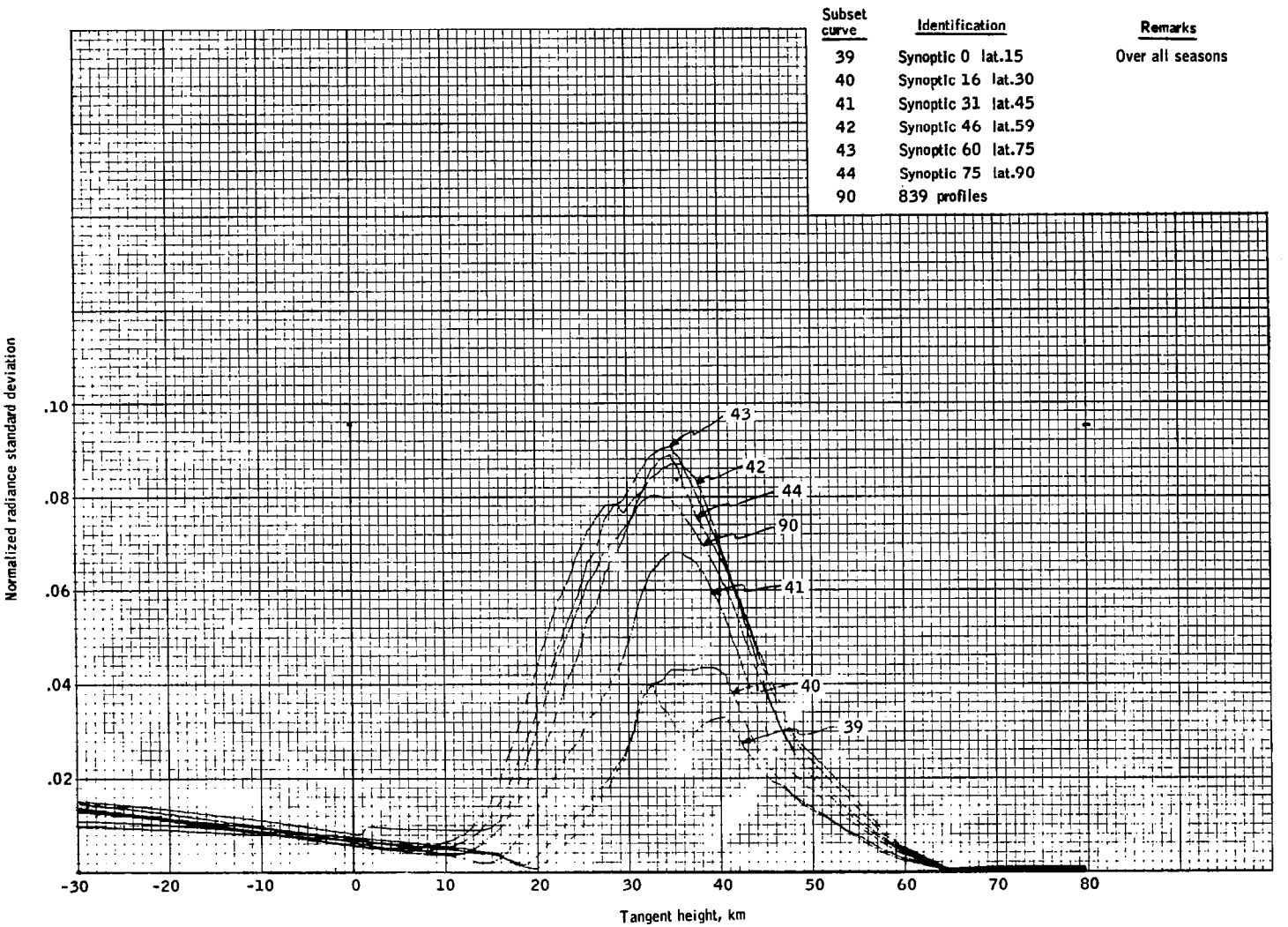


Figure A64. Normalized Radiance Standard Deviation versus Tangent Height, Set 16

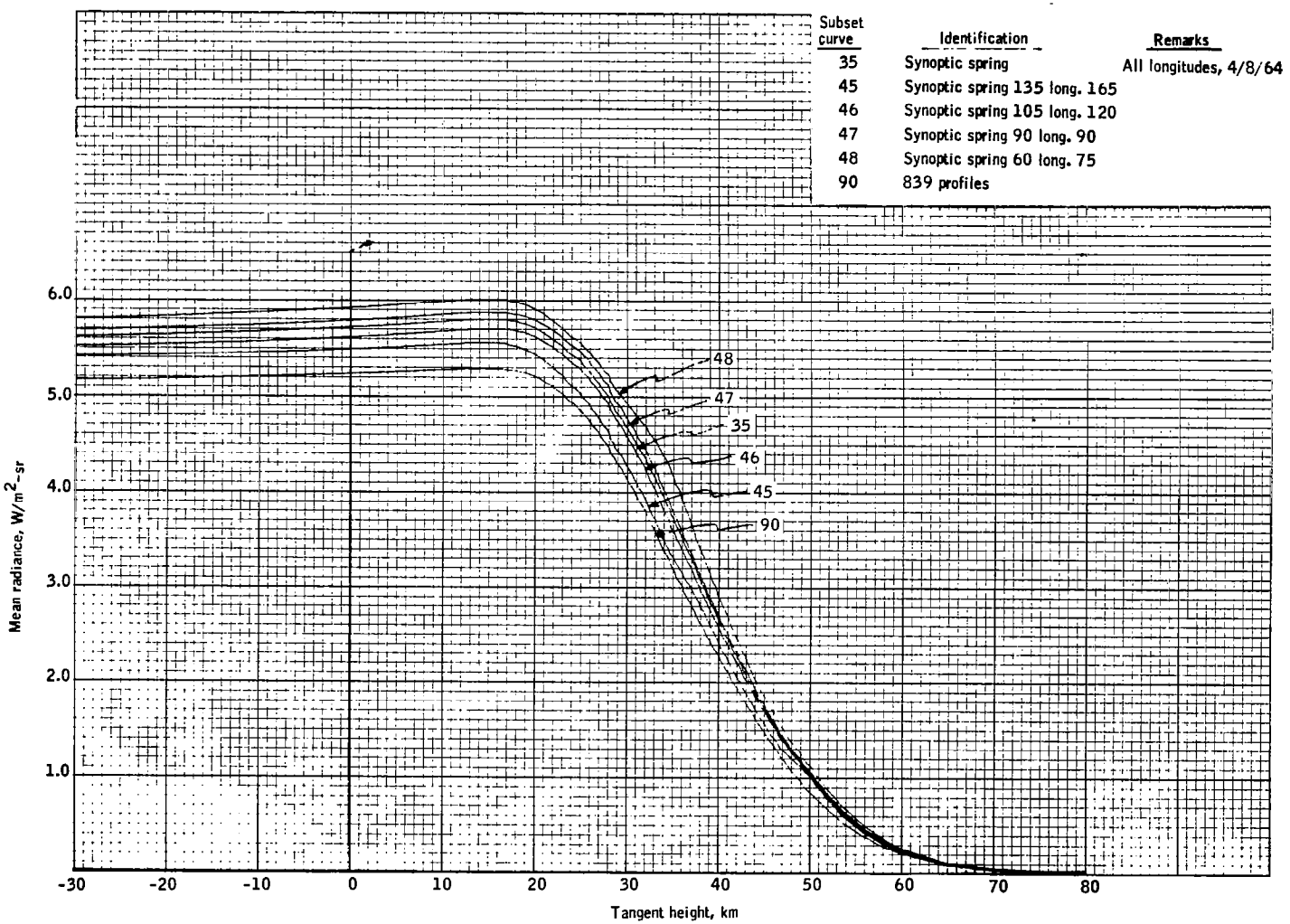


Figure A65. Mean Radiance versus Tangent Height, Set 17

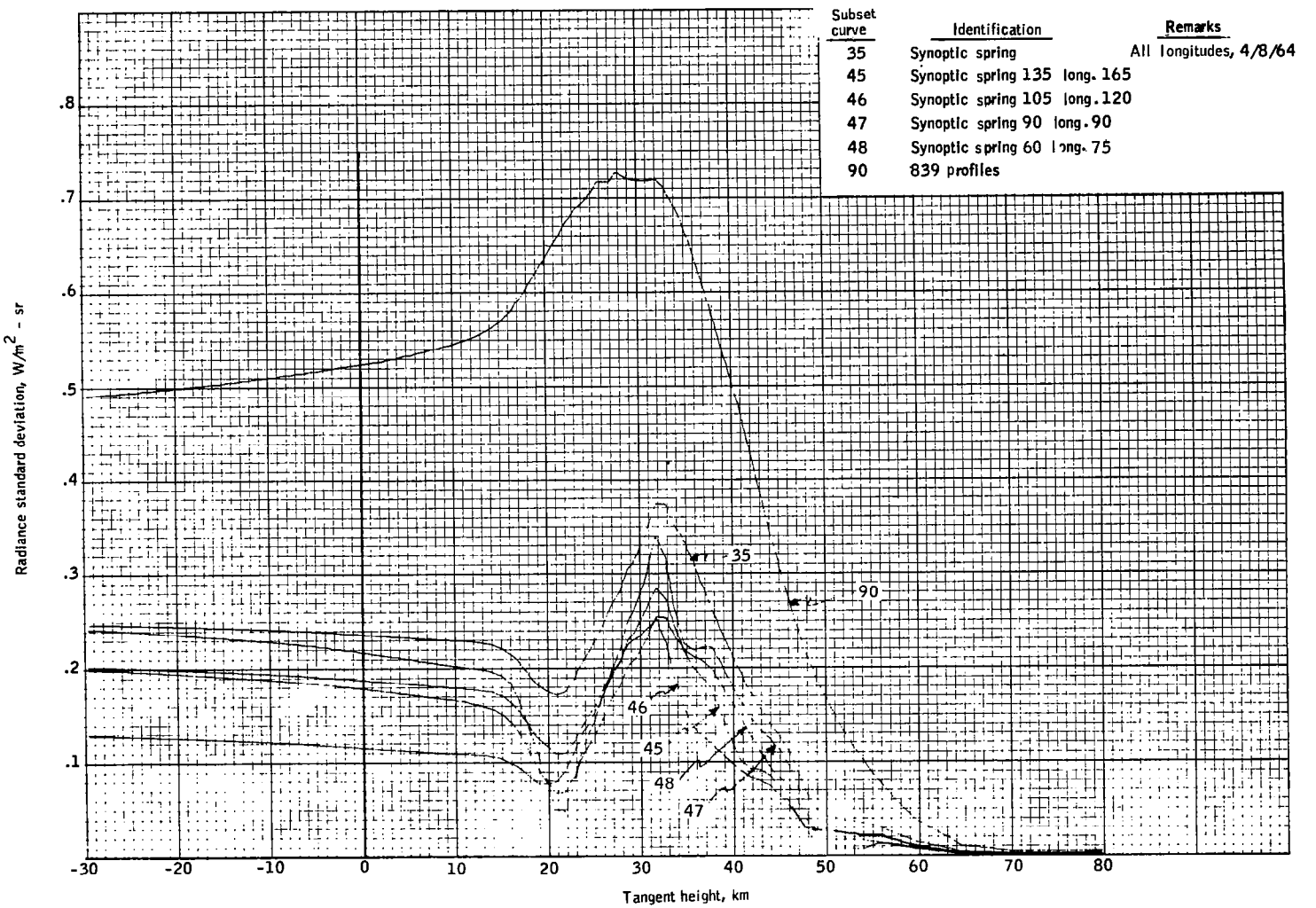


Figure A66. Radiance Standard Deviation versus Tangent Height, Set 17

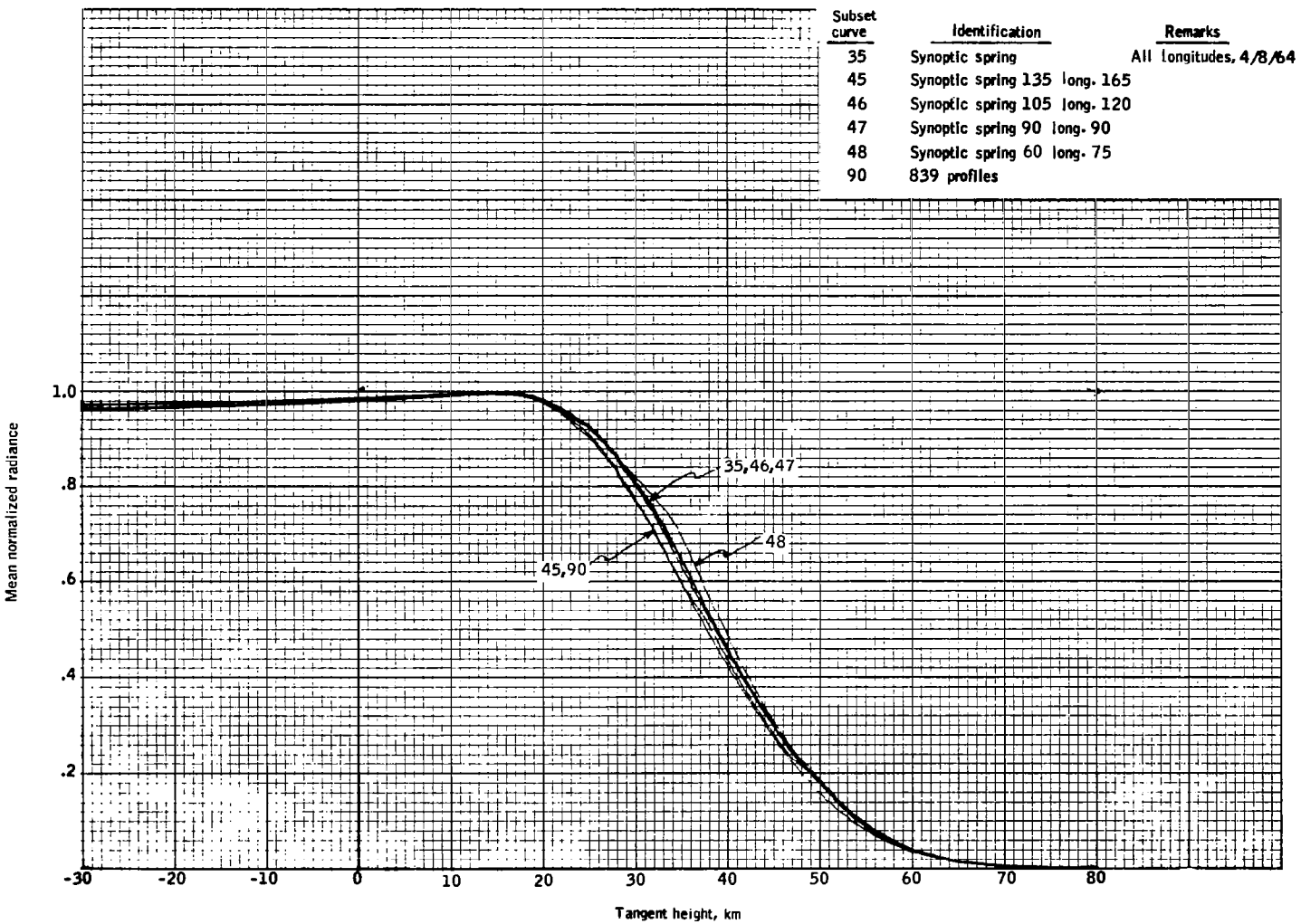


Figure A67. Mean Normalized Radiance versus Tangent Height, Set 17

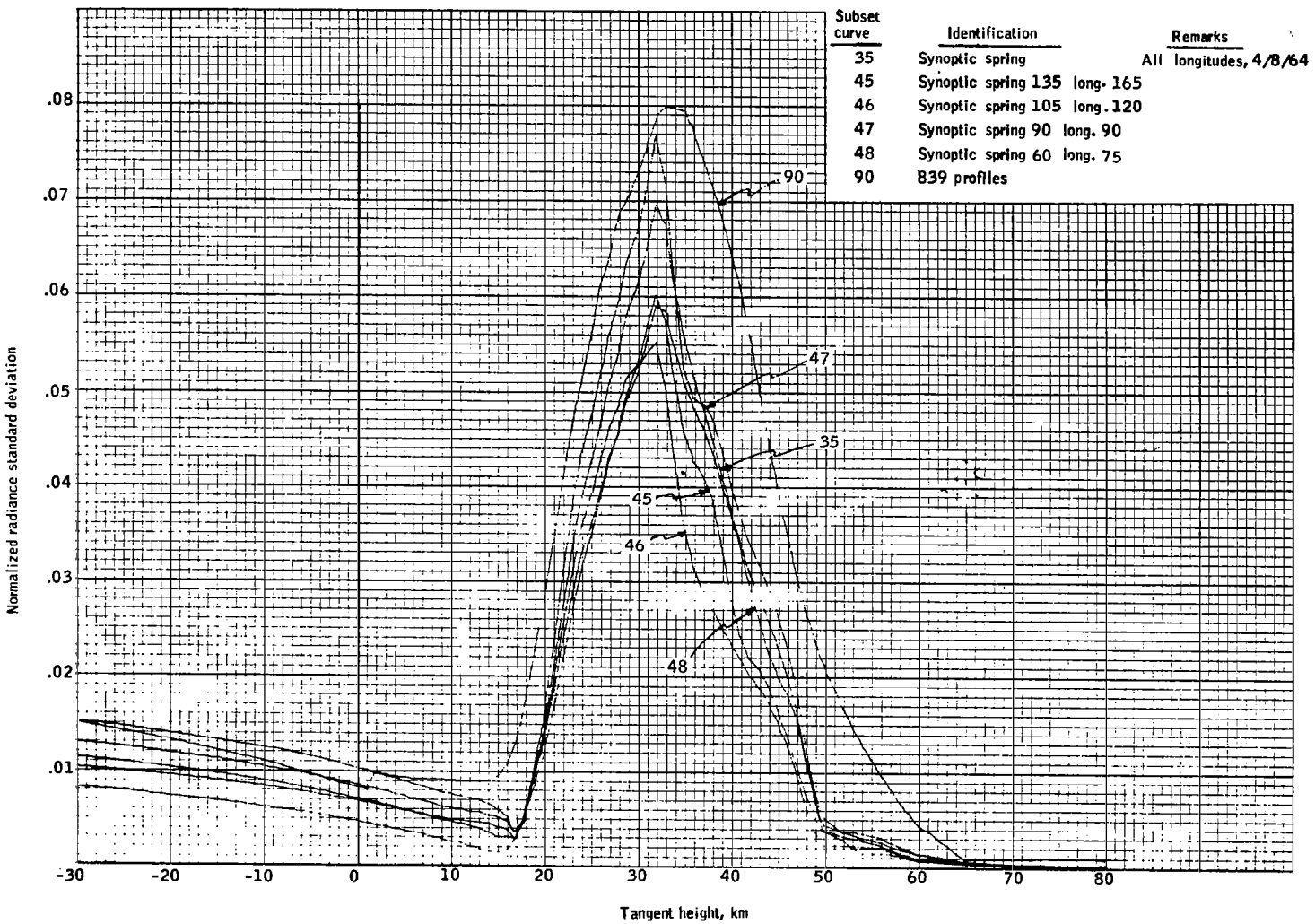


Figure A68. Normalized Radiance Standard Deviation versus Tangent Height, Set 17

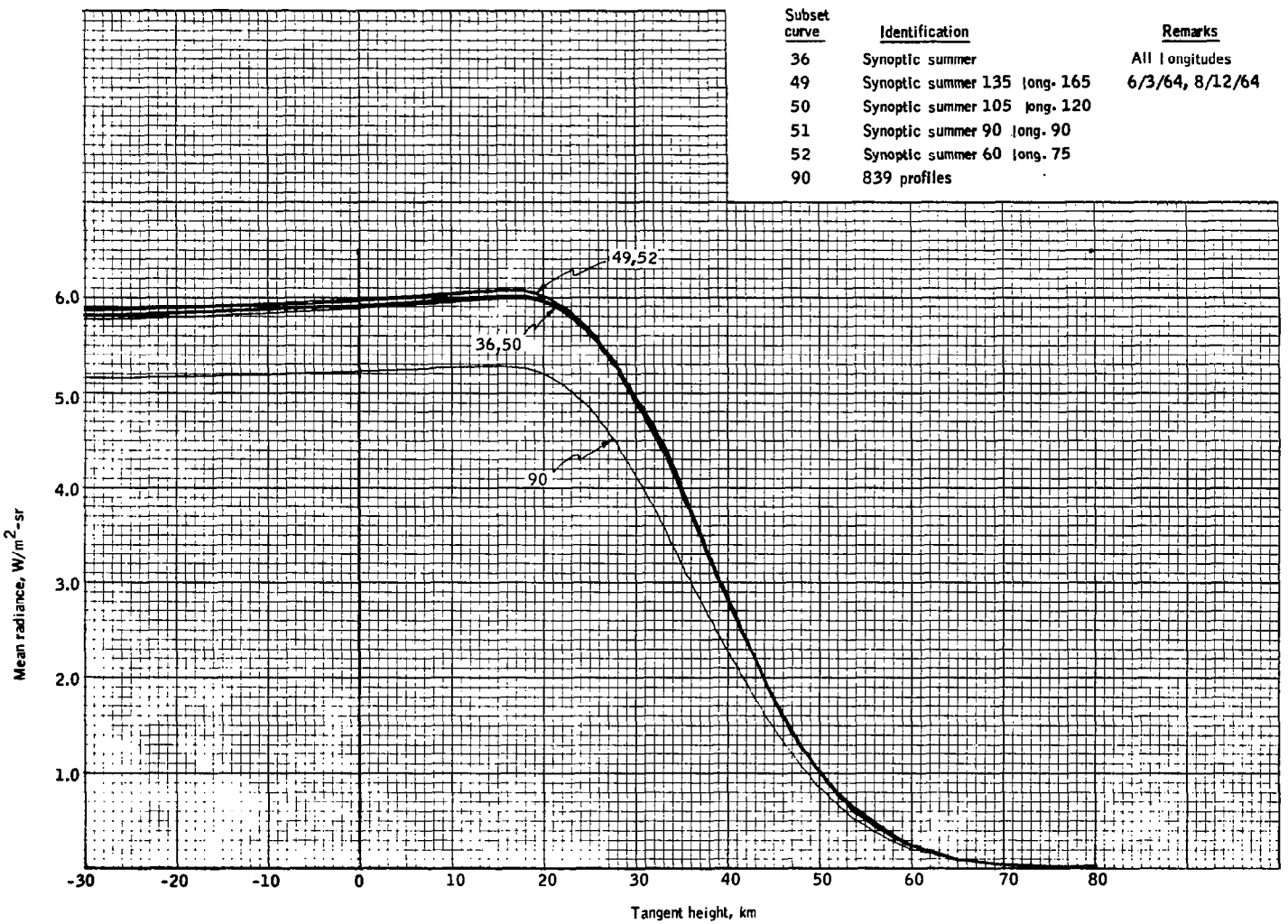


Figure A69. Mean Radiance versus Tangent Height, Set 18

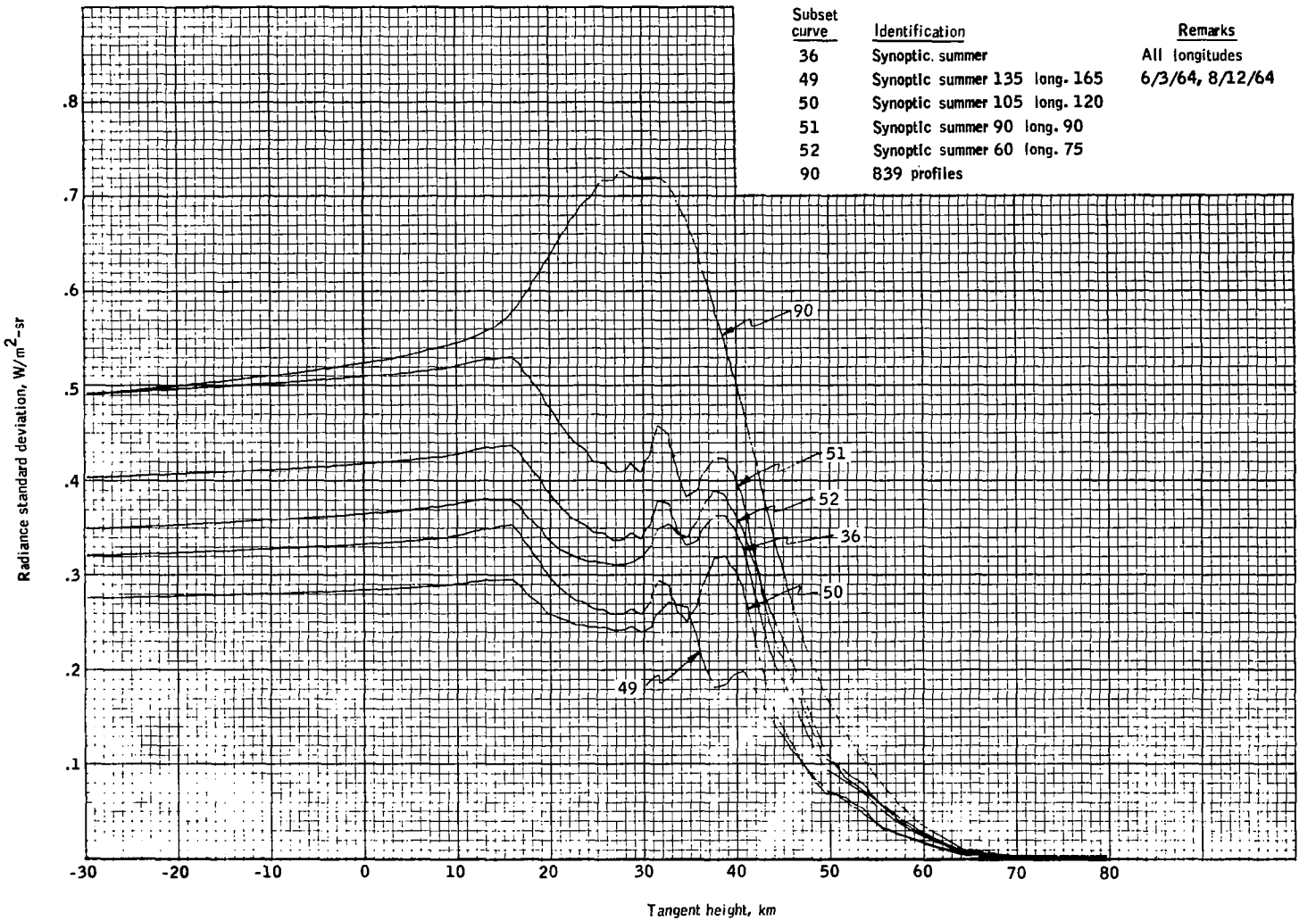


Figure A70. Radiance Standard Deviation versus Tangent Height, Set 18

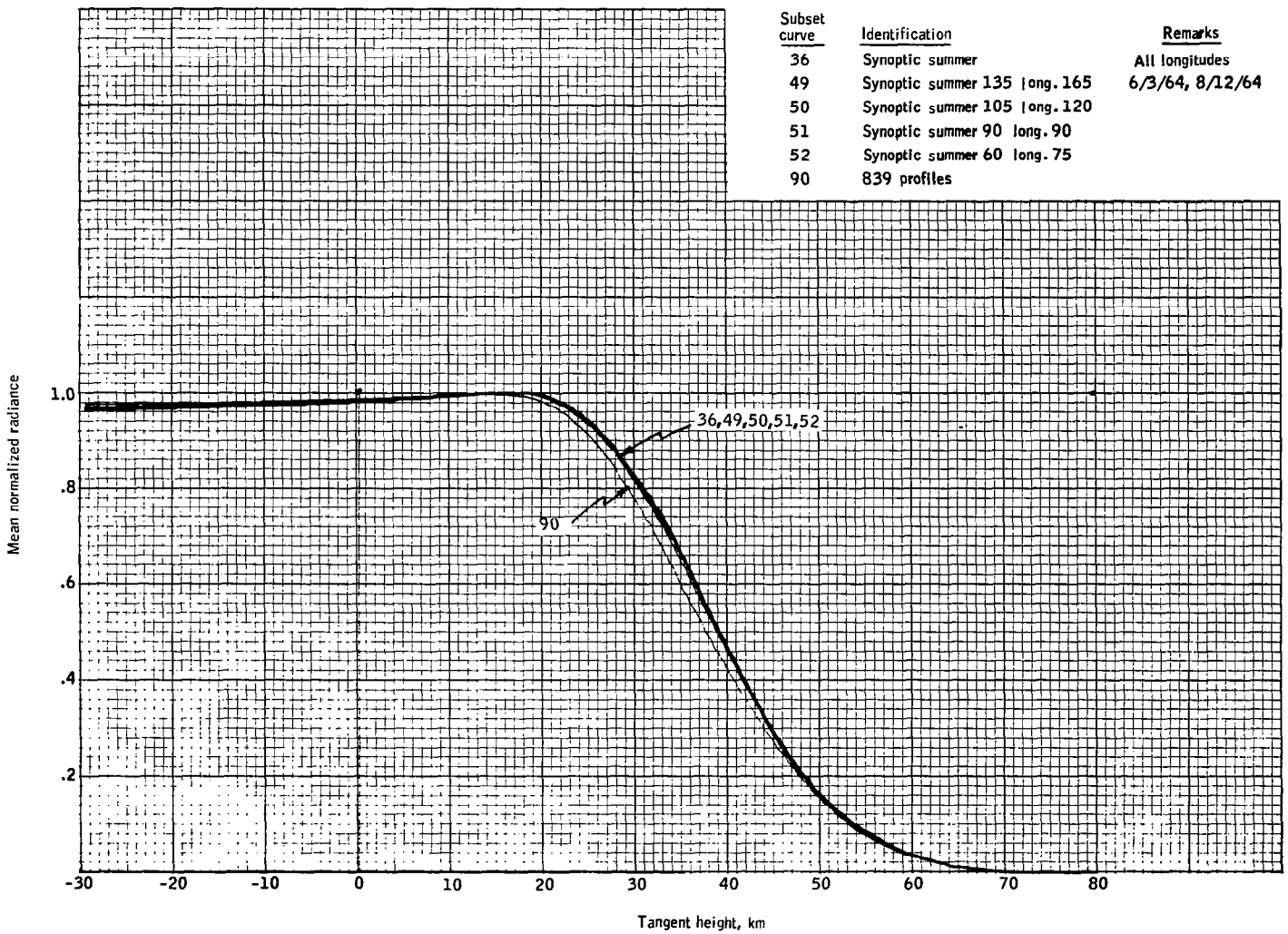


Figure A71. Mean Normalized Radiance versus Tangent Height, Set 18

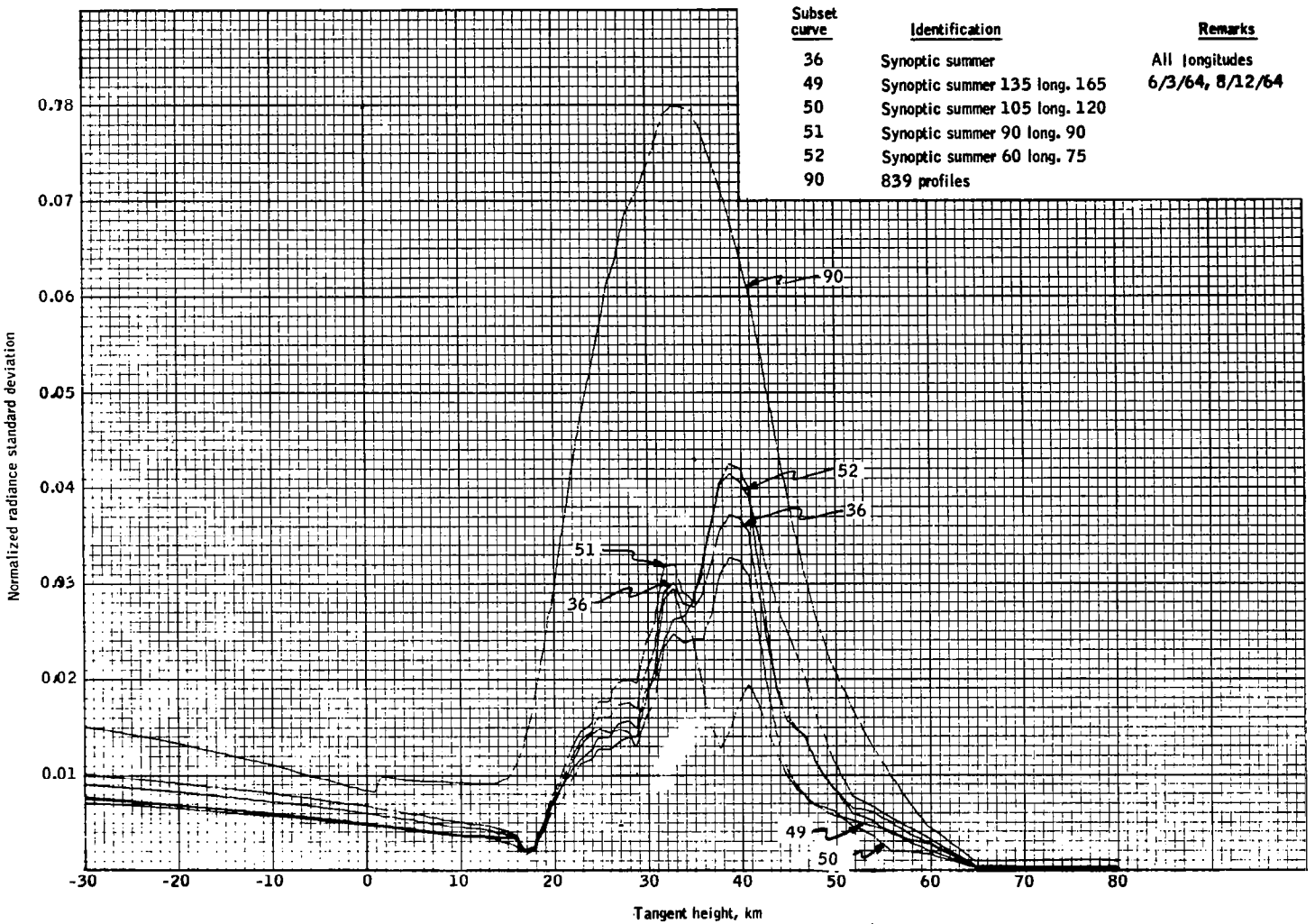


Figure A72. Normalized Radiance Standard Deviation versus Tangent Height, Set 18

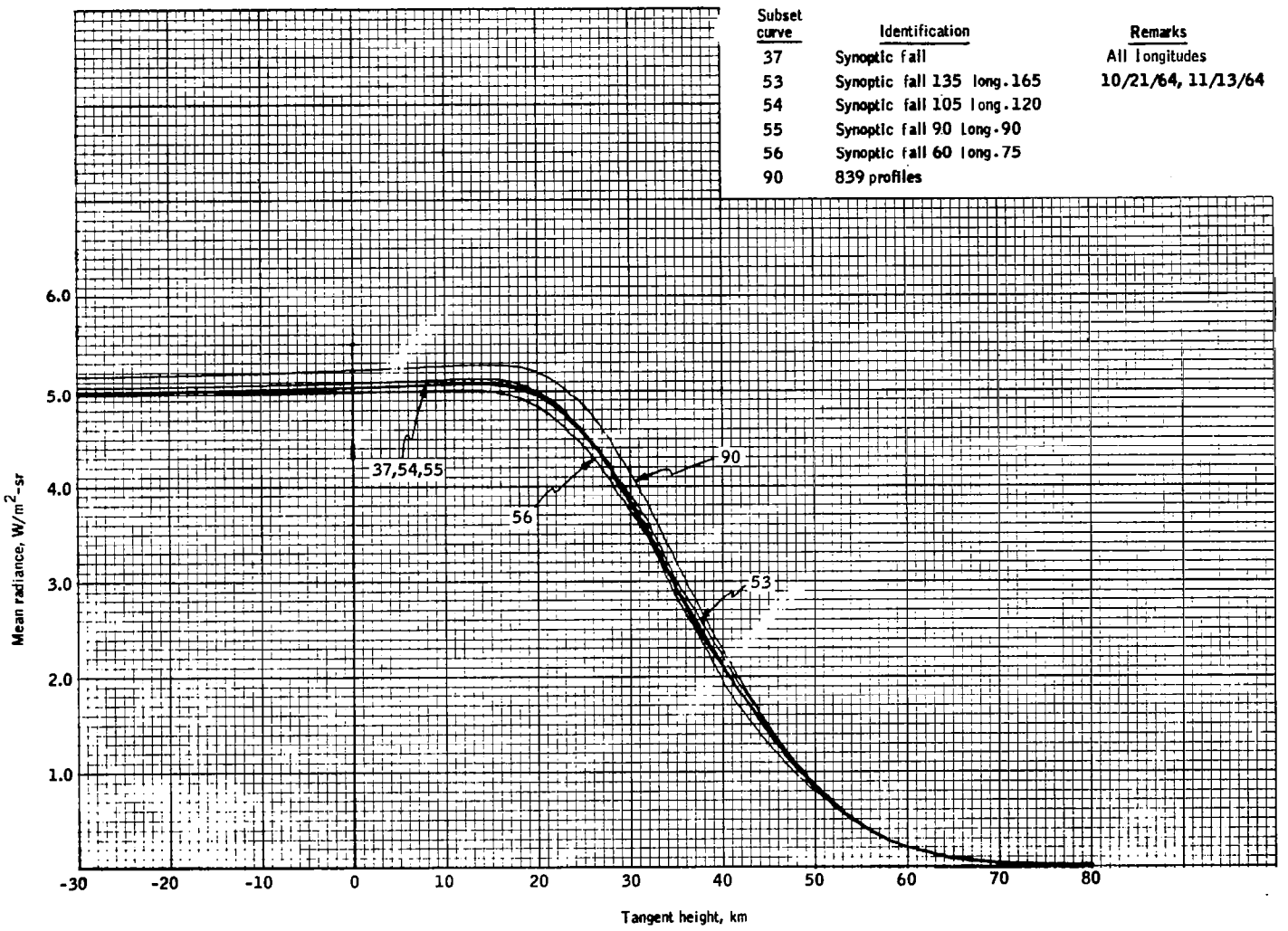


Figure A73. Mean Radiance versus Tangent Height, Set 19

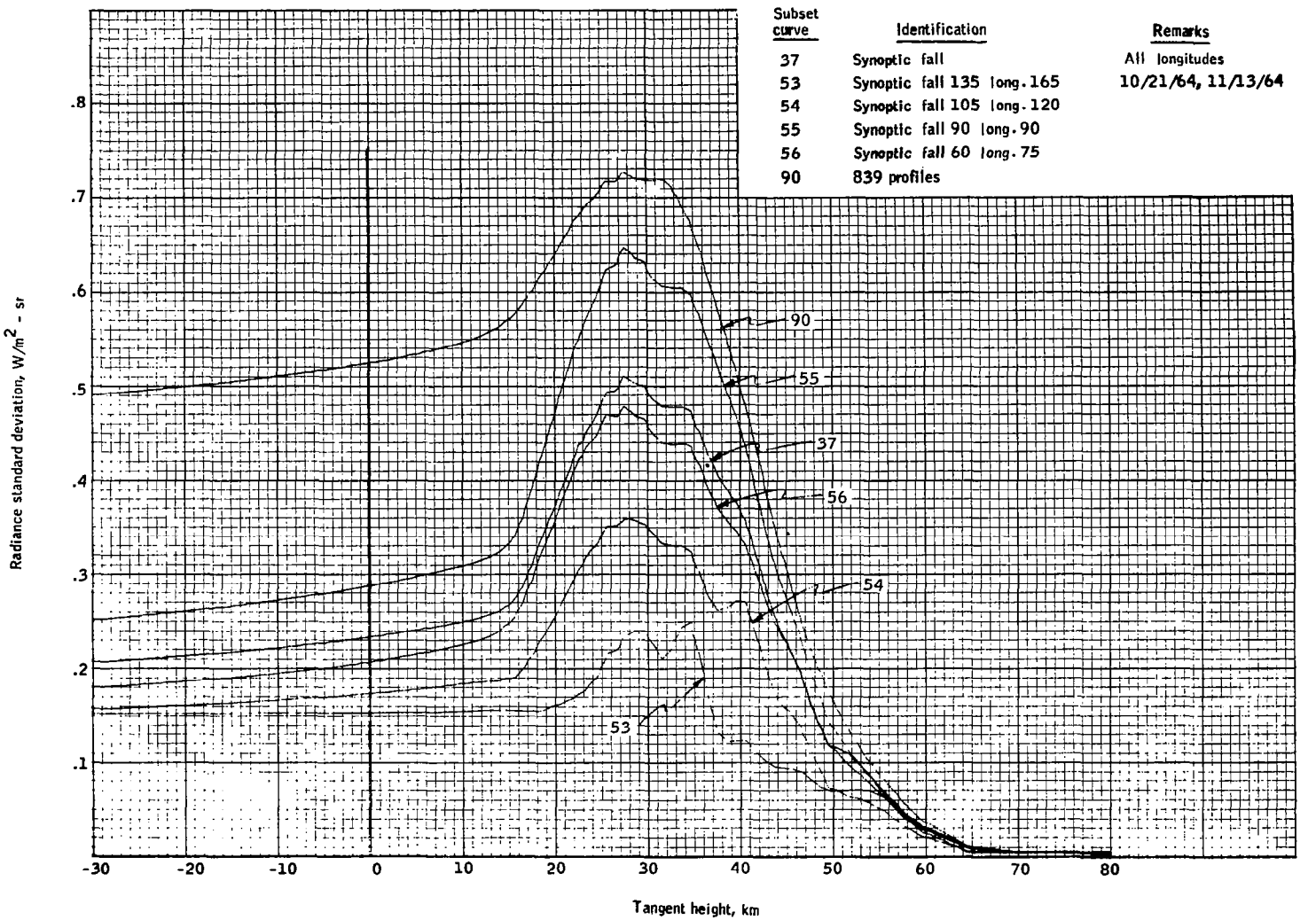


Figure A74. Radiance Standard Deviation versus Tangent Height, Set 19

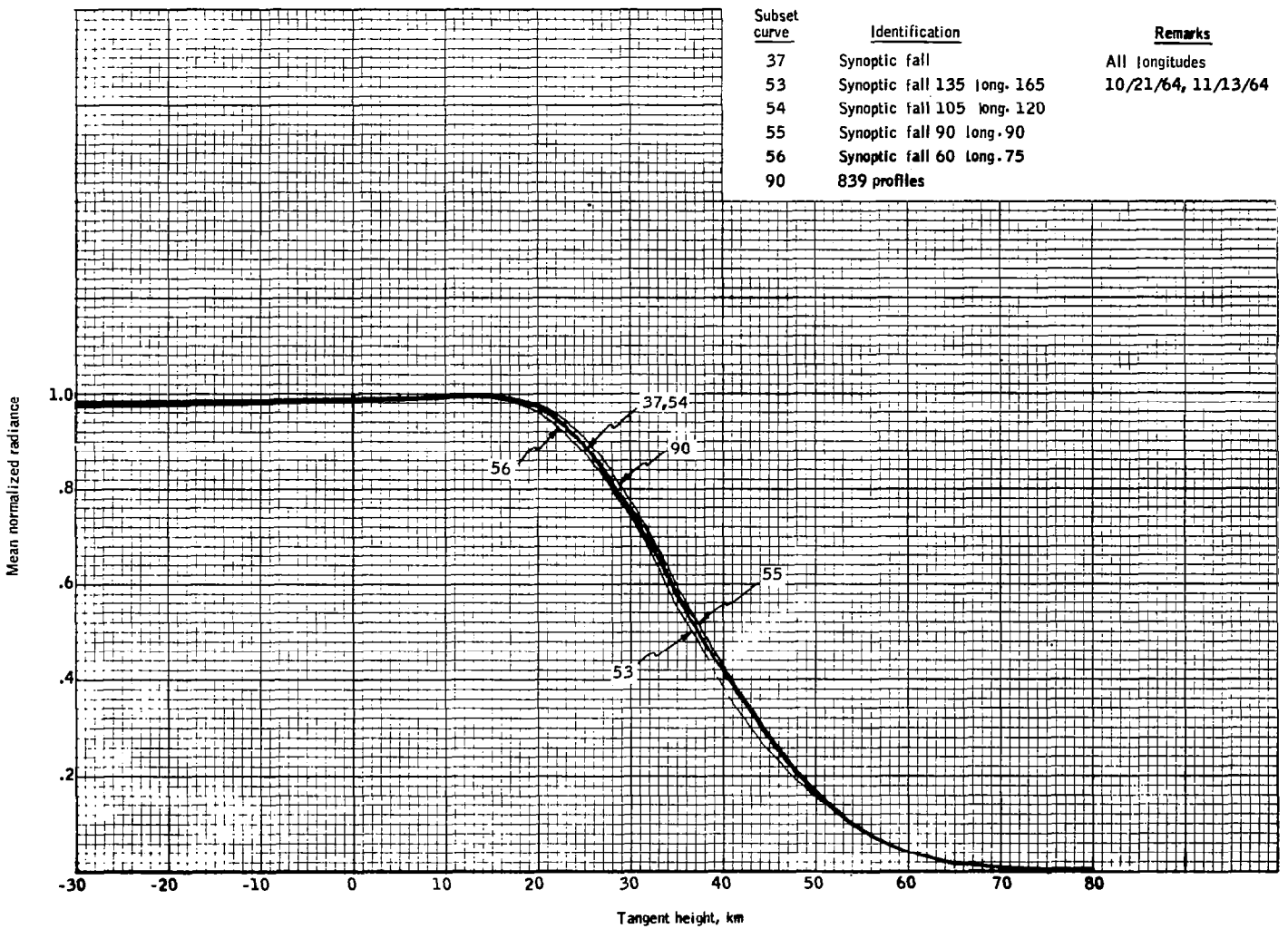


Figure A75. Mean Normalized Radiance versus Tangent Height, Set 19

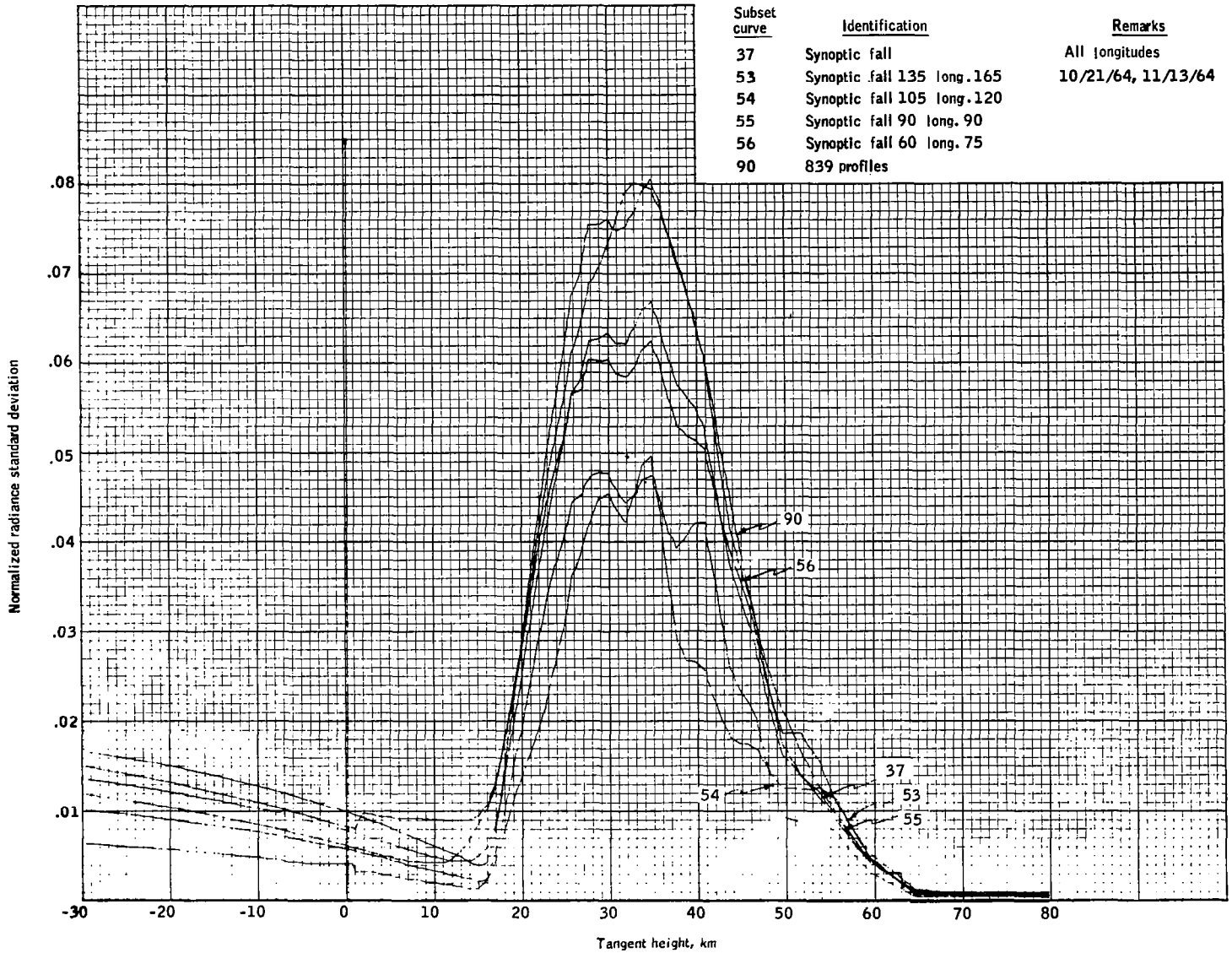


Figure A76. Normalized Radiance Standard Deviation versus Tangent Height, Set 19

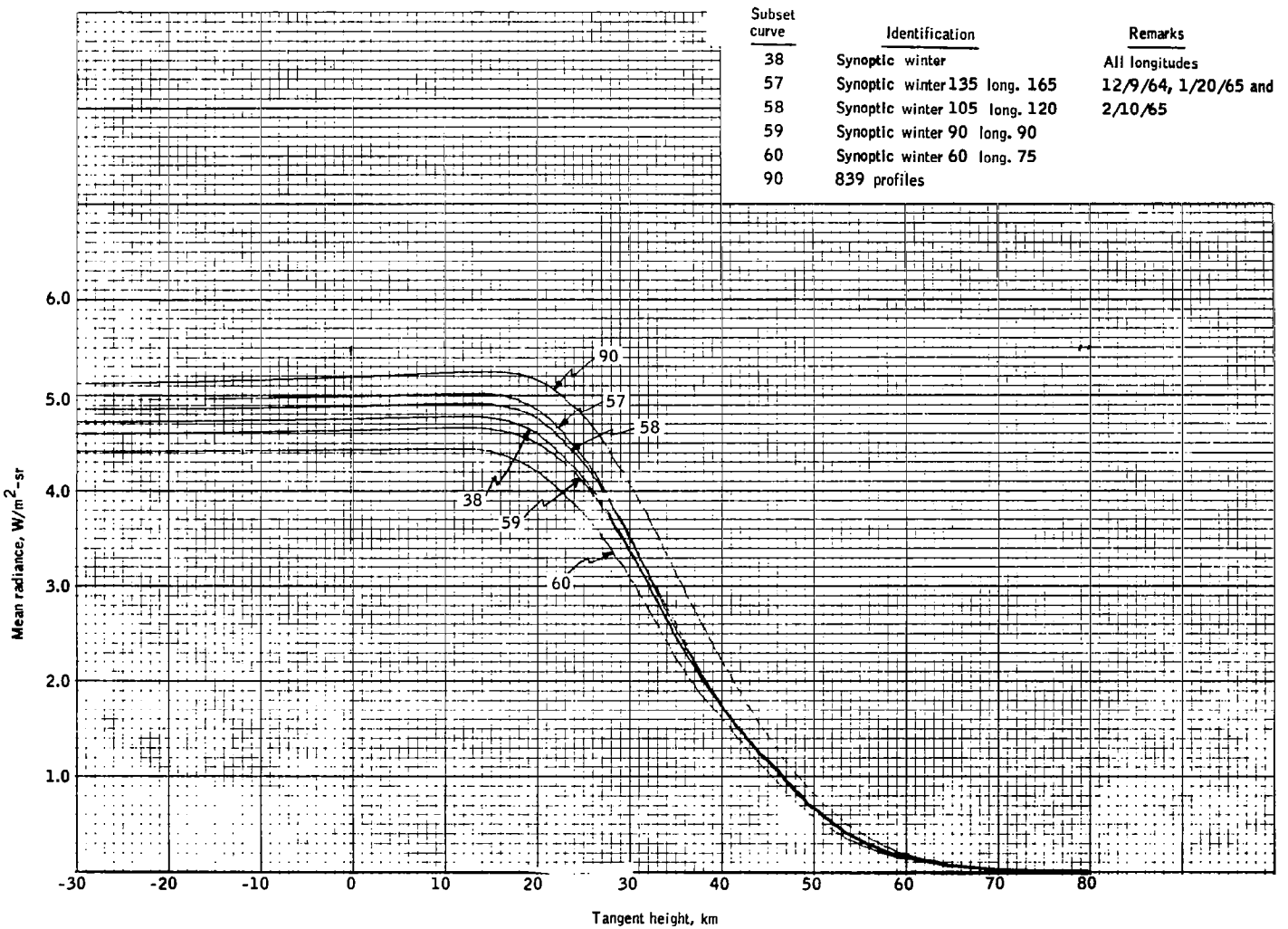


Figure A77. Mean Radiance versus Tangent Height, Set 20

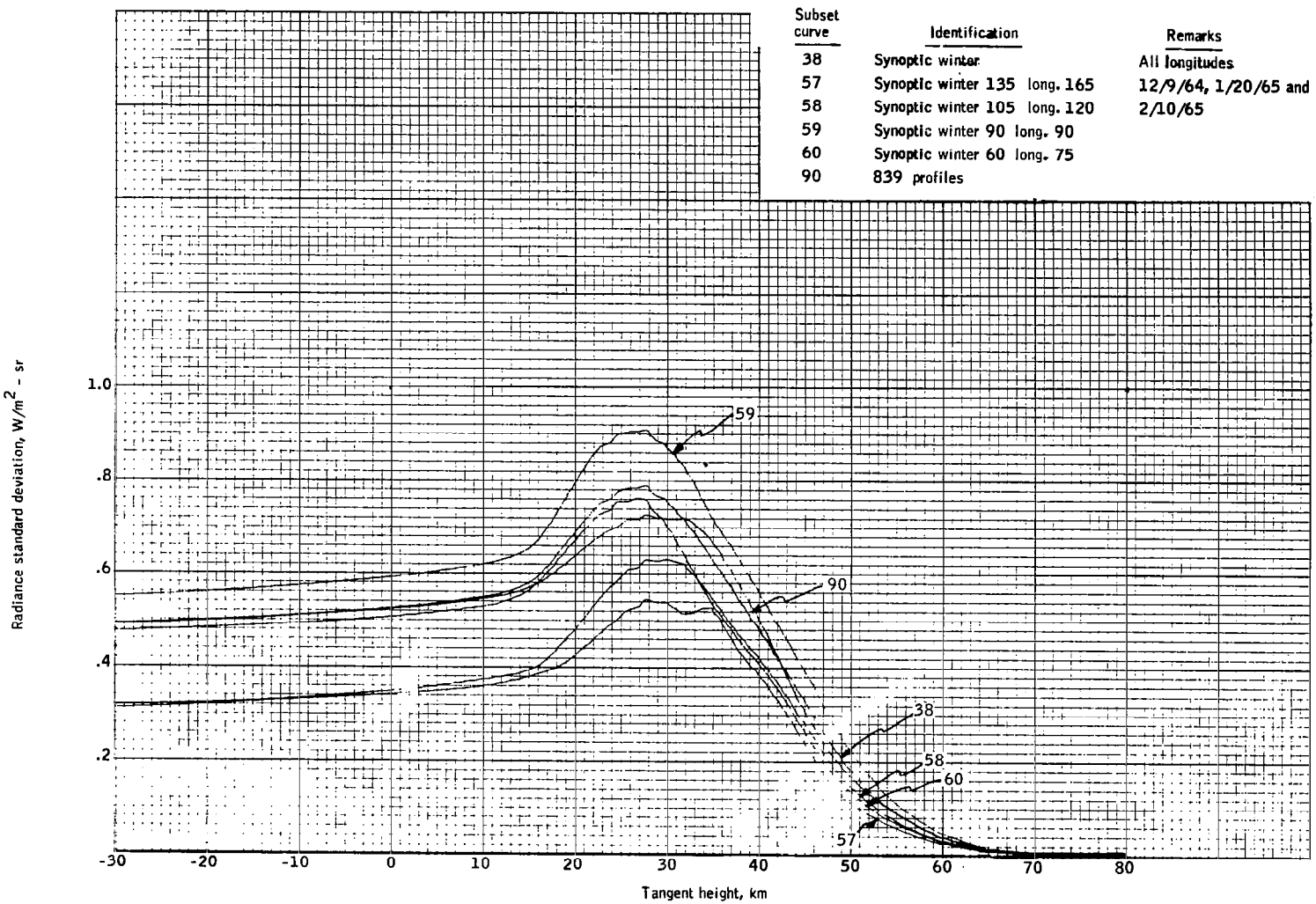


Figure A78. Radiance Standard Deviation versus Tangent Height, Set 20

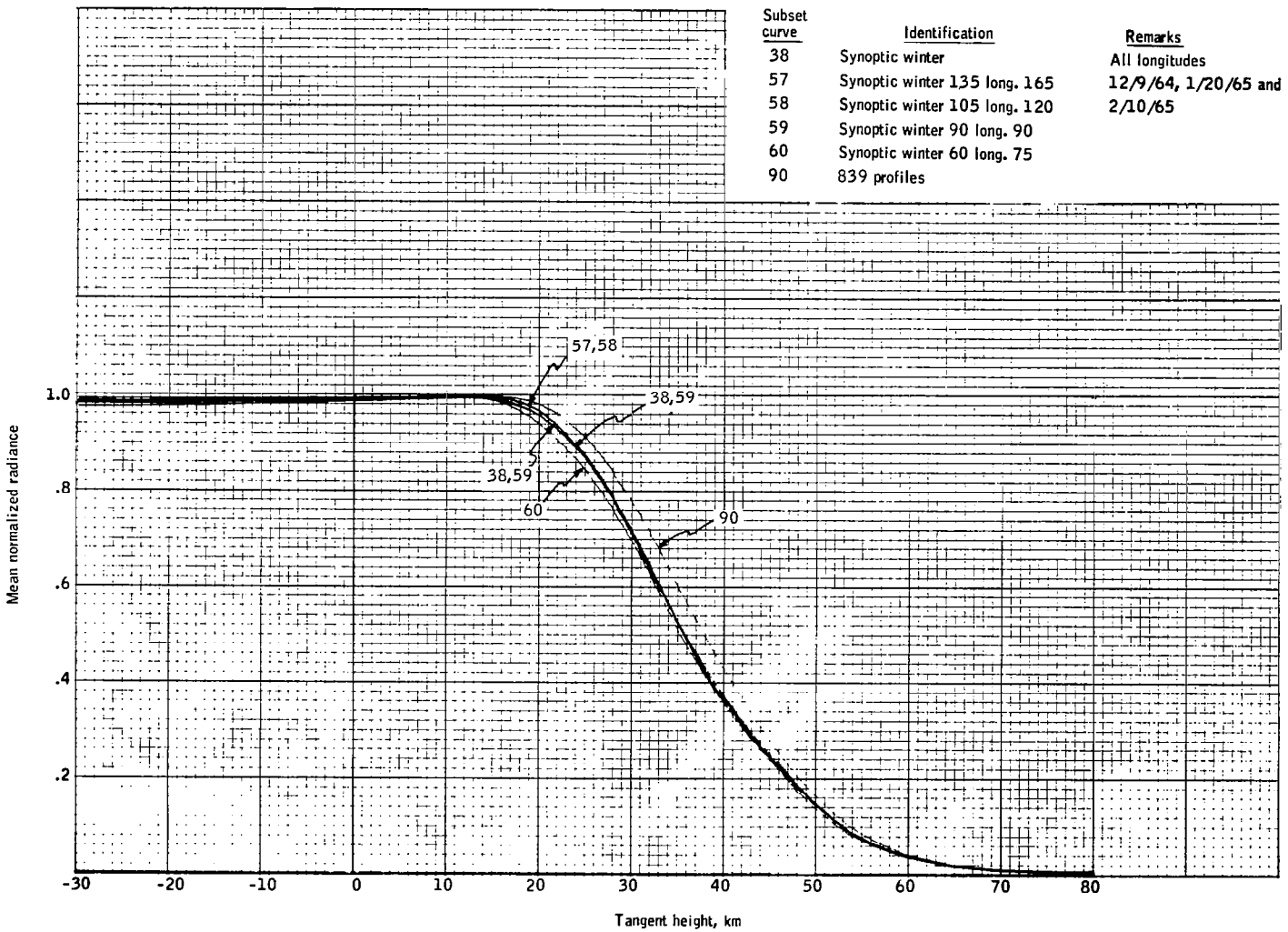


Figure A79. Mean Normalized Radiance versus Tangent Height, Set 20

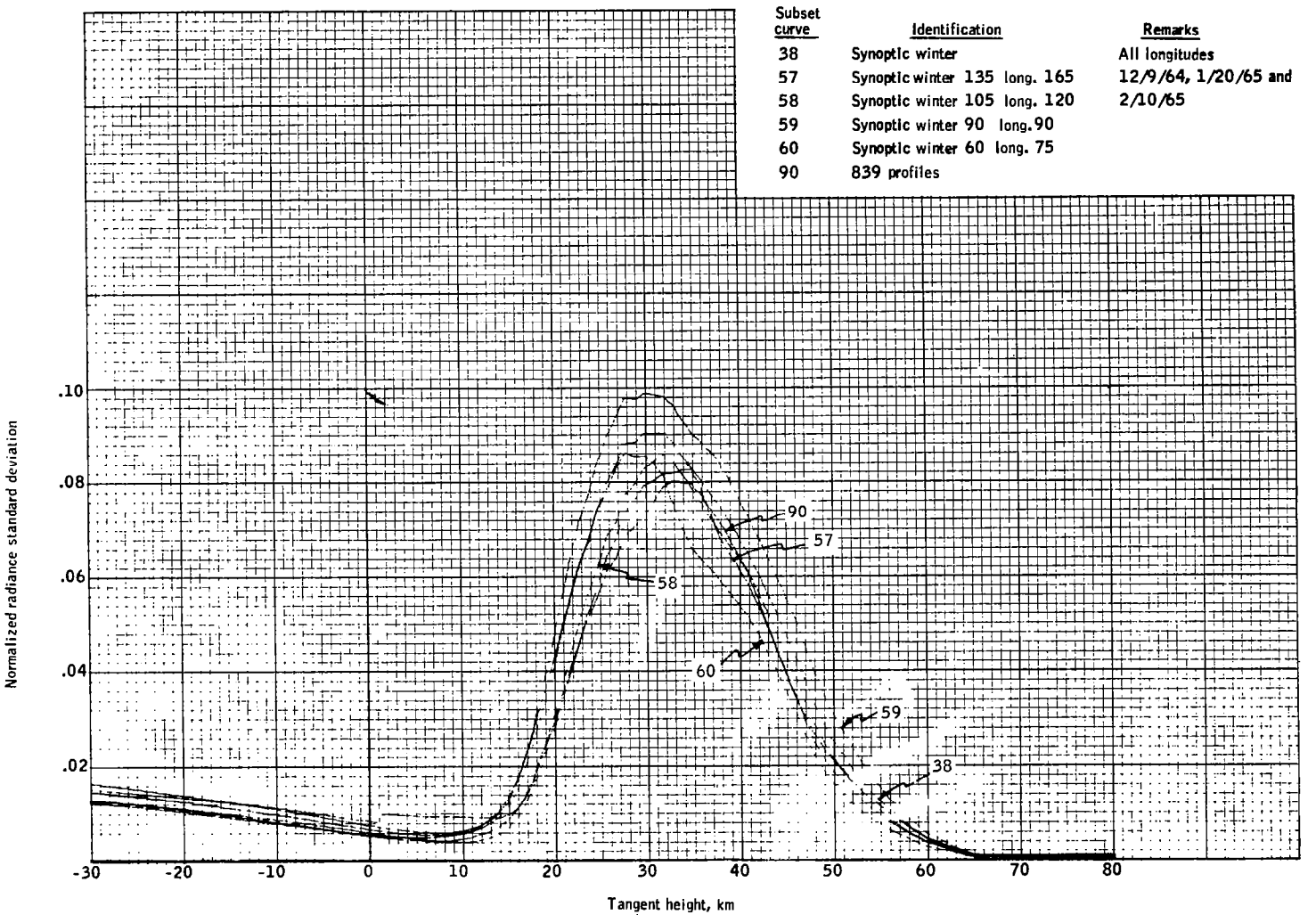


Figure A80. Normalized Radiance Standard Deviation versus Tangent Height, Set 20

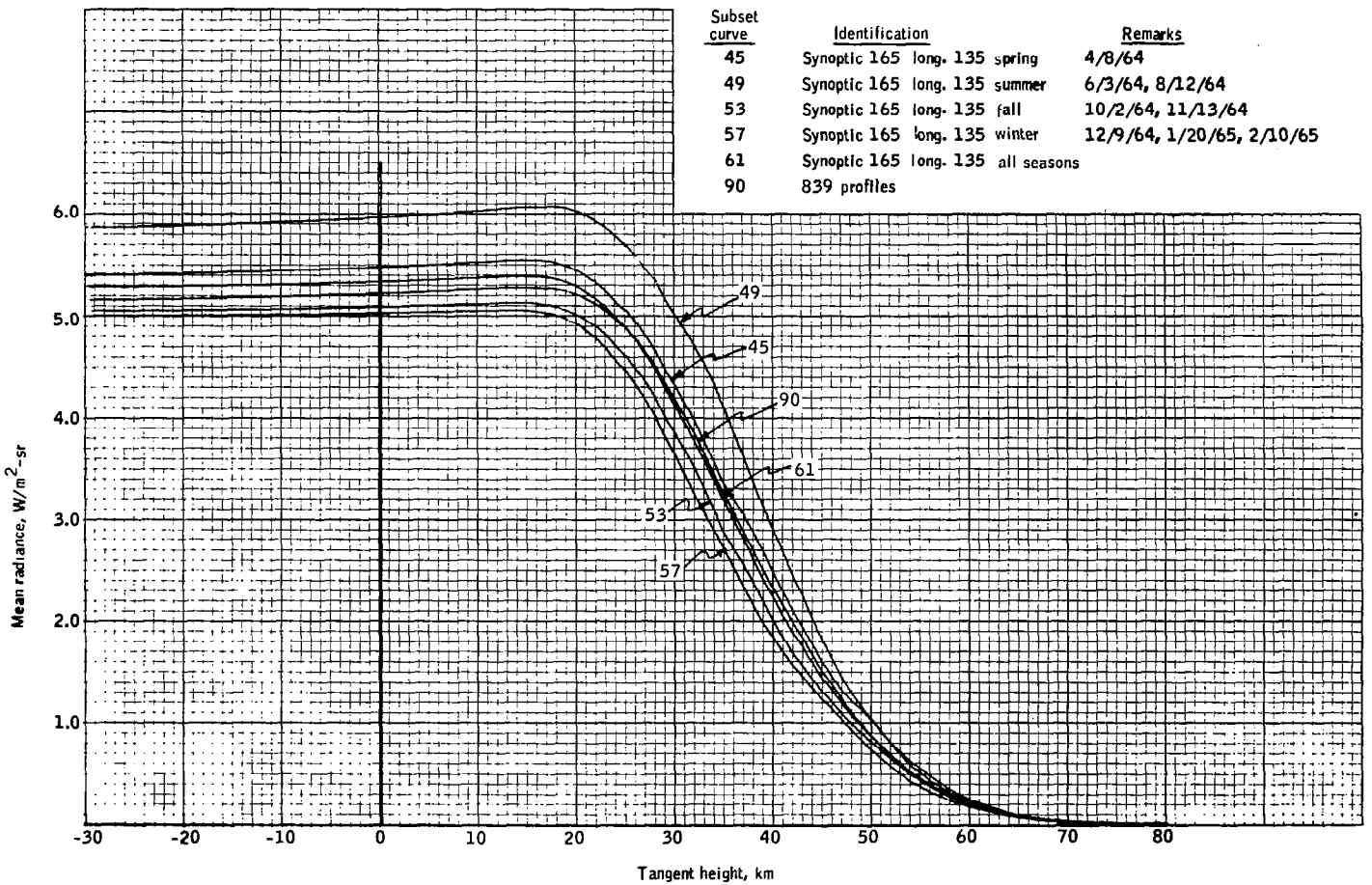


Figure A81. Mean Radiance versus Tangent Height, Set 21

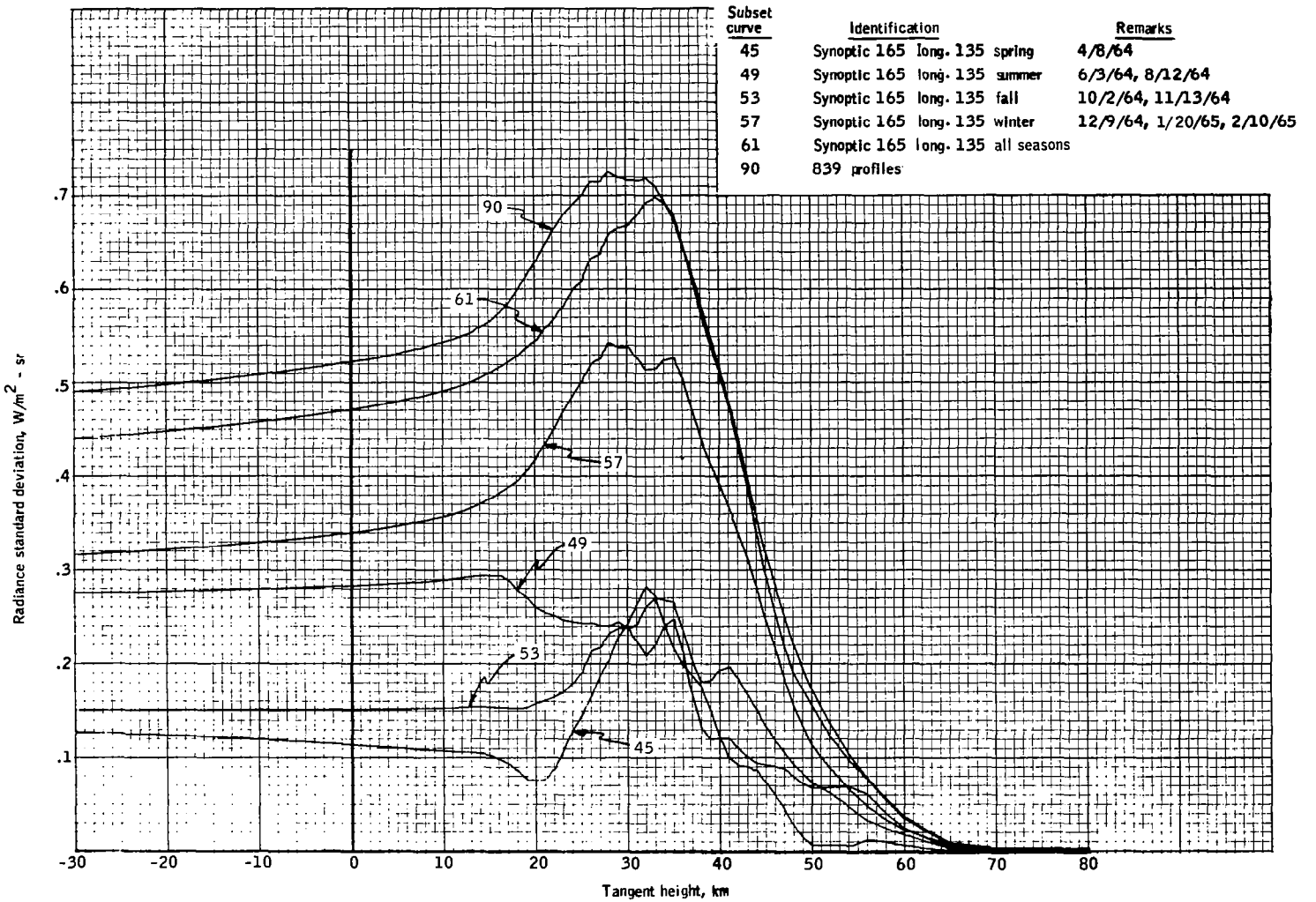


Figure A82. Radiance Standard Deviation versus Tangent Height, Set 21

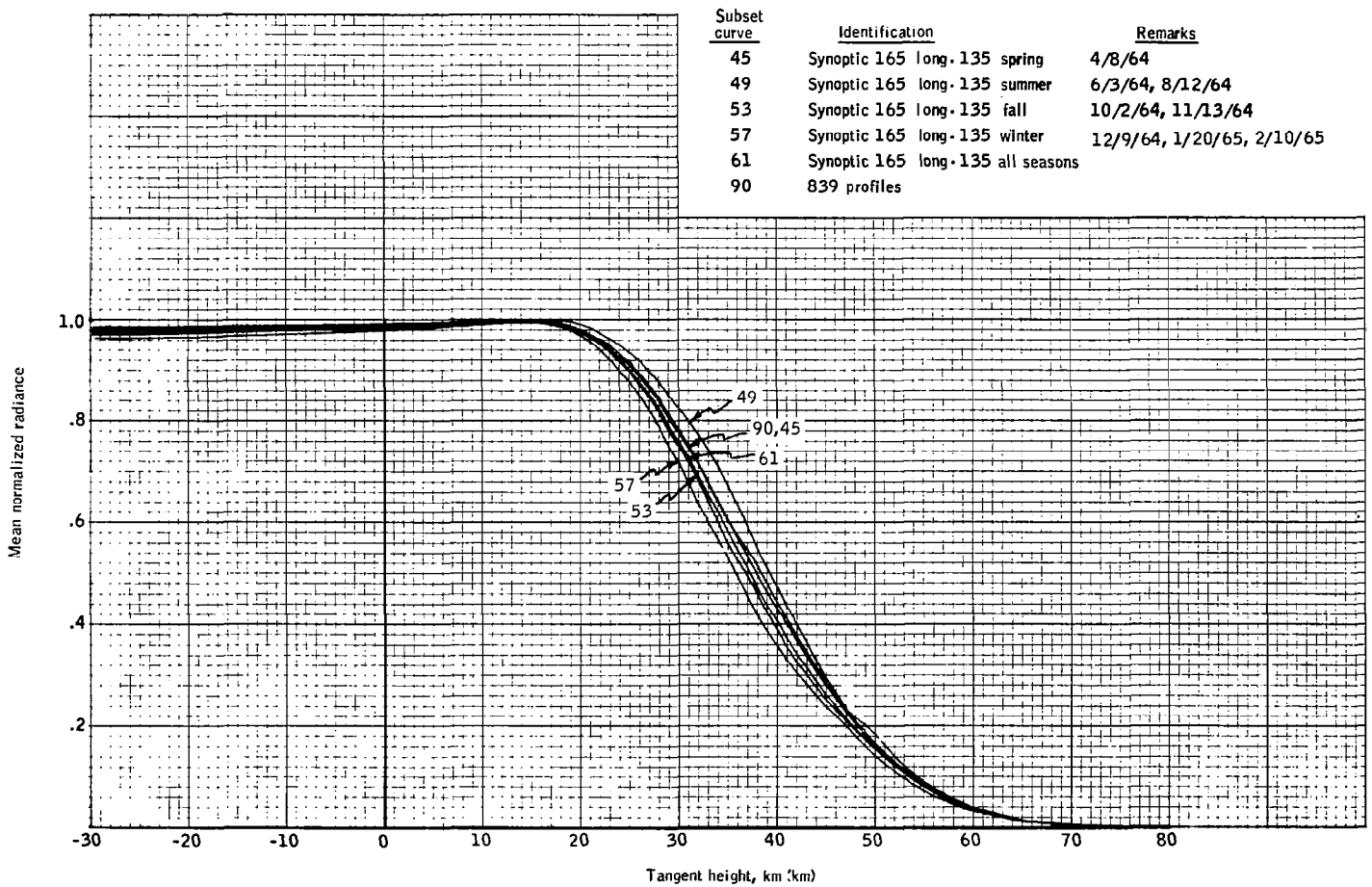


Figure A83. Mean Normalized Radiance versus Tangent Height, Set 21

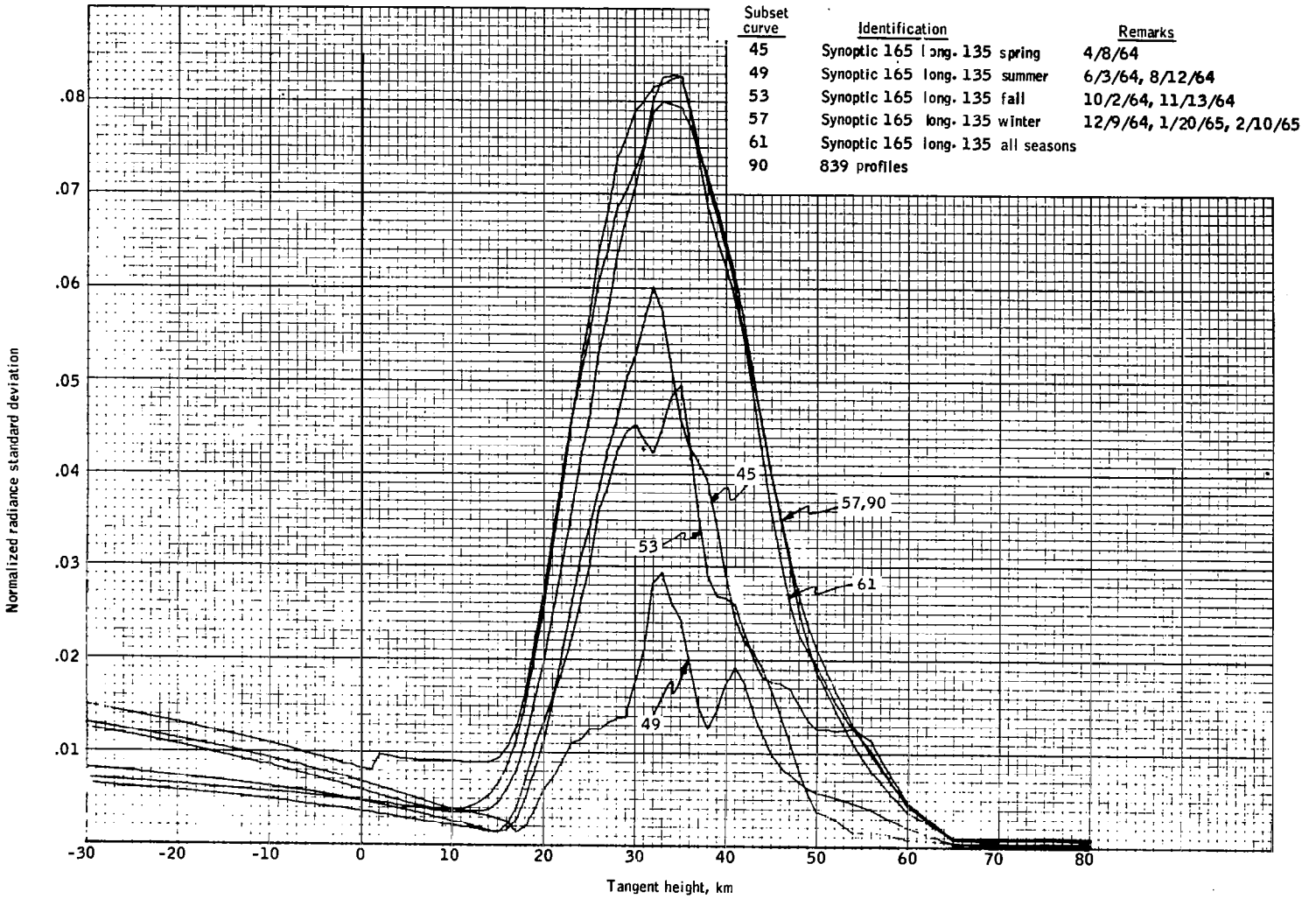


Figure A84. Normalized Radiance Standard Deviation versus Tangent Height, Set 21

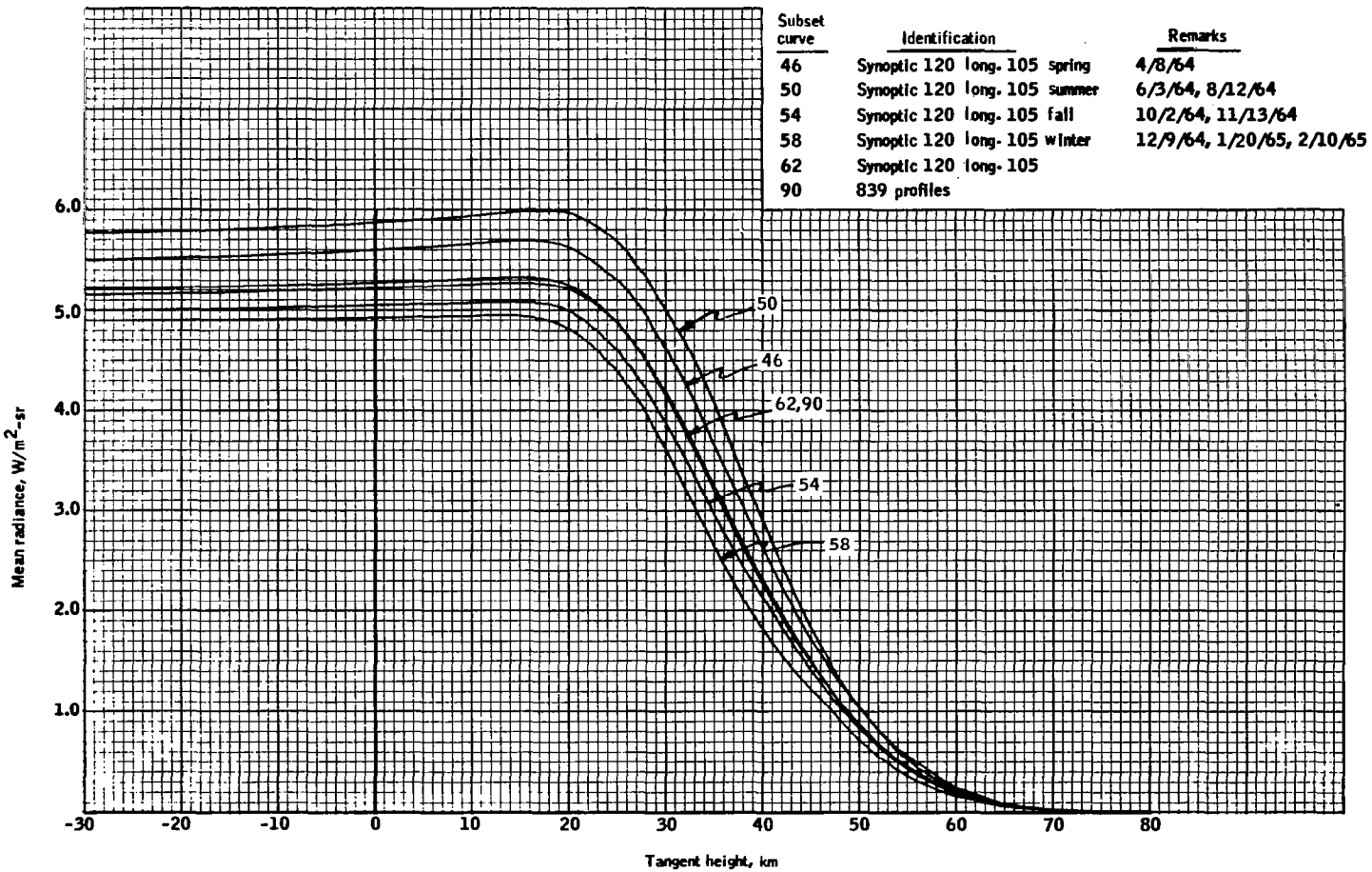


Figure A85. Mean Radiance versus Tangent Height, Set 22

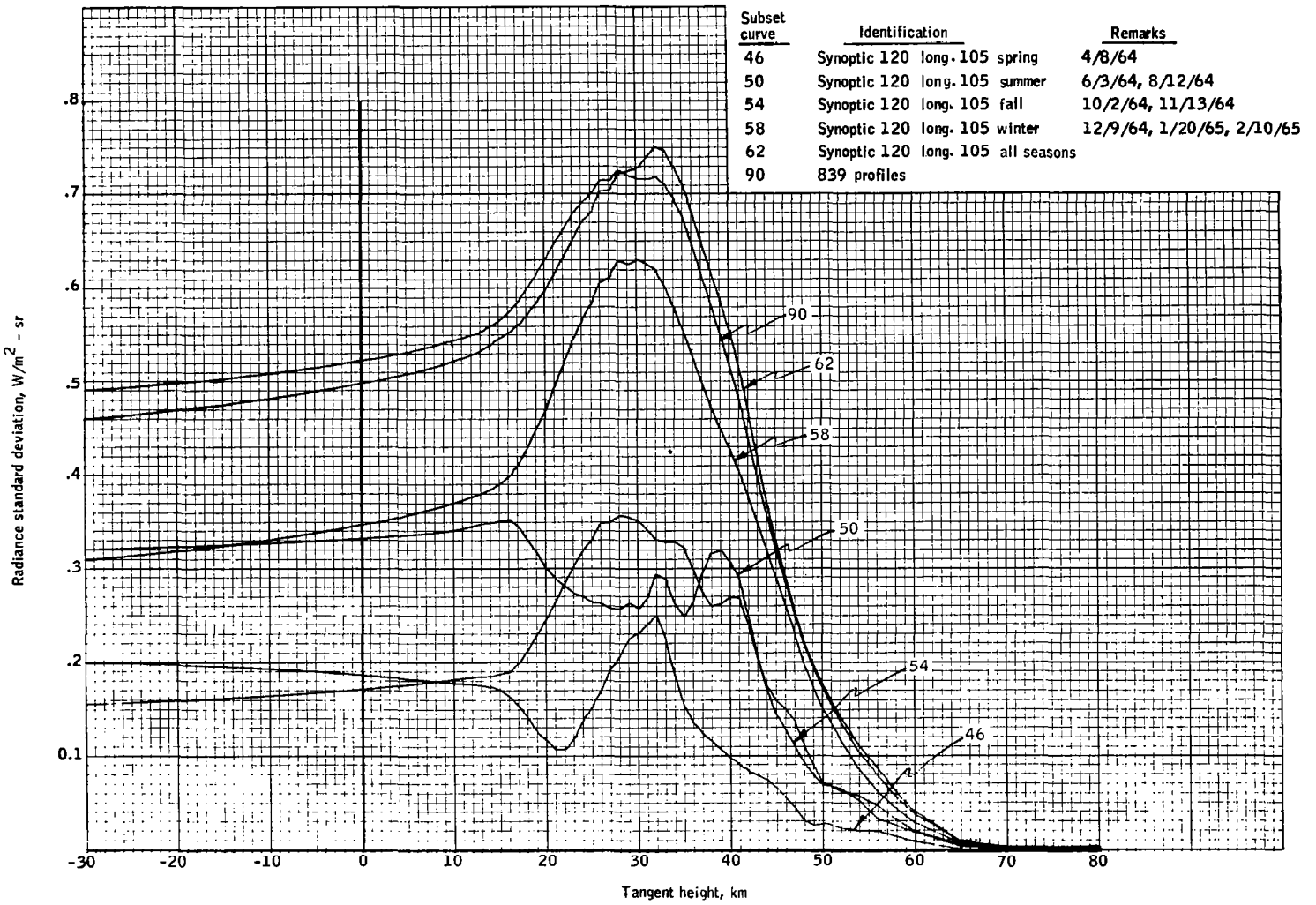


Figure A86. Radiance Standard Deviation versus Tangent Height, Set 22

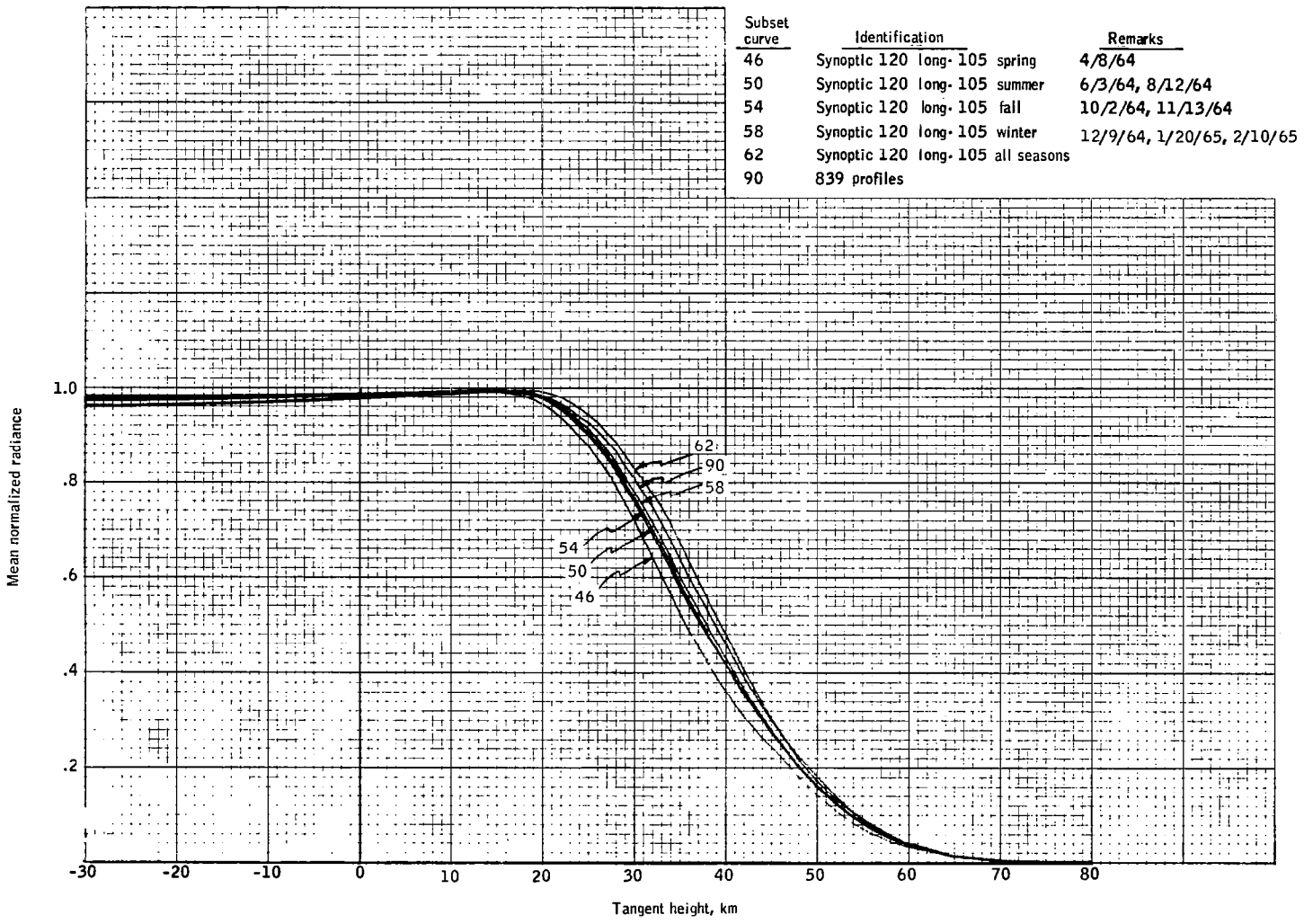


Figure A87. Mean Normalized Radiance versus Tangent Height, Set 22

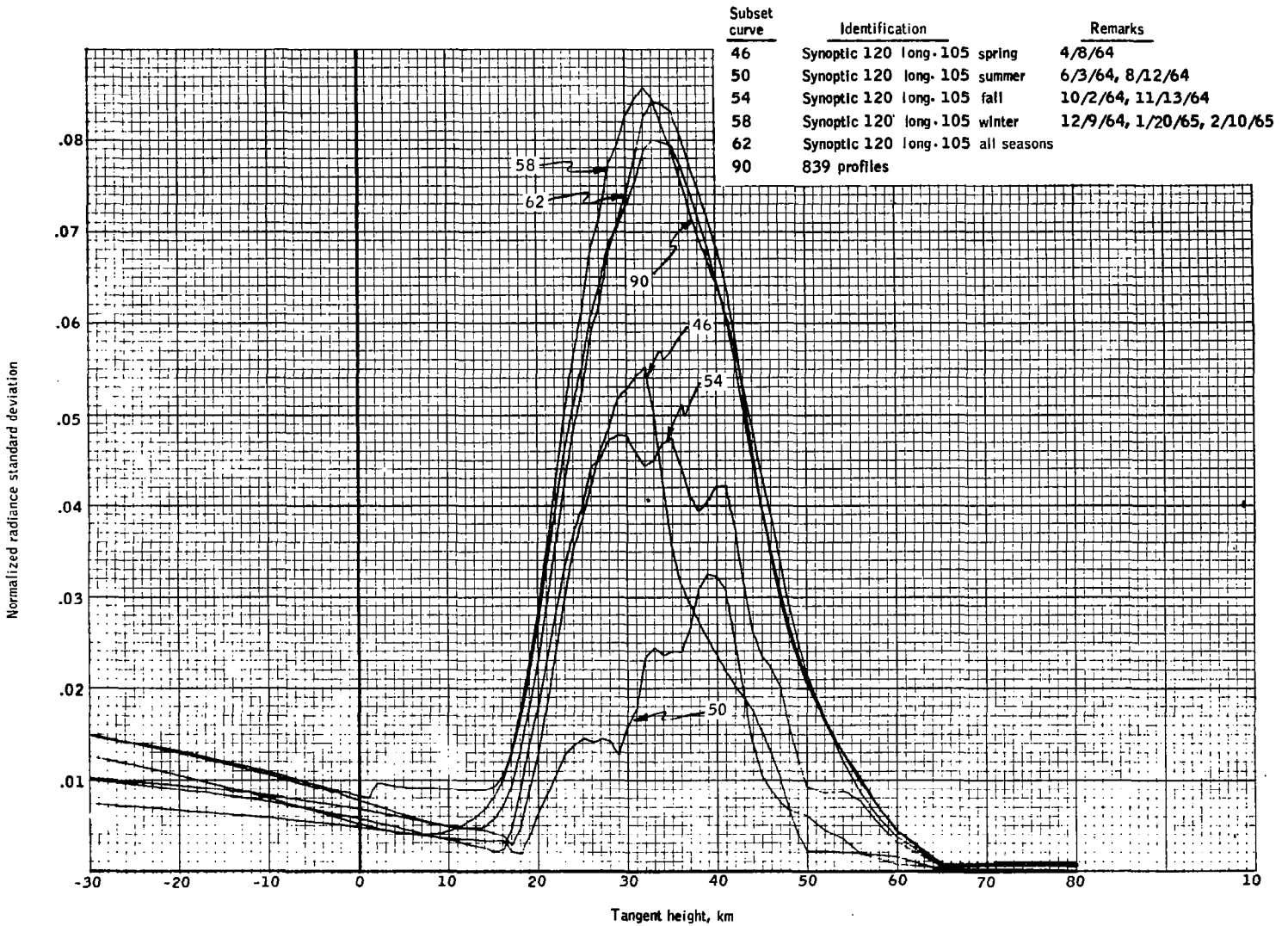


Figure A88. Normalized Radiance Standard Deviation versus Tangent Height, Set 22

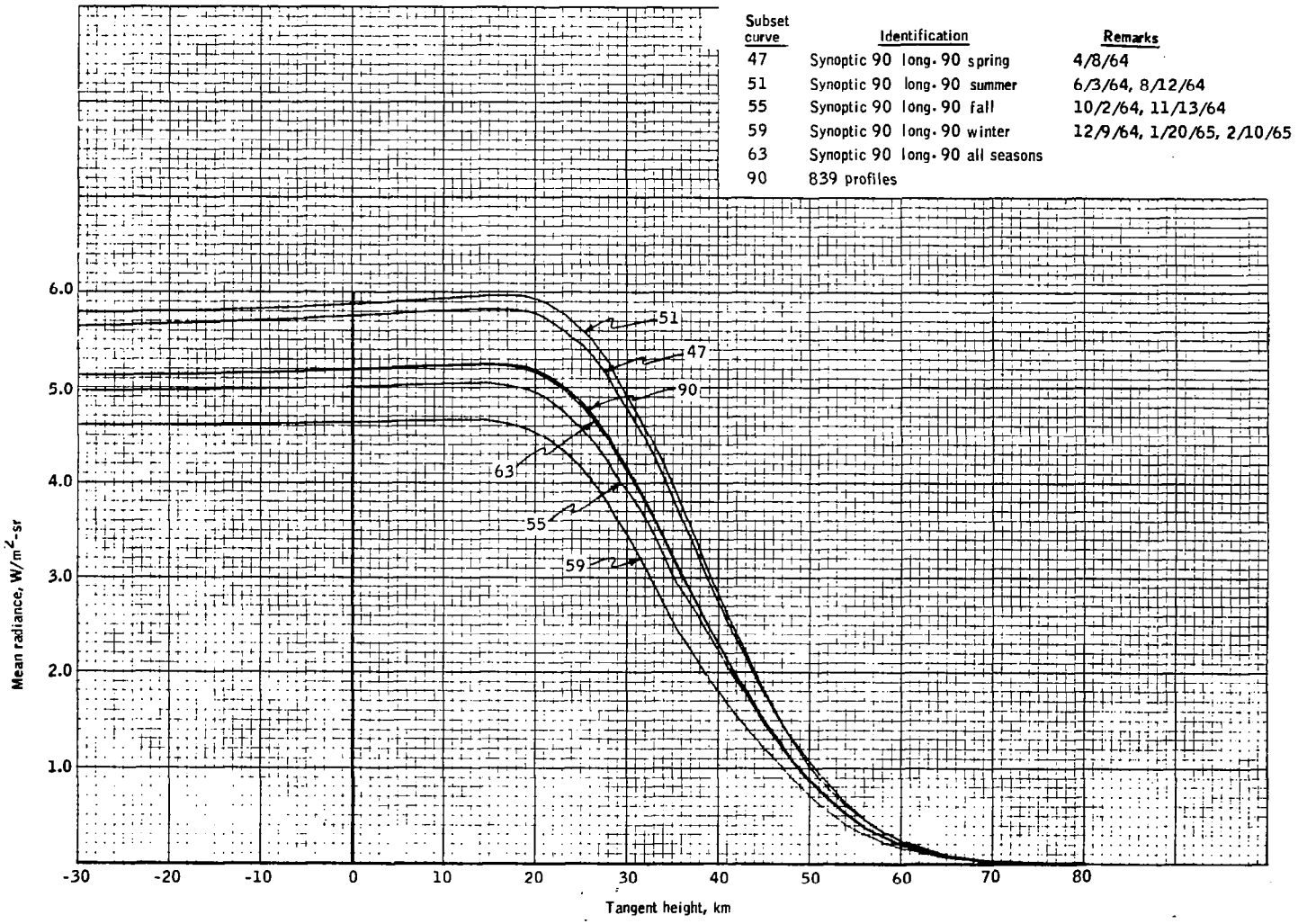


Figure A89. Mean Radiance versus Tangent Height, Set 23

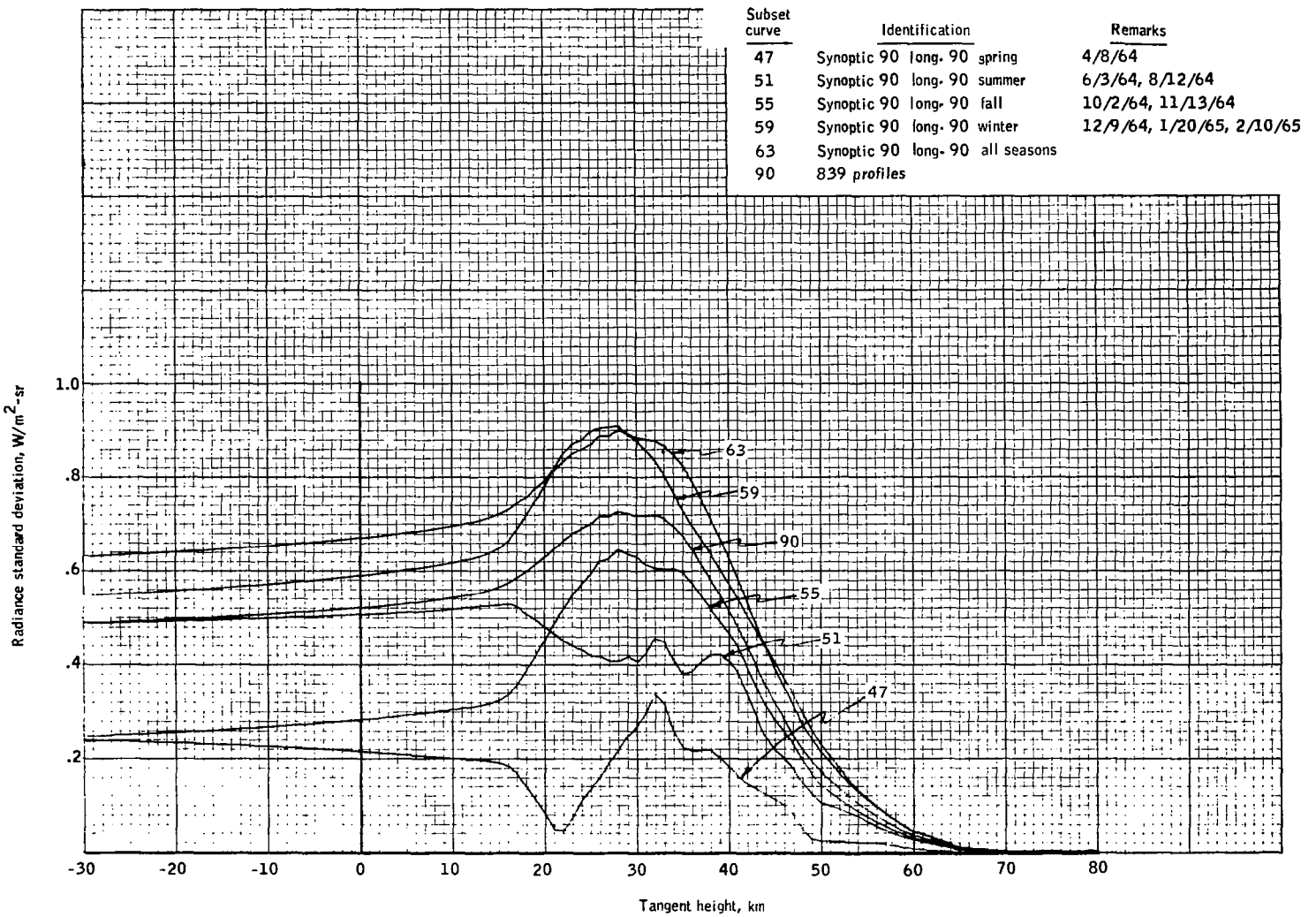


Figure A90. Radiance Standard Deviation versus Tangent Height, Set 23

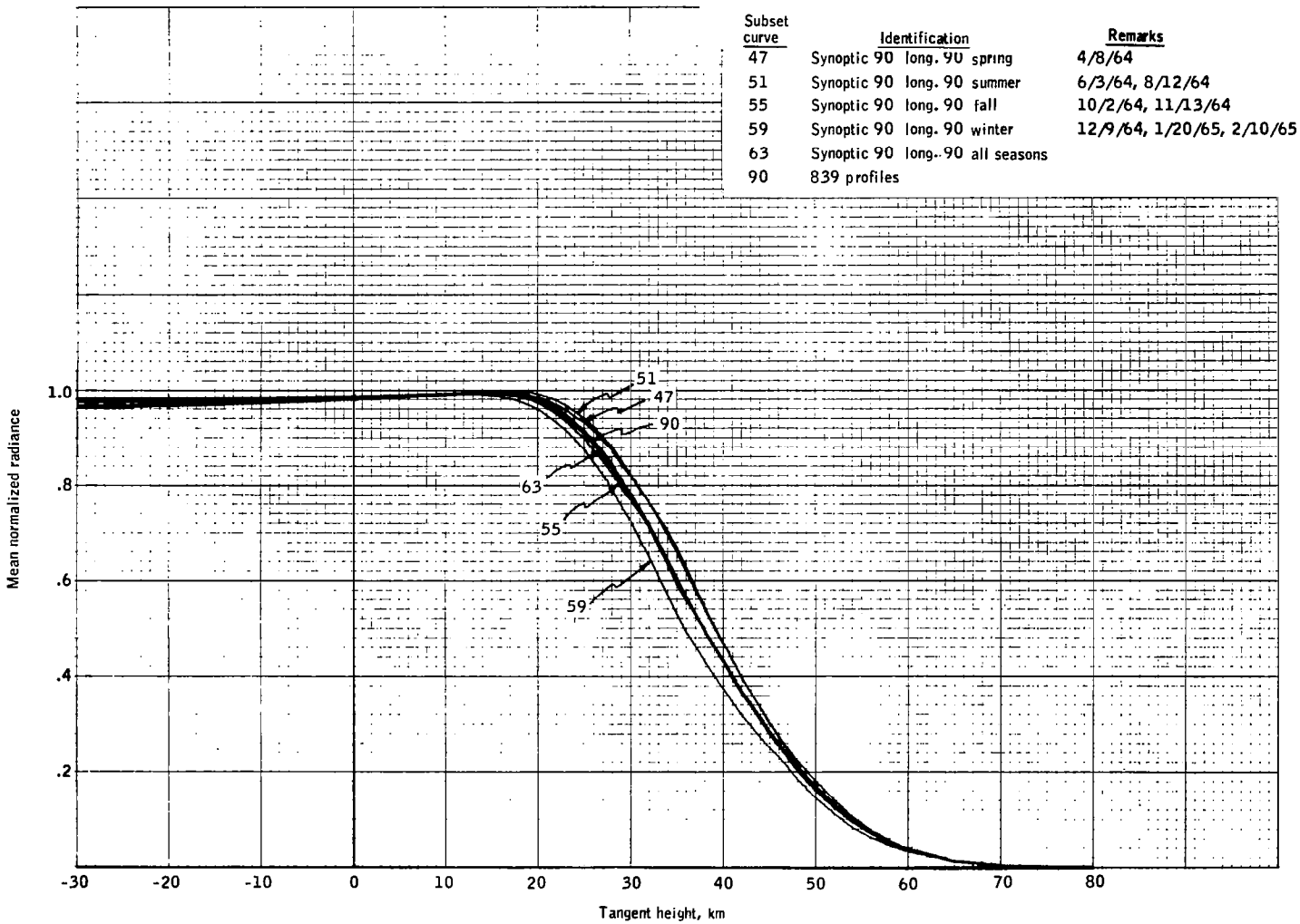


Figure A91. Mean Normalized Radiance versus Tangent Height, Set 23

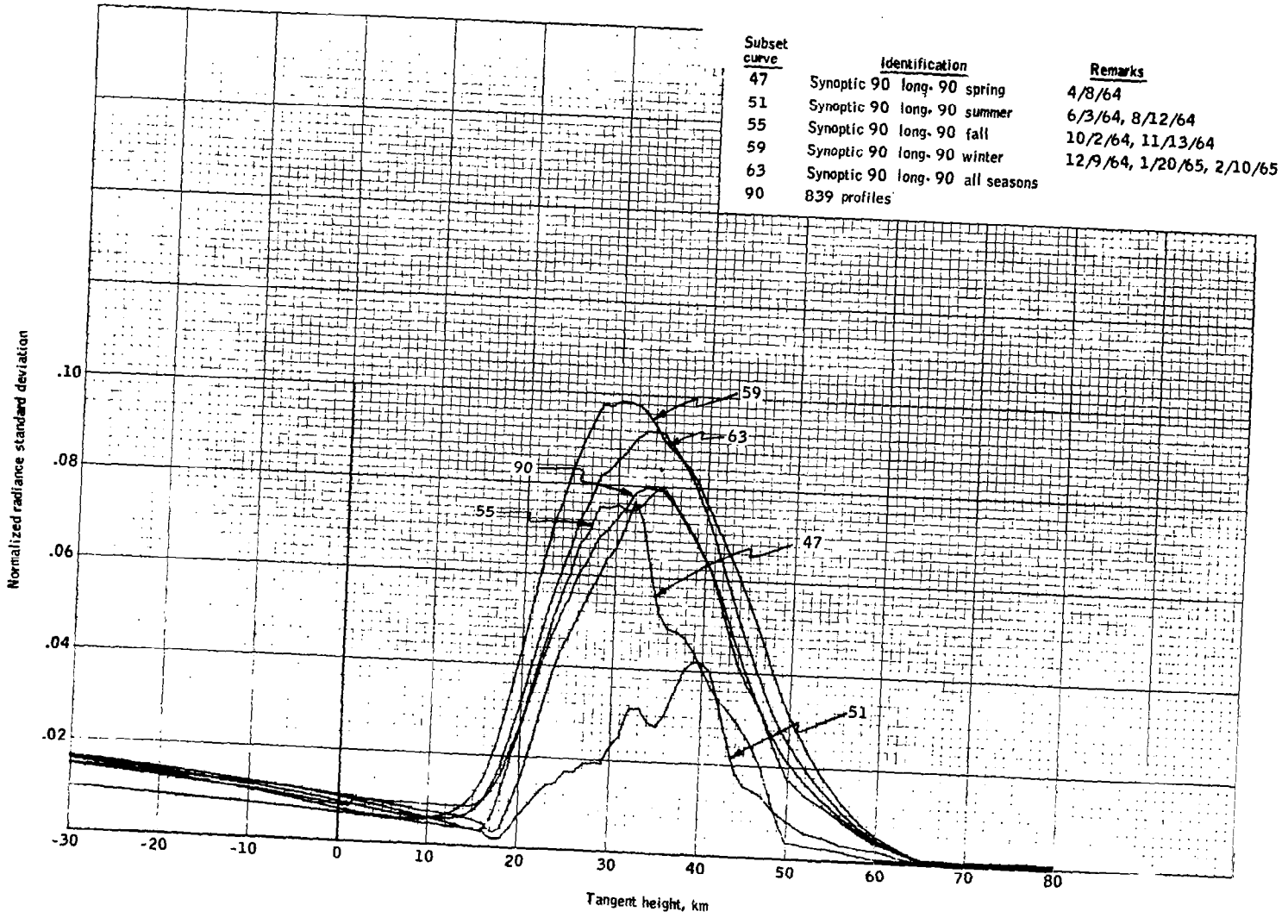


Figure A92. Normalized Radiance Standard Deviation versus Tangent Height, Set 23

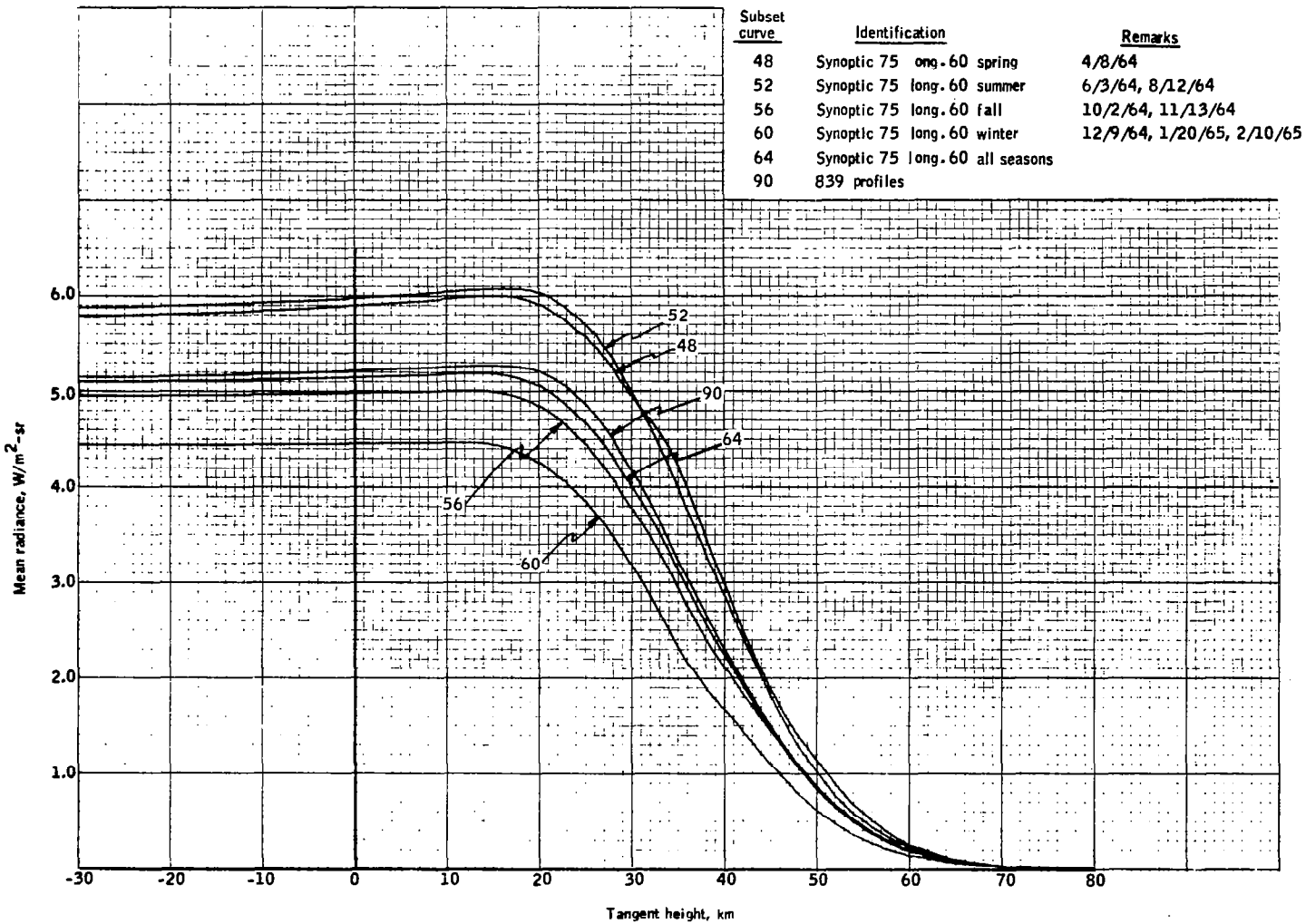


Figure A93. Mean Radiance versus Tangent Height, Set 24

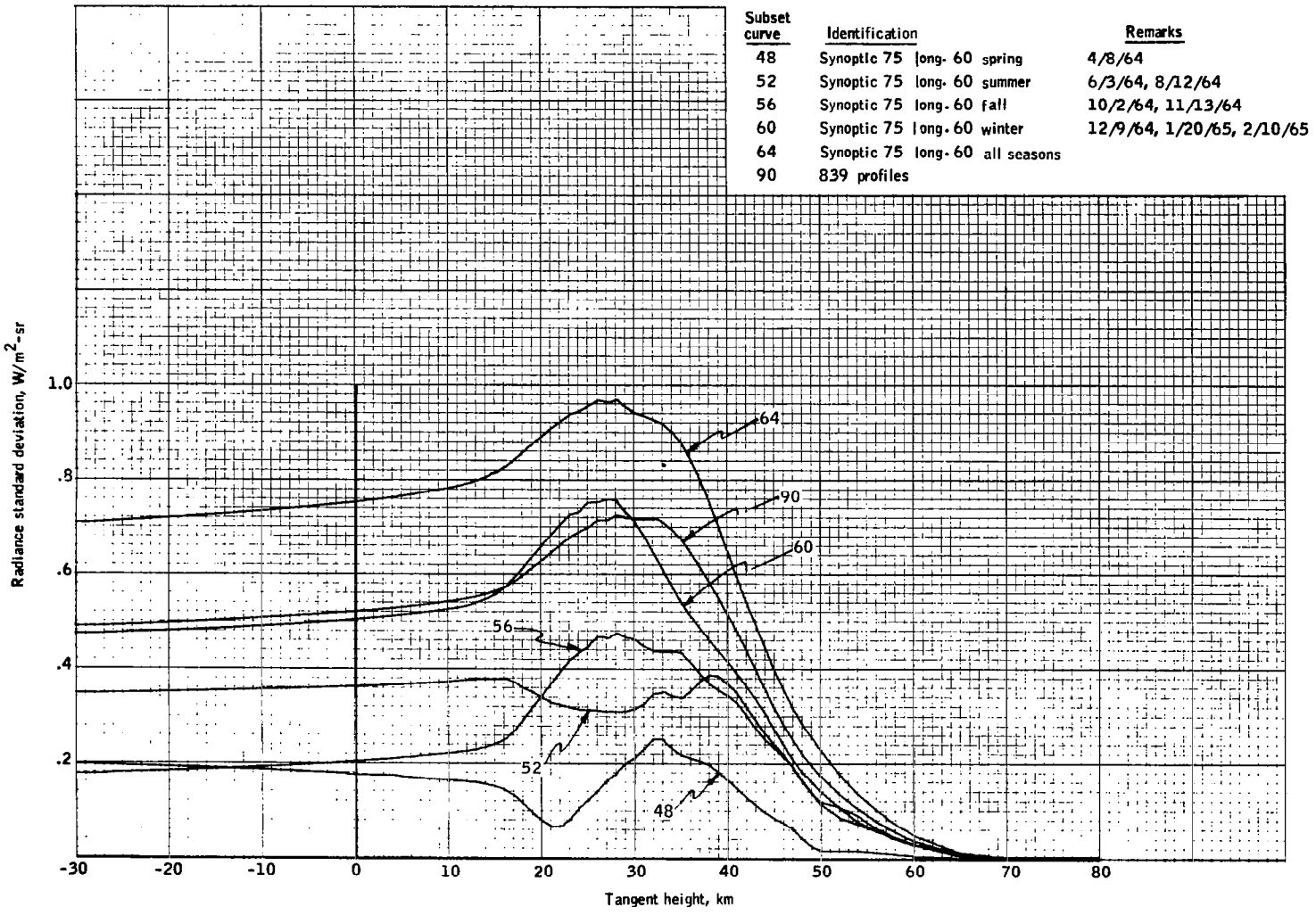


Figure A94. Radiance Standard Deviation versus Tangent Height, Set 24

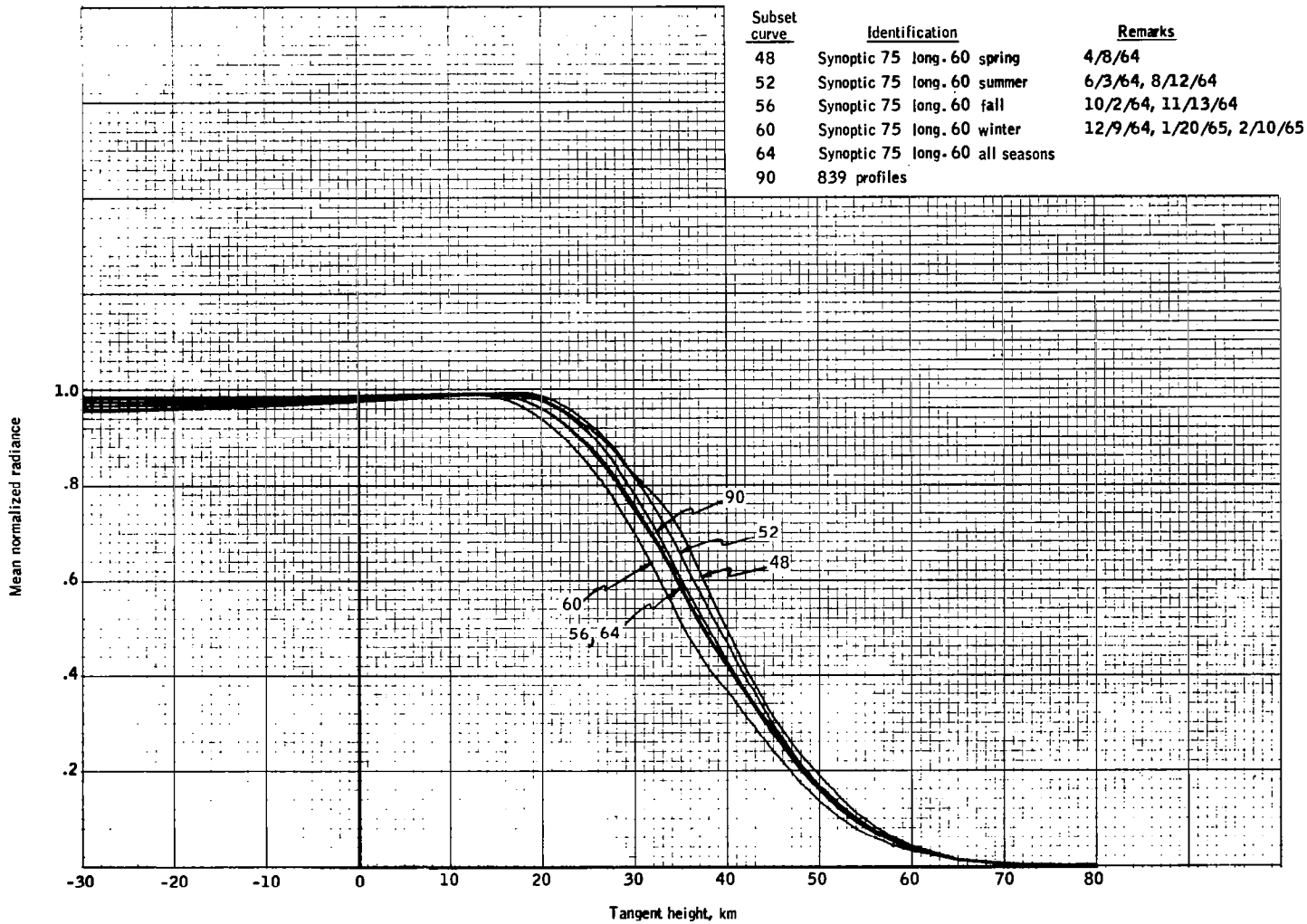


Figure A95. Mean Normalized Radiance versus Tangent Height, Set 24

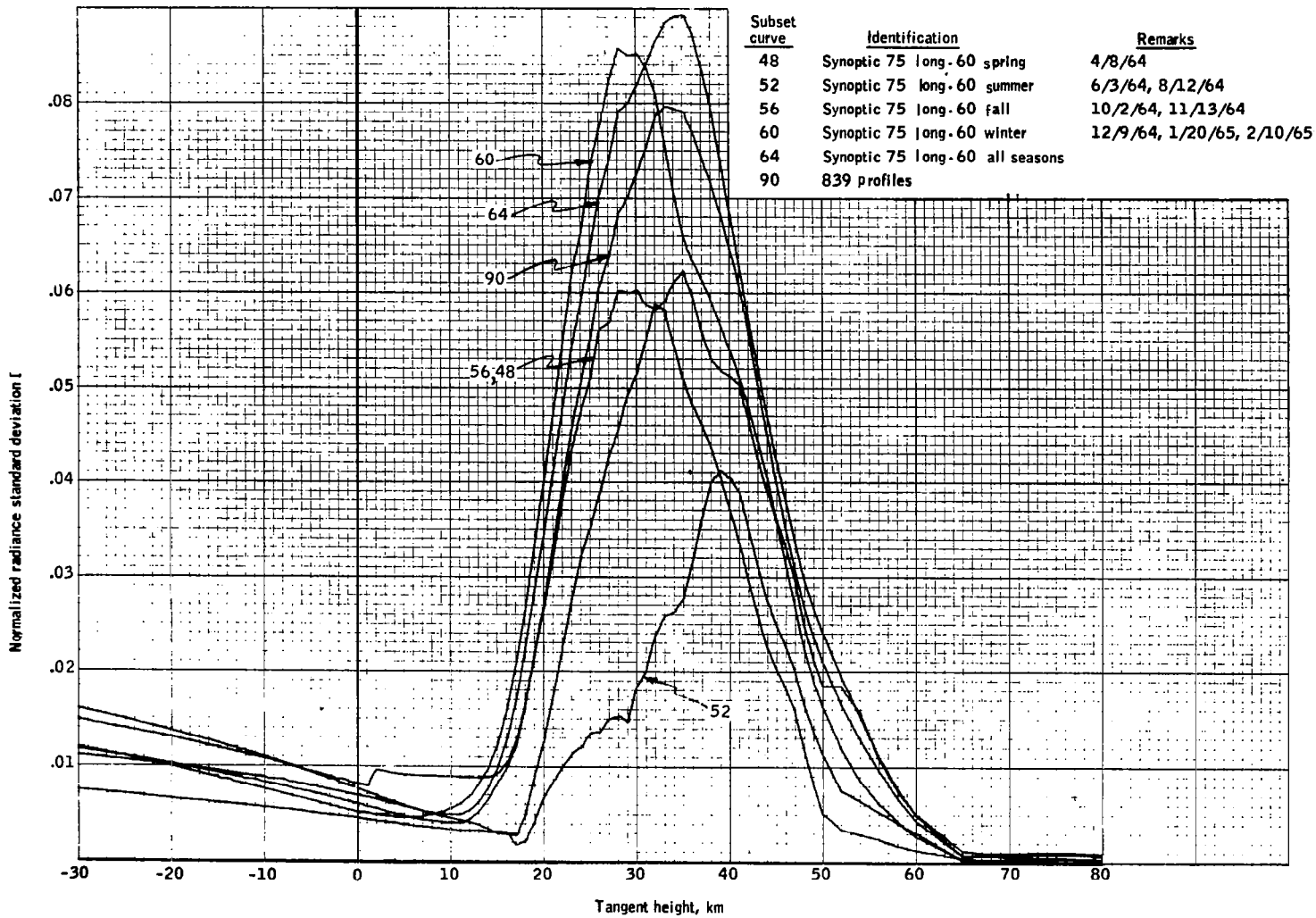


Figure A96. Normalized Radiance Standard Deviation versus Tangent Height, Set 24

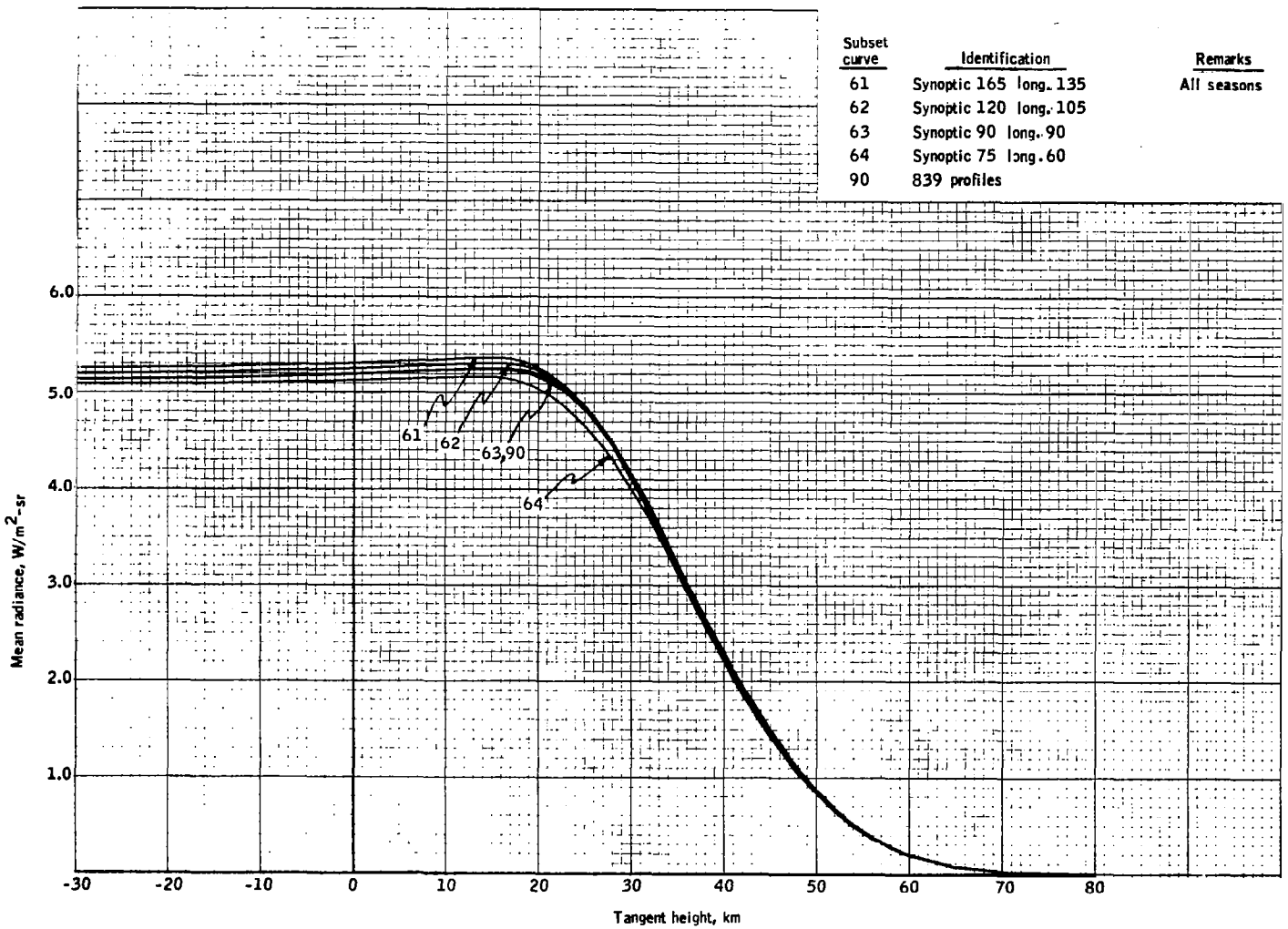


Figure A97. Mean Radiance versus Tangent Height, Set 25

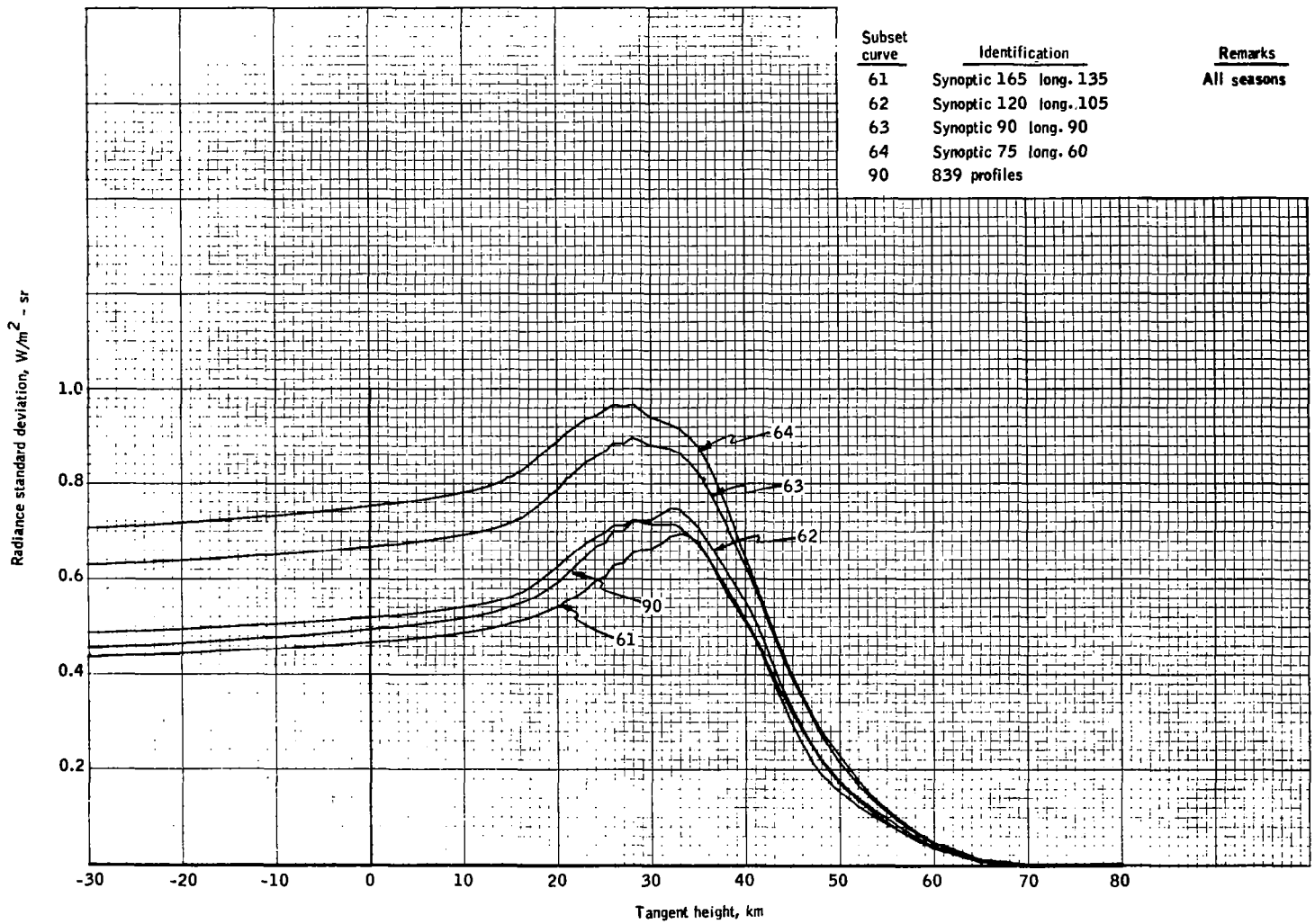


Figure A98. Radiance Standard Deviation versus Tangent Height, Set 25

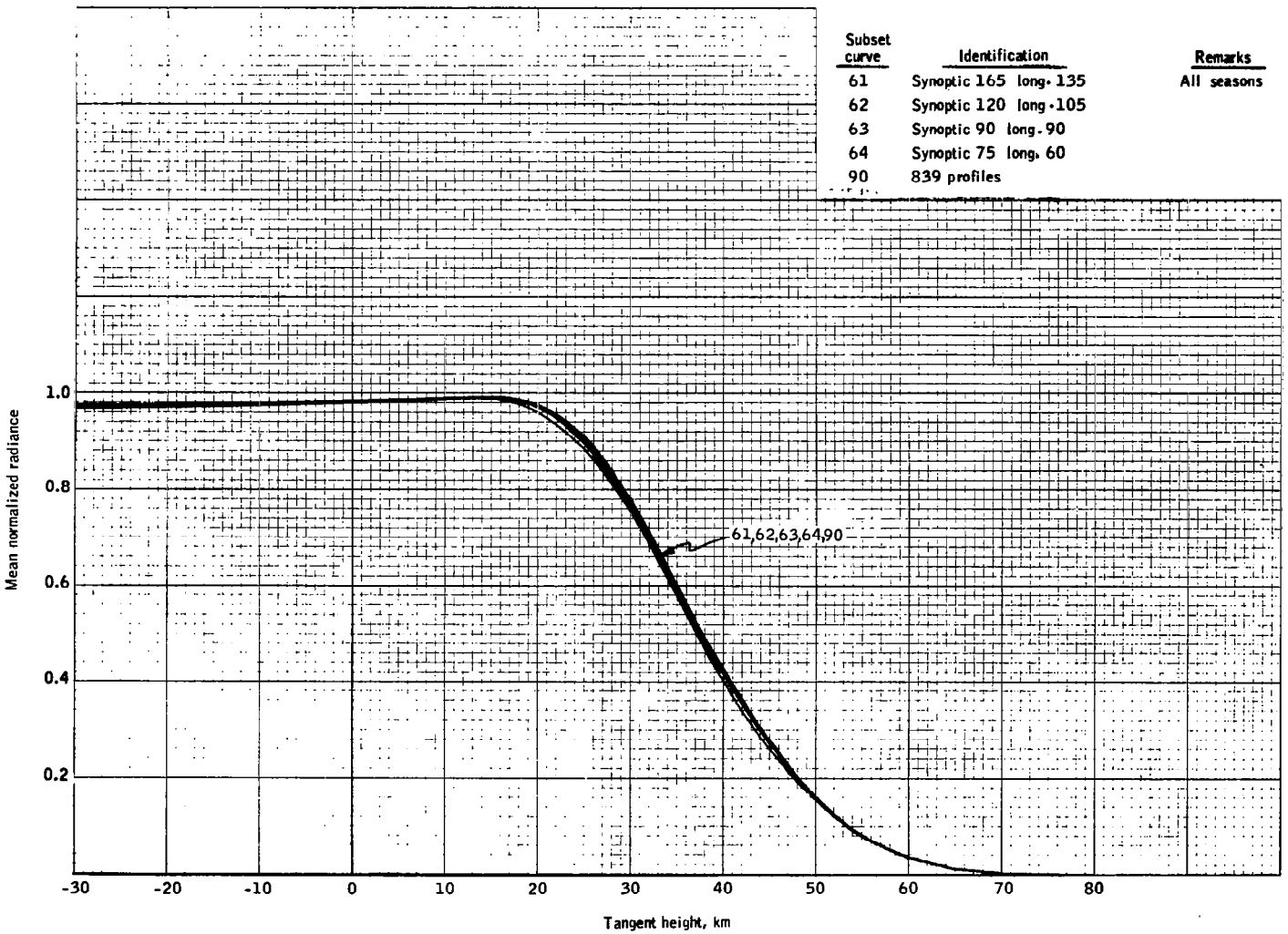


Figure A99. Mean Normalized Radiance versus Tangent Height, Set 25

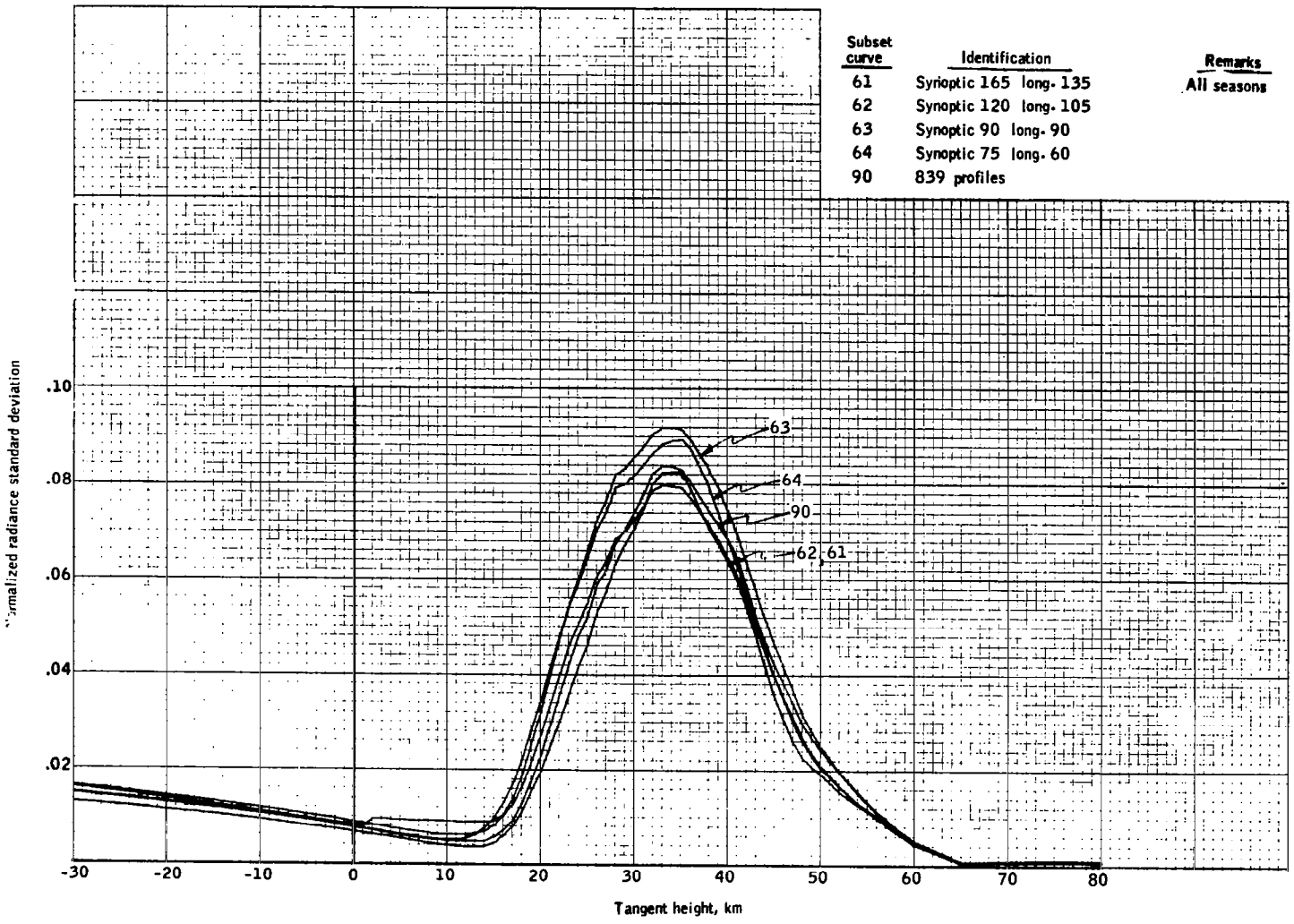


Figure A100. Normalized Radiance Standard Deviation versus Tangent Height, Set 25

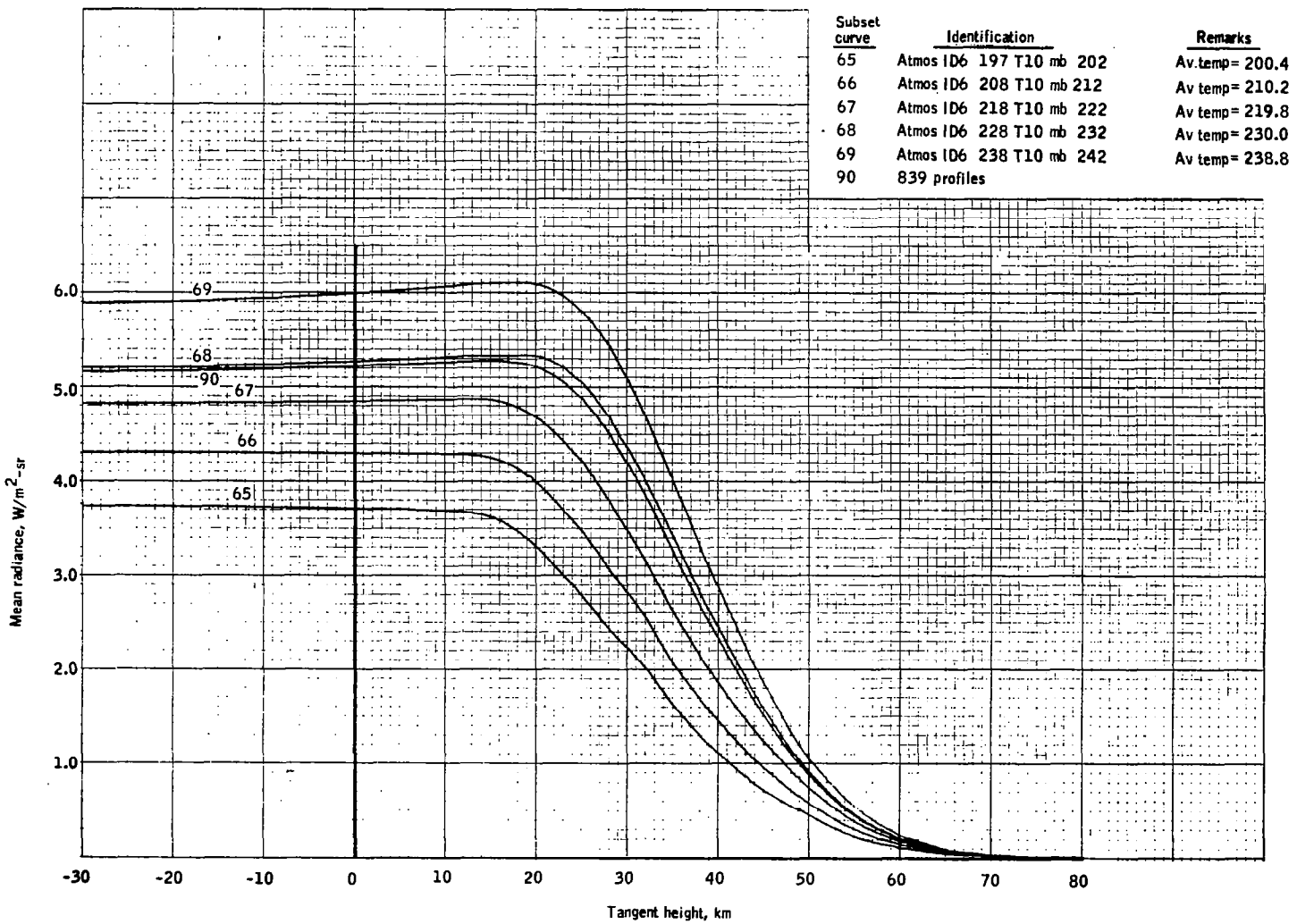


Figure A101. Mean Radiance versus Tangent Height, Set 26

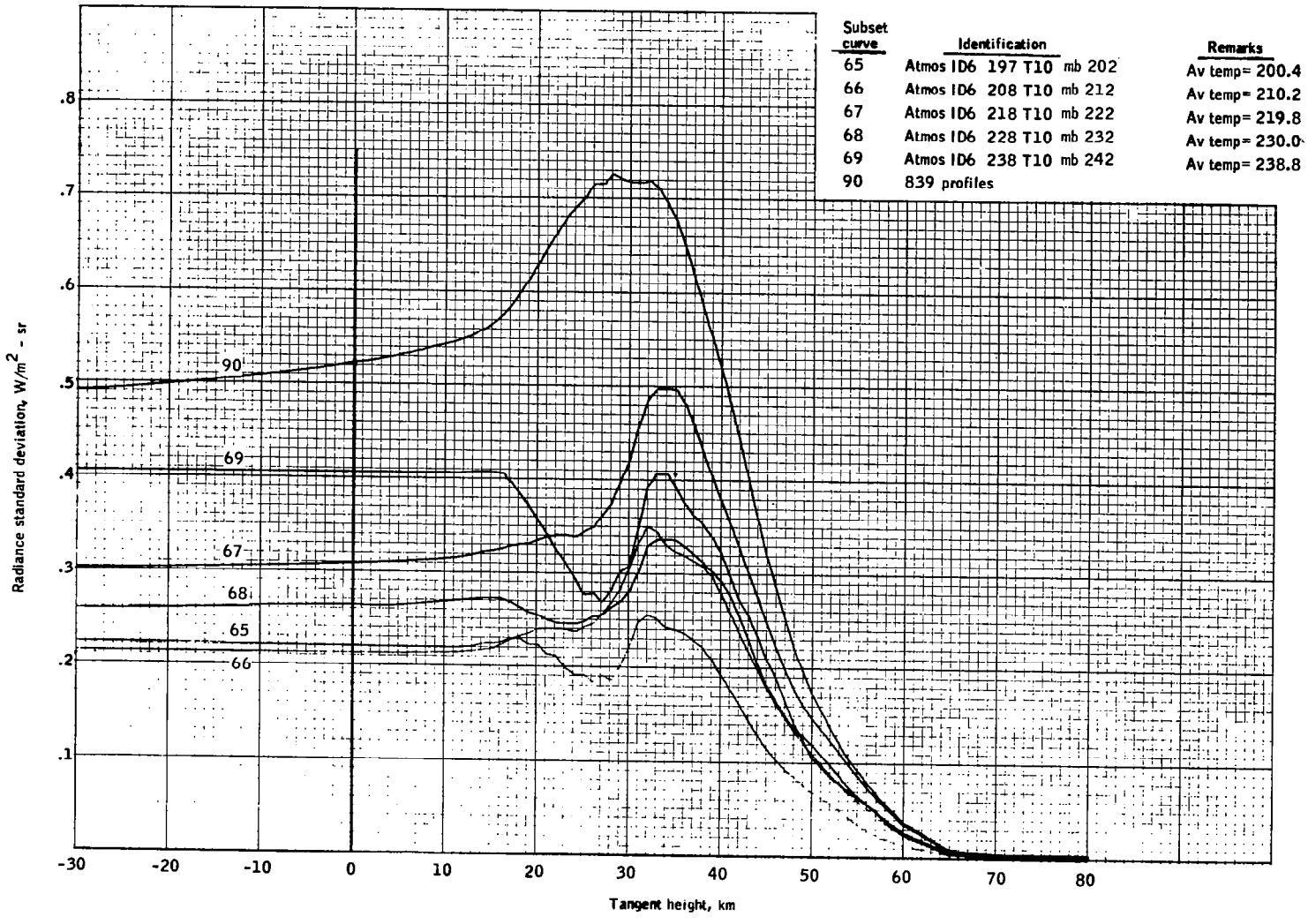


Figure A102. Radiance Standard Deviation versus Tangent Height, Set 26

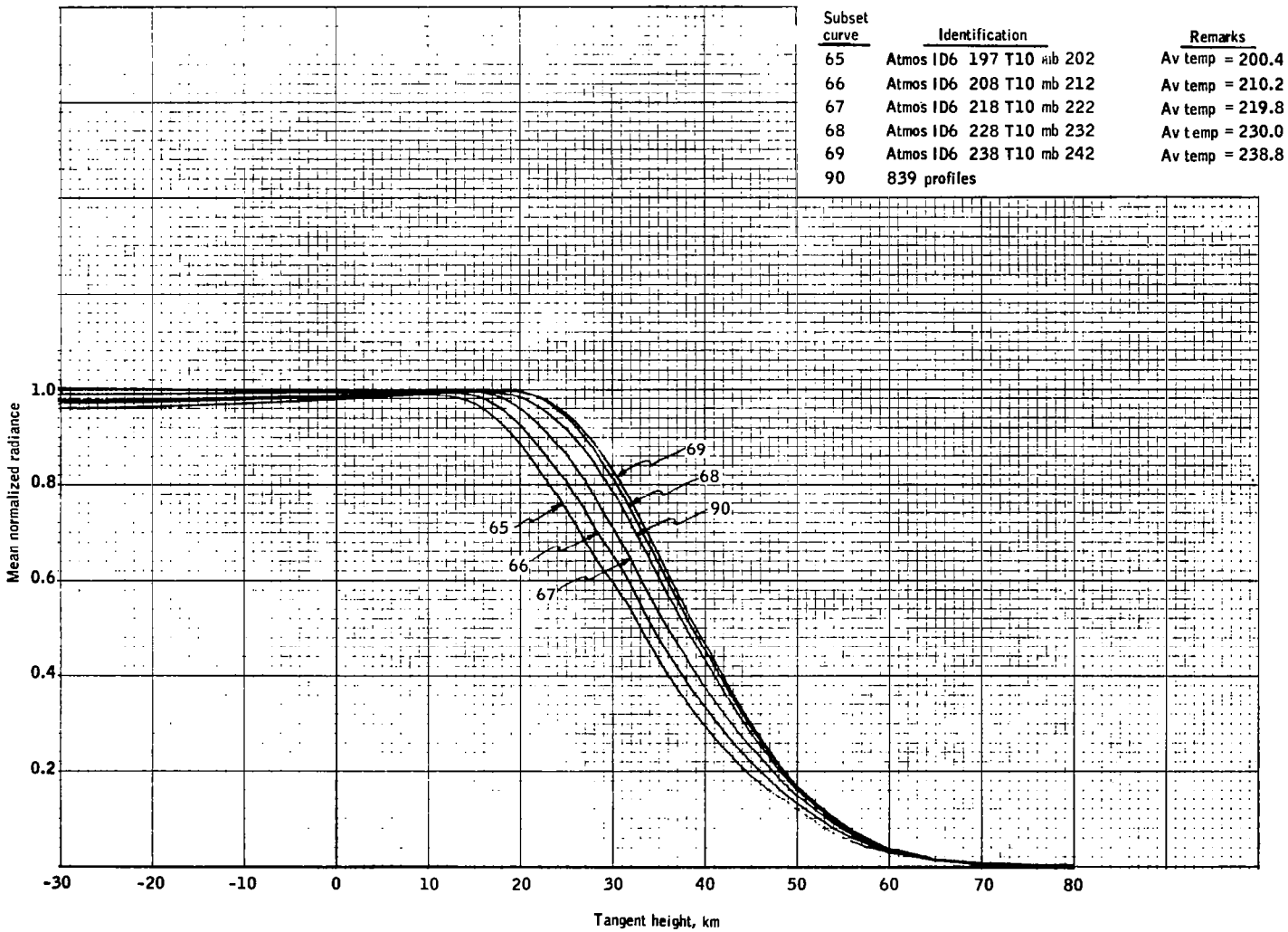


Figure A103. Mean Normalized Radiance versus Tangent Height, Set 26

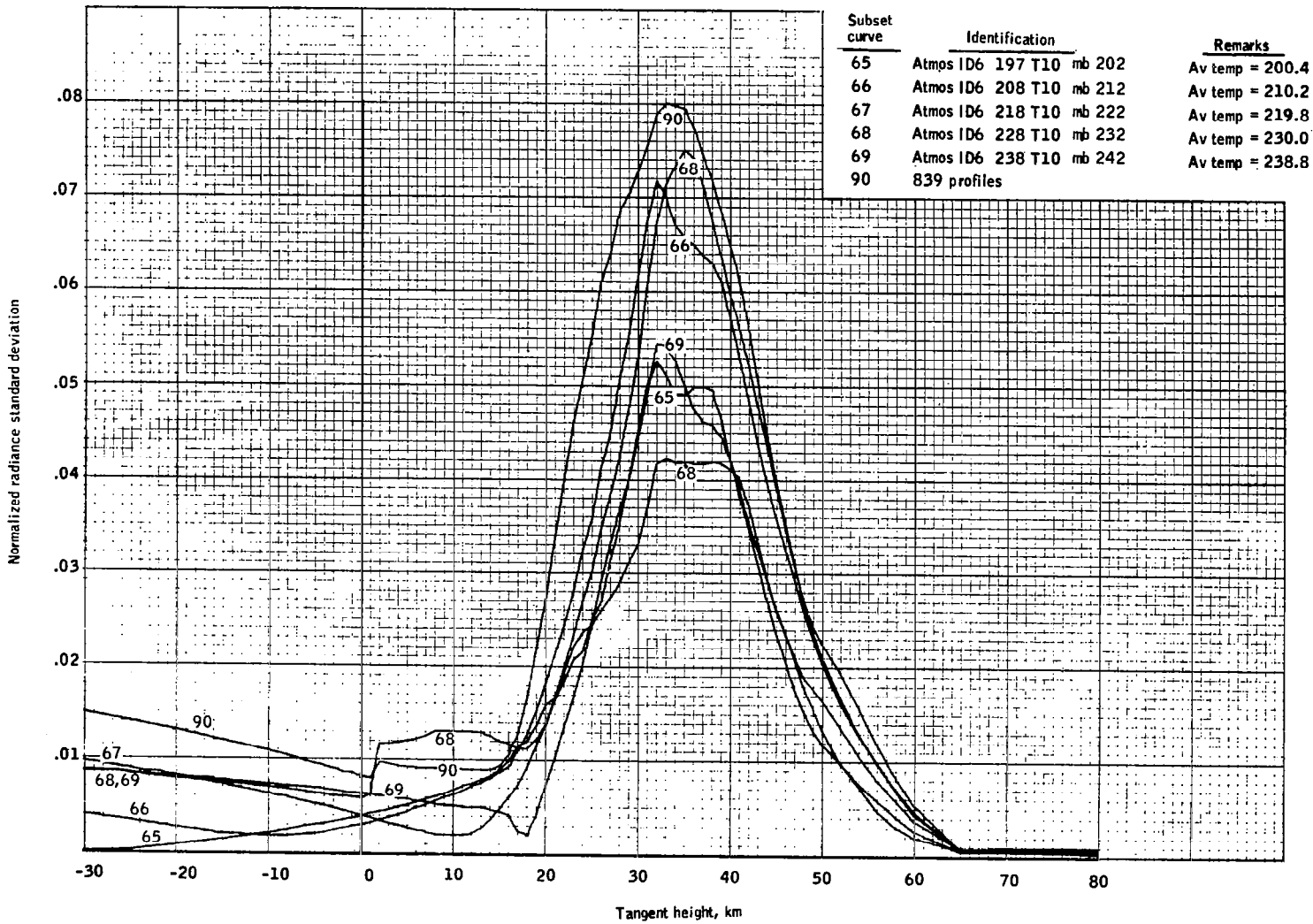


Figure A104. Normalized Radiance Standard Deviation versus Tangent Height, Set 26

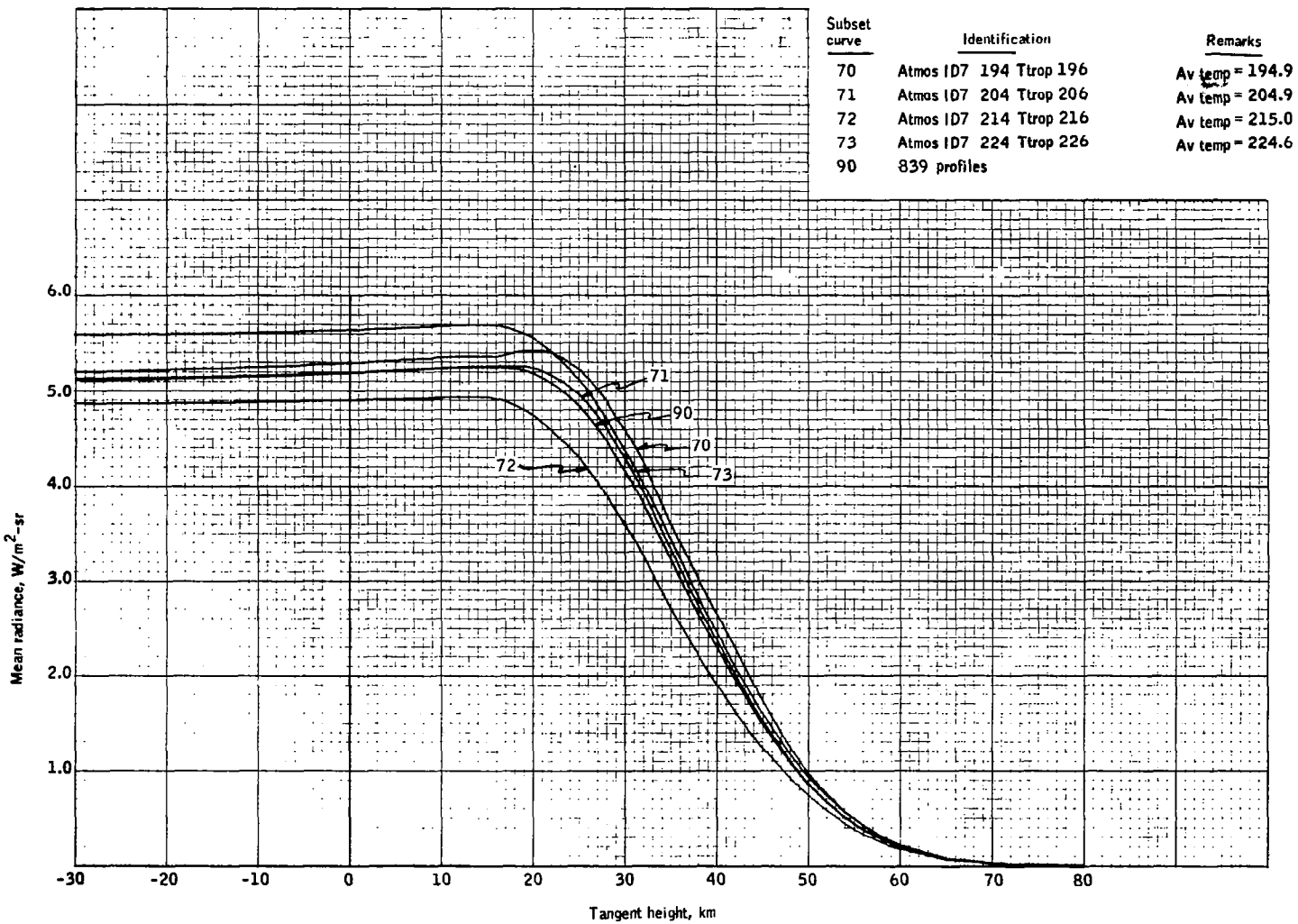


Figure A105. Mean Radiance versus Tangent Height, Set 27

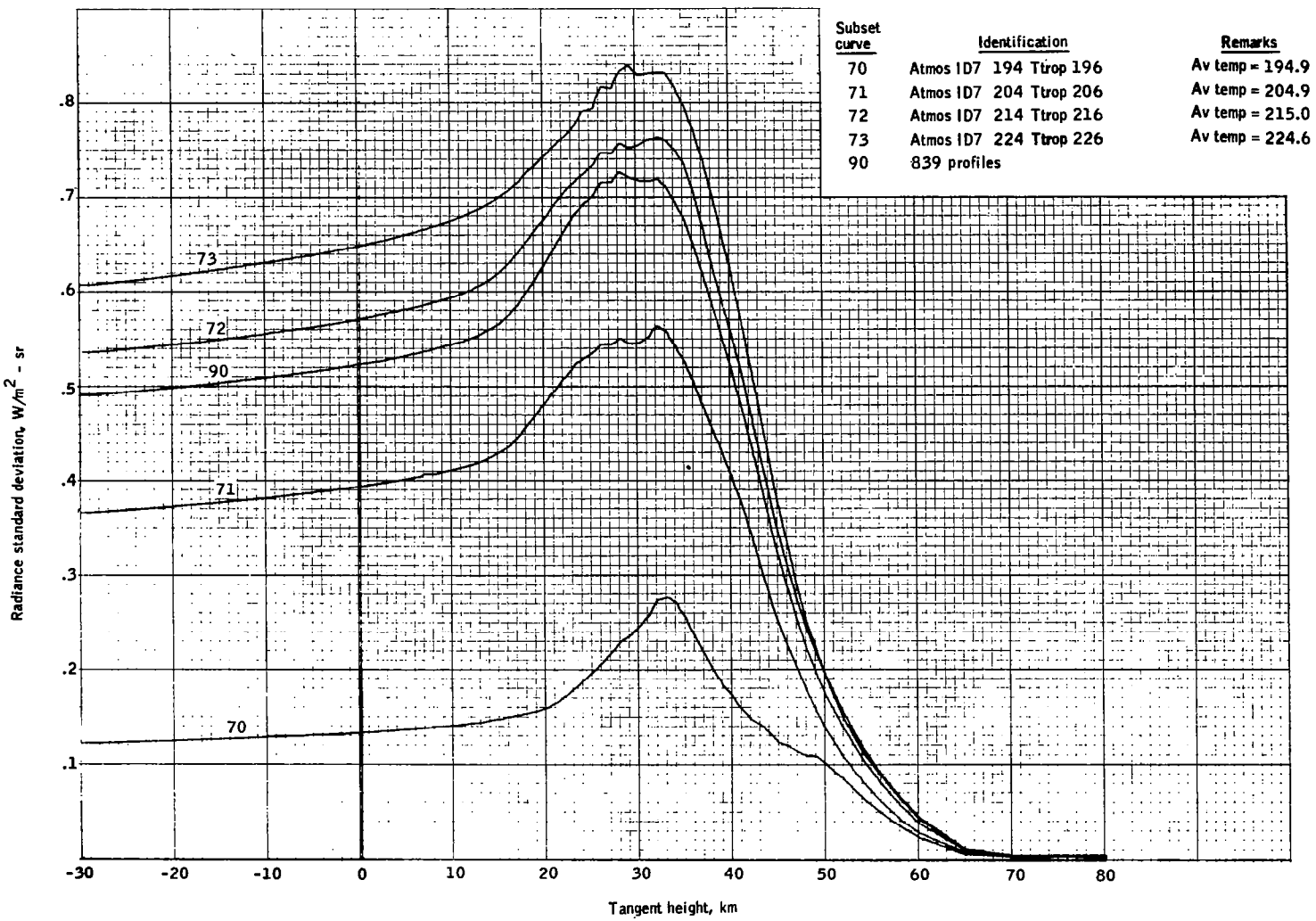


Figure A106. Radiance Standard Deviation versus Tangent Height, Set 27

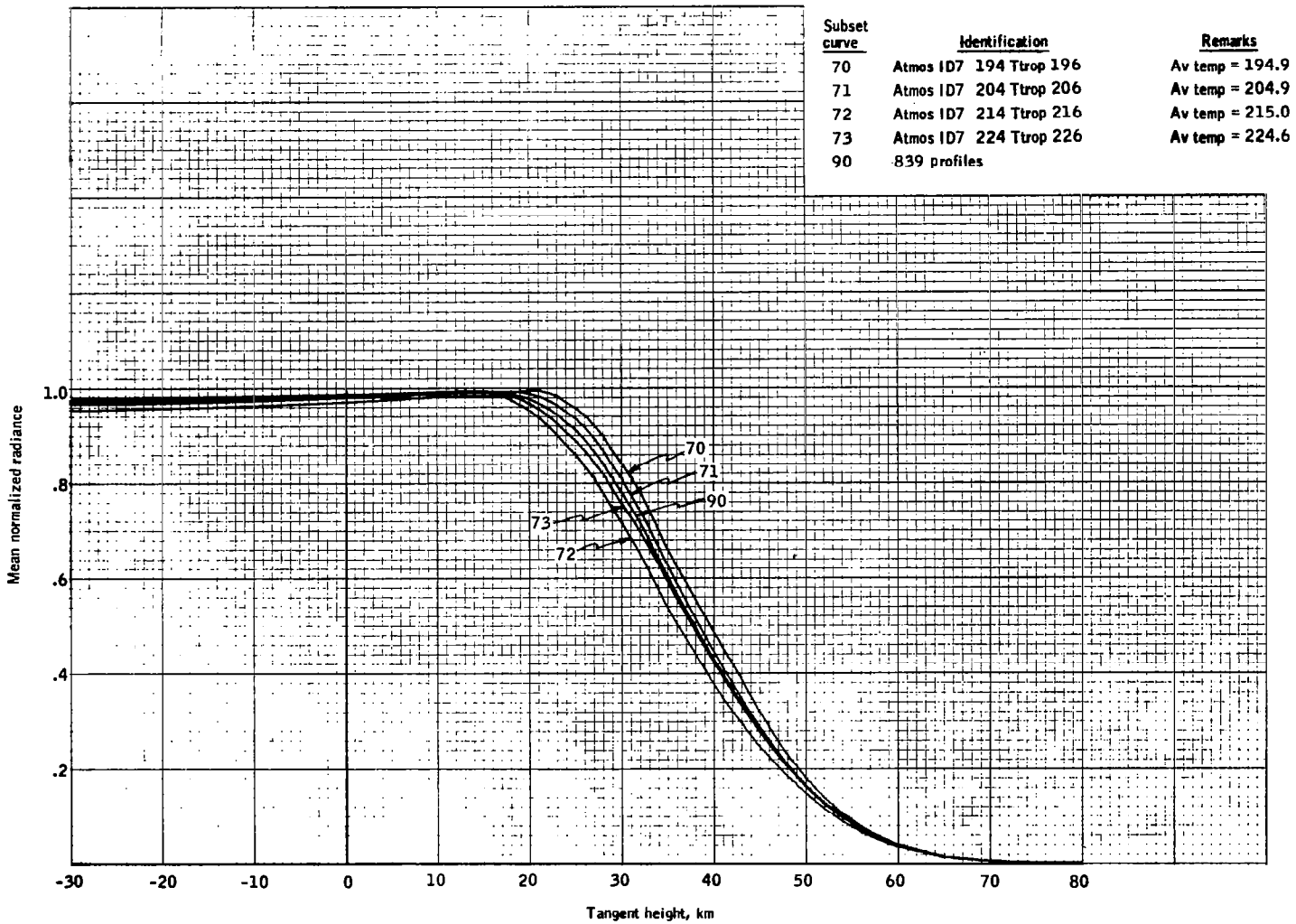


Figure A107. Mean Normalized Radiance versus Tangent Height, Set 27

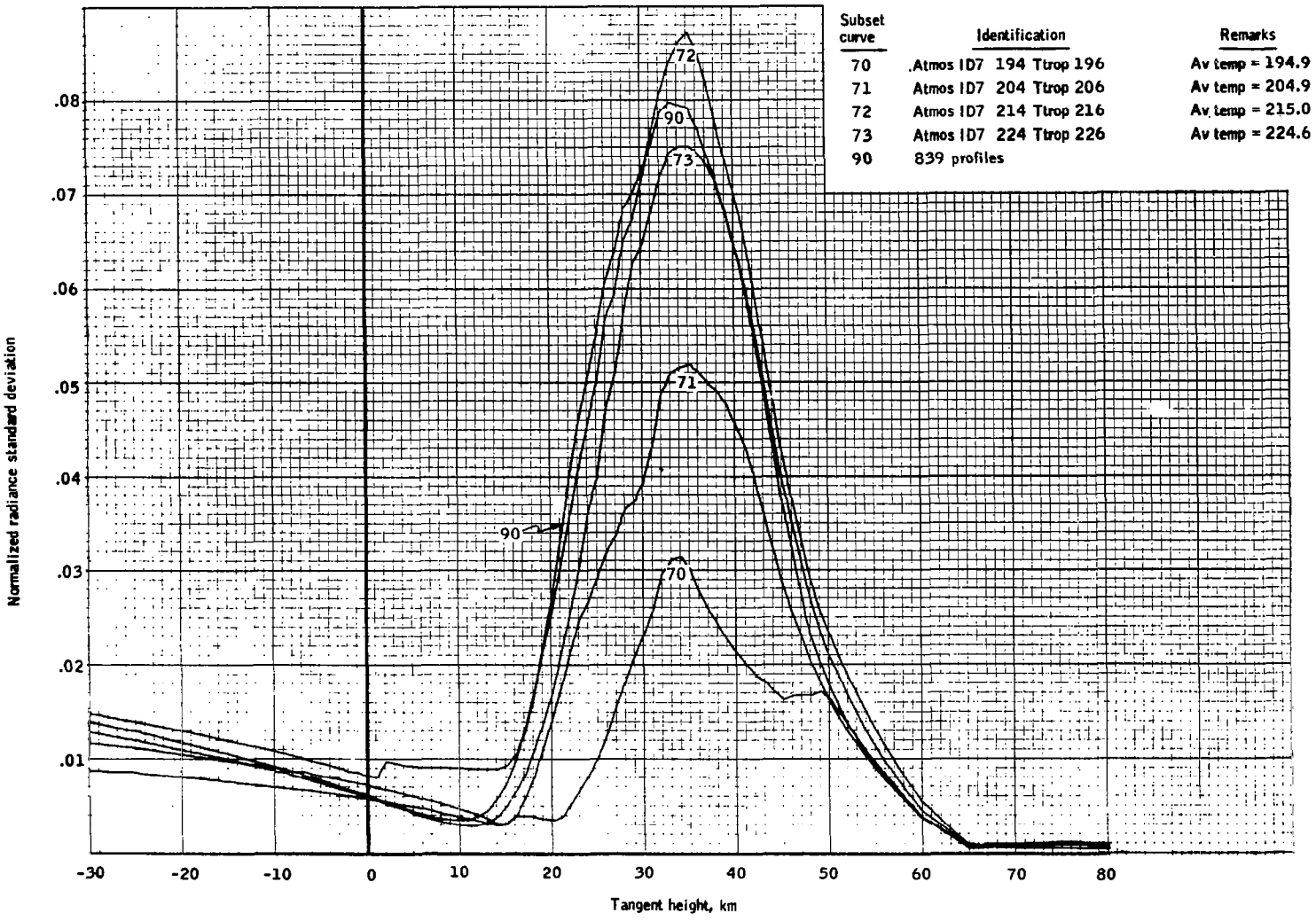


Figure A108. Normalized Radiance Standard Deviation versus Tangent Height, Set 27

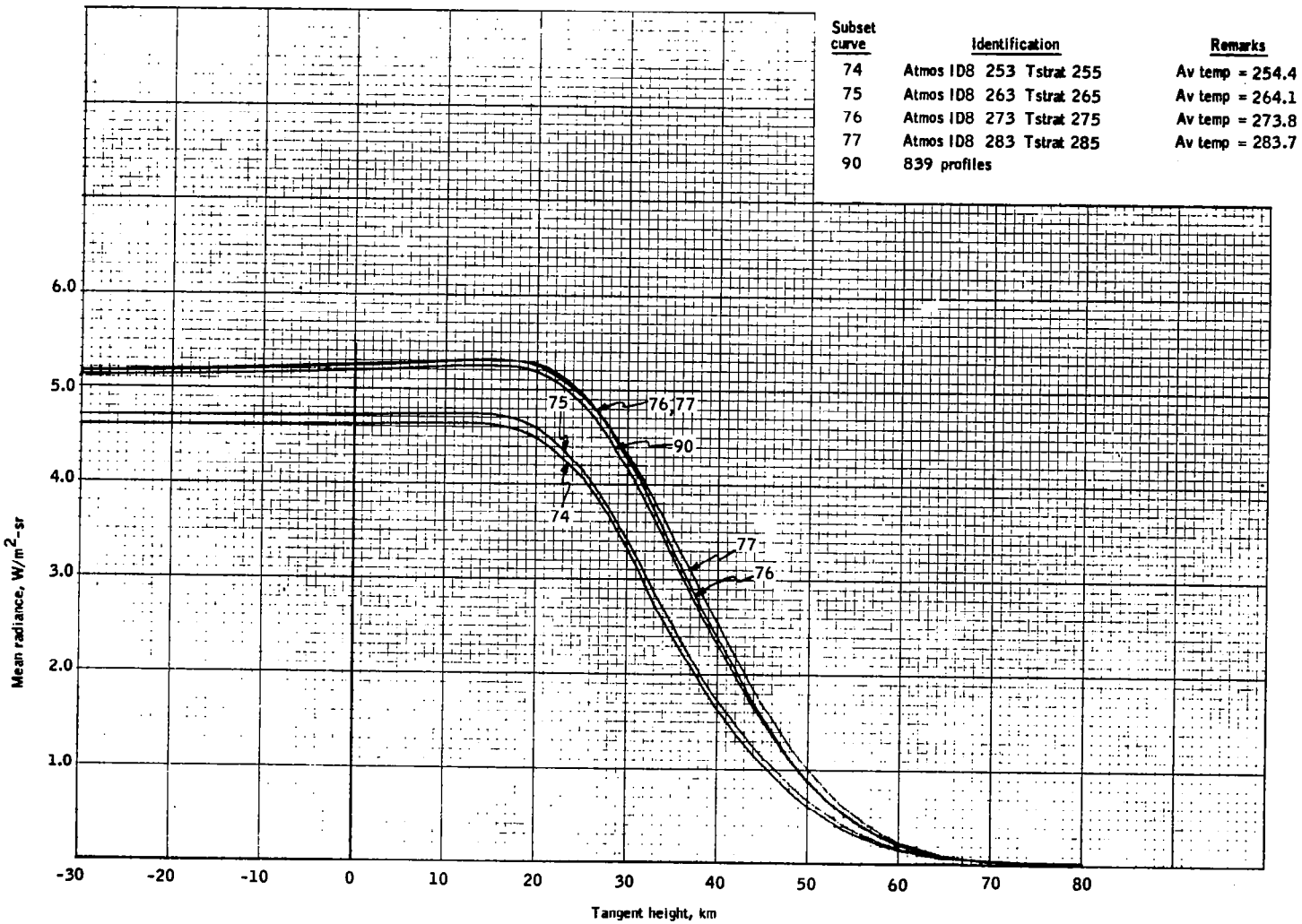


Figure A109. Mean Radiance versus Tangent Height, Set 28

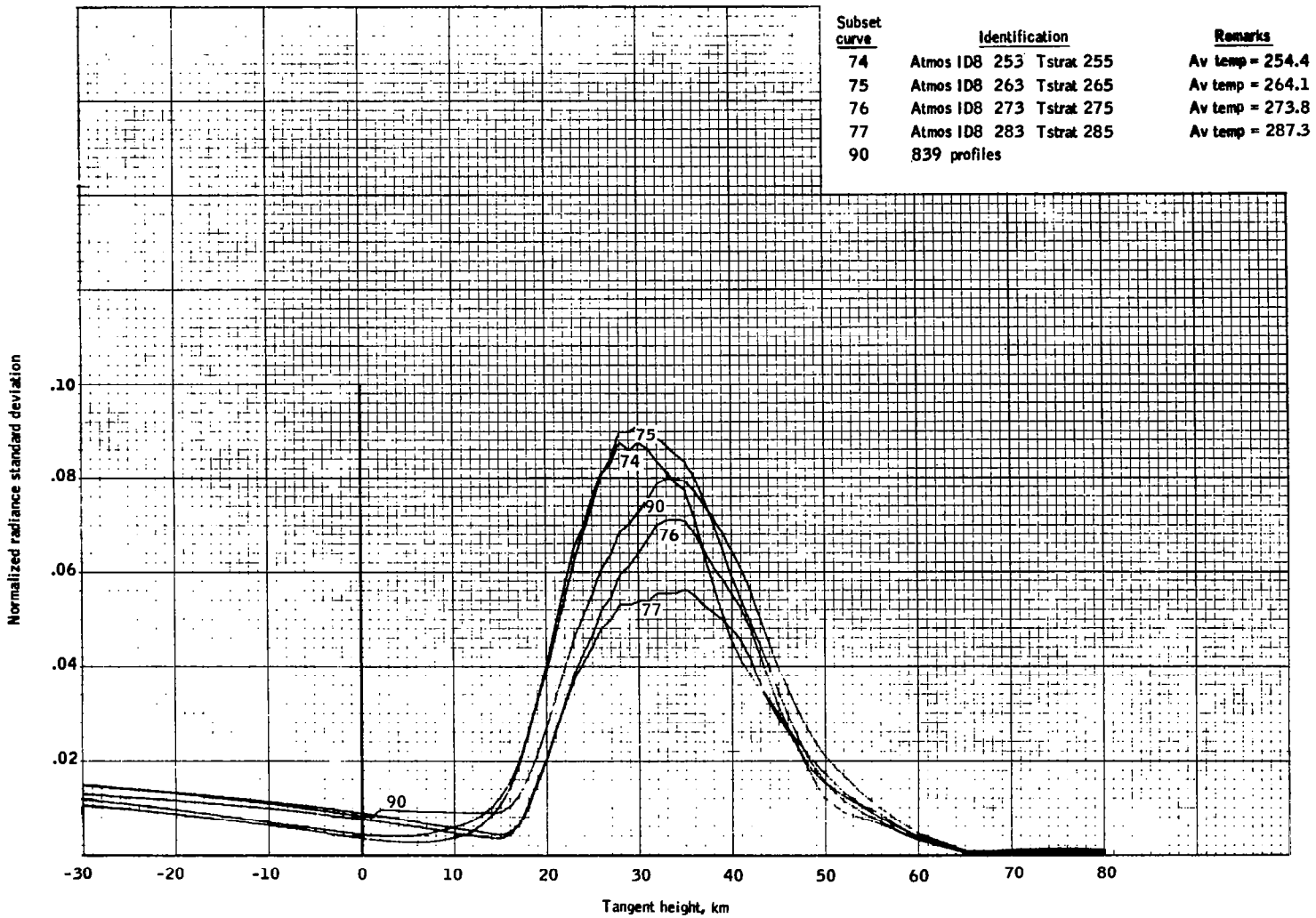


Figure A112. Normalized Radiance Standard Deviation versus Tangent Height, Set 28

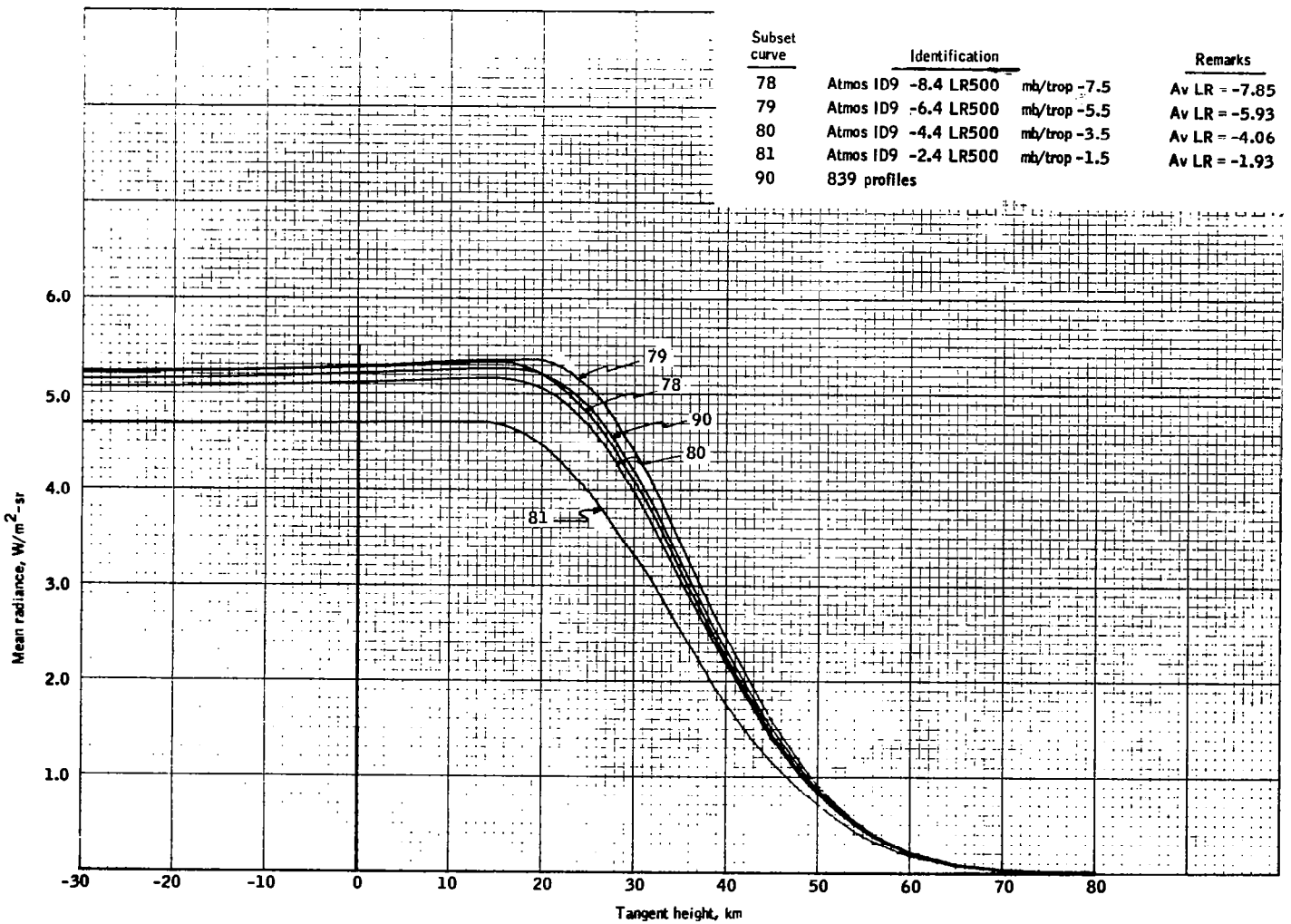


Figure A113. Mean Radiance versus Tangent Height, Set 29

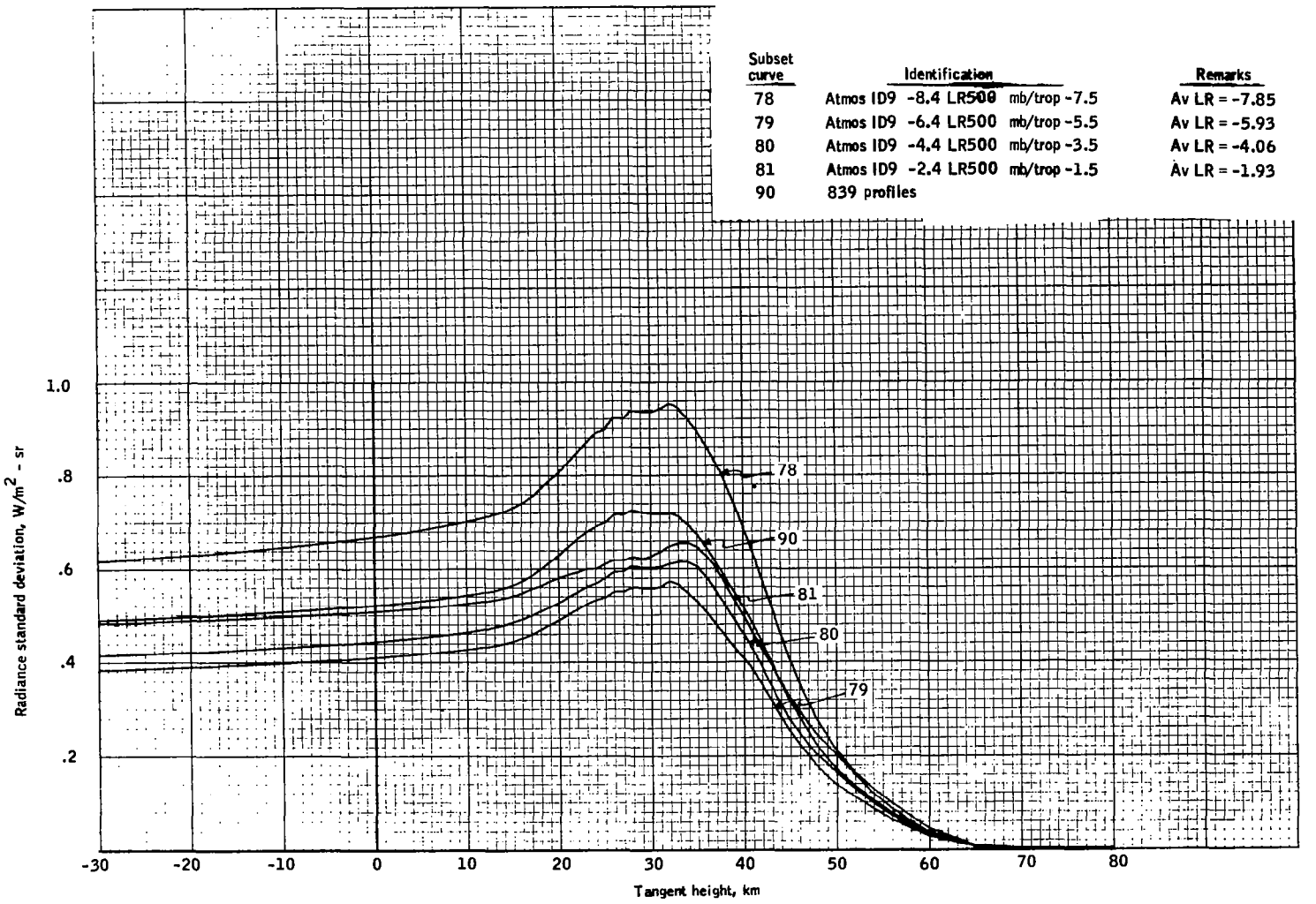


Figure A114. Radiance Standard Deviation versus Tangent Height, Set 29

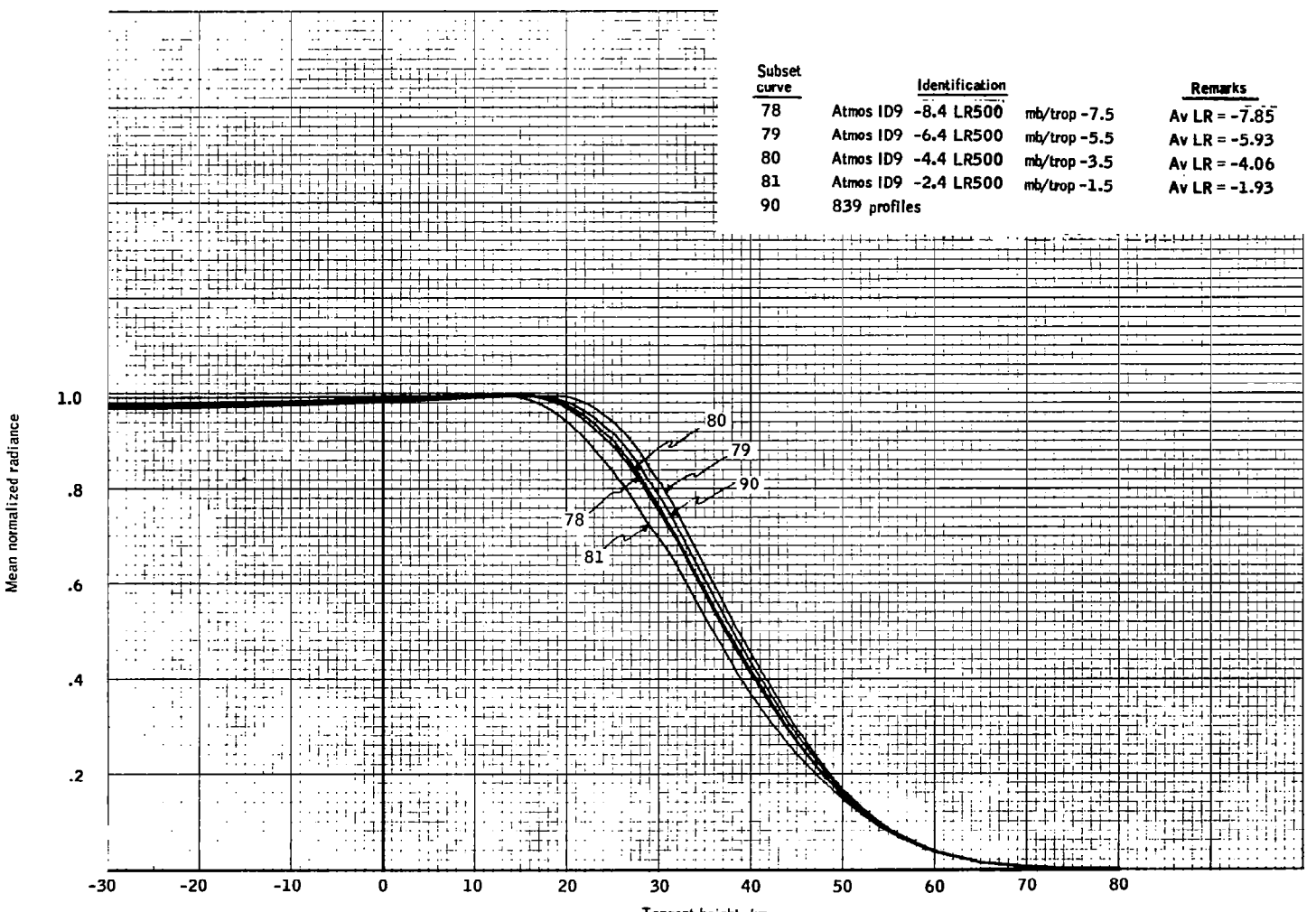


Figure A115. Mean Normalized Radiance versus Tangent Height, Set 29

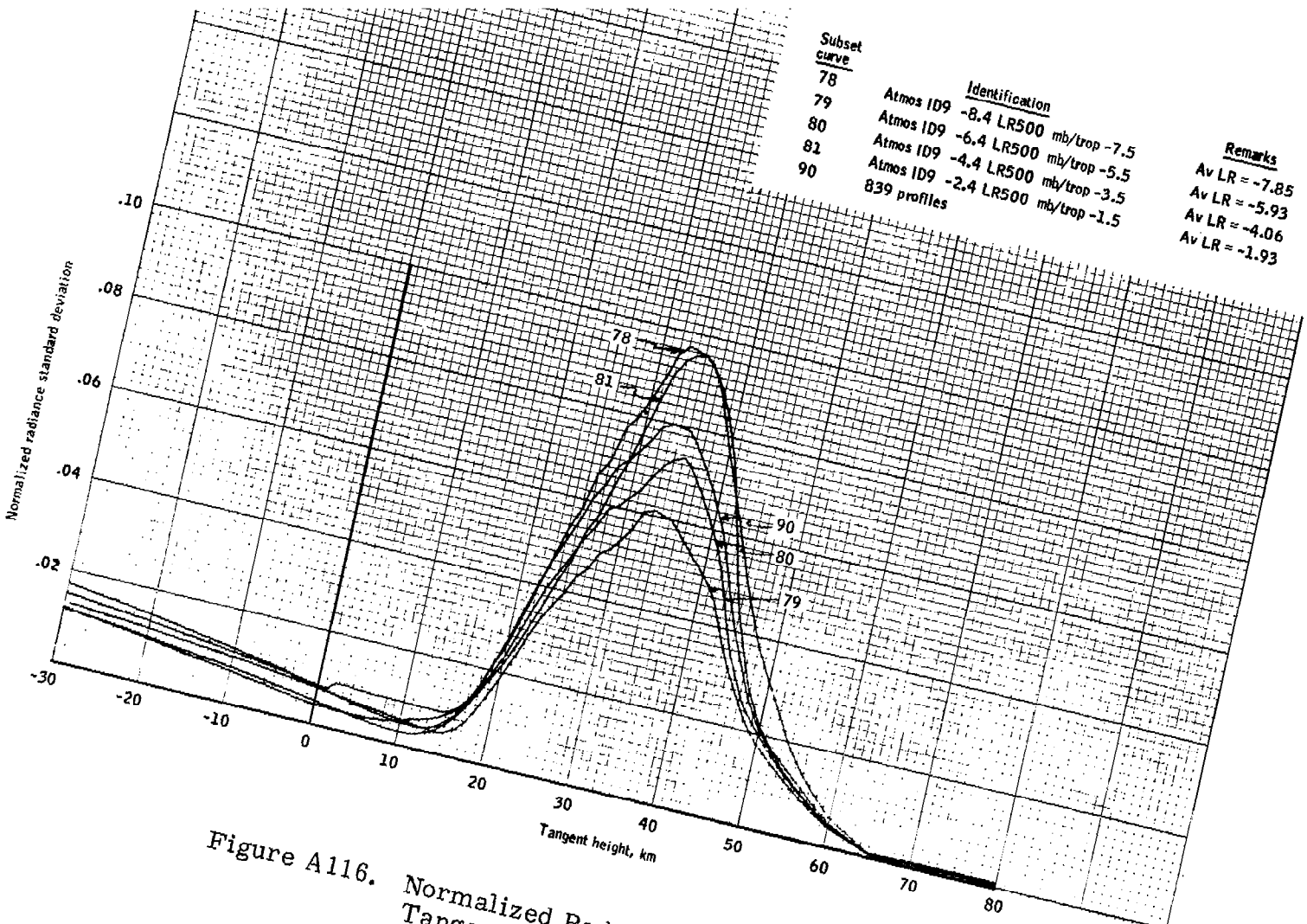


Figure A116. Normalized Radiance Standard Deviation versus Tangent Height, Set 29

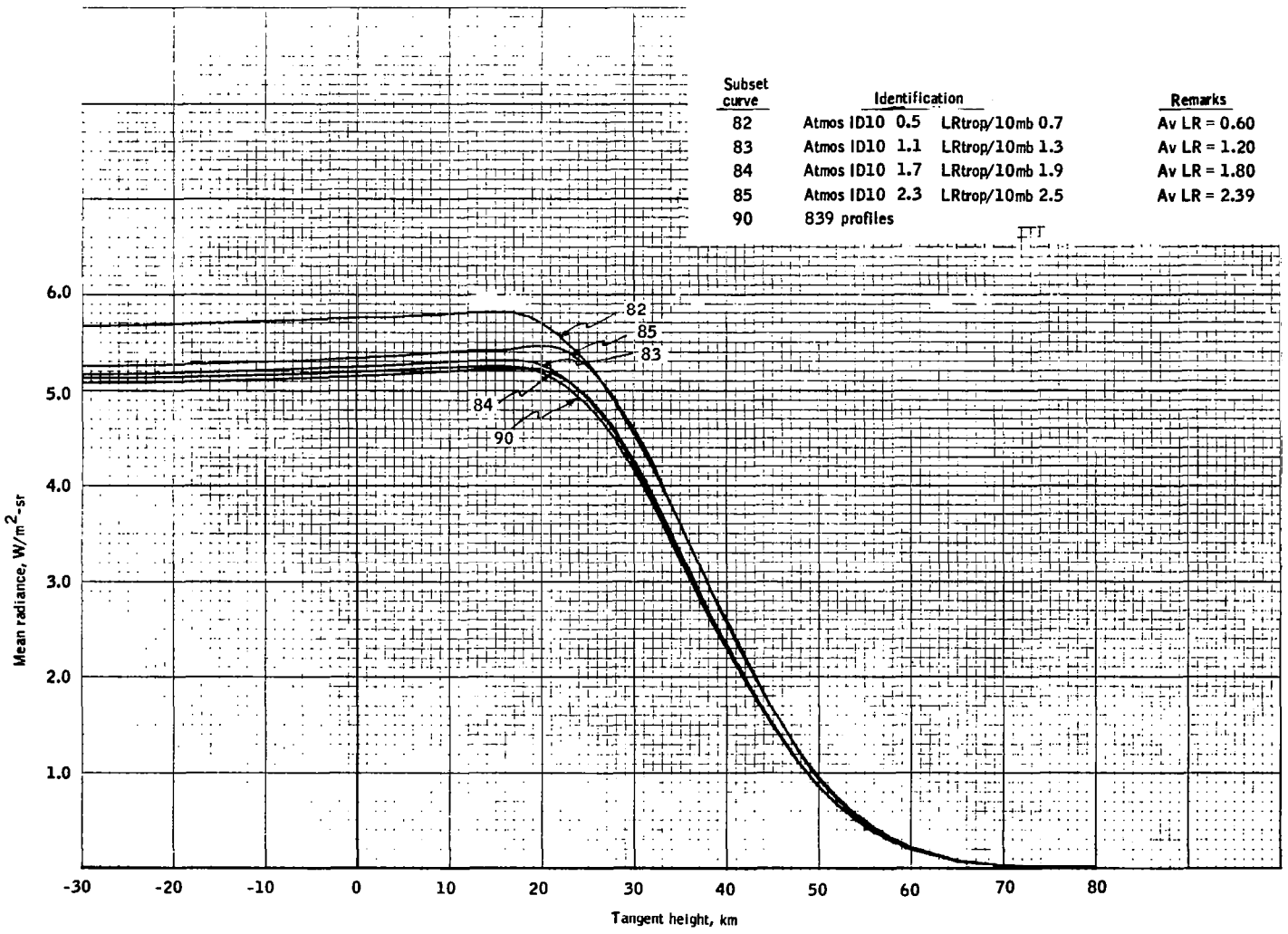


Figure A117. Mean Radiance versus Tangent Height, Set 30

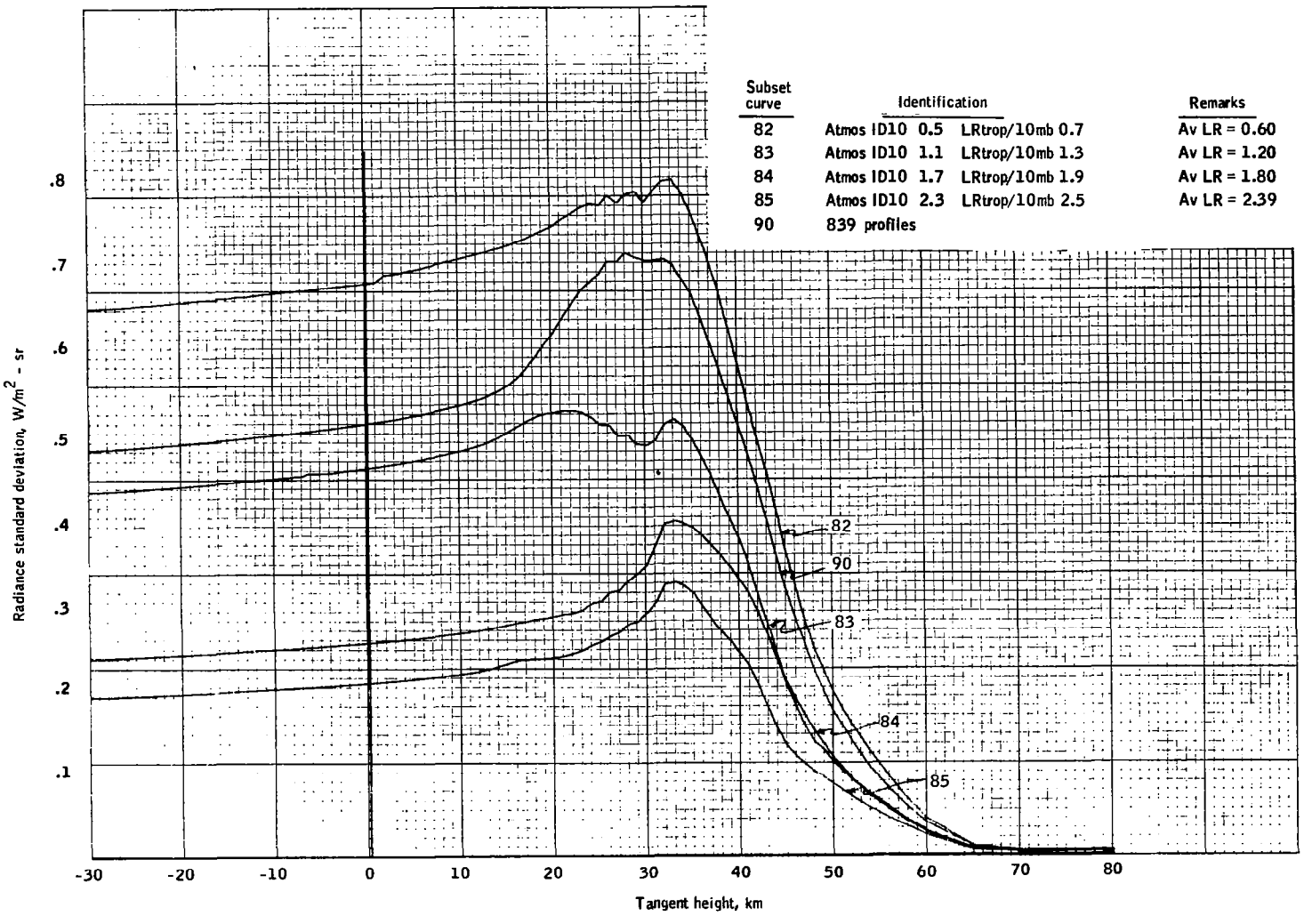


Figure A118. Radiance Standard Deviation versus Tangent Height, Set 30

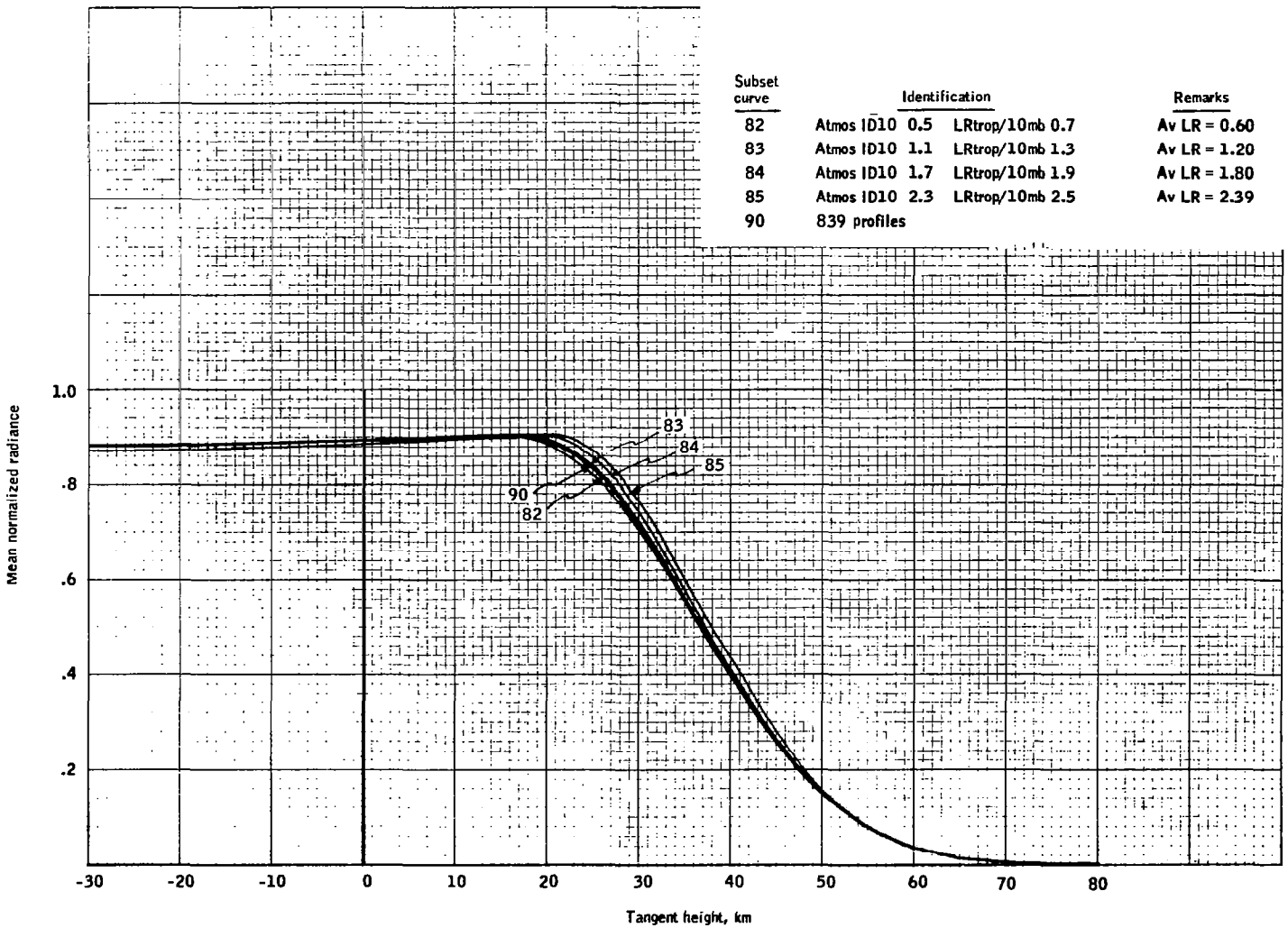


Figure A119. Mean Normalized Radiance versus Tangent Height, Set 30

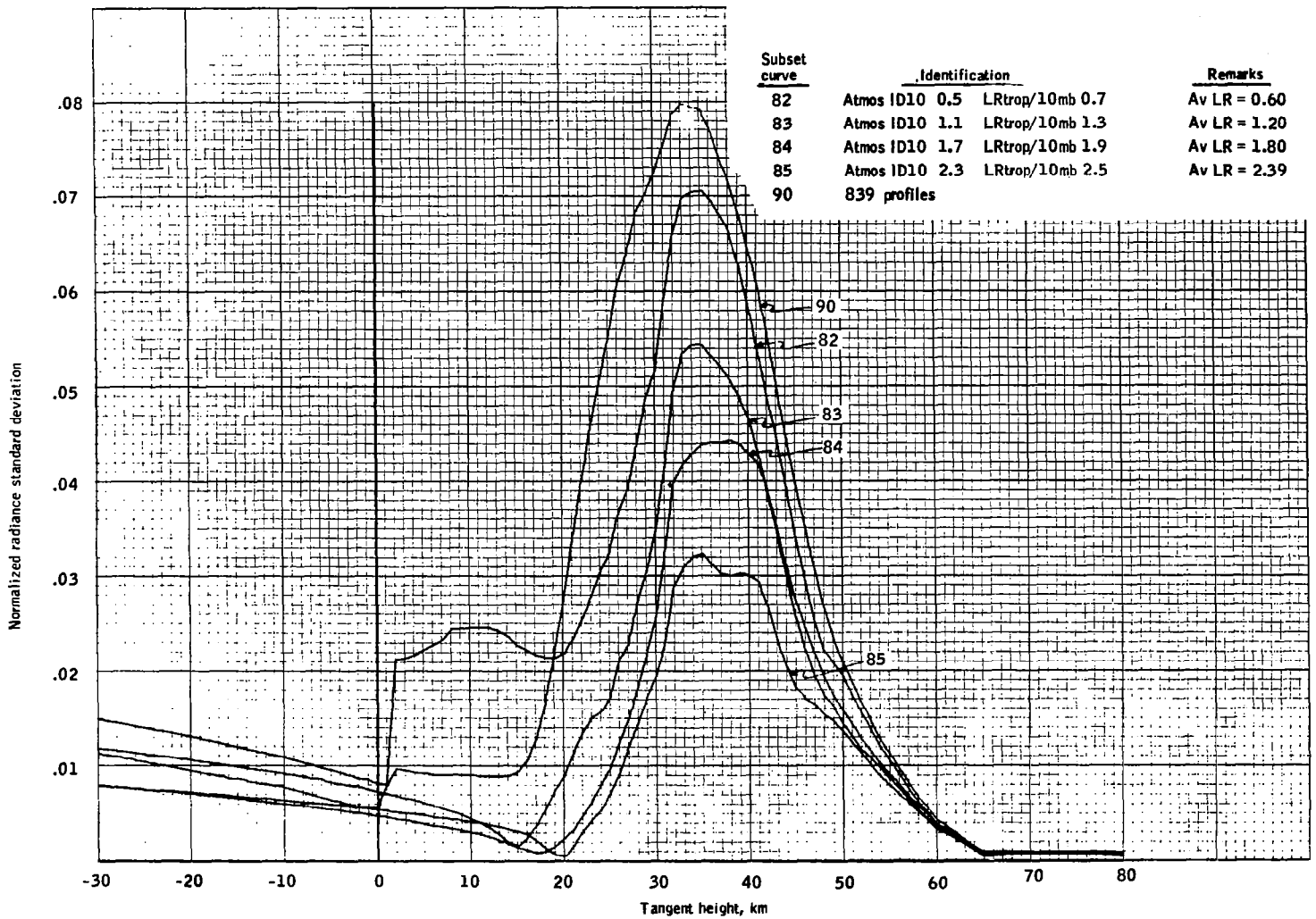


Figure A120. Normalized Radiance Standard Deviation versus Tangent Height, Set 30

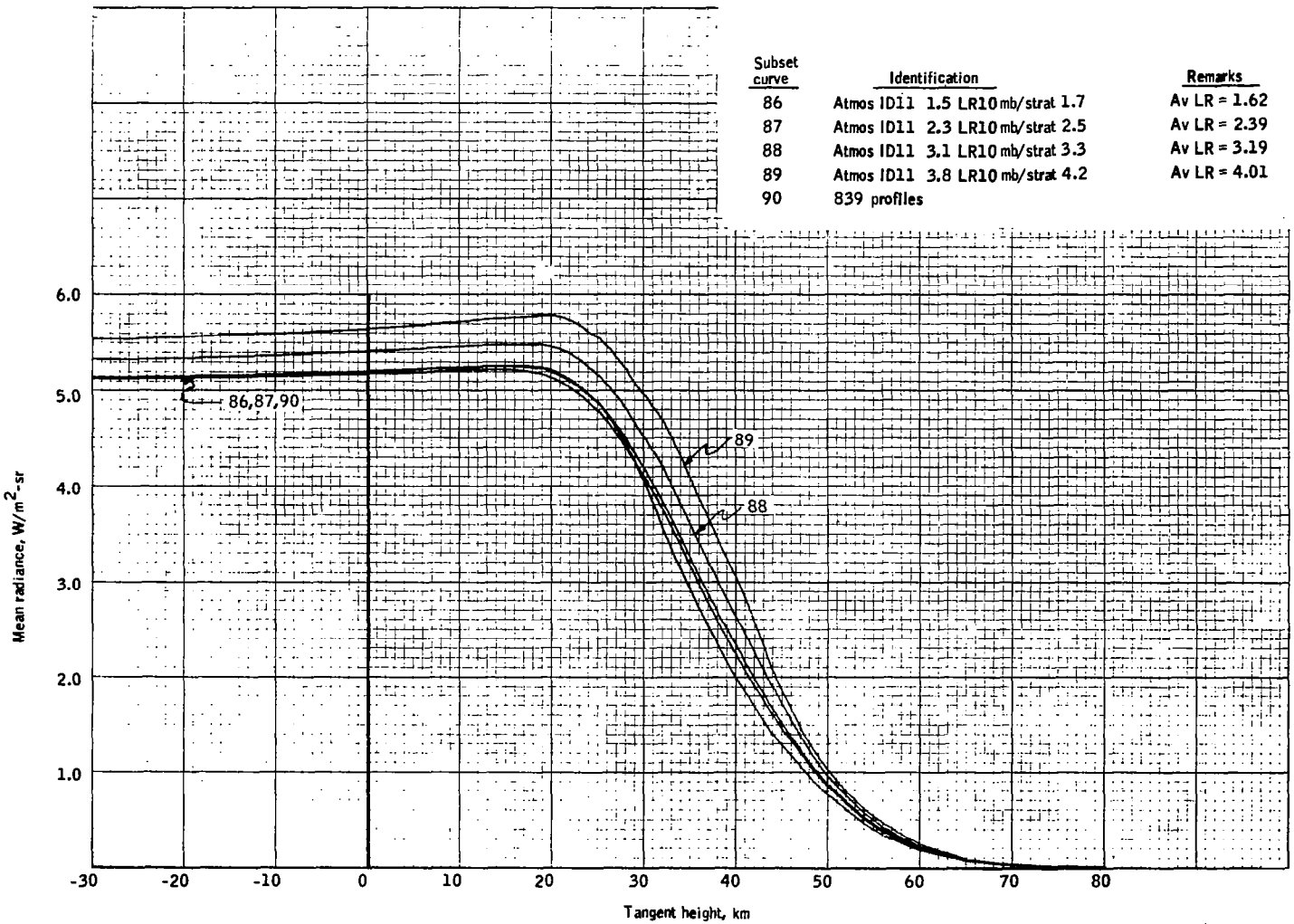


Figure A21. Mean Radiance versus Tangent Height, Set 31

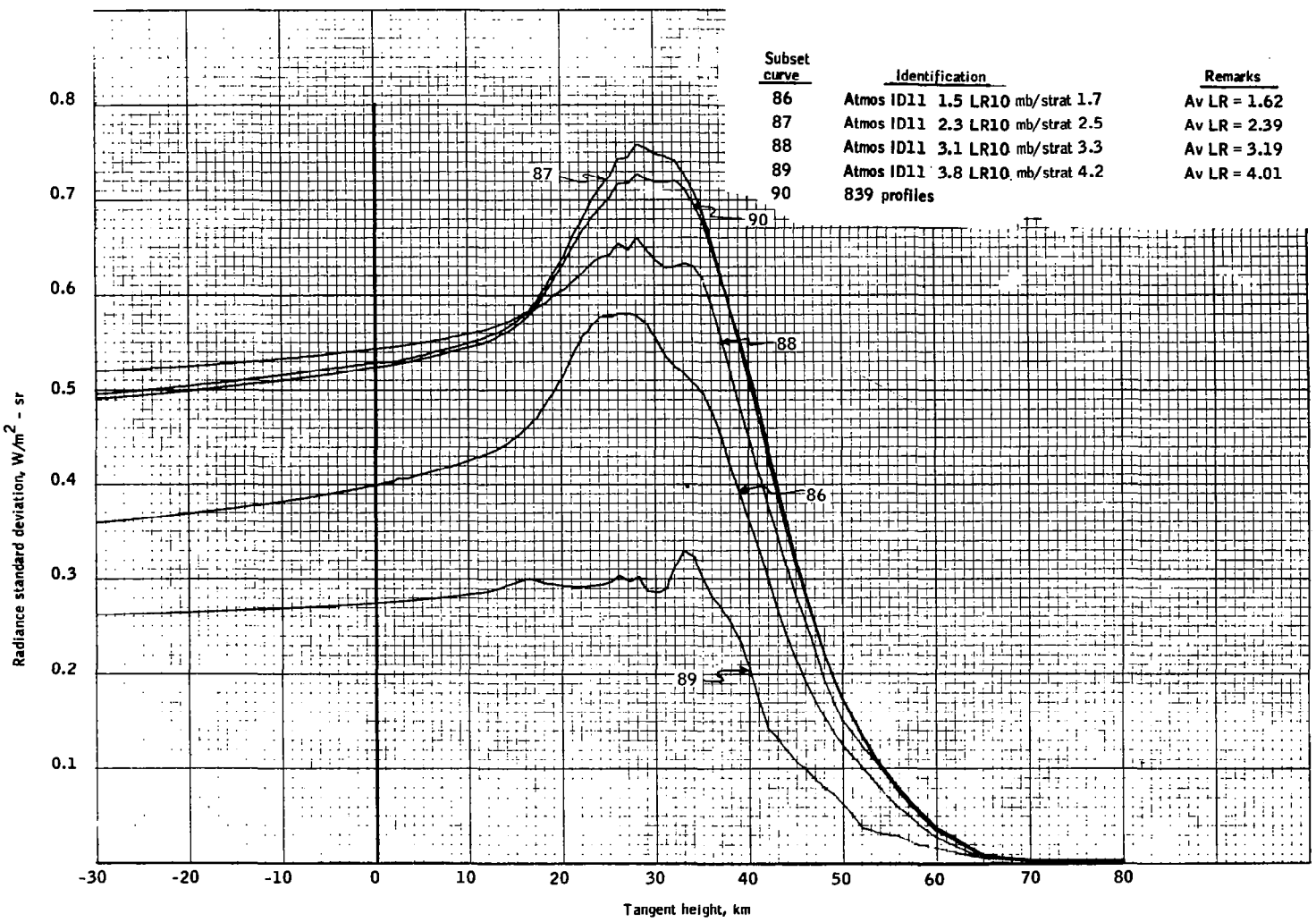


Figure A122. Radiance Standard Deviation versus Tangent Height, Set 31

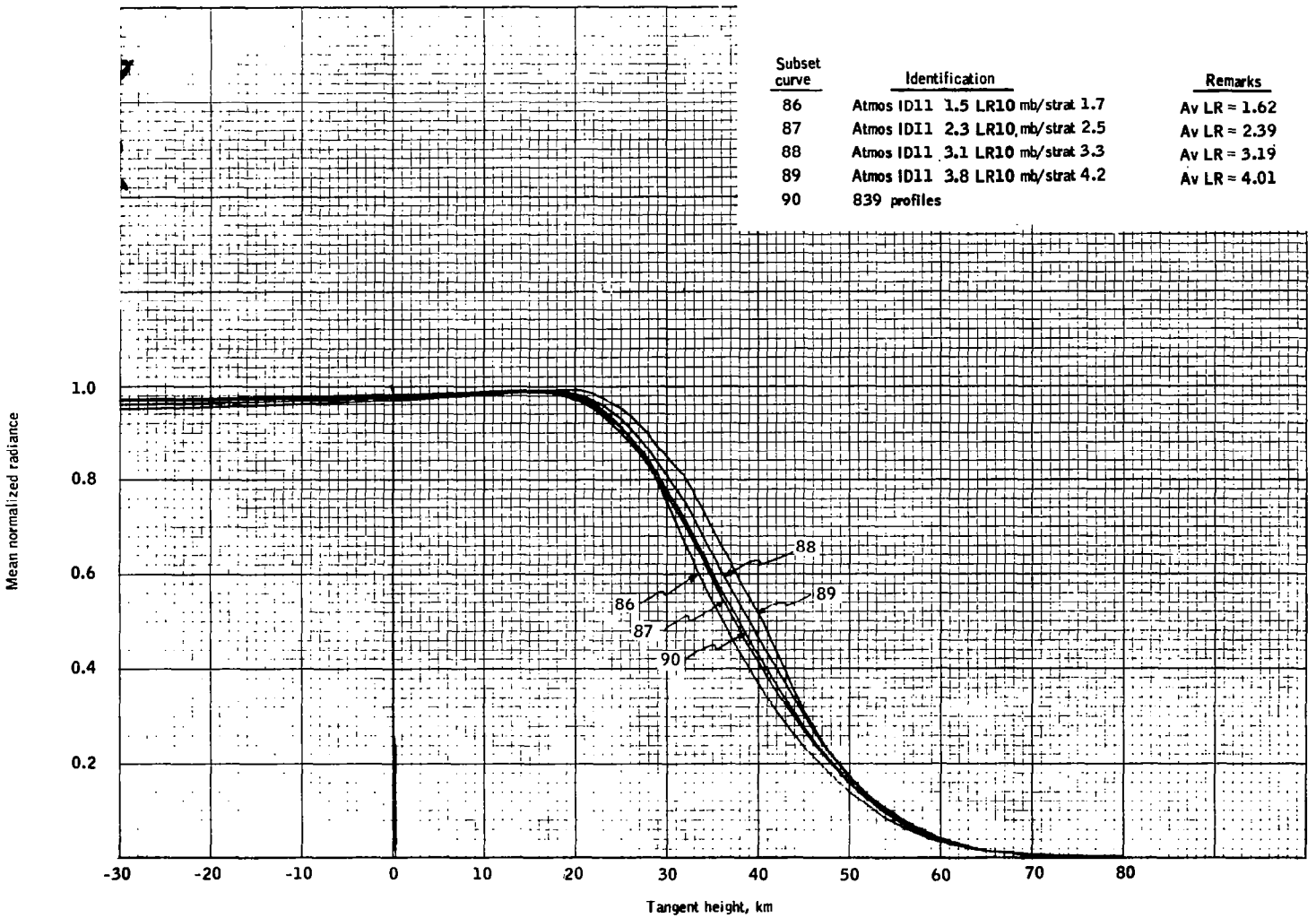


Figure A123. Mean Normalized Radiance versus Tangent Height, Set 31

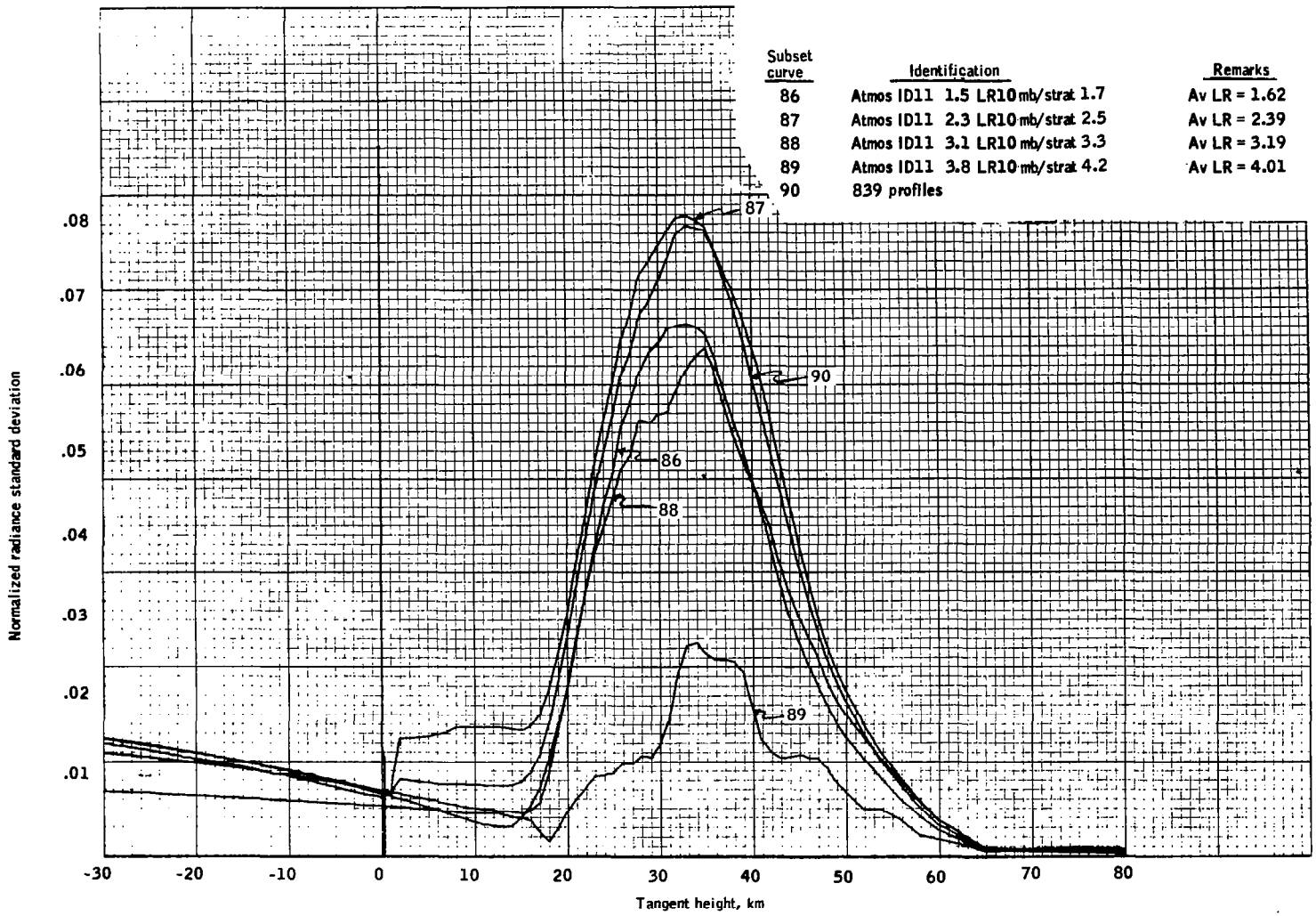


Figure A124. Normalized Radiance Standard Deviation versus Tangent Height, Set 31

Subset curve	Identification	Remarks
90	839 Profiles	
91	Sea	286 Profiles
92	Land, < 1 km	529 Profiles
93	Land, < 2 km	24 Profiles

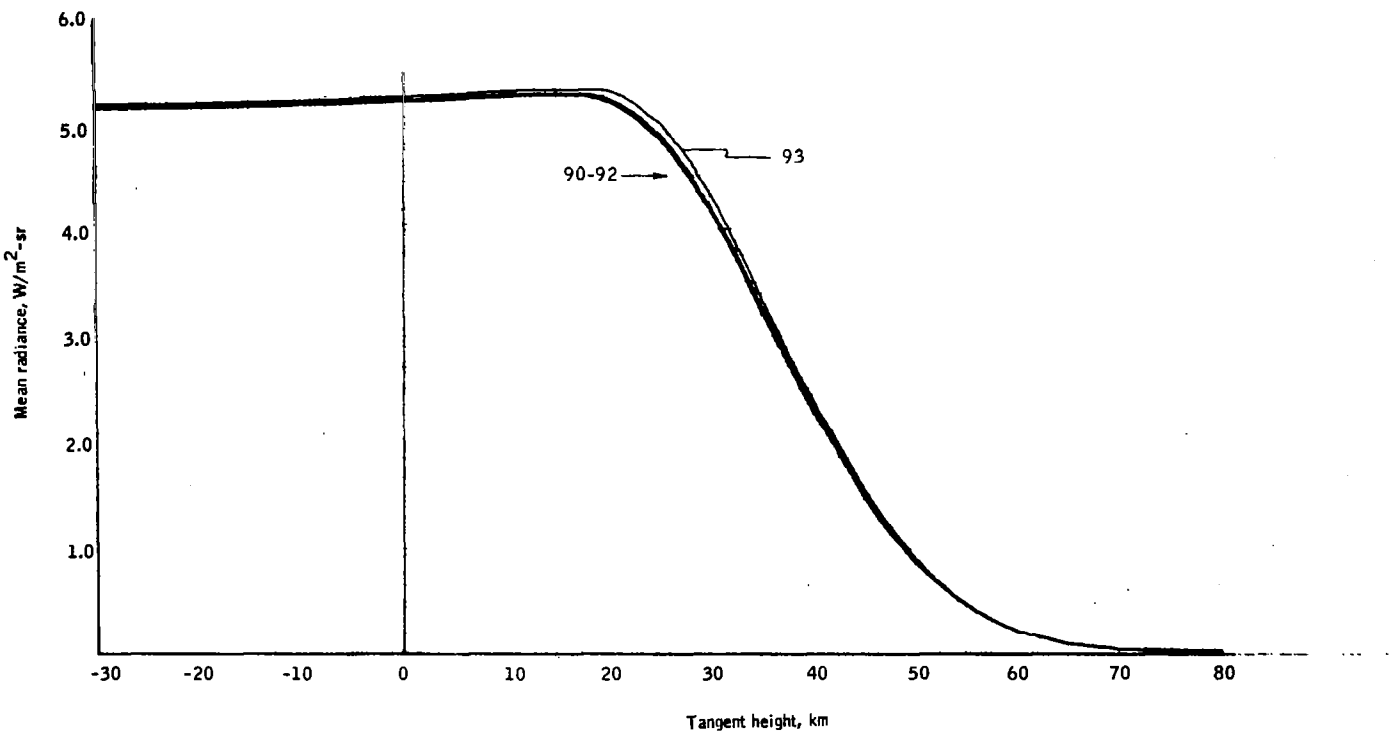


Figure A125. Mean Radiance versus Tangent Height, Set 32

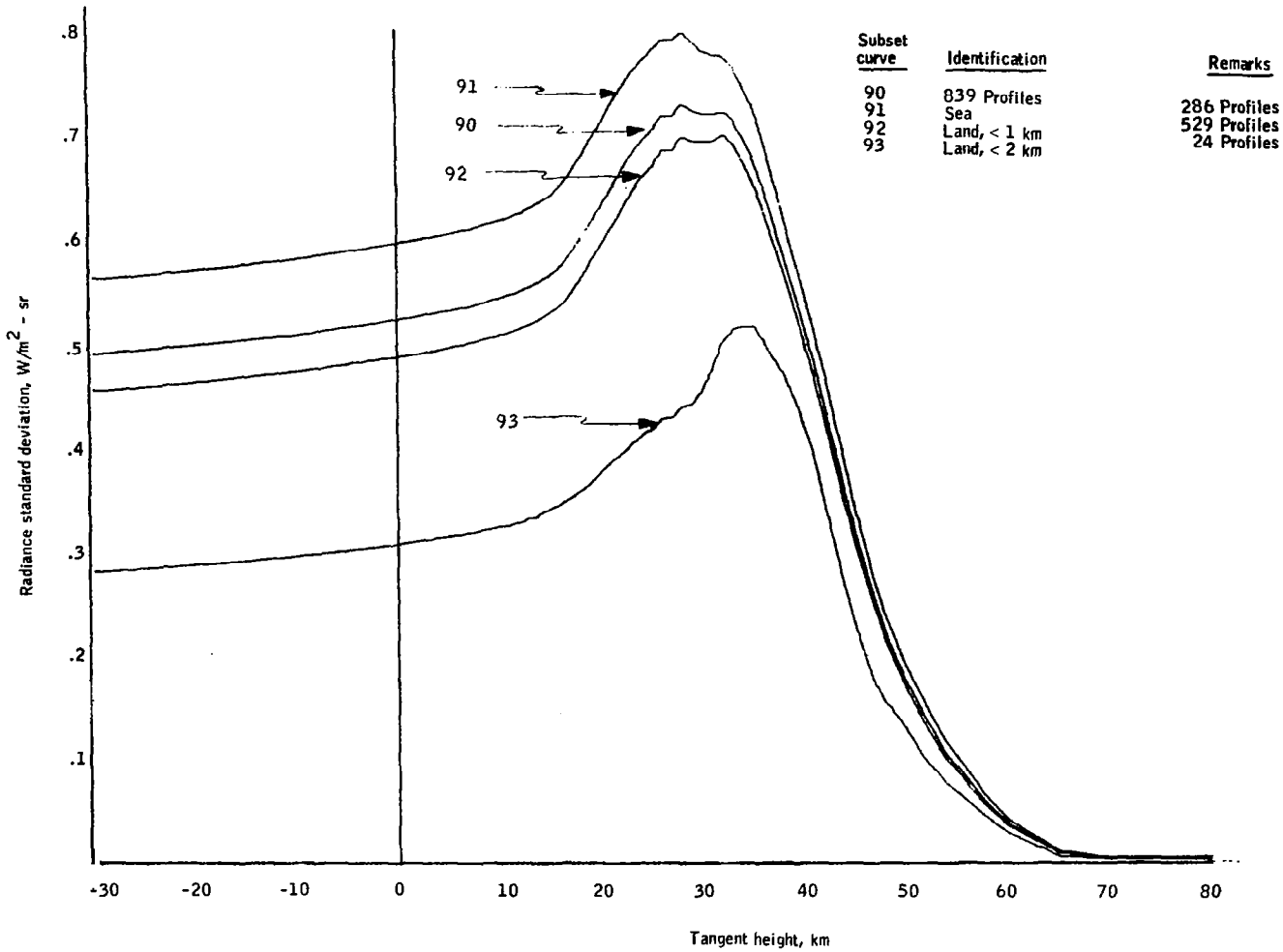


Figure A126. Radiance Standard Deviation versus Tangent Height, Set 32

Subset curve	Identification	Remarks
90	839 Profiles	
91	Sea	286 Profiles
92	Land, < 1 km	529 Profiles
93	Land, < 2 km	24 Profiles

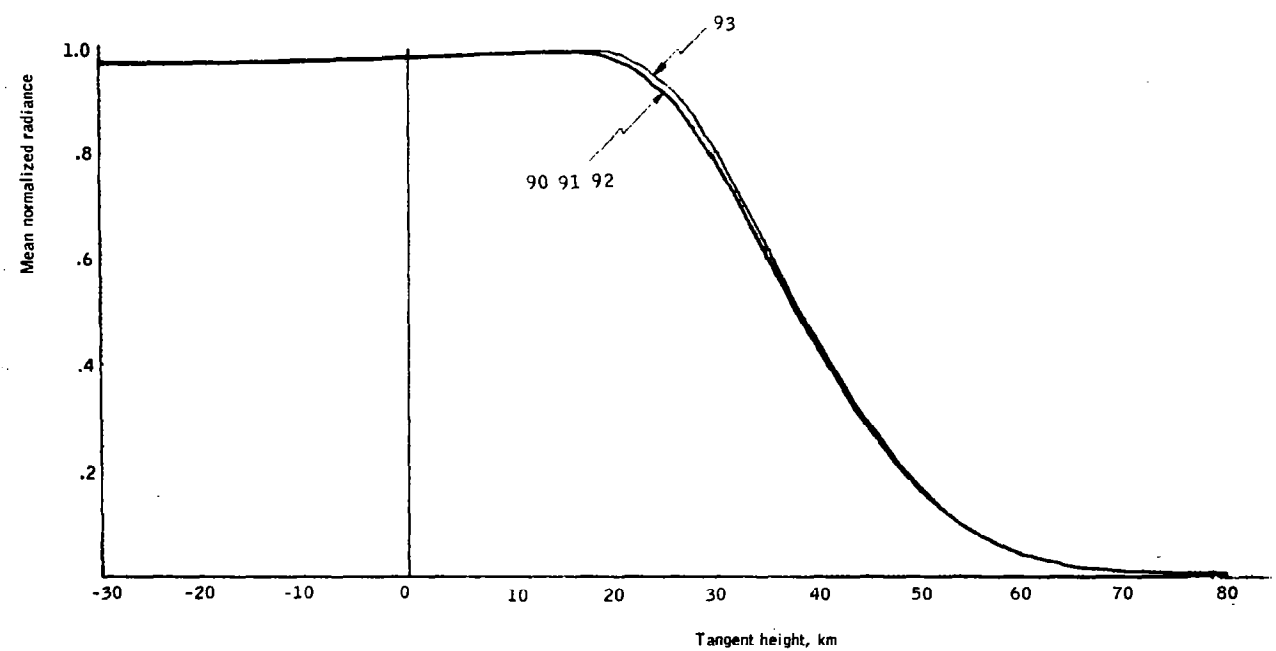


Figure A127. Mean Normalized Radiance versus Tangent Height, Set 32

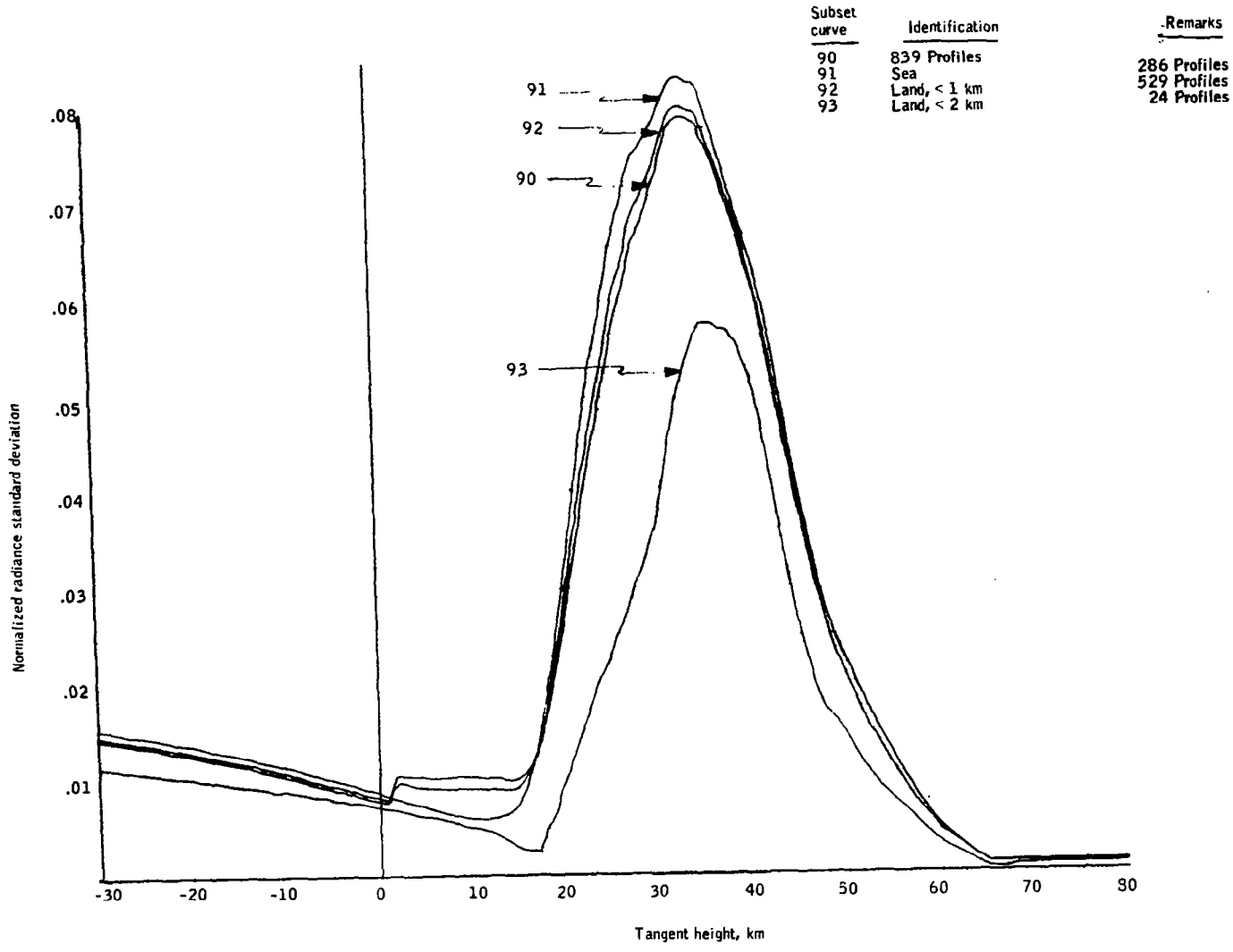


Figure A128. Normalized Radiance Standard Deviation versus Tangent Height, Set 32

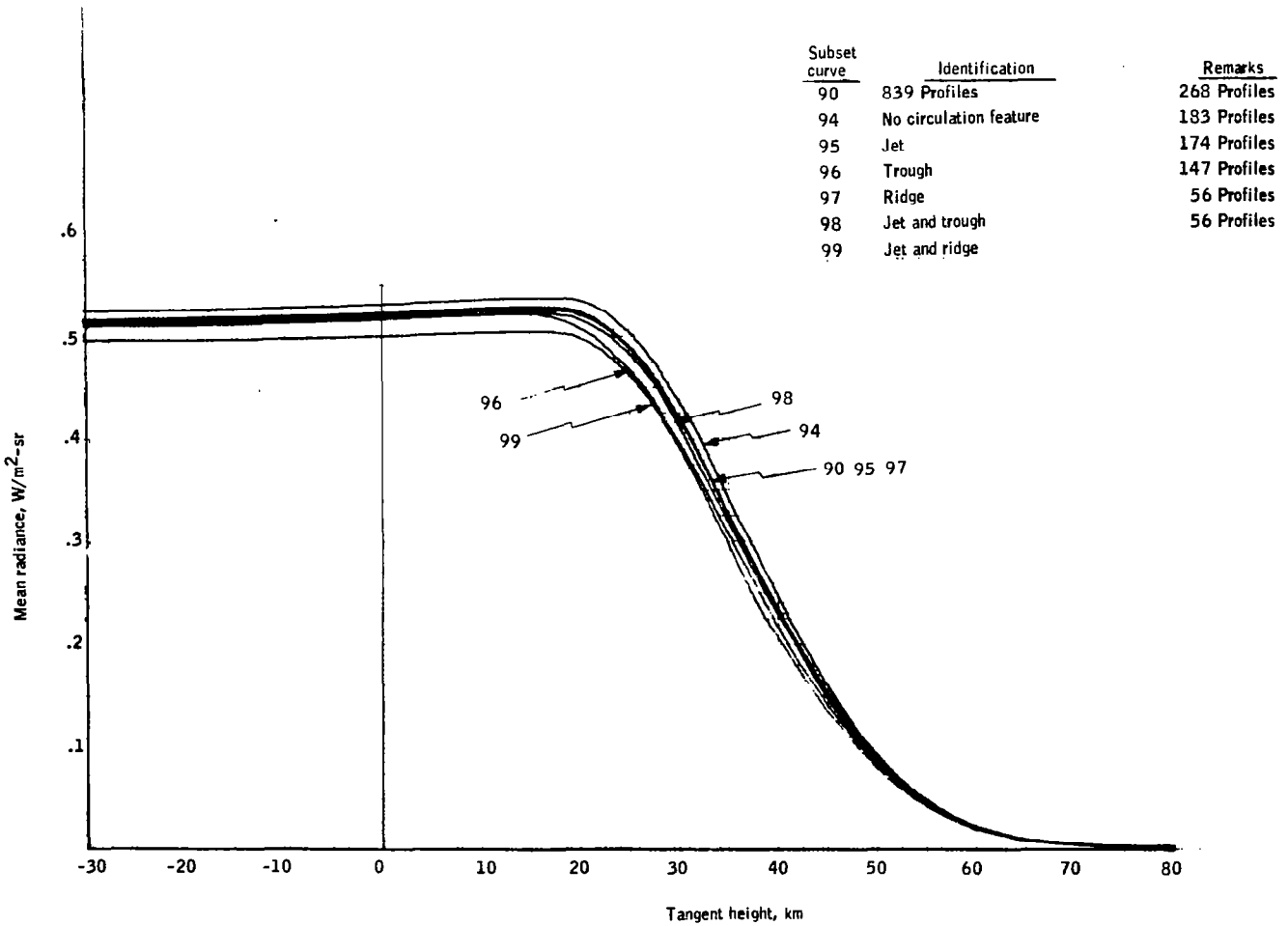


Figure A129. Mean Radiance versus Tangent Height, Set 33

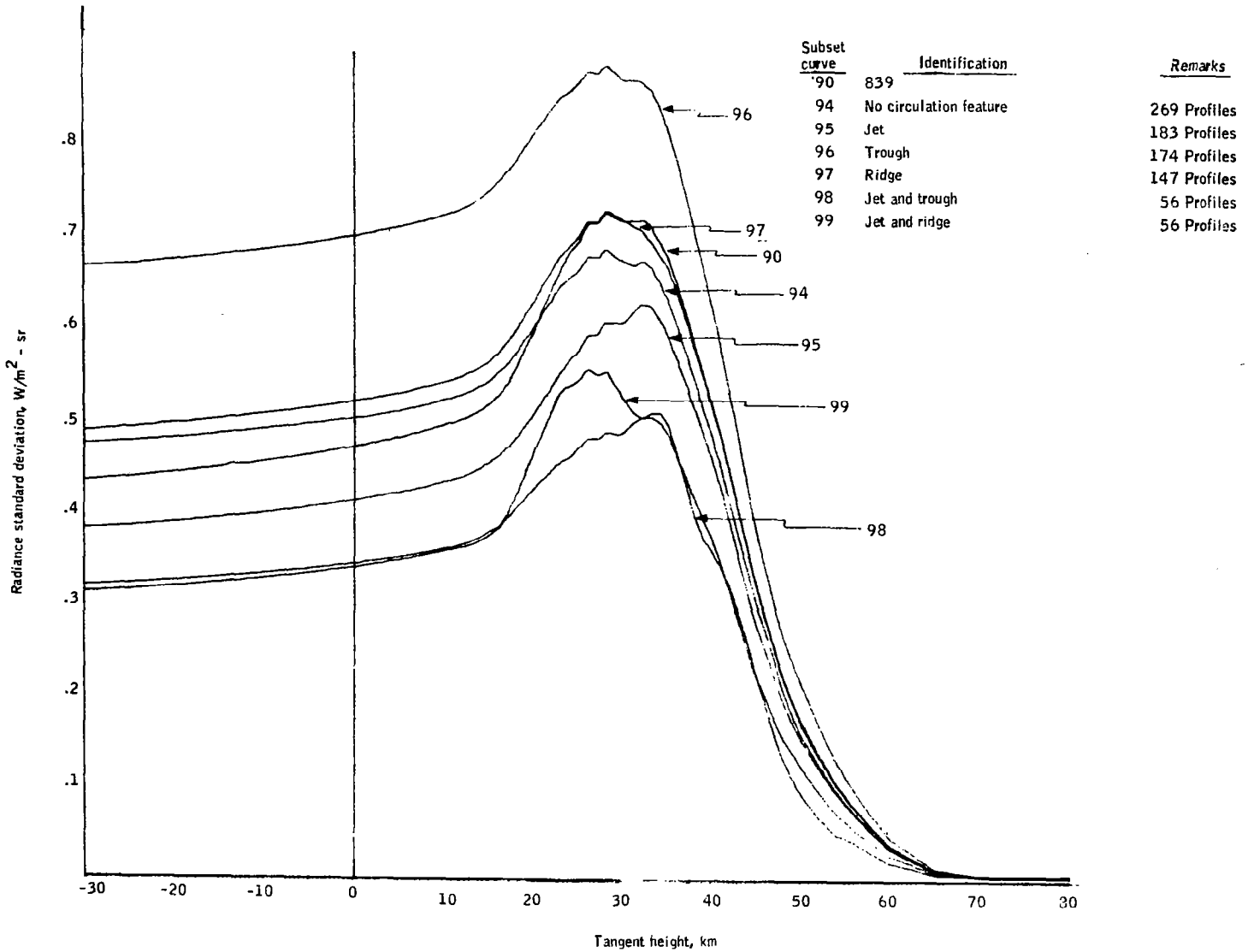


Figure A130. Radiance Standard Deviation versus Tangent Height, Set 33

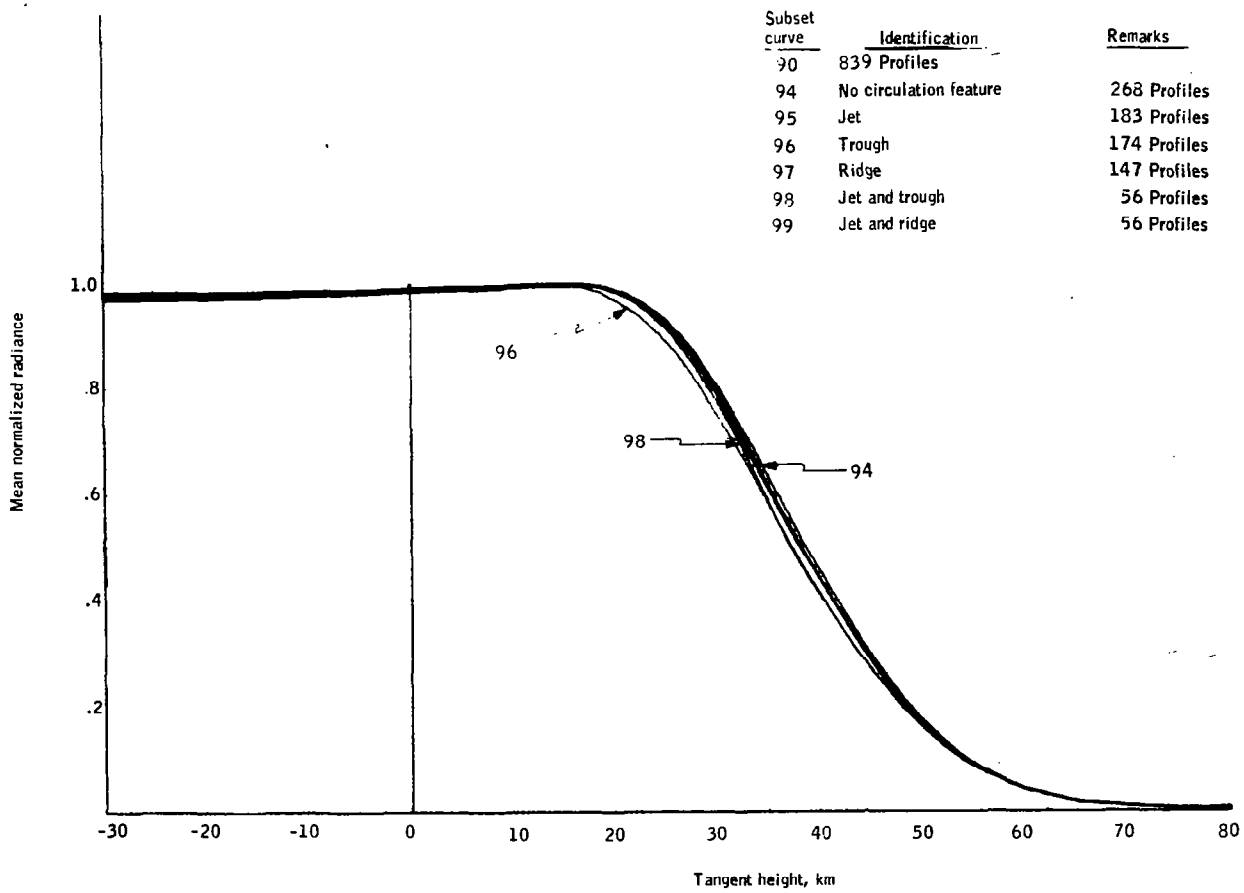
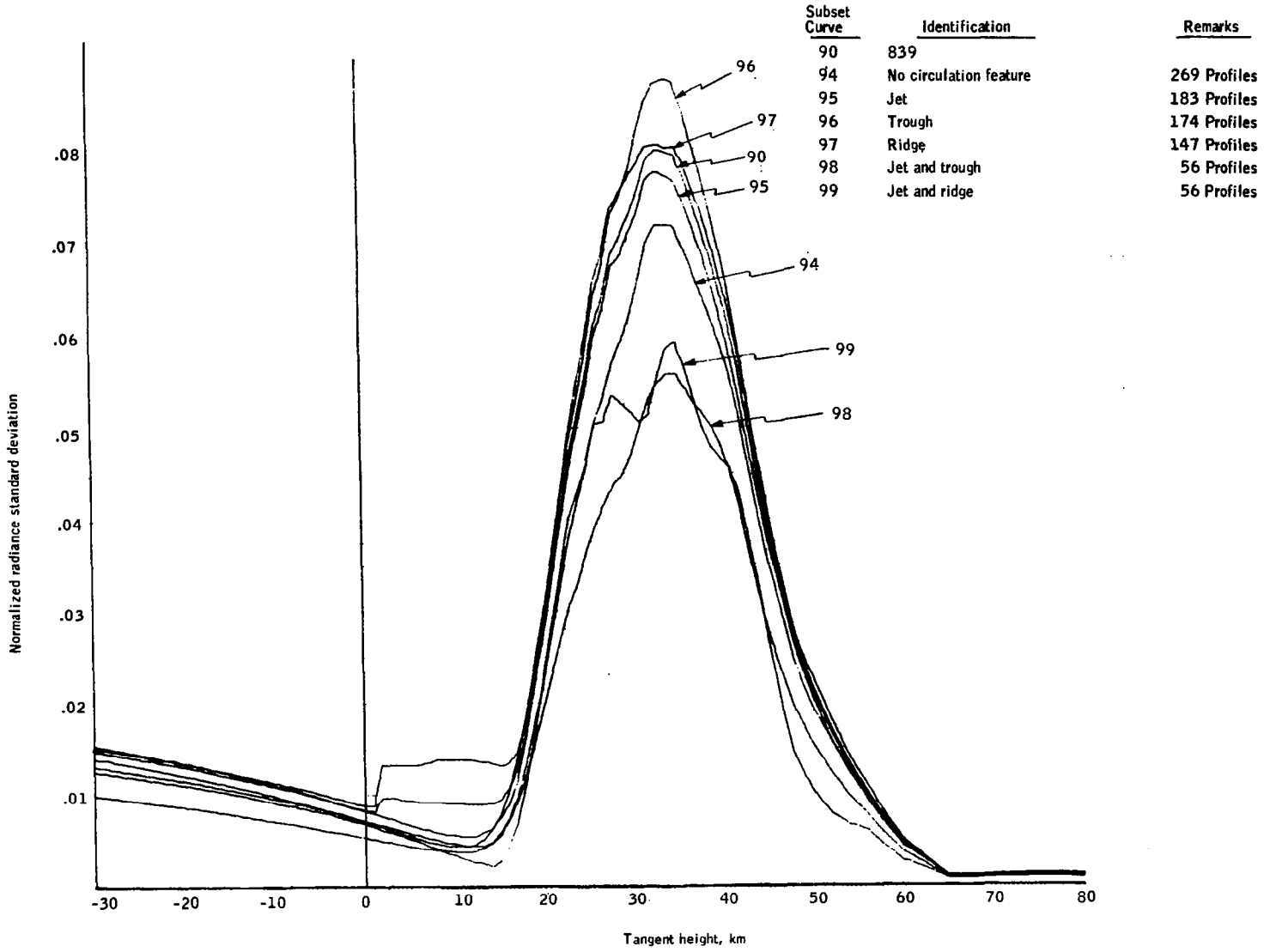


Figure A131. Mean Normalized Radiance versus Tangent Height, Set 33



Subset Curve	Identification	Remarks
90	839	
94	No circulation feature	269 Profiles
95	Jet	183 Profiles
96	Trough	174 Profiles
97	Ridge	147 Profiles
98	Jet and trough	56 Profiles
99	Jet and ridge	56 Profiles

Figure A132. Normalized Radiance Standard Deviation versus Tangent Height, Set 33

APPENDIX B

POLYNOMIAL FUNCTION FITTED TO 20 RADIANCE PROFILES

APPENDIX B

POLYNOMIAL FUNCTION FITTED TO 20 RADIANCE PROFILES

This appendix contains the radiance profile curve fits for Function 3 for twenty climotological temperature profiles. The twenty selected profiles represent January, April, July, and October at 90° West longitude and at North latitudes of 20°, 30°, 45°, 60° and 75°. Ten coefficients resulted from the use of this function, the ratio of two, fifth order polynomials.

Tables B1 through B20 show the coefficients obtained and a detailed comparison to illustrate the differences between the numerically integrated radiance profile values and the values obtained from the curve fit.

TABLE B1. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 843, JANUARY, 20°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER =	.5191955433E 01
COEFFICIENT OF H TO THE 1-TH POWER =	.2433700385E-01
COEFFICIENT OF H TO THE 2-TH POWER =	.1248527564E-03
COEFFICIENT OF H TO THE 3-TH POWER =	-.4376342200E-04
COEFFICIENT OF H TO THE 4-TH POWER =	.8429696496E-07
COEFFICIENT OF H TO THE 5-TH POWER =	.3492002345E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER =	.0000000000E-00
COEFFICIENT OF H TO THE 4-TH POWER =	.4344117600E-07
COEFFICIENT OF H TO THE 6-TH POWER =	.6834960999E-10
COEFFICIENT OF H TO THE 8-TH POWER =	.1578348326E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.0974900000	5.2365549887	.1420649887E 00	.2786959636E-01
-25.0000000000	5.1068300000	5.1581670224	.5133702235E-01	.9459614582E-02
-20.0000000000	5.1239600000	5.0483645770	-.7556042304E-01	-.1475332029E-01
-15.0000000000	5.1399400000	4.9892510064	-.1506489935E 00	-.2931726705E-01
-10.0000000000	5.1583400000	5.0028047493	-.1555352507E 00	-.3015219057E-01
-8.0000000000	5.1665000000	5.0269018432	-.1395981565E 00	-.2701986970E-01
-6.0000000000	5.1750000000	5.0596619769	-.1153380231E 00	-.2230265885E-01
-4.0000000000	5.1842700000	5.0993657325	-.7490421753E-01	-.1637727540E-01
-3.0000000000	5.1941000000	5.1441285829	-.4997141704E-01	-.9620803805E-02
.0000000000	5.2045300000	5.1919554332	-.1257456683E-01	-.2416081151E-02
1.0000000000	5.2100400000	5.2163733872	.5333387239E-02	.1215612018E-02
2.0000000000	5.2156000000	5.2407765395	.2509453948E-01	.4811746321E-02
3.0000000000	5.2215100000	5.2644973951	.4338739510E-01	.8309357848E-02
4.0000000000	5.2275700000	5.2884650907	.6084950066E-01	.1164883314E-01
5.0000000000	5.2337600000	5.3112050335	.7744503354E-01	.1479720766E-01
6.0000000000	5.2401600000	5.3328382739	.9267827393E-01	.1768615346E-01
7.0000000000	5.2466600000	5.3530806071	.1064206071E 00	.2028349600E-01
8.0000000000	5.2532500000	5.3716414023	.1183914023E 00	.2253670194E-01
9.0000000000	5.2597900000	5.3885221675	.1294321675E 00	.2461772491E-01
10.0000000000	5.2662100000	5.4025147914	.1363047914E 00	.2588290086E-01
11.0000000000	5.2711100000	5.4141996747	.1428896747E 00	.2710705208E-01
12.0000000000	5.2751300000	5.4229434416	.1478134416E 00	.2802081496E-01
13.0000000000	5.2768700000	5.4283966059	.1515266059E 00	.2871524320E-01
14.0000000000	5.2749200000	5.4301919469	.1552919469E 00	.2943571578E-01
15.0000000000	5.2761200000	5.4279374500	.1518174501E 00	.2877444980E-01
16.0000000000	5.2737100000	5.4212728200	.1475128200E 00	.2797135602E-01
17.0000000000	5.2687800000	5.4096082029	.1208282029E 00	.2288461881E-01
18.0000000000	5.3078300000	5.3926268363	.8481483632E-01	.1597962932E-01
19.0000000000	5.3259400000	5.3697829793	.4474297934E-01	.8402374319E-02
20.0000000000	5.3367000000	5.3405517109	.3851710928E-02	.1096914715E-02
21.0000000000	5.3406300000	5.3043801052	-.3624989479E-01	-.7345174496E-02
22.0000000000	5.3430400000	5.2606902050	-.8234979502E-01	-.1541253575E-01
23.0000000000	5.3328100000	5.2088430318	-.1239756982E 00	-.2323834568E-01
24.0000000000	5.2945500000	5.1483530603	-.1511969397E 00	-.2853014643E-01
25.0000000000	5.2766000000	5.0784870369	-.1881129611E 00	-.2833830044E-01
26.0000000000	5.1477100000	4.9986921161	-.1490178830E 00	-.2898438363E-01
27.0000000000	5.0293500000	4.9084092235	-.1209477764E 00	-.2404699938E-01
28.0000000000	4.9137500000	4.8071385795	-.1066114205E 00	-.2169654958E-01
29.0000000000	4.7551400000	4.6944682987	-.6067170131E-01	-.1275918297E-01
30.0000000000	4.6011100000	4.5701068114	-.3120318864E-01	-.6781370662E-02
31.0000000000	4.4069900000	4.4339179540	.2692795308E-01	.6110282524E-02
32.0000000000	4.2011900000	4.2859569382	.8476693815E-01	.2017688754E-01
33.0000000000	4.0317000000	4.1265047195	.9484671953E-01	.2351482889E-01
34.0000000000	3.8340500000	3.9560976693	.1140476693E 00	.3075719943E-01
35.0000000000	3.6486600000	3.7765490464	.1268890464E 00	.3477688970E-01
36.0000000000	3.4662900000	3.5854586996	.1191686996E 00	.3454446042E-01
37.0000000000	3.2721500000	3.3887076511	.1165576511E 00	.3562118213E-01
38.0000000000	3.0854300000	3.1854367747	.1000067747E 00	.3241258908E-01
39.0000000000	2.9163600000	2.9770046784	.6164467846E-01	.2113754077E-01
40.0000000000	2.7482200000	2.7684329708	.2021970885E-01	.7354931864E-02
41.0000000000	2.5882600000	2.5588350856	-.2942691436E-01	-.9838373214E-02
42.0000000000	2.4000400000	2.3513378092	-.5670719082E-01	-.2354703029E-01
43.0000000000	2.2077000000	2.1480002759	-.5969972411E-01	-.2704159266E-01
44.0000000000	2.0234000000	1.9507372047	-.7274279527E-01	-.3599935224E-01
45.0000000000	1.8386300000	1.7612524572	-.7773752480E-01	-.4208434693E-01
46.0000000000	1.6351400000	1.5809876916	-.5418530440E-01	-.3311784214E-01
47.0000000000	1.4474200000	1.3110896238	-.4631397623E-01	-.3178971172E-01
48.0000000000	1.2954200000	1.2523925246	-.4302747539E-01	-.3321507726E-01
49.0000000000	1.1362000000	1.1054274444	-.3077755562E-01	-.2708374991E-01
50.0000000000	1.0021800000	.9704345274	-.3174847263E-01	-.3167641804E-01
52.0000000000	.7262770000	.7360720416	.9795481504E-02	.1348664710E-01
54.0000000000	.5007480000	.5467523408	.3700834085E-01	.7259340975E-01
56.0000000000	.3815620000	.3976870774	.1612507749E-01	.4226070046E-01
58.0000000000	.2778560000	.2830280776	.5172477528E-02	.1861716944E-01
60.0000000000	.1935710000	.1967619212	.3190621237E-02	.1648450045E-01
65.0000000000	.0762147000	.0701794255	-.6034474515E-02	-.7918255290E-01
70.0000000000	.0284136000	.0203016007	-.8111993147E-02	-.2854970629E 00
75.0000000000	.0107929000	.0069453990	-.3847501007E-02	-.3564844877E 00
80.0000000000	.0057418600	.0090403617	.3298501683E-02	.5744657102E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1555352507E 00
MAXIMUM RELATIVE DIFFERENCE = .5744657102E 00

TABLE B2. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 853, JANUARY, 30°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5201111567E 01
COEFFICIENT OF H TO THE 1-TH POWER = .2110490735E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.1380615244E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4219613846E-04
COEFFICIENT OF H TO THE 4-TH POWER = .2056897849E-06
COEFFICIENT OF H TO THE 5-TH POWER = .2287038469E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .1368880866E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.5481284046E-14

ALTITUDE	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.0821000000	5.1943693989	.1122193989E 00	.2208108752E-01
-25.0000000000	5.0929000000	5.1371458878	.4417588782E-01	.8673895156E-02
-20.0000000000	5.1054000000	5.0434764981	-.6196350190E-01	-.1213676038E-01
-15.0000000000	5.1196000000	4.9968454272	-.1228245728E 00	-.2399072064E-01
-10.0000000000	5.1359000000	5.0196004122	-.1163495878E 00	-.2265395648E-01
-8.0000000000	5.1431000000	5.0456318726	-.9753812743E-01	-.1896459332E-01
-6.0000000000	5.1508000000	5.0788467846	-.7200321538E-01	-.1397889967E-01
-4.0000000000	5.1590000000	5.1172350642	-.4184493583E-01	-.8110929822E-02
-2.0000000000	5.1678000000	5.1586943588	-.9185641204E-02	-.1777448626E-02
.0000000000	5.1773000000	5.2011156777	.2391567775E-01	.4600018880E-02
1.0000000000	5.1822000000	5.2220405347	.3975053472E-01	.7670457408E-02
2.0000000000	5.1874000000	5.2424389956	.5503899560E-01	.1061013140E-01
3.0000000000	5.1927100000	5.2620652420	.6935524203E-01	.1335627101E-01
4.0000000000	5.1982000000	5.2806778095	.8241780951E-01	.1585488404E-01
5.0000000000	5.2039000000	5.2980385417	.9408854169E-01	.1808021632E-01
6.0000000000	5.2098000000	5.3139110099	.1040310099E 00	.1996802419E-01
7.0000000000	5.2159000000	5.3280583998	.1121283998E 00	.2149729786E-01
8.0000000000	5.2221000000	5.3402408829	.1181108829E 00	.2261737649E-01
9.0000000000	5.2283000000	5.3502124989	.1218624989E 00	.2330802240E-01
10.0000000000	5.2347000000	5.3577175910	.1229975910E 00	.2349649858E-01
11.0000000000	5.2409000000	5.3624868555	.1220968555E 00	.2329919252E-01
12.0000000000	5.2456000000	5.3642330867	.1186330867E 00	.2260598579E-01
13.0000000000	5.2507000000	5.3626467287	.1123467287E 00	.2140399041E-01
14.0000000000	5.2530000000	5.3573913744	.1043513744E 00	.1986494952E-01
15.0000000000	5.2556000000	5.3480993975	.9223997496E-01	.1759982010E-01
16.0000000000	5.2534000000	5.3343679478	.8098794784E-01	.1539702213E-01
17.0000000000	5.2569700000	5.3157556010	.5978560097E-01	.1118241134E-01
18.0000000000	5.2568000000	5.2917800136	.3498001360E-01	.6654240907E-02
19.0000000000	5.2541900000	5.2619170121	.7727012140E-02	.1470638127E-02
20.0000000000	5.2380500000	5.2256016100	-.1244839004E-01	-.2376531351E-02
21.0000000000	5.2172500000	5.1822315168	-.3004848321E-01	-.5764940335E-02
22.0000000000	5.1747600000	5.1311737527	-.4358624731E-01	-.8422853873E-02
23.0000000000	5.1383400000	5.0717749937	-.6656500626E-01	-.1295457410E-01
24.0000000000	5.0831900000	5.0043762413	-.7991375874E-01	-.1570151002E-01
25.0000000000	5.0162100000	4.9253322900	-.9087770998E-01	-.1811680731E-01
26.0000000000	4.9527700000	4.8370362569	-.1157337431E 00	-.2336747781E-01
27.0000000000	4.8497300000	4.7379490899	-.1117809101E 00	-.2304889347E-01
28.0000000000	4.7432600000	4.6276335023	-.1156764977E 00	-.2437701026E-01
29.0000000000	4.5645100000	4.5057911767	-.8871882332E-01	-.1930974648E-01
30.0000000000	4.4412300000	4.3723013832	-.6892861678E-01	-.1552016373E-01
31.0000000000	4.2375000000	4.2272584438	-.1024155620E-01	-.2416886419E-02
32.0000000000	4.0211600000	4.0710048419	.4984484192E-01	.1239563756E-01
33.0000000000	3.8442000000	3.9041563745	.5995637453E-01	.1559658044E-01
34.0000000000	3.6426200000	3.7276157094	.8499570945E-01	.2333367451E-01
35.0000000000	3.4467000000	3.5425711726	.9587117255E-01	.2781535146E-01
36.0000000000	3.2594900000	3.3504785980	.9098859799E-01	.2791497995E-01
37.0000000000	3.0606700000	3.1530255861	.9235558605E-01	.3017495713E-01
38.0000000000	2.8695300000	2.9520793601	.8254936010E-01	.2876755430E-01
39.0000000000	2.6955200000	2.7496213296	.5410132963E-01	.2007083221E-01
40.0000000000	2.5168200000	2.5476731167	.3085311671E-01	.1225876968E-01
41.0000000000	2.3476900000	2.3482198911	.5298911128E-03	.2257074455E-03
42.0000000000	2.1719400000	2.1531371646	-.1880283539E-01	-.8657161518E-02
43.0000000000	1.9802600000	1.9641266730	-.1613332698E-01	-.8147075141E-02
44.0000000000	1.8092700000	1.7826657301	-.2660426986E-01	-.1470442215E-01
45.0000000000	1.6448000000	1.6099727265	-.3482727353E-01	-.2117416922E-01
46.0000000000	1.4759100000	1.4469895792	-.2892042084E-01	-.1959497587E-01
47.0000000000	1.3293400000	1.2943802250	-.3495977502E-01	-.2629859556E-01
48.0000000000	1.1947300000	1.1525429140	-.4152708598E-01	-.3477776511E-01
49.0000000000	1.0595700000	1.0216332264	-.3793677359E-01	-.3580393328E-01
50.0000000000	.9436540000	.9015944103	-.4205958967E-01	-.4457098648E-01
52.0000000000	.6962210000	.6930480695	-.3172930531E-02	-.4557361141E-02
54.0000000000	.4927500000	.5235203569	.3077035688E-01	.6244618341E-01
56.0000000000	.3696320000	.3883753716	.1874337155E-01	.5070819505E-01
58.0000000000	.2710490000	.2825435759	.1149457594E-01	.4240774155E-01
60.0000000000	.1901370000	.2010767664	.1093976643E-01	.5753623140E-01
65.0000000000	.0789590000	.0758904670	-.3069132993E-02	-.3886966237E-01
70.0000000000	.0311321000	.0223106382	-.8821461816E-02	-.2833558230E 00
75.0000000000	.0131230000	.0071089231	-.6014876914E-02	-.4583182397E 00
80.0000000000	.0071401400	.0115829646	.4442824599E-02	.6222321409E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1229975910E 00
MAXIMUM RELATIVE DIFFERENCE = .6222321409E 00

TABLE B3. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 863, JANUARY, 45°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5197731910E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1225374872E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.1210934257E-02
COEFFICIENT OF H TO THE 3-TH POWER = -.3419565461E-04
COEFFICIENT OF H TO THE 4-TH POWER = .5694681924E-06
COEFFICIENT OF H TO THE 5-TH POWER = -.1502581968E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = -.3117911999E-06
COEFFICIENT OF H TO THE 6-TH POWER = .4341378654E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.9267094150E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.0311100000	5.1452169968	.1141069968E 00	.2268028265E-01
-25.0000000000	5.0384000000	5.0574199195	.1861891954E-01	.3695108855E-02
-20.0000000000	5.0474000000	4.9591424199	-.8832758007E-01	-.1749937693E-01
-15.0000000000	5.0573300000	4.9415832585	-.1157467415E 00	-.2288697680E-01
-10.0000000000	5.0686700000	5.0076273469	-.6104265313E-01	-.1204313028E-01
-8.0000000000	5.0736400000	5.0479721940	-.2566780601E-01	-.5059051492E-02
-6.0000000000	5.0790100000	5.0907065080	.1169650801E-01	.2302911002E-02
-4.0000000000	5.0847000000	5.1320783598	.4737835977E-01	.9317827949E-02
-2.0000000000	5.0908400000	5.1686890498	.7782904984E-01	.1528799650E-01
.0000000000	5.0974700000	5.1977319182	.1002619182E 00	.1966895699E-01
1.0000000000	5.1009500000	5.2087477267	.1077927267E 00	.2113189243E-01
2.0000000000	5.1046100000	5.2171570585	.1125470585E 00	.2204812092E-01
3.0000000000	5.1083800000	5.2224474888	.1144674888E 00	.2240776657E-01
4.0000000000	5.1123100000	5.2257355380	.1134255380E 00	.2218674385E-01
5.0000000000	5.1164000000	5.2257871575	.1093871575E 00	.2137971182E-01
6.0000000000	5.1205100000	5.2230064024	.1023964024E 00	.1999691490E-01
7.0000000000	5.1249700000	5.2174274347	.9245743466E-01	.1804058066E-01
8.0000000000	5.1294500000	5.2091050447	.7965504467E-01	.1552894475E-01
9.0000000000	5.1340000000	5.1981039050	.6410390495E-01	.1248615211E-01
10.0000000000	5.1389400000	5.1844867853	.4554678530E-01	.8863070069E-02
11.0000000000	5.1439200000	5.1683019640	.2438196396E-01	.4739957845E-02
12.0000000000	5.1489300000	5.1499700661	.1640066097E-02	.3185874899E-03
13.0000000000	5.1539000000	5.1282705675	-.2372943249E-01	-.4605869108E-02
14.0000000000	5.1581200000	5.1043282126	-.4789178741E-01	-.9278063133E-02
15.0000000000	5.1465300000	5.0775996357	-.6893036430E-01	-.1339356116E-01
16.0000000000	5.1382000000	5.0478605443	-.9033945565E-01	-.1758192688E-01
17.0000000000	5.1174000000	5.0147939348	-.1021460652E 00	-.1996233498E-01
18.0000000000	5.0847800000	4.9779799756	-.1068100244E 00	-.2100574872E-01
19.0000000000	5.0348100000	4.9369886077	-.1020215923E 00	-.2026475818E-01
0.0000000000	4.9941600000	4.8908745730	-.1032854270E 00	-.2068124108E-01
21.0000000000	4.9242000000	4.8391804736	-.8573952640E-01	-.1740937369E-01
22.0000000000	4.8452600000	4.7809425431	-.6431745685E-01	-.1327439455E-01
23.0000000000	4.7765700000	4.7152080162	-.6136198375E-01	-.1284645337E-01
24.0000000000	4.6911400000	4.6409618192	-.5017818078E-01	-.1069637248E-01
25.0000000000	4.6207000000	4.5571656557	-.4353434434E-01	-.1374993946E-01
26.0000000000	4.5564700000	4.4628102825	-.9365971747E-01	-.2055532407E-01
27.0000000000	4.4598000000	4.3569807578	-.1029992422E 00	-.2309410405E-01
28.0000000000	4.3554300000	4.2389326300	-.1164973700E 00	-.2674761619E-01
29.0000000000	4.2058300000	4.1081747165	-.0765528352E-01	-.2321902776E-01
30.0000000000	4.0463000000	3.9645515613	-.8174843871E-01	-.2020325698E-01
31.0000000000	3.8345900000	3.8083163674	-.2627363257E-01	-.6851744924E-02
32.0000000000	3.6078700000	3.6401838505	.3143385051E-01	.8710453900E-02
33.0000000000	3.4184200000	3.4613527495	.4292274946E-01	.1255627568E-01
34.0000000000	3.1919700000	3.2734901455	.8162014561E-01	.2553912273E-01
35.0000000000	2.9761000000	3.0786742712	.1020642712E 00	.3428876177E-01
36.0000000000	2.7385300000	2.8792984812	.9576848123E-01	.3440540653E-01
37.0000000000	2.5206000000	2.6779452771	.8734527713E-01	.3371623491E-01
38.0000000000	2.4056000000	2.4772442222	.7164422217E-01	.2978226728E-01
39.0000000000	2.2318000000	2.2797300113	.4787001135E-01	.2144948303E-01
40.0000000000	2.0420000000	2.0877162825	.4566628250E-01	.2236294002E-01
41.0000000000	1.8667700000	1.9031972879	.3647728791E-01	.1954084503E-01
42.0000000000	1.6845600000	1.7277843117	.3822431175E-01	.2262382617E-01
43.0000000000	1.4948000000	1.5626780855	.6778808551E-01	.4534653754E-01
44.0000000000	1.3475300000	1.4086736426	.6814364264E-01	.5083335882E-01
45.0000000000	1.2170000000	1.2661909330	.5406083298E-01	.4459983386E-01
46.0000000000	1.1202100000	1.1353222988	.1511229883E-01	.1349059447E-01
47.0000000000	1.0416300000	1.0158908540	-.2573914600E-01	-.2471044997E-01
48.0000000000	.9851500000	.9075094154	-.5280558456E-01	-.5498777439E-01
49.0000000000	.8624300000	.8096388762	-.5279462382E-01	-.6121591337E-01
50.0000000000	.7733200000	.7216371431	-.5168285695E-01	-.6683243282E-01
52.0000000000	.5978150000	.5724333510	-.1538164896E-01	-.2616749991E-01
54.0000000000	.4271870000	.4542301795	.2705217947E-01	.6332631721E-01
56.0000000000	.3260780000	.3618835882	.3980558818E-01	.1235899011E 00
58.0000000000	.2386180000	.2914373457	.5281934574E-01	.2213552445E 00
60.0000000000	.1726740000	.2420817275	.6940772754E-01	.4019581844E 00
65.0000000000	.0861800000	.0672947156	-.1388618440E-01	-.1710523584E 00
70.0000000000	.0337870000	.0520369287	.1226902872E-01	.3085158814E 00
75.0000000000	.0277690000	.0274231476	.4696747589E-02	.2066388282E 00
80.0000000000	.0158580000	.0126938868	-.3141913225E-02	-.1443746360E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1164973700E 00
MAXIMUM RELATIVE DIFFERENCE = .4019581844E 00

TABLE B4. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 873, JANUARY, 60°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .4668411423E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1312821101E-01
COEFFICIENT OF H TO THE 2-TH POWER = .3114278738E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4763945515E-04
COEFFICIENT OF H TO THE 4-TH POWER = .2536733885E-06
COEFFICIENT OF H TO THE 5-TH POWER = .1635935184E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .4076392252E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.9107614637E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	4.7660400000	4.8543478580	.8830785802E-01	.1852855998E-01
-25.0000000000	4.7706100000	4.9393983672	.1687883672E 00	.3538087733E-01
-20.0000000000	4.7757400000	4.8320890582	.5630905819E-01	.1179054692E-01
-15.0000000000	4.7916700000	4.6932461182	-.9842388180E-01	-.1849726936E-01
-10.0000000000	4.7864300000	4.6164448982	-.1719851038E 00	-.3591680443E-01
-8.0000000000	4.7914300000	4.6032095667	-.1832214333E 00	-.3823940521E-01
-6.0000000000	4.7946100000	4.6113727245	-.1832372755E 00	-.3821734728E-01
-4.0000000000	4.7979500000	4.6239859218	-.1739740782E 00	-.3626001014E-01
-2.0000000000	4.8015300000	4.6437857130	-.1577942870E 00	-.3286292359E-01
.0000000000	4.8054200000	4.6684114225	-.1370085775E 00	-.2851125968E-01
1.0000000000	4.8074200000	4.6818036753	-.1256763247E 00	-.2614187996E-01
2.0000000000	4.8096100000	4.6955364291	-.1140735709E 00	-.2371784217E-01
3.0000000000	4.8118200000	4.7093321895	-.1024878105E 00	-.2129917795E-01
4.0000000000	4.8141400000	4.7229169454	-.9122305464E-01	-.1894898251E-01
5.0000000000	4.8165000000	4.7369169038	-.8048309622E-01	-.1670987153E-01
6.0000000000	4.8189200000	4.7483539698	-.7056613021E-01	-.1464355711E-01
7.0000000000	4.8214100000	4.7596393318	-.6177068820E-01	-.1281174349E-01
8.0000000000	4.8239100000	4.7695673571	-.5413264285E-01	-.1122222420E-01
9.0000000000	4.8263200000	4.7778064537	-.4851354625E-01	-.1005187104E-01
10.0000000000	4.8290800000	4.7839906208	-.4508937920E-01	-.9337053683E-02
11.0000000000	4.8314600000	4.7877098912	-.4375010879E-01	-.9055256338E-02
12.0000000000	4.8321400000	4.7885007739	-.4348922606E-01	-.9041289952E-02
13.0000000000	4.8299400000	4.7858371302	-.4410286984E-01	-.9131142383E-02
14.0000000000	4.8253400000	4.7791221717	-.4621782826E-01	-.9578149573E-02
15.0000000000	4.8112700000	4.7676824499	-.4358755010E-01	-.9059468726E-02
16.0000000000	4.7435400000	4.7507648949	-.3517510508E-01	-.7349675315E-02
17.0000000000	4.7555400000	4.7275381617	-.2802183831E-01	-.5892437129E-02
18.0000000000	4.7053800000	4.6970996917	-.8280308291E-02	-.1759753366E-02
19.0000000000	4.6357700000	4.6584899791	.2171997914E-01	.4684290818E-02
20.0000000000	4.5395500000	4.6107154539	.5116545394E-01	.1122180148E-01
21.0000000000	4.4778100000	4.5527810987	.1049710987E 00	.2360062563E-01
22.0000000000	4.3349100000	4.4837333155	.1488233155E 00	.3433133071E-01
23.0000000000	4.2287300000	4.4027126010	.1739826010E 00	.4114299117E-01
24.0000000000	4.1573000000	4.3090142580	.1412142580E 00	.3388220597E-01
25.0000000000	4.1320700000	4.2021537664	.7008376635E-01	.1696093395E-01
26.0000000000	4.0849400000	4.0819317288	-.7908271170E-02	-.7119604730E-03
27.0000000000	4.0107300000	3.9484918394	-.6223816457E-01	-.1551791434E-01
28.0000000000	3.9144300000	3.8023644417	-.1120655583E 00	-.2862883185E-01
29.0000000000	3.7421800000	3.6444885394	-.1376914605E 00	-.3640531606E-01
30.0000000000	3.6242900000	3.4762063820	-.1480836180E 00	-.4085865591E-01
31.0000000000	3.4300100000	3.2992278207	-.1037821793E 00	-.3049717141E-01
32.0000000000	3.1474800000	3.1155651664	-.5231483361E-01	-.1651414675E-01
33.0000000000	2.9211600000	2.9274434538	-.4371654622E-01	-.1471362909E-01
34.0000000000	2.7357700000	2.7371945135	.1424513452E-02	.5206997736E-03
35.0000000000	2.5166700000	2.5471454670	.3047546705E-01	.1210944107E-01
36.0000000000	2.3291200000	2.3595126871	.3039268707E-01	.1304900008E-01
37.0000000000	2.1460100000	2.1763108767	.2830087671E-01	.1317539337E-01
38.0000000000	1.9766800000	1.9992841407	.2260414066E-01	.1143540718E-01
39.0000000000	1.8165500000	1.8298624281	.1331242805E-01	.7328412680E-02
40.0000000000	1.6374400000	1.6691432904	.3170329040E-01	.1936149746E-01
41.0000000000	1.4708900000	1.5178961057	.3904610567E-01	.2640301949E-01
42.0000000000	1.3262300000	1.3765841165	.5035411647E-01	.3796786113E-01
43.0000000000	1.1744400000	1.2453988620	.7095886196E-01	.6041931641E-01
44.0000000000	1.0658800000	1.1243016955	.6841169547E-01	.6479055154E-01
45.0000000000	.9592340000	1.0130677941	.5383379411E-01	.5612164926E-01
46.0000000000	.8931070000	.9113290990	.1822209902E-01	.2040304141E-01
47.0000000000	.8363030000	.8186137251	.1768927492E-01	.2115175351E-01
48.0000000000	.7769210000	.7343803850	-.4254061498E-01	-.5475530338E-01
49.0000000000	.7041890000	.6580471891	-.4614181089E-01	-.6552479384E-01
50.0000000000	.6370880000	.5890147811	-.4807321886E-01	-.7545773717E-01
52.0000000000	.4946260000	.4704697774	-.2415622256E-01	-.4883734804E-01
54.0000000000	.3690500000	.3741651926	.5115192574E-02	.1386043239E-01
56.0000000000	.2832480000	.2959448787	.1269687875E-01	.4482601376E-01
58.0000000000	.2176270000	.2321233807	.1449638071E-01	.6661113146E-01
60.0000000000	.1670080000	.1793558757	.1234787574E-01	.7393583385E-01
65.0000000000	.0442361000	.0664515248	-.2778457519E-01	-.2948400388E 00
70.0000000000	.0573996000	.0109860293	.5168642935E-01	.9004667167E 00
75.0000000000	.0375987000	.0445060365	.6907336518E-02	.1837121102E 00
80.0000000000	.0247382000	.0206607690	-.4077431025E-02	-.1648232703E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1832372755E 00
MAXIMUM RELATIVE DIFFERENCE = .9004667167E 00

TABLE B5. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 883, JANUARY, 75°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER =	.4370785477E 01
COEFFICIENT OF H TO THE 1-TH POWER =	.7134978190E-02
COEFFICIENT OF H TO THE 2-TH POWER =	-.1346164743E-02
COEFFICIENT OF H TO THE 3-TH POWER =	-.3044999270E-04
COEFFICIENT OF H TO THE 4-TH POWER =	.5375538458E-06
COEFFICIENT OF H TO THE 5-TH POWER =	-.2359681503E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER =	-.5371187212E-06
COEFFICIENT OF H TO THE 6-TH POWER =	.7887274580E-09
COEFFICIENT OF H TO THE 8-TH POWER =	-.2457562670E-12

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	4.2568700000	4.3529205457	.9605054568E-01	.2256365401E-01
-25.0000000000	4.2598100000	4.2950217358	.3521173577E-01	.8246034346E-02
-20.0000000000	4.2431700000	4.2022302230	-.6093077611E-01	-.1429447480E-01
-15.0000000000	4.2670300000	4.1712229331	-.9580706694E-01	-.2245286931E-01
-10.0000000000	4.2714900000	4.2203239017	-.5116609835E-01	-.1197851207E-01
-8.0000000000	4.2734700000	4.2539174266	-.1955257339E-01	-.4575338867E-02
-6.0000000000	4.2755900000	4.2894358518	.1404585176E-01	.3285125972E-02
-4.0000000000	4.2778400000	4.3233763350	.4553633496E-01	.1064470269E-01
-2.0000000000	4.2802000000	4.3514203142	.7122031419E-01	.1663948278E-01
.0000000000	4.2827400000	4.3707854770	.8804547699E-01	.2055821203E-01
1.0000000000	4.2840800000	4.3765447229	.9246672288E-01	.2158370929E-01
2.0000000000	4.2854700000	4.3734731157	.9400311569E-01	.2193531064E-01
3.0000000000	4.2868700000	4.3794837729	.9261377294E-01	.2160405446E-01
4.0000000000	4.2883600000	4.3765608708	.8820087080E-01	.2056750618E-01
5.0000000000	4.2898100000	4.3707424072	.8093240723E-01	.1886619856E-01
6.0000000000	4.2913100000	4.3621123095	.7080230952E-01	.1649899670E-01
7.0000000000	4.2928400000	4.3507882256	.5794822561E-01	.1349880862E-01
8.0000000000	4.2942600000	4.3369074052	.4264740524E-01	.0931258293E-02
9.0000000000	4.2956900000	4.3206111057	.2492110569E-01	.5801420898E-02
10.0000000000	4.2970600000	4.3020279570	.4967657037E-02	.1156129316E-02
11.0000000000	4.2976600000	4.2812566979	-.1640330214E-01	-.3816798477E-02
12.0000000000	4.2959200000	4.2583486888	-.3757133121E-01	-.8745817243E-02
13.0000000000	4.2905200000	4.2332904364	-.5722956336E-01	-.1333860776E-01
14.0000000000	4.2826000000	4.2059869464	-.7697305361E-01	-.1791929914E-01
15.0000000000	4.2652600000	4.1762456765	-.8901432354E-01	-.2086961253E-01
16.0000000000	4.2399800000	4.1437624244	-.9621757564E-01	-.2269293149E-01
17.0000000000	4.2023200000	4.1081005875	-.9421041248E-01	-.2241866605E-01
18.0000000000	4.1597200000	4.0647281316	-.9499186840E-01	-.2187451761E-01
19.0000000000	4.0901500000	4.0249248367	-.6522516326E-01	-.1594688783E-01
20.0000000000	3.9899100000	3.9758768445	-.1403315549E-01	-.3517160910E-02
21.0000000000	3.8776400000	3.9206459022	.4300590220E-01	.1109074133E-01
22.0000000000	3.7928300000	3.8582048997	.6537489966E-01	.1723644341E-01
23.0000000000	3.6993000000	3.7874791145	.8817911452E-01	.2383670276E-01
24.0000000000	3.6468800000	3.7074038230	.6052382298E-01	.1659605553E-01
25.0000000000	3.6114200000	3.6169983330	.5578372977E-02	.1544649082E-02
26.0000000000	3.5442000000	3.5154543515	-.2874564851E-01	-.8110614926E-02
27.0000000000	3.4749700000	3.4022332118	-.7273778816E-01	-.2093191831E-01
28.0000000000	3.3723600000	3.2771570972	-.9520290777E-01	-.2823034989E-01
29.0000000000	3.2377800000	3.1405014357	-.9778566427E-01	-.3004483451E-01
30.0000000000	3.0792200000	2.9938442925	-.8417970749E-01	-.2798751226E-01
31.0000000000	2.8624900000	2.8360665367	-.2642346377E-01	-.9230936622E-02
32.0000000000	2.6394600000	2.6713572054	.3189720544E-01	.1208474667E-01
33.0000000000	2.4615500000	2.5010896972	.3953969723E-01	.1606292670E-01
34.0000000000	2.2562800000	2.3277151006	.7143510062E-01	.3166056545E-01
35.0000000000	2.0676000000	2.1539039338	.8620393885E-01	.4169275191E-01
36.0000000000	1.9070300000	1.9818844786	.7485447857E-01	.3925186210E-01
37.0000000000	1.7484000000	1.8142944644	.6589446444E-01	.3768843768E-01
38.0000000000	1.6032400000	1.6530430814	.4982308143E-01	.3107649599E-01
39.0000000000	1.4784200000	1.4998335551	.2141355508E-01	.1448809103E-01
40.0000000000	1.3507300000	1.3558228843	.5098884314E-02	.3774910096E-02
41.0000000000	1.2370700000	1.2219567905	-.1521320950E-01	-.1229777579E-01
42.0000000000	1.1285000000	1.0983457343	-.3015426568E-01	-.2672066077E-01
43.0000000000	1.0205500000	.9854024692	-.3514753078E-01	-.3443979304E-01
44.0000000000	.9306610000	.8828829207	-.4771807927E-01	-.5127662583E-01
45.0000000000	.8512170000	.7904723255	-.6074467450E-01	-.7136214914E-01
46.0000000000	.7839740000	.7077795839	-.7619241611E-01	-.9718997838E-01
47.0000000000	.7258170000	.6344747708	-.9134722918E-01	-.1258474646E 00
48.0000000000	.6697440000	.5705874379	-.9915656224E-01	-.1480514379E 00
49.0000000000	.6092070000	.5175631364	-.9164386363E-01	-.1504314028E 00
50.0000000000	.5521780000	.4854894258	-.6668857420E-01	-.1207736893E 00
52.0000000000	.4264970000	.3106369841	-.1158600159E 00	-.2716549376E 00
54.0000000000	.3158980000	.2679313170	-.4796668304E-01	-.1518423132E 00
56.0000000000	.2430770000	.2178485916	-.2522840844E-01	-.1037877234E 00
58.0000000000	.1875490000	.1763445374	-.1120446261E-01	-.5974152147E-01
60.0000000000	.1438150000	.1420813755	-.8336344673E-03	-.5796505700E-02
65.0000000000	.0828921000	.0860049538	.3112853836E-02	.3755308209E-01
70.0000000000	.0515914000	.0531381803	.1546680336E-02	.2997936358E-01
75.0000000000	.0345030000	.0337310851	-.7727149235E-03	-.2239506731E-01
80.0000000000	.0221994000	.0219741689	-.2252310780E-03	-.1014581826E-01

MAXIMUM ABSOLUTE DIFFERENCE = .1158600159E 00
MAXIMUM RELATIVE DIFFERENCE = .2716549376E 00

TABLE B6. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 893, APRIL, 20°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER =	.5458858880E 01
COEFFICIENT OF H TO THE 1-TH POWER =	.2252421825E-01
COEFFICIENT OF H TO THE 2-TH POWER =	.1096875009E-03
COEFFICIENT OF H TO THE 3-TH POWER =	-.4160064623E-04
COEFFICIENT OF H TO THE 4-TH POWER =	.2603471855E-07
COEFFICIENT OF H TO THE 5-TH POWER =	.3854231971E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER =	.1103727710E-09
COEFFICIENT OF H TO THE 8-TH POWER =	.8047241493E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.3465100000	5.4640044605	.1174964605E 00	.2197629116E-01
-25.0000000000	5.3601800000	5.4337562751	.7357627511E-01	.1372645604E-01
-20.0000000000	5.3759000000	5.3380795713	-.3751042865E-01	-.6977918452E-02
-15.0000000000	5.3030000000	5.2777245032	-.1153654068E 00	-.2139133721E-01
-10.0000000000	5.4130300000	5.2854733926	-.1275566074E 00	-.2356473313E-01
-8.0000000000	5.4218500000	5.3068107468	-.1150392532E 00	-.2121771225E-01
-6.0000000000	5.4312500000	5.3366242778	-.9462572224E-01	-.1742245749E-01
-4.0000000000	5.4412400000	5.3731797351	-.6806026494E-01	-.1250822697E-01
-2.0000000000	5.4519300000	5.4145822541	-.3734774585E-01	-.6850371492E-02
.0000000000	5.4633200000	5.4588598805	-.4461119519E-02	-.8165583416E-03
1.0000000000	5.4692900000	5.4814512149	.1216121489E-01	.2223545450E-02
2.0000000000	5.4755300000	5.5040137429	.2848376284E-01	.5202010188E-02
3.0000000000	5.4819500000	5.5262981058	.4434810579E-01	.8089841350E-02
4.0000000000	5.4870700000	5.5480864126	.6008641263E-01	.1094875020E-01
5.0000000000	5.4948500000	5.5690607730	.7419077295E-01	.1350187611E-01
6.0000000000	5.5019900000	5.5890020555	.8701205553E-01	.1581465170E-01
7.0000000000	5.5093000000	5.6076882842	.9838828418E-01	.1785858170E-01
8.0000000000	5.5167900000	5.6248425233	.1080525233E 00	.1958612223E-01
9.0000000000	5.5243500000	5.6402002747	.1158502747E 00	.2097084267E-01
10.0000000000	5.5319700000	5.6534863468	.1215163468E 00	.2196620675E-01
11.0000000000	5.5392700000	5.6644115656	.1251415656E 00	.2259170713E-01
12.0000000000	5.5451400000	5.6726683179	.1275283179E 00	.2299821427E-01
13.0000000000	5.5506400000	5.6779267347	.1272867347E 00	.2203190240E-01
14.0000000000	5.5568600000	5.6798298519	.1229698519E 00	.2212937737E-01
15.0000000000	5.5581700000	5.6779889200	.1198189200E 00	.2155726075E-01
16.0000000000	5.5577200000	5.6719786795	.1142586795E 00	.2055855270E-01
17.0000000000	5.5689500000	5.6613328763	.9238287629E-01	.1658892184E-01
18.0000000000	5.5866800000	5.6455403058	.5886030581E-01	.1053562912E-01
19.0000000000	5.5945200000	5.6240417599	.2952175988E-01	.5276906665E-02
20.0000000000	5.5963300000	5.5962283190	-.1016609895E-03	-.1816565311E-04
21.0000000000	5.5924400000	5.5614416968	-.3099830318E-01	-.5542894189E-02
22.0000000000	5.5842700000	5.5189768809	-.6529311911E-01	-.1169237847E-01
23.0000000000	5.5588000000	5.4680885292	-.9071147077E-01	-.1631853471E-01
24.0000000000	5.5180600000	5.4080012408	-.1100587593E 00	-.1994519075E-01
25.0000000000	5.4620000000	5.3379249499	-.1240750501E 00	-.2271604725E-01
26.0000000000	5.3786400000	5.2570760593	-.1215639407E 00	-.2260124133E-01
27.0000000000	5.2675400000	5.1647048870	-.1028351130E 00	-.1952241710E-01
28.0000000000	5.1656100000	5.0601296332	-.1054803668E 00	-.2041973102E-01
29.0000000000	5.0223700000	4.9427765271	-.7959347288E-01	-.1584779156E-01
30.0000000000	4.8956600000	4.8122250756	-.8343492441E-01	-.1704263050E-01
31.0000000000	4.7574000000	4.6682564265	-.8914357354E-01	-.1873787647E-01
32.0000000000	4.5912600000	4.5109018452	-.8035815480E-01	-.1750241868E-01
33.0000000000	4.4109400000	4.3404873296	-.7045267042E-01	-.1597225771E-01
34.0000000000	4.1512200000	4.1576696303	.6449630338E-02	.1553671051E-02
35.0000000000	3.8950300000	3.9634586368	.6842863685E-01	.1756819250E-01
36.0000000000	3.6689100000	3.7592214310	.9031143105E-01	.2461533018E-01
37.0000000000	3.4493900000	3.5466644551	.9727445511E-01	.2820048041E-01
38.0000000000	3.2407000000	3.3277921697	.8709216969E-01	.2687449307E-01
39.0000000000	3.0445100000	3.1048431239	.6033312387E-01	.1981702273E-01
40.0000000000	2.8358500000	2.8802671360	.4435713596E-01	.1564156636E-01
41.0000000000	2.6408000000	2.6563298130	.1552981306E-01	.5880722908E-02
42.0000000000	2.4424400000	2.4356124137	-.6827586272E-02	-.2795395699E-02
43.0000000000	2.2350800000	2.2203157092	-.1476429075E-01	-.6605710200E-02
44.0000000000	2.0459700000	2.0124758883	-.3349411167E-01	-.1637077361E-01
45.0000000000	1.8623200000	1.8133938148	-.4848118522E-01	-.2603268247E-01
46.0000000000	1.6445000000	1.6258164577	-.3868354230E-01	-.2324033782E-01
47.0000000000	1.4914600000	1.4494465654	-.4199343463E-01	-.2815592415E-01
48.0000000000	1.3320400000	1.2854941323	-.4654586774E-01	-.3494329580E-01
49.0000000000	1.1730000000	1.1342712788	-.3872872119E-01	-.3301681261E-01
50.0000000000	1.0378500000	.9958710101	-.4197898992E-01	-.4044803191E-01
52.0000000000	.7588240000	.7565953719	-.2228628134E-02	-.2936949983E-02
54.0000000000	.5344300000	.5639704339	.2954043385E-01	.5527465497E-01
56.0000000000	.3963700000	.4123916894	.1602168942E-01	.4042104453E-01
58.0000000000	.2893420000	.2955312726	.6189272611E-02	.2139085446E-01
60.0000000000	.2012730000	.2071551697	.5882169728E-02	.2922483258E-01
65.0000000000	.0780630000	.0755820990	-.2480900981E-02	-.3178075376E-01
70.0000000000	.0286974000	.0219479120	-.6849688030E-02	-.2386850479E 00
75.0000000000	.0103628000	.0064432305	-.3919269526E-02	-.3782166009E 00
80.0000000000	.0053327100	.0082697883	.2937678277E-02	.5507665478E 00

MAXIMUM ABSOLUTE DIFFERENCE =	.1275566074E 00
MAXIMUM RELATIVE DIFFERENCE =	.5507665478E 00

TABLE B7. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 903, APRIL, 30°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER =	.5556643294E 01
COEFFICIENT OF H TO THE 1-TH POWER =	.1915449065E-01
COEFFICIENT OF H TO THE 2-TH POWER =	.2126021171E-03
COEFFICIENT OF H TO THE 3-TH POWER =	-.3880734691E-04
COEFFICIENT OF H TO THE 4-TH POWER =	-.1430673335E-07
COEFFICIENT OF H TO THE 5-TH POWER =	.3839321364E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER =	.6309100997E-07
COEFFICIENT OF H TO THE 6-TH POWER =	.4963322781E-10
COEFFICIENT OF H TO THE 8-TH POWER =	.2910915258E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.4449100000	5.5281531102	.8324311023E-01	.1528824356E-01
-25.0000000000	5.4589800000	5.5454450390	.8646503898E-01	.1583904667E-01
-20.0000000000	5.4747500000	5.4770011906	.2951190574E-02	.5390548562E-03
-15.0000000000	5.4925400000	5.4237022975	-.6883770249E-01	-.1253294514E-01
-10.0000000000	5.5129700000	5.4209339866	-.9203601336E-01	-.1669445206E-01
-8.0000000000	5.5219900000	5.4352209126	-.8676908740E-01	-.1571337279E-01
-6.0000000000	5.5315900000	5.4572448966	-.7434510344E-01	-.1344006651E-01
-4.0000000000	5.5418700000	5.4858133130	-.5605668700E-01	-.1011512125E-01
-2.0000000000	5.5527900000	5.5194892391	-.3330076087E-01	-.5997127324E-02
.0000000000	5.5636800000	5.5566432942	-.7036705807E-02	-.1264757464E-02
1.0000000000	5.5698700000	5.5759712171	.6101517135E-02	.1095396885E-02
2.0000000000	5.5762500000	5.5954864529	.1923645292E-01	.3449711351E-02
3.0000000000	5.5828600000	5.6149432623	.3208326230E-01	.5746743120E-02
4.0000000000	5.5897900000	5.6340873354	.4429733544E-01	.7924686873E-02
5.0000000000	5.5969600000	5.6526555954	.5569559537E-01	.9951044025E-02
6.0000000000	5.6042400000	5.6703757887	.6613578874E-01	.1180102721E-01
7.0000000000	5.6118900000	5.6869658571	.7507585709E-01	.1337799869E-01
8.0000000000	5.6197900000	5.7021330746	.8234307464E-01	.1465234015E-01
9.0000000000	5.6278300000	5.7155729499	.8774293994E-01	.1559090092E-01
10.0000000000	5.6361600000	5.7269678099	.9080780987E-01	.1611164514E-01
11.0000000000	5.6439800000	5.7359852652	.9200526525E-01	.1630148676E-01
12.0000000000	5.6517900000	5.7422762092	.9048620924E-01	.1601018602E-01
13.0000000000	5.6605400000	5.7454727062	.8493270620E-01	.1500434697E-01
14.0000000000	5.6675500000	5.7451855890	.7763558901E-01	.1369826274E-01
15.0000000000	5.6745600000	5.7410018871	.6664188712E-01	.1170872933E-01
16.0000000000	5.6764400000	5.7324821563	.5604215630E-01	.9872764673E-02
17.0000000000	5.6809100000	5.7191578377	.3824783769E-01	.6732605587E-02
18.0000000000	5.6802400000	5.7005288227	.2028882271E-01	.3571824906E-02
19.0000000000	5.6776000000	5.6760614694	-.1538530603E-02	-.2709825636E-03
20.0000000000	5.6607600000	5.6451873886	-.1557261137E-01	-.2750975377E-02
21.0000000000	5.6362100000	5.6073034130	-.2890658705E-01	-.5128727823E-02
22.0000000000	5.6103800000	5.5617732547	-.4860674581E-01	-.8663717219E-02
23.0000000000	5.5664000000	5.5079314556	-.5846854442E-01	-.1050383451E-01
24.0000000000	5.5100000000	5.4450903358	-.6490966410E-01	-.1178033832E-01
25.0000000000	5.4519500000	5.3725506848	-.7939931519E-01	-.1456347090E-01
26.0000000000	5.3773100000	5.2896149869	-.8769301308E-01	-.1630797054E-01
27.0000000000	5.2743500000	5.1956178856	-.7873211437E-01	-.1492735870E-01
28.0000000000	5.1757100000	5.0899324232	-.8577757678E-01	-.1657310336E-01
29.0000000000	5.0345400000	4.9720272599	-.6251774008E-01	-.1241776609E-01
30.0000000000	4.9002800000	4.8414695642	-.5881043580E-01	-.1200144396E-01
31.0000000000	4.7378900000	4.6980195508	-.3987044921E-01	-.8415233197E-02
32.0000000000	4.5538000000	4.5416257532	-.1217424675E-01	-.2673425874E-02
33.0000000000	4.3796300000	4.3724951116	-.7134888438E-02	-.1629107582E-02
34.0000000000	4.1552000000	4.1911289617	.3592896170E-01	.8646746656E-02
35.0000000000	3.9326600000	3.9983562283	.6569522827E-01	.1670503636E-01
36.0000000000	3.7248700000	3.7953467633	.7047676331E-01	.1892059678E-01
37.0000000000	3.5152900000	3.5836210890	.6833108899E-01	.1943825089E-01
38.0000000000	3.3096100000	3.3650179399	.5540793986E-01	.1674153144E-01
39.0000000000	3.1095600000	3.1416929922	.3209299219E-01	.1032075026E-01
40.0000000000	2.8896500000	2.9158448308	.2619883080E-01	.9066437390E-02
41.0000000000	2.6802300000	2.6900471555	.9817155500E-02	.3662803379E-02
42.0000000000	2.4640600000	2.4666708939	.2648931899E-02	.1075027353E-02
43.0000000000	2.2277900000	2.2482110882	.2042108821E-01	.9166522970E-02
44.0000000000	2.0177300000	2.0367490179	.1901901793E-01	.9425947935E-02
45.0000000000	1.8231000000	1.8342534032	.1115340317E-01	.6117823035E-02
46.0000000000	1.6302900000	1.6423278751	.1203787512E-01	.7388885760E-02
47.0000000000	1.4650400000	1.4622112023	-.2828797646E-02	-.1930867175E-02
48.0000000000	1.3123200000	1.2947646181	-.1755538193E-01	-.1337736370E-01
49.0000000000	1.1582000000	1.1404821278	-.1771787221E-01	-.1529776568E-01
50.0000000000	1.0273700000	.9995105909	-.2785040914E-01	-.2710945084E-01
52.0000000000	.7630450000	.7567500611	-.6294938888E-02	-.8247610008E-02
54.0000000000	.5438080000	.5627126236	.1890462362E-01	.3476341579E-01
56.0000000000	.4007300000	.4113859297	.1065592974E-01	.2659129525E-01
58.0000000000	.2937570000	.2958478204	.2110820398E-02	.7185600337E-02
60.0000000000	.2079810000	.2093566505	.1375650479E-02	.6614308416E-02
65.0000000000	.0861980000	.0819945718	-.4204328241E-02	-.4877473194E-01
70.0000000000	.0330070000	.0293428747	-.3664175781E-02	-.1110120817E 00
75.0000000000	.0130282000	.0114051002	-.1423099801E-02	-.1092322655E 00
80.0000000000	.0073798400	.0087873847	.1407544735E-02	.1907283539E 00

MAXIMUM ABSOLUTE DIFFERENCE = .9203601336E-01
MAXIMUM RELATIVE DIFFERENCE = .1907283539E 00

TABLE B8. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 913, APRIL, 45°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER =	.5665251250E 01
COEFFICIENT OF H TO THE 1-TH POWER =	.1635370709E-01
COEFFICIENT OF H TO THE 2-TH POWER =	.1755479184E-04
COEFFICIENT OF H TO THE 3-TH POWER =	-.3612034365E-04
COEFFICIENT OF H TO THE 4-TH POWER =	.3738450771E-07
COEFFICIENT OF H TO THE 5-TH POWER =	.3161237360E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER =	.0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER =	.1362684653E-09
COEFFICIENT OF H TO THE 8-TH POWER =	.7714349709E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.5417400000	5.5406971643	-.1042835676E-02	-.1881783837E-03
-25.0000000000	5.5554500000	5.6218437424	.6639374237E-01	.1195110070E-01
-20.0000000000	5.5707500000	5.5802588626	.9508862640E-02	.1706926830E-02
-15.0000000000	5.5879000000	5.5365974014	-.5138059855E-01	-.9196455357E-02
-10.0000000000	5.6075600000	5.5388886838	-.6867131624E-01	-.1274620267E-01
-8.0000000000	5.6162800000	5.5530891500	-.6239084995E-01	-.1110892797E-01
-6.0000000000	5.6254700000	5.5755513318	-.4991886821E-01	-.8873688459E-02
-4.0000000000	5.6353300000	5.6024322130	-.3289778696E-01	-.5837774711E-02
-2.0000000000	5.6445900000	5.6329034748	-.1299652518E-01	-.2301940379E-02
.0000000000	5.6572000000	5.6652512592	.8051259196E-02	.1423180007E-02
1.0000000000	5.6631400000	5.6815864405	.1844664052E-01	.3257281348E-02
2.0000000000	5.6693000000	5.6977405794	.2844057944E-01	.5016594542E-02
3.0000000000	5.6748600000	5.7134983528	.3863835275E-01	.6808682276E-02
4.0000000000	5.6815400000	5.7286448695	.4710486946E-01	.8290862946E-02
5.0000000000	5.6884900000	5.7426646205	.5447642047E-01	.9576283342E-02
6.0000000000	5.6955600000	5.7562398408	.6067984084E-01	.1065388403E-01
7.0000000000	5.7030700000	5.7682482747	.6517827467E-01	.1142862961E-01
8.0000000000	5.7108500000	5.7787603445	.6791034446E-01	.1189146002E-01
9.0000000000	5.7188600000	5.7875357309	.6867573090E-01	.1200863999E-01
10.0000000000	5.7273000000	5.7943193415	.6692938149E-01	.1168584320E-01
11.0000000000	5.7361400000	5.7988349824	.6269698242E-01	.1093016949E-01
12.0000000000	5.7450000000	5.8007899462	.5578994619E-01	.9711043722E-02
13.0000000000	5.7551400000	5.7998409988	.4470999884E-01	.7768707423E-02
14.0000000000	5.7623000000	5.7956534826	.3335348763E-01	.5788223910E-02
15.0000000000	5.7648900000	5.7877955408	.2290554078E-01	.3973283234E-02
16.0000000000	5.7645400000	5.7758244094	.1128440938E-01	.1957555916E-02
17.0000000000	5.7520000000	5.7592361195	.7236119520E-02	.1258017997E-02
18.0000000000	5.7276200000	5.7374700024	.9850002345E-02	.1719737403E-02
19.0000000000	5.6902000000	5.7090055024	.1970550237E-01	.3463059712E-02
20.0000000000	5.6559200000	5.6758609238	.1994092375E-01	.3525672880E-02
21.0000000000	5.6023800000	5.6345948660	.3223486600E-01	.5753801255E-02
22.0000000000	5.5359400000	5.5853112776	.4937122758E-01	.8918309732E-02
23.0000000000	5.4766900000	5.5271687543	.5047875430E-01	.9217018729E-02
24.0000000000	5.3946700000	5.4592961533	.6462615335E-01	.1197963052E-01
25.0000000000	5.3144200000	5.3808137425	.6639374248E-01	.1249313048E-01
26.0000000000	5.2458000000	5.2908624151	.4500241508E-01	.8578653467E-02
27.0000000000	5.1400300000	5.1886403249	.4861032493E-01	.9457206461E-02
28.0000000000	5.0365300000	5.0734470857	.3691708572E-01	.7329865148E-02
29.0000000000	4.8941200000	4.9447344237	.5061442367E-01	.1034188448E-01
30.0000000000	4.7601000000	4.8021611389	.4206113890E-01	.8836188084E-02
31.0000000000	4.6009600000	4.6456489992	.4468899919E-01	.9712972768E-02
32.0000000000	4.4230000000	4.4754349834	.5243498340E-01	.1185507109E-01
33.0000000000	4.2585800000	4.2921143277	.3353432768E-01	.7874532751E-02
34.0000000000	4.0548400000	4.0966684023	.4182840232E-01	.1031567271E-01
35.0000000000	3.8482300000	3.8904718211	.4224182107E-01	.1097694812E-01
36.0000000000	3.6443000000	3.6752745374	.3097453738E-01	.8499447735E-02
37.0000000000	3.4222900000	3.4531570095	.3086700948E-01	.9019402062E-02
38.0000000000	3.2041000000	3.2264595732	.2235957322E-01	.6978425525E-02
39.0000000000	3.0012100000	2.9976904771	-.3519522870E-02	-.1172701301E-02
40.0000000000	2.7879200000	2.7694199861	-.1850001389E-01	-.6635776453E-02
41.0000000000	2.5817500000	2.5441699441	-.3758005590E-01	-.1455603996E-01
42.0000000000	2.3619900000	2.3243087675	-.3768123248E-01	-.1595317189E-01
43.0000000000	2.1053200000	2.1110609098	.6640909793E-02	.3154346984E-02
44.0000000000	1.8838000000	1.9089376168	.2513761677E-01	.1334410063E-01
45.0000000000	1.6863200000	1.7166927802	.3037278018E-01	.1801127910E-01
46.0000000000	1.5104600000	1.5363045079	.2584450787E-01	.1711035570E-01
47.0000000000	1.3630100000	1.3684802302	.5470230200E-02	.4013345610E-02
48.0000000000	1.2251900000	1.2135811406	-.1160885942E-01	-.9475150321E-02
49.0000000000	1.0827700000	1.0716606828	-.1110931717E-01	-.1026008956E-01
50.0000000000	.9625320000	.9425115964	-.2002040362E-01	-.2079972783E-01
52.0000000000	.7296040000	.7206980446	-.8905955434E-02	-.1220656059E-01
54.0000000000	.5339130000	.5431550454	.9242045354E-02	.1731002121E-01
56.0000000000	.3973830000	.4036892418	.6306241849E-02	.1586943037E-01
58.0000000000	.2918850000	.2959059994	.4020999401E-02	.1377597136E-01
60.0000000000	.2058920000	.2138287975	.7936797503E-02	.3854835304E-01
65.0000000000	.0866550000	.0886873933	.2031893272E-02	.2344794355E-01
70.0000000000	.0348810000	.0334021338	-.1478866162E-02	-.4239747030E-01
75.0000000000	.0150615000	.0132487176	-.1812782354E-02	-.1203586863E 00
80.0000000000	.0089281600	.0097110541	.1382894084E-02	.1660503742E 00

MAXIMUM ABSOLUTE DIFFERENCE = .6867573090E-01
MAXIMUM RELATIVE DIFFERENCE = .1660503742E 00

TABLE B9. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 923, APRIL, 60°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5778565498E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1292745930E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.9526062559E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.3461216984E-04
COEFFICIENT OF H TO THE 4-TH POWER = .4010059044E-06
COEFFICIENT OF H TO THE 5-TH POWER = .1753640948E-09

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = -.2170418613E-06
COEFFICIENT OF H TO THE 6-TH POWER = .3070133163E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.4951500679E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.6072800000	5.7000026466	.9272264660E-01	.1653611851E-01
-25.0000000000	5.6183300000	5.6549232297	.3569932969E-01	.6354082079E-02
-20.0000000000	5.6306300000	5.5705235495	-.6010645052E-01	-.1067490681E-01
-15.0000000000	5.6444600000	5.5495753219	-.9488467812E-01	-.1681023129E-01
-10.0000000000	5.6601600000	5.6031035686	-.5705643143E-01	-.1008035664E-01
-8.0000000000	5.6670800000	5.6381004387	-.2897956131E-01	-.5113667234E-02
-6.0000000000	5.6743500000	5.6762172935	.1857229479E-02	.3273132968E-03
-4.0000000000	5.6821700000	5.7142419491	.3207194911E-01	.5644313548E-02
-2.0000000000	5.6904900000	5.7492033144	.5871331444E-01	.1031779591E-01
.0000000000	5.6992300000	5.7785654981	.7933549809E-01	.1392038891E-01
1.0000000000	5.7039100000	5.7905073951	.8659739507E-01	.1518211106E-01
2.0000000000	5.7087900000	5.8003595448	.9156954478E-01	.1604009690E-01
3.0000000000	5.7138200000	5.8072732236	.9415322357E-01	.1647815710E-01
4.0000000000	5.7190700000	5.8132370012	.9416700118E-01	.1646543952E-01
5.0000000000	5.7245200000	5.8160734631	.9155346308E-01	.1599321220E-01
6.0000000000	5.7301700000	5.8164345193	.8626451934E-01	.1505444330E-01
7.0000000000	5.7360300000	5.8142953744	.7826537440E-01	.1364451971E-01
8.0000000000	5.7421200000	5.8096472601	.6752726011E-01	.1175998762E-01
9.0000000000	5.7484400000	5.8024890568	.5404905682E-01	.9402386878E-02
10.0000000000	5.7554000000	5.7928179419	.3741794186E-01	.6501362522E-02
11.0000000000	5.7623100000	5.7806192143	.1830921433E-01	.3177408770E-02
12.0000000000	5.7688300000	5.7659554539	-.2974546063E-02	-.5156238030E-03
13.0000000000	5.7747900000	5.7484551823	-.2633481770E-01	-.4560307422E-02
14.0000000000	5.7774000000	5.7283012135	-.4909878653E-01	-.8498422566E-02
15.0000000000	5.7743300000	5.7052189149	-.6911108506E-01	-.1196867603E-01
16.0000000000	5.7668600000	5.6789646558	-.8789534416E-01	-.1524145621E-01
17.0000000000	5.7444300000	5.6492148039	-.9521519612E-01	-.1657522089E-01
18.0000000000	5.7087700000	5.6155557504	-.9321424963E-01	-.1632825453E-01
19.0000000000	5.6697500000	5.5774756054	-.9227439456E-01	-.1627486125E-01
20.0000000000	5.6096800000	5.5334583992	-.7532160083E-01	-.1342707620E-01
21.0000000000	5.5359200000	5.4854818566	-.5043814344E-01	-.9111067979E-02
22.0000000000	5.4475400000	5.4300200542	-.1751994576E-01	-.3216120627E-02
23.0000000000	5.3715700000	5.3670524865	-.4517513516E-02	-.8410043091E-03
24.0000000000	5.2687200000	5.2955812140	.2686121396E-01	.5098242830E-02
25.0000000000	5.1606400000	5.2145577567	.5391775674E-01	.1044788180E-01
26.0000000000	5.0768300000	5.1229211421	.4609114210E-01	.9078724735E-02
27.0000000000	4.9532200000	5.0196479040	.6442790398E-01	.1341105462E-01
28.0000000000	4.8482700000	4.9038137877	.5554378768E-01	.1145641387E-01
29.0000000000	4.7050700000	4.7746453817	.6959538175E-01	.1479157202E-01
30.0000000000	4.5942200000	4.6316979570	.3747795704E-01	.8157637208E-02
31.0000000000	4.4982900000	4.4747336383	-.2355636172E-01	-.5236737008E-02
32.0000000000	4.3724900000	4.3039920429	-.6849795708E-01	-.1566566352E-01
33.0000000000	4.2081900000	4.1201442166	-.8804578340E-01	-.2062248292E-01
34.0000000000	3.9483600000	3.9243406265	-.2401937348E-01	-.6083379803E-02
35.0000000000	3.6853400000	3.7182055825	.3286558253E-01	.8917924134E-02
36.0000000000	3.4484900000	3.5037938472	.5530384718E-01	.1603711978E-01
37.0000000000	3.2085000000	3.2835100056	.7501000556E-01	.2337852752E-01
38.0000000000	2.9850400000	3.0599965547	.7493655468E-01	.2510384883E-01
39.0000000000	2.7894700000	2.8360014791	.4653147912E-01	.1668111832E-01
40.0000000000	2.5974800000	2.6142391910	.1655919099E-01	.6374607723E-02
41.0000000000	2.4140800000	2.3972593870	-.1682061303E-01	-.6967711523E-02
42.0000000000	2.2164900000	2.1873365229	-.2915347711E-01	-.1315299284E-01
43.0000000000	1.9829200000	1.9863887770	.3468777053E-02	.1749327786E-02
44.0000000000	1.7809000000	1.7959305603	.1503056027E-01	.8439867636E-02
45.0000000000	1.6019900000	1.6170579208	.1506792082E-01	.9405752106E-02
46.0000000000	1.4443700000	1.4504624516	.6092451615E-02	.4218068511E-02
47.0000000000	1.3117200000	1.2964670042	-.1525299584E-01	-.1162824066E-01
48.0000000000	1.1868800000	1.1550756878	-.3180431222E-01	-.2679656935E-01
49.0000000000	1.0570500000	1.0269310225	-.3101897748E-01	-.2934485358E-01
50.0000000000	.9464410000	.9088722936	-.3756870643E-01	-.3969471571E-01
52.0000000000	.7315120000	.7076784607	-.2383353933E-01	-.3258120077E-01
54.0000000000	.5437850000	.5456775863	.1892586283E-02	.3480394427E-02
56.0000000000	.4069860000	.4166127439	.9626743918E-02	.2365374710E-01
58.0000000000	.2981320000	.3145241659	.1639216582E-01	.5498291300E-01
60.0000000000	.2116660000	.2341147289	.2244872892E-01	.1060573211E 00
65.0000000000	.0905892000	.1000319895	.9442789548E-02	.1042374759E 00
70.0000000000	.0386542000	.0194051743	-.1884902574E-01	-.4876320230E 00
75.0000000000	.0174616000	.1356837579	.1182221579E 00	.6770408092E 01
80.0000000000	.0095109800	.0005260941	-.8984285861E-02	-.9446821116E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1182221579E 00
MAXIMUM RELATIVE DIFFERENCE = .6770408092E 01

TABLE B10. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 933, APRIL, 75°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5627655596E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1480536285E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.3787469612E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4586194649E-04
COEFFICIENT OF H TO THE 4-TH POWER = .4661623895E-06
COEFFICIENT OF H TO THE 5-TH POWER = .1200355700E-09

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .1272882504E-06
COEFFICIENT OF H TO THE 6-TH POWER = .6232624515E-10
COEFFICIENT OF H TO THE 8-TH POWER = .8202476172E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.3191900000	5.5944643477	.7527434768E-01	.1363865891E-01
-25.0000000000	5.5270400000	5.5509059201	.2386592011E-01	.4318029201E-02
-20.0000000000	5.5358800000	5.4863743026	-.4950569743E-01	-.8942698993E-02
-15.0000000000	5.5457200000	5.4594781312	-.8624186878E-01	-.1555106799E-01
-10.0000000000	5.5568500000	5.4849108381	-.7193916186E-01	-.1294603271E-01
-8.0000000000	5.5617300000	5.5073975252	-.5433247484E-01	-.9768988218E-02
-6.0000000000	5.5668900000	5.5347687046	-.3212129543E-01	-.5770061099E-02
-4.0000000000	5.5723300000	5.5652458006	-.7084199373E-02	-.1271317272E-02
-2.0000000000	5.5781500000	5.5968928115	.1874281155E-01	.3360040792E-02
.0000000000	5.5843600000	5.6276555958	.4329559578E-01	.7753009437E-02
1.0000000000	5.5876200000	5.6420360975	.5441609750E-01	.9738689728E-02
2.0000000000	5.5910000000	5.6553803601	.6438036010E-01	.1151499912E-01
3.0000000000	5.5944800000	5.6674037868	.7292378676E-01	.1303495352E-01
4.0000000000	5.5981300000	5.6778149231	.7968492311E-01	.1423420376E-01
5.0000000000	5.6018800000	5.6863147878	.8443478779E-01	.1507258060E-01
6.0000000000	5.6057500000	5.6925960674	.8684606742E-01	.1549231903E-01
7.0000000000	5.6098000000	5.6963422109	.8654221089E-01	.1542696903E-01
8.0000000000	5.6139600000	5.6972264649	.8326646488E-01	.1483203743E-01
9.0000000000	5.6182900000	5.6949108985	.7662089850E-01	.1363776140E-01
10.0000000000	5.6230000000	5.6890454794	.6604547937E-01	.1174559477E-01
11.0000000000	5.6275700000	5.6792672715	.5169727145E-01	.9186428859E-02
12.0000000000	5.6307600000	5.6651998454	.3443984540E-01	.6116376014E-02
13.0000000000	5.6323100000	5.6464530051	.1414300514E-01	.2511048778E-02
14.0000000000	5.6300900000	5.6226229576	-.7467042451E-02	-.1326274083E-02
15.0000000000	5.6226600000	5.5932930697	-.2936693028E-01	-.5222960356E-02
16.0000000000	5.6064800000	5.5580353807	-.4844461930E-01	-.8640826205E-02
17.0000000000	5.5869500000	5.5164130547	-.7053694526E-01	-.1262530455E-01
18.0000000000	5.5483100000	5.4679839752	-.8032602481E-01	-.1447756611E-01
19.0000000000	5.4921000000	5.4123056915	-.7979430851E-01	-.1452892491E-01
20.0000000000	5.4337200000	5.3489419243	-.8477807573E-01	-.1560221648E-01
21.0000000000	5.3442300000	5.2774708179	-.6675918208E-01	-.1249182428E-01
22.0000000000	5.2363400000	5.1974950887	-.3884491132E-01	-.7418332523E-02
23.0000000000	5.1389200000	5.1086541482	-.3026585183E-01	-.5889539512E-02
24.0000000000	5.0129600000	5.0106381823	-.2321817708E-02	-.4631630231E-03
25.0000000000	4.8728100000	4.9032040286	.3039402855E-01	.6237474589E-02
26.0000000000	4.7608900000	4.7861925197	.2530251967E-01	.5314661686E-02
27.0000000000	4.6020400000	4.6595467558	.5750675584E-01	.1249592699E-01
28.0000000000	4.4722200000	4.5233303366	.5111053663E-01	.1142844865E-01
29.0000000000	4.3009600000	4.3777459525	.7678595251E-01	.1785321242E-01
30.0000000000	4.1724800000	4.2231489235	.5066892346E-01	.1214359888E-01
31.0000000000	4.0558700000	4.0600613209	.4191320928E-02	.1033396270E-02
32.0000000000	3.9222900000	3.8891782313	-.3311174868E-01	-.8441943018E-02
33.0000000000	3.7812500000	3.7113691534	-.6988084663E-01	-.1848088506E-01
34.0000000000	3.5895700000	3.5276715943	-.6189840565E-01	-.1724396116E-01
35.0000000000	3.3883000000	3.3392770521	-.4902294786E-01	-.1446830206E-01
36.0000000000	3.1831800000	3.1475085244	-.3567147563E-01	-.1120623893E-01
37.0000000000	2.9436300000	2.9537909683	.1016046826E-01	.3451679816E-02
38.0000000000	2.7178400000	2.7596122760	.4177227603E-01	.1536965974E-01
39.0000000000	2.5283100000	2.5664871401	.3817714012E-01	.1509986517E-01
40.0000000000	2.3490200000	2.3759086657	.2688866571E-01	.1144675895E-01
41.0000000000	2.1813500000	2.1893078702	.7957870199E-02	.3648140005E-02
42.0000000000	2.0038400000	2.0080132178	.4173217836E-02	.2082610308E-02
43.0000000000	1.7983100000	1.8332160696	.3490606957E-01	.1941048516E-01
44.0000000000	1.6234600000	1.6659434193	.4248341930E-01	.2616844228E-01
45.0000000000	1.4671600000	1.5070391125	.3987911250E-01	.2718116123E-01
46.0000000000	1.3292000000	1.3571539973	.2795399727E-01	.2103069310E-01
47.0000000000	1.2119000000	1.2167447369	.4844736919E-02	.3997637527E-02
48.0000000000	1.1005600000	1.0860804039	-.1447959614E-01	-.1315657133E-01
49.0000000000	.9836710000	.9652555278	-.1841547224E-01	-.1872117023E-01
50.0000000000	.8823200000	.8542080145	-.2811198550E-01	-.3186143972E-01
52.0000000000	.6783340000	.6605420204	-.1779197962E-01	-.2622893680E-01
54.0000000000	.4982910000	.5022864485	.3995448538E-02	.8018303638E-02
56.0000000000	.3723310000	.3755518100	.3220810023E-02	.8650394469E-02
58.0000000000	.2729940000	.2759678370	.2973837009E-02	.1089341527E-01
60.0000000000	.1926550000	.1991438064	.6488806421E-02	.3368096596E-01
65.0000000000	.0815561000	.0808136040	-.7424960304E-03	-.9104113983E-02
70.0000000000	.0346008000	.0292743686	-.5326431413E-02	-.1539395451E 00
75.0000000000	.0156575000	.0120876815	-.3569818489E-02	-.2279941555E 00
80.0000000000	.0084615800	.0108535360	.2391955952E-02	.2826843157E 00

MAXIMUM ABSOLUTE DIFFERENCE = .8684606742E-01
MAXIMUM RELATIVE DIFFERENCE = .2826843157E 00

TABLE B11. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 943, JULY, 20°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5529777767E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1661925483E-01
COEFFICIENT OF H TO THE 2-TH POWER = .3402342068E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.3279409310E-04
COEFFICIENT OF H TO THE 4-TH POWER = -.2465792918E-06
COEFFICIENT OF H TO THE 5-TH POWER = .5534068013E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = -.5857232875E-07
COEFFICIENT OF H TO THE 6-TH POWER = .2043560208E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.8213926463E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.4500900000	5.3721507504	-.7793924956E-01	-.1430054358E-01
-25.0000000000	5.4628400000	5.5461271986	.8328719862E-01	.1524613546E-01
-20.0000000000	5.4772600000	5.5193764857	.4211648571E-01	.7689334761E-02
-15.0000000000	5.4935600000	5.4546282466	-.3893175340E-01	-.7086798615E-02
-10.0000000000	5.5123700000	5.4294586098	-.8291139020E-01	-.1504096971E-01
-8.0000000000	5.5206600000	5.4352115185	-.8544848152E-01	-.1547796675E-01
-6.0000000000	5.5295700000	5.4493933738	-.8017662622E-01	-.1449961321E-01
-4.0000000000	5.5390100000	5.4708519817	-.6815801829E-01	-.1230509031E-01
-2.0000000000	5.5491500000	5.4981635048	-.5098649517E-01	-.9188163083E-02
.0000000000	5.5599700000	5.5297797666	-.3019223345E-01	-.5430287114E-02
1.0000000000	5.5656600000	5.5467045442	-.1895545582E-01	-.3405787600E-02
2.0000000000	5.5716000000	5.5641162338	-.7483766240E-02	-.1343198765E-02
3.0000000000	5.5777300000	5.5818192211	.4089221125E-02	.7331335732E-03
4.0000000000	5.5841300000	5.5996215333	.1549153328E-01	.2774207134E-02
5.0000000000	5.5900600000	5.6173315352	.2727153523E-01	.4878576479E-02
6.0000000000	5.5969000000	5.6347557553	.3785575532E-01	.6763700498E-02
7.0000000000	5.6039400000	5.6516958248	.4775582484E-01	.8521830148E-02
8.0000000000	5.6111600000	5.6679445249	.5678452495E-01	.1011992617E-01
9.0000000000	5.6185600000	5.6832809438	.6472094383E-01	.1151913370E-01
10.0000000000	5.6257900000	5.6974647626	.7167476263E-01	.1274039071E-01
11.0000000000	5.6328100000	5.7102297051	.7741970512E-01	.1374441977E-01
12.0000000000	5.6385700000	5.7212762137	.8270621371E-01	.1466794129E-01
13.0000000000	5.6448600000	5.7302634495	.8540344951E-01	.1512941854E-01
14.0000000000	5.6525300000	5.7368007625	.8427076248E-01	.1490850336E-01
15.0000000000	5.6549500000	5.7404388444	.8548884440E-01	.1511752436E-01
16.0000000000	5.6565300000	5.7406608667	.8413086670E-01	.1487322912E-01
17.0000000000	5.6704400000	5.7368740190	.6643401901E-01	.1171584904E-01
18.0000000000	5.6914400000	5.7284020086	.3696200861E-01	.6494319782E-02
19.0000000000	5.7036700000	5.7144792544	.1080925444E-01	.1895140226E-02
20.0000000000	5.7057900000	5.6942477110	-.1154228902E-01	-.2022908138E-02
21.0000000000	5.6883100000	5.6667574678	-.2155253224E-01	-.3788916610E-02
22.0000000000	5.6636900000	5.6309724793	-.3271752068E-01	-.5776714594E-02
23.0000000000	5.6223000000	5.5857829408	-.3651705918E-01	-.6495039251E-02
24.0000000000	5.5677100000	5.5300258883	-.3768411170E-01	-.6768332348E-02
25.0000000000	5.5155700000	5.4625155038	-.5305449622E-01	-.9619041409E-02
26.0000000000	5.4466700000	5.3820842491	-.6458575095E-01	-.1185784175E-01
27.0000000000	5.3522300000	5.2876352765	-.6459472346E-01	-.1206874956E-01
28.0000000000	5.2588500000	5.1782054883	-.8064451169E-01	-.1533500893E-01
29.0000000000	5.1169100000	5.0530371463	-.6387285373E-01	-.1248270025E-01
30.0000000000	4.9694700000	4.9116541489	-.5781585112E-01	-.1163420870E-01
31.0000000000	4.7757300000	4.7539371927	-.2179280731E-01	-.4563241077E-02
32.0000000000	4.5611200000	4.5801903640	.1907036403E-01	.4181070444E-02
33.0000000000	4.3703600000	4.3911906960	.2083069597E-01	.4766356998E-02
34.0000000000	4.1366900000	4.1882123306	.5152233063E-01	.1245496535E-01
35.0000000000	3.9057100000	3.9730184749	.6730847494E-01	.1723335192E-01
36.0000000000	3.6857300000	3.7478174031	.6208740307E-01	.1684534762E-01
37.0000000000	3.4540000000	3.5151830145	.6118301454E-01	.1771366952E-01
38.0000000000	3.2292600000	3.2779452182	.4868521825E-01	.1507627700E-01
39.0000000000	3.0184800000	3.0390597334	.2057973339E-01	.6817912788E-02
40.0000000000	2.7916600000	2.8014698394	.9809839350E-02	.3513980696E-02
41.0000000000	2.5815100000	2.5679735222	-.1353647784E-01	-.5243627892E-02
42.0000000000	2.3685200000	2.3411081900	-.2741181001E-01	-.1157339183E-01
43.0000000000	2.1452500000	2.1230620358	-.2218796419E-01	-.1034283379E-01
44.0000000000	1.9454900000	1.9156169722	-.2987302783E-01	-.1535501484E-01
45.0000000000	1.7569700000	1.7201237594	-.3684624063E-01	-.2097146829E-01
46.0000000000	1.5672000000	1.5375062817	-.2969371833E-01	-.1896698719E-01
47.0000000000	1.3887500000	1.3682893998	-.2046060022E-01	-.1473310547E-01
48.0000000000	1.2224900000	1.2126435756	-.9846424422E-02	-.8054400790E-02
49.0000000000	1.0931300000	1.0704393925	-.2269060750E-01	-.2075746480E-01
50.0000000000	.9594020000	.9413058722	-.1809612779E-01	-.1886188249E-01
52.0000000000	.7311560000	.7198982986	-.1125770144E-01	-.1539712652E-01
54.0000000000	.5377280000	.5426714293	.4943429271E-02	.9193178096E-02
56.0000000000	.3970210000	.4030738711	.6052871105E-02	.1524572026E-01
58.0000000000	.2895090000	.2946468753	.5137875317E-02	.1774685871E-01
60.0000000000	.2013460000	.2115217349	.1017573488E-01	.5053854996E-01
65.0000000000	.0778741000	.0832173736	.5343273594E-02	.6861425806E-01
70.0000000000	.0280959000	.0260644383	-.2031461665E-02	-.7230455942E-01
75.0000000000	.0099340000	.0068039739	-.3130026146E-02	-.3150821568E 00
80.0000000000	.0050781600	.0073034933	.2225333306E-02	.4382164615E 00

MAXIMUM ABSOLUTE DIFFERENCE = .8548884440E-01
MAXIMUM RELATIVE DIFFERENCE = .4382164615E 00

TABLE B12. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 953, JULY, 30°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5588695285E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1618985834E-01
COEFFICIENT OF H TO THE 2-TH POWER = .3962018907E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.3262058428E-04
COEFFICIENT OF H TO THE 4-TH POWER = -.2389618875E-06
COEFFICIENT OF H TO THE 5-TH POWER = .5278256116E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .1401747847E-09
COEFFICIENT OF H TO THE 8-TH POWER = .7755610095E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.5077500000	5.4354261681	-.7232383188E-01	-.1313128444E-01
-25.0000000000	5.5208300000	5.5981740097	.7734400971E-01	.1400948946E-01
-20.0000000000	5.5356100000	5.5780698341	.4245983412E-01	.7670308082E-02
-15.0000000000	5.5522900000	5.5200582076	-.3223179237E-01	-.5805134885E-02
-10.0000000000	5.5714600000	5.4953454600	-.7611454003E-01	-.1366150704E-01
-8.0000000000	5.5799600000	5.4998805189	-.8007948114E-01	-.1435126437E-01
-6.0000000000	5.5890200000	5.5124785879	-.7654141213E-01	-.1369496121E-01
-4.0000000000	5.5986300000	5.5322930413	-.6633695871E-01	-.1184878420E-01
-2.0000000000	5.6089300000	5.5581572988	-.5077270122E-01	-.9052118892E-02
.0000000000	5.6192100000	5.5886952853	-.3051471467E-01	-.5430427884E-02
1.0000000000	5.6249900000	5.6052484905	-.1974150946E-01	-.3509607921E-02
2.0000000000	5.6310300000	5.6223951400	-.8634860002E-02	-.1533442372E-02
3.0000000000	5.6372400000	5.6399312717	.2691271729E-02	.4774094645E-03
4.0000000000	5.6437400000	5.6576472110	.1390721102E-01	.2464183506E-02
5.0000000000	5.6504200000	5.6753267472	.2490674720E-01	.4407946171E-02
6.0000000000	5.6573800000	5.6927457017	.3536570165E-01	.6251250871E-02
7.0000000000	5.6645300000	5.7096698743	.4513987426E-01	.7968864894E-02
8.0000000000	5.6718800000	5.7258523568	.5397235682E-01	.9515779040E-02
9.0000000000	5.6794000000	5.7410302118	.6163021181E-01	.1085153569E-01
10.0000000000	5.6868600000	5.7549205222	.6806052220E-01	.1196803105E-01
11.0000000000	5.6934400000	5.7672158355	.7377583551E-01	.1295804215E-01
12.0000000000	5.6994800000	5.7775790450	.7809904497E-01	.1370283692E-01
13.0000000000	5.7056100000	5.7856377813	.8002778130E-01	.1402615694E-01
14.0000000000	5.7134300000	5.7909784264	.7754842637E-01	.1357300717E-01
15.0000000000	5.7170700000	5.7931399137	.7606991373E-01	.1330575168E-01
16.0000000000	5.7190800000	5.7916075466	.7252754665E-01	.1268168073E-01
17.0000000000	5.7327700000	5.7858071523	.5303715232E-01	.9251575123E-02
18.0000000000	5.7531100000	5.7750999924	.2198999241E-01	.3822279152E-02
19.0000000000	5.7644600000	5.7587789770	-.5681023031E-02	-.9855256227E-03
20.0000000000	5.7654700000	5.7360668682	-.2940313176E-01	-.5099867272E-02
21.0000000000	5.7472000000	5.7061173139	-.4108268612E-01	-.7148295886E-02
22.0000000000	5.7225000000	5.6680196928	-.5448030717E-01	-.9520368225E-02
23.0000000000	5.6784000000	5.6208088798	-.5759112022E-01	-.1014213867E-01
24.0000000000	5.6186600000	5.5634810947	-.5517890534E-01	-.9820652138E-02
25.0000000000	5.5602100000	5.4950169626	-.6519303744E-01	-.1172492360E-01
26.0000000000	5.4852000000	5.4144127125	-.7078728754E-01	-.1290514248E-01
27.0000000000	5.3965200000	5.3207200363	-.7579996370E-01	-.1404608223E-01
28.0000000000	5.2822900000	5.2130944596	-.6919554042E-01	-.1309553456E-01
29.0000000000	5.1338200000	5.0908511234	-.4296887656E-01	-.8369766871E-02
30.0000000000	4.9856800000	4.9535256625	-.3215433750E-01	-.6449338406E-02
31.0000000000	4.7930300000	4.8009364832	.7906483195E-02	.1649579326E-02
32.0000000000	4.5832600000	4.6332433800	.4998338004E-01	.1090563923E-01
33.0000000000	4.4040000000	4.4509963374	.4699633736E-01	.1067128460E-01
34.0000000000	4.1934400000	4.2551678745	.6172787453E-01	.1472010439E-01
35.0000000000	3.9843600000	4.0471627008	.6280270078E-01	.1576230581E-01
36.0000000000	3.7800800000	3.8287999456	.4871994564E-01	.1288860173E-01
37.0000000000	3.5617800000	3.6022658202	.4048582018E-01	.1136673803E-01
38.0000000000	3.3470600000	3.3700379496	.2297794960E-01	.6865114339E-02
39.0000000000	3.1398100000	3.1347862730	-.5023726946E-02	-.1600009856E-02
40.0000000000	2.9132500000	2.8992586383	-.1399136175E-01	-.4802664291E-02
41.0000000000	2.6994500000	2.6661613552	-.3328864479E-01	-.1233163970E-01
42.0000000000	2.4808200000	2.4380455605	-.4277443948E-01	-.1724205685E-01
43.0000000000	2.2480400000	2.2172091744	-.3083082558E-01	-.1371453603E-01
44.0000000000	2.0385200000	2.0056217738	-.3289822624E-01	-.1613828966E-01
45.0000000000	1.8397800000	1.8048764178	-.3490358224E-01	-.1897160652E-01
46.0000000000	1.6382700000	1.6161690206	-.2210097940E-01	-.1349043772E-01
47.0000000000	1.4492800000	1.4403028722	-.8977127785E-02	-.6194198350E-02
48.0000000000	1.2753800000	1.2777137742	.2333774159E-02	.1829865733E-02
49.0000000000	1.1407000000	1.1285101345	-.1218986553E-01	-.1068630274E-01
50.0000000000	1.0011900000	.9925221825	-.8667817499E-02	-.8657515056E-02
52.0000000000	.7614690000	.7584411091	-.3027890936E-02	-.3976381095E-02
54.0000000000	.5610100000	.5705280914	.9518091424E-02	.1696599245E-01
56.0000000000	.4168120000	.4225023323	.5690332276E-02	.1365203563E-01
58.0000000000	.3049020000	.3078078189	.2905818913E-02	.9530337331E-02
60.0000000000	.2115290000	.2202728378	.8743837835E-02	.4133635499E-01
65.0000000000	.0808347000	.0865373132	.5702613162E-02	.7054659804E-01
70.0000000000	.0281127000	.0276930102	-.4196897681E-03	-.1492883174E-01
75.0000000000	.0093285800	.0069531254	-.2375454577E-02	-.2546426763E 00
80.0000000000	.0044545400	.0044475515	-.6988503515E-05	-.1568849649E-02

MAXIMUM ABSOLUTE DIFFERENCE = .8007948114E-01
MAXIMUM RELATIVE DIFFERENCE = .2546426763E 00

TABLE B13. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 963, JULY, 45°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5956022607E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1698888463E-01
COEFFICIENT OF H TO THE 2-TH POWER = .2640227881E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.3717497647E-04
COEFFICIENT OF H TO THE 4-TH POWER = -.4481554439E-07
COEFFICIENT OF H TO THE 5-TH POWER = .3718553645E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .9379122735E-07
COEFFICIENT OF H TO THE 6-TH POWER = .2511639731E-10
COEFFICIENT OF H TO THE 8-TH POWER = .3593945159E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.8527500000	5.8692822416	.1653224163E-01	.2824696361E-02
-25.0000000000	5.8662600000	5.9368810150	.7062101501E-01	.1203850750E-01
-20.0000000000	5.8814000000	5.8967891173	.1538911732E-01	.2616573830E-02
-15.0000000000	5.8977100000	5.8509731278	-.4673687220E-01	-.7924579574E-02
-10.0000000000	5.9172000000	5.8432427943	-.7395720571E-01	-.1249868277E-01
-8.0000000000	5.9258200000	5.8534463811	-.7237361894E-01	-.1221326651E-01
-6.0000000000	5.9349300000	5.8708160661	-.6411393393E-01	-.1080281215E-01
-4.0000000000	5.9446400000	5.8945131999	-.5012680007E-01	-.8432268407E-02
-2.0000000000	5.9543500000	5.9233885939	-.3096140613E-01	-.5199796137E-02
.0000000000	5.9654000000	5.9546226067	-.9457393273E-02	-.1585353278E-02
1.0000000000	5.9713400000	5.9732377377	.1897737660E-02	.3178076714E-03
2.0000000000	5.9774500000	5.9907494696	.1329946955E-01	.2224940325E-02
3.0000000000	5.9837600000	6.0083132578	.2455325780E-01	.4103315941E-02
4.0000000000	5.9903700000	6.0256703326	.3530033262E-01	.5892846788E-02
5.0000000000	5.9971800000	6.0425476709	.4536767091E-01	.7564833958E-02
6.0000000000	6.0043000000	6.0586578585	.5435785846E-01	.9053154983E-02
7.0000000000	6.0116300000	6.0736988359	.6206883592E-01	.1032479310E-01
8.0000000000	6.0192500000	6.0873535174	.6810351742E-01	.1131428624E-01
9.0000000000	6.0270500000	6.0992892653	.7223926533E-01	.1198584139E-01
10.0000000000	6.0352000000	6.1091572058	.7395720581E-01	.1225430902E-01
11.0000000000	6.0431900000	6.1165913657	.7340136568E-01	.1214612906E-01
12.0000000000	6.0512000000	6.1212076178	.7000761780E-01	.1156921236E-01
13.0000000000	6.0596900000	6.1226024282	.6291242823E-01	.1038211991E-01
14.0000000000	6.0669000000	6.1203514104	.5345141038E-01	.8810333181E-02
15.0000000000	6.0744100000	6.1140077133	.3959771333E-01	.6518775211E-02
16.0000000000	6.0766200000	6.1031002965	.2648029645E-01	.4357734473E-02
17.0000000000	6.0800600000	6.0871321812	.7072181164E-02	.1163176213E-02
18.0000000000	6.0845300000	6.0655788196	-.1895118042E-01	-.3114649845E-02
19.0000000000	6.0769600000	6.0378867789	-.3907322107E-01	-.6429731488E-02
20.0000000000	6.0576600000	6.0034730167	-.5418698331E-01	-.8945200508E-02
21.0000000000	6.0315900000	5.9617251055	-.6986489447E-01	-.1158316372E-01
22.0000000000	5.9841000000	5.9120028646	-.7209713540E-01	-.1204811674E-01
23.0000000000	5.9207800000	5.8536419536	-.6713804645E-01	-.1133939218E-01
24.0000000000	5.8535300000	5.7859600838	-.6756991622E-01	-.1154344750E-01
25.0000000000	5.7647700000	5.7082665781	-.5650342189E-01	-.9801504984E-02
26.0000000000	5.6530200000	5.6198760494	-.3314395060E-01	-.5863052067E-02
27.0000000000	5.5407500000	5.5201269419	-.2062305805E-01	-.3722069765E-02
28.0000000000	5.4085200000	5.4084055499	-.1144501439E-03	-.2116108360E-04
29.0000000000	5.2477200000	5.2841758624	.3645586243E-01	.6946990775E-02
30.0000000000	5.1070500000	5.1470151465	.3996514650E-01	.7825485652E-02
31.0000000000	4.9456800000	4.9966545437	.5099454371E-01	.1031096835E-01
32.0000000000	4.7694700000	4.8330231310	.6355313100E-01	.1332498810E-01
33.0000000000	4.6155500000	4.6562929224	.4074292244E-01	.8827316884E-02
34.0000000000	4.4343900000	4.4669212658	.3253126580E-01	.7336130966E-02
35.0000000000	4.2484400000	4.2656861917	.1724619171E-01	.4059417506E-02
36.0000000000	4.0562500000	4.0537097090	-.2540290952E-02	-.6262658742E-03
37.0000000000	3.8445000000	3.8324640597	-.1203594029E-01	-.3130690673E-02
38.0000000000	3.6290500000	3.6037567467	-.2529325330E-01	-.6969662392E-02
39.0000000000	3.4127800000	3.3699691823A	-.4308817621E-01	-.1262553584E-01
40.0000000000	3.1673200000	3.1326073938	-.3471260623E-01	-.1095961451E-01
41.0000000000	2.9355400000	2.8949922006	-.4054779936E-01	-.1381272248E-01
42.0000000000	2.7010300000	2.6593871250	-.4164287499E-01	-.1541740558E-01
43.0000000000	2.4582600000	2.4282797262	-.2998027380E-01	-.1219572942E-01
44.0000000000	2.2371000000	2.2040011994	-.3309880056E-01	-.1479540501E-01
45.0000000000	2.0202600000	1.9886349386	-.3162506144E-01	-.1565395614E-01
46.0000000000	1.7906700000	1.7839443252	-.6725674844E-02	-.3755954388E-02
47.0000000000	1.5755200000	1.5913247372	.1580473724E-01	.1003144183E-01
48.0000000000	1.3855100000	1.4117816286	.2627162858E-01	.1896170261E-01
49.0000000000	1.2417700000	1.2459334802	.4163480247E-02	.3352859424E-02
50.0000000000	1.0924300000	1.0940359723	.1605972255E-02	.1470091681E-02
52.0000000000	.8370730000	.8315529156	-.5520084399E-02	-.6594507766E-02
54.0000000000	.6215490000	.6208606708	-.7083292166E-03	-.1139582599E-02
56.0000000000	.4628470000	.4558651512	-.6981848847E-02	-.1508457189E-01
58.0000000000	.3390840000	.3293690167	-.9714983295E-02	-.2865066855E-01
60.0000000000	.2386800000	.2341700830	-.4509316957E-02	-.1889273067E-01
65.0000000000	.0911760000	.0924593446	.1283344573E-02	.1407546473E-01
70.0000000000	.0292537000	.0320031180	.2749418028E-02	.9398530880E-01
75.0000000000	.0082905700	.0098706818	.1580111753E-02	.1905914494E 00
80.0000000000	.0034370100	.0044700689	.1032158884E-02	.3002285936E 00

MAXIMUM ABSOLUTE DIFFERENCE = .7395720581E-01
MAXIMUM RELATIVE DIFFERENCE = .3002285936E 00

TABLE B14. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 973, JULY, 60°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .6528420328E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1799256533E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.3355132341E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4053189394E-04
COEFFICIENT OF H TO THE 4-TH POWER = .2190681827E-06
COEFFICIENT OF H TO THE 5-TH POWER = .1873760571E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .8703488113E-10
COEFFICIENT OF H TO THE 8-TH POWER = .1355369304E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	6.3633300000	6.4466017798	.8327177980E-01	.1308619540E-01
-25.0000000000	6.3776300000	6.4198064768	.4217647684E-01	.6613189671E-02
-20.0000000000	6.3942300000	6.3500989056	-.4413109444E-01	-.6901705826E-02
-15.0000000000	6.4122200000	6.3230157901	-.8920420993E-01	-.1391159535E-01
-10.0000000000	6.4332300000	6.3569166618	-.7631333821E-01	-.1186236746E-01
-8.0000000000	6.4425000000	6.3844480749	-.5805192508E-01	-.9010776109E-02
-6.0000000000	6.4523400000	6.4173844858	-.3495551425E-01	-.5417494156E-02
-4.0000000000	6.4627700000	6.4537277526	-.9042247373E-02	-.1399128760E-02
-2.0000000000	6.4738900000	6.4914208087	.1753080871E-01	.2707925020E-02
.0000000000	6.4857300000	6.5284203282	.4263032820E-01	.6572881361E-02
1.0000000000	6.4920000000	6.5460370689	.5394706887E-01	.8309661275E-02
2.0000000000	6.4985000000	6.5427426792	.6416267925E-01	.9873338368E-02
3.0000000000	6.5053400000	6.5783018259	.7296182585E-01	.1121568217E-01
4.0000000000	6.5124100000	6.5924839807	.8007398075E-01	.1229559883E-01
5.0000000000	6.5197000000	6.6050625931	.8536259313E-01	.1309302470E-01
6.0000000000	6.5273100000	6.6158138220	.8850382201E-01	.1355900394E-01
7.0000000000	6.5352200000	6.6245148227	.8929482268E-01	.1366362918E-01
8.0000000000	6.5434400000	6.6309415797	.8746157968E-01	.1336621793E-01
9.0000000000	6.5518900000	6.6348662841	.8297628415E-01	.1266448065E-01
10.0000000000	6.5611000000	6.6360542597	.7495425965E-01	.1142403860E-01
11.0000000000	6.5708100000	6.6342604475	.6345044746E-01	.9656411836E-02
12.0000000000	6.5807700000	6.6292254745	.4845547453E-01	.7363192230E-02
13.0000000000	6.5909800000	6.6206713424	.2969134238E-01	.4504844861E-02
14.0000000000	6.5997900000	6.6082967969	.8506796905E-02	.1288949634E-02
15.0000000000	6.6072900000	6.5917724637	-.1551753632E-01	-.2348547789E-02
16.0000000000	6.6082200000	6.5707358725	-.3748412746E-01	-.5672348599E-02
17.0000000000	6.6000500000	6.5447865374	-.5526346262E-01	-.8373188479E-02
18.0000000000	6.5875300000	6.5134813171	-.7404868290E-01	-.1124073559E-01
19.0000000000	6.5595700000	6.4763303526	-.8223964741E-01	-.1253926502E-01
20.0000000000	6.5163500000	6.4327939599	-.8355604022E-01	-.1282252184E-01
21.0000000000	6.4708700000	6.3822809559	-.8858904405E-01	-.1369043792E-01
22.0000000000	6.4039200000	6.3241490020	-.7977099800E-01	-.1245658878E-01
23.0000000000	6.3212700000	6.2577076564	-.6356234357E-01	-.1005531223E-01
24.0000000000	6.2382600000	6.1822249317	-.5603506828E-01	-.8982483622E-02
25.0000000000	6.1293900000	6.0969382243	-.3244177571E-01	-.5292831527E-02
26.0000000000	6.0016600000	6.0010705020	-.5894980131E-03	-.9822249397E-04
27.0000000000	5.8808100000	5.8938525735	.1304257350E-01	.2217819278E-02
28.0000000000	5.7310400000	5.7745520655	.4351206549E-01	.7592350688E-02
29.0000000000	5.5601100000	5.4425093747	.8239937473E-01	.1481973823E-01
30.0000000000	5.4178400000	5.4971802964	.7934029642E-01	.1464426717E-01
31.0000000000	5.2596400000	5.3381842429	.7854424289E-01	.1493338763E-01
32.0000000000	5.0847000000	5.1653559821	.8056598211E-01	.1584450530E-01
33.0000000000	4.9265500000	4.9787977099	.5224770987E-01	.1060533434E-01
34.0000000000	4.7330700000	4.7789271662	.4585716617E-01	.9688672716E-02
35.0000000000	4.5354000000	4.5665166218	.3111662176E-01	.6860832949E-02
36.0000000000	4.3366700000	4.3427171426	.6047142553E-02	.1394420731E-02
37.0000000000	4.1270200000	4.1090628421	-.1795715788E-01	-.4351119664E-02
38.0000000000	3.9111200000	3.8674510313	-.4366896870E-01	-.1116533594E-01
39.0000000000	3.6848600000	3.6200962915	-.6476370851E-01	-.1757562255E-01
40.0000000000	3.4180700000	3.3694593490	-.4861065098E-01	-.1422166631E-01
41.0000000000	3.1653000000	3.1181548045	-.4714519551E-01	-.1489438458E-01
42.0000000000	2.9106000000	2.8688447034	-.4184529661E-01	-.1437641817E-01
43.0000000000	2.6481700000	2.6241270336	-.2404296643E-01	-.9079087279E-02
44.0000000000	2.4104300000	2.3864290412	-.2400095883E-01	-.9957127496E-02
45.0000000000	2.1760600000	2.1579145821	-.1814541787E-01	-.8338656961E-02
46.0000000000	1.9344000000	1.9404127201	.6012720100E-02	.3108312707E-02
47.0000000000	1.7077400000	1.7353718690	.2763186899E-01	.1618037230E-01
48.0000000000	1.5073400000	1.5438405588	.3650055877E-01	.2421521274E-01
49.0000000000	1.3558200000	1.3664729523	.1059295234E-01	.7812603137E-02
50.0000000000	1.1992700000	1.2035550092	.4285009170E-02	.3573014559E-02
52.0000000000	.9364650000	.9204288237	-.1401617632E-01	-.1499625667E-01
54.0000000000	.7045340000	.6917534508	-.1278054918E-01	-.1814042924E-01
56.0000000000	.5283100000	.5100289087	-.1738109128E-01	-.3289941753E-01
58.0000000000	.3857310000	.3709690107	-.1476198927E-01	-.3827016567E-01
60.0000000000	.2666790000	.2645965145	-.2082485528E-02	-.7808595967E-02
65.0000000000	.0966900100	.1038411768	.7151076828E-02	.7395872822E-01
70.0000000000	.0294550000	.0341417024	.4686702423E-02	.1591139848E 00
75.0000000000	.0077553700	.0089550852	.1201375231E-02	.1549418866E 00
80.0000000000	.0030342900	.0038917964	.8565063849E-03	.2821827189E 00

MAXIMUM ABSOLUTE DIFFERENCE = .8929482268E-01
MAXIMUM RELATIVE DIFFERENCE = .2821827189E 00

TABLE B15. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 983, JULY, 75°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .6940031133E 0[illegible]
COEFFICIENT OF H TO THE 1-TH POWER = .1816503353E-0[illegible]
COEFFICIENT OF H TO THE 2-TH POWER = -.463710[illegible]E-0[illegible]
COEFFICIENT OF H TO THE 3-TH POWER = -.405867[illegible]E-0[illegible]
COEFFICIENT OF H TO THE 4-TH POWER = .22614[illegible]3110E-0[illegible]
COEFFICIENT OF H TO THE 5-TH POWER = .1937144250E-0[illegible]

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-[illegible]
COEFFICIENT OF H TO THE 4-TH POWER = -.2982[illegible]527E-0[illegible]
COEFFICIENT OF H TO THE 6-TH POWER = .9908462447E-1[illegible]
COEFFICIENT OF H TO THE 8-TH POWER = .8935543877E-1[illegible]

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	6.7516030000	6.8407181823	.8911818230E-01	.1319[illegible]564[illegible]E-01
-25.0000000000	6.7481[illegible]0000	6.8050557856	.3695578563E-01	.5469[illegible]539E-02
-20.0000000000	6.7[illegible]3[illegible]0000	6.7338123741	-.5249762587E-01	-.7735[illegible]1111E-02
-15.0000000000	6.[illegible]0000	6.7175415953	-.9395840467E-01	-.1394[illegible]1612E-01
-10.0000000000	6.8994400000	6.7560025899	-.7343741006E-01	-.1[illegible]5304468E-01
-8.0000000000	6.8398[illegible]0000	6.7873277302	-.5217226979E-01	-.7[illegible]8831E-02
-6.0000000000	6.8[illegible]0000	6.8236238162	-.2653618378E-01	-.3[illegible]9[illegible]E-02
-4.0000000000	6.8[illegible]0000	6.8626545299	.1214529955E-02	.1770[illegible]268E-03
-2.0000000000	6.8734400000	6.9021775846	.2873768457E-01	.4[illegible]7[illegible]E-02
.0000000000	6.8862600000	6.9400311333	.5377113329E-01	.7808464902E-02
1.0000000000	6.8[illegible]0000	6.9576022959	.6467229586E-01	.9302[illegible]E-02
2.0000000000	6.8[illegible]0000	6.9741885969	.7419859685E-01	.1075[illegible]E-01
3.0000000000	6.9072100000	6.9892021000	.8205210001E-01	.1185[illegible]909E-01
4.0000000000	6.9147300000	7.0037447410	.8805474102E-01	.1[illegible]E-01
5.0000000000	6.9225500000	7.0144873140	.9190731398E-01	.1377[illegible]E-01
6.0000000000	6.9301800000	7.0241079139	.9392791387E-01	.1355[illegible]949E-01
7.0000000000	6.9356200000	7.0315398258	.9291982544E-01	.1319[illegible]E-01
8.0000000000	6.9474600000	7.0365885857	.8909885868E-01	.1[illegible]E-01
9.0000000000	6.9560000000	7.0389701232	.8291012316E-01	.1191[illegible]E-01
10.0000000000	6.9650000000	7.0345742639	.7259426391E-01	.1062[illegible]644E-01
11.0000000000	6.9760000000	7.0351431604	.5876316040E-01	.8423135199E-02
12.0000000000	6.9860000000	7.0285151258	.4161512581E-01	.5956[illegible]509E-02
13.0000000000	6.9965700000	7.0143896441	.2181964410E-01	.3118[illegible]E-02
14.0000000000	7.0046300000	7.0045217060	-.1082940435E-03	-.1546[illegible]E-04
15.0000000000	7.0116500000	6.9866158309	-.2503416906E-01	-.3570[illegible]E-02
16.0000000000	7.0117900000	6.9643398941	-.4745010592E-01	-.6[illegible]E-02
17.0000000000	7.0033400000	6.9373189236	-.6602107636E-01	-.9[illegible]
18.0000000000	6.9900500000	6.9051290894	-.8532091063E-01	-.1[illegible]E-01
19.0000000000	6.9611300000	6.8672021782	-.9383782177E-01	-.1[illegible]E-01
20.0000000000	6.9182100000	6.8232709387	-.9193906130E-01	-.1[illegible]E-01
21.0000000000	6.8642500000	6.7724657846	-.9178421543E-01	-.1377[illegible]E-01
22.0000000000	6.7997[illegible]0000	6.7142134658	-.7848653421E-01	-.1159[illegible]E-01
23.0000000000	6.7013100000	6.6477884465	-.5352155349E-01	-.7986[illegible]E-02
24.0000000000	6.6139800000	6.5724075567	-.4157214325E-01	-.6[illegible]
25.0000000000	6.4[illegible]0000	6.4872409922	-.1120900783E-01	-.1[illegible]
26.0000000000	6.3741400000	6.3914243990	.1728439896E-01	.2711[illegible]E-02
27.0000000000	6.2631500000	6.2840435587	.2093355874E-01	.3302337121E-02
28.0000000000	6.1187100000	6.1643620436	.4565204357E-01	.7461[illegible]E-02
29.0000000000	5.9631[illegible]0000	6.0314[illegible]	.8233[illegible]051E-01	.1[illegible]
30.0000000000	5.8035[illegible]0000	5.8846727168	.8111271681E-01	.1397[illegible]E-01
31.0000000000	5.6416[illegible]0000	5.7234561647	.8245616470E-01	.1461[illegible]E-01
32.0000000000	5.4609[illegible]0000	5.5474714409	.8657144092E-01	.1595[illegible]E-01
33.0000000000	5.2[illegible]0000	5.3566211558	.5941115497E-01	.1[illegible]
34.0000000000	5.0[illegible]	5.1512555809	.5446558095E-01	.1068[illegible]E-01
35.0000000000	4.8[illegible]0000	4.9319221799	.3982217990E-01	.8140[illegible]E-02
36.0000000000	4.6[illegible]0000	4.6997008105	.1282001954E-01	.2[illegible]E-02
37.0000000000	4.4[illegible]0000	4.4560483627	-.1692163725E-01	-.3[illegible]E-02
38.0000000000	4.2[illegible]0000	4.2029173171	-.4767268291E-01	-.1[illegible]E-01
39.0000000000	4.0137[illegible]0000	3.9425153540	-.7075464596E-01	-.1763017339E-01
40.0000000000	3.7[illegible]0000	3.6774355726	-.5197442739E-01	-.1393[illegible]E-01
41.0000000000	3.4[illegible]0000	3.4104609963	-.4848900373E-01	-.1[illegible]E-01
42.0000000000	3.1[illegible]0000	3.1444703217	-.4179967835E-01	-.1311[illegible]E-01
43.0000000000	2.9[illegible]0000	2.8823146840	-.2246531600E-01	-.7[illegible]E-02
44.0000000000	2.6[illegible]0000	2.6266065666	-.2280343341E-01	-.9[illegible]E-02
45.0000000000	2.3[illegible]0000	2.3800616543	-.1721434575E-01	-.7[illegible]E-02
46.0000000000	2.1[illegible]0000	2.1445124876	.9352487536E-02	.4[illegible]E-02
47.0000000000	1.8[illegible]0000	1.9217496514	.3179965143E-01	.1677[illegible]E-01
48.0000000000	1.6723000000	1.7130425902	.4074259018E-01	.2[illegible]E-01
49.0000000000	1.5[illegible]0000	1.5192286742	.1226567420E-01	.8[illegible]E-02
50.0000000000	1.3[illegible]0000	1.3407364085	.4826408462E-02	.3612[illegible]E-02
52.0000000000	1.0456500000	1.0296476660	-.1600233397E-01	-.1530[illegible]E-01
54.0000000000	.7014270000	.7748501188	-.1457198120E-01	-.1[illegible]E-01
56.0000000000	.5565930000	.5762924108	-.2030038916E-01	-.3[illegible]E-01
58.0000000000	.4369650000	.4204923731E	-.1654126821E-01	-.3[illegible]E-01
60.0000000000	.3745970000	.3014810028	-.3115997200E-02	-.1[illegible]E-01
65.0000000000	.1132880000	.1205161790	.7226179021E-02	.6[illegible]E-01
70.0000000000	.0456850000	.0411[illegible]01761	.5495179072E-02	.1[illegible]
75.0000000000	.0[illegible]54000	.0121665642	.2061164230E-02	.2[illegible]
80.0000000000	.0030746100	.0062[illegible]473	.2305237286E-02	.5796[illegible]

MAXIMUM ABSOLUTE DIFFERENCE = .9395840467E-01
MAXIMUM RELATIVE DIFFERENCE = .5796991120E 00

TABLE B16. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 993, OCTOBER, 20°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5412350971E 01
COEFFICIENT OF H TO THE 1-TH POWER = .2718419353E-01
COEFFICIENT OF H TO THE 2-TH POWER = .6923530277E-04
COEFFICIENT OF H TO THE 3-TH POWER = -.4724110739E-04
COEFFICIENT OF H TO THE 4-TH POWER = .9598311450E-07
COEFFICIENT OF H TO THE 5-TH POWER = .3213010744E-09

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-00
COEFFICIENT OF H TO THE 4-TH POWER = .6740876192E-07
COEFFICIENT OF H TO THE 6-TH POWER = .3175196027E-10
COEFFICIENT OF H TO THE 8-TH POWER = .2708317967E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.3965200000	5.4273132032	.1187932032E 00	.2277783849E-01
-25.0000000000	5.3909400000	5.3598205951	.3948059508E-01	.7420690234E-02
-20.0000000000	5.3937000000	5.2646932028	-.6709067021E-01	-.1257853588E-01
-15.0000000000	5.3383000000	5.2101882566	-.1296817434E 00	-.2423790296E-01
-10.0000000000	5.3662500000	5.2362021036	-.1300478964E 00	-.2423440884E-01
-8.0000000000	5.3739200000	5.2594494520	-.1144505480E 00	-.2129740451E-01
-5.0000000000	5.3621400000	5.2003475175	-.9179248250E-01	-.1705501574E-01
-3.0000000000	5.3206600000	5.3272290464	-.6356995965E-01	-.1179217410E-01
-2.0000000000	5.4001900000	5.3685770854	-.3161291459E-01	-.5854937468E-02
.0000000000	5.4101100000	5.4123500706	.2240970585E-02	.4142190427E-03
1.0000000000	5.4153000000	5.4345578910	.1925789102E-01	.3556200214E-02
2.0000000000	5.4207300000	5.4566381123	.3590811226E-01	.6642207771E-02
3.0000000000	5.4363100000	5.4732826744	.5201867436E-01	.9566380871E-02
4.0000000000	5.4314500000	5.4993603140	.6791031497E-01	.1250314490E-01
5.0000000000	5.4374100000	5.5194577784	.8204737844E-01	.1508842280E-01
6.0000000000	5.4435700000	5.5383374066	.9475760661E-01	.1740722220E-01
7.0000000000	5.4495900000	5.5557118076	.1058218075E 00	.1941723733E-01
8.0000000000	5.4553200000	5.5712833915	.1149633915E 00	.2106067470E-01
9.0000000000	5.4625500000	5.5847477659	.1218977659E 00	.2231395075E-01
10.0000000000	5.4691300000	5.5957015760	.1266615760E 00	.2315934645E-01
11.0000000000	5.4740900000	5.6040817831	.1291017831E 00	.2358027742E-01
12.0000000000	5.4793700000	5.6093145731	.1299445731E 00	.2371529972E-01
13.0000000000	5.4832000000	5.6111140970	.1278240970E 00	.2331156962E-01
14.0000000000	5.4881400000	5.6091310549	.1209910548E 00	.2204591261E-01
15.0000000000	5.4977100000	5.6029911522	.1152811522E 00	.2100718093E-01
16.0000000000	5.4859900000	5.5923034774	.1063134774E 00	.1937904698E-01
17.0000000000	5.4925500000	5.5766587784	.7690887937E-01	.1308406425E-01
18.0000000000	5.5031500000	5.5556284618	.3247846178E-01	.5880423432E-02
19.0000000000	5.5364000000	5.5287623517	-.7637648319E-02	-.1379533328E-02
20.0000000000	5.5407730000	5.4995889604	-.4518103963E-01	-.8154288898E-02
21.0000000000	5.5272610000	5.4556150174	-.7162498761E-01	-.1295954448E-01
22.0000000000	5.5058860000	5.4083266913	-.9755330867E-01	-.1771802304E-01
23.0000000000	5.4606610000	5.3531923230	-.1114176770E 00	-.2038895310E-01
24.0000000000	5.4076700000	5.2896670903	-.1180329097E 00	-.2187569940E-01
25.0000000000	5.3425500000	5.2172003292	-.1253496708E 00	-.2336257112E-01
26.0000000000	5.2610200000	5.1352459936	-.1147740064E 00	-.2186163223E-01
27.0000000000	5.1200600000	5.0432768608	-.8528313917E-01	-.1662904141E-01
28.0000000000	5.0148600000	4.9408029759	-.7405702406E-01	-.1555273398E-01
29.0000000000	4.8698500000	4.8273946551	-.4103534488E-01	-.8429866141E-02
30.0000000000	4.7336500000	4.7027100792	-.3097992079E-01	-.6544560541E-02
31.0000000000	4.5732100000	4.5665270701	-.6682929932E-02	-.1461321464E-02
32.0000000000	4.3986200000	4.4187780622	.2015806217E-01	.4582815102E-02
33.0000000000	4.2884000000	4.2505865731	.1118657310E-01	.2633126162E-02
34.0000000000	4.0777200000	4.0803026940	.1150269405E-01	.2860492924E-02
35.0000000000	3.8077100000	3.9085343776	.1082437756E-01	.2771120899E-02
36.0000000000	3.6389700000	3.7181707256	.1920072564E-01	.5180830323E-02
37.0000000000	3.4860700000	3.5103832664	.6530326640E-01	.1890606973E-01
38.0000000000	3.2175500000	3.3136715165	.9612151649E-01	.2987413295E-01
39.0000000000	3.0129300000	3.1027400769	.8981007692E-01	.2980821955E-01
40.0000000000	2.8144200000	2.8885561410	.7413614097E-01	.2634153439E-01
41.0000000000	2.6296800000	2.6723836699	.4355836989E-01	.1656413323E-01
42.0000000000	2.4374900000	2.4589905673	.2150056731E-01	.8870781750E-02
43.0000000000	2.2277900000	2.2480156203	.2022562033E-01	.9078782261E-02
44.0000000000	2.0379000000	2.0424268447	.4526844699E-02	.2221328181E-02
45.0000000000	1.8598500000	1.8441643997	-.1428560034E-01	-.7686835965E-02
46.0000000000	1.6765000000	1.6549239160	-.2157608402E-01	-.1286971967E-01
47.0000000000	1.5150900000	1.4761029052	-.3898709475E-01	-.2573252778E-01
48.0000000000	1.3406300000	1.3087682279	-.5186177208E-01	-.3811599927E-01
49.0000000000	1.1954600000	1.1536453376	-.4183466236E-01	-.3499402944E-01
50.0000000000	1.0827500000	1.0111274529	-.4162234708E-01	-.3953671846E-01
52.0000000000	.7428870000	.7639897500	.1302749994E-02	.1708105676E-02
54.0000000000	.5349810000	.5681155331	.3013453313E-01	.5638223059E-01
56.0000000000	.3967710000	.4094736883	.1270268830E-01	.3201518315E-01
58.0000000000	.2896250000	.2906580080	.1033005002E-02	.3566694323E-02
60.0000000000	.2014730000	.2019044403	.5214403445E-03	.2588140071E-02
65.0000000000	.0781259000	.0733961717	-.4732728297E-02	-.6057589826E-01
70.0000000000	.0294758000	.0228014530	-.5924346994E-02	-.2062378417E 00
75.0000000000	.0103725000	.0079187403	-.2453759658E-02	-.2365639583E 00
80.0000000000	.0053353700	.0075977824	.2262412441E-02	.4240404022E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1300478964E 00
MAXIMUM RELATIVE DIFFERENCE = .4240404022E 00

TABLE B17. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 1003, OCTOBER, 30°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5410678464E 01
COEFFICIENT OF H TO THE 1-TH POWER = .2142913985E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.1810841788E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4228531457E-04
COEFFICIENT OF H TO THE 4-TH POWER = .2005046792E-06
COEFFICIENT OF H TO THE 5-TH POWER = .2383449525E-08

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .1168421151E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.1758203604E-14

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.2801300000	5.3975028269	.1173728269E 00	.2222015476E-01
-25.0000000000	5.2818000000	5.3249990430	.3519904295E-01	.6651420044E-02
-20.0000000000	5.3900100000	5.2334085326	-.7141146739E-01	-.1396130094E-01
-15.0000000000	5.3137300000	5.1976635380	-.1270664610E 00	-.2368588537E-01
-10.0000000000	5.3368400000	5.2217214876	-.1151185124E 00	-.2157053845E-01
-5.0000000000	5.3844100000	5.2498885690	-.9452143099E-01	-.1748609669E-01
-6.0000000000	5.3520600000	5.2849307523	-.6752924771E-01	-.1241648807E-01
-4.0000000000	5.3416900000	5.3248171601	-.3627283995E-01	-.6765944975E-02
-2.0000000000	5.3702500000	5.3674372223	-.2812777719E-02	-.5237703494E-03
.0000000000	5.3792500000	5.4106784642	.3142846425E-01	.5842536460E-02
1.0000000000	5.3844500000	5.4318844369	.4745443688E-01	.8813270277E-02
2.0000000000	5.3937600000	5.4524773685	.6271736851E-01	.1163639355E-01
3.0000000000	5.3852900000	5.4722107772	.7692077722E-01	.1425702367E-01
4.0000000000	5.4010600000	5.4908425604	.8976256038E-01	.1661037249E-01
5.0000000000	5.4370200000	5.5081410803	.1011141080E 00	.1870052415E-01
6.0000000000	5.4136700000	5.5238489402	.1107789402E 00	.2046508446E-01
7.0000000000	5.4193900000	5.5377508643	.1183608643E 00	.2184025584E-01
8.0000000000	5.4258600000	5.5496016748	.1237416748E 00	.2280591060E-01
9.0000000000	5.4323500000	5.5591584031	.1267784031E 00	.2333754325E-01
10.0000000000	5.4389500000	5.5661701505	.1272201505E 00	.2339057365E-01
11.0000000000	5.4447800000	5.5703746114	.1255946114E 00	.2306697634E-01
12.0000000000	5.4502400000	5.5714941643	.1212541642E 00	.2227480805E-01
13.0000000000	5.4555100000	5.5692319324	.1137219324E 00	.2084533805E-01
14.0000000000	5.4596700000	5.5632674171	.1046676171E 00	.1917809857E-01
15.0000000000	5.4628000000	5.5532834383	.9036343833E-01	.1654137489E-01
16.0000000000	5.4630100000	5.5388103108	.7580031076E-01	.1387519165E-01
17.0000000000	5.4783700000	5.5195744994	.4515449943E-01	.8283942281E-02
18.0000000000	5.4956600000	5.4949650474	.9265047353E-02	.1689051480E-02
19.0000000000	5.4928200000	5.4645423286	-.2823767136E-01	-.5180033180E-02
20.0000000000	5.4868000000	5.4279081443	-.5859135570E-01	-.1074327745E-01
21.0000000000	5.4644200000	5.3843578456	-.8006215443E-01	-.1465157344E-01
22.0000000000	5.4356700000	5.3333350198	-.1023349802E 00	-.1808690126E-01
23.0000000000	5.3904500000	5.2742193135	-.1162306865E 00	-.2156233454E-01
24.0000000000	5.3266400000	5.2063779642	-.1202620358E 00	-.2257744624E-01
25.0000000000	5.2626200000	5.1291815530	-.1237384470E 00	-.2355417630E-01
26.0000000000	5.1577800000	5.0420243659	-.1157556341E 00	-.2248291309E-01
27.0000000000	5.0243100000	4.9443495076	-.8996049238E-01	-.1796947412E-01
28.0000000000	4.9228200000	4.8356785736	-.8714142644E-01	-.1770152604E-01
29.0000000000	4.7245400000	4.7156457070	-.5289479304E-01	-.1109285032E-01
30.0000000000	4.6239300000	4.5840317854	-.4489871459E-01	-.9609580154E-02
31.0000000000	4.4433500000	4.4408034275	-.2254617252E-01	-.5051401414E-02
32.0000000000	4.2827800000	4.2481500503	.3370050355E-02	.7868838341E-03
33.0000000000	4.1246800000	4.1205074590	-.4172540968E-02	-.1011603559E-02
34.0000000000	3.8395000000	3.9445853604	.5085530371E-02	.1270307570E-02
35.0000000000	3.7475600000	3.7593756025	.1181560248E-01	.3152878602E-02
36.0000000000	3.5438600000	3.5661460991	.2226609907E-01	.6282072073E-02
37.0000000000	3.3202300000	3.3664217467	.6439124666E-01	.1940050322E-01
38.0000000000	3.0690600000	3.1619429240	.9288292397E-01	.3026420695E-01
39.0000000000	2.8451600000	2.9546170503	.8943705035E-01	.3121515938E-01
40.0000000000	2.6597200000	2.7464477165	.8672771648E-01	.3240787710E-01
41.0000000000	2.4740800000	2.5394637822	.6538378222E-01	.2642751339E-01
42.0000000000	2.2898200000	2.3356436289	.4582362885E-01	.2001188124E-01
43.0000000000	2.1052700000	2.1368439768	.3157397684E-01	.1499750026E-01
44.0000000000	1.9402700000	1.9447381175	.4468117520E-02	.2302432864E-02
45.0000000000	1.7802800000	1.7607674785	-.1951232147E-01	-.1096025427E-01
46.0000000000	1.6137000000	1.5861103817	-.2758961829E-01	-.1709711736E-01
47.0000000000	1.4644200000	1.4216644590	-.4275554098E-01	-.2919627853E-01
48.0000000000	1.3915200000	1.2680487572	-.5347124783E-01	-.4046192866E-01
49.0000000000	1.1489600000	1.1256162494	-.4334375061E-01	-.3707889972E-01
50.0000000000	1.0356100000	.9944780202	-.4193197981E-01	-.4045807277E-01
52.0000000000	.7444740000	.7655088300	.1084830017E-02	.1419146988E-02
54.0000000000	.5446930000	.5784426208	.3374962082E-01	.6196081244E-01
56.0000000000	.4072560000	.4288675365	.2161153646E-01	.5306621992E-01
58.0000000000	.2697120000	.3116015867	.1188958667E-01	.3947003880E-01
60.0000000000	.2136340000	.2213797409	.7745740923E-02	.3625704074E-01
65.0000000000	.0800548000	.0832856959	-.6769104109E-02	-.7516649983E-01
70.0000000000	.0239918000	.0247267477	-.9265052261E-02	-.2725677239E 00
75.0000000000	.0130211000	.0080027302	-.5018369794E-02	-.3854029071E 00
80.0000000000	.0073776200	.0118140357	.4436415742E-02	.6013342706E 00

MAXIMUM ABSOLUTE DIFFERENCE = .1272201595E 00
MAXIMUM RELATIVE DIFFERENCE = .6013342706E 00

TABLE B18. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 1013, OCTOBER, 45°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5297059768E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1779498272E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.5122665934E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.4296001575E-04
COEFFICIENT OF H TO THE 4-TH POWER = .4083131555E-06
COEFFICIENT OF H TO THE 5-TH POWER = .6120728558E-09

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 6-TH POWER = .1493344556E-09
COEFFICIENT OF H TO THE 8-TH POWER = -.2030985579E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.1643400000	5.2740912179	.1097512179 00	.2125174134E-01
-25.0000000000	5.1723400000	5.1838712317	.1159123165E-01	.2229403258E-02
-20.0000000000	5.1814100000	5.0972460522	-.8416394782E-01	-.1624344490E-01
-15.0000000000	5.1917500000	5.0717111423	-.1200388577E 00	-.2312107820E-01
-10.0000000000	5.2036000000	5.1141127951	-.8948720490E-01	-.1719717213E-01
-5.0000000000	5.2088700000	5.1453635546	-.6350644537E-01	-.1219198125E-01
-4.0000000000	5.2145200000	5.1816163213	-.3290367869E-01	-.6310011024E-02
-3.0000000000	5.2205400000	5.2205337855	-.6214469158E-05	-.1190387998E-05
-2.0000000000	5.2269800000	5.2598778869	.3279088689E-01	.6273390542E-02
-1.0000000000	5.2339000000	5.2970507682	.6315976618E-01	.1206743885E-01
1.0000000000	5.2375700000	5.3142999315	.7672993153E-01	.1464991046E-01
2.0000000000	5.2413400000	5.3302634816	.8892348164E-01	.1696579150E-01
3.0000000000	5.2452500000	5.3447070133	.9945701330E-01	.1896134852E-01
4.0000000000	5.2493400000	5.3573958201	.1080358201E 00	.2058076034E-01
5.0000000000	5.2535800000	5.3681025279	.1145225279E 00	.2179895003E-01
6.0000000000	5.2579600000	5.3766061654	.1186461654E 00	.2256486649E-01
7.0000000000	5.2624500000	5.3826846986	.1202346986E 00	.2284766575E-01
8.0000000000	5.2670500000	5.3861270703	.1190770703E 00	.2260697550E-01
9.0000000000	5.2707900000	5.3866948041	.1159048041E 00	.2199002504E-01
10.0000000000	5.2752100000	5.3841732517	.1089632517E 00	.2065571830E-01
11.0000000000	5.2796400000	5.3783145833	.9867658331E-01	.1869002116E-01
12.0000000000	5.2839100000	5.3688686456	.8495864563E-01	.1607874578E-01
13.0000000000	5.2888500000	5.3555538443	.6660384435E-01	.1259301834E-01
14.0000000000	5.2915200000	5.3380732332	.4655323325E-01	.8797705243E-02
15.0000000000	5.2931500000	5.3161010385	.2295103851E-01	.4335988685E-02
16.0000000000	5.2881700000	5.2492818799	.1111879799E-02	.2102579530E-03
17.0000000000	5.2801600000	5.2577290012	-.2293099879E-01	-.4342860594E-02
18.0000000000	5.2638400000	5.2195238667	-.4431613334E-01	-.8418974235E-02
19.0000000000	5.2451400000	5.1757175180	-.6942248200E-01	-.1373558227E-01
20.0000000000	5.2076100000	5.1253341283	-.8227587170E-01	-.1579916155E-01
21.0000000000	5.1569200000	5.0678771947	-.8904280531E-01	-.1726666408E-01
22.0000000000	5.1048200000	5.0028388021	-.1019811979E 00	-.1997743267E-01
23.0000000000	5.0306300000	4.9297123294	-.1009176706E 00	-.2006064262E-01
24.0000000000	4.9431100000	4.8480088492	-.9510115060E-01	-.1923913302E-01
25.0000000000	4.8540100000	4.7572772832	-.9672271683E-01	-.1992639407E-01
26.0000000000	4.7493800000	4.6571280979	-.9225190213E-01	-.1942398842E-01
27.0000000000	4.6176600000	4.5472599653	-.7043003470E-01	-.1525222237E-01
28.0000000000	4.5049100000	4.4274893799	-.7742162007E-01	-.1718605257E-01
29.0000000000	4.3536100000	4.2917747490	-.5583525098E-01	-.1282504657E-01
30.0000000000	4.2303600000	4.1582540102	-.7210598979E-01	-.1704488266E-01
31.0000000000	4.1073800000	4.0092584540	-.9812154599E-01	-.2388908404E-01
32.0000000000	3.9569000000	3.8513352235	-.1056647765E 00	-.2670079441E-01
33.0000000000	3.7831900000	3.6852550196	-.9793498043E-01	-.2588687865E-01
34.0000000000	3.5175600000	3.5120099198	-.5580081168E-02	-.1586336431E-02
35.0000000000	3.2622500000	3.3327989377	.7054893767E-01	.2162585261E-01
36.0000000000	3.0641600000	3.1490010053	.9484100534E-01	.3105305725E-01
37.0000000000	2.8738500000	2.9621362354	.8828423539E-01	.3072054401E-01
38.0000000000	2.7036600000	2.7738176390	.7015763798E-01	.2594913487E-01
39.0000000000	2.5358400000	2.5656964983	.4985649827E-01	.1966074290E-01
40.0000000000	2.3449500000	2.3894053754	.5445537559E-01	.2322240371E-01
41.0000000000	2.1695600000	2.2165029253	.4694292530E-01	.2163707171E-01
42.0000000000	1.9988800000	2.0384244707	.3953447066E-01	.1977821224E-01
43.0000000000	1.8319500000	1.8664415118	.3449511182E-01	.1882775830E-01
44.0000000000	1.6849200000	1.7014322935	.1471229350E-01	.8721393724E-02
45.0000000000	1.5469600000	1.5449663449	-.2095655511E-02	-.1354692504E-02
46.0000000000	1.4028900000	1.3967887437	-.6101256324E-02	-.4349062524E-02
47.0000000000	1.2768300000	1.2579448915	-.1888510853E-01	-.1486893990E-01
48.0000000000	1.1604000000	1.1282739169	-.3212608308E-01	-.2768535254E-01
49.0000000000	1.0463800000	1.0081384712	-.3824152883E-01	-.3656450207E-01
50.0000000000	.9446840000	.8973466243	-.4733737568E-01	-.5010921714E-01
52.0000000000	.7110430000	.7029085915	-.8234408452E-02	-.1158074610E-01
54.0000000000	.5046750000	.5418105893	.3713658931E-01	.7358317592E-01
56.0000000000	.3775620000	.4106022373	.3302023730E-01	.8745183112E-01
58.0000000000	.2772740000	.3051270260	.2784802598E-01	.1004350425E 00
60.0000000000	.1977150000	.2214028224	.2368782243E-01	.1198079176E 00
65.0000000000	.0963930000	.0946289649	-.1764335115E-02	-.2042180259E-01
70.0000000000	.0363730000	.0188486689	-.1752513109E-01	-.4818064400E 00
75.0000000000	.0157680000	-.0003025514	-.1607095139E-01	-.1019187196E 01
80.0000000000	.0092333500	.0290324292	.1979907921E-01	.2144300737E 01

MAXIMUM ABSOLUTE DIFFERENCE = .1202346986E 00
MAXIMUM RELATIVE DIFFERENCE = .2144300737E 01

TABLE B19. - RATIO OF TWO POLYNOMIAL CURVE FIT TO PROFILE NO. 1023, OCTOBER, 60°N

COEFFICIENTS OF THE NUMERATOR

COEFFICIENT OF H TO THE 0-TH POWER = .5076052232E 01
COEFFICIENT OF H TO THE 1-TH POWER = .1535348527E-01
COEFFICIENT OF H TO THE 2-TH POWER = -.2287461883E-03
COEFFICIENT OF H TO THE 3-TH POWER = -.5006806003E-04
COEFFICIENT OF H TO THE 4-TH POWER = .5594063542E-06
COEFFICIENT OF H TO THE 5-TH POWER = -.4851901190E-09

COEFFICIENTS OF THE DENOMINATOR

COEFFICIENT OF H TO THE 2-TH POWER = .0000000000E-80
COEFFICIENT OF H TO THE 4-TH POWER = .2989667573E-06
COEFFICIENT OF H TO THE 6-TH POWER = -.4358330772E-10
COEFFICIENT OF H TO THE 8-TH POWER = .2103670475E-13

ALTITUDE H	OBSERVED RADIATION	CALCULATED RADIATION	ABSOLUTE DIFFERENCE	RELATIVE DIFFERENCE
-30.0000000000	5.0045500000	5.0860631198	.8151311977E-01	.1628780205E-01
-25.0000000000	5.0084500000	5.0072578873	-.1192112886E-02	-.2380202829E-03
-20.0000000000	5.0129100000	4.9437316411	-.6917835891E-01	-.1380004008E-01
-15.0000000000	5.0180100000	4.9136671260	-.9834287401E-01	-.1959798287E-01
-10.0000000000	5.0239200000	4.9407870339	-.8313296607E-01	-.1654743031E-01
-5.0000000000	5.0264800000	4.9605071134	-.6597288662E-01	-.1312506697E-01
-4.0000000000	5.0292900000	4.9853182669	-.4397173318E-01	-.8743129383E-02
-4.0000000000	5.0322900000	5.0139435558	-.1834644417E-01	-.3645744614E-02
-2.0000000000	5.0355000000	5.0448156692	.9315669187E-02	.1849998846E-02
.0000000000	5.0389500000	5.0760522314	.3710223164E-01	.7363087873E-02
1.0000000000	5.0407500000	5.0911259398	.5037593978E-01	.9993738984E-02
2.0000000000	5.0426600000	5.1054242005	.6276820049E-01	.1244743855E-01
3.0000000000	5.0446100000	5.1186235359	.7401353592E-01	.1467180534E-01
4.0000000000	5.0466500000	5.1303528438	.8370284384E-01	.1658582304E-01
5.0000000000	5.0487500000	5.1402335925	.9148359246E-01	.1812004802E-01
6.0000000000	5.0509000000	5.1478604885	.9696048852E-01	.1919667555E-01
7.0000000000	5.0530900000	5.1528067136	.9971671358E-01	.1973380913E-01
8.0000000000	5.0553100000	5.1546258247	.9931582467E-01	.1964584262E-01
9.0000000000	5.0575400000	5.1528544096	.9531440961E-01	.1884600213E-01
10.0000000000	5.0601300000	5.1470155808	.8688558082E-01	.1717062226E-01
11.0000000000	5.0625900000	5.1366233736	.7403337363E-01	.1462361630E-01
12.0000000000	5.0638500000	5.1211880950	.5733809502E-01	.1132302399E-01
13.0000000000	5.0646300000	5.1002276398	.3559263980E-01	.7027688065E-02
14.0000000000	5.0614000000	5.0732497529	.1184975289E-01	.2341200634E-02
15.0000000000	5.0521600000	5.0398101749	-.1234982511E-01	-.2444464369E-02
16.0000000000	5.0390800000	4.9994715553	-.3960844470E-01	-.7860253201E-02
17.0000000000	5.0122700000	4.9518379671	-.6043203293E-01	-.1205681915E-01
18.0000000000	4.9719800000	4.8965597991	-.7542020091E-01	-.1516904752E-01
19.0000000000	4.9269200000	4.8333437516	-.9357624843E-01	-.1899284917E-01
20.0000000000	4.8574000000	4.7619626141	-.9543738591E-01	-.1964783339E-01
21.0000000000	4.7674600000	4.6822644712	-.8519552877E-01	-.1787021365E-01
22.0000000000	4.6629100000	4.5941809629	-.6872903707E-01	-.1473951611E-01
23.0000000000	4.5724400000	4.4977342276	-.7470577236E-01	-.1633827286E-01
24.0000000000	4.4578500000	4.3930421802	-.6480781977E-01	-.1453790948E-01
25.0000000000	4.3420700000	4.2803218216	-.6174817844E-01	-.1422090810E-01
26.0000000000	4.2483900000	4.1598903460	-.8849965395E-01	-.2083133939E-01
27.0000000000	4.1097300000	4.0321638887	-.7756610133E-01	-.1887377082E-01
28.0000000000	3.9827200000	3.8876539329	-.8506606713E-01	-.2135878674E-01
29.0000000000	3.8168300000	3.7569612239	-.5986877603E-01	-.1568547045E-01
30.0000000000	3.6657400000	3.6107676973	-.5497230271E-01	-.1499623615E-01
31.0000000000	3.4823600000	3.4598263235	-.2253367654E-01	-.6470804161E-02
32.0000000000	3.2998500000	3.3049494957	.1509940573E-01	.4589692828E-02
33.0000000000	3.1294700000	3.1469958451	.1752564506E-01	.5600195899E-02
34.0000000000	2.9382600000	2.9868563914	.4859639145E-01	.1653917334E-01
35.0000000000	2.7590000000	2.8254414998	.6644149980E-01	.2408173244E-01
36.0000000000	2.6033900000	2.6636651872	.6027518718E-01	.2315257690E-01
37.0000000000	2.4596000000	2.5024322532	.4283225321E-01	.1741431644E-01
38.0000000000	2.3178700000	2.3426249751	.2475497506E-01	.1068005327E-01
39.0000000000	2.1723400000	2.1850909325	.1275093254E-01	.5869676266E-02
40.0000000000	1.9998700000	2.0306319614	.3076196143E-01	.1538198054E-01
41.0000000000	1.8420900000	1.8799943807	.3790438070E-01	.2057683430E-01
42.0000000000	1.6893900000	1.7338605935	.4447059349E-01	.2632346201E-01
43.0000000000	1.5427600000	1.5928421260	.5008212605E-01	.3246268120E-01
44.0000000000	1.4178000000	1.4574741409	.3967414095E-01	.2798288945E-01
45.0000000000	1.2978700000	1.3282114419	.3034144187E-01	.2337787442E-01
46.0000000000	1.1761500000	1.2054259712	.2927597117E-01	.2489135839E-01
47.0000000000	1.0719800000	1.0894057887	.1742578870E-01	.1625570318E-01
48.0000000000	.9783700000	.9803555038	.1977503791E-02	.2021206314E-02
49.0000000000	.8931710000	.8743981155	-.1477288452E-01	-.1653981659E-01
50.0000000000	.8167380000	.7835781903	-.3315980975E-01	-.4060030236E-01
52.0000000000	.6286330000	.6151644521	-.1346854791E-01	-.2142513662E-01
54.0000000000	.4516580000	.4740945169	.2243851685E-01	.4968032639E-01
56.0000000000	.3392150000	.3584847100	.1926971004E-01	.5680677459E-01
58.0000000000	.2491860000	.2658180959	.1663209587E-01	.6674570749E-01
60.0000000000	.1775670000	.1932211045	.1565410455E-01	.8815886144E-01
65.0000000000	.0804291000	.0800193377	-.4097622823E-03	-.5094701822E-02
70.0000000000	.0377043000	.0311296550	-.6574544995E-02	-.1743716879E 00
75.0000000000	.0187441000	.0154437711	-.3300328942E-02	-.1760729478E 00
80.0000000000	.0115628000	.0142511609	.2688660912E-02	.2325328357E 00

MAXIMUM ABSOLUTE DIFFERENCE = .9971671358E-01
MAXIMUM RELATIVE DIFFERENCE = .2325328357E 00

APPENDIX C

TRIGONOMETRIC FUNCTION FITTED TO 20 RADIANCE PROFILES

APPENDIX C

TRIGONOMETRIC FUNCTION FITTED TO 20 RADIANCE PROFILES

This appendix contains the radiance profile curve fits for Function 7 for twenty climotological temperature profiles. The twenty selected profiles represent January, April, July, and October at 90° West longitude and at North latitudes of 20°, 30°, 45°, 60° and 75°. Five coefficients resulted from the use of this function, a trigonometric series using only the odd coefficients through the ninth harmonic.

Tables C1 through C20 show the coefficients obtained and a detailed comparison to illustrate the differences between the numerically integrated radiance profile values and the values obtained from the curve fit.

TABLE C1. TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 843 (JANUARY, 20° N)

THE COEFFICIENTS ARE

N	A(N)
1.	5.58657065
3.	.12586612
5.	-1.04013318
7.	.38894751
9.	.14230350

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.20355460	5.09749000	.10606460
-25.0	.07139983	5.17606478	5.10983000	.06623478
-20.0	.14279967	5.10849149	5.12396000	-.01546851
-15.0	.21419950	5.03919547	5.13994000	-.10074453
-10.0	.28559933	5.01338572	5.15834000	-.14495428
-8.0	.31415927	5.02317039	5.16650000	-.14332961
-6.0	.34271920	5.04607836	5.17508000	-.12900164
-4.0	.37127913	5.08195440	5.18427000	-.10231560
-2.0	.39983907	5.12964354	5.19410000	-.06445646
.0	.42839900	5.18698805	5.20453000	-.01754195
1.0	.44267896	5.21834496	5.21004000	.00830496
2.0	.45695893	5.25088249	5.21568000	.03520249
3.0	.47123890	5.28408256	5.22151000	.06257256
4.0	.48551886	5.31738455	5.22757000	.08981455
5.0	.49979883	5.35019133	5.23376000	.11643133
6.0	.51407880	5.38187592	5.24016000	.14171592
7.0	.52835876	5.41178866	5.24666000	.16512866
8.0	.54263873	5.43926473	5.25325000	.18601473
9.0	.55691870	5.46363192	5.25979000	.20384192
10.0	.57119866	5.48421871	5.26621000	.21800871
11.0	.58547863	5.50036227	5.27131000	.22905227
12.0	.59975860	5.51141651	5.27513000	.23628651
13.0	.61403856	5.51676000	5.27687000	.23989000
14.0	.62831853	5.51580356	5.27492000	.24088356
15.0	.64259850	5.50799759	5.27612000	.23187759
16.0	.65687846	5.49283888	5.27371000	.21912888
17.0	.67115843	5.46987697	5.28478000	.18109697
18.0	.68543840	5.43871978	5.30781000	.13090978
19.0	.69971836	5.39903868	5.32504000	.07399868
20.0	.71399833	5.35057268	5.33470000	.01587268
21.0	.72827830	5.29313196	5.34363000	-.05049804
22.0	.74255826	5.22660046	5.34304000	-.11643954
23.0	.75683823	5.15093762	5.33281000	-.18187238
24.0	.77111820	5.06617927	5.29955000	-.23337073
25.0	.78539816	4.97243762	5.22660000	-.25416238
26.0	.79967813	4.86990038	5.14771000	-.27780962
27.0	.81395810	4.75882900	5.02935000	-.27052100
28.0	.82823806	4.63955613	4.91375000	-.27419387
29.0	.84251803	4.51248226	4.75514000	-.24265774
30.0	.85679800	4.37807168	4.60131000	-.22323832
31.0	.87107796	4.23684771	4.40699000	-.17014229
32.0	.88535793	4.08938741	4.20119000	-.11180259
33.0	.89963790	3.93631569	4.03170000	-.09538431
34.0	.91391786	3.77829909	3.83805000	-.05975091
35.0	.92819783	3.61603909	3.64866000	-.03262091
36.0	.94247780	3.45026522	3.46622000	-.01595478
37.0	.95675776	3.28172803	3.27715000	.00957803
38.0	.97103773	3.11119190	3.08543000	.02576190
39.0	.98531770	2.93942793	2.91636000	.02306793
40.0	.99959766	2.76720686	2.74822000	.01898686
41.0	1.01387763	2.59529225	2.58426000	.01103225
42.0	1.02815760	2.42443380	2.40804000	.01639380
43.0	1.04243756	2.25536113	2.20770000	.04766113
44.0	1.05671753	2.08877784	2.02348000	.06529784
45.0	1.07099750	1.92535612	1.83863000	.08672612
46.0	1.08527746	1.76573175	1.63514000	.13059175
47.0	1.09955743	1.61049973	1.45742000	.15307973
48.0	1.11383740	1.46021047	1.29542000	.16479047
49.0	1.12811736	1.31536653	1.13620000	.17916653
50.0	1.14239733	1.17641998	1.00218000	.17423998
52.0	1.17095726	.91776354	.72627700	.19148654
54.0	1.19951719	.68678672	.50974800	.17703872
56.0	1.22807713	.48515962	.38156200	.10359762
58.0	1.25663706	.31369331	.27785600	.03583731
60.0	1.28519699	.17238542	.19357100	-.02118558
65.0	1.35659483	-.05544608	.07621470	-.13166078
70.0	1.42799466	-.12904142	.02841360	-.15745502
75.0	1.49939649	-.09282606	.01079290	-.10361896
80.0	1.57079633	-.00000000	.00574186	-.00574186

TABLE C2. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 853, JANUARY, 30°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.50506026
3.	.21044424
5.	-1.02863647
7.	.32722566
9.	.16824084

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.18233453	5.08215000	.10018453
-25.0	.07139983	5.15477109	5.09297000	.06180109
-20.0	.14279967	5.08737240	5.10544000	-.01806760
-15.0	.21419950	5.01929855	5.11967000	-.10037145
-10.0	.28559933	4.99602043	5.13595000	-.13992957
-8.0	.31415927	5.00697450	5.14317000	-.13619550
-6.0	.34271920	5.03092603	5.15085000	-.11992397
-4.0	.37127913	5.06751117	5.15908000	-.09156883
-2.0	.39983907	5.11532834	5.16788000	-.05255166
.0	.42839900	5.17194789	5.17730000	-.00535211
1.0	.44267896	5.20253463	5.18229000	.02024463
2.0	.45695893	5.23398390	5.18740000	.04658390
3.0	.47123890	5.26574446	5.19271000	.07303446
4.0	.48551886	5.29722450	5.19826000	.09896450
5.0	.49979883	5.32779842	5.20395000	.12384842
6.0	.51407880	5.35681415	5.20888000	.14693415
7.0	.52835876	5.38360099	5.21593000	.16767099
8.0	.54263873	5.40747772	5.22213000	.18534772
9.0	.55691870	5.42776103	5.22835000	.19941103
10.0	.57119866	5.44377406	5.23472000	.20905406
11.0	.58547863	5.45485488	5.24039000	.21446488
12.0	.59975860	5.46036495	5.24565000	.21471495
13.0	.61403856	5.45969730	5.25027000	.20942730
14.0	.62831853	5.45228434	5.25304000	.19924434
15.0	.64259850	5.43760531	5.25586000	.18174531
16.0	.65687846	5.41519304	5.25348000	.16171304
17.0	.67115843	5.38464022	5.25697000	.12767022
18.0	.68543840	5.34560478	5.25680000	.08880478
19.0	.69971836	5.29781461	5.25419000	.04362461
20.0	.71399833	5.24107136	5.23805000	.00302136
21.0	.72827830	5.17525329	5.21228000	-.03702671
22.0	.74255826	5.10031724	5.17476000	-.07444276
23.0	.75683823	5.01629963	5.13834000	-.12204037
24.0	.77111820	4.92331648	5.08319000	-.15987352
25.0	.78539816	4.82156244	5.01621000	-.19464756
26.0	.79967813	4.71130893	4.95277000	-.24146107
27.0	.81395810	4.59290136	4.84973000	-.25682864
28.0	.82823806	4.46675545	4.74326000	-.27650455
29.0	.84251803	4.33335281	4.59451000	-.26115719
30.0	.85679800	4.19323576	4.44123000	-.24799424
31.0	.87107796	4.04700147	4.23750000	-.19049853
32.0	.88535793	3.89529557	4.02116000	-.12586443
33.0	.89963790	3.73880526	3.84420000	-.10539474
34.0	.91391786	3.57825208	3.64262000	-.06436792
35.0	.92819783	3.41438435	3.44670000	-.03231565
36.0	.94247780	3.24796948	3.25949000	-.01152052
37.0	.95675776	3.07978617	3.06067000	.01911617
38.0	.97103773	2.91061673	2.86953000	.04108673
39.0	.98531770	2.74123941	2.69552000	.04571941
40.0	.99959766	2.57242108	2.51682000	.05560108
41.0	1.01387763	2.40491016	2.34769000	.05722016
42.0	1.02815760	2.23942998	2.17194000	.06748998
43.0	1.04243756	2.07667262	1.98026000	.09641262
44.0	1.05671753	1.91729328	1.80927000	.10802328
45.0	1.07099750	1.76190527	1.64480000	.11710527
46.0	1.08527746	1.61107567	1.47591000	.13516567
47.0	1.09955743	1.46532160	1.32934000	.13598160
48.0	1.11383740	1.32510728	1.19407000	.13103728
49.0	1.12811736	1.19084178	1.05957000	.13127178
50.0	1.14239733	1.06287746	.94365400	.11922346
52.0	1.17095726	.82697393	.69622100	.13075293
54.0	1.19951719	.61906695	.49275000	.12631695
56.0	1.22807713	.43993489	.36963200	.07030289
58.0	1.25663706	.28952589	.27104900	.01847689
60.0	1.28519699	.16704805	.19013700	-.02308895
65.0	1.35659683	-.02750114	.07895960	-.10646074
70.0	1.42799666	-.09143741	.03113210	-.12256951
75.0	1.49939649	-.06747783	.01312380	-.08060163
80.0	1.57079633	-.00000000	.00714014	-.00714014

TABLE C3. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 863, JANUARY, 45°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.30550668
3.	.39578447
5.	-1.00250013
7.	.20045471
9.	.22358985

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.12283558	5.03111000	.09172558
-25.0	.07139983	5.09436398	5.03880000	.05556398
-20.0	.14279967	5.02524998	5.04747000	-.02222002
-15.0	.21419950	4.95681748	5.05733000	-.10051252
-10.0	.28559933	4.93574180	5.06867000	-.13292820
-8.0	.31415927	4.94800207	5.07364000	-.12563793
-6.0	.34271920	4.97310588	5.07901000	-.10590412
-4.0	.37127913	5.01028051	5.08470000	-.07441949
-2.0	.39983907	5.05762864	5.09086000	-.03323136
.0	.42839900	5.11216419	5.09747000	.01469419
1.0	.44267896	5.14092122	5.10095000	.03997122
2.0	.45695893	5.16991879	5.10461000	.06530879
3.0	.47123890	5.19853560	5.10838000	.09015560
4.0	.48551886	5.22611353	5.11231000	.11380353
5.0	.49979883	5.25196596	5.11640000	.13556596
6.0	.51407880	5.27538651	5.12061000	.15477651
7.0	.52835876	5.29565827	5.12497000	.17068827
8.0	.54263873	5.31206333	5.12945000	.18261333
9.0	.55691870	5.32389246	5.13400000	.18989246
10.0	.57119866	5.33045473	5.13894000	.19151473
11.0	.58547863	5.33108716	5.14392000	.18716716
12.0	.59975860	5.32516387	5.14793000	.17723387
13.0	.61403856	5.31210504	5.15200000	.16010504
14.0	.62831853	5.29138515	5.15213000	.13925515
15.0	.64259850	5.26254069	5.14653000	.11601069
16.0	.65687846	5.22517695	5.13820000	.08697695
17.0	.67115843	5.17897406	5.11694000	.06203406
18.0	.68543840	5.12369199	5.08479000	.03890199
19.0	.69971836	5.05017450	5.03891000	.02026450
20.0	.71399833	4.98535202	4.99416000	-.00880798
21.0	.72827830	4.90224339	4.92492000	-.02267661
22.0	.74255826	4.80995642	4.84526000	-.03530358
23.0	.75683823	4.70868728	4.77657000	-.06788272
24.0	.77111820	4.59871874	4.69114000	-.09242126
25.0	.78539816	4.48041729	4.62070000	-.14028271
26.0	.79967813	4.35422920	4.55647000	-.20224080
27.0	.81395810	4.22067546	4.45998000	-.23930454
28.0	.82823806	4.08034592	4.35543000	-.27508408
29.0	.84251803	3.93389248	4.20583000	-.27193752
30.0	.85679800	3.78202156	4.04630000	-.26427844
31.0	.87107796	3.62548591	3.83459000	-.20910409
32.0	.88535793	3.44507597	3.60875000	-.14367403
33.0	.89963790	3.30161077	3.41843000	-.11681923
34.0	.91391786	3.13592858	3.19197000	-.05604142
35.0	.92819783	2.96887753	2.97661000	-.00773247
36.0	.94247780	2.80130612	2.78353000	.01777612
37.0	.95675776	2.63405396	2.59060000	.04345396
38.0	.97103773	2.46794278	2.40560000	.06234278
39.0	.98531770	2.30376779	2.23186000	.07190779
40.0	.99959766	2.14228967	2.04205000	.10023967
41.0	1.01387763	1.98422702	1.86672000	.11750702
42.0	1.02815760	1.83024972	1.68956000	.14068972
43.0	1.04243756	1.68097290	1.49489000	.18608290
44.0	1.05671753	1.53695194	1.34053000	.19642194
45.0	1.07099750	1.39867832	1.21213000	.18654832
46.0	1.08527746	1.26657641	1.12021000	.14636641
47.0	1.09955743	1.14100129	1.04163000	.09937129
48.0	1.11383740	1.02223758	.96031500	.06192258
49.0	1.12811736	.91049918	.86243300	.04806618
50.0	1.14239733	.80593004	.77332000	.03261004
52.0	1.17095726	.61853640	.58781500	.03072140
54.0	1.19951719	.45989339	.42718700	.03270639
56.0	1.22807713	.32890856	.32207800	.00683056
58.0	1.25663706	.22371703	.23861800	-.01490097
60.0	1.28519699	.14186567	.17267400	-.03080833
65.0	1.35659683	.02025694	.08118090	-.06092396
70.0	1.42799666	-.01996080	.03976790	-.05972870
75.0	1.49939649	-.01805273	.02272600	-.04077963
80.0	1.57079633	-.00000000	.01483580	-.01483580

TABLE C4. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 873, JANUARY, 60°N

THE COEFFICIENTS ARE

N	A(N)
1.	4.92492431
3.	.49360599
5.	-.92103659
7.	.10552310
9.	.23897261

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	4.84198942	4.76604000	.07594942
-25.0	.07139983	4.81565957	4.77061000	.04504957
-20.0	.14279967	4.75209893	4.77578000	-.02368107
-15.0	.21419950	4.69013602	4.78167000	-.09153398
-10.0	.28559933	4.67272384	4.78843000	-.11570616
-8.0	.31415927	4.68471430	4.79143000	-.10671570
-6.0	.34271920	4.70816017	4.79461000	-.08644983
-4.0	.37127913	4.74205769	4.79796000	-.05590231
-2.0	.39983907	4.78432077	4.80158000	-.01725923
.0	.42839900	4.83183110	4.80542000	.02641110
1.0	.44267896	4.85632541	4.80748000	.04884541
2.0	.45695893	4.88055801	4.80961000	.07094801
3.0	.47123890	4.90391267	4.81182000	.09209267
4.0	.48551886	4.92574216	4.81414000	.11160216
5.0	.49979883	4.94537670	4.81650000	.12887670
6.0	.51407880	4.96213290	4.81892000	.14321290
7.0	.52835876	4.97532319	4.82141000	.15391319
8.0	.54263873	4.98426529	4.82370000	.16056529
9.0	.55691870	4.98829196	4.82632000	.16197196
10.0	.57119866	4.98676054	4.82908000	.15768054
11.0	.58547863	4.97906234	4.83146000	.14760234
12.0	.59975860	4.96463168	4.83219000	.13244168
13.0	.61403856	4.94295443	4.82994000	.11301443
14.0	.62831853	4.91357589	4.82534000	.08823589
15.0	.64259850	4.87610800	4.81127000	.06483800
16.0	.65687846	4.83023559	4.78594000	.04429559
17.0	.67115843	4.77572178	4.75556000	.02016178
18.0	.68543840	4.71241226	4.70538000	.00703226
19.0	.69971836	4.64023849	4.63677000	.00346849
20.0	.71399833	4.55921977	4.55955000	-.00033023
21.0	.72827830	4.46946407	4.44781000	.02165407
22.0	.74255826	4.37116769	4.33491000	.03625769
23.0	.75683823	4.26461371	4.22873000	.03588371
24.0	.77111820	4.15016928	4.16780000	-.01763072
25.0	.78539816	4.02828171	4.13207000	-.10378829
26.0	.79967813	3.89947358	4.08484000	-.18536642
27.0	.81395810	3.76433674	4.01073000	-.24639326
28.0	.82823806	3.62352549	3.91443000	-.29090451
29.0	.84251803	3.47774885	3.78218000	-.30443115
30.0	.85679800	3.32776222	3.62429000	-.29652778
31.0	.87107796	3.17435840	3.40301000	-.22865160
32.0	.88535793	3.01835821	3.16788000	-.14952179
33.0	.89963790	2.86060080	2.97116000	-.11055920
34.0	.91391786	2.70193378	2.73577000	-.03383622
35.0	.92819783	2.54320333	2.51667000	.02653333
36.0	.94247780	2.38524454	2.32912000	.05612454
37.0	.95675776	2.22887184	2.14801000	.08086184
38.0	.97103773	2.07487002	1.97668000	.09819002
39.0	.98531770	1.92398565	1.81655000	.10743565
40.0	.99959766	1.77691922	1.63744000	.13947922
41.0	1.01387763	1.63431802	1.47885000	.15546802
42.0	1.02815760	1.49676989	1.32623000	.17053989
43.0	1.04243756	1.36479784	1.17444000	.19035784
44.0	1.05671753	1.23885578	1.05589000	.18296578
45.0	1.07099750	1.11932519	.95923400	.16009119
46.0	1.08527746	1.00651291	.89310700	.11340591
47.0	1.09955743	.90065004	.83630300	.06434704
48.0	1.11383740	.80189190	.77692100	.02497090
49.0	1.12811736	.71031908	.70418900	.00613008
50.0	1.14239733	.62593945	.63708800	-.01114855
52.0	1.17095726	.47844706	.49462600	-.01617894
54.0	1.19951719	.35816157	.36905000	-.01088843
56.0	1.22807713	.26294764	.28324800	-.02030036
58.0	1.25663706	.18998970	.21762700	-.02763730
60.0	1.28519699	.13601840	.16700800	-.03098960
65.0	1.35659683	.06133754	.09423610	-.03289856
70.0	1.42799666	.03320863	.05739960	-.02419097
75.0	1.49939649	.01718639	.03759870	-.02041231
80.0	1.57079633	.00000000	.02473820	-.02473820

TABLE C5. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 883, JANUARY, 75°N

THE COEFFICIENTS ARE

N	A(N)
1.	4.35446977
3.	.49182649
5.	-.80533553
7.	.05361327
9.	.21764257

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	4.31221656	4.25687000	.05534656
-25.0	.07139983	4.29068998	4.25981000	.03087998
-20.0	.14279967	4.23919919	4.26317000	-.02397081
-15.0	.21419950	4.19049408	4.26703000	-.07653592
-10.0	.28559933	4.18018547	4.27149000	-.09130453
-8.0	.31415927	4.19193174	4.27347000	-.08153826
-6.0	.34271920	4.21303524	4.27559000	-.06255476
-4.0	.37127913	4.24244785	4.27784000	-.03539215
-2.0	.39983907	4.27818456	4.28020000	-.00201544
.0	.42839900	4.31737498	4.28274000	.03463498
1.0	.44267896	4.33715286	4.28408000	.05307286
2.0	.45695893	4.35637630	4.28547000	.07090630
3.0	.47123890	4.37449695	4.28687000	.08762695
4.0	.48551886	4.39094189	4.28836000	.10258189
5.0	.49979883	4.40512124	4.28981000	.11531124
6.0	.51407880	4.41643623	4.29131000	.12512623
7.0	.52835876	4.42428748	4.29284000	.13144748
8.0	.54263873	4.42808356	4.29426000	.13382356
9.0	.55691870	4.42724954	4.29569000	.13155954
10.0	.57119866	4.42123542	4.29706000	.12417542
11.0	.58547863	4.40952439	4.29766000	.11186439
12.0	.59975860	4.39164074	4.29592000	.09572074
13.0	.61403856	4.36715722	4.29052000	.07663722
14.0	.62831853	4.33570196	4.28296000	.05274196
15.0	.64259850	4.29696451	4.26526000	.03170451
16.0	.65687846	4.25070125	4.23998000	.01072125
17.0	.67115843	4.19673979	4.20232000	-.00558021
18.0	.68543840	4.13498255	4.15972000	-.02473745
19.0	.69971836	4.06540917	4.09015000	-.02474083
20.0	.71399833	3.98807805	3.98991000	-.00183195
21.0	.72827830	3.90312666	3.87764000	.02548666
22.0	.74255826	3.81077085	3.79283000	.01794085
23.0	.75683823	3.71130307	3.69930000	.01200307
24.0	.77111820	3.60508953	3.64688000	-.04179047
25.0	.78539816	3.49256631	3.61142000	-.11885369
26.0	.79967813	3.37423462	3.54420000	-.16996538
27.0	.81395810	3.25065502	3.47497000	-.22431498
28.0	.82823806	3.12244101	3.37236000	-.24991899
29.0	.84251803	2.99025174	3.23778000	-.24752826
30.0	.85679800	2.85478429	3.07922000	-.22443571
31.0	.87107796	2.71676533	2.86249000	-.14572467
32.0	.88535793	2.57694251	2.63946000	-.06251749
33.0	.89963790	2.43607555	2.46155000	-.02547445
34.0	.91391786	2.29492732	2.25628000	.03864732
35.0	.92819783	2.15425482	2.06760000	.08665482
36.0	.94247780	2.01480048	1.90703000	.10777048
37.0	.95675776	1.87728359	1.74840000	.12888359
38.0	.97103773	1.74239225	1.60324000	.13915225
39.0	.98531770	1.61077583	1.47842000	.13235583
40.0	.99959766	1.48303801	1.35073000	.13230801
41.0	1.01387763	1.35973061	1.23707000	.12266061
42.0	1.02815760	1.24134818	1.12850000	.11284818
43.0	1.04243756	1.12832352	1.02055000	.10777352
44.0	1.05671753	1.02102408	.93060100	.09042308
45.0	1.07099750	.91974942	.85121700	.06853242
46.0	1.08527746	.82472955	.78397400	.04075555
47.0	1.09955743	.73612441	.72581700	.01030741
48.0	1.11383740	.65402429	.66974400	-.01571971
49.0	1.12811736	.57845117	.60920700	-.03075583
50.0	1.14239733	.50936116	.55217800	-.04281684
52.0	1.17095726	.39014533	.42649700	-.03635167
54.0	1.19951719	.29484958	.31589800	-.02104842
56.0	1.22807713	.22117641	.24307700	-.02190059
58.0	1.25663706	.16625484	.18754900	-.02129416
60.0	1.28519699	.12685797	.14381500	-.01695703
65.0	1.35659683	.07448589	.08289210	-.00840621
70.0	1.42799666	.05173510	.05159150	.00014360
75.0	1.49939649	.02939738	.03450380	-.00510642
80.0	1.57079633	.00000000	.02219940	-.02219940

TABLE C6. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 893, APRIL, 20°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.86633725
3.	.13068101
5.	-1.10266558
7.	.41557681
9.	.15576534

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.46569484	5.34651000	.11918484
-25.0	.07139983	5.43538244	5.36018000	.07520244
-20.0	.14279967	5.36072094	5.37559000	-.01486906
-15.0	.21419950	5.28364975	5.39309000	-.10944025
-10.0	.28559933	5.25368658	5.41303000	-.15934342
-8.0	.31415927	5.26361908	5.42185000	-.15823092
-6.0	.34271920	5.28790186	5.43125000	-.14334814
-4.0	.37127913	5.32640299	5.44124000	-.11483701
-2.0	.39983907	5.37790567	5.45193000	-.07402433
.0	.42839900	5.44010475	5.46332000	-.02321525
1.0	.44267896	5.47421093	5.46929000	.00492093
2.0	.45695893	5.50966649	5.47553000	.03413649
3.0	.47123890	5.54591373	5.48195000	.06396373
4.0	.48551886	5.58234875	5.48797000	.09437875
5.0	.49979883	5.61832802	5.49485000	.12347802
6.0	.51407880	5.65317560	5.50199000	.15118560
7.0	.52835876	5.68619092	5.50930000	.17689092
8.0	.54263873	5.71665692	5.51679000	.19986692
9.0	.55691870	5.74384852	5.52435000	.21949852
10.0	.57119866	5.76704129	5.53197000	.23507129
11.0	.58547863	5.78552021	5.53927000	.24625021
12.0	.59975860	5.79858835	5.54514000	.25344835
13.0	.61403856	5.80557540	5.55064000	.25493540
14.0	.62831853	5.80584597	5.55686000	.24898597
15.0	.64259850	5.79980745	5.55817000	.24063745
16.0	.65687846	5.78391740	5.55772000	.22619740
17.0	.67115843	5.76069038	5.56895000	.19174038
18.0	.68543840	5.72870410	5.58668000	.14202410
19.0	.69971836	5.68760475	5.59452000	.09308475
20.0	.71399833	5.63711167	5.59633000	.04078167
21.0	.72827830	5.57702100	5.59244000	-.01541900
22.0	.74255826	5.50720847	5.58427000	-.07706153
23.0	.75683823	5.42763130	5.55880000	-.13116870
24.0	.77111820	5.33832906	5.51806000	-.17973094
25.0	.78539816	5.23942364	5.46700000	-.22257636
26.0	.79967813	5.13111821	5.37864000	-.24752179
27.0	.81395810	5.01369532	5.26754000	-.25384468
28.0	.82823806	4.88751405	5.16561000	-.27809595
29.0	.84251803	4.75300636	5.02237000	-.26936364
30.0	.85679800	4.61067264	4.89566000	-.28498736
31.0	.87107796	4.46107655	4.75740000	-.29632345
32.0	.88535793	4.30483920	4.59126000	-.28642080
33.0	.89963790	4.14263279	4.41094000	-.26830721
34.0	.91391786	3.97517381	4.15122000	-.17604619
35.0	.92819783	3.80321582	3.89503000	-.09181418
36.0	.94247780	3.62754196	3.66891000	-.04136804
37.0	.95675776	3.44895732	3.44939000	-.00043268
38.0	.97103773	3.26828119	3.24070000	.02758119
39.0	.98531770	3.08633938	3.04451000	.04182938
40.0	.99959766	2.90395657	2.83585000	.06810657
41.0	1.01387763	2.72194894	2.64080000	.08114894
42.0	1.02815760	2.54111707	2.44244000	.09867707
43.0	1.04243756	2.36223916	2.23508000	.12715916
44.0	1.05671753	2.18606474	2.04597000	.14009474
45.0	1.07099750	2.01330887	1.86732000	.15098887
46.0	1.08527746	1.84464685	1.66450000	.18014685
47.0	1.09955743	1.68070956	1.49146000	.18924956
48.0	1.11383740	1.52207943	1.33204000	.19003943
49.0	1.12811736	1.36928704	1.17300000	.19628704
50.0	1.14239733	1.22280839	1.03785000	.18495839
52.0	1.17095726	.95041161	.75882400	.19158761
54.0	1.19951719	.70754322	.53443000	.17311322
56.0	1.22807713	.49591833	.39637000	.09954833
58.0	1.25663706	.31633460	.28934200	.02699260
60.0	1.28519699	.16872517	.20127300	-.03254783
65.0	1.35659683	-.06769463	.07806300	-.14575763
70.0	1.42799666	-.14166212	.02869760	-.17035972
75.0	1.49939649	-.10043874	.01036250	-.11080124
80.0	1.57079633	-.00000000	.00533271	-.00533271

TABLE C7. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 903, APRIL, 30°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.95431199
3.	.16027619
5.	-1.11510775
7.	.39975770
9.	.15858150

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.55781963	5.44491000	.11290963
-25.0	.07139983	5.52876453	5.45898000	.06978453
-20.0	.14279967	5.45755873	5.47475000	-.01719127
-15.0	.21419950	5.38523058	5.49254000	-.10730942
-10.0	.28559933	5.35991013	5.51297000	-.15305987
-8.0	.31415927	5.37130355	5.52199000	-.15068645
-6.0	.34271920	5.39665697	5.53159000	-.13493303
-4.0	.37127913	5.43573348	5.54187000	-.10613652
-2.0	.39983907	5.48721922	5.55279000	-.06557078
.0	.42839900	5.54872384	5.56368000	-.01495616
1.0	.44767896	5.58220621	5.56987000	.01233621
2.0	.45695893	5.61684384	5.57625000	.04059384
3.0	.47123890	5.65707329	5.58286000	.06921329
4.0	.48551886	5.68728630	5.58979000	.09749630
5.0	.49979883	5.72183645	5.59696000	.12487645
6.0	.51407880	5.75504645	5.60424000	.15080645
7.0	.52835876	5.78621592	5.61189000	.17432592
8.0	.54263873	5.81462965	5.61979000	.19483965
9.0	.55691870	5.83956605	5.62783000	.21173605
10.0	.57119866	5.86030588	5.63616000	.22414588
11.0	.58547863	5.87614093	5.64398000	.23216093
12.0	.59975860	5.88638277	5.65179000	.23459277
13.0	.61403856	5.89037120	5.66054000	.22983120
14.0	.62831853	5.88748247	5.66755000	.21993247
15.0	.64259850	5.87713714	5.67456000	.20257714
16.0	.65687846	5.85880732	5.67644000	.18236732
17.0	.67115843	5.83202341	5.68091000	.15111341
18.0	.68543840	5.79638015	5.68024000	.11614015
19.0	.69971836	5.75154182	5.67760000	.07394182
20.0	.71399833	5.69724671	5.66076000	.03648671
21.0	.72827830	5.63331065	5.63621000	-.00289935
22.0	.74255826	5.55962963	5.61038000	-.05075037
23.0	.75683823	5.47618149	5.56640000	-.09021851
24.0	.77111820	5.38302662	5.51000000	-.12697338
25.0	.78539816	5.28030769	5.45195000	-.17164231
26.0	.79967813	5.16824846	5.37731000	-.20906154
27.0	.81395810	5.04715166	5.27435000	-.22719834
28.0	.82823806	4.91739592	5.17571000	-.25831408
29.0	.84251803	4.77943196	5.03454000	-.25510804
30.0	.85679800	4.63377792	4.90028000	-.26650208
31.0	.87107796	4.48101403	4.73789000	-.25687597
32.0	.88535793	4.32177662	4.55380000	-.23202338
33.0	.89963790	4.15675162	4.37963000	-.22287838
34.0	.91391786	3.98666757	4.15520000	-.16853243
35.0	.92819783	3.81228831	3.93266000	-.12037169
36.0	.94247780	3.63440537	3.72487000	-.09046463
37.0	.95675776	3.45383026	3.51529000	-.06145974
38.0	.97103773	3.27138665	3.30961000	-.03822335
39.0	.98531770	3.08790262	3.10956000	-.02165738
40.0	.99959766	2.90420305	2.88965000	.01455305
41.0	1.01387763	2.72110219	2.68023000	.04087219
42.0	1.02815760	2.53939661	2.46406000	.07533661
43.0	1.04243756	2.35985850	2.22779000	.13206850
44.0	1.05671753	2.18322942	2.01773000	.16549942
45.0	1.07099750	2.01021458	1.82310000	.18711458
46.0	1.08527746	1.84147774	1.63029000	.21118774
47.0	1.09955743	1.67763664	1.46504000	.21259664
48.0	1.11383740	1.51925911	1.31232000	.20693911
49.0	1.12811736	1.36685991	1.15820000	.20865991
50.0	1.14239733	1.22089814	1.02737000	.19352814
52.0	1.17095726	.94983453	.76304500	.18678953
54.0	1.19951719	.70857399	.54380800	.16476599
56.0	1.22807713	.49868012	.40073000	.09795012
58.0	1.25663706	.32080329	.29375700	.02704629
60.0	1.28519699	.17474056	.20798100	-.03324044
65.0	1.35659483	-.05923280	.08619890	-.14543170
70.0	1.42799666	-.13357421	.03300700	-.16658121
75.0	1.49939649	-.09553274	.01302820	-.10856094
80.0	1.57079633	-.00000000	.00737984	-.00737984

TABLE C8. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 913, APRIL, 45°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.99416571
3.	.25046707
5.	-1.11999949
7.	.34407845
9.	.17308181

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.64179354	5.54174000	.10005354
-25.0	.07139983	5.61480271	5.55545000	.05935271
-20.0	.14279967	5.54933310	5.57075000	-.02141690
-15.0	.21419950	5.48499122	5.58798000	-.10298878
-10.0	.28559933	5.46744735	5.60756000	-.14011265
-8.0	.31415927	5.48115639	5.61628000	-.13512361
-6.0	.34271920	5.50800802	5.62547000	-.11746198
-4.0	.37127913	5.54751338	5.63533000	-.08781662
-2.0	.39983907	5.59811211	5.64590000	-.04778789
.0	.42839900	5.65718435	5.65720000	-.00001565
1.0	.44267896	5.68880708	5.66314000	.02566708
2.0	.45695893	5.72112680	5.66930000	.05182680
3.0	.47123890	5.75356190	5.67486000	.07870190
4.0	.48551886	5.78548935	5.68154000	.10394935
5.0	.49979883	5.81625181	5.68849000	.12776181
6.0	.51407880	5.84516522	5.69556000	.14960522
7.0	.52835876	5.87152695	5.70307000	.16845695
8.0	.54263873	5.89462429	5.71085000	.18377429
9.0	.55691870	5.91374312	5.71886000	.19488312
10.0	.57119866	5.92817685	5.72739000	.20078685
11.0	.58547863	5.93723523	5.73614000	.20109523
12.0	.59975860	5.94025310	5.74500000	.19525310
13.0	.61403856	5.93659892	5.75514000	.18145892
14.0	.62831853	5.92568287	5.76230000	.16338287
15.0	.64259850	5.90696457	5.76489000	.14207457
16.0	.65687846	5.87996017	5.76454000	.11542017
17.0	.67115843	5.84424877	5.75200000	.09224877
18.0	.68543840	5.79947807	5.72762000	.07185807
19.0	.69971836	5.74536928	5.69020000	.05516928
20.0	.71399833	5.68172102	5.65592000	.02580102
21.0	.72827830	5.60841233	5.60236000	.00605233
22.0	.74255826	5.52540472	5.53594000	-.01053528
23.0	.75683823	5.43274320	5.47669000	-.04394680
24.0	.77111820	5.33055628	5.39467000	-.06411372
25.0	.78539816	5.21905501	5.31442000	-.09536499
26.0	.79967813	5.09853105	5.24586000	-.14732895
27.0	.81395810	4.96935373	5.14003000	-.17067627
28.0	.82823806	4.83196629	5.03653000	-.20456371
29.0	.84251803	4.68688125	4.89412000	-.20723875
30.0	.85679800	4.53467501	4.76010000	-.22542499
31.0	.87107796	4.37598180	4.60096000	-.22497820
32.0	.88535793	4.21148697	4.42300000	-.21151303
33.0	.89963790	4.04191987	4.25858000	-.21666013
34.0	.91391786	3.86804622	4.05484000	-.18679378
35.0	.92819783	3.69066033	3.84823000	-.15756967
36.0	.94247780	3.51057698	3.64430000	-.13372302
37.0	.95675776	3.32862334	3.42229000	-.09366666
38.0	.97103773	3.14563086	3.20410000	-.05846914
39.0	.98531770	2.96242731	3.00121000	-.03878269
40.0	.99959766	2.77982904	2.78792000	-.00809096
41.0	1.01387763	2.59863360	2.58175000	.01688360
42.0	1.02815760	2.41961272	2.36199000	.05762272
43.0	1.04243756	2.24350581	2.10532000	.13848581
44.0	1.05671753	2.07101404	1.88380000	.18721404
45.0	1.07099750	1.90279499	1.68632000	.21647499
46.0	1.08527746	1.73945804	1.51044000	.22899804
47.0	1.09955743	1.58156035	1.36301000	.21855035
48.0	1.11383740	1.42960370	1.22519000	.20441370
49.0	1.12811736	1.28403201	1.08277000	.20126201
50.0	1.14239733	1.14522955	.96253200	.18269755
52.0	1.17095726	.88916619	.72960400	.15956219
54.0	1.19951719	.66327547	.53391300	.12936247
56.0	1.22807713	.46847282	.39738300	.07108982
58.0	1.25663706	.30478736	.29188500	.01290236
60.0	1.28519699	.17145205	.20589200	-.03443995
65.0	1.35659683	-.03998061	.08465550	-.12663611
70.0	1.42799666	-.10781919	.03488100	-.14270019
75.0	1.49939649	-.07819661	.01506150	-.09325811
80.0	1.57079633	-.00000000	.00832816	-.00832816

TABLE C9. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 923, APRIL, 60°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.98885240
3.	.33358013
5.	-1.10233520
7.	.28768185
9.	.18599045

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.69376962	5.60728000	.08648962
-25.0	.07139983	5.66810294	5.61833000	.04977294
-20.0	.14279967	5.60617243	5.63063000	-.02445757
-15.0	.21419950	5.54626597	5.64446000	-.09819403
-10.0	.28559933	5.53185919	5.66016000	-.12830081
-8.0	.31415927	5.54582801	5.66708000	-.12125199
-6.0	.34271920	5.57207130	5.67436000	-.10228870
-4.0	.37127913	5.60990037	5.68217000	-.07226963
-2.0	.39983907	5.65756658	5.69049000	-.03292342
.0	.42839900	5.71228369	5.69923000	.01305369
1.0	.44267896	5.74115206	5.70391000	.03724206
2.0	.45695893	5.77031490	5.70879000	.06152490
3.0	.47123890	5.79918079	5.71382000	.08536079
4.0	.48551886	5.82712034	5.71907000	.10805034
5.0	.49979883	5.85347351	5.72452000	.12895351
6.0	.51407880	5.87755748	5.73017000	.14738748
7.0	.52835876	5.89867503	5.73603000	.16264503
8.0	.54263873	5.91612322	5.74212000	.17400322
9.0	.55691870	5.92920224	5.74844000	.18076224
10.0	.57119866	5.93722440	5.75540000	.18182440
11.0	.58547863	5.93952302	5.76231000	.17721302
12.0	.59975860	5.93546118	5.76883000	.16663118
13.0	.61403856	5.92444018	5.77479000	.14965018
14.0	.62831853	5.90590749	5.77740000	.12850749
15.0	.64259850	5.87936434	5.77433000	.10503434
16.0	.65687846	5.84437246	5.76686000	.07751246
17.0	.67115843	5.80056030	5.74443000	.05613030
18.0	.68543840	5.74762826	5.70877000	.03885826
19.0	.69971836	5.68535316	5.66975000	.01560316
20.0	.71399833	5.61359166	5.60968000	.00391166
21.0	.72827830	5.53228275	5.53592000	-.00363725
22.0	.74255826	5.44144923	5.44754000	-.00609077
23.0	.75683823	5.34119807	5.37157000	-.03037193
24.0	.77111820	5.23171982	5.26872000	-.03700018
25.0	.78539816	5.11328696	5.16064000	-.04735304
26.0	.79967813	4.98625122	5.07683000	-.09057878
27.0	.81395810	4.85104005	4.95322000	-.10217995
28.0	.82823806	4.70815204	4.84827000	-.14011796
29.0	.84251803	4.55815170	4.70507000	-.14691830
30.0	.85679800	4.40166331	4.59422000	-.19255669
31.0	.87107796	4.23936429	4.49829000	-.25892571
32.0	.88535793	4.07197785	4.37249000	-.30051215
33.0	.89963790	3.90026531	4.20819000	-.30792469
34.0	.91391786	3.72501801	3.94836000	-.22334199
35.0	.92819783	3.54704905	3.68534000	-.13829095
36.0	.94247780	3.36718481	3.44849000	-.08130519
37.0	.95675776	3.18625660	3.20850000	-.02224340
38.0	.97103773	3.00509234	2.98506000	.02003234
39.0	.98531770	2.82450845	2.78947000	.03503845
40.0	.99959766	2.64530214	2.59768000	.04762214
41.0	1.01387763	2.46824405	2.41408000	.05416405
42.0	1.02815760	2.29407139	2.21649000	.07758139
43.0	1.04243756	2.12348177	1.98292000	.14056177
44.0	1.05671753	1.95712752	1.78090000	.17622752
45.0	1.07099750	1.79561088	1.60199000	.19362088
46.0	1.08527746	1.63947985	1.44437000	.19510985
47.0	1.09955743	1.48922484	1.31172000	.17750484
48.0	1.11383740	1.34527614	1.18688000	.15839614
49.0	1.12811736	1.20800222	1.05705000	.15095222
50.0	1.14239733	1.07770878	.94644100	.13126778
52.0	1.17095726	.83897229	.73151200	.10746029
54.0	1.19951719	.63027052	.54378500	.08648552
56.0	1.22807713	.45186890	.40698600	.04488290
58.0	1.25663706	.30318467	.29813200	.00505267
60.0	1.28519699	.18290605	.21166600	-.02875995
65.0	1.35659683	-.00706660	.09058920	-.09765580
70.0	1.42799666	-.07170452	.03865420	-.11035872
75.0	1.49939649	-.05530570	.01746160	-.07276730
80.0	1.57079633	-.00000000	.00951038	-.00951038

TABLE C10. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 933, APRIL, 75°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.80412162
3.	.43142562
5.	-1.05743406
7.	.21025797
9.	.19548097

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.58385213	5.51919000	.06466213
-25.0	.07139983	5.56116661	5.52704000	.03412661
-20.0	.14279967	5.50707463	5.53588000	-.02880537
-15.0	.21419950	5.45676508	5.54572000	-.08895492
-10.0	.28559933	5.44925567	5.55685000	-.10759433
-8.0	.31415927	5.46413331	5.56173000	-.09759669
-6.0	.34271920	5.48978702	5.56689000	-.07710298
-4.0	.37127913	5.52527814	5.57233000	-.04705186
-2.0	.39983907	5.56865763	5.57815000	-.00949237
.0	.42839900	5.61700087	5.58436000	.03264087
1.0	.44267896	5.64187610	5.58762000	.05425610
2.0	.45695893	5.66650570	5.59100000	.07550570
3.0	.47123890	5.69030300	5.59448000	.09582300
4.0	.48551886	5.71264885	5.59813000	.11451885
5.0	.49979883	5.73289910	5.60188000	.13101910
6.0	.51407880	5.75039262	5.60575000	.14464262
7.0	.52835876	5.76445961	5.60980000	.15465961
8.0	.54263873	5.77443028	5.61396000	.16047028
9.0	.55691870	5.77964360	5.61829000	.16135360
10.0	.57119866	5.77945614	5.62300000	.15645614
11.0	.58547863	5.77325069	5.62757000	.14568069
12.0	.59975860	5.76044480	5.63076000	.12968480
13.0	.61403856	5.74049878	5.63231000	.10818878
14.0	.62831853	5.71292338	5.63009000	.08283338
15.0	.64259850	5.67728675	5.62266000	.05462675
16.0	.65687846	5.63322083	5.60648000	.02674083
17.0	.67115843	5.58042684	5.58695000	-.00652316
18.0	.68543840	5.51867997	5.54831000	-.02963003
19.0	.69971836	5.44783314	5.49210000	-.04426686
20.0	.71399833	5.36781977	5.43372000	-.06590023
21.0	.72827830	5.27865548	5.34423000	-.06557452
22.0	.74255826	5.18043883	5.23634000	-.05590117
23.0	.75683823	5.07335095	5.13892000	-.06556905
24.0	.77111820	4.95765411	5.01296000	-.05530589
25.0	.78539816	4.83368932	4.87281000	-.03912068
26.0	.79967813	4.70187293	4.76089000	-.05901707
27.0	.81395810	4.56269226	4.60204000	-.03934774
28.0	.82823806	4.41670042	4.47222000	-.05551958
29.0	.84251803	4.26451030	4.30096000	-.03644970
30.0	.85679800	4.10678788	4.17248000	-.06569212
31.0	.87107796	3.94424497	4.05587000	-.11162503
32.0	.88535793	3.77763138	3.92229000	-.14465862
33.0	.89963790	3.60772676	3.78125000	-.17352324
34.0	.91391786	3.43533222	3.58957000	-.15423778
35.0	.92819783	3.26126168	3.38830000	-.12703832
36.0	.94247780	3.08633332	3.18318000	-.09684668
37.0	.95675776	2.91136104	2.94363000	-.03226896
38.0	.97103773	2.73714618	2.71784000	.01930618
39.0	.98531770	2.56446953	2.52831000	.03615953
40.0	.99959766	2.39408375	2.34902000	.04506375
41.0	1.01387763	2.22670637	2.18135000	.04535637
42.0	1.02815760	2.06301333	2.00384000	.05917333
43.0	1.04243756	1.90363324	1.79831000	.10532324
44.0	1.05671753	1.74914236	1.62346000	.12568236
45.0	1.07099750	1.60006040	1.46716000	.13290040
46.0	1.08527746	1.45684716	1.32920000	.12764716
47.0	1.09955743	1.31990000	1.21190000	.10800000
48.0	1.11383740	1.18955219	1.10056000	.08899219
49.0	1.12811736	1.06607218	.98367100	.08240118
50.0	1.14239733	.94966363	.88232000	.06734363
52.0	1.17095726	.73855778	.67833400	.06022378
54.0	1.19951719	.55662148	.49829100	.05833048
56.0	1.22807713	.40333835	.37233100	.03100735
58.0	1.25663706	.27741217	.27299400	.00441817
60.0	1.28519699	.17691701	.19265500	-.01573799
65.0	1.35659683	.02055699	.08155610	-.06099911
70.0	1.42799666	-.03499773	.03460080	-.06959853
75.0	1.49939649	-.03079868	.01565750	-.04645618
80.0	1.57079633	-.00000000	.00846158	-.00846158

TABLE C11. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 943, JULY, 20°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.94985043
3.	.17579630
5.	-1.13371032
7.	.40391027
9.	.18444911

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.58029578	5.45009000	.13020578
-25.0	.07139983	5.54640279	5.46784000	.08356279
-20.0	.14279967	5.46273407	5.47726000	-.01452593
-15.0	.21419950	5.37563664	5.49356000	-.11792336
-10.0	.28559933	5.33965912	5.51237000	-.17271088
-8.0	.31415927	5.34914047	5.52066000	-.17151953
-6.0	.34271920	5.37423205	5.52957000	-.15533795
-4.0	.37127913	5.41475622	5.53901000	-.12425378
-2.0	.39983907	5.46934355	5.54915000	-.07980645
.0	.42839900	5.53543556	5.55997000	-.02453444
1.0	.44267896	5.57168771	5.56566000	.00602771
2.0	.45695893	5.60935769	5.57160000	.03775769
3.0	.47123890	5.64783480	5.57773000	.07010480
4.0	.48551886	5.68645946	5.58413000	.10232946
5.0	.49979883	5.72453065	5.59006000	.13447065
6.0	.51407880	5.76131411	5.59690000	.16441411
7.0	.52835876	5.79605099	5.60394000	.19211099
8.0	.54263873	5.82796704	5.61116000	.21680704
9.0	.55691870	5.85628202	5.61856000	.23772202
10.0	.57119866	5.88021931	5.62579000	.25442931
11.0	.58547863	5.89901560	5.63281000	.26620560
12.0	.59975860	5.91193042	5.63957000	.27336042
13.0	.61403856	5.91825549	5.64486000	.27339549
14.0	.62831853	5.91732371	5.65253000	.26479371
15.0	.64259850	5.90851770	5.65495000	.25356770
16.0	.65687846	5.89127765	5.65653000	.23474765
17.0	.67115843	5.86510861	5.67044000	.19466861
18.0	.68543840	5.82958694	5.69144000	.13814694
19.0	.69971836	5.78436579	5.70367000	.08069579
20.0	.71399833	5.72917981	5.70579000	.02338981
21.0	.72827830	5.66384872	5.68831000	-.02446128
22.0	.74255826	5.58827991	5.66369000	-.07541009
23.0	.75683823	5.50246992	5.62230000	-.11983008
24.0	.77111820	5.40650491	5.56771000	-.16120509
25.0	.78539816	5.30055999	5.51557000	-.21501001
26.0	.79967813	5.18489750	5.44667000	-.26177250
27.0	.81395810	5.05986433	5.35223000	-.29236567
28.0	.82823806	4.92588817	5.25885000	-.33296183
29.0	.84251803	4.78347296	5.11691000	-.33343704
30.0	.85679800	4.63319336	4.96947000	-.33627664
31.0	.87107796	4.47568857	4.77573000	-.30004143
32.0	.88535793	4.31165549	4.56112000	-.24946451
33.0	.89963790	4.14184121	4.37036000	-.22851879
34.0	.91391786	3.96703513	4.13669000	-.16965487
35.0	.92819783	3.78806076	3.90571000	-.11764924
36.0	.94247780	3.60576714	3.68573000	-.07996286
37.0	.95675776	3.42102035	3.45400000	-.03297965
38.0	.97103773	3.23469479	3.22926000	.00543479
39.0	.98531770	3.04766476	3.01848000	.02918476
40.0	.99959766	2.86079615	2.79166000	.06913615
41.0	1.01387763	2.67493842	2.58151000	.09342842
42.0	1.02815760	2.49091709	2.36852000	.12239709
43.0	1.04243756	2.30952661	2.14525000	.16427661
44.0	1.05671753	2.13152390	1.94549000	.18603390
45.0	1.07099750	1.95762242	1.75697000	.20065242
46.0	1.08527746	1.78848703	1.56720000	.22128703
47.0	1.09955743	1.62472948	1.38875000	.23597948
48.0	1.11383740	1.46690478	1.22249000	.24441478
49.0	1.12811736	1.31550819	1.09313000	.22237819
50.0	1.14239733	1.17097316	.95940200	.21157116
52.0	1.17095726	.90390484	.73115600	.17274884
54.0	1.19951719	.66789710	.53772800	.13016910
56.0	1.22807713	.46414584	.39702100	.06712484
58.0	1.25663706	.29290002	.28950900	.00339102
60.0	1.28519699	.15354882	.20134600	-.04779718
65.0	1.35659683	-.06571446	.07787410	-.14358856
70.0	1.42799666	-.13151211	.02809590	-.15960801
75.0	1.49939649	-.09213923	.00993400	-.10207323
80.0	1.57079633	-.00000000	.00507816	-.00507816

TABLE C12. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 953, JULY, 30°N

THE COEFFICIENTS ARE

N	A(N)
1.	6.02161998
3.	.15965713
5.	-1.13357585
7.	.41315375
9.	.16903780

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.62989282	5.50775000	.12214282
-25.0	.07139983	5.59812057	5.52083000	.07729057
-20.0	.14279067	5.51984958	5.53561000	-.01576042
-15.0	.21419950	5.43895553	5.55229000	-.11333447
-10.0	.28559933	5.40709666	5.57146000	-.16436334
-8.0	.31415927	5.41713484	5.57996000	-.16282516
-6.0	.34271920	5.44205055	5.58902000	-.14696945
-4.0	.37127913	5.48166556	5.59863000	-.11696444
-2.0	.39983907	5.53466506	5.60893000	-.07426494
.0	.42839900	5.59859749	5.61921000	-.02061251
1.0	.44267896	5.63360159	5.62499000	.00861159
2.0	.45695893	5.66994082	5.63103000	.03891082
3.0	.47123890	5.70702903	5.63724000	.06978903
4.0	.48551886	5.74423261	5.64374000	.10049261
5.0	.49979883	5.78087750	5.65042000	.13045750
6.0	.51407880	5.81625690	5.65738000	.15887690
7.0	.52835876	5.84963946	5.66453000	.18510946
8.0	.54263873	5.88027796	5.67188000	.20839796
9.0	.55691870	5.90741821	5.67940000	.22801821
10.0	.57119866	5.93030823	5.68686000	.24344823
11.0	.58547863	5.94820740	5.69344000	.25476740
12.0	.59975860	5.96039565	5.69948000	.26091565
13.0	.61403856	5.96618233	5.70561000	.26057233
14.0	.62831853	5.96491490	5.71343000	.25148490
15.0	.64259850	5.95598708	5.71707000	.23891708
16.0	.65687846	5.93884658	5.71908000	.21976658
17.0	.67115843	5.91300206	5.73277000	.18023206
18.0	.68543840	5.87802948	5.75311000	.12491948
19.0	.69971836	5.83357759	5.76446000	.06911759
20.0	.71399833	5.77937253	5.76547000	.01390253
21.0	.72827830	5.71522154	5.74720000	-.03197846
22.0	.74255826	5.64101562	5.72250000	-.08148438
23.0	.75683823	5.55673134	5.67840000	-.12166866
24.0	.77111820	5.46243141	5.61866000	-.15622859
25.0	.78539816	5.35826444	5.56021000	-.20194556
26.0	.79967813	5.24446361	5.48520000	-.24073639
27.0	.81395810	5.12134431	5.39652000	-.27517569
28.0	.82823806	4.98930097	5.28229000	-.29298903
29.0	.84251803	4.84880292	5.13382000	-.28501708
30.0	.85679800	4.70038949	4.98568000	-.28529051
31.0	.87107796	4.54466430	4.79303000	-.24836570
32.0	.88535793	4.38228897	4.58326000	-.20097103
33.0	.89963790	4.21397626	4.40400000	-.19002374
34.0	.91391786	4.04048267	4.19344000	-.15295733
35.0	.92819783	3.86260074	3.98436000	-.12175926
36.0	.94247780	3.68115111	3.78008000	-.09892889
37.0	.95675776	3.49697434	3.56178000	-.06480566
38.0	.97103773	3.31092277	3.34706000	-.03613723
39.0	.98531770	3.12385238	3.13981000	-.01595762
40.0	.99959766	2.93661486	2.91325000	.02336486
41.0	1.01387763	2.75004982	2.69945000	.05059982
42.0	1.02815760	2.56497752	2.48082000	.08415752
43.0	1.04243756	2.38219183	2.24804000	.13415183
44.0	1.05671753	2.20245384	2.03852000	.16393384
45.0	1.07099750	2.02648592	1.83978000	.18670592
46.0	1.08527746	1.85496648	1.63827000	.21669648
47.0	1.09955743	1.68852531	1.44928000	.23924531
48.0	1.11383740	1.52773967	1.27538000	.25235967
49.0	1.12811736	1.37313104	1.14070000	.23243104
50.0	1.14239733	1.22516263	1.00119000	.22397263
52.0	1.17095726	.95069794	.76146900	.18922894
54.0	1.19951719	.70683516	.56101000	.14582516
56.0	1.22807713	.49508780	.41681200	.07827580
58.0	1.25663706	.31602887	.30490200	.01112687
60.0	1.28519699	.16935877	.21152900	-.04217023
65.0	1.35659683	-.06432843	.08083470	-.14516313
70.0	1.42799666	-.13706888	.02811270	-.16518158
75.0	1.49939649	-.09720721	.00932858	-.10653579
80.0	1.57079633	-.00000000	.00445454	-.00445454

TABLE C13. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 963, JULY, 45°N

THE COEFFICIENTS ARE

N	A(N)
1.	6.38034248
3.	.17712218
5.	-1.17074593
7.	.41895511
9.	.15012939

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.95580323	5.85275000	.10305323
-25.0	.07139983	5.92812327	5.86626000	.06186327
-20.0	.14279967	5.86052563	5.88140000	-.02087437
-15.0	.21419950	5.79266954	5.89771000	-.10504046
-10.0	.28559933	5.77093251	5.91720000	-.14626749
-8.0	.31415927	5.78313893	5.92582000	-.14268107
-6.0	.34271920	5.80882356	5.93493000	-.12610644
-4.0	.37127913	5.84768795	5.94464000	-.09695205
-2.0	.39983907	5.89837472	5.95435000	-.05597528
.0	.42839900	5.95846681	5.96548000	-.00701319
1.0	.44267896	5.99100850	5.97134000	.01966850
2.0	.45695893	6.02454828	5.97745000	.04709828
3.0	.47123890	6.05852278	5.98376000	.07476278
4.0	.48551886	6.09232414	5.99037000	.10195414
5.0	.49979883	6.12530652	5.99718000	.12812652
6.0	.51407880	6.15679326	6.00430000	.15249326
7.0	.52835876	6.18608451	6.01163000	.17445451
8.0	.54263873	6.21246526	6.01925000	.19321526
9.0	.55691870	6.23521370	6.02705000	.20816370
10.0	.57119866	6.25360978	6.03520000	.21840978
11.0	.58547863	6.26694380	6.04319000	.22375380
12.0	.59975860	6.27452498	6.05120000	.22332498
13.0	.61403856	6.27568990	6.05969000	.21599990
14.0	.62831853	6.26981063	6.06690000	.20291063
15.0	.64259850	6.25630252	6.07441000	.18189252
16.0	.65687846	6.23463148	6.07662000	.15801148
17.0	.67115843	6.20432073	6.08006000	.12426073
18.0	.68543840	6.16495685	6.08453000	.08042685
19.0	.69971836	6.11619514	6.07696000	.03923514
20.0	.71399833	6.05776416	6.05766000	.00010416
21.0	.72827830	5.98946939	6.03159000	-.04212061
22.0	.74255826	5.91119603	5.98410000	-.07290397
23.0	.75683823	5.82291088	5.92078000	-.09786912
24.0	.77111820	5.72466328	5.85353000	-.12886672
25.0	.78539816	5.61658502	5.76477000	-.14818498
26.0	.79967813	5.49888948	5.65302000	-.15413052
27.0	.81395810	5.37186969	5.54075000	-.16888031
28.0	.82823806	5.23589559	5.40852000	-.17262441
29.0	.84251803	5.09141049	5.24772000	-.15630951
30.0	.85679800	4.93892665	5.10705000	-.16812335
31.0	.87107796	4.77902024	4.94566000	-.16663976
32.0	.88535793	4.61232561	4.76947000	-.15714439
33.0	.89963790	4.43952900	4.61555000	-.17602100
34.0	.91391786	4.26136184	4.43439000	-.17302816
35.0	.92819783	4.07859354	4.24444000	-.16984646
36.0	.94247780	3.89202415	4.05625000	-.16422585
37.0	.95675776	3.70247670	3.84450000	-.14202330
38.0	.97103773	3.51078952	3.62905000	-.11826048
39.0	.98531770	3.31780853	3.41278000	-.09497147
40.0	.99959766	3.12437964	3.16732000	-.04294036
41.0	1.01387763	2.93134131	2.93554000	-.00419869
42.0	1.02815760	2.73951739	2.70103000	.03848739
43.0	1.04243756	2.54971030	2.45826000	.09145030
44.0	1.05671753	2.36269464	2.23710000	.12559464
45.0	1.07099750	2.17921122	2.02026000	.15895122
46.0	1.08527746	1.99996170	1.79067000	.20929170
47.0	1.09955743	1.82560372	1.57552000	.25008372
48.0	1.11383740	1.65674669	1.38551000	.27123669
49.0	1.12811736	1.49394820	1.24177000	.25217820
50.0	1.14239733	1.33771104	1.09243000	.24528104
52.0	1.17095726	1.04664498	.83707300	.20957198
54.0	1.19951719	.78640413	.62156900	.16483513
56.0	1.22807713	.55888616	.46284700	.09603916
58.0	1.25663706	.36504420	.33908400	.02596020
60.0	1.28519699	.20493186	.23868000	-.03374814
65.0	1.35659683	-.05466910	.09117600	-.14584510
70.0	1.42799666	-.14063672	.02925370	-.16989042
75.0	1.49939649	-.10243000	.00829057	-.11072057
80.0	1.57079633	-.00000000	.00343791	-.00343791

TABLE C14. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 973, JULY, 60°N

THE COEFFICIENTS ARE

N	A(N)
1.	6.91098454
3.	.22140405
5.	-1.25111611
7.	.42239920
9.	.15309595

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	6.45676763	6.36333000	.09343763
-25.0	.07139983	6.43077805	6.37763000	.05314805
-20.0	.14279967	6.36800479	6.39423000	-.02622521
-15.0	.21419950	6.30732590	6.41222000	-.10489410
-10.0	.28559933	6.29371407	6.43323000	-.13951593
-8.0	.31415927	6.30899200	6.44250000	-.13350800
-6.0	.34271920	6.33741159	6.45234000	-.11492841
-4.0	.37127913	6.37849837	6.46277000	-.08427163
-2.0	.39983907	6.43070847	6.47389000	-.04318153
.0	.42839900	6.49143185	6.48579000	.00564185
1.0	.44267896	6.52389375	6.49209000	.03180375
2.0	.45695893	6.55705794	6.49858000	.05847794
3.0	.47123890	6.59033736	6.50534000	.08499736
4.0	.48551886	6.62310109	6.51241000	.11069109
5.0	.49979883	6.65468106	6.51970000	.13498106
6.0	.51407880	6.68437939	6.52731000	.15706939
7.0	.52835876	6.71147620	6.53522000	.17625620
8.0	.54263873	6.73523785	6.54348000	.19175785
9.0	.55691870	6.75492552	6.55189000	.20303552
10.0	.57119866	6.76980391	6.56110000	.20870391
11.0	.58547863	6.77915000	6.57081000	.20834000
12.0	.59975860	6.78226182	6.58077000	.20149182
13.0	.61403856	6.77846703	6.59098000	.18748703
14.0	.62831853	6.76713114	6.59979000	.16734114
15.0	.64259850	6.74766546	6.60729000	.14037546
16.0	.65687846	6.71953449	6.60822000	.11131449
17.0	.67115843	6.68226268	6.60005000	.08221268
18.0	.68543840	6.63544063	6.58753000	.04791063
19.0	.69971836	6.57873040	6.55857000	.02016040
20.0	.71399833	6.51187007	6.51635000	-.00447993
21.0	.72827830	6.43467743	6.47087000	-.03619257
22.0	.74255826	6.34705276	6.40392000	-.05686724
23.0	.75683823	6.24898054	6.32127000	-.07228946
24.0	.77111820	6.14053040	6.23826000	-.09772960
25.0	.78539816	6.02185694	6.12938000	-.10752306
26.0	.79967813	5.89319862	6.00166000	-.10846138
27.0	.81395810	5.75487580	5.88081000	-.12593420
28.0	.82823806	5.60728779	5.73104000	-.12375221
29.0	.84251803	5.45090908	5.56011000	-.10920092
30.0	.85679800	5.28628477	5.41784000	-.13155523
31.0	.87107796	5.11402531	5.25964000	-.14561469
32.0	.88535793	4.93480049	5.08479000	-.14998951
33.0	.89963790	4.74933302	4.92655000	-.17721698
34.0	.91391786	4.55839143	4.73307000	-.17467857
35.0	.92819783	4.36278280	4.53540000	-.17261720
36.0	.94247780	4.16334500	4.33667000	-.17332500
37.0	.95675776	3.96093887	4.12702000	-.16608113
38.0	.97103773	3.75644029	3.91112000	-.15467971
39.0	.98531770	3.55073219	3.68486000	-.13412781
40.0	.99959766	3.34469675	3.41807000	-.07337325
41.0	1.01387763	3.13920771	3.16530000	-.02609229
42.0	1.02815760	2.93512299	2.91069000	.02443299
43.0	1.04243756	2.73327770	2.64817000	.08510770
44.0	1.05671753	2.53447753	2.41043000	.12404753
45.0	1.07099750	2.33949262	2.17606000	.16343262
46.0	1.08527746	2.14905202	1.93440000	.21465202
47.0	1.09955743	1.96383874	1.70774000	.25609874
48.0	1.11383740	1.78448535	1.50734000	.27714535
49.0	1.12811736	1.61157034	1.35588000	.25569034
50.0	1.14239733	1.44561505	1.19927000	.24634505
52.0	1.17095726	1.13636981	.93464500	.20172481
54.0	1.19951719	.85970440	.70453400	.15517040
56.0	1.22807713	.61757579	.52831000	.08926579
58.0	1.25663706	.41095703	.38573100	.02522603
60.0	1.28519699	.23988386	.26667900	-.02679514
65.0	1.35659683	-.03960517	.09669010	-.13629527
70.0	1.42799666	-.13619607	.02945500	-.16565107
75.0	1.49939649	-.10194650	.00775371	-.10970021
80.0	1.57079633	-.00000000	.00303529	-.00303529

TABLE C15. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 983, JULY, 75°N

THE COEFFICIENTS ARE

N	A(N)
1.	7.35631583
3.	.19642211
5.	-1.31190962
7.	.46247895
9.	.14104474

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	6.84435200	6.75160000	.09275200
-25.0	.07139983	6.81913285	6.76810000	.05103285
-20.0	.14279967	6.75840773	6.78631000	-.02790227
-15.0	.21419950	6.70041638	6.80654000	-.10612362
-10.0	.28559933	6.68948319	6.82944000	-.13995681
-8.0	.31415927	6.70574630	6.83950000	-.13375370
-6.0	.34271920	6.73509871	6.85016000	-.11506129
-4.0	.37127913	6.77708045	6.86144000	-.08435955
-2.0	.39983907	6.83017040	6.87344000	-.04326960
.0	.42839900	6.89178456	6.88626000	.00552456
1.0	.44267896	6.92470349	6.89302000	.03168349
2.0	.45695893	6.95833548	6.89999000	.05834548
3.0	.47123890	6.99209474	6.90721000	.08488474
4.0	.48551886	7.02535048	6.91473000	.11062048
5.0	.49979883	7.05743345	6.92255000	.13488345
6.0	.51407880	7.08764301	6.93018000	.15746301
7.0	.52835876	7.11525474	6.93862000	.17663474
8.0	.54763873	7.13952853	6.94746000	.19206853
9.0	.55691870	7.15971693	6.95606000	.20365693
10.0	.57119866	7.17507376	6.96598000	.20909376
11.0	.58547863	7.18486274	6.97640000	.20846274
12.0	.59975860	7.18836623	6.98690000	.20146623
13.0	.61403856	7.18489371	6.99657000	.18832371
14.0	.62831853	7.17379011	7.00463000	.16916011
15.0	.64259850	7.15444377	7.01165000	.14279377
16.0	.65687846	7.12629393	7.01179000	.11450393
17.0	.67115843	7.08883773	7.00334000	.08549773
18.0	.68543840	7.04163648	6.99045000	.05118648
19.0	.69971836	6.98432135	6.96113000	.02319135
20.0	.71399833	6.91659819	6.91521000	.00138819
21.0	.72827830	6.83825155	6.86425000	-.02599845
22.0	.74255826	6.74914781	6.79270000	-.04355219
23.0	.75683823	6.64923739	6.70131000	-.05207261
24.0	.77111820	6.53855606	6.61398000	-.07542394
25.0	.78539816	6.41722528	6.49845000	-.08122472
26.0	.79967813	6.28545158	6.37414000	-.08868842
27.0	.81395810	6.14352507	6.26315000	-.11962493
28.0	.82823806	5.99181701	6.11871000	-.12689299
29.0	.84251803	5.83077654	5.94912000	-.11834346
30.0	.85679800	5.66092660	5.80356000	-.14263340
31.0	.87107796	5.48285913	5.64100000	-.15814087
32.0	.88535793	5.29722956	5.46090000	-.16367044
33.0	.89963790	5.10475069	5.29724000	-.19248931
34.0	.91391786	4.90618608	5.09679000	-.19060392
35.0	.92819783	4.70234301	4.89210000	-.18975699
36.0	.94247780	4.49406502	4.68688000	-.19281498
37.0	.95675776	4.28222435	4.47299000	-.19076565
38.0	.97103773	4.06771403	4.25059000	-.18287597
39.0	.98531770	3.85144007	4.01327000	-.16182993
40.0	.99959766	3.63431359	3.72941000	-.09509641
41.0	1.01387763	3.41724309	3.45895000	-.04170691
42.0	1.02815760	3.20112692	3.18626000	.01486692
43.0	1.04243756	2.98684599	2.90478000	.08206599
44.0	1.05671753	2.77525692	2.64950000	.12575692
45.0	1.07099750	2.56718552	2.39728000	.16990552
46.0	1.08527746	2.36342078	2.13516000	.22826078
47.0	1.09955743	2.16470935	1.89004000	.27466935
48.0	1.11383740	1.97175065	1.67230000	.29945065
49.0	1.12811736	1.78519253	1.50696000	.27823253
50.0	1.14239733	1.60562752	1.33591000	.26971752
52.0	1.17095726	1.26955250	1.04565000	.22390250
54.0	1.19951719	.96705801	.79142700	.17563101
56.0	1.22807713	.70065874	.59659300	.10406574
58.0	1.25663706	.47184005	.43696500	.03487505
60.0	1.28519699	.28108036	.30459700	-.02351664
65.0	1.35659683	-.03459826	.11328800	-.14788626
70.0	1.42799666	-.14753251	.03568500	-.18321751
75.0	1.49939649	-.11254198	.01010540	-.12264738
80.0	1.57079633	-.00000000	.00397661	-.00397661

TABLE C16. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 993, OCTOBER, 20°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.80175486
3.	.14198756
5.	-1.07270779
7.	.39945320
9.	.14259228

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.41308010	5.30852000	.10456010
-25.0	.07139983	5.38538475	5.32034000	.06504475
-20.0	.14279967	5.31729292	5.33370000	-.01640708
-15.0	.21419950	5.24740512	5.34883000	-.10142488
-10.0	.28559933	5.22116775	5.36625000	-.14508225
-8.0	.31415927	5.23084895	5.37392000	-.14307105
-6.0	.34271920	5.25368104	5.38214000	-.12845896
-4.0	.37127913	5.28948772	5.39086000	-.10137228
-2.0	.39983907	5.33708191	5.40019000	-.06310809
.0	.42839900	5.39426260	5.41011000	-.01584740
1.0	.44267896	5.42549529	5.41530000	.01019529
2.0	.45695893	5.45787031	5.42073000	.03714031
3.0	.47123890	5.49086133	5.42631000	.06455133
4.0	.48551886	5.52389893	5.43145000	.09244893
5.0	.49979883	5.55637672	5.43741000	.11896672
6.0	.51407880	5.58765811	5.44358000	.14407811
7.0	.52835876	5.61708348	5.44989000	.16719348
8.0	.54263873	5.64397785	5.45632000	.18765785
9.0	.55691870	5.66765871	5.46285000	.20480871
10.0	.57119866	5.68744419	5.46913000	.21831419
11.0	.58547863	5.70766117	5.47499000	.22767117
12.0	.59975860	5.71265344	5.47937000	.23328344
13.0	.61403856	5.71678970	5.48329000	.23349970
14.0	.62831853	5.71447126	5.48814000	.22633126
15.0	.64259850	5.70513949	5.48771000	.21742949
16.0	.65687846	5.68828275	5.48599000	.20229275
17.0	.67115843	5.66344278	5.49975000	.16369278
18.0	.68543840	5.63022053	5.52315000	.10707053
19.0	.69971836	5.58828121	5.53640000	.05188121
20.0	.71399833	5.53735869	5.54077000	-.00341131
21.0	.72827830	5.47725904	5.52724000	-.04998096
22.0	.74255826	5.40786317	5.50588000	-.09801683
23.0	.75683823	5.32912873	5.46461000	-.13548127
24.0	.77111820	5.24109096	5.40797000	-.16687904
25.0	.78539816	5.14386283	5.34255000	-.19868717
26.0	.79967813	5.03763408	5.25002000	-.21238592
27.0	.81395810	4.92266960	5.12956000	-.20589040
28.0	.82823806	4.79930684	5.01886000	-.21955316
29.0	.84251803	4.66795248	4.86843000	-.20047752
30.0	.85679800	4.52907837	4.73369000	-.20461163
31.0	.87107796	4.38321675	4.57321000	-.18999325
32.0	.88535793	4.23095492	4.39862000	-.16766508
33.0	.89963790	4.07292935	4.24840000	-.17547065
34.0	.91391786	3.90981932	4.07772000	-.16790068
35.0	.92819783	3.74234024	3.89771000	-.15536976
36.0	.94247780	3.57123668	3.69897000	-.12773332
37.0	.95675776	3.39727519	3.45409000	-.05681481
38.0	.97103773	3.22123707	3.21755000	.00368707
39.0	.98531770	3.04391113	3.01293000	.03098113
40.0	.99959766	2.86608654	2.81442000	.05166654
41.0	1.01387763	2.68854578	2.62968000	.05886578
42.0	1.02815760	2.51205797	2.43749000	.07456797
43.0	1.04243756	2.33737242	2.22779000	.10958242
44.0	1.05671753	2.16521258	2.03790000	.12731258
45.0	1.07099750	1.99627051	1.85845000	.13782051
46.0	1.08527746	1.83120175	1.67650000	.15470175
47.0	1.09955743	1.67062078	1.51509000	.15553078
48.0	1.11383740	1.51509707	1.36063000	.15446707
49.0	1.12811736	1.36515171	1.19548000	.16967171
50.0	1.14239733	1.22125459	1.05275000	.16850459
52.0	1.17095726	.95321658	.76268700	.19052958
54.0	1.19951719	.71365228	.53498100	.17867128
56.0	1.22807713	.50433632	.39677100	.10756532
58.0	1.25663706	.32616172	.28962500	.03653672
60.0	1.28519699	.17918282	.20147300	-.02229018
65.0	1.35659683	-.05816500	.07812890	-.13629390
70.0	1.42799666	-.13500729	.02872580	-.16373309
75.0	1.49939649	-.09714729	.01037250	-.10751979
80.0	1.57079633	-.00000000	.00533537	-.00533537

TABLE C17. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 1003, OCTOBER, 30°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.74434696
3.	.17957612
5.	-1.06230406
7.	.36030079
9.	.16176413

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.38368395	5.28013000	.10355395
-25.0	.07139983	5.35558507	5.29180000	.06378507
-20.0	.14279967	5.28675768	5.30491000	-.01815232
-15.0	.21419950	5.21689338	5.31973000	-.10283662
-10.0	.28559933	5.19231727	5.33684000	-.14452273
-8.0	.31415927	5.20312449	5.34441000	-.14128551
-6.0	.34271920	5.22724637	5.35246000	-.12521363
-4.0	.37127913	5.26438328	5.36109000	-.09670672
-2.0	.39983907	5.31318837	5.37025000	-.05706163
.0	.42839900	5.37127255	5.37925000	-.00797745
1.0	.44267896	5.40277796	5.38443000	.01834796
2.0	.45695893	5.43527142	5.38976000	.04551142
3.0	.47123890	5.46820065	5.39529000	.07291065
4.0	.48551886	5.50097108	5.40108000	.09989108
5.0	.49979883	5.53295250	5.40702000	.12593250
6.0	.51407880	5.56348628	5.41307000	.15041628
7.0	.52835876	5.59189316	5.41939000	.17250316
8.0	.54263873	5.61748130	5.42586000	.19162130
9.0	.55691870	5.63955465	5.43238000	.20717465
10.0	.57119866	5.65742152	5.43895000	.21847152
11.0	.58547863	5.67040308	5.44478000	.22562308
12.0	.59975860	5.67784186	5.45024000	.22760186
13.0	.61403856	5.67910998	5.45551000	.22359998
14.0	.62831853	5.67361716	5.45860000	.21501716
15.0	.64259850	5.66081819	5.46289000	.19792819
16.0	.65687846	5.64021996	5.46301000	.17720996
17.0	.67115843	5.61138785	5.47437000	.13701785
18.0	.68543840	5.57395143	5.48568000	.08827143
19.0	.69971836	5.52760935	5.49282000	.03478935
20.0	.71399833	5.47213342	5.48650000	-.01436658
21.0	.72827830	5.40737182	5.46442000	-.05704818
22.0	.74255826	5.33325135	5.43657000	-.10331865
23.0	.75683823	5.24977877	5.39045000	-.14067123
24.0	.77111820	5.15704114	5.32664000	-.16959886
25.0	.78539816	5.05520525	5.25292000	-.19771475
26.0	.79967813	4.94451606	5.15778000	-.21326394
27.0	.81395810	4.82529433	5.03431000	-.20901567
28.0	.82823806	4.69793326	4.92282000	-.22488674
29.0	.84251803	4.56289439	4.76954000	-.20564561
30.0	.85679800	4.42070279	4.62893000	-.20822721
31.0	.87107796	4.27194143	4.46335000	-.19140857
32.0	.88535793	4.11724515	4.28278000	-.16553485
33.0	.89963790	3.95729398	4.12468000	-.16738602
34.0	.91391786	3.79280609	3.93950000	-.14669391
35.0	.92819783	3.62453044	3.74756000	-.12302956
36.0	.94247780	3.45323923	3.54388000	-.09064077
37.0	.95675776	3.27972020	3.30203000	-.02230980
38.0	.97103773	3.10476893	3.06906000	.03570893
39.0	.98531770	2.92918126	2.86518000	.06400126
40.0	.99959766	2.75374584	2.65972000	.09402584
41.0	1.01387763	2.57923699	2.47408000	.10515699
42.0	1.02815760	2.40640789	2.28982000	.11658789
43.0	1.04243756	2.23598422	2.10527000	.13071422
44.0	1.05671753	2.06865828	1.94027000	.12838828
45.0	1.07099750	1.90508368	1.78028000	.12480368
46.0	1.08527746	1.74587064	1.61370000	.13217064
47.0	1.09955743	1.59158186	1.46442000	.12716186
48.0	1.11383740	1.44272922	1.32152000	.12120922
49.0	1.12811736	1.29977098	1.16896000	.13081098
50.0	1.14239733	1.16310977	1.03641000	.12669977
52.0	1.17095726	.91000365	.76442400	.14557965
54.0	1.19951719	.68548550	.54469300	.14079250
56.0	1.22807713	.49072171	.40725600	.08346571
58.0	1.25663706	.32601504	.29971200	.02630304
60.0	1.28519699	.19087881	.21363400	-.02275519
65.0	1.35659683	-.02674706	.09005480	-.11680186
70.0	1.42799666	-.10064679	.03399180	-.13463859
75.0	1.49939649	-.07534400	.01302110	-.08836510
80.0	1.57079633	-.00000000	.00737762	-.00737762

TABLE C18. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 1013, OCTOBER, 45°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.51072834
3.	.30130455
5.	-1.00980242
7.	.26366295
9.	.18140202

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.24729543	5.16434000	.08295543
-25.0	.07139983	5.22160355	5.17234000	.04926355
-20.0	.14279967	5.15920938	5.18141000	-.02220062
-15.0	.21419950	5.09746684	5.19175000	-.09428316
-10.0	.28559933	5.07897313	5.20360000	-.12462687
-8.0	.31415927	5.09061570	5.20887000	-.11825430
-6.0	.34271920	5.11419368	5.21452000	-.10032632
-4.0	.37127913	5.14910919	5.22054000	-.07143081
-2.0	.39983907	5.19374556	5.22698000	-.03323444
.0	.42839900	5.24548878	5.23390000	.01158878
1.0	.44267896	5.27295520	5.23757000	.03538520
2.0	.45695893	5.30081103	5.24134000	.05947103
3.0	.47123890	5.32849584	5.24525000	.08324584
4.0	.48551886	5.35541266	5.24936000	.10605266
5.0	.49979883	5.38093508	5.25358000	.12735508
6.0	.51407880	5.40441481	5.25796000	.14645481
7.0	.52835876	5.42518971	5.26245000	.16273971
8.0	.54263873	5.44259213	5.26705000	.17554213
9.0	.55691870	5.45595742	5.27079000	.18516742
10.0	.57119866	5.46463251	5.27521000	.18942251
11.0	.58547863	5.46798450	5.27964000	.18834450
12.0	.59975860	5.46540894	5.28391000	.18149894
13.0	.61403856	5.45633800	5.28895000	.16738800
14.0	.62831853	5.44024806	5.29152000	.14872806
15.0	.64259850	5.41666687	5.29315000	.12351687
16.0	.65687846	5.38518009	5.28917000	.09701009
17.0	.67115843	5.34543710	5.28016000	.06527710
18.0	.68543840	5.29715600	5.26384000	.03331600
19.0	.69971836	5.24012782	5.24514000	-.00501218
20.0	.71399833	5.17421970	5.20761000	-.03339030
21.0	.72827830	5.09937722	5.15692000	-.05754278
22.0	.74255826	5.01562571	5.10482000	-.08919429
23.0	.75683823	4.92307052	5.03063000	-.10755948
24.0	.77111820	4.82189633	4.94311000	-.12121367
25.0	.78539816	4.71236548	4.85400000	-.14163452
26.0	.79967813	4.59481533	4.74938000	-.15456467
27.0	.81395810	4.46965468	4.61769000	-.14803532
28.0	.82823806	4.33735942	4.50491000	-.16755058
29.0	.84251803	4.19846732	4.35361000	-.15514268
30.0	.85679800	4.05357212	4.23036000	-.17678788
31.0	.87107796	3.90331703	4.10738000	-.20406297
32.0	.88535793	3.74838771	3.95699000	-.20860229
33.0	.89963790	3.58950475	3.78319000	-.19368525
34.0	.91391786	3.42741597	3.51759000	-.09017403
35.0	.92819783	3.26288837	3.26225000	.00063837
36.0	.94247780	3.09670012	3.05416000	.04254012
37.0	.95675776	2.92963246	2.87385000	.05578246
38.0	.97103773	2.76246178	2.70366000	.05880178
39.0	.98531770	2.59595192	2.53584000	.06011192
40.0	.99959766	2.43084683	2.34495000	.08589683
41.0	1.01387763	2.26786358	2.16956000	.09830358
42.0	1.02815760	2.10768593	1.99889000	.10879593
43.0	1.04243756	1.95095851	1.83195000	.11900851
44.0	1.05671753	1.79828155	1.68692000	.11136155
45.0	1.07099750	1.65020642	1.54696000	.10324642
46.0	1.08527746	1.50723181	1.40289000	.10434181
47.0	1.09955743	1.36980077	1.27683000	.09297077
48.0	1.11383740	1.23829848	1.16040000	.07789848
49.0	1.12811736	1.11305079	1.04638000	.06667079
50.0	1.14239733	.99432363	.94468400	.04963963
52.0	1.17095726	.77719617	.71104300	.06615317
54.0	1.19951719	.58786656	.50467500	.08319156
56.0	1.22807713	.42640473	.37758200	.04882273
58.0	1.25663706	.29209429	.27727400	.01482029
60.0	1.28519699	.18355380	.19771500	-.01416120
65.0	1.35659683	.01151552	.08639430	-.07487878
70.0	1.42799666	-.04994139	.03637380	-.08631519
75.0	1.49939649	-.04145582	.01576840	-.05722422
80.0	1.57079633	-.00000000	.00923335	-.00923335

TABLE C19. - TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 1023, OCTOBER, 60°N

THE COEFFICIENTS ARE

N	A(N)
1.	5.20544286
3.	.44747046
5.	-.93492796
7.	.14275350
9.	.19327508

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	5.05401393	5.00455000	.04946393
-25.0	.07139983	5.03346026	5.00845000	.02501026
-20.0	.14279967	4.98455124	5.01291000	-.02835876
-15.0	.21419950	4.93927865	5.01801000	-.07873135
-10.0	.28559933	4.93266727	5.02392000	-.09125273
-8.0	.31415927	4.94596296	5.02648000	-.08051704
-6.0	.34271920	4.96871150	5.02929000	-.06057850
-4.0	.37127913	4.99992565	5.03229000	-.03236435
-2.0	.39983907	5.03768905	5.03550000	.00218905
.0	.42839900	5.07919655	5.03895000	.04024655
1.0	.44267896	5.10025805	5.04075000	.05950805
2.0	.45695893	5.12085373	5.04266000	.07819373
3.0	.47123890	5.14043623	5.04461000	.09582623
4.0	.48551886	5.15843071	5.04665000	.11178071
5.0	.49979883	5.17424197	5.04875000	.12549197
6.0	.51407880	5.18726211	5.05090000	.13636211
7.0	.52835876	5.19687843	5.05309000	.14378843
8.0	.54263873	5.20248165	5.05531000	.14717165
9.0	.55691870	5.20347410	5.05754000	.14593410
10.0	.57119866	5.19927803	5.06013000	.13914803
11.0	.58547863	5.18934362	5.06259000	.12675362
12.0	.59975860	5.17315686	5.06385000	.10930686
13.0	.61403856	5.15024696	5.06463000	.08561696
14.0	.62831853	5.12019329	5.06140000	.05879329
15.0	.64259850	5.08263170	5.05216000	.03047170
16.0	.65687846	5.03726018	5.03908000	-.00181982
17.0	.67115843	4.98384372	5.01227000	-.02842628
18.0	.68543840	4.92221828	4.97198000	-.04976172
19.0	.69971836	4.85229393	4.92692000	-.07462607
20.0	.71399833	4.77405694	4.85740000	-.08334306
21.0	.72827830	4.68757096	4.76746000	-.07988904
22.0	.74255826	4.59297710	4.66291000	-.06993290
23.0	.75683823	4.49049311	4.57244000	-.08194689
24.0	.77111820	4.38041146	4.45785000	-.07743854
25.0	.78539816	4.26309653	4.34207000	-.07897347
26.0	.79967813	4.13898084	4.24839000	-.10940916
27.0	.81395810	4.00856040	4.10973000	-.10116960
28.0	.82823806	3.87238927	3.98272000	-.11033073
29.0	.84251803	3.73107344	3.81683000	-.08575656
30.0	.85679800	3.58526403	3.66574000	-.08047597
31.0	.87107796	3.43564998	3.48236000	-.04671002
32.0	.88535793	3.28295033	3.28985000	-.00689967
33.0	.89963790	3.12790618	3.12947000	-.00156382
34.0	.91391786	2.97127245	2.93826000	.03301245
35.0	.92819783	2.81380957	2.75900000	.05480957
36.0	.94247780	2.65427525	2.60339000	.05288525
37.0	.95675776	2.49941634	2.45960000	.03981634
38.0	.97103773	2.34396101	2.31787000	.02609101
39.0	.98531770	2.19061128	2.17234000	.01827128
40.0	.99959766	2.04003608	1.99987000	.04016608
41.0	1.01387763	1.89286478	1.84209000	.05077478
42.0	1.02815760	1.74968146	1.68939000	.06029146
43.0	1.04243756	1.61101989	1.54276000	.06825989
44.0	1.05671753	1.47735921	1.41780000	.05955921
45.0	1.07099750	1.34912051	1.29787000	.05125051
46.0	1.08527746	1.22666426	1.17615000	.05051426
47.0	1.09955743	1.11028856	1.07198000	.03830856
48.0	1.11383740	1.00022831	.97837800	.02185031
49.0	1.12811736	.89665522	.89317100	.00348422
50.0	1.14239733	.79967870	.81673800	-.01705930
52.0	1.17095726	.62565201	.62863300	-.00298099
54.0	1.19951719	.47785855	.45165800	.02620055
56.0	1.22807713	.35519079	.33921500	.01597579
58.0	1.25663706	.25586642	.24918600	.00668042
60.0	1.28519699	.17759462	.17756700	.00002762
65.0	1.35659683	.05647004	.08042910	-.02395906
70.0	1.42799666	.00803240	.03770420	-.02967180
75.0	1.49939649	-.00307751	.01874410	-.02182161
80.0	1.57079633	.00000000	.01156250	-.01156250

TABLE C20. TRIGONOMETRIC SERIES CURVE FIT TO PROFILE NO. 1033 (OCTOBER, 75° N)

THE COEFFICIENTS ARE

N	A(N)
1.	4.96988133
3.	.48820177
5.	-.89907370
7.	.10822729
9.	.19793183

HEIGHT	THETA	N(CALC)	N(MEAS)	N(RES)
-30.0	.00000000	4.86516853	4.81977000	.04539853
-25.0	.07139983	4.84531803	4.82276000	.02255803
-20.0	.14279967	4.79818042	4.82617000	-.02798958
-15.0	.21419950	4.75480022	4.83000000	-.07519978
-10.0	.28559933	4.74884876	4.83454000	-.08549124
-8.0	.31415927	4.76173706	4.83653000	-.07479294
-6.0	.34271920	4.78356788	4.83858000	-.05501212
-4.0	.37127913	4.81328702	4.84069000	-.02740298
-2.0	.39983907	4.84893034	4.84318000	.00575034
.0	.42839900	4.88766875	4.84573000	.04193875
1.0	.44267896	4.90710240	4.84708000	.06002240
2.0	.45695893	4.92591191	4.84846000	.07745191
3.0	.47123890	4.94355538	4.84976000	.09379538
4.0	.48551886	4.95946553	4.85127000	.10819553
5.0	.49979883	4.97305695	4.85269000	.12036695
6.0	.51407880	4.98373370	4.85398000	.12975370
7.0	.52835876	4.99089727	4.85566000	.13523727
8.0	.54263873	4.99395474	4.85719000	.13676474
9.0	.55691870	4.99232698	4.85847000	.13385698
10.0	.57119866	4.98545682	4.86046000	.12499682
11.0	.58547863	4.97281704	4.86183000	.11098704
12.0	.59975860	4.95391807	4.86109000	.09282807
13.0	.61403856	4.92831526	4.85895000	.06936526
14.0	.62831853	4.89561566	4.85094000	.04467566
15.0	.64259850	4.85548415	4.83604000	.01944415
16.0	.65687846	4.80764884	4.81083000	-.00318116
17.0	.67115843	4.75190568	4.78229000	-.03038432
18.0	.68543840	4.68812224	4.73362000	-.04549776
19.0	.69971836	4.61624044	4.66706000	-.05081956
20.0	.71399833	4.53627843	4.59928000	-.06300157
21.0	.72827830	4.44833141	4.50942000	-.06108859
22.0	.74255826	4.35257142	4.40612000	-.05354858
23.0	.75683823	4.24924613	4.31166000	-.06241387
24.0	.77111820	4.13867664	4.20044000	-.06176336
25.0	.78539816	4.02125432	4.09764000	-.07638568
26.0	.79967813	3.89743665	4.00686000	-.10942335
27.0	.81395810	3.76774236	3.87981000	-.11206764
28.0	.82823806	3.63274561	3.75891000	-.12616439
29.0	.84251803	3.49306956	3.59550000	-.10243044
30.0	.85679800	3.34937935	3.44340000	-.09402065
31.0	.87107796	3.20237454	3.25940000	-.05702546
32.0	.88535793	3.05278115	3.06756000	-.01477885
33.0	.89963790	2.90134342	2.90786000	-.00651658
34.0	.91391786	2.74881547	2.71831000	.03050547
35.0	.92819783	2.59595289	2.53978000	.05617289
36.0	.94247780	2.44350434	2.38277000	.06073434
37.0	.95675776	2.29220349	2.22910000	.06310349
38.0	.97103773	2.14276117	2.08295000	.05981117
39.0	.98531770	1.99585797	1.94677000	.04908797
40.0	.99959766	1.85213740	1.80030000	.05183740
41.0	1.01387763	1.71219957	1.66419000	.04800957
42.0	1.02815760	1.57659570	1.52660000	.04999570
43.0	1.04243756	1.44582328	1.38507000	.06075328
44.0	1.05671753	1.32032206	1.26276000	.05756206
45.0	1.07099750	1.20047101	1.14853000	.05194101
46.0	1.08527746	1.08658600	1.03732000	.04946600
47.0	1.09955743	.97891853	.94419700	.03472153
48.0	1.11383740	.87765531	.86012300	.01753231
49.0	1.12811736	.78291871	.78377200	-.00085329
50.0	1.14239733	.69476809	.71565800	-.02088991
52.0	1.17095726	.53816095	.55081400	-.01265305
54.0	1.19951719	.40714917	.39744200	.00970717
56.0	1.22807713	.30025118	.29810700	.00214418
58.0	1.25663706	.21534715	.21760400	-.00225685
60.0	1.28519699	.14985969	.15420500	-.00434531
65.0	1.35659683	.05225839	.06907660	-.01681821
70.0	1.42799666	.01458106	.03214890	-.01756784
75.0	1.49939649	.00332678	.01647450	-.01314772
80.0	1.57079633	.00000000	.00986560	-.00986560

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