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Angular Radiation Models for Earth-Atmosphere System

Volume II—Longwave Radiation

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Summary

This document presents the longwave angular radiation models that are required for analysis of satellite measurements of Earth radiation, such as those from the Earth Radiation Budget Experiment (ERBE). The models contain limb-darkening characteristics and mean fluxes. Limb-darkening characteristics are the longwave anisotropic factor and the standard deviation of the longwave radiance. Derivation of these models from the Nimbus 7 ERB (Earth Radiation Budget) data set is described. Tabulated values and computer-generated plots are included for the limb-darkening and mean-flux models. This report is volume II of a set of two documents; volume I (NASA RP-1184, 1988) describes shortwave angular models.

Introduction

Analysis of satellite measurements for determination of the Earth's radiation budget requires information about the angular characteristics of radiation that is reflected (shortwave)¹ and emitted (longwave)¹ from the Earth-atmosphere system (Smith et al. 1986). For an imaginary surface element at the top of the atmosphere, the angular characteristics can be defined by models which express the exiting radiance, for each direction out to space, as a function of the total hemispheric flux leaving the element. In principle, a radiance measurement at a single angle can then be converted into an inferred hemispheric flux. For application of the angular models, it is necessary to classify the Earth observations into a set of scenes (e.g., ocean, land, snow, desert, and clouds) such that each has a distinct angular model. In addition, it is required to have a complete set of angular models for each scene class.

To analyze the Nimbus 3 satellite measurements, Raschke et al. (1973) used three scenes (ocean, snow, and cloud-land combination) and empirical models derived from a variety of sources including aircraft, balloons, and early satellite data. The scene identification was a static process, since the scene type for a given measurement location was determined a priori. For the Nimbus 7 Earth Radiation Budget (ERB) measurements, Jacobowitz et al. (1984) used four scenes (ocean, land, snow-ice combination, and clouds); a threshold method based on climatological values of reflected and emitted fluxes for cloud identification; and angular models for each scene.

The recent Earth Radiation Budget Experiment (ERBE) described by Barkstrom and Smith (1986)

has a complex system of inversion algorithms which utilize angular radiation models. The ERBE inversion algorithms (Smith et al. 1986) use a set of 12 scenes, a Maximum Likelihood Estimation (MLE) scene identification method (Wielicki and Green 1989), and a comprehensive set of angular models. Because of the special requirements of the MLE method, statistical parameters (i.e., standard deviation of radiances) are required as part of the angular model data set.

The purpose of this report is to describe and present the top-of-the-atmosphere longwave angular models and associated statistical quantities that have been developed for the ERBE inversion algorithms. This report is volume II of a set of two documents; volume I (Suttles et al. 1988) describes the shortwave models developed for the ERBE analysis. The longwave models include limb-darkening characteristics and mean fluxes and were derived from Nimbus 7 ERB satellite measurements by Taylor and Stowe (1986). Limb-darkening characteristics used herein consist of the longwave anisotropic factor and standard deviation of the longwave radiance. A brief description of the model characteristics and derivation is presented. Tabulated values and plots of the models are also included.

Symbols

C_j	coefficient in normalization equation for anisotropic factors for angle bin with j th viewing-zenith-angle range
ERB	Earth Radiation Budget
ERBE	Earth Radiation Budget Experiment
L	radiance, $W/(m^2\text{-sr})$
L_{njq}	average radiance for angle bin having n th colatitude, j th viewing zenith angle, and q th season, $W/(m^2\text{-sr})$
M	radiation flux, W/m^2
MLE	Maximum Likelihood Estimation
M_{nq}	average radiation flux for n th colatitude and q th season, W/m^2
N	number of observations
N_{njq}	number of observations for angle bin having n th colatitude, j th viewing zenith angle, and q th season
R	longwave anisotropic function (defined by eq. (2))

¹ Reflected radiation occurs primarily in the shortwave spectral region (0-5 μm), and emitted radiation occurs primarily in the longwave region (> 5 μm).

R_{njq}	average longwave anisotropic factor for angle bin having n th colatitude, j th viewing zenith angle, and q th season
t	time of year
θ	viewing zenith angle, deg (see fig. 1)
σ	standard deviation of radiance, $W/(m^2\text{-sr})$
Ω	colatitude, deg
Subscripts and superscripts:	
j	index for viewing-zenith-angle bin
L	land scene type
lw	longwave
m	index for observations in a given angle bin
mix	value for mix of 50-percent ocean and 50-percent land
n	index for colatitude angle bin
O	ocean scene type
q	index for seasons

A bar over a symbol denotes average value.

Scene Types and Angular Grid

The scene types selected for the ERBE data analysis (Smith et al. 1986) are used in this work. These scene types were defined on the basis of broad categories of climatologically important surface and cloud features and are given in table 1. The land and desert scenes include vegetated and nonvegetated types, and the snow scene includes snow and ice. In this work, twelve scene types are used: nine basic types and three mixed types. Data for the land-ocean mixed scenes are derived from values for the basic types as described in the section entitled "Mixed-Scene Models." Four levels of cloud coverage are included: clear-sky (0 to 5 percent), partly cloudy (5 to 50 percent), mostly cloudy (50 to 95 percent), and overcast (95 to 100 percent). At a given time and location on the Earth, the surface type for a clear-sky scene without snow cover can be determined by reference to a geographic map or atlas. To determine snow-covered scenes, time-varying snow maps are used (Fye 1978; Morse and Ropelewski 1983). The presence of a cloudy scene must be determined as part of the data processing using a scene identification technique that must be applied during both

the development and application stages for the angular models. Because of differences in measurements available for cloud detection in these two stages, the scene identification methods for development and application, in general, are not the same. For example, Wielicki and Green (1989) give a discussion of differences in cloud algorithms between the model development described herein and the ERBE data processing algorithms.

For derivation of angular models, it has been assumed that longwave radiance changes primarily with colatitude Ω , time of year t , and viewing zenith angle θ . Azimuthal symmetry has been assumed throughout this work. To describe radiance variations, the space, time, and angular coordinates are divided into increments called "bins," and the model is represented by mean values for each bin. Table 2 gives the bin definitions for the colatitude and viewing zenith angle. Each colatitude bin subtends 18° in latitude, so that there are 10 bins to cover 180° . The first colatitude bin starts at the North Pole, and the tenth bin ends at the South Pole. The viewing zenith angles are based on the angular coordinate system shown in figure 1. Following the approach of Taylor and Stowe (1984), seven viewing-zenith-angle bins are used with the first and last bin increments spanning 15° and the remaining bin increments spanning 12° . For time variations, the four seasons (based on the Northern Hemisphere) are winter (Dec., Jan., and Feb.), spring (Mar., Apr., and May), summer (June, July, and Aug.), and fall (Sept., Oct., and Nov.).

Longwave Model Parameters

Longwave models required for scene identification and radiance-to-flux conversion of satellite radiance measurements include limb-darkening and flux characteristics. The model characteristics are based on the following relation between radiance L and flux M assuming azimuthal symmetry:

$$M(L, t) = 2\pi \int_0^{\pi/2} d\theta L(\Omega, \theta, t) \cos \theta \sin \theta \quad (1)$$

An anisotropic function R is defined as

$$R(\Omega, \theta, t) = \frac{\pi L(\Omega, \theta, t)}{M(\Omega, t)} \quad (2)$$

which is the ratio of the equivalent Lambertian flux to the actual flux. Thus, if the radiance is Lambertian, that is, independent of viewing zenith angle, then $R = 1$. By substituting equation (2) into

equation (1), a normalization condition for R can be written as

$$2 \int_0^{\pi/2} d\theta R(\Omega, \theta, t) \cos \theta \sin \theta = 1 \quad (3)$$

For the finite angular bins which are used to represent the models, the integrals in equations (1) and (3) can be written as the following summations:

$$M_{nq} = \pi \sum_{j=1}^7 \bar{L}_{njq} (\sin^2 \theta_{j+1} - \sin^2 \theta_j) \quad (4)$$

and

$$\sum_{j=1}^7 \bar{R}_{njq} (\sin^2 \theta_{j+1} - \sin^2 \theta_j) = 1 \quad (5)$$

Equation (5) can be further simplified to

$$\sum_{j=1}^7 C_j \bar{R}_{njq} = 1 \quad (6)$$

where

$$C_j = (\sin^2 \theta_{j+1} - \sin^2 \theta_j) \quad (7)$$

and values for C_j are given in table 3.

In equations (4) to (6) the barred quantities are values that have been averaged over the observations for the angular bin defined by the indices n , j , and q . Index n refers to colatitude Ω , index j refers to viewing zenith angle θ , and index q refers to time of year with seasonal resolution. The discrete approximation of R , R_{njq} , is called the anisotropic factor.

To use the angular models with the MLE scene identification method, other statistical parameters are also needed. These parameters include the standard deviation of the longwave radiances for each angle bin,

$$\sigma_{njq} = \left[\frac{1}{N_{njq}} \sum_{m=1}^{N_{njq}} (L_{njqm} - \bar{L}_{njq})^2 \right]^{1/2} \quad (8)$$

In equation (8), N_{njq} represents the number of observations for the njq th bin, and m is the index for the observations. As previously noted, the bar indicates bin-averaged values. In subsequent equations, the bar is omitted and all quantities with subscripts njq are understood to be bin-averaged values.

In summary, the limb-darkening characteristics for the longwave angular models presented here are

the anisotropic factor R_{njq} and the standard deviation of the radiance σ_{njq} . The normalization condition for R_{njq} , which is given by equation (6), is an important constraint to ensure that radiation energy is neither created nor destroyed by use of the angular models. The flux parameters for the longwave angular models are the zonal-seasonal mean fluxes M_{nq} .

Nimbus 7 ERB Data Processing

Ideally, longwave angular radiation models would be based on broadband satellite measurements with unbiased sampling over all viewing angles, over the entire Earth, and over time. Also, it is desirable to use high-resolution measurements for cloud detection to ensure accurate sorting by scene type. Unfortunately, no single satellite platform can satisfy all these requirements, primarily because of the inevitable orbit-dependent sampling biases. The Nimbus 7 ERB experiment was designed specifically to provide extensive viewing-angle coverage and has provided a prime resource for constructing the required longwave models.

The Nimbus 7 satellite was launched into orbit in October 1978. The orbit is nearly circular and Sun-synchronous with a period of 104 min, an average altitude of about 950 km, an orbital inclination of 99.3°, and equatorial-crossing times near local noon and midnight (Kyle, Ardanuy, and Hurley 1985). In addition to other experiments, this satellite contained instruments for the ERB experiment. The ERB measurement package included three separate instrument groups for solar observations, wide-field-of-view Earth observations, and narrow-field-of-view scanner observations of the Earth. The longwave angular radiation models in this publication were derived from Nimbus 7 ERB scanner measurements.

The ERB scanner instrument is described in detail by Jacobowitz et al. (1984), so only a general description is necessary here. The ERB scanner consists of four optical telescopes, each of which has a broadband shortwave (0.2- to 4- μm) and longwave (5- to 50- μm) channel. This instrument has a multi-axis scanning capability. It can scan from horizon to horizon along the orbital track and scan to a viewing zenith angle of 72° in the cross-track direction. At the nadir, spatial resolution is about 90 km \times 90 km, and it increases to as much as 250 km \times 250 km at the maximum scan angle.

The ERB measurements were processed at the NOAA National Environmental Satellite, Data, and Information Service using methods described by Taylor and Stowe (1984, 1986). Using the archived Nimbus 7 ERB scanner data tapes, measurements were sorted into the colatitude bins, angular bins, and

scene types described previously. Scene identification was performed with an improved Nimbus 7 cloud-detection algorithm described by Stowe et al. (1988). The improved cloud-detection scheme, called the new cloud-ERB (NCLE) algorithm, uses measurements from the Temperature and Humidity Infrared Radiometer (THIR) and the Total Ozone Mapping Spectrometer (TOMS), both of which are on the Nimbus 7 spacecraft with the ERB instrument. The NCLE algorithm is based on a surface temperature analysis from 3-hourly, Air Force 3-D nephelometer data (Fye 1978); on reflectance data from the ultraviolet channel of the TOMS; and on infrared window channel emission from the THIR. To derive angular models, simultaneous data from the ERB scanner, TOMS, THIR, and the surface temperature analysis were available for 205 days of the period from April 1, 1979, to June 22, 1980.

For each angular bin where sufficient data were available, results were determined for the mean long-wave radiances, the standard deviation of the radiances, and the anisotropic factors. The anisotropic factor was determined by first integrating the mean radiance over all viewing-angle bins to obtain the flux (eq. (4)) and then applying the definition of R (eq. (2)).

After obtaining values for all angle bins, the models were checked using the normalization criterion (eq. (6)), and, if necessary, the anisotropic factors were adjusted to satisfy the criterion. Final model values satisfy the normalization condition to within ± 0.0001 .

Model Development

Limb-Darkening and Flux Models

Measurements from the Nimbus 7 ERB scanner provided the data source for deriving the limb-darkening and flux models for the nine basic scene types (i.e., all but the land-ocean mix scenes). Unfortunately, values for some viewing-angle, colatitude, season, and scene-type combinations were not available from the ERB processing results. Some of the bin-mean values were either missing or were of questionable accuracy because of small sample populations. When fewer than eight samples were available for a bin, the mean values for that bin were treated as missing. In some cases, anomalous spikes or dips occurred in the limb-darkening variations with viewing zenith angle and in the flux variations with colatitude. The anomalous values were discarded and considered to be missing also. Methods for filling in missing data are discussed in this section.

Most of the missing data typically occurred for an entire season or colatitude bin. For these cases, bin-mean values for all viewing-angle bins were replicated from other seasons or colatitude bins. In some cases, bin-mean values were missing for occasional and isolated viewing-angle bins. In those cases, values were determined by interpolation, extrapolation, or averaging using surrounding viewing-angle bin values. Depending on appropriateness, missing data were filled in using one of the following methods:

1. Replication of data from appropriate season of opposite hemisphere (e.g., Southern Hemisphere winter for Northern Hemisphere winter)
2. Replication of data from contiguous season of same hemisphere
3. Replication of data from adjacent colatitude bin
4. Replication of data from a similar scene type
5. Replication of data from daytime to nighttime or vice versa
6. Interpolation, extrapolation, or averaging using values in surrounding bins

Because of the requirements of some satellite data processing systems (e.g., inversion of ERBE data), some model values for anisotropic factors were filled in even for conditions which never occur (e.g., desert at polar colatitudes and snow in the tropics). The ERBE data processing system evaluates the long-wave anisotropic factor by interpolating in viewing zenith angle and colatitude. Thus, conditions which never occur have been included so that the interpolation algorithm will work correctly. These values are usually replications of adjacent colatitude bin values. For most scene types and conditions that actually exist, less than 10 percent of the model values had to be filled in. Exceptions where filling in can be as high as 50 percent are as follows: the midlatitude land and mostly cloudy over land for the winter and spring seasons, for which intermittent snow cover can cause a loss of sampling; the midlatitude snow models for the spring, summer, and fall seasons, for which snow coverage is intermittent or sparse; and desert models in the winter and spring. In all cases, comments are provided in table 4 to indicate the source of the data or method used to fill in missing values.

For the flux values reported in this publication, a constant correction of 3 W/m^2 was added to the values derived from the archived ERB data tapes in accordance with the recommendation of Kylling et al. (1985). The need for this correction resulted from a slight error in the ERB longwave calibration equation.

Mixed-Scene Models

Since the Nimbus 7 ERB data were not sorted for the mixed-scene types (i.e., clear over land-ocean mix, partly cloudy over land-ocean mix, and mostly cloudy over land-ocean mix), models for these scenes were determined by computations. The computations were performed using equations developed under the assumption that observations of a mixed scene are either ocean or land with equal (i.e., 50-percent) probability of being one or the other.

Equations for computation of the mixed-scene parameters are developed in detail in the appendix and are summarized below:

Mean flux:

$$M_{nq}^{\text{mix}} = \frac{M_{nq}^O + M_{nq}^L}{2} \quad (9)$$

Anisotropic factor:

$$R_{njq}^{\text{mix}} = \frac{M_{nq}^L R_{njq}^L + M_{nq}^O R_{njq}^O}{2M_{nq}^{\text{mix}}} \quad (10)$$

Standard deviation:

$$\sigma_{njq}^{\text{mix}} = \left[\frac{(\sigma_{njq}^L)^2 + (\sigma_{njq}^O)^2}{2} + \frac{1}{4\pi^2} (M_{nq}^L R_{njq}^L - M_{nq}^O R_{njq}^O)^2 \right]^{1/2} \quad (11)$$

Overcast Cloud Models

The Nimbus 7 ERB data were sorted into models for overcast clouds separately over ocean and land, but the ERBE scene classifications include only a general overcast type. Therefore, all parameters for the overcast model were computed using a weighted average of the overcast-over-ocean and overcast-over-land values. Since little difference existed between these two models, approximate frequency-of-occurrence weights of 0.75 for ocean and 0.25 for land were used. The averaging was performed after the overcast-over-ocean and overcast-over-land models were completely filled in using the methods outlined previously.

Combining Daytime and Nighttime Data

The ERB measurements were made from a satellite in a Sun-synchronous orbit with equatorial crossing times near local noon and local midnight.

Therefore, data were analyzed to produce separate "daytime" and "nighttime" longwave models. Daytime results are more reliable than nighttime results, because the daytime scene identification uses both the THIR infrared (IR) and TOMS solar ultra-violet (UV) data; the nighttime scene selection can only use the THIR IR data.

If both daytime and nighttime limb-darkening and longwave flux models were used to analyze satellite data, an interpolation or temporal modeling scheme would be required to predict values for times between local noon and local midnight. Because of the small day-night variations of anisotropic factors for most scenes and because of the necessity to minimize the large data set that is required, the ERBE analysis was designed to use day-night average models for limb-darkening parameters. For mean longwave fluxes, daytime values are used along with a temporal model to adjust for time of day.

Therefore, the models presented here consist of simple day-night average models for the anisotropic factors and radiance standard deviations. For fluxes, results consist of daytime mean values and day-night flux differences for use in establishing temporal corrections.

Results

Results for the longwave angular radiation models are presented in figures which contain tables of the bin-averaged values and plots of these values.

Limb-Darkening Models

Day-night average limb-darkening parameters (i.e., anisotropic factors and standard deviations of radiance) are given in figures 2 to 13. The day, night, and day-night limb-darkening parameters have been examined for all seasons, colatitudes, and scene types. Little variation was found in the anisotropic factors; maximum and minimum values are summarized in table 5. The measure of significance for anisotropic factors is the departure from the isotropic value, $R = 1.0$. The largest departures from isotropy occur at the lowest and highest viewing zenith angles. The largest anisotropic factors occurred for viewing zenith bin 1, where the values ranged from 1.090 to 1.019 over the entire set of models. The mean value is 1.044, and the standard deviation is ± 0.0106 . The smallest anisotropic factors and largest variability are found at the highest viewing zenith angles. Because of uncertainties associated with measurements at the higher viewing zenith angles (primarily uncertainties due to larger natural variability and errors in scene identification and instrument pointing angle), it is common practice not to analyze measurements at

the higher angles. However, the measurements at the higher angles do slightly affect the entire model, since they must be used in determining the flux for calculating anisotropic factors. For ERBE, scanner data are analyzed only up to a viewing zenith angle of 70° , which occurs in bin 6. Over all models for both day and night, anisotropic factors for bin 6 range from 0.976 to 0.896 with a mean of 0.946 and a standard deviation of ± 0.0128 .

To characterize the standard deviation of the radiances, the dispersion (standard deviation divided by mean) has been determined and evaluated for variation over viewing zenith angle, colatitude, and season. The major variations were with colatitude and with seasonal changes in the polar regions. Only small variations were found with viewing zenith angle. Therefore, the dispersions have been averaged over viewing zenith angle and plotted versus colatitude for the seasonal extremes—winter and summer. These results are given in figure 14 for ocean scenes, in figure 15 for land scenes, and in figure 16 for snow and desert scenes. The systematically larger dispersion for overcast clouds in the tropics is believed to be due to the use of one category for all cloud types. In the tropics, there are very high convective clouds and low-level boundary-layer clouds. Combining, into one scene type, clouds with such large differences in radiating temperature causes a large variance of outgoing longwave radiance in the tropics. On the other hand, clouds in the polar regions are confined to a much smaller altitude range and, therefore, a smaller variance of outgoing radiance. It may be possible to reduce the large variability in the models by developing techniques for accurately identifying different cloud types, particularly in terms of altitude and optical depth, and to rederive models by using additional cloud scene types.

Flux Models

Mean daytime longwave fluxes are presented in figures 17 to 28. All scenes except the overcast cloud show large variations of longwave flux with colatitude. The largest flux occurs in the tropics where temperatures are the highest. Overcast cloud scenes show little variation of flux with colatitude or season. The other scenes show considerable differences in their seasonal variations; the highest variations occur from the middle to the high latitudes. Ocean scenes exhibit small seasonal variations, land and snow scenes have moderate variations, and high-latitude deserts have large seasonal variations. Near the equator, even the desert scenes show very little seasonal change.

Table 6 gives day-night longwave flux differences based on Nimbus 7 ERB data. These values are

useful for constructing diurnal models of longwave flux. As expected, the day-night differences are largest for the desert and land scenes and smallest for the ocean and overcast cloud scenes.

Concluding Remarks

The primary purposes of this report are to present longwave angular radiation models for satellite data analysis and to describe the data and methods used in deriving the models. This report is volume II of a set of two documents; volume I (Suttles et al. 1988) describes shortwave angular models. The longwave models include limb-darkening and flux characteristics and have been developed for Earth radiation budget (ERB) measurement and simulation applications. These models describe the mean variation of top-of-the-atmosphere outgoing longwave radiation with viewing zenith angle, colatitude, and season for 12 scene categories. They have been derived primarily from radiances measured by the Nimbus 7 ER scanner satellite instrument, which operated between late 1978 and mid-1980. Missing and sparsely sampled observed quantities have been replaced by several estimation techniques.

Results show that the mean anisotropic factors vary from 1.067 to 0.837 over viewing zenith angle but have little variation with either scene type, colatitude, or season. Standard deviations of radiances are largest for mostly cloudy and overcast scenes; these standard deviations indicate a need to classify clouds by cloud type. Fluxes have large variations with colatitude for all scenes except overcast clouds and large variations with season for the desert, land, and snow scenes. Day-night flux differences were large for desert and land scene types.

The models presented herein have been archived as part of the Earth Radiation Budget Experiment (ERBE) results² and are available from the National Space Sciences Data Center, Goddard Space Flight Center, Greenbelt, Maryland 20771.

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² The archived model data include a $+5 \text{ W/m}^2$ adjustment relative to values given in this report, to all flux values on the basis of comparisons between initial ERBE and Nimbus 7 ERB measurements. This adjustment is contained in the ERBE Science Team minutes, December 3-4, 1985.

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Appendix

Equations for Mixed-Scene Properties

Along the coastlines of continents, scenes occur that are a mix of two or more types. Since the majority of these scenes are a mix of a land type and an ocean type and are normally of about equal proportions, all mixed scenes have been assumed to be composed of 50-percent land and 50-percent ocean. Furthermore, it is assumed that a collection of observations for a coastal region consists of single observations that are either land or ocean scenes with half the observations looking like land and half like ocean. With these assumptions, the statistical properties of the mixed scenes can be calculated using the properties for the corresponding land and ocean scene types.

The relations for the mixed-scene properties are based on the equations that define the desired statistical properties of the radiance observations as follows:

Mean:

$$\bar{L} = \frac{1}{N} \sum_1^N L \quad (\text{A1})$$

Standard deviation:

$$\sigma = \left[\frac{1}{N} \sum_1^N (L - \bar{L})^2 \right]^{1/2} = \left[\left(\frac{1}{N} \sum_1^N L^2 \right) - \bar{L}^2 \right]^{1/2} \quad (\text{A2})$$

With the assumption that half of the observations are ocean O and half are land L , equations (A1) and (A2) can be written as follows:

$$\bar{L}^{\text{mix}} = \frac{1}{N} \left(\sum_1^{N/2} L^O + \sum_{N/2+1}^N L^L \right) = \frac{1}{2} (\bar{L}^O + \bar{L}^L) \quad (\text{A3})$$

and

$$\begin{aligned} (\sigma^{\text{mix}})^2 = & \frac{1}{N} \left[\sum_1^{N/2} (L^O)^2 + \sum_{N/2+1}^N (L^L)^2 \right] \\ & - \left[\frac{1}{2} (\bar{L}^O + \bar{L}^L) \right]^2 \end{aligned} \quad (\text{A4})$$

If the statistical properties of the ocean and land radiance observations for the coastal regions are assumed to be equal to the statistical properties of the observations for the rest of the Earth, equation (A4) can be simplified as follows:

$$(\sigma^{\text{mix}})^2 = \frac{1}{2} (\sigma^O)^2 + \frac{1}{2} (\sigma^L)^2 + \frac{1}{4} (\bar{L}^O - \bar{L}^L)^2 \quad (\text{A5})$$

Using equations (A3) and (A5) with the definitions of anisotropic factor R (eq. (2)) and flux M (eq. (4)), the mixed-scene equations have been derived as follows:

Mean flux:

$$M_{nq}^{\text{mix}} = \frac{M_{nq}^O + M_{nq}^L}{2} \quad (\text{A6})$$

Anisotropic factor:

$$R_{njq}^{\text{mix}} = \frac{M_{nq}^L R_{njq}^L + M_{nq}^O R_{njq}^O}{2 M_{nq}^{\text{mix}}} \quad (\text{A7})$$

and

Standard deviation:

$$\begin{aligned} \sigma_{njq}^{\text{mix}} = & \left[\frac{(\sigma_{njq}^L)^2 + (\sigma_{njq}^O)^2}{2} \right. \\ & \left. + \frac{1}{4\pi^2} (M_{nq}^L R_{njq}^L - M_{nq}^O R_{njq}^O)^2 \right]^{1/2} \end{aligned} \quad (\text{A8})$$

where the statistical properties for land and ocean scenes are those determined from the global data set

Table 1. Scene Types for Angular Models

Scene	Cloud coverage, percent	Figures
Clear over ocean	0 to 5	2, 17
Clear over land	↓	3, 18
Clear over snow		4, 19
Clear over desert		5, 20
Clear over land-ocean mix		6, 21
Partly cloudy over ocean		7, 22
Partly cloudy over land or desert	5 to 50	8, 23
Partly cloudy over land-ocean mix	5 to 50	9, 24
Mostly cloudy over ocean	50 to 95	10, 25
Mostly cloudy over land or desert	50 to 95	11, 26
Mostly cloudy over land-ocean mix	50 to 95	12, 27
Overcast	95 to 100	13, 28

Table 2. Definitions for Angular Bins

(a) Colatitude

Colatitude bin	Colatitude angle Ω , deg
1	^a 0 to 18
2	18 to 36
3	36 to 54
4	54 to 72
5	72 to 90
6	90 to 108
7	108 to 126
8	126 to 144
9	144 to 162
10	162 to 180

(b) Viewing zenith

Zenith-angle bin	Viewing zenith angle θ , deg
1	0 to 15
2	15 to 27
3	27 to 39
4	39 to 51
5	51 to 63
6	63 to 75
7	75 to 90

^aNorth Pole is at 0° colatitude.

Table 3. Longwave Integration Coefficients (C_j)

Bin	Viewing zenith angle θ , deg	C_j
1	0 to 15	0.06699
2	15 to 27	.13912
3	27 to 39	.18994
4	39 to 51	.20790
5	51 to 63	.18994
6	63 to 75	.13912
7	75 to 90	.06699

Table 4. Identification of Sources for Tabulated Data in
 Figures 2 to 13 and 17 to 28

- 1—Average of daytime overcast land and overcast ocean.
- 2—Value estimated.
- 3—Value is 50-percent ocean and 50-percent land composite.
- 4—Daytime data from NOAA analysis using initial cloud algorithm (CLE).
- 5—Nighttime overcast model derived by averaging overcast ocean and overcast land using weighting factors 0.75 and 0.25, respectively.
- 6—Daytime overcast model derived by averaging overcast ocean and overcast land using weighting factors 0.75 and 0.25, respectively.
- 7—Data taken from partly cloudy over ocean in opposite hemisphere.
- 8—Nighttime data taken from NOAA ERB data tape.
- 9—Daytime data taken from NOAA ERB data tape.
- 10—Nighttime data taken from NOAA ERB data tape (increased sample size).
- 11—Data taken from appropriate season of opposite hemisphere.
- 12—Data taken from contiguous season.
- 13—Data taken from adjacent colatitude bin.
- 14—Data taken from clear snow.
- 15—Data taken from partly cloudy over ocean.
- 16—Data taken from mostly cloudy over ocean.
- 17—Data taken from overcast over ocean.
- 18—Data taken from overcast over land.
- 19—Data taken from clear ocean.
- 20—Average of two adjacent colatitude bins.
- 21—Data calculated by interpolating between adjacent viewing zenith bins.
- 22—Data replicated from following viewing zenith bin.
- 23—Comment 8 with sample population size between 8 and 20.
- 24—Comment 8 with sample population size between 21 and 50.
- 25—Comment 8 with sample population size between 51 and 100.
- 26—Comment 8 with sample population size between 101 and 500.
- 27—Comment 8 with sample population size greater than 500.
- 28—Comment 9 with sample population size between 8 and 20.
- 29—Comment 9 with sample population size between 21 and 50.
- 30—Comment 9 with sample population size between 51 and 100.
- 31—Comment 9 with sample population size between 101 and 500.
- 32—Comment 9 with sample population size greater than 500.
- 33—Comment 10 with sample population size between 8 and 20.
- 34—Comment 10 with sample population size between 21 and 50.
- 35—Comment 10 with sample population size between 51 and 100.
- 36—Comment 10 with sample population size between 101 and 500.
- 37—Comment 10 with sample population size greater than 500.
- 38—Average of night and day with day comment 11 and night comment 11.
- 39—Average of night and day with day comment 11 and night comment 12.
- 40—Average of night and day with day comment 11 and night comment 13.
- 41—Average of night and day with day comment 11 and night comment 14.
- 42—Average of night and day with day comment 11 and night comment 15.
- 43—Average of night and day with day comment 11 and night comment 16.
- 44—Average of night and day with day comment 11 and night comment 17.
- 45—Average of night and day with day comment 11 and night comment 18.
- 46—Average of night and day with day comment 11 and night comment 19.
- 47—Average of night and day with day comment 11 and night comment 20.
- 48—Average of night and day with day comment 11 and night comment 21.
- 49—Average of night and day with day comment 11 and night comment 22.
- 50—Average of night and day with day comment 11 and night comment 33.

Table 4. Concluded

369—Average of night and day with day comment 30 and night comment 19.
 370—Average of night and day with day comment 30 and night comment 20.
 371—Average of night and day with day comment 30 and night comment 21.
 372—Average of night and day with day comment 30 and night comment 22.
 373—Average of night and day with day comment 30 and night comment 33.
 374—Average of night and day with day comment 30 and night comment 34.
 375—Average of night and day with day comment 30 and night comment 35.
 376—Average of night and day with day comment 30 and night comment 36.
 377—Average of night and day with day comment 30 and night comment 37.
 378—Average of night and day with day comment 31 and night comment 11.
 379—Average of night and day with day comment 31 and night comment 12.
 380—Average of night and day with day comment 31 and night comment 13.
 381—Average of night and day with day comment 31 and night comment 14.
 382—Average of night and day with day comment 31 and night comment 15.
 383—Average of night and day with day comment 31 and night comment 16.
 384—Average of night and day with day comment 31 and night comment 17.
 385—Average of night and day with day comment 31 and night comment 18.
 386—Average of night and day with day comment 31 and night comment 19.
 387—Average of night and day with day comment 31 and night comment 20.
 388—Average of night and day with day comment 31 and night comment 21.
 389—Average of night and day with day comment 31 and night comment 22.
 390—Average of night and day with day comment 31 and night comment 33.
 391—Average of night and day with day comment 31 and night comment 34.
 392—Average of night and day with day comment 31 and night comment 35.
 393—Average of night and day with day comment 31 and night comment 36.
 394—Average of night and day with day comment 31 and night comment 37.
 395—Average of night and day with day comment 32 and night comment 11.
 396—Average of night and day with day comment 32 and night comment 12.
 397—Average of night and day with day comment 32 and night comment 13.
 398—Average of night and day with day comment 32 and night comment 14.
 399—Average of night and day with day comment 32 and night comment 15.
 400—Average of night and day with day comment 32 and night comment 16.
 401—Average of night and day with day comment 32 and night comment 17.
 402—Average of night and day with day comment 32 and night comment 18.
 403—Average of night and day with day comment 32 and night comment 19.
 404—Average of night and day with day comment 32 and night comment 20.
 405—Average of night and day with day comment 32 and night comment 21.
 406—Average of night and day with day comment 32 and night comment 22.
 407—Average of night and day with day comment 32 and night comment 33.
 408—Average of night and day with day comment 32 and night comment 34.
 409—Average of night and day with day comment 32 and night comment 35.
 410—Average of night and day with day comment 32 and night comment 36.
 411—Average of night and day with day comment 32 and night comment 37.
 412—Daytime data used for both daytime and nighttime.
 413—Nighttime data used for both daytime and nighttime.
 414—Average of night and day with day comment 12 and night comment 7.
 415—Average of night and day with day comment 6 and night comment 5.

Table 5. Maximum and Minimum Longwave Anisotropic Factors
for All Scene Types, Colatitudes, and Seasons

	Zenith angle bin 1 ($\theta = 0^\circ$ to 15°)		Zenith angle bin 6 ($\theta = 63^\circ$ to 75°)		Zenith angle bin 7 ($\theta = 75^\circ$ to 90°)	
	Max	Min	Max	Min	Max	Min
Day	1.085	1.019	0.976	0.896	0.959	0.810
Night	1.090	1.023	0.973	0.914	0.946	0.833
Day-night average	1.067	1.023	0.972	0.915	0.949	0.837

Table 6. Day-Night Longwave Flux Differences

PC = Partly cloudy
 MC = Mostly cloudy
 Ovcst = Overcast

Scene	Flux differences, W/m ² , for bin—									
	1	2	3	4	5	6	7	8	9	10
	At colatitude, deg, of—									
	0 to 18	18 to 36	36 to 54	54 to 72	72 to 90	90 to 108	108 to 126	126 to 144	144 to 162	162 to 180
Winter (Northern Hemisphere)										
Ocean	(a)	(a)	8.30	1.71	-0.53	-1.27	0.41	1.30	1.10	(a)
Land	(a)	(a)	19.88	28.73	35.88	21.27	42.81	(a)	(a)	(a)
Snow	(a)	7.25	7.40	(a)	(a)	(a)	(a)	(a)	-11.73	(a)
Desert	(a)	(a)	(a)	39.61	42.71	(a)	58.20	(a)	(a)	(a)
PC over ocean	(a)	5.12	2.94	2.25	-.05	.14	3.10	2.82	.67	(a)
PC over land	(a)	(a)	18.46	29.23	18.02	9.76	25.17	23.11	(a)	(a)
MC over ocean	(a)	3.00	2.40	-3.53	-11.88	-10.93	-1.99	2.69	1.68	(a)
MC over land	(a)	(a)	9.62	2.16	1.85	7.64	5.63	4.30	(a)	(a)
Ovcst over ocean	(a)	-2.69	-1.39	-4.98	-21.50	-28.43	-18.50	-7.79	-3.83	(a)
Ovcst over land	(a)	(a)	-3.02	-11.11	7.53	11.91	-1.42	(a)	(a)	(a)
Spring (Northern Hemisphere)										
Ocean	(a)	(a)	5.75	-0.91	-0.92	0.39	0.63	8.14	(a)	(a)
Land	(a)	28.83	40.77	40.76	36.83	19.16	27.23	(a)	(a)	(a)
Snow	4.10	-1.69	(a)	(a)	(a)	(a)	(a)	(a)	6.00	(a)
Desert	(a)	(a)	51.79	51.93	(a)	(a)	(a)	(a)	(a)	(a)
PC over ocean	(a)	1.30	3.24	2.22	1.17	1.52	2.19	2.72	2.37	(a)
PC over land	(a)	18.57	27.67	39.01	12.74	2.85	8.76	(a)	(a)	(a)
MC over ocean	(a)	2.57	2.18	-5.51	-13.17	-8.73	-.91	1.90	3.71	(a)
MC over land	(a)	3.75	.41	2.91	-1.63	-11.25	-12.71	(a)	(a)	(a)
Ovcst over ocean	1.72	-2.09	-5.01	-16.52	-28.56	-19.95	-9.70	-4.38	.46	(a)
Ovcst over land	(a)	3.73	-.80	3.37	7.04	-15.04	-41.67	(a)	(a)	(a)
Summer (Northern Hemisphere)										
Ocean	(a)	3.08	7.19	0.46	-1.05	0.44	2.22	4.50	(a)	(a)
Land	(a)	23.08	37.08	34.55	21.16	28.86	38.38	(a)	(a)	(a)
Snow	-2.82	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)	(a)
Desert	(a)	(a)	53.78	47.57	36.47	28.21	42.52	(a)	(a)	(a)
PC over ocean	10.43	2.52	8.22	2.93	-.42	1.41	2.02	2.46	5.06	(a)
PC over land	(a)	16.20	25.84	44.95	12.81	15.61	21.41	(a)	(a)	(a)
MC over ocean	9.18	6.03	8.60	-2.05	-11.18	-4.69	-.49	1.88	4.88	(a)
MC over land	(a)	4.64	5.75	5.19	6.95	11.71	2.64	(a)	(a)	(a)
Ovcst over ocean	4.64	-2.97	-7.26	-24.13	-22.74	-12.67	-3.55	-1.23	-.30	(a)
Ovcst over land	(a)	1.59	.40	9.04	13.42	13.83	-27.61	(a)	(a)	(a)
Fall (Northern Hemisphere)										
Ocean	(a)	(a)	0.03		0.90	1.22	-0.50	3.98	4.18	(a)
Land	(a)	21.38	32.57	26.04	28.40	36.18	45.23	(a)	(a)	(a)
Snow	26.04	4.77	9.02	(a)	(a)	(a)	(a)	(a)	1.76	27.76
Desert	(a)	(a)	45.31	42.55	42.96	(a)	60.04	(a)	(a)	(a)
PC over ocean	5.07	2.61	3.60	1.29	-.74	2.27	2.57	1.65	2.89	(a)
PC over land	(a)	11.98	23.25	35.88	13.57	17.54	27.58	(a)	(a)	(a)
MC over ocean	8.19	4.54	3.48	-4.71	-12.29	-6.13	-1.08	1.83	3.69	(a)
MC over land	(a)	4.24	5.23	3.83	5.98	11.88	9.62	7.12	(a)	(a)
Ovcst over ocean	7.48	1.75	-3.67	-13.76	-28.55	-20.87	-12.01	-6.70	-2.50	(a)
Ovcst over land	(a)	1.63	-3.49	-6.36	11.05	18.27	-2.12	(a)	(a)	(a)

^aFlux for day, night, or both were unavailable.

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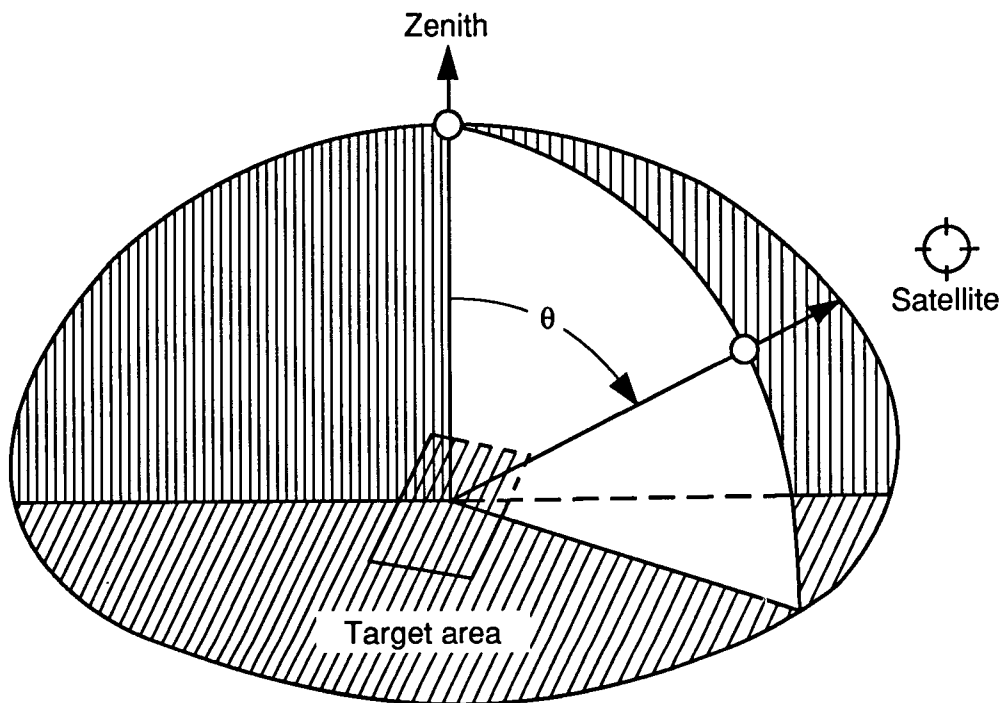
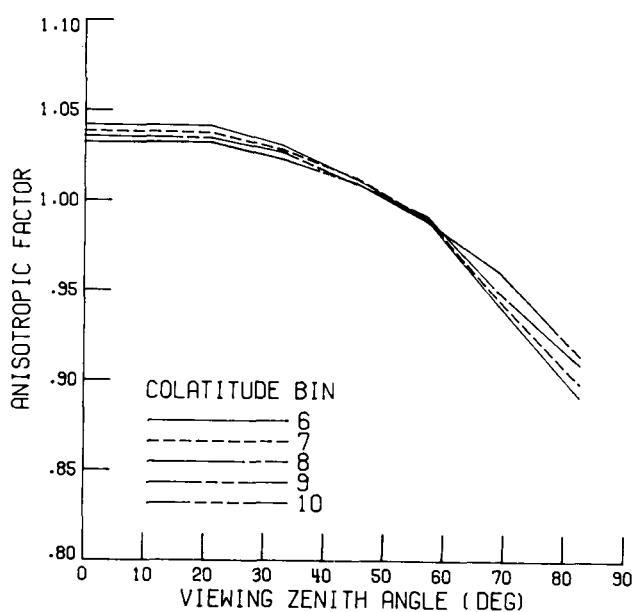
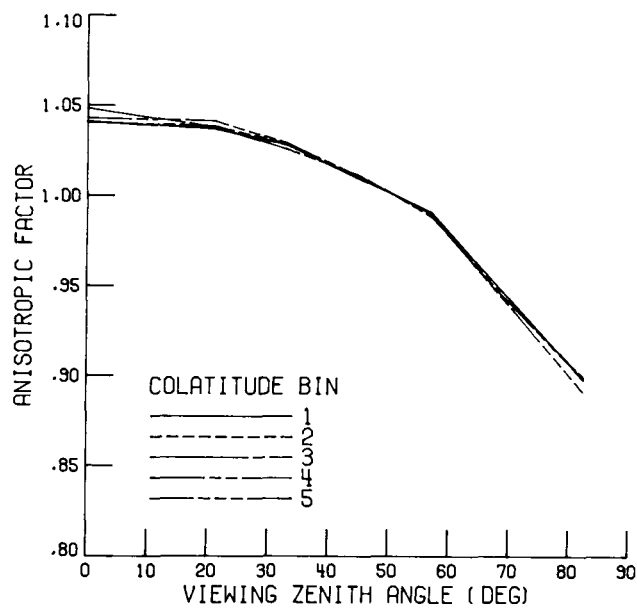


Figure 1. Viewing geometry between satellite and target area at top of atmosphere.

SCENE TYPE : CLEAR OCEAN
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER(DEC,JAN,FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.04(261) 4.1(261)	1.04(273) 4.1(273)	1.05(376) 4.0(376)	1.04(411) 3.6(411)	1.04(411) 2.5(411)	1.04(241) 2.4(241)	1.04(377) 2.8(377)	1.04(241) 4.3(241)	1.03(240) 2.6(240)	1.03(74) 2.6(74)
2	15-27	1.04(295) 4.3(295)	1.04(308) 4.3(308)	1.04(394) 4.3(394)	1.04(411) 3.6(411)	1.04(411) 2.7(411)	1.04(411) 2.6(411)	1.04(411) 3.3(411)	1.03(411) 4.4(411)	1.03(394) 2.7(394)	1.03(74) 2.7(74)
3	27-39	1.03(278) 3.8(278)	1.03(291) 3.8(291)	1.03(393) 4.3(393)	1.03(411) 3.6(411)	1.03(411) 2.6(411)	1.03(411) 2.6(411)	1.03(411) 3.1(411)	1.03(411) 4.2(411)	1.02(394) 2.9(394)	1.02(74) 2.9(74)
4	39-51	1.01(295) 4.4(295)	1.01(308) 4.4(308)	1.01(394) 4.2(394)	1.01(411) 3.6(411)	1.01(411) 2.6(411)	1.01(411) 2.4(411)	1.01(411) 2.9(411)	1.01(411) 4.2(411)	1.01(394) 2.6(394)	1.01(74) 2.6(74)
5	51-63	.99(295) 3.9(295)	.99(308) 3.9(308)	.99(376) 4.2(376)	.99(411) 3.6(411)	.99(411) 2.7(411)	.99(411) 2.7(411)	.99(411) 3.1(411)	.99(411) 4.0(411)	.99(394) 2.5(394)	.99(74) 2.5(74)
6	63-75	.95(295) 4.3(295)	.95(308) 4.3(308)	.94(394) 4.2(394)	.94(411) 3.8(411)	.94(411) 3.3(411)	.94(411) 3.3(411)	.94(411) 3.3(411)	.95(411) 4.1(411)	.96(394) 2.8(394)	.96(74) 2.8(74)
7	75-90	.90(278) 4.3(278)	.90(290) 4.3(290)	.90(359) 4.3(359)	.90(411) 3.4(411)	.89(411) 3.2(411)	.89(411) 3.3(411)	.90(394) 2.9(394)	.91(411) 3.7(411)	.91(359) 2.7(359)	.91(74) 2.7(74)



(a) Winter (Northern Hemisphere).

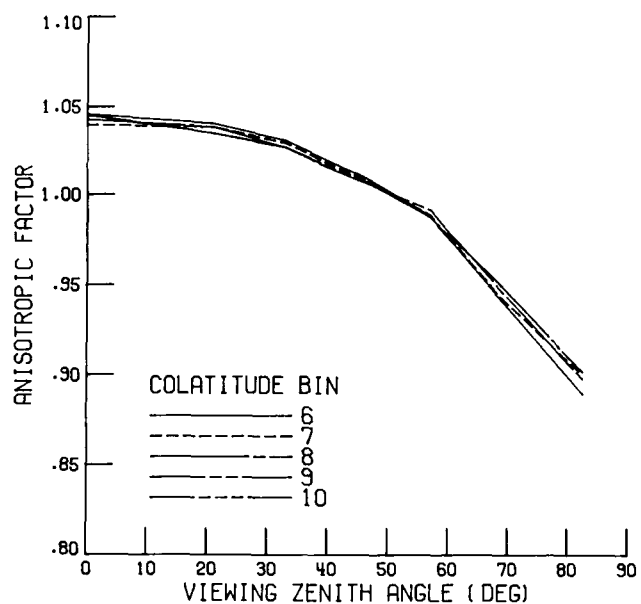
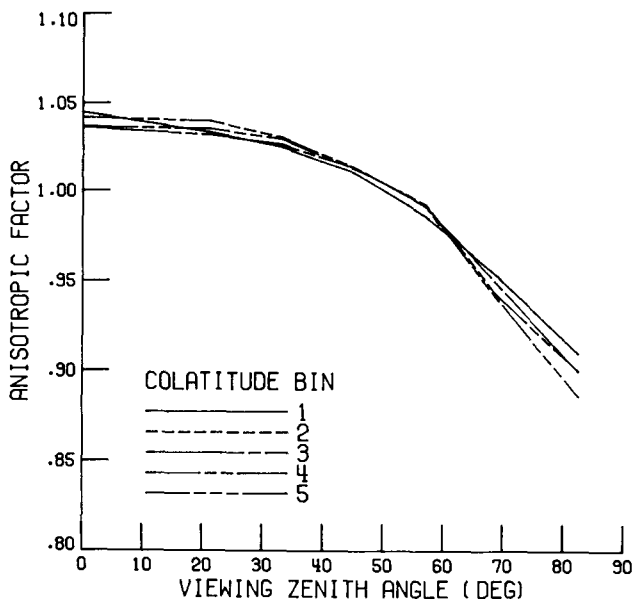
Figure 2. Day-night average limb-darkening model for clear over ocean. (See table 4 for explanation of data sources.)

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SCENE TYPE : CLEAR OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR, APR, MAY)

BIN NO.	NORTH POLE ANGLE (DEG)	COLATITUDE									
		1	2	3	4	5	6	7	8	9	10
1	0-15	1.04(278)	1.04(290)	1.04(240)	1.04(241)	1.04(241)	1.05(394)	1.04(241)	1.04(241)	1.05(308)	1.05(295)
		3.0(278)	3.0(290)	4.4(240)	4.5(241)	3.3(241)	2.4(394)	3.5(241)	4.3(241)	3.4(308)	3.4(295)
2	15-27	1.03(295)	1.03(308)	1.03(394)	1.04(394)	1.04(394)	1.04(411)	1.04(411)	1.04(394)	1.04(326)	1.04(312)
		2.8(295)	2.8(308)	4.5(394)	4.8(394)	3.3(394)	3.0(411)	4.0(411)	4.1(394)	3.5(326)	3.5(312)
3	27-39	1.03(295)	1.03(308)	1.03(394)	1.03(394)	1.03(394)	1.03(411)	1.03(394)	1.03(394)	1.03(308)	1.03(295)
		3.4(295)	3.4(308)	4.2(394)	4.7(394)	3.4(394)	2.6(411)	4.0(394)	4.3(394)	3.8(308)	3.8(295)
4	39-51	1.01(295)	1.01(308)	1.01(394)	1.01(411)	1.01(411)	1.01(411)	1.01(411)	1.01(394)	1.01(326)	1.01(312)
		2.9(295)	2.9(308)	4.3(394)	4.2(411)	3.4(411)	2.5(411)	4.0(411)	4.3(394)	3.6(326)	3.6(312)
5	51-63	.99(295)	.99(308)	.99(394)	.99(394)	.99(394)	.99(411)	.99(394)	.99(394)	.99(309)	.99(295)
		3.2(295)	3.2(308)	4.4(394)	4.3(394)	3.4(394)	2.7(411)	3.3(394)	4.0(394)	3.9(309)	3.9(295)
6	63-75	.95(295)	.95(308)	.95(394)	.94(411)	.94(411)	.94(411)	.94(411)	.95(394)	.95(326)	.95(312)
		3.1(295)	3.1(308)	4.1(394)	4.6(411)	4.0(411)	3.4(411)	3.8(411)	4.4(394)	3.6(326)	3.6(312)
7	75-90	.91(278)	.91(291)	.90(394)	.90(394)	.89(394)	.89(411)	.90(394)	.90(394)	.90(308)	.90(295)
		3.2(278)	3.2(291)	4.1(394)	4.6(394)	3.8(394)	3.4(411)	3.2(394)	3.9(394)	3.4(308)	3.4(295)



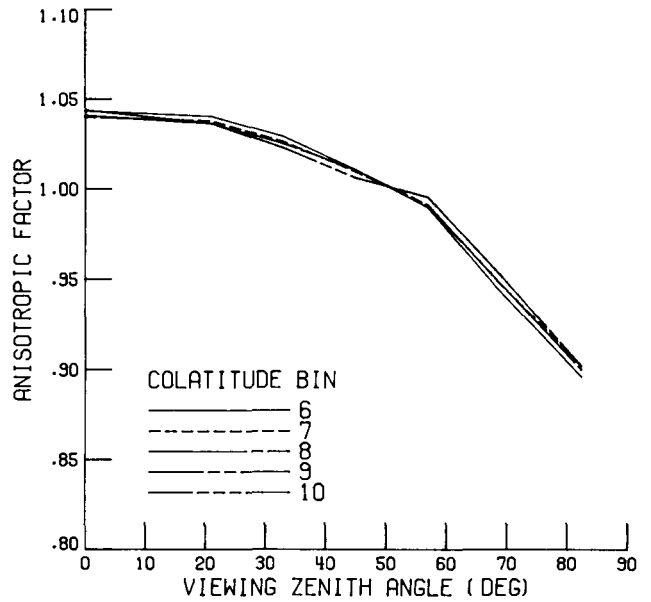
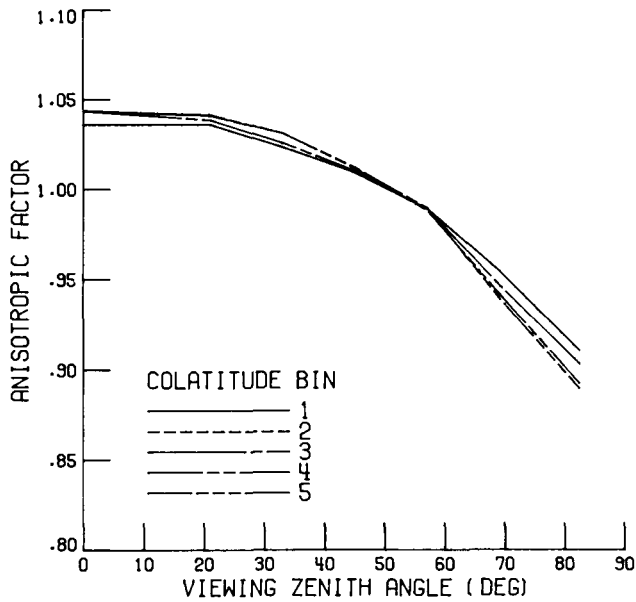
(b) Spring (Northern Hemisphere).

Figure 2. Continued.

SCENE TYPE : CLEAR OCEAN
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
 () - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(74) 3.5(74)	1.04(393) 3.5(393)	1.04(394) 4.5(394)	1.04(394) 3.3(394)	1.04(241) 2.4(241)	1.04(411) 2.7(411)	1.04(411) 3.8(411)	1.04(394) 4.3(394)	1.04(326) 4.3(326)	1.04(312) 4.3(312)
2	15-27	1.04(74) 3.3(74)	1.04(394) 3.3(394)	1.04(411) 4.6(411)	1.04(411) 3.5(411)	1.04(411) 2.5(411)	1.04(411) 2.8(411)	1.04(411) 3.8(411)	1.04(411) 4.3(411)	1.04(326) 4.3(326)	1.04(312) 4.3(312)
3	27-39	1.02(74) 3.3(74)	1.02(394) 3.3(394)	1.03(394) 4.6(394)	1.03(411) 3.6(411)	1.03(411) 2.6(411)	1.03(411) 2.8(411)	1.03(411) 3.8(411)	1.03(394) 4.1(394)	1.02(326) 4.4(326)	1.02(312) 4.4(312)
4	39-51	1.01(74) 3.3(74)	1.01(394) 3.3(394)	1.01(411) 4.4(411)	1.01(411) 3.1(411)	1.01(411) 2.6(411)	1.01(411) 2.8(411)	1.01(411) 3.7(411)	1.01(411) 4.1(411)	1.01(326) 4.3(326)	1.01(312) 4.3(312)
5	51-63	.99(74) 3.1(74)	.99(394) 3.1(394)	.99(394) 4.4(394)	.99(411) 3.1(411)	.99(411) 2.6(411)	.99(411) 2.8(411)	.99(411) 3.6(411)	.99(394) 4.1(394)	1.00(326) 3.9(326)	1.00(312) 3.9(312)
6	63-75	.96(74) 2.9(74)	.96(394) 2.9(394)	.95(411) 4.3(411)	.94(411) 3.4(411)	.94(411) 3.2(411)	.94(411) 3.2(411)	.95(411) 3.8(411)	.95(394) 4.0(394)	.95(326) 4.1(326)	.95(312) 4.1(312)
7	75-90	.91(74) 2.9(74)	.91(376) 2.9(376)	.90(394) 4.1(394)	.89(394) 3.3(394)	.89(411) 3.4(411)	.90(411) 2.9(411)	.90(411) 3.4(411)	.90(394) 4.0(394)	.90(309) 3.8(309)	.90(295) 3.8(295)



(c) Summer (Northern Hemisphere).

Figure 2. Continued.

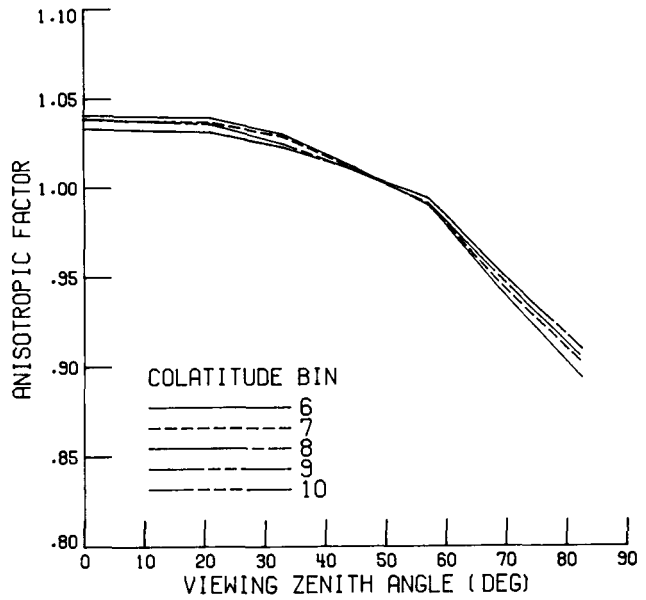
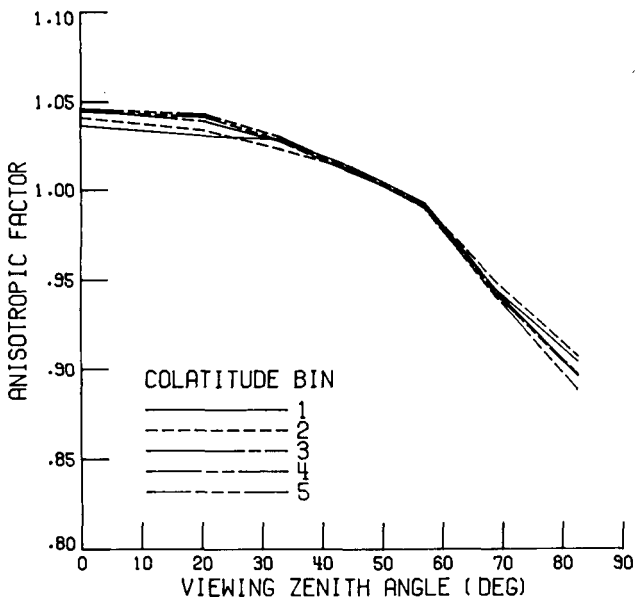
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SCENE TYPE : CLEAR OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT, OCT, NOV)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(291) 3.0(291)	1.04(308) 4.0(308)	1.05(394) 4.5(394)	1.04(411) 3.1(411)	1.05(411) 2.6(411)	1.04(394) 2.8(394)	1.04(241) 3.8(241)	1.04(411) 3.7(411)	1.03(241) 3.4(241)	1.03(74) 3.4(74)
2	15-27	1.03(308) 3.1(308)	1.03(308) 4.1(308)	1.04(411) 4.5(411)	1.04(411) 3.2(411)	1.04(411) 2.7(411)	1.04(411) 2.9(411)	1.04(411) 3.8(411)	1.04(411) 3.9(411)	1.03(394) 3.3(394)	1.03(74) 3.3(74)
3	27-39	1.03(291) 3.4(291)	1.02(308) 4.3(308)	1.03(394) 4.4(394)	1.03(411) 3.2(411)	1.03(411) 2.6(411)	1.03(411) 2.8(411)	1.03(411) 3.8(411)	1.03(411) 3.8(411)	1.02(394) 3.3(394)	1.02(74) 3.3(74)
4	39-51	1.01(308) 2.6(308)	1.01(308) 3.5(308)	1.01(411) 4.4(411)	1.01(411) 3.1(411)	1.01(411) 2.6(411)	1.01(411) 2.8(411)	1.01(411) 3.7(411)	1.01(411) 3.7(411)	1.01(394) 3.1(394)	1.01(74) 3.1(74)
5	51-63	.99(308) 3.1(308)	.99(308) 4.1(308)	.99(394) 4.2(394)	.99(411) 3.3(411)	.99(411) 2.8(411)	.99(411) 3.0(411)	.99(411) 3.8(411)	.99(411) 3.6(411)	.99(394) 3.2(394)	.99(74) 3.2(74)
6	63-75	.94(308) 3.0(308)	.95(309) 4.2(309)	.94(411) 4.3(411)	.94(411) 3.6(411)	.94(411) 3.4(411)	.94(411) 3.4(411)	.95(411) 3.8(411)	.95(411) 3.8(411)	.95(394) 3.2(394)	.95(74) 3.2(74)
7	75-90	.90(291) 3.4(291)	.91(308) 3.6(308)	.90(394) 4.1(394)	.90(411) 3.4(411)	.89(411) 3.2(411)	.89(411) 3.3(411)	.90(411) 3.6(411)	.90(411) 3.7(411)	.91(377) 3.0(377)	.91(74) 3.0(74)



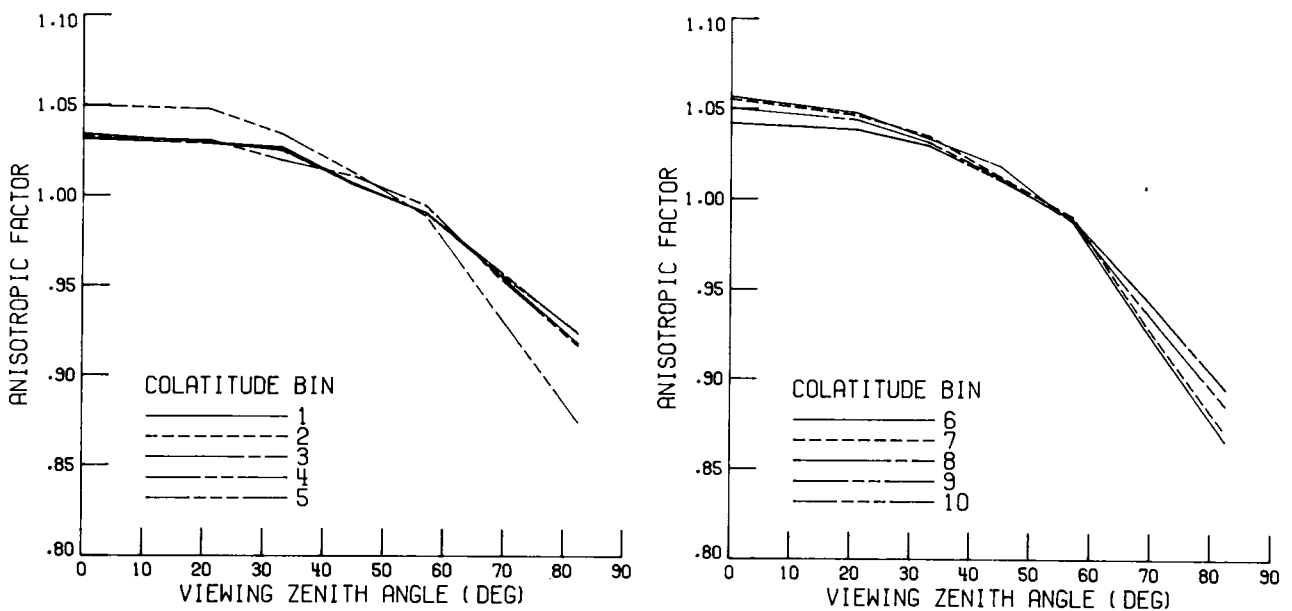
(d) Fall (Northern Hemisphere).

Figure 2. Concluded.

SCENE TYPE : CLEAR LAND
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER(DEC,JAN,FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.03(75) 4.8(75)	1.03(75) 5.5(75)	1.03(364) 5.3(364)	1.03(413) 6.7(413)	1.05(411) 4.8(411)	1.06(363) 6.0(363)	1.06(393) 6.4(393)	1.05(40) 6.4(40)	1.04(40) 4.1(40)	1.04(40) 4.1(40)
2	15-27	1.03(75) 4.8(75)	1.03(75) 5.5(75)	1.03(381) 5.1(381)	1.03(413) 6.7(413)	1.05(411) 4.7(411)	1.05(380) 6.2(380)	1.05(411) 6.2(411)	1.04(40) 6.4(40)	1.04(40) 4.4(40)	1.04(40) 4.4(40)
3	27-39	1.03(75) 4.4(75)	1.02(75) 5.4(75)	1.03(364) 5.0(364)	1.02(413) 6.7(413)	1.03(411) 4.7(411)	1.03(380) 5.6(380)	1.04(411) 5.9(411)	1.03(40) 6.0(40)	1.03(40) 4.1(40)	1.03(40) 4.1(40)
4	39-51	1.01(75) 4.6(75)	1.01(75) 5.4(75)	1.01(381) 5.0(381)	1.01(413) 6.2(413)	1.01(411) 4.7(411)	1.02(380) 5.5(380)	1.01(411) 6.0(411)	1.01(40) 5.9(40)	1.01(40) 3.9(40)	1.01(40) 3.9(40)
5	51-63	.99(75) 4.3(75)	.99(75) 5.0(75)	.99(364) 4.8(364)	.99(413) 6.0(413)	.99(411) 4.6(411)	.99(380) 5.3(380)	.99(411) 5.8(411)	.99(40) 5.8(40)	.99(40) 4.1(40)	.99(40) 4.1(40)
6	63-75	.96(75) 4.3(75)	.96(75) 5.0(75)	.96(381) 4.8(381)	.96(413) 5.6(413)	.93(411) 4.8(411)	.93(380) 5.8(380)	.93(411) 5.9(411)	.94(40) 5.7(40)	.95(40) 4.2(40)	.95(40) 4.2(40)
7	75-90	.92(75) 4.0(75)	.92(75) 4.7(75)	.92(364) 4.4(364)	.92(413) 4.8(413)	.87(411) 4.8(411)	.87(363) 5.3(363)	.87(394) 5.4(394)	.89(40) 5.3(40)	.90(40) 3.8(40)	.90(40) 3.8(40)



(a) Winter (Northern Hemisphere).

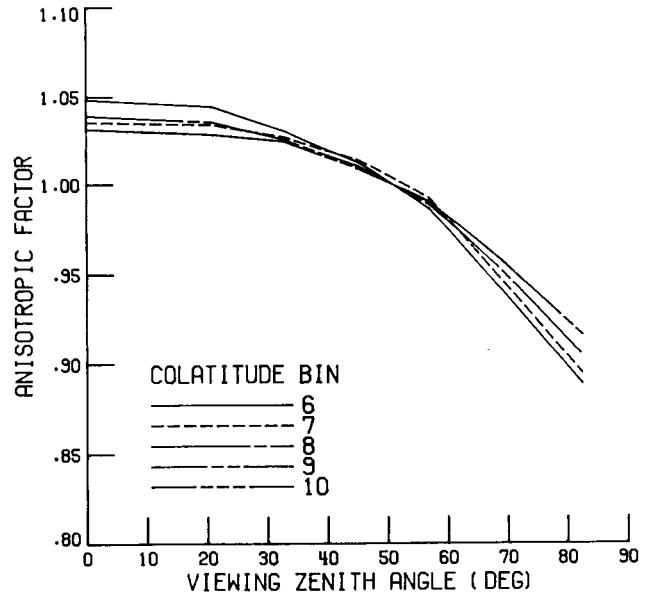
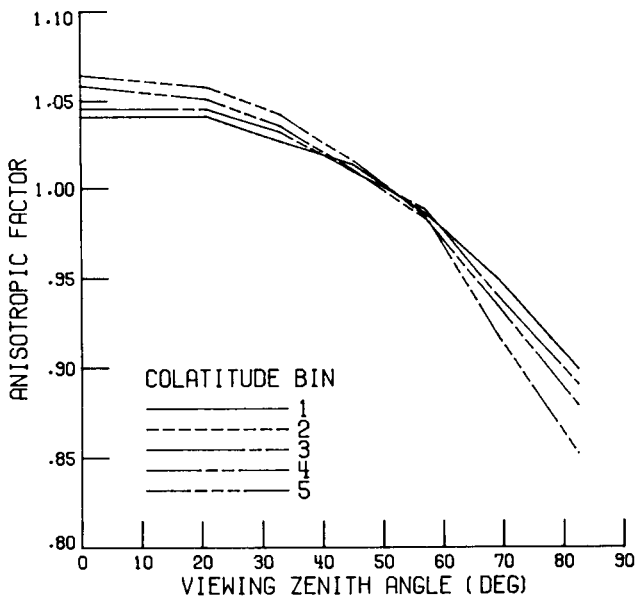
Figure 3. Day-night average limb-darkening model for clear over land. (See table 4 for explanation of data sources.)

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SCENE TYPE : CLEAR LAND
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(74) 4.8(74)	1.04(372) 4.8(372)	1.05(389) 5.6(389)	1.06(393) 7.9(393)	1.06(393) 5.8(393)	1.05(240) 3.7(240)	1.04(389) 5.1(389)	1.04(38) 6.9(38)	1.03(38) 4.1(38)	1.03(38) 4.1(38)
2	15-27	1.04(74) 5.0(74)	1.04(393) 5.0(393)	1.05(411) 5.5(411)	1.05(411) 7.6(411)	1.06(411) 6.1(411)	1.04(410) 3.9(410)	1.03(411) 5.2(411)	1.04(38) 6.8(38)	1.03(38) 4.2(38)	1.03(38) 4.2(38)
3	27-39	1.03(74) 5.3(74)	1.03(218) 5.3(218)	1.03(394) 5.1(394)	1.04(394) 7.6(394)	1.04(393) 6.2(393)	1.03(393) 3.8(393)	1.03(393) 5.1(393)	1.03(38) 6.6(38)	1.03(38) 3.8(38)	1.03(38) 3.8(38)
4	39-51	1.01(74) 4.5(74)	1.01(393) 4.5(393)	1.01(411) 5.3(411)	1.01(411) 7.3(411)	1.02(411) 6.3(411)	1.01(393) 4.7(393)	1.01(411) 5.1(411)	1.01(38) 6.5(38)	1.01(38) 3.6(38)	1.01(38) 3.6(38)
5	51-63	.99(74) 4.4(74)	.99(376) 4.4(376)	.99(394) 5.4(394)	.98(394) 6.7(394)	.98(393) 5.8(393)	.99(393) 3.9(393)	.99(393) 5.9(393)	.99(38) 6.0(38)	.99(38) 3.9(38)	.99(38) 3.9(38)
6	63-75	.95(74) 4.9(74)	.95(393) 4.9(393)	.94(411) 4.8(411)	.93(411) 6.3(411)	.92(411) 6.8(411)	.94(394) 4.3(394)	.95(411) 4.9(411)	.95(38) 5.8(38)	.96(38) 3.9(38)	.96(38) 3.9(38)
7	75-90	.90(74) 4.3(74)	.90(376) 4.3(376)	.89(394) 5.0(394)	.88(393) 5.2(393)	.85(393) 6.5(393)	.89(393) 7.7(393)	.89(393) 4.9(393)	.90(38) 5.3(38)	.92(38) 3.4(38)	.92(38) 3.4(38)



(b) Spring (Northern Hemisphere).

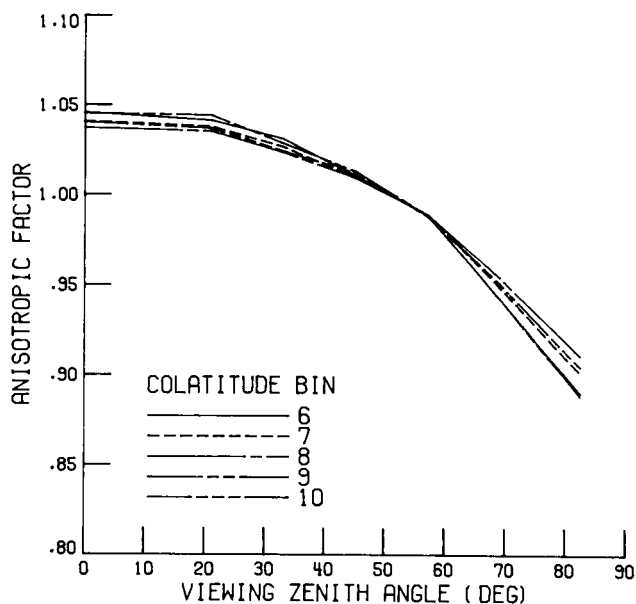
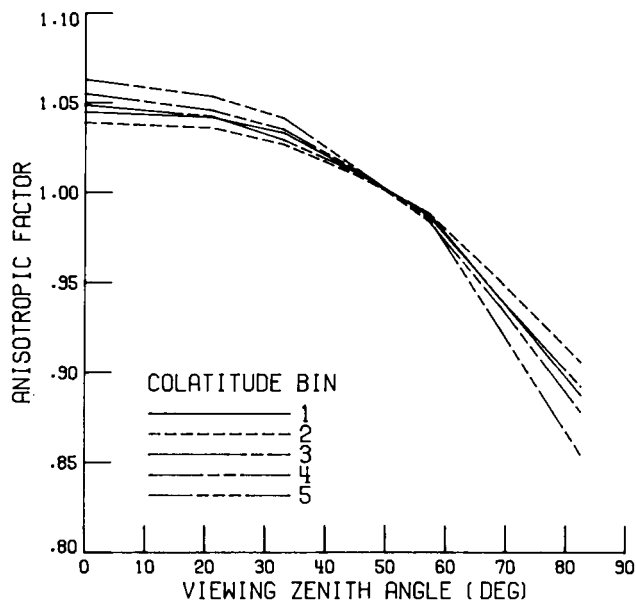
Figure 3. Continued.

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SCENE TYPE : CLEAR LAND
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

BIN NO.	NORTH POLE ANGLE (DEG)	COLATITUDE									
		1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN ANGLE NO. (DEG)											
1	0-15	1.04(412) 4.0(412)	1.04(411) 3.8(411)	1.05(411) 6.7(411)	1.06(393) 7.1(393)	1.06(393) 5.0(393)	1.05(411) 3.8(411)	1.04(411) 5.7(411)	1.04(413) 5.6(413)	1.05(63) 4.6(63)	1.04(58) 4.6(58)
2	15-27	1.04(412) 4.4(412)	1.04(411) 4.1(411)	1.04(411) 6.6(411)	1.05(411) 7.2(411)	1.05(411) 4.9(411)	1.04(411) 3.9(411)	1.04(411) 5.5(411)	1.04(413) 5.5(413)	1.04(63) 4.7(63)	1.04(58) 4.9(58)
3	27-39	1.03(412) 4.3(412)	1.03(411) 4.1(411)	1.03(411) 6.3(411)	1.04(394) 7.2(394)	1.04(393) 5.0(393)	1.03(411) 3.7(411)	1.03(411) 5.5(411)	1.02(413) 5.7(413)	1.03(63) 5.2(63)	1.02(58) 5.2(58)
4	39-51	1.01(412) 4.1(412)	1.01(411) 3.9(411)	1.01(411) 6.2(411)	1.01(411) 6.8(411)	1.01(411) 4.7(411)	1.01(411) 3.6(411)	1.01(411) 5.1(411)	1.01(413) 5.1(413)	1.01(63) 4.4(63)	1.01(58) 4.4(58)
5	51-63	.99(412) 4.3(412)	.99(411) 3.8(411)	.99(411) 6.0(411)	.98(394) 6.5(394)	.99(393) 4.4(393)	.99(411) 3.6(411)	.99(411) 5.0(411)	.99(413) 4.9(413)	.99(63) 3.9(63)	.99(58) 4.0(58)
6	63-75	.94(412) 4.3(412)	.95(411) 3.9(411)	.94(411) 5.9(411)	.94(394) 6.4(394)	.92(411) 4.8(411)	.94(411) 3.9(411)	.95(411) 4.8(411)	.95(413) 5.0(413)	.94(63) 4.7(63)	.95(58) 4.5(58)
7	75-90	.89(412) 3.8(412)	.91(411) 3.6(411)	.89(411) 5.5(411)	.88(393) 5.9(393)	.85(393) 4.6(393)	.89(411) 3.9(411)	.90(411) 4.3(411)	.91(413) 4.6(413)	.89(63) 4.3(63)	.90(58) 4.2(58)



(c) Summer (Northern Hemisphere).

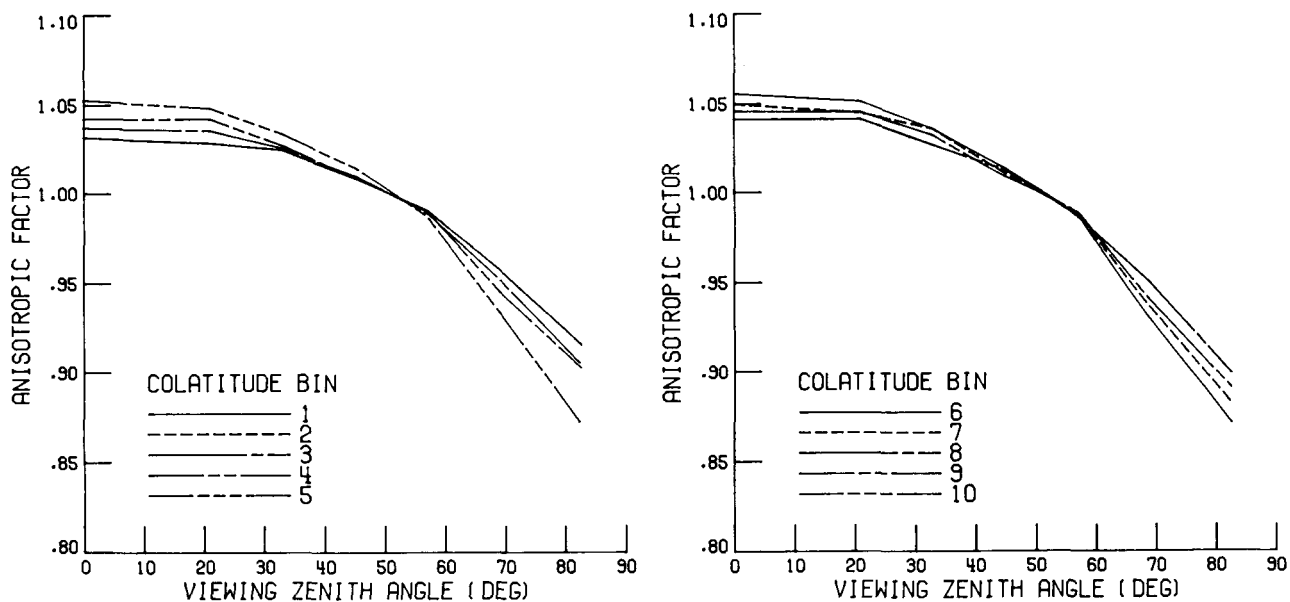
Figure 3. Continued.

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SCENE TYPE : CLEAR LAND
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT, OCT, NOV)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.03(74) 4.1(74)	1.03(394) 4.1(394)	1.04(413) 6.5(413)	1.04(236) 6.8(236)	1.05(411) 5.4(411)	1.06(394) 5.5(394)	1.05(411) 6.7(411)	1.05(38) 5.6(38)	1.04(38) 4.8(38)	1.04(38) 4.8(38)
2	15-27	1.03(74) 4.2(74)	1.03(411) 4.2(411)	1.04(413) 6.8(413)	1.04(411) 6.8(411)	1.05(411) 5.4(411)	1.05(411) 5.9(411)	1.04(411) 6.6(411)	1.05(38) 5.5(38)	1.04(38) 5.0(38)	1.04(38) 5.0(38)
3	27-39	1.03(74) 3.8(74)	1.03(394) 3.8(394)	1.03(413) 6.6(413)	1.03(411) 6.5(411)	1.03(411) 5.3(411)	1.04(411) 5.6(411)	1.04(411) 6.6(411)	1.03(38) 5.1(38)	1.03(38) 5.3(38)	1.03(38) 5.3(38)
4	39-51	1.01(74) 3.6(74)	1.01(411) 3.6(411)	1.01(413) 6.5(413)	1.01(411) 6.3(411)	1.02(411) 5.2(411)	1.01(411) 5.4(411)	1.01(411) 6.4(411)	1.01(38) 5.3(38)	1.01(38) 4.5(38)	1.01(38) 4.5(38)
5	51-63	.99(74) 3.9(74)	.99(394) 3.9(394)	.99(413) 6.0(413)	.99(411) 6.0(411)	.99(411) 5.1(411)	.99(411) 5.2(411)	.99(411) 6.0(411)	.99(38) 5.4(38)	.99(38) 4.4(38)	.99(38) 4.4(38)
6	63-75	.96(74) 3.9(74)	.96(411) 3.9(411)	.95(413) 5.8(413)	.95(411) 5.6(411)	.93(411) 5.5(411)	.93(411) 5.5(411)	.94(411) 5.7(411)	.94(38) 4.8(38)	.95(38) 4.9(38)	.95(38) 4.9(38)
7	75-90	.92(74) 3.4(74)	.92(394) 3.4(394)	.90(413) 5.3(413)	.90(411) 5.0(411)	.87(411) 5.7(411)	.87(394) 5.0(394)	.88(411) 5.3(411)	.89(38) 5.0(38)	.90(38) 4.3(38)	.90(38) 4.3(38)



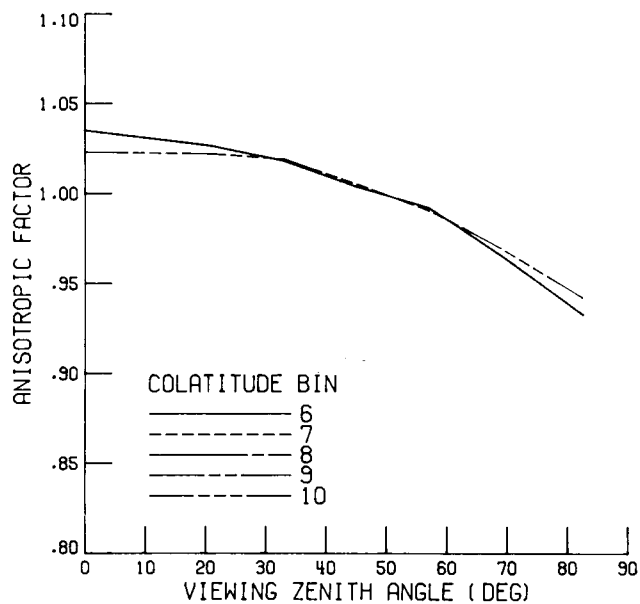
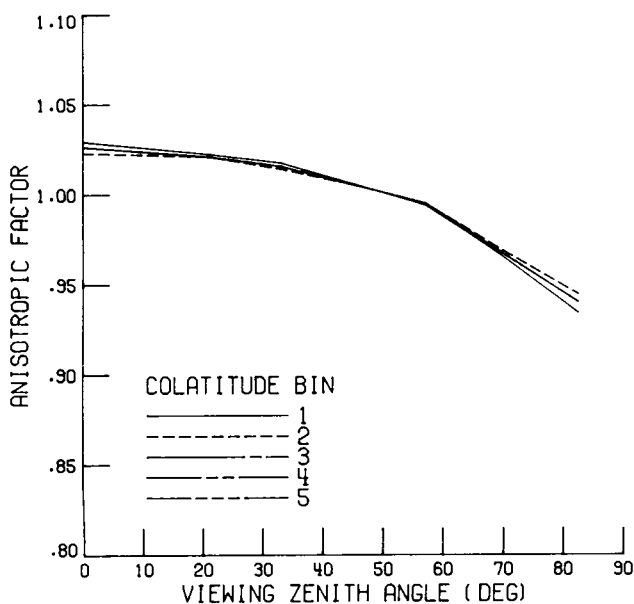
(d) Fall (Northern Hemisphere).

Figure 3. Concluded.

SCENE TYPE : CLEAR SNOW
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

VIEWING ZENITH BIN NO. (DEG)	BIN ANGLE NO. (DEG)	COLATITUDE									
		NORTH POLE 1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
1	0-15	1.03(413) 4.5(413)	1.02(411) 6.1(411)	1.03(411) 5.8(411)	1.03(74) 5.8(74)	1.03(74) 5.8(74)	1.04(72) 4.7(72)	1.04(72) 4.7(72)	1.04(72) 4.7(72)	1.04(395) 4.7(395)	1.02(412) 4.6(412)
2	15-27	1.02(413) 4.6(413)	1.02(411) 6.1(411)	1.02(411) 5.7(411)	1.02(74) 5.7(74)	1.02(74) 5.7(74)	1.03(72) 4.8(72)	1.03(72) 4.8(72)	1.03(72) 4.8(72)	1.03(395) 4.8(395)	1.02(412) 4.6(412)
3	27-39	1.02(413) 4.4(413)	1.01(411) 6.1(411)	1.02(411) 5.6(411)	1.02(74) 5.6(74)	1.02(74) 5.6(74)	1.02(72) 4.7(72)	1.02(72) 4.7(72)	1.02(72) 4.7(72)	1.02(395) 4.7(395)	1.02(412) 4.4(412)
4	39-51	1.01(413) 4.3(413)	1.01(411) 5.9(411)	1.01(411) 5.4(411)	1.01(74) 5.4(74)	1.01(74) 5.4(74)	1.00(72) 5.8(72)	1.00(72) 5.8(72)	1.00(72) 5.8(72)	1.00(395) 5.8(395)	1.01(412) 4.2(412)
5	51-63	.99(413) 4.0(413)	1.00(411) 5.6(411)	1.00(411) 5.2(411)	1.00(74) 5.2(74)	1.00(74) 5.2(74)	.99(72) 4.6(72)	.99(72) 4.6(72)	.99(72) 4.6(72)	.99(395) 4.6(395)	.99(412) 4.0(412)
6	63-75	.97(413) 3.8(413)	.97(411) 5.3(411)	.97(411) 4.9(411)	.97(74) 4.9(74)	.97(74) 4.9(74)	.97(72) 4.2(72)	.97(72) 4.2(72)	.97(72) 4.2(72)	.97(395) 4.2(395)	.97(412) 3.8(412)
7	75-90	.93(413) 3.6(413)	.94(411) 4.9(411)	.94(411) 4.5(411)	.94(74) 4.5(74)	.94(74) 4.5(74)	.93(72) 3.8(72)	.93(72) 3.8(72)	.93(72) 3.8(72)	.93(395) 3.8(395)	.94(412) 3.4(412)



(a) Winter (Northern Hemisphere).

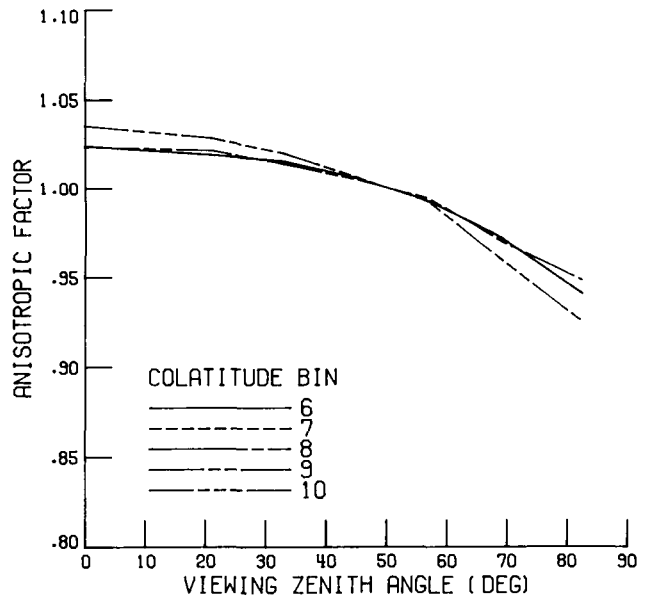
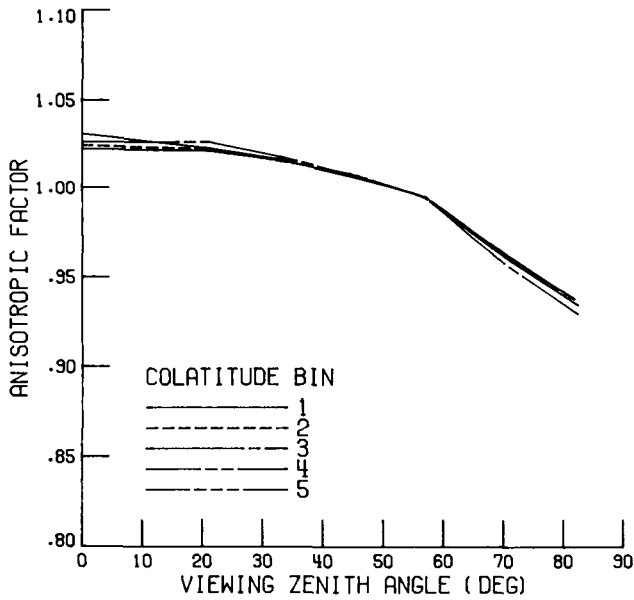
Figure 4. Day-night average limb-darkening model for clear over snow. (See table 4 for explanation of data sources.)

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SCENE TYPE : CLEAR SNOW
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.03(379) 4.6(379)	1.02(412) 5.3(412)	1.03(83) 3.9(83)	1.02(412) 5.0(412)	1.02(412) 5.0(412)	1.02(39) 5.7(39)	1.02(39) 5.7(39)	1.02(39) 5.7(39)	1.02(39) 6.1(39)	1.04(412) 4.6(412)
2	15-27	1.02(396) 4.9(396)	1.02(412) 5.5(412)	1.03(73) 4.2(73)	1.02(412) 5.1(412)	1.02(412) 5.1(412)	1.02(39) 5.4(39)	1.02(39) 5.4(39)	1.02(39) 5.4(39)	1.02(39) 6.2(39)	1.03(412) 4.3(412)
3	27-39	1.02(379) 4.7(379)	1.02(412) 5.4(412)	1.02(73) 4.1(73)	1.02(412) 5.0(412)	1.02(412) 5.0(412)	1.02(39) 5.9(39)	1.02(39) 5.9(39)	1.02(39) 5.9(39)	1.01(39) 6.2(39)	1.02(412) 4.0(412)
4	39-51	1.01(396) 4.6(396)	1.01(412) 5.2(412)	1.01(73) 3.8(73)	1.01(412) 4.8(412)	1.01(412) 4.8(412)	1.01(39) 5.4(39)	1.01(39) 5.4(39)	1.01(39) 5.4(39)	1.01(39) 6.0(39)	1.01(412) 4.2(412)
5	51-63	.99(396) 4.5(396)	.99(412) 5.1(412)	.99(73) 3.9(73)	.99(412) 4.8(412)	.99(412) 4.8(412)	.99(39) 5.3(39)	.99(39) 5.3(39)	.99(39) 5.3(39)	.99(39) 5.7(39)	.99(412) 4.1(412)
6	63-75	.96(396) 4.1(396)	.96(412) 4.8(412)	.96(73) 4.0(73)	.97(412) 4.6(412)	.97(412) 4.6(412)	.97(39) 5.2(39)	.97(39) 5.2(39)	.97(39) 5.2(39)	.97(39) 5.4(39)	.96(412) 3.9(412)
7	75-90	.93(379) 3.9(379)	.94(412) 4.5(412)	.93(73) 3.1(73)	.94(412) 4.3(412)	.94(412) 4.3(412)	.94(39) 5.1(39)	.94(39) 5.1(39)	.94(39) 5.1(39)	.95(39) 5.1(39)	.93(412) 3.8(412)



(b) Spring (Northern Hemisphere).

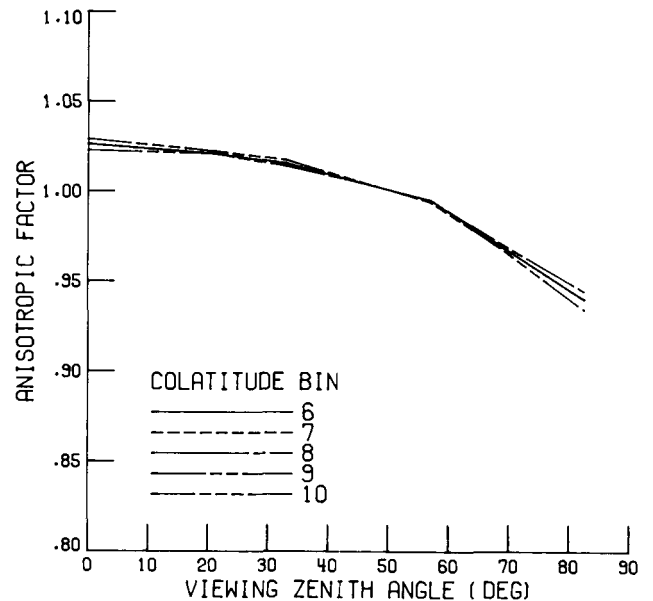
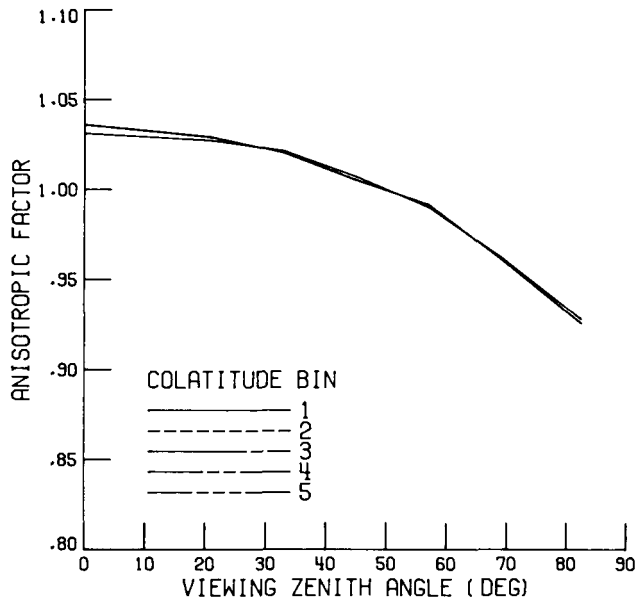
Figure 4. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : CLEAR SNOW
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-13	13-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN	ANGLE										
	NO. (DEG)										
1	0-15	1.03(406) 2.6(406)	1.04(86) 3.1(86)	1.04(74) 3.1(74)	1.04(74) 3.1(74)	1.04(74) 3.1(74)	1.03(38) 5.8(38)	1.03(38) 5.8(38)	1.03(38) 5.8(38)	1.02(38) 6.1(38)	1.03(413) 4.5(413)
2	15-27	1.03(410) 2.8(410)	1.03(87) 3.3(87)	1.03(74) 3.3(74)	1.03(74) 3.3(74)	1.03(74) 3.3(74)	1.02(38) 5.7(38)	1.02(38) 5.7(38)	1.02(38) 5.7(38)	1.02(38) 6.1(38)	1.02(413) 4.6(413)
3	27-39	1.02(409) 2.9(409)	1.02(87) 3.1(87)	1.02(74) 3.1(74)	1.02(74) 3.1(74)	1.02(74) 3.1(74)	1.02(38) 5.6(38)	1.02(38) 5.6(38)	1.02(38) 5.6(38)	1.01(38) 6.1(38)	1.02(413) 4.4(413)
4	39-51	1.01(410) 2.6(410)	1.01(87) 4.0(87)	1.01(74) 4.6(74)	1.01(74) 4.6(74)	1.01(74) 4.6(74)	1.01(38) 5.4(38)	1.01(38) 5.4(38)	1.01(38) 5.4(38)	1.01(38) 5.9(38)	1.01(413) 4.3(413)
5	51-63	.99(410) 2.7(410)	.99(87) 3.1(87)	.99(74) 3.1(74)	.99(74) 3.1(74)	.99(74) 3.1(74)	1.00(38) 5.2(38)	1.00(38) 5.2(38)	1.00(38) 5.2(38)	1.00(38) 5.6(38)	.99(413) 4.0(413)
6	63-75	.96(410) 2.6(410)	.96(87) 2.9(87)	.96(74) 2.9(74)	.96(74) 2.9(74)	.96(74) 2.9(74)	.97(38) 4.9(38)	.97(38) 4.9(38)	.97(38) 4.9(38)	.97(38) 5.3(38)	.97(413) 3.8(413)
7	75-90	.93(410) 2.5(410)	.93(86) 2.8(86)	.93(74) 2.8(74)	.93(74) 2.8(74)	.93(74) 2.8(74)	.94(38) 4.5(38)	.94(38) 4.5(38)	.94(38) 4.5(38)	.94(38) 4.9(38)	.93(413) 3.6(413)



(c) Summer (Northern Hemisphere).

Figure 4. Continued.

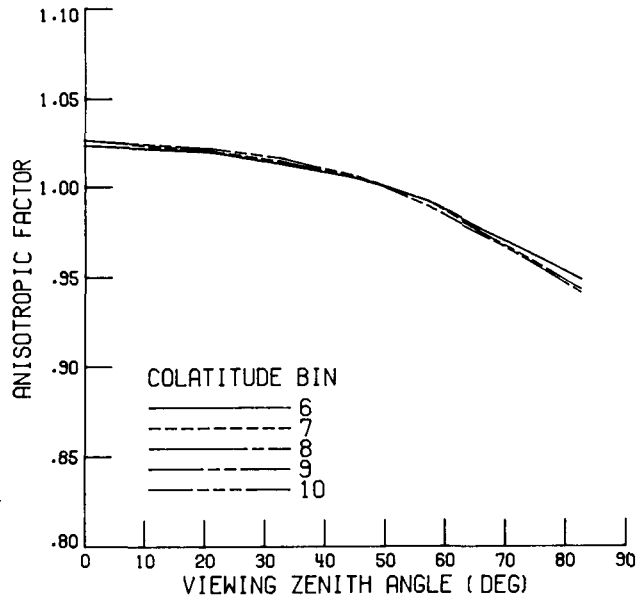
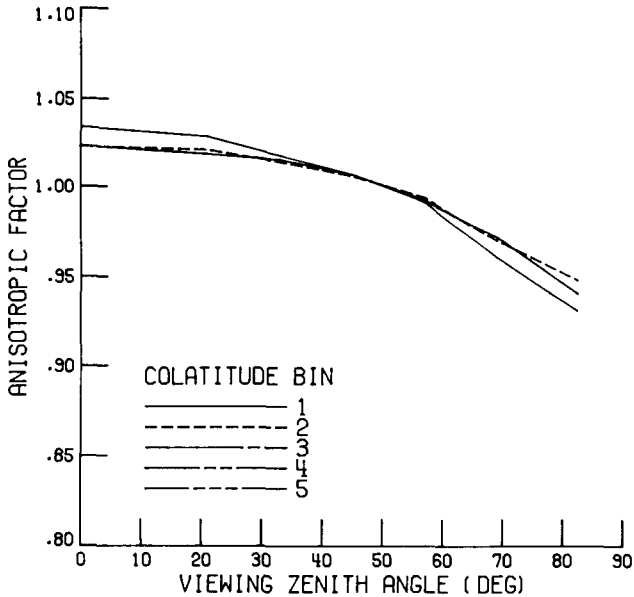
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SCENE TYPE : CLEAR SNOW
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL(SEPT,OCT,NOV)

COLATITUDE

		NORTH POLE									
		1	2	3	4	5	6	7	8	9	10
BIN NO.	ANGLE(DEG)	0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.03(412) 5.4(412)	1.02(226) 6.1(226)	1.02(379) 5.7(379)	1.02(73) 5.7(73)	1.02(73) 5.7(73)	1.02(73) 8.0(73)	1.02(73) 8.0(73)	1.02(73) 8.0(73)	1.03(88) 8.6(88)	1.03(396) 7.7(396)
2	15-27	1.03(412) 5.2(412)	1.02(396) 6.2(396)	1.02(396) 5.4(396)	1.02(73) 5.4(73)	1.02(73) 5.4(73)	1.02(73) 8.0(73)	1.02(73) 8.0(73)	1.02(73) 8.0(73)	1.02(88) 8.7(88)	1.02(396) 7.7(396)
3	27-39	1.02(412) 5.0(412)	1.01(396) 6.2(396)	1.02(379) 5.9(379)	1.02(73) 5.9(73)	1.02(73) 5.9(73)	1.01(73) 7.8(73)	1.01(73) 7.8(73)	1.01(73) 7.8(73)	1.02(88) 8.6(88)	1.02(396) 7.5(396)
4	39-51	1.01(412) 5.1(412)	1.01(396) 6.0(396)	1.01(396) 5.4(396)	1.01(73) 5.4(73)	1.01(73) 5.4(73)	1.01(73) 7.6(73)	1.01(73) 7.6(73)	1.01(73) 7.6(73)	1.01(88) 8.4(88)	1.01(396) 7.3(396)
5	51-63	.99(412) 4.9(412)	.99(396) 5.7(396)	.99(379) 5.3(379)	.99(73) 5.3(73)	.99(73) 5.3(73)	.99(73) 7.2(73)	.99(73) 7.2(73)	.99(73) 7.2(73)	.99(88) 8.0(88)	.99(396) 6.9(396)
6	63-75	.96(412) 4.7(412)	.97(396) 5.4(396)	.97(396) 5.2(396)	.97(73) 5.2(73)	.97(73) 5.2(73)	.97(73) 6.9(73)	.97(73) 6.9(73)	.97(73) 6.9(73)	.97(88) 7.6(88)	.97(396) 6.6(396)
7	75-90	.93(412) 4.5(412)	.95(396) 5.1(396)	.94(379) 5.1(379)	.94(73) 5.1(73)	.94(73) 5.1(73)	.95(73) 6.4(73)	.95(73) 6.4(73)	.95(73) 6.4(73)	.94(88) 7.3(88)	.94(396) 6.1(396)



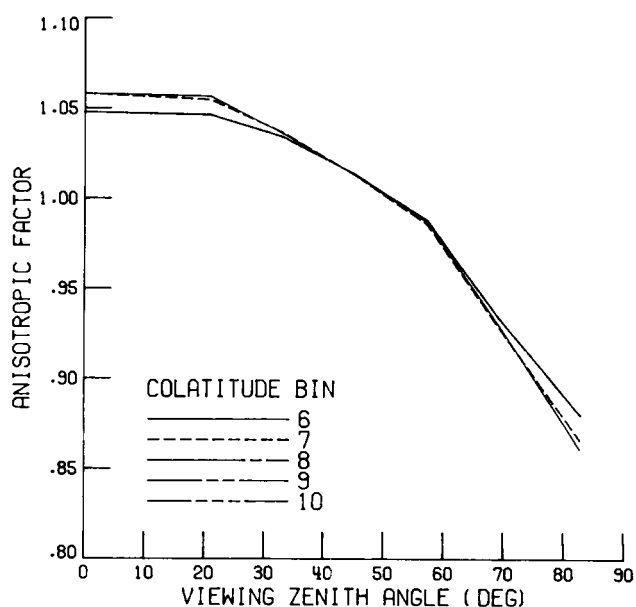
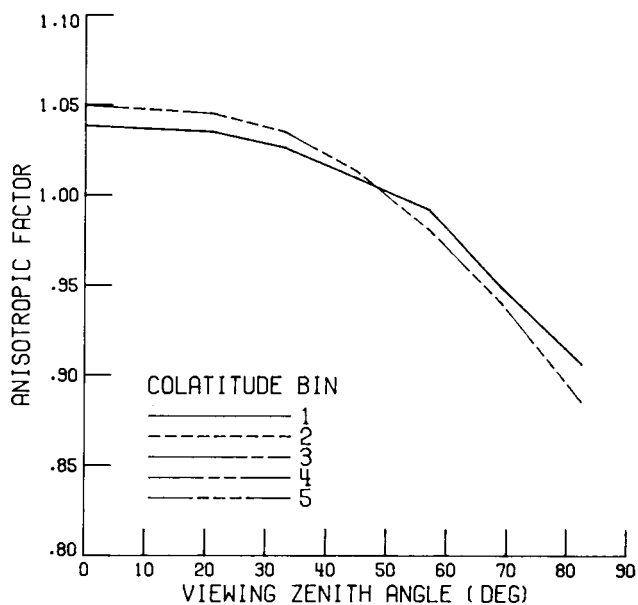
(d) Fall (Northern Hemisphere).

Figure 4. Concluded.

SCENE TYPE : CLEAR DESERT
 DATA / 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER(DEC,JAN,FEB)

BIN NO. ANGLE(DEG)	COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
VIEWING ZENITH BIN ANGLE NO. (DEG)										
1 0-15	1.04(74) 4.9(74)	1.04(74) 4.9(74)	1.04(74) 4.9(74)	1.04(411) 4.9(411)	1.05(393) 4.8(393)	1.06(40) 5.5(40)	1.06(393) 6.3(393)	1.05(40) 6.6(40)	1.05(40) 6.6(40)	1.05(40) 6.6(40)
2 15-27	1.04(74) 5.0(74)	1.04(74) 5.0(74)	1.04(74) 5.0(74)	1.04(411) 5.0(411)	1.05(393) 4.9(393)	1.06(40) 5.4(40)	1.05(411) 6.3(411)	1.05(40) 6.6(40)	1.05(40) 6.6(40)	1.05(40) 6.6(40)
3 27-39	1.03(74) 5.0(74)	1.03(74) 5.0(74)	1.03(74) 5.0(74)	1.03(411) 5.0(411)	1.04(393) 4.9(393)	1.04(40) 5.0(40)	1.04(410) 6.1(410)	1.03(40) 6.1(40)	1.03(40) 6.1(40)	1.03(40) 6.1(40)
4 39-51	1.01(74) 4.8(74)	1.01(74) 4.8(74)	1.01(74) 4.8(74)	1.01(411) 4.8(411)	1.01(393) 4.9(393)	1.01(40) 4.5(40)	1.01(411) 5.6(411)	1.01(40) 6.1(40)	1.01(40) 6.1(40)	1.01(40) 6.1(40)
5 51-63	.99(74) 4.6(74)	.99(74) 4.6(74)	.99(74) 4.6(74)	.99(411) 4.6(411)	.98(393) 4.9(393)	.99(40) 4.3(40)	.99(411) 5.5(411)	.99(40) 6.1(40)	.99(40) 6.1(40)	.99(40) 6.1(40)
6 63-75	.95(74) 4.6(74)	.95(74) 4.6(74)	.95(74) 4.6(74)	.95(411) 4.6(411)	.94(394) 4.7(394)	.93(40) 5.4(40)	.93(411) 6.1(411)	.93(40) 6.1(40)	.93(40) 6.1(40)	.93(40) 6.1(40)
7 75-90	.91(74) 4.5(74)	.91(74) 4.5(74)	.91(74) 4.5(74)	.91(411) 4.5(411)	.89(393) 4.5(393)	.86(40) 5.6(40)	.87(393) 5.2(393)	.88(40) 5.2(40)	.88(40) 5.2(40)	.88(40) 5.2(40)



(a) Winter (Northern Hemisphere).

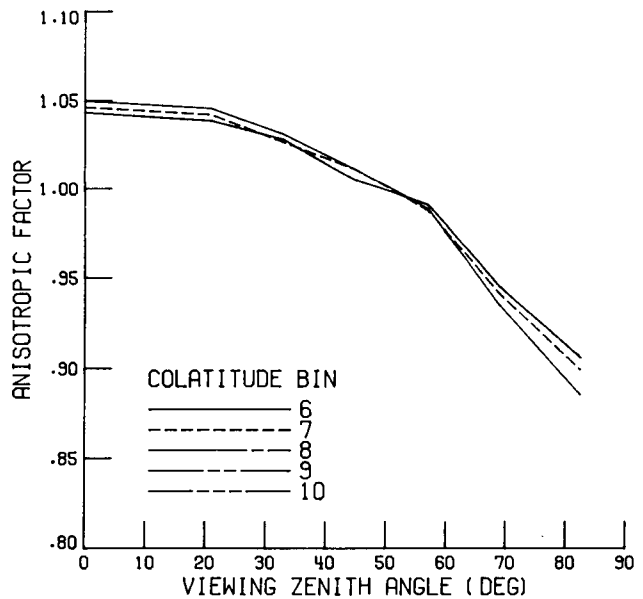
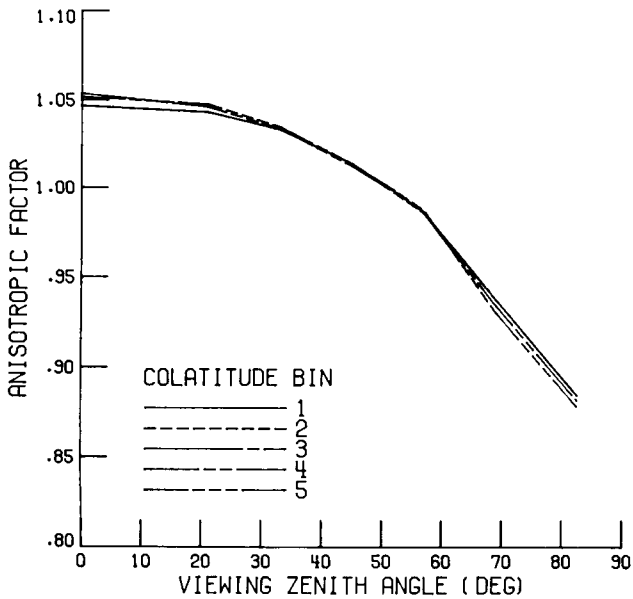
Figure 5. Day-night average limb-darkening model for clear over desert. (See table 4 for explanation of data sources.)

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SCENE TYPE : CLEAR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR, APR, MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(74) 6.1(74)	1.05(74) 6.1(74)	1.05(227) 6.1(227)	1.05(411) 5.7(411)	1.05(87) 4.8(87)	1.05(38) 4.0(38)	1.05(378) 5.5(378)	1.04(38) 7.8(38)	1.04(38) 7.8(38)	1.04(38) 7.8(38)
2	15-27	1.04(74) 6.2(74)	1.04(74) 6.2(74)	1.04(380) 6.2(380)	1.05(411) 5.7(411)	1.05(87) 4.8(87)	1.05(38) 4.3(38)	1.04(395) 5.8(395)	1.04(38) 7.9(38)	1.04(38) 7.9(38)	1.04(38) 7.9(38)
3	27-39	1.03(74) 5.9(74)	1.03(74) 5.9(74)	1.03(380) 5.9(380)	1.03(411) 5.8(411)	1.04(87) 4.8(87)	1.03(38) 4.0(38)	1.03(378) 5.5(378)	1.03(38) 7.8(38)	1.03(38) 7.8(38)	1.03(38) 7.8(38)
4	39-51	1.01(74) 5.6(74)	1.01(74) 5.6(74)	1.01(380) 5.6(380)	1.01(411) 5.5(411)	1.01(87) 4.6(87)	1.01(38) 4.2(38)	1.01(378) 5.2(378)	1.01(38) 7.7(38)	1.01(38) 7.7(38)	1.01(38) 7.7(38)
5	51-63	.99(74) 5.8(74)	.99(74) 5.8(74)	.99(380) 5.8(380)	.99(411) 5.6(411)	.99(87) 4.6(87)	.99(38) 3.9(38)	.99(378) 5.0(378)	.99(38) 7.2(38)	.99(38) 7.2(38)	.99(38) 7.2(38)
6	63-75	.94(74) 5.4(74)	.94(74) 5.4(74)	.94(380) 5.4(380)	.93(411) 5.7(411)	.93(87) 5.2(87)	.94(38) 4.8(38)	.94(378) 5.2(378)	.95(38) 6.7(38)	.95(38) 6.7(38)	.95(38) 6.7(38)
7	75-90	.88(74) 4.4(74)	.88(74) 4.4(74)	.88(380) 4.4(380)	.88(411) 5.2(411)	.88(87) 4.9(87)	.89(38) 4.1(38)	.90(378) 4.4(378)	.91(38) 6.2(38)	.91(38) 6.2(38)	.91(38) 6.2(38)



(b) Spring (Northern Hemisphere).

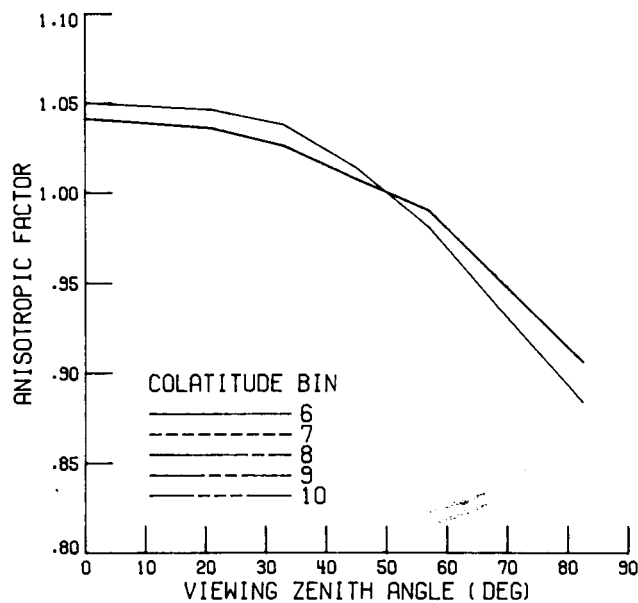
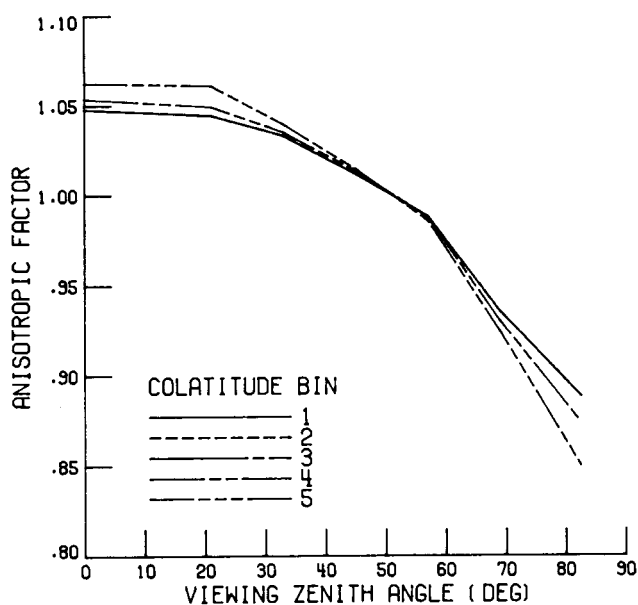
Figure 5. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : CLEAR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

BIN NO.	NORTH POLE ANGLE (DEG)	COLATITUDE									
		1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(74) 7.0(74)	1.05(74) 7.0(74)	1.05(241) 7.0(241)	1.05(411) 5.4(411)	1.06(240) 4.7(240)	1.05(375) 3.6(375)	1.04(411) 4.3(411)	1.04(74) 4.3(74)	1.04(74) 4.3(74)	1.04(74) 4.3(74)
2	15-27	1.04(74) 7.0(74)	1.04(74) 7.0(74)	1.04(411) 7.0(411)	1.05(411) 5.6(411)	1.06(393) 4.7(393)	1.05(393) 3.4(393)	1.04(411) 4.4(411)	1.04(74) 4.4(74)	1.04(74) 4.4(74)	1.04(74) 4.4(74)
3	27-39	1.03(74) 6.8(74)	1.03(74) 6.8(74)	1.03(411) 6.8(411)	1.04(411) 5.6(411)	1.04(393) 4.5(393)	1.04(376) 3.2(376)	1.03(411) 4.2(411)	1.03(74) 4.2(74)	1.03(74) 4.2(74)	1.03(74) 4.2(74)
4	39-51	1.01(74) 6.9(74)	1.01(74) 6.9(74)	1.01(411) 6.9(411)	1.01(411) 5.5(411)	1.01(393) 4.0(393)	1.01(393) 3.3(393)	1.01(411) 4.2(411)	1.01(74) 4.2(74)	1.01(74) 4.2(74)	1.01(74) 4.2(74)
5	51-63	.99(74) 6.9(74)	.99(74) 6.9(74)	.99(411) 6.9(411)	.99(411) 5.2(411)	.99(393) 3.8(393)	.98(376) 3.4(376)	.99(411) 3.9(411)	.99(74) 3.9(74)	.99(74) 3.9(74)	.99(74) 3.9(74)
6	63-75	.94(74) 6.7(74)	.94(74) 6.7(74)	.94(411) 6.7(411)	.93(411) 5.7(411)	.92(393) 5.2(393)	.93(393) 4.0(393)	.95(411) 3.9(411)	.95(74) 3.9(74)	.95(74) 3.9(74)	.95(74) 3.9(74)
7	75-90	.89(74) 6.1(74)	.89(74) 6.1(74)	.89(394) 6.1(394)	.87(411) 5.4(411)	.85(376) 5.7(376)	.88(358) 3.6(358)	.91(411) 3.4(411)	.91(74) 3.4(74)	.91(74) 3.4(74)	.91(74) 3.4(74)



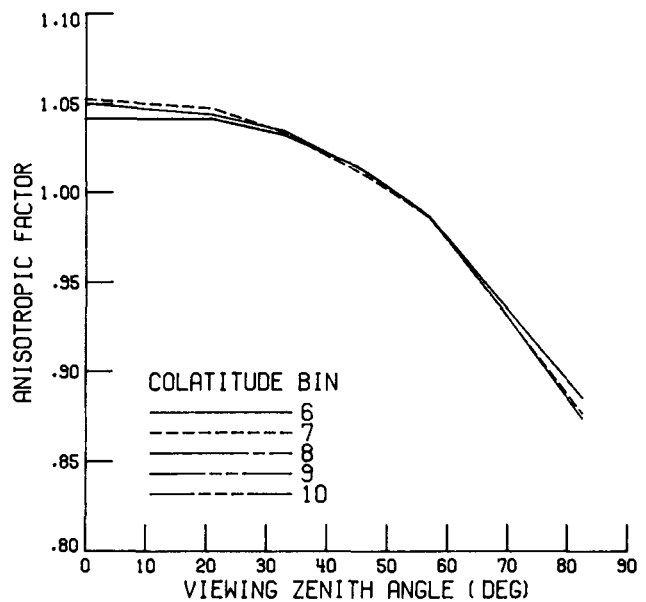
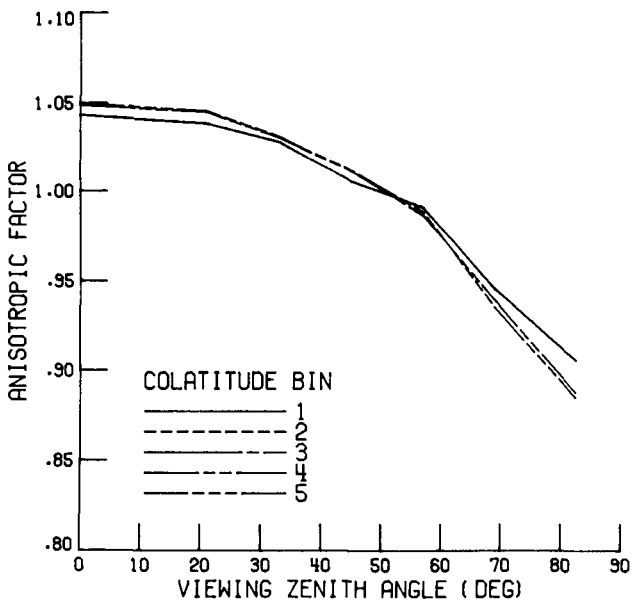
(c) Summer (Northern Hemisphere).

Figure 5. Continued.

SCENE TYPE : CLEAR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT,OCT,NOV)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(74) 7.8(74)	1.04(74) 7.8(74)	1.04(410) 7.8(410)	1.05(411) 6.0(411)	1.05(393) 4.0(393)	1.05(51) 5.1(51)	1.05(411) 6.8(411)	1.04(40) 6.0(40)	1.04(40) 6.0(40)	1.04(40) 6.0(40)
2	15-27	1.04(74) 7.9(74)	1.04(74) 7.9(74)	1.04(411) 7.9(411)	1.05(411) 6.3(411)	1.05(394) 4.3(394)	1.04(53) 4.7(53)	1.05(411) 6.5(411)	1.04(40) 5.9(40)	1.04(40) 5.9(40)	1.04(40) 5.9(40)
3	27-39	1.03(74) 7.8(74)	1.03(74) 7.8(74)	1.03(411) 7.8(411)	1.03(411) 6.3(411)	1.03(393) 4.0(393)	1.04(52) 4.9(52)	1.03(411) 6.3(411)	1.03(40) 5.6(40)	1.03(40) 5.6(40)	1.03(40) 5.6(40)
4	39-51	1.01(74) 7.7(74)	1.01(74) 7.7(74)	1.01(411) 7.7(411)	1.01(411) 6.0(411)	1.01(394) 4.2(394)	1.02(53) 4.7(53)	1.01(411) 6.1(411)	1.02(40) 5.3(40)	1.02(40) 5.3(40)	1.02(40) 5.3(40)
5	51-63	.99(74) 7.2(74)	.99(74) 7.2(74)	.99(411) 7.2(411)	.99(411) 5.6(411)	.99(393) 3.9(393)	.99(53) 4.8(53)	.99(411) 5.8(411)	.99(40) 5.5(40)	.99(40) 5.5(40)	.99(40) 5.5(40)
6	63-75	.95(74) 6.7(74)	.95(74) 6.7(74)	.95(411) 6.7(411)	.94(411) 5.5(411)	.94(394) 4.8(394)	.94(53) 5.2(53)	.94(411) 5.8(411)	.94(40) 5.3(40)	.94(40) 5.3(40)	.94(40) 5.3(40)
7	75-90	.91(74) 6.2(74)	.91(74) 6.2(74)	.91(394) 6.2(394)	.89(411) 5.1(411)	.89(393) 4.1(393)	.87(52) 5.1(52)	.88(411) 5.1(411)	.89(40) 4.3(40)	.89(40) 4.3(40)	.89(40) 4.3(40)



(d) Fall (Northern Hemisphere).

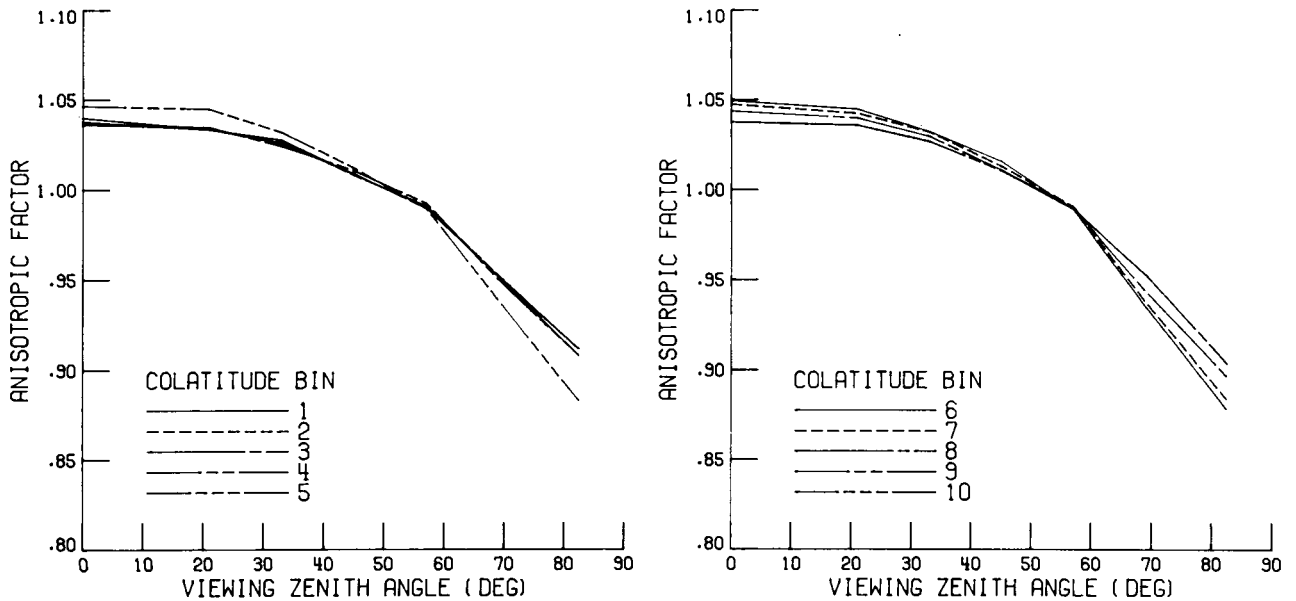
Figure 5. Concluded.

ORIGINAL PAGE IS
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SCENE TYPE : LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

VIEWING ZENITH BIN NO.	VIEWING ZENITH ANGLE (DEG)	COLATITUDE									
		1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
1	0-15	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)
		5.4(3)	4.9(3)	5.0(3)	5.5(3)	5.6(3)	5.3(3)	9.3(3)	10.9(3)	9.4(3)	9.4(3)
2	15-27	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)
		5.5(3)	5.0(3)	4.9(3)	5.5(3)	5.6(3)	5.3(3)	9.0(3)	10.7(3)	9.3(3)	9.3(3)
3	27-39	1.03(3)	1.03(3)	1.03(3)	1.02(3)	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.03(3)
		5.0(3)	4.7(3)	4.7(3)	5.5(3)	5.5(3)	4.9(3)	8.8(3)	10.3(3)	9.2(3)	9.2(3)
4	39-51	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.02(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)
		5.3(3)	5.0(3)	4.8(3)	5.2(3)	5.3(3)	4.8(3)	8.3(3)	10.0(3)	8.7(3)	8.8(3)
5	51-63	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)
		4.9(3)	4.6(3)	4.6(3)	5.1(3)	5.1(3)	4.6(3)	8.2(3)	9.5(3)	8.6(3)	8.6(3)
6	63-75	.95(3)	.95(3)	.95(3)	.95(3)	.94(3)	.94(3)	.94(3)	.94(3)	.95(3)	.95(3)
		4.8(3)	4.8(3)	4.5(3)	5.1(3)	5.1(3)	4.9(3)	7.5(3)	9.0(3)	7.8(3)	7.9(3)
7	75-90	.91(3)	.91(3)	.91(3)	.91(3)	.88(3)	.88(3)	.88(3)	.90(3)	.90(3)	.90(3)
		4.5(3)	4.8(3)	4.4(3)	4.6(3)	4.7(3)	4.4(3)	6.4(3)	7.9(3)	7.2(3)	7.3(3)



(a) Winter (Northern Hemisphere).

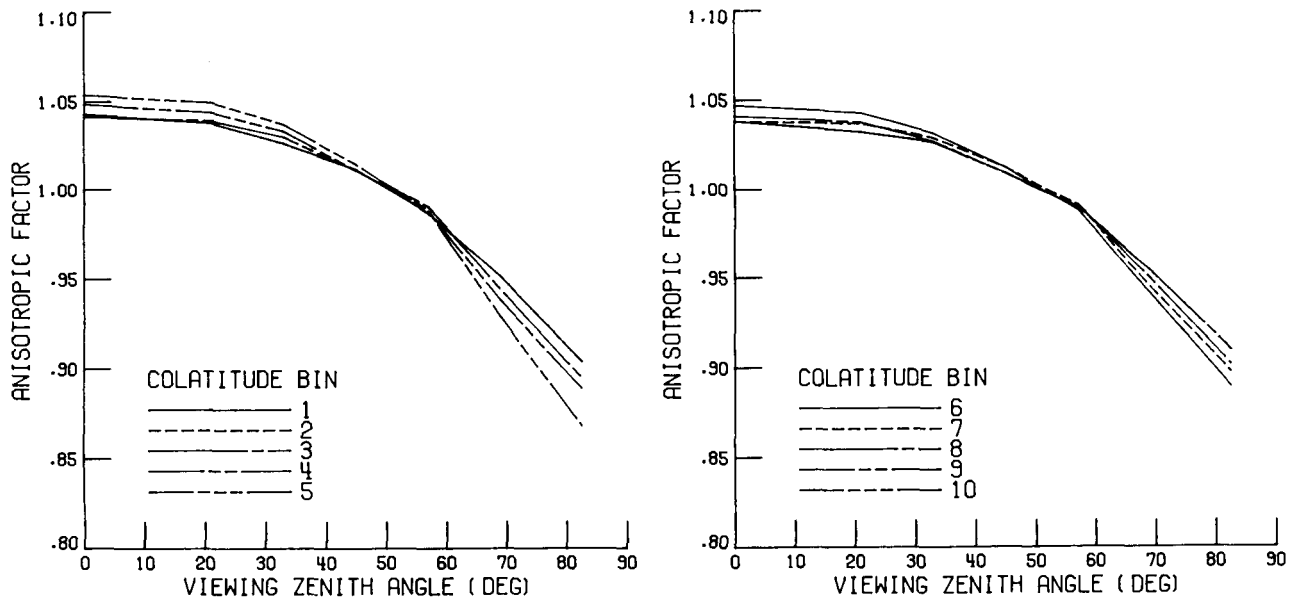
Figure 6. Day-night average limb-darkening model for clear over land-ocean mix. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.04(3) 6.6(3)	1.04(3) 6.6(3)	1.04(3) 7.8(3)	1.05(3) 10.3(3)	1.05(3) 8.0(3)	1.05(3) 3.3(3)	1.04(3) 5.0(3)	1.04(3) 8.1(3)	1.04(3) 8.0(3)	1.04(3) 7.5(3)
2	15-27	1.04(3) 6.9(3)	1.04(3) 7.0(3)	1.04(3) 7.9(3)	1.04(3) 9.9(3)	1.05(3) 7.9(3)	1.04(3) 3.6(3)	1.04(3) 5.2(3)	1.04(3) 8.1(3)	1.03(3) 8.3(3)	1.03(3) 7.7(3)
3	27-39	1.03(3) 6.9(3)	1.03(3) 7.0(3)	1.03(3) 7.4(3)	1.03(3) 9.5(3)	1.04(3) 7.7(3)	1.03(3) 3.4(3)	1.03(3) 5.1(3)	1.03(3) 8.0(3)	1.03(3) 8.3(3)	1.03(3) 7.8(3)
4	39-51	1.01(3) 6.5(3)	1.01(3) 6.5(3)	1.01(3) 7.1(3)	1.01(3) 8.9(3)	1.01(3) 7.3(3)	1.01(3) 3.9(3)	1.01(3) 5.3(3)	1.01(3) 8.0(3)	1.01(3) 8.2(3)	1.01(3) 7.6(3)
5	51-63	.99(3) 6.3(3)	.99(3) 6.4(3)	.99(3) 7.1(3)	.99(3) 8.3(3)	.99(3) 6.7(3)	.99(3) 3.5(3)	.99(3) 5.4(3)	.99(3) 7.5(3)	.99(3) 8.3(3)	.99(3) 7.7(3)
6	63-75	.95(3) 6.2(3)	.95(3) 6.3(3)	.94(3) 6.4(3)	.94(3) 8.0(3)	.93(3) 6.6(3)	.94(3) 4.0(3)	.94(3) 5.0(3)	.95(3) 7.6(3)	.95(3) 8.2(3)	.95(3) 7.7(3)
7	75-90	.90(3) 5.0(3)	.90(3) 5.7(3)	.89(3) 6.3(3)	.89(3) 6.9(3)	.87(3) 6.0(3)	.89(3) 6.0(3)	.90(3) 4.6(3)	.90(3) 7.2(3)	.91(3) 8.0(3)	.91(3) 7.5(3)



(b) Spring (Northern Hemisphere).

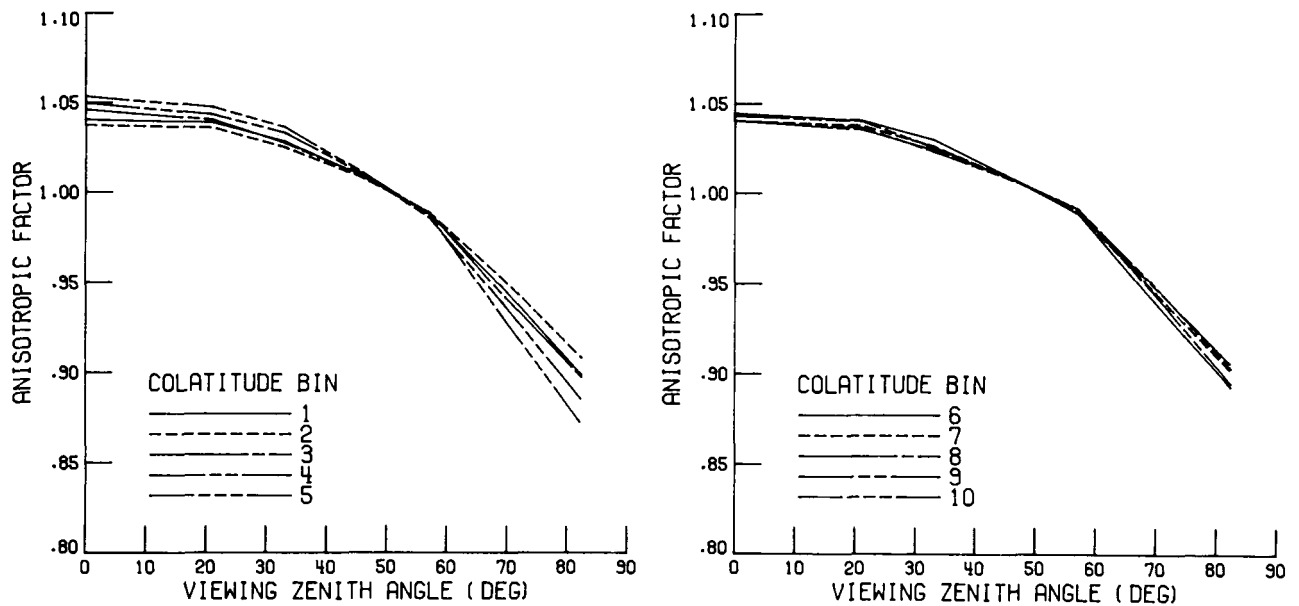
Figure 6. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

VIEWING ZENITH BIN NO.	VIEWING ZENITH ANGLE (DEG)	COLATITUDE									
		1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
1	0-15	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)
		4.8(3)	5.7(3)	7.7(3)	8.4(3)	5.3(3)	4.1(3)	6.2(3)	5.5(3)	5.8(3)	5.4(3)
2	15-27	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)
		4.6(3)	5.6(3)	7.7(3)	8.3(3)	5.6(3)	4.1(3)	6.1(3)	5.5(3)	5.9(3)	5.5(3)
3	27-39	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.04(3)	1.03(3)	1.03(3)	1.02(3)	1.03(3)	1.02(3)
		4.8(3)	5.7(3)	7.5(3)	8.2(3)	5.0(3)	4.0(3)	6.1(3)	5.4(3)	6.1(3)	5.7(3)
4	39-51	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)
		4.5(3)	5.5(3)	7.2(3)	7.7(3)	4.6(3)	3.9(3)	5.8(3)	5.1(3)	5.7(3)	5.3(3)
5	51-63	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)
		4.4(3)	5.3(3)	7.0(3)	7.3(3)	4.2(3)	3.8(3)	5.6(3)	5.0(3)	5.0(3)	4.7(3)
6	63-75	.95(3)	.95(3)	.94(3)	.94(3)	.93(3)	.94(3)	.95(3)	.95(3)	.95(3)	.95(3)
		4.1(3)	5.1(3)	6.7(3)	7.1(3)	4.4(3)	4.1(3)	5.6(3)	5.2(3)	5.2(3)	5.0(3)
7	75-90	.90(3)	.91(3)	.90(3)	.89(3)	.87(3)	.89(3)	.90(3)	.91(3)	.89(3)	.90(3)
		3.6(3)	4.8(3)	6.1(3)	6.3(3)	4.1(3)	3.8(3)	5.1(3)	5.0(3)	4.8(3)	4.8(3)



(c) Summer (Northern Hemisphere).

Figure 6. Continued.

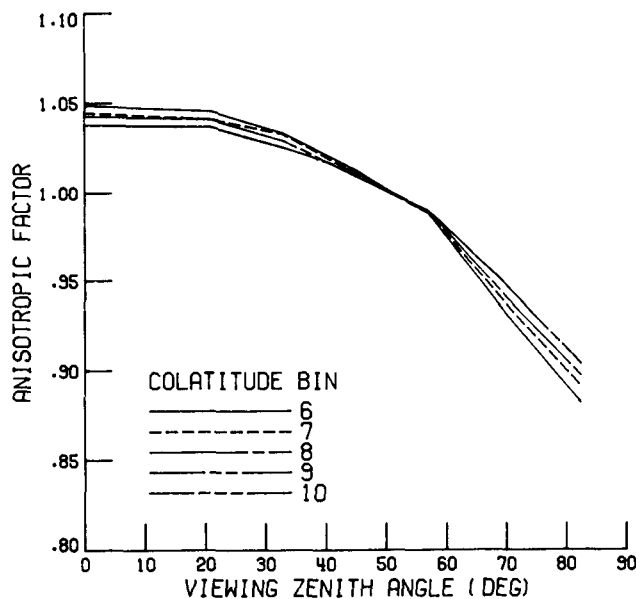
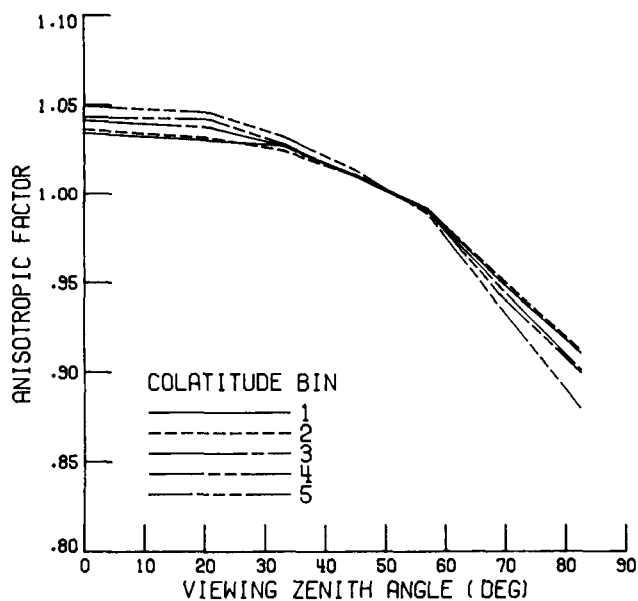
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SCENE TYPE : LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT,OCT,NOV)

COLATITUDE

		NORTH POLE									
		1	2	3	4	5	6	7	8	9	10
BIN NO.	ANGLE(DEG)	0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.03(3) 4.3(3)	1.04(3) 4.6(3)	1.04(3) 6.0(3)	1.04(3) 5.6(3)	1.05(3) 5.6(3)	1.05(3) 6.7(3)	1.04(3) 9.5(3)	1.04(3) 9.0(3)	1.04(3) 9.6(3)	1.04(3) 9.1(3)
2	15-27	1.03(3) 4.4(3)	1.03(3) 4.8(3)	1.04(3) 6.2(3)	1.04(3) 5.6(3)	1.05(3) 5.6(3)	1.05(3) 6.7(3)	1.04(3) 9.3(3)	1.04(3) 9.0(3)	1.04(3) 9.7(3)	1.04(3) 9.2(3)
3	27-39	1.03(3) 4.3(3)	1.02(3) 4.8(3)	1.03(3) 6.1(3)	1.03(3) 5.5(3)	1.03(3) 5.4(3)	1.03(3) 6.3(3)	1.03(3) 9.3(3)	1.03(3) 8.8(3)	1.03(3) 9.4(3)	1.03(3) 9.0(3)
4	39-51	1.01(3) 3.9(3)	1.01(3) 4.3(3)	1.01(3) 6.0(3)	1.01(3) 5.3(3)	1.01(3) 5.3(3)	1.01(3) 6.0(3)	1.01(3) 8.8(3)	1.01(3) 8.4(3)	1.01(3) 9.0(3)	1.01(3) 8.6(3)
5	51-63	.99(3) 4.2(3)	.99(3) 4.7(3)	.99(3) 5.6(3)	.99(3) 5.2(3)	.99(3) 5.1(3)	.99(3) 5.7(3)	.99(3) 8.4(3)	.99(3) 8.2(3)	.99(3) 8.5(3)	.99(3) 8.1(3)
6	63-75	.95(3) 4.5(3)	.95(3) 4.9(3)	.95(3) 5.7(3)	.94(3) 5.1(3)	.94(3) 5.3(3)	.94(3) 5.6(3)	.94(3) 7.7(3)	.94(3) 7.5(3)	.95(3) 8.5(3)	.95(3) 8.1(3)
7	75-90	.91(3) 4.3(3)	.91(3) 4.4(3)	.90(3) 5.4(3)	.90(3) 4.7(3)	.88(3) 5.1(3)	.88(3) 4.9(3)	.89(3) 6.9(3)	.90(3) 7.2(3)	.90(3) 7.7(3)	.90(3) 7.4(3)



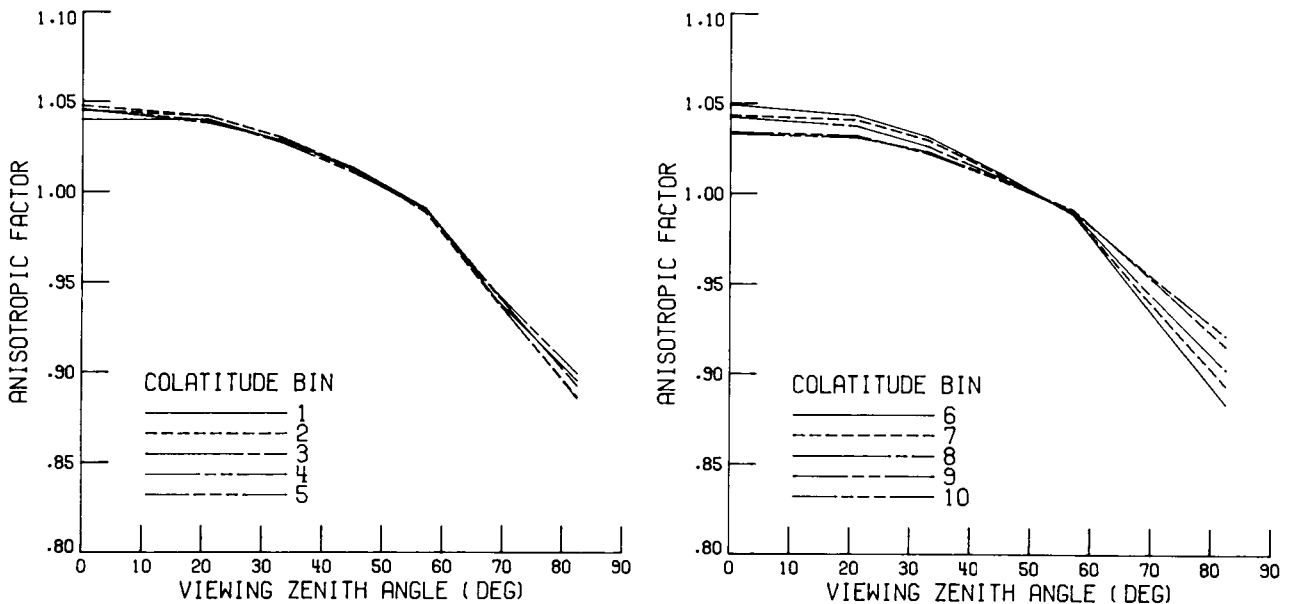
(d) Fall (Northern Hemisphere).

Figure 6. Concluded.

SCENE TYPE : PARTLY CLOUDY OVER OCEAN
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER(DEC,JAN,FEB)

		COLATITUDE									
		1	2	3	4	5	6	7	8	9	10
BIN NO.	NORTH POLE										
ANGLE(DEG)		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(413) 3.8(413)	1.05(393) 3.8(393)	1.05(411) 4.9(411)	1.05(411) 4.6(411)	1.05(411) 3.9(411)	1.05(411) 3.6(411)	1.04(411) 4.0(411)	1.04(411) 4.9(411)	1.03(411) 3.2(411)	1.03(227) 3.1(227)
2	15-27	1.04(413) 3.8(413)	1.04(411) 3.6(411)	1.04(411) 4.8(411)	1.04(411) 4.7(411)	1.04(411) 3.9(411)	1.04(411) 3.8(411)	1.04(411) 4.1(411)	1.04(411) 4.8(411)	1.03(411) 3.3(411)	1.03(380) 3.2(380)
3	27-39	1.03(413) 4.0(413)	1.03(393) 3.4(393)	1.03(411) 4.7(411)	1.03(411) 4.6(411)	1.03(411) 3.9(411)	1.03(411) 3.9(411)	1.03(411) 4.0(411)	1.03(411) 4.6(411)	1.02(411) 3.1(411)	1.02(380) 3.0(380)
4	39-51	1.01(413) 4.0(413)	1.01(394) 3.3(394)	1.01(411) 4.5(411)	1.01(411) 4.6(411)	1.01(411) 3.9(411)	1.01(411) 3.6(411)	1.01(411) 3.9(411)	1.01(411) 4.6(411)	1.01(411) 2.9(411)	1.01(380) 3.1(380)
5	51-63	.99(413) 3.3(413)	.99(394) 3.6(394)	.99(411) 4.6(411)	.99(411) 4.5(411)	.99(411) 4.0(411)	.99(411) 3.8(411)	.99(411) 3.9(411)	.99(411) 4.5(411)	.99(411) 2.9(411)	.99(380) 3.1(380)
6	63-75	.94(413) 3.5(413)	.94(394) 3.9(394)	.94(411) 4.9(411)	.94(411) 5.0(411)	.94(411) 5.1(411)	.94(411) 4.8(411)	.94(411) 4.6(411)	.95(411) 4.8(411)	.96(411) 3.3(411)	.96(380) 3.1(380)
7	75-90	.90(413) 3.0(413)	.89(393) 4.4(393)	.89(411) 4.9(411)	.90(411) 4.7(411)	.89(411) 5.6(411)	.88(411) 5.3(411)	.89(411) 4.7(411)	.90(411) 4.8(411)	.92(411) 3.1(411)	.92(363) 2.8(363)



(a) Winter (Northern Hemisphere).

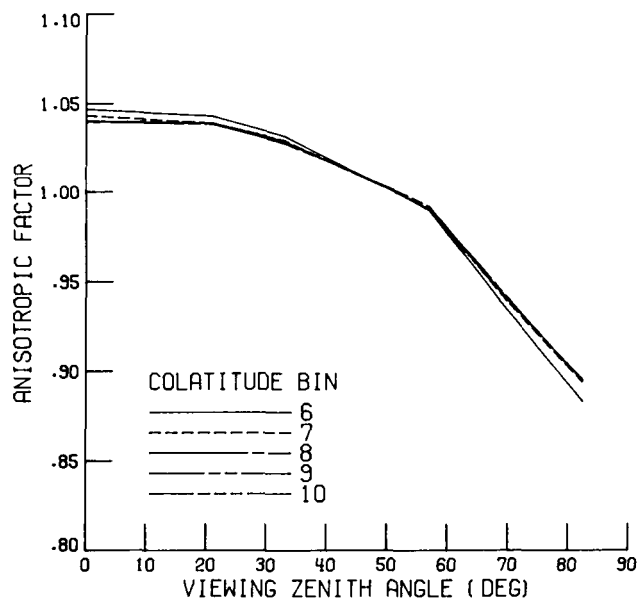
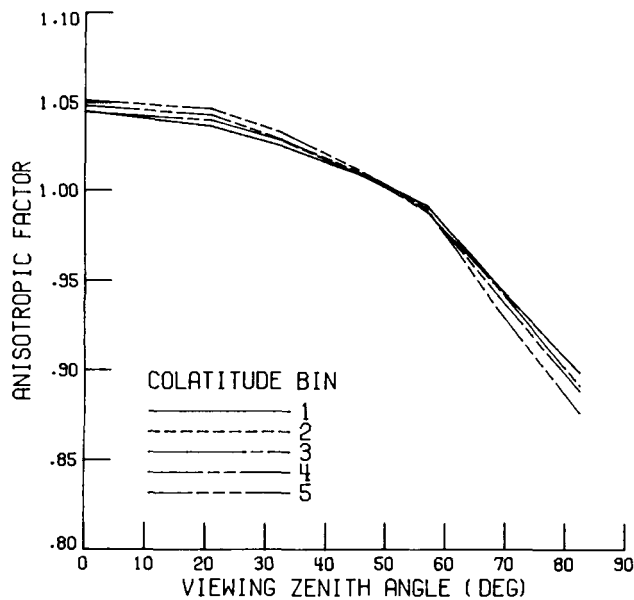
Figure 7. Day-night average limb-darkening model for partly cloudy over ocean. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

BIN NO.	NORTH POLE ANGLE (DEG)	COLATITUDE									
		1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.05(74) 3.5(74)	1.05(393) 3.5(393)	1.04(411) 4.6(411)	1.05(411) 4.5(411)	1.05(411) 3.8(411)	1.05(411) 3.6(411)	1.04(411) 4.2(411)	1.04(241) 4.8(241)	1.04(411) 3.6(411)	1.04(74) 3.6(74)
2	15-27	1.04(74) 3.6(74)	1.04(394) 3.6(394)	1.04(411) 4.8(411)	1.04(411) 5.0(411)	1.05(411) 4.4(411)	1.04(411) 4.1(411)	1.04(411) 4.6(411)	1.04(411) 4.8(411)	1.04(411) 3.7(411)	1.04(74) 3.7(74)
3	27-39	1.03(74) 3.5(74)	1.03(393) 3.5(393)	1.03(411) 4.6(411)	1.03(411) 4.8(411)	1.03(411) 4.2(411)	1.03(411) 4.0(411)	1.03(411) 4.4(411)	1.03(411) 4.8(411)	1.03(411) 3.7(411)	1.03(74) 3.7(74)
4	39-51	1.01(74) 3.3(74)	1.01(394) 3.3(394)	1.01(411) 4.5(411)	1.01(411) 4.9(411)	1.01(411) 4.1(411)	1.01(411) 4.1(411)	1.01(411) 4.6(411)	1.01(411) 4.7(411)	1.01(411) 3.6(411)	1.01(74) 3.6(74)
5	51-63	.99(74) 3.3(74)	.99(394) 3.3(394)	.99(411) 4.6(411)	.99(411) 4.6(411)	.99(411) 4.4(411)	.99(411) 3.9(411)	.99(411) 4.3(411)	.99(411) 4.6(411)	.99(411) 3.5(411)	.99(74) 3.5(74)
6	63-75	.95(74) 3.7(74)	.95(394) 3.7(394)	.95(411) 4.8(411)	.94(411) 5.3(411)	.93(411) 5.5(411)	.94(411) 4.9(411)	.94(411) 4.8(411)	.94(411) 4.9(411)	.94(411) 3.8(411)	.94(74) 3.8(74)
7	75-90	.90(74) 3.6(74)	.90(393) 3.6(393)	.89(411) 5.0(411)	.89(411) 5.6(411)	.88(411) 5.8(411)	.88(411) 5.4(411)	.89(411) 4.9(411)	.90(411) 5.1(411)	.90(394) 4.0(394)	.90(74) 4.0(74)



(b) Spring (Northern Hemisphere).

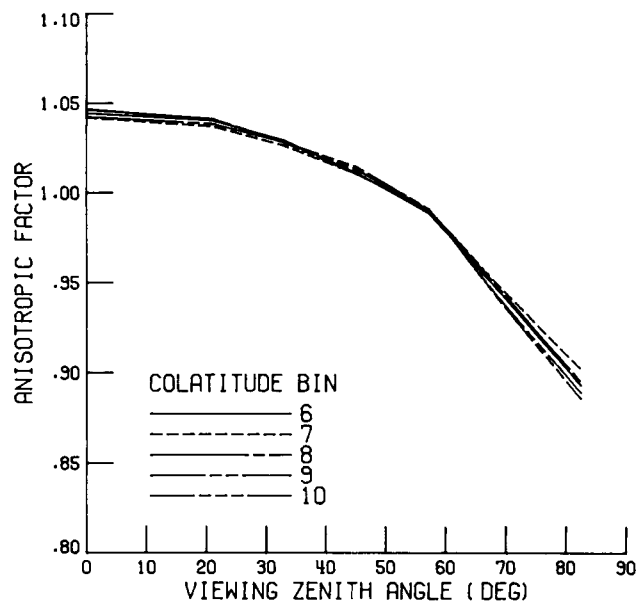
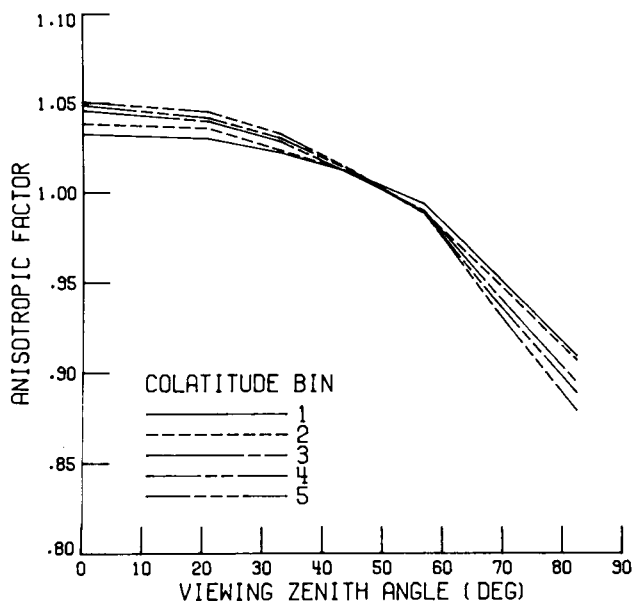
Figure 7. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.03(412) 3.4(412)	1.04(411) 3.6(411)	1.05(411) 4.8(411)	1.05(411) 3.6(411)	1.05(411) 3.5(411)	1.04(411) 3.4(411)	1.04(411) 4.5(411)	1.04(411) 4.3(411)	1.05(411) 4.0(411)	1.05(412) 3.5(412)
2	15-27	1.03(412) 3.4(412)	1.04(411) 3.6(411)	1.04(411) 4.9(411)	1.04(411) 3.8(411)	1.05(411) 3.6(411)	1.04(411) 3.4(411)	1.04(411) 4.6(411)	1.04(411) 4.3(411)	1.04(411) 4.0(411)	1.04(412) 3.4(412)
3	27-39	1.02(412) 3.4(412)	1.02(411) 3.6(411)	1.03(411) 4.9(411)	1.03(411) 3.7(411)	1.03(411) 3.6(411)	1.03(411) 3.4(411)	1.03(411) 4.5(411)	1.03(411) 4.2(411)	1.03(411) 3.9(411)	1.03(412) 3.4(412)
4	39-51	1.01(412) 3.6(412)	1.01(411) 3.5(411)	1.01(411) 4.9(411)	1.01(411) 3.7(411)	1.01(411) 3.6(411)	1.01(411) 3.5(411)	1.01(411) 4.4(411)	1.01(411) 4.1(411)	1.01(411) 3.9(411)	1.01(412) 3.4(412)
5	51-63	.99(412) 3.6(412)	.99(411) 3.6(411)	.99(411) 4.8(411)	.99(411) 3.6(411)	.99(411) 3.7(411)	.99(411) 3.5(411)	.99(411) 4.3(411)	.99(411) 4.2(411)	.99(411) 4.0(411)	.99(412) 3.6(412)
6	63-75	.95(412) 3.8(412)	.95(411) 3.9(411)	.94(411) 5.1(411)	.94(411) 4.5(411)	.94(411) 5.0(411)	.94(411) 4.2(411)	.95(411) 4.7(411)	.95(411) 4.5(411)	.94(411) 4.3(411)	.94(412) 3.9(412)
7	75-90	.91(412) 3.9(412)	.91(394) 4.0(394)	.90(411) 5.3(411)	.89(411) 4.6(411)	.88(411) 5.6(411)	.89(411) 4.4(411)	.90(411) 4.4(411)	.90(411) 4.5(411)	.89(411) 4.3(411)	.89(412) 4.0(412)



(c) Summer (Northern Hemisphere).

Figure 7. Continued.

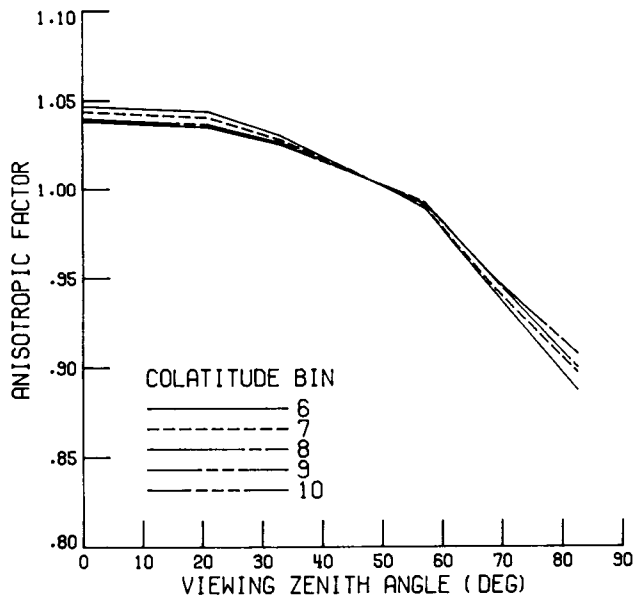
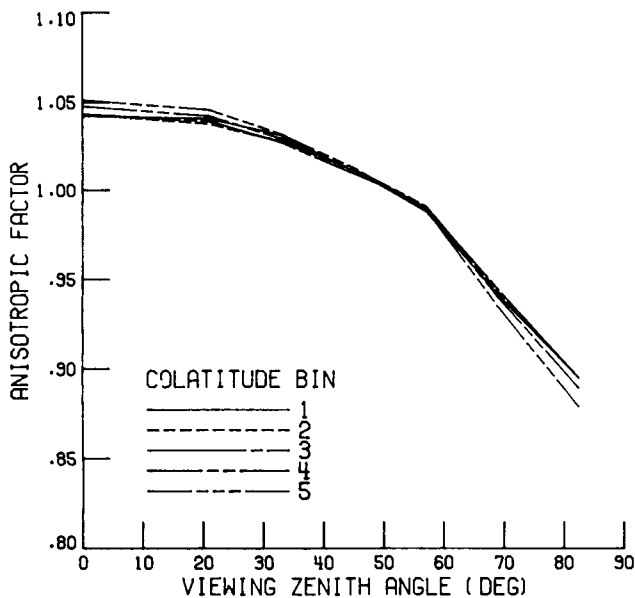
ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT,OCT,NOV)

COLATITUDE

		NORTH POLE									
		1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
		COLATITUDE									
BIN NO.	ANGLE (DEG)										
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(240) 3.3(240)	1.04(411) 3.9(411)	1.04(411) 5.5(411)	1.05(411) 4.0(411)	1.05(411) 3.6(411)	1.05(411) 3.7(411)	1.04(411) 4.4(411)	1.04(411) 4.3(411)	1.04(411) 3.5(411)	1.04(74) 3.5(74)
2	15-27	1.04(394) 3.1(394)	1.04(411) 4.0(411)	1.04(411) 5.4(411)	1.04(411) 4.1(411)	1.05(411) 3.8(411)	1.04(411) 3.8(411)	1.04(411) 4.4(411)	1.04(411) 4.4(411)	1.04(411) 3.7(411)	1.04(74) 3.7(74)
3	27-39	1.03(393) 3.3(393)	1.03(411) 3.8(411)	1.03(411) 5.4(411)	1.03(411) 4.1(411)	1.03(411) 3.8(411)	1.03(411) 3.8(411)	1.03(411) 4.4(411)	1.03(411) 4.2(411)	1.03(411) 3.6(411)	1.03(74) 3.6(74)
4	39-51	1.01(394) 3.1(394)	1.01(411) 3.8(411)	1.01(411) 5.3(411)	1.01(411) 4.0(411)	1.01(411) 3.9(411)	1.01(411) 3.7(411)	1.01(411) 4.3(411)	1.01(411) 4.1(411)	1.01(411) 3.6(411)	1.01(74) 3.6(74)
5	51-63	.99(394) 3.3(394)	.99(411) 3.8(411)	.99(411) 5.1(411)	.99(411) 3.9(411)	.99(411) 4.0(411)	.99(411) 3.8(411)	.99(411) 4.3(411)	.99(411) 4.1(411)	.99(411) 3.6(411)	.99(74) 3.6(74)
6	63-75	.94(394) 3.5(394)	.94(411) 4.2(411)	.94(411) 5.4(411)	.94(411) 4.8(411)	.93(411) 5.2(411)	.94(411) 4.7(411)	.94(411) 4.8(411)	.95(411) 4.4(411)	.95(411) 4.0(411)	.95(74) 4.0(74)
7	75-90	.90(393) 3.8(393)	.90(394) 4.1(394)	.90(411) 5.4(411)	.89(411) 5.0(411)	.88(411) 5.8(411)	.89(411) 5.1(411)	.90(411) 4.8(411)	.90(411) 4.4(411)	.91(411) 3.8(411)	.91(74) 3.8(74)



(d) Fall (Northern Hemisphere).

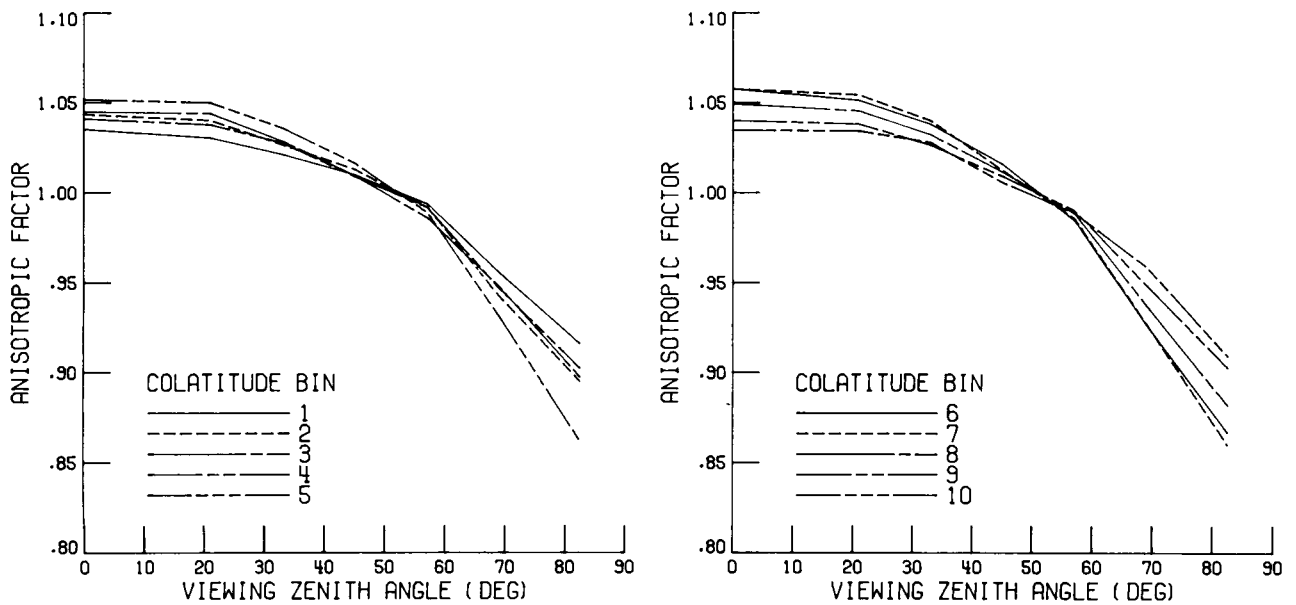
Figure 7. Concluded.

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SCENE TYPE : PARTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(58) 4.7(58)	1.04(414) 4.6(414)	1.04(413) 7.4(413)	1.04(411) 7.3(411)	1.05(411) 6.1(411)	1.06(410) 5.9(410)	1.06(411) 8.0(411)	1.05(38) 7.3(38)	1.04(42) 4.4(42)	1.03(41) 4.7(41)
2	15-27	1.03(58) 4.9(58)	1.04(414) 4.8(414)	1.04(413) 7.4(413)	1.04(411) 7.2(411)	1.05(411) 6.1(411)	1.05(411) 6.1(411)	1.05(411) 7.9(411)	1.05(38) 7.5(38)	1.04(42) 4.4(42)	1.03(41) 5.5(41)
3	27-39	1.02(58) 4.6(58)	1.03(414) 4.6(414)	1.03(413) 7.3(413)	1.03(411) 6.8(411)	1.04(411) 5.8(411)	1.04(410) 5.4(410)	1.04(411) 7.8(411)	1.03(38) 7.3(38)	1.03(42) 4.3(42)	1.03(41) 5.1(41)
4	39-51	1.01(58) 4.4(58)	1.01(414) 4.5(414)	1.01(413) 7.1(413)	1.01(411) 6.7(411)	1.02(411) 5.6(411)	1.02(411) 5.7(411)	1.01(411) 7.7(411)	1.01(38) 7.0(38)	1.01(42) 4.3(42)	1.01(41) 4.3(41)
5	51-63	.99(58) 4.4(58)	.99(414) 4.6(414)	.99(413) 6.8(413)	.99(411) 6.5(411)	.99(411) 5.8(411)	.98(410) 5.7(410)	.99(411) 7.2(411)	.99(38) 6.7(38)	.99(42) 4.1(42)	.99(41) 4.2(41)
6	63-75	.96(58) 4.4(58)	.94(414) 4.9(414)	.95(413) 6.8(413)	.95(411) 6.9(411)	.93(411) 6.7(411)	.93(411) 6.9(411)	.93(411) 7.7(411)	.94(38) 7.2(38)	.95(42) 4.4(42)	.96(41) 4.4(41)
7	75-90	.92(58) 4.2(58)	.90(414) 4.7(414)	.90(413) 7.1(413)	.90(411) 6.9(411)	.86(411) 7.4(411)	.87(393) 7.0(393)	.86(411) 8.0(411)	.88(38) 6.6(38)	.90(42) 4.2(42)	.91(41) 4.5(41)



(a) Winter (Northern Hemisphere).

Figure 8. Day-night average limb-darkening model for partly cloudy over land or desert. (See table 4 for explanation of data sources.)

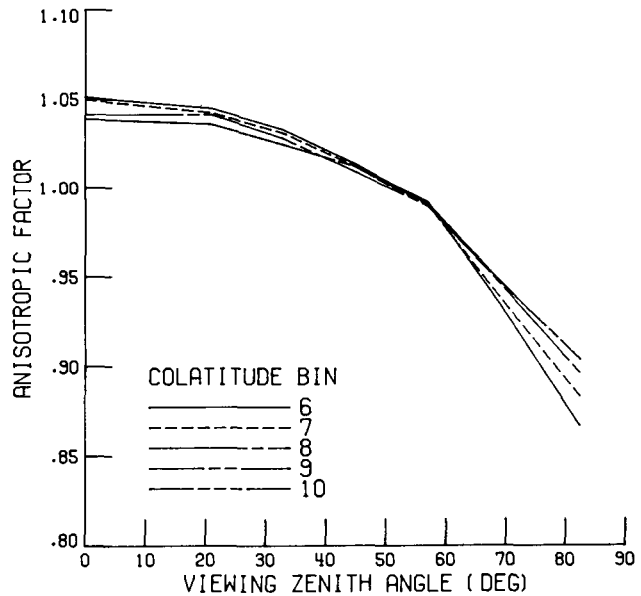
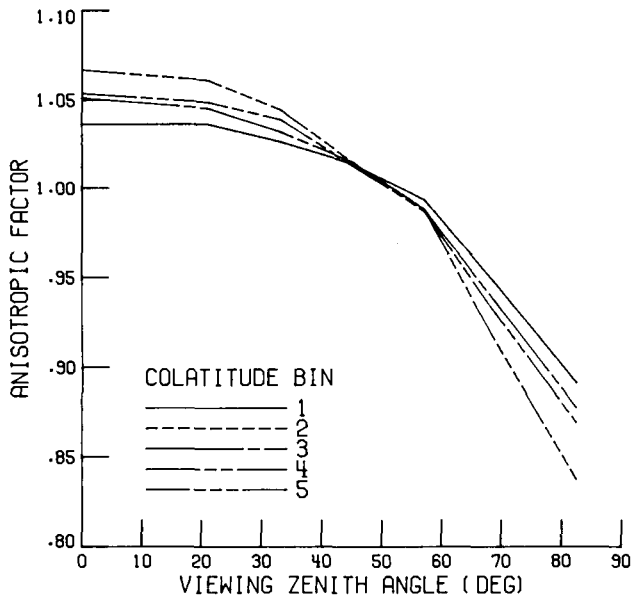
ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

COLATITUDE

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.04(74) 5.0(74)	1.04(236) 5.0(236)	1.05(413) 7.8(413)	1.05(406) 9.0(406)	1.07(393) 6.9(393)	1.05(393) 5.1(393)	1.05(393) 6.1(393)	1.04(38) 7.4(38)	1.04(38) 4.6(38)	1.04(38) 4.6(38)
2	15-27	1.04(74) 5.0(74)	1.04(394) 5.0(394)	1.05(413) 7.5(413)	1.05(411) 9.1(411)	1.06(411) 7.3(411)	1.04(411) 5.2(411)	1.04(411) 6.0(411)	1.04(38) 7.5(38)	1.04(38) 4.7(38)	1.04(38) 4.7(38)
3	27-39	1.03(74) 4.8(74)	1.03(393) 4.8(393)	1.03(413) 7.1(413)	1.04(411) 8.5(411)	1.04(411) 7.3(411)	1.03(411) 5.3(411)	1.03(394) 6.0(394)	1.03(38) 7.4(38)	1.02(38) 4.4(38)	1.02(38) 4.4(38)
4	39-51	1.01(74) 5.2(74)	1.01(394) 5.2(394)	1.02(413) 7.2(413)	1.01(411) 8.4(411)	1.02(411) 7.3(411)	1.01(411) 4.9(411)	1.01(411) 5.9(411)	1.01(38) 7.1(38)	1.01(38) 4.3(38)	1.01(38) 4.3(38)
5	51-63	.99(74) 5.1(74)	.99(393) 5.1(393)	.99(413) 6.9(413)	.99(411) 8.1(411)	.99(411) 7.1(411)	.99(411) 4.9(411)	.99(411) 5.5(411)	.99(38) 6.9(38)	.99(38) 4.4(38)	.99(38) 4.4(38)
6	63-75	.95(74) 5.4(74)	.95(394) 5.4(394)	.94(413) 7.2(413)	.93(411) 8.7(411)	.91(411) 8.4(411)	.94(411) 6.7(411)	.94(411) 6.3(411)	.95(38) 6.9(38)	.95(38) 4.6(38)	.95(38) 4.6(38)
7	75-90	.89(74) 5.1(74)	.89(393) 5.1(393)	.88(413) 6.9(413)	.87(411) 8.4(411)	.84(393) 8.5(393)	.87(393) 7.4(393)	.88(393) 6.2(393)	.90(38) 7.0(38)	.90(38) 4.7(38)	.90(38) 4.7(38)



(b) Spring (Northern Hemisphere).

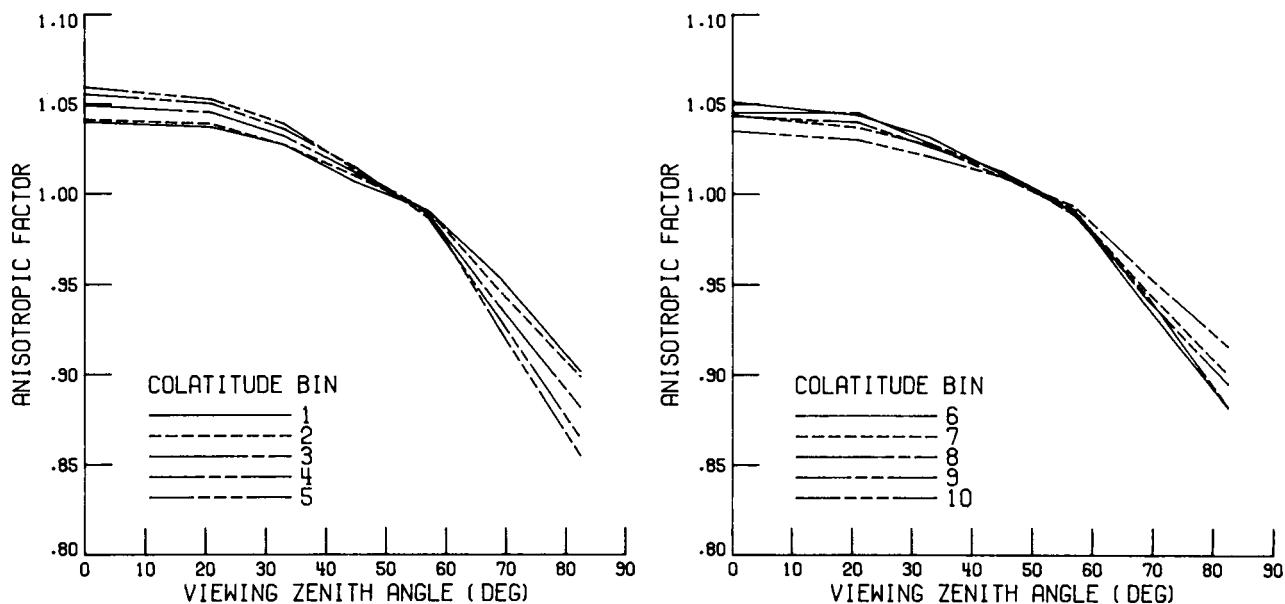
Figure 8. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

BIN NU. ANGLE (DEG)	COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
VIEWING ZENITH BIN NO. (DEG)										
1 0-15	1.04(412) 5.3(412)	1.04(411) 4.9(411)	1.05(411) 7.3(411)	1.06(411) 9.1(411)	1.06(411) 6.3(411)	1.05(411) 4.7(411)	1.04(411) 6.2(411)	1.05(49) 6.7(49)	1.04(38) 4.6(38)	1.04(38) 4.7(38)
2 15-27	1.04(412) 6.1(412)	1.04(411) 4.9(411)	1.05(411) 7.5(411)	1.05(411) 9.1(411)	1.05(411) 6.3(411)	1.04(411) 4.7(411)	1.04(411) 6.2(411)	1.05(52) 6.7(52)	1.04(38) 4.8(38)	1.03(38) 4.9(38)
3 27-39	1.03(412) 5.6(412)	1.03(411) 4.7(411)	1.03(411) 7.3(411)	1.04(411) 8.8(411)	1.04(411) 6.1(411)	1.03(411) 4.9(411)	1.03(411) 6.0(411)	1.03(51) 6.7(51)	1.03(38) 4.6(38)	1.02(38) 4.6(38)
4 39-51	1.01(412) 4.9(412)	1.01(411) 4.7(411)	1.01(411) 7.0(411)	1.01(411) 8.6(411)	1.01(411) 5.9(411)	1.01(411) 4.9(411)	1.01(411) 6.1(411)	1.01(52) 6.4(52)	1.01(38) 4.5(38)	1.01(38) 4.4(38)
5 51-63	.99(412) 4.8(412)	.99(411) 4.6(411)	.99(411) 6.7(411)	.99(411) 8.3(411)	.99(411) 5.9(411)	.99(411) 5.1(411)	.99(411) 6.0(411)	.99(52) 6.5(52)	.99(38) 4.6(38)	.99(38) 4.4(38)
6 63-75	.95(412) 5.0(412)	.95(411) 4.8(411)	.94(411) 7.2(411)	.93(411) 8.4(411)	.92(411) 6.7(411)	.94(411) 5.9(411)	.95(411) 5.9(411)	.94(52) 6.5(52)	.94(38) 4.9(38)	.96(38) 4.4(38)
7 75-90	.90(412) 5.2(412)	.90(411) 4.8(411)	.88(411) 6.6(411)	.86(411) 7.9(411)	.85(411) 7.0(411)	.88(411) 6.3(411)	.90(411) 5.9(411)	.88(51) 7.5(51)	.90(38) 4.7(38)	.92(38) 4.2(38)



(c) Summer (Northern Hemisphere).

Figure 8. Continued.

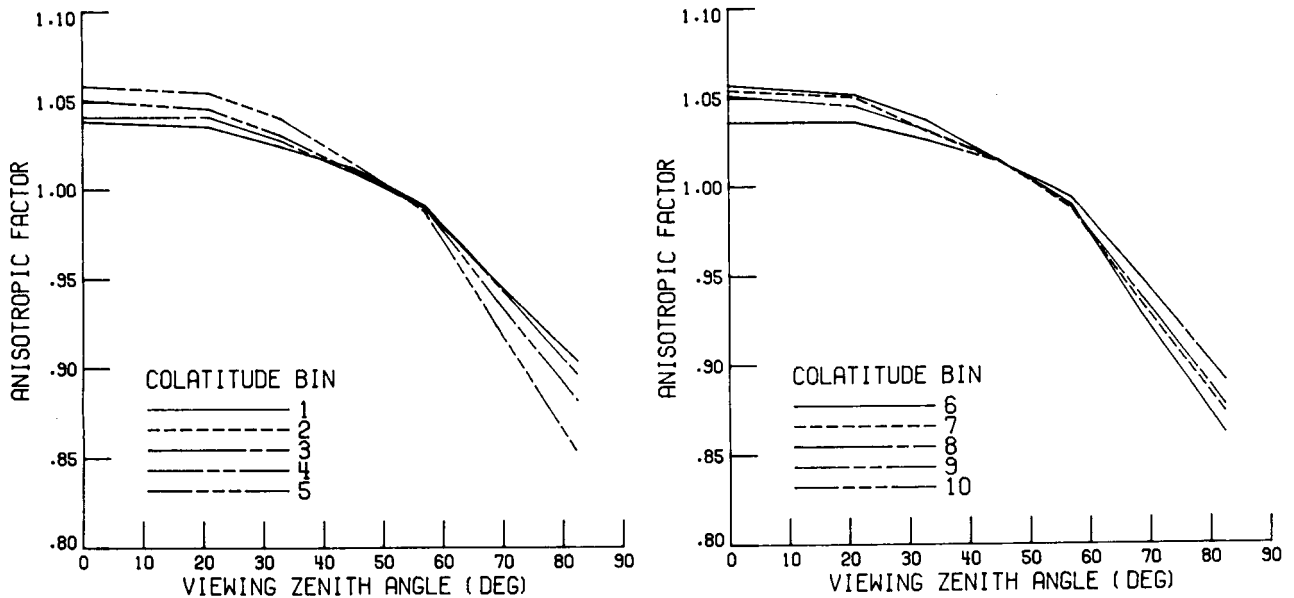
ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT, OCT, NOV)

COLATITUDE

		NORTH POLE										
		1	2	3	4	5	6	7	8	9	10	
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180	
		COLATITUDE										
BIN NO.	ANGLE (DEG)											
VIEWING ZENITH												
BIN NO.	ANGLE (DEG)											
1	0-15	1.04(.74) 4.6(74)	1.04(411) 4.6(411)	1.04(412) 7.4(412)	1.05(411) 8.5(411)	1.06(406) 6.3(406)	1.06(411) 6.7(411)	1.05(411) 7.7(411)	1.05(38) 7.8(38)	1.04(38) 5.0(38)	1.04(38) 5.0(38)	
2	15-27	1.04(74) 4.7(74)	1.04(411) 4.7(411)	1.04(412) 7.5(412)	1.05(411) 8.5(411)	1.05(411) 6.4(411)	1.05(411) 6.4(411)	1.05(411) 8.0(411)	1.05(38) 7.5(38)	1.04(38) 5.0(38)	1.04(38) 5.0(38)	
3	27-39	1.02(74) 4.4(74)	1.02(411) 4.4(411)	1.03(412) 7.4(412)	1.03(411) 8.2(411)	1.04(411) 6.1(411)	1.04(411) 6.1(411)	1.03(411) 7.9(411)	1.03(38) 7.1(38)	1.03(38) 4.8(38)	1.03(38) 4.8(38)	
4	39-51	1.01(74) 4.3(74)	1.01(411) 4.3(411)	1.01(412) 7.1(412)	1.01(411) 8.1(411)	1.02(411) 6.2(411)	1.02(411) 6.1(411)	1.02(411) 7.6(411)	1.02(38) 7.2(38)	1.01(38) 5.2(38)	1.01(38) 5.2(38)	
5	51-63	.99(74) 4.4(74)	.99(411) 4.4(411)	.99(412) 6.9(412)	.99(411) 7.7(411)	.99(411) 6.3(411)	.99(411) 5.7(411)	.99(411) 7.1(411)	.99(38) 6.9(38)	.99(38) 5.1(38)	.99(38) 5.1(38)	
6	63-75	.95(74) 4.6(74)	.95(411) 4.6(411)	.95(412) 6.9(412)	.94(411) 7.8(411)	.92(411) 7.4(411)	.93(411) 6.8(411)	.93(411) 7.6(411)	.94(38) 7.2(38)	.95(38) 5.4(38)	.95(38) 5.4(38)	
7	75-90	.90(74) 4.7(74)	.90(394) 4.7(394)	.90(412) 7.0(412)	.98(411) 7.3(411)	.85(411) 7.6(411)	.86(411) 7.3(411)	.87(411) 7.1(411)	.88(38) 6.9(38)	.89(38) 5.1(38)	.89(38) 5.1(38)	



(d) Fall (Northern Hemisphere).

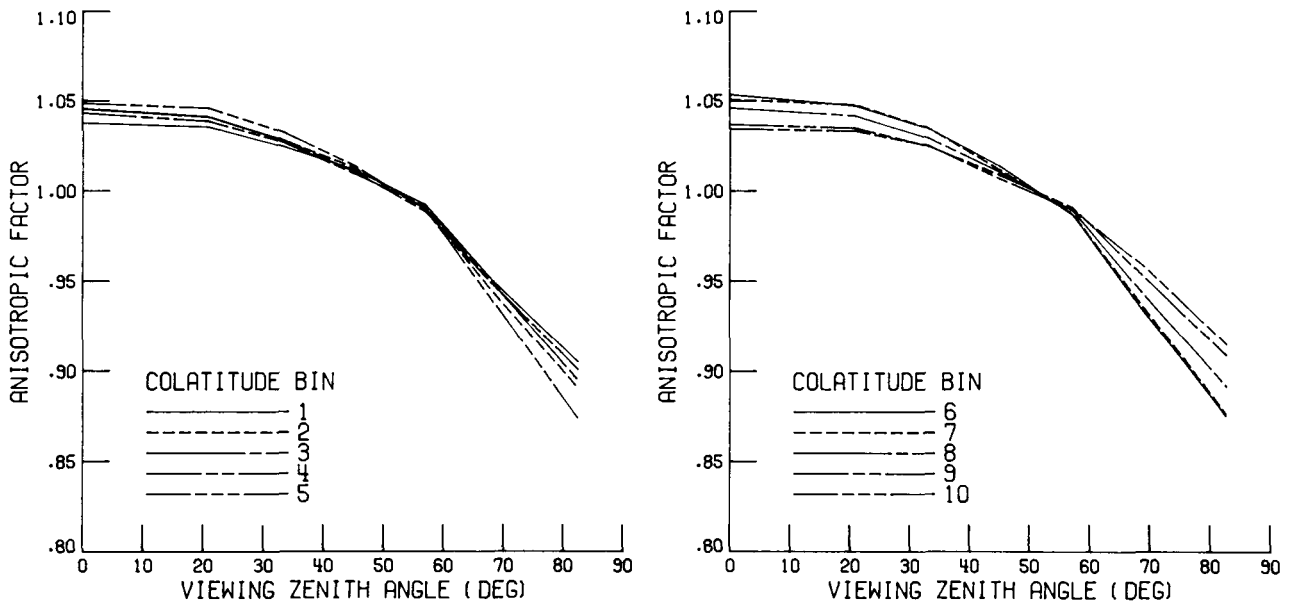
Figure 8. Concluded.

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(3) 5.8(3)	1.05(3) 5.4(3)	1.05(3) 6.4(3)	1.04(3) 6.2(3)	1.05(3) 5.1(3)	1.05(3) 5.0(3)	1.05(3) 7.1(3)	1.05(3) 7.9(3)	1.04(3) 6.9(3)	1.03(3) 5.8(3)
2	15-27	1.04(3) 6.0(3)	1.04(3) 5.3(3)	1.04(3) 6.3(3)	1.04(3) 6.1(3)	1.05(3) 5.1(3)	1.05(3) 5.2(3)	1.05(3) 7.0(3)	1.04(3) 8.0(3)	1.03(3) 6.9(3)	1.03(3) 6.2(3)
3	27-39	1.02(3) 5.9(3)	1.03(3) 5.2(3)	1.03(3) 6.3(3)	1.03(3) 5.8(3)	1.03(3) 4.9(3)	1.03(3) 4.9(3)	1.04(3) 6.9(3)	1.03(3) 7.8(3)	1.02(3) 6.7(3)	1.03(3) 6.0(3)
4	39-51	1.01(3) 5.7(3)	1.01(3) 5.0(3)	1.01(3) 6.1(3)	1.01(3) 5.8(3)	1.01(3) 4.8(3)	1.01(3) 5.0(3)	1.01(3) 6.6(3)	1.01(3) 7.5(3)	1.01(3) 6.5(3)	1.01(3) 5.4(3)
5	51-63	.99(3) 5.2(3)	.99(3) 5.0(3)	.99(3) 6.0(3)	.99(3) 5.6(3)	.99(3) 5.0(3)	.99(3) 5.2(3)	.99(3) 6.2(3)	.99(3) 7.1(3)	.99(3) 6.3(3)	.99(3) 5.4(3)
6	63-75	.95(3) 5.0(3)	.94(3) 5.2(3)	.95(3) 6.0(3)	.95(3) 6.0(3)	.94(3) 6.0(3)	.93(3) 6.3(3)	.94(3) 6.5(3)	.94(3) 7.1(3)	.95(3) 6.1(3)	.96(3) 5.5(3)
7	75-90	.91(3) 4.5(3)	.89(3) 5.1(3)	.89(3) 6.2(3)	.90(3) 5.9(3)	.87(3) 6.6(3)	.88(3) 6.6(3)	.88(3) 6.6(3)	.89(3) 6.5(3)	.91(3) 5.7(3)	.92(3) 4.9(3)



(a) Winter (Northern Hemisphere).

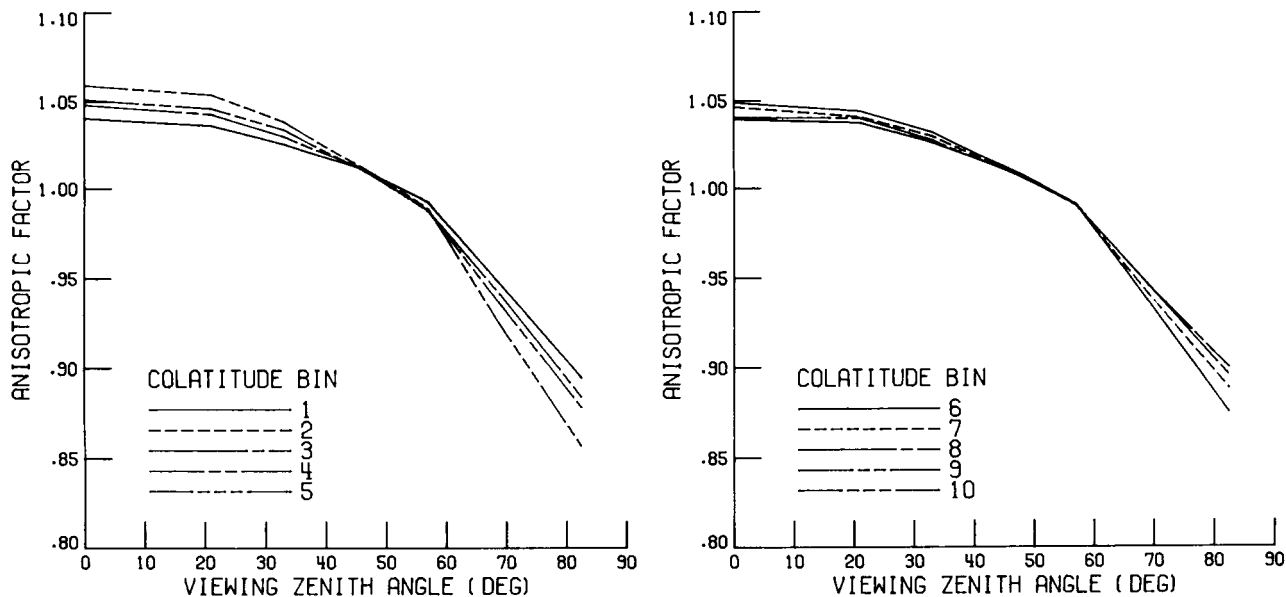
Figure 9. Day-night average limb-darkening model for partly cloudy over land-ocean mix. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING (MAR, APR, MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(3) 5.0(3)	1.04(3) 5.2(3)	1.05(3) 7.6(3)	1.05(3) 8.5(3)	1.06(3) 5.6(3)	1.05(3) 4.7(3)	1.05(3) 5.2(3)	1.04(3) 6.6(3)	1.04(3) 5.8(3)	1.04(3) 4.6(3)
2	15-27	1.04(3) 5.2(3)	1.04(3) 5.4(3)	1.04(3) 7.5(3)	1.05(3) 8.7(3)	1.05(3) 6.0(3)	1.04(3) 5.1(3)	1.04(3) 5.3(3)	1.04(3) 6.7(3)	1.04(3) 5.8(3)	1.04(3) 4.6(3)
3	27-39	1.03(3) 5.1(3)	1.03(3) 5.3(3)	1.03(3) 7.2(3)	1.03(3) 8.4(3)	1.04(3) 6.0(3)	1.03(3) 5.1(3)	1.03(3) 5.3(3)	1.03(3) 6.6(3)	1.03(3) 5.6(3)	1.03(3) 4.5(3)
4	39-51	1.01(3) 5.3(3)	1.01(3) 5.4(3)	1.01(3) 7.2(3)	1.01(3) 8.1(3)	1.01(3) 5.9(3)	1.01(3) 4.8(3)	1.01(3) 5.3(3)	1.01(3) 6.3(3)	1.01(3) 5.7(3)	1.01(3) 4.5(3)
5	51-63	.99(3) 5.1(3)	.99(3) 5.3(3)	.99(3) 6.9(3)	.99(3) 7.7(3)	.99(3) 5.9(3)	.99(3) 4.8(3)	.99(3) 4.9(3)	.99(3) 6.2(3)	.99(3) 5.6(3)	.99(3) 4.4(3)
6	63-75	.95(3) 5.3(3)	.95(3) 5.5(3)	.94(3) 6.9(3)	.94(3) 7.9(3)	.92(3) 7.1(3)	.94(3) 6.2(3)	.94(3) 5.6(3)	.95(3) 6.3(3)	.95(3) 5.7(3)	.95(3) 4.7(3)
7	75-90	.89(3) 4.9(3)	.89(3) 5.0(3)	.88(3) 6.6(3)	.88(3) 7.7(3)	.86(3) 7.5(3)	.88(3) 6.9(3)	.89(3) 5.6(3)	.90(3) 6.4(3)	.90(3) 5.8(3)	.90(3) 4.8(3)



(b) Spring (Northern Hemisphere).

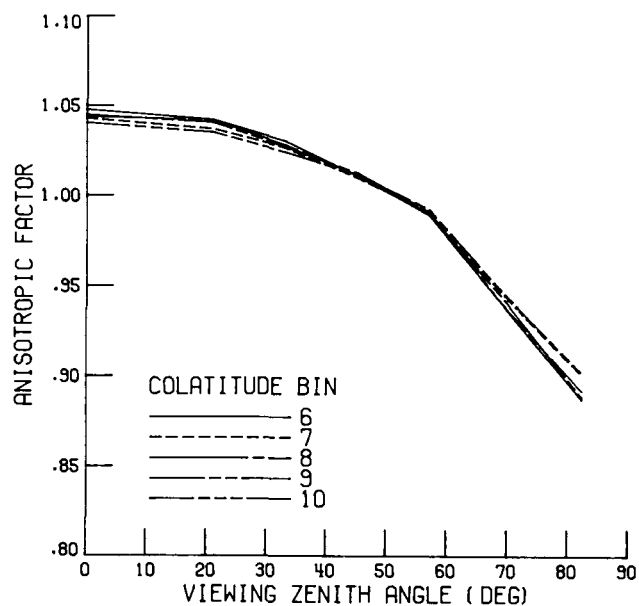
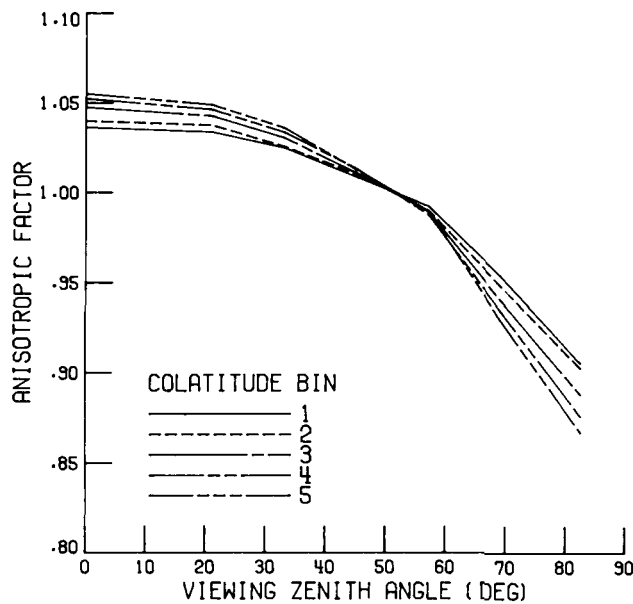
Figure 9. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-16	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN ANGLE NO. (DEG)	1	0-15	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.06(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)
			5.0(3)	5.3(3)	6.9(3)	9.7(3)	5.1(3)	4.1(3)	5.5(3)	5.7(3)	4.3(3)
2	15-27	1.03(3)	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)
		5.4(3)	5.3(3)	7.1(3)	9.8(3)	5.2(3)	4.1(3)	5.5(3)	5.7(3)	4.5(3)	6.6(3)
3	27-39	1.02(3)	1.03(3)	1.03(3)	1.03(3)	1.04(3)	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.02(3)
		5.1(3)	5.2(3)	6.9(3)	9.5(3)	5.0(3)	4.3(3)	5.3(3)	5.6(3)	4.3(3)	6.5(3)
4	39-51	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)
		4.6(3)	5.0(3)	6.7(3)	9.2(3)	4.9(3)	4.3(3)	5.3(3)	5.4(3)	4.3(3)	6.5(3)
5	51-63	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)
		4.6(3)	5.0(3)	6.4(3)	8.6(3)	4.9(3)	4.4(3)	5.2(3)	5.5(3)	4.4(3)	6.6(3)
6	63-75	.95(3)	.95(3)	.94(3)	.94(3)	.93(3)	.94(3)	.95(3)	.95(3)	.94(3)	.95(3)
		4.8(3)	5.1(3)	6.6(3)	8.6(3)	6.0(3)	5.2(3)	5.4(3)	5.6(3)	4.7(3)	6.8(3)
7	75-90	.91(3)	.90(3)	.89(3)	.88(3)	.87(3)	.89(3)	.90(3)	.89(3)	.89(3)	.90(3)
		4.2(3)	4.4(3)	6.3(3)	7.7(3)	6.5(3)	5.5(3)	5.3(3)	6.2(3)	4.6(3)	6.9(3)



(c) Summer (Northern Hemisphere).

Figure 9. Continued.

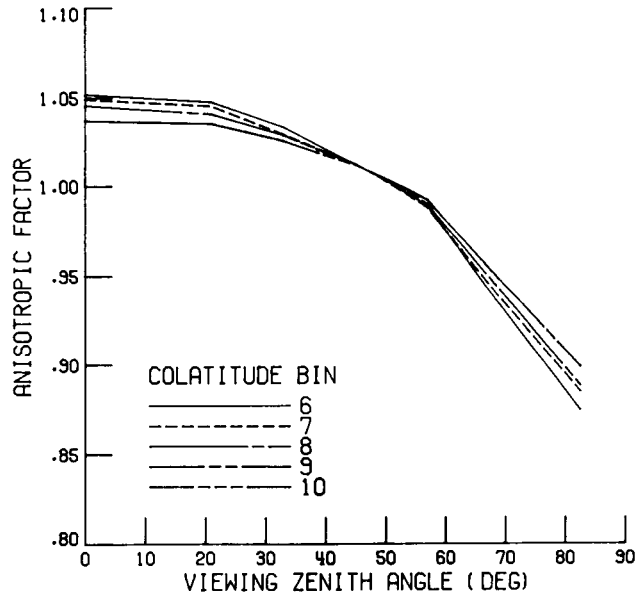
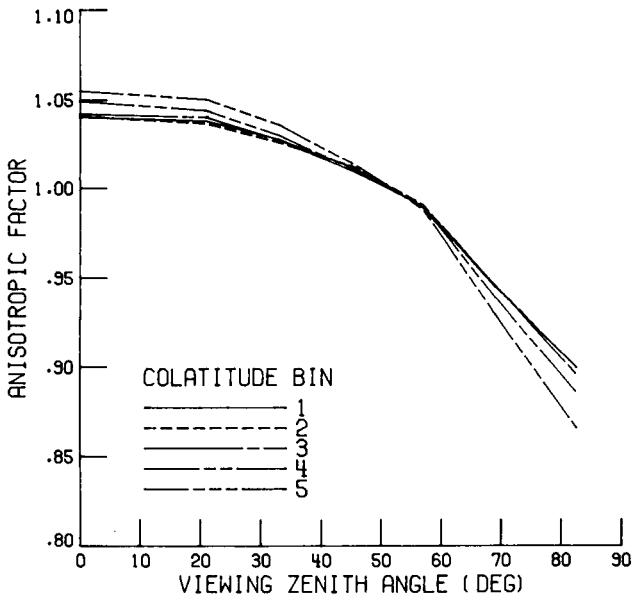
ORIGINAL PAGE IS
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SCENE TYPE : PARTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL(SEPT,OCT,NOV)

COLATITUDE

		NORTH POLE									
		1	2	3	4	5	6	7	8	9	10
BIN NO.	ANGLE(DEG)	0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04() 4.5()	1.04() 4.3()	1.04() 6.6()	1.05() 6.7()	1.05() 5.1()	1.05() 5.4()	1.05() 7.2()	1.05() 7.2()	1.04() 5.9()	1.04() 6.3()
2	15-27	1.04() 4.4()	1.04() 4.4()	1.04() 6.6()	1.04() 6.7()	1.05() 5.3()	1.05() 5.3()	1.05() 7.4()	1.04() 7.0()	1.04() 6.0()	1.04() 6.4()
3	27-39	1.03() 4.3()	1.03() 4.2()	1.03() 6.6()	1.03() 6.5()	1.04() 5.1()	1.03() 5.1()	1.03() 7.1()	1.03() 6.6()	1.03() 5.9()	1.03() 6.2()
4	39-51	1.01() 4.3()	1.01() 4.2()	1.01() 6.3()	1.01() 6.4()	1.01() 5.2()	1.01() 5.0()	1.01() 6.9()	1.01() 6.6()	1.01() 6.1()	1.01() 6.4()
5	51-63	.99() 4.4()	.99() 4.2()	.99() 6.2()	.99() 6.1()	.99() 5.3()	.99() 4.9()	.99() 6.5()	.99() 6.3()	.99() 5.9()	.99() 6.3()
6	63-75	.94() 4.6()	.95() 4.5()	.95() 6.3()	.94() 6.5()	.93() 6.4()	.93() 5.9()	.94() 6.7()	.94() 6.4()	.95() 6.0()	.95() 6.3()
7	75-90	.90() 4.8()	.90() 4.6()	.90() 6.3()	.89() 6.3()	.87() 6.9()	.87() 6.4()	.88() 6.2()	.89() 6.0()	.90() 5.3()	.90() 5.6()



(d) Fall (Northern Hemisphere).

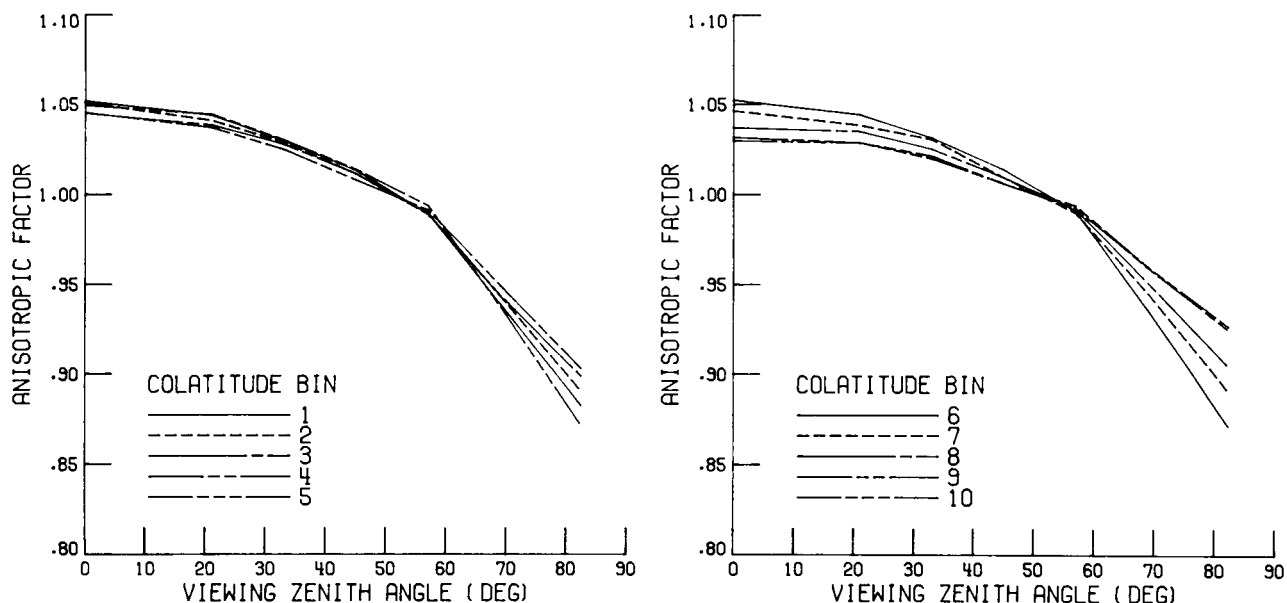
Figure 9. Concluded.

**ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER OCEAN
 DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
 2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
 () - DATA SOURCE

SEASON : WINTER(DEC,JAN,FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(87) 5.1(87)	1.05(411) 5.3(411)	1.04(411) 6.6(411)	1.05(411) 7.5(411)	1.05(411) 7.9(411)	1.05(411) 8.2(411)	1.05(411) 8.3(411)	1.04(411) 6.4(411)	1.03(411) 4.3(411)	1.03(397) 4.1(397)
2	15-27	1.04(88) 5.0(88)	1.04(411) 5.4(411)	1.04(411) 6.5(411)	1.04(411) 7.7(411)	1.04(411) 8.2(411)	1.04(411) 8.3(411)	1.04(411) 8.2(411)	1.04(411) 6.6(411)	1.03(411) 4.4(411)	1.03(397) 4.3(397)
3	27-39	1.03(87) 4.8(87)	1.03(411) 5.1(411)	1.03(411) 6.5(411)	1.02(411) 7.7(411)	1.03(411) 8.1(411)	1.03(411) 7.9(411)	1.03(411) 7.7(411)	1.03(411) 6.5(411)	1.02(411) 4.3(411)	1.02(397) 4.0(397)
4	39-51	1.01(88) 4.5(88)	1.01(411) 5.0(411)	1.01(411) 6.3(411)	1.01(411) 7.6(411)	1.01(411) 8.1(411)	1.01(411) 8.3(411)	1.01(411) 7.9(411)	1.01(411) 6.4(411)	1.01(411) 4.2(411)	1.01(397) 4.0(397)
5	51-63	.99(88) 4.9(88)	.99(411) 5.1(411)	.99(411) 6.3(411)	.99(411) 7.4(411)	.99(411) 8.0(411)	.99(411) 8.1(411)	.99(411) 7.8(411)	.99(411) 6.3(411)	.99(411) 4.1(411)	.99(397) 4.0(397)
6	63-75	.94(88) 5.1(88)	.94(411) 5.4(411)	.94(411) 6.5(411)	.95(411) 7.9(411)	.94(411) 9.3(411)	.94(411) 9.5(411)	.95(411) 8.4(411)	.95(411) 6.6(411)	.96(411) 4.2(411)	.96(397) 4.1(397)
7	75-90	.88(87) 5.2(87)	.89(411) 5.3(411)	.90(411) 6.3(411)	.90(411) 8.1(411)	.87(411) 9.7(411)	.87(411) 10.2(411)	.89(411) 9.0(411)	.90(411) 6.6(411)	.92(411) 4.1(411)	.93(397) 3.9(397)



(a) Winter (Northern Hemisphere).

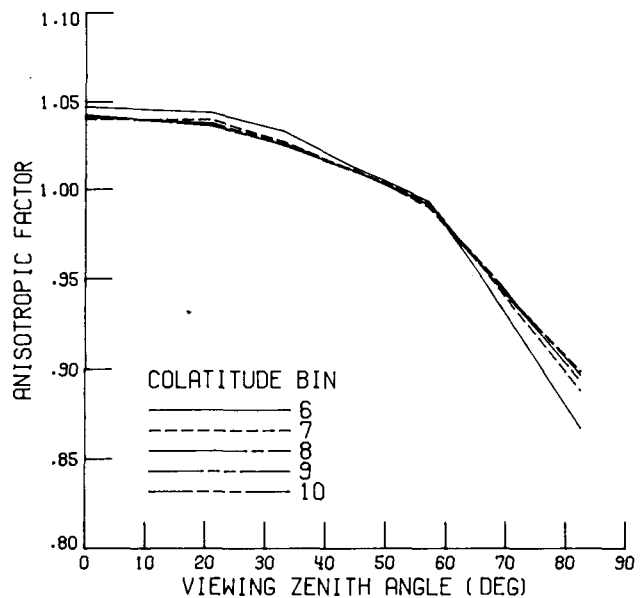
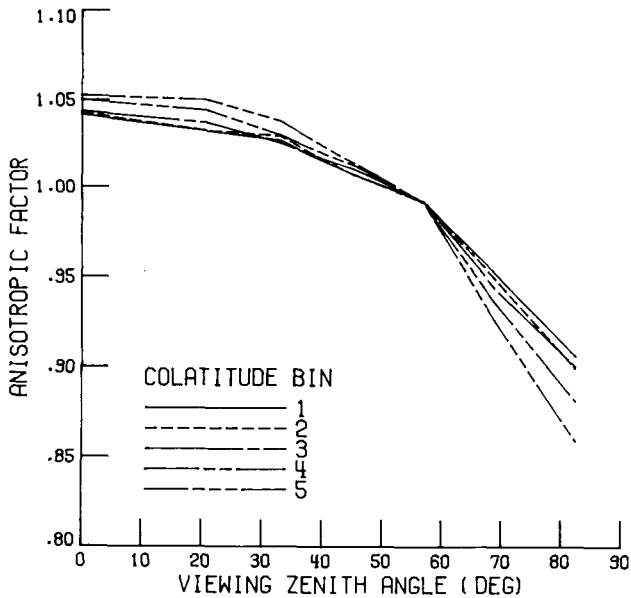
Figure 10. Day-night average limb-darkening model for mostly cloudy over ocean. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
VIEWING ZENITH	BIN ANGLE										
NO.	(DEG)										
1	0-15	1.04(380) 4.3(380)	1.04(412) 4.6(412)	1.04(411) 6.1(411)	1.05(413) 7.6(413)	1.05(411) 8.5(411)	1.05(241) 8.6(241)	1.04(241) 8.1(241)	1.04(411) 6.6(411)	1.04(411) 4.7(411)	1.04(40) 4.7(40)
2	15-27	1.03(210) 5.2(210)	1.03(412) 5.0(412)	1.04(411) 6.1(411)	1.04(413) 7.4(413)	1.05(411) 8.6(411)	1.04(411) 8.5(411)	1.04(411) 8.1(411)	1.04(411) 6.7(411)	1.04(411) 4.8(411)	1.04(40) 4.5(40)
3	27-39	1.03(380) 4.8(380)	1.03(412) 4.8(412)	1.03(411) 6.0(411)	1.03(413) 7.3(413)	1.04(411) 8.0(411)	1.03(411) 8.3(411)	1.03(411) 8.1(411)	1.03(411) 6.6(411)	1.03(411) 4.7(411)	1.03(40) 4.4(40)
4	39-51	1.01(380) 4.8(380)	1.01(412) 4.6(412)	1.01(411) 6.2(411)	1.01(413) 7.6(413)	1.02(411) 8.5(411)	1.01(411) 8.4(411)	1.01(411) 8.0(411)	1.01(411) 6.6(411)	1.01(411) 4.9(411)	1.01(40) 4.4(40)
5	51-63	.99(380) 4.7(380)	.99(412) 4.6(412)	.99(411) 6.1(411)	.99(413) 7.8(413)	.99(411) 8.4(411)	.99(411) 8.1(411)	.99(411) 8.1(411)	.99(411) 6.4(411)	.99(411) 4.7(411)	.99(40) 4.4(40)
6	63-75	.95(380) 4.9(380)	.95(412) 5.0(412)	.94(411) 6.5(411)	.94(413) 8.6(413)	.93(411) 9.6(411)	.94(411) 9.7(411)	.94(411) 8.7(411)	.95(411) 7.0(411)	.95(411) 5.0(411)	.95(40) 4.8(40)
7	75-90	.91(380) 4.6(380)	.90(412) 4.8(412)	.90(411) 6.5(411)	.88(413) 8.9(413)	.86(411) 9.9(411)	.87(411) 10.2(411)	.89(411) 9.0(411)	.89(411) 7.0(411)	.90(411) 5.1(411)	.90(40) 4.7(40)



(b) Spring (Northern Hemisphere).

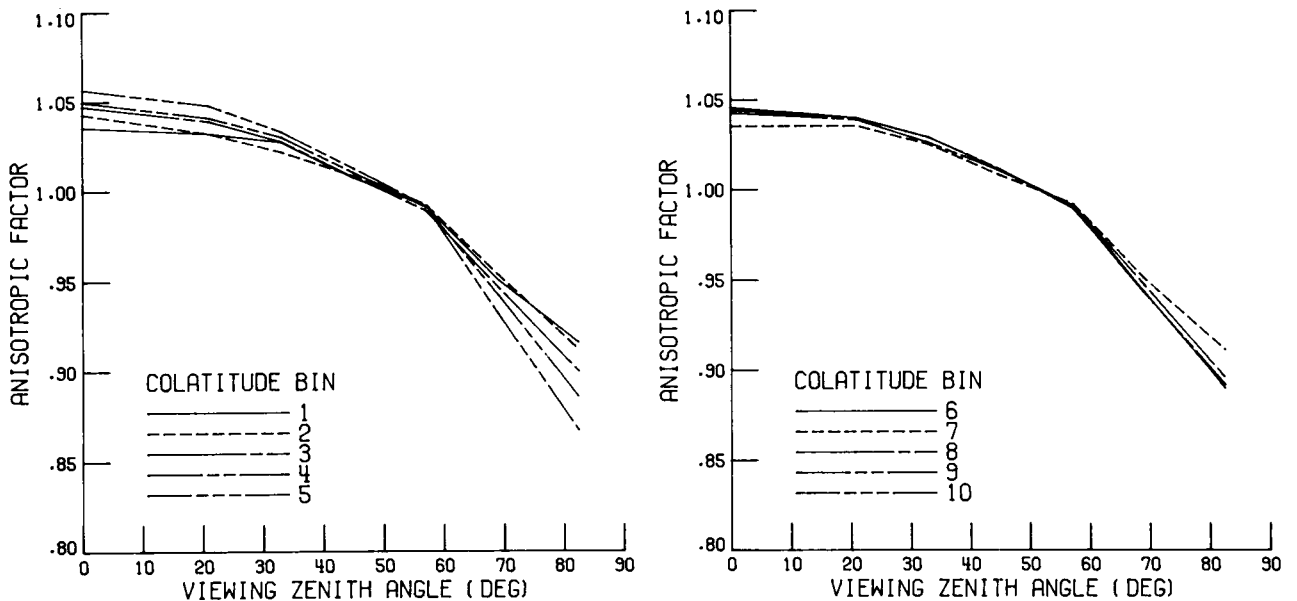
Figure 10. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(409) 4.6(409)	1.04(411) 5.0(411)	1.05(411) 7.2(411)	1.05(411) 8.0(411)	1.06(411) 8.2(411)	1.04(411) 6.9(411)	1.04(411) 7.6(411)	1.04(411) 6.3(411)	1.05(411) 5.4(411)	1.05(74) 5.4(74)
2	15-27	1.03(410) 4.6(410)	1.03(411) 5.2(411)	1.04(411) 7.1(411)	1.04(411) 8.0(411)	1.05(411) 8.1(411)	1.04(411) 7.1(411)	1.04(411) 7.4(411)	1.04(411) 6.3(411)	1.04(411) 5.3(411)	1.04(74) 5.3(74)
3	27-39	1.03(410) 4.1(410)	1.02(411) 5.1(411)	1.03(411) 6.9(411)	1.03(411) 7.7(411)	1.03(411) 7.7(411)	1.03(411) 6.9(411)	1.03(411) 7.3(411)	1.03(411) 6.3(411)	1.03(411) 5.3(411)	1.03(74) 5.3(74)
4	39-51	1.01(410) 4.3(410)	1.01(411) 4.9(411)	1.01(411) 7.0(411)	1.01(411) 7.9(411)	1.01(411) 8.0(411)	1.01(411) 7.2(411)	1.01(411) 7.4(411)	1.01(411) 6.2(411)	1.01(411) 5.3(411)	1.01(74) 5.3(74)
5	51-63	.99(410) 4.4(410)	.99(411) 4.9(411)	.99(411) 6.9(411)	.99(411) 7.7(411)	.99(411) 7.8(411)	.99(411) 7.0(411)	.99(411) 7.1(411)	.99(411) 6.1(411)	.99(411) 5.3(411)	.99(74) 5.3(74)
6	63-75	.95(410) 4.8(410)	.95(411) 5.2(411)	.95(411) 7.3(411)	.94(411) 8.7(411)	.93(411) 9.2(411)	.94(411) 8.1(411)	.95(411) 7.6(411)	.95(411) 6.5(411)	.94(411) 5.7(411)	.94(74) 5.7(74)
7	75-90	.92(410) 4.5(410)	.91(411) 5.3(411)	.90(411) 7.4(411)	.89(411) 9.3(411)	.87(411) 9.7(411)	.89(411) 8.8(411)	.91(411) 7.4(411)	.90(411) 6.6(411)	.89(411) 5.8(411)	.89(74) 5.8(74)



(c) Summer (Northern Hemisphere).

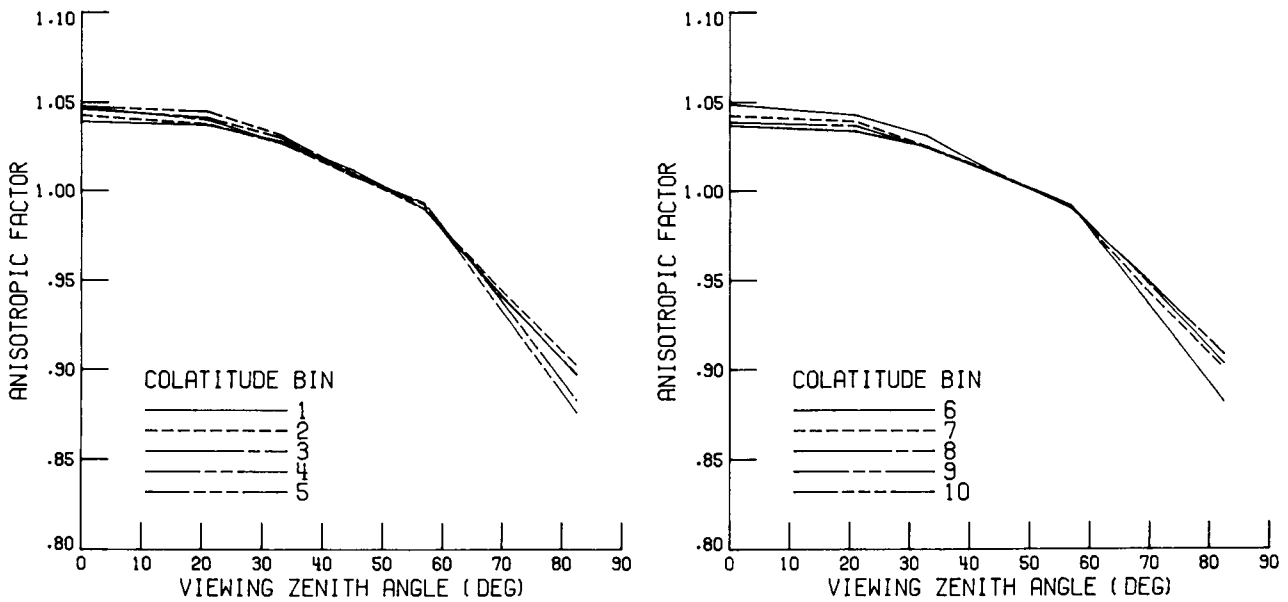
Figure 10. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER OCEAN
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/H**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT,OCT,NOV)

		COLATITUDE									
		NORTH POLE									
VIEWING ZENITH BIN NO.	VIEWING ZENITH ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
1	0-15	1.04(411) 4.6(411)	1.04(411) 5.5(411)	1.05(411) 7.2(411)	1.05(411) 8.4(411)	1.05(413) 7.9(413)	1.05(411) 7.4(411)	1.04(411) 7.5(411)	1.04(411) 5.9(411)	1.04(411) 5.3(411)	1.04(74) 5.3(74)
2	15-27	1.04(411) 4.3(411)	1.04(411) 5.4(411)	1.04(411) 7.3(411)	1.04(411) 8.2(411)	1.04(413) 7.5(413)	1.04(411) 7.4(411)	1.04(411) 7.4(411)	1.04(411) 5.9(411)	1.03(411) 5.1(411)	1.03(74) 5.1(74)
3	27-39	1.03(411) 4.1(411)	1.03(411) 5.2(411)	1.03(411) 7.1(411)	1.03(411) 7.9(411)	1.03(413) 7.4(413)	1.03(411) 7.2(411)	1.03(411) 7.5(411)	1.03(411) 5.9(411)	1.03(411) 5.1(411)	1.03(74) 5.1(74)
4	39-51	1.01(411) 4.2(411)	1.01(411) 5.4(411)	1.01(411) 7.1(411)	1.01(411) 8.2(411)	1.01(413) 7.5(413)	1.01(411) 7.5(411)	1.01(411) 7.5(411)	1.01(411) 5.9(411)	1.01(411) 5.0(411)	1.01(74) 5.0(74)
5	51-63	.99(411) 4.2(411)	.99(411) 5.3(411)	.99(411) 6.8(411)	.99(411) 7.9(411)	.99(413) 7.3(413)	.99(411) 7.2(411)	.99(411) 7.3(411)	.99(411) 5.8(411)	.99(411) 5.1(411)	.99(74) 5.1(74)
6	63-75	.95(411) 4.5(411)	.95(411) 5.6(411)	.94(411) 7.1(411)	.94(411) 8.9(411)	.94(413) 8.4(413)	.94(411) 8.4(411)	.95(411) 8.0(411)	.95(411) 6.1(411)	.95(411) 5.3(411)	.95(74) 5.3(74)
7	75-90	.90(411) 4.5(411)	.90(411) 5.6(411)	.90(411) 7.1(411)	.88(411) 9.3(411)	.88(413) 9.0(413)	.88(411) 9.2(411)	.90(411) 8.2(411)	.90(411) 6.2(411)	.91(411) 5.4(411)	.91(74) 5.4(74)



(d) Fall (Northern Hemisphere).

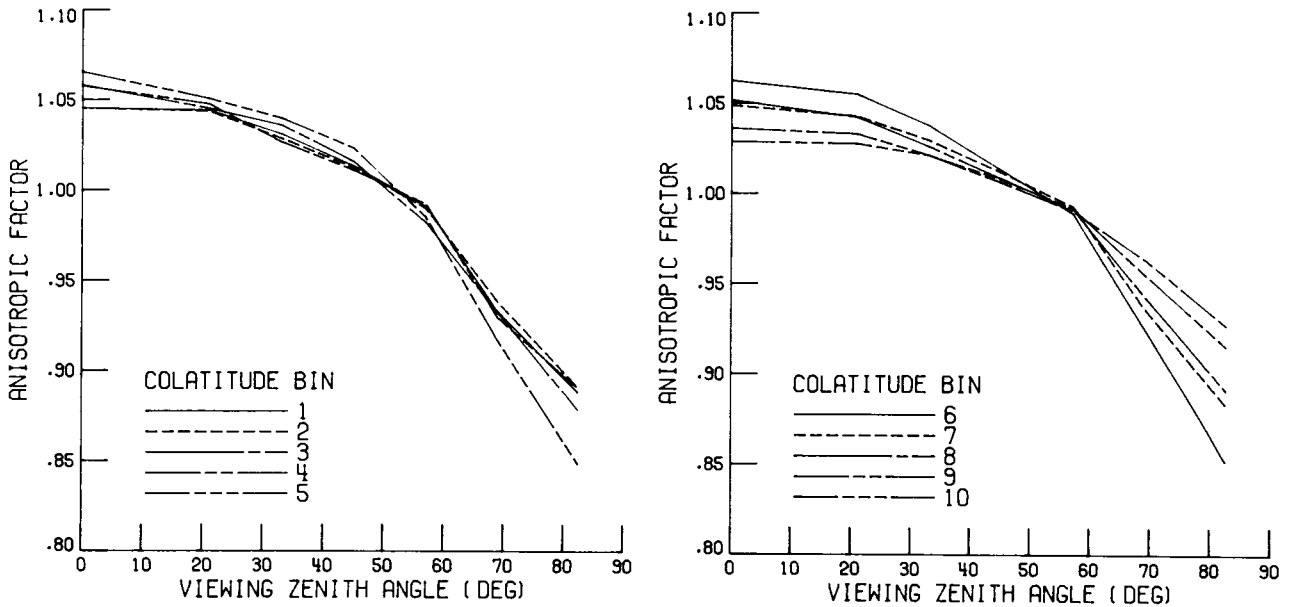
Figure 10. Concluded.

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SCENE TYPE : MOSTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

VIEWING ZENITH BIN NO. ANGLE (DEG)	COLATITUDE									
	NORTH POLE 1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
1 0-15	1.05(75) 5.9(75)	1.05(62) 6.1(62)	1.06(412) 7.6(412)	1.06(70) 8.9(70)	1.07(412) 8.5(412)	1.06(410) 8.8(410)	1.05(394) 10.1(394)	1.05(38) 7.8(38)	1.04(43) 5.4(43)	1.03(41) 3.5(41)
2 15-27	1.04(75) 6.1(75)	1.04(62) 6.3(62)	1.05(412) 7.4(412)	1.05(71) 9.3(71)	1.05(412) 9.3(412)	1.06(411) 8.8(411)	1.04(411) 10.7(411)	1.04(38) 8.0(38)	1.03(43) 5.3(43)	1.03(41) 3.8(41)
3 27-39	1.03(75) 5.9(75)	1.03(62) 6.0(62)	1.04(412) 7.1(412)	1.03(71) 9.1(71)	1.04(412) 8.6(412)	1.04(411) 8.4(411)	1.03(394) 9.9(394)	1.03(38) 7.5(38)	1.02(43) 5.1(43)	1.02(41) 3.8(41)
4 39-51	1.01(75) 5.8(75)	1.01(62) 6.2(62)	1.02(412) 7.6(412)	1.01(71) 8.7(71)	1.02(412) 8.8(412)	1.01(411) 8.4(411)	1.01(411) 10.2(411)	1.01(38) 7.8(38)	1.01(43) 5.1(43)	1.01(41) 3.9(41)
5 51-63	.99(75) 6.0(75)	.99(62) 6.2(62)	.98(412) 7.6(412)	.99(71) 8.4(71)	.99(412) 9.3(412)	.99(411) 8.6(411)	.99(411) 9.5(411)	.99(38) 7.4(38)	.99(43) 5.0(43)	.99(41) 3.8(41)
6 63-75	.93(75) 6.7(75)	.94(62) 6.9(62)	.93(412) 7.8(412)	.93(71) 9.2(71)	.92(412) 10.4(412)	.93(411) 9.1(411)	.94(411) 10.1(411)	.94(38) 7.6(38)	.96(43) 5.2(43)	.96(41) 3.6(41)
7 75-90	.89(75) 6.2(75)	.89(62) 6.7(62)	.88(412) 7.7(412)	.89(71) 8.7(71)	.85(412) 10.6(412)	.85(411) 9.3(411)	.88(394) 9.8(394)	.89(38) 7.6(38)	.92(43) 5.0(43)	.93(41) 3.9(41)



(a) Winter (Northern Hemisphere).

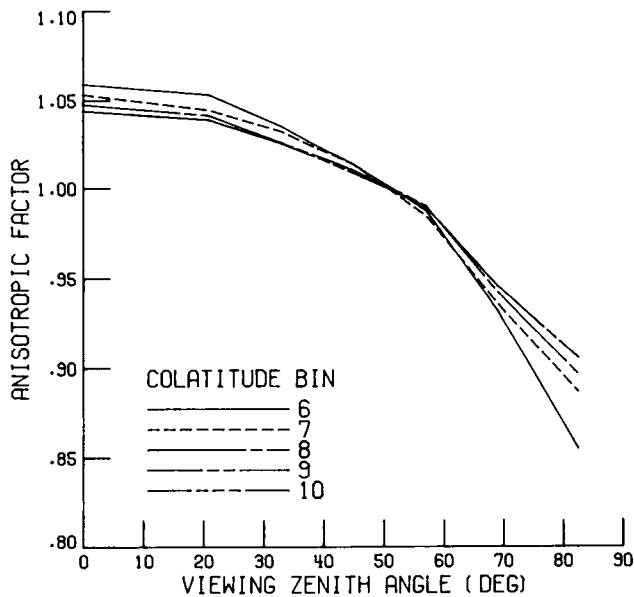
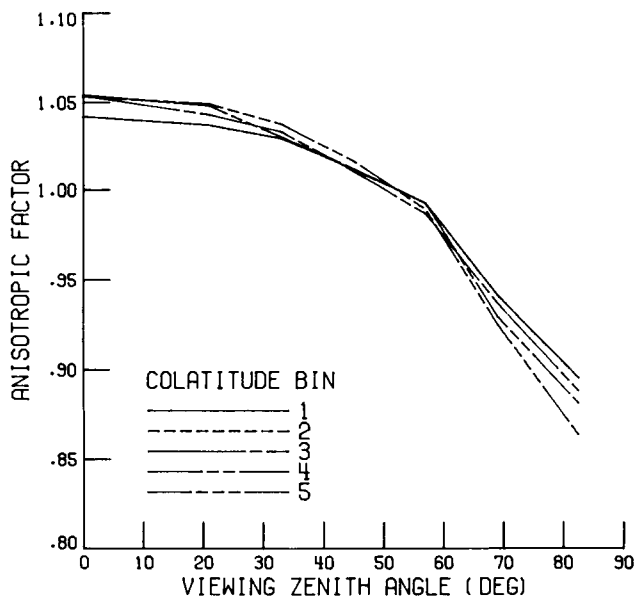
Figure 11. Day-night average limb-darkening model for mostly cloudy over land or desert. (See table 4 for explanation of data sources.)

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SCENE TYPE : MOSTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR, APR, MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO.	ANGLE (DEG)										
1	0-15	1.04(77) 5.1(77)	1.04(383) 5.1(383)	1.05(412) 7.1(412)	1.05(412) 8.8(412)	1.05(43) 8.5(43)	1.06(225) 8.3(225)	1.05(393) 9.2(393)	1.05(38) 7.1(38)	1.04(38) 5.3(38)	1.04(38) 5.3(38)
2	15-27	1.04(77) 5.4(77)	1.04(400) 5.4(400)	1.04(412) 6.9(412)	1.05(412) 9.1(412)	1.05(43) 8.8(43)	1.05(395) 8.7(395)	1.04(411) 9.0(411)	1.04(38) 7.2(38)	1.04(38) 5.1(38)	1.04(38) 5.1(38)
3	27-39	1.03(77) 4.9(77)	1.03(383) 4.9(383)	1.03(412) 6.8(412)	1.03(412) 9.0(412)	1.04(43) 8.4(43)	1.04(395) 8.9(395)	1.03(394) 8.8(394)	1.03(38) 7.0(38)	1.03(38) 5.1(38)	1.03(38) 5.1(38)
4	39-51	1.01(77) 5.0(77)	1.01(400) 5.0(400)	1.01(412) 7.2(412)	1.01(412) 8.6(412)	1.02(43) 8.5(43)	1.01(395) 8.7(395)	1.01(411) 8.9(411)	1.01(38) 7.1(38)	1.01(38) 5.2(38)	1.01(38) 5.2(38)
5	51-63	.99(77) 5.6(77)	.99(383) 5.0(383)	.99(412) 6.7(412)	.99(412) 8.6(412)	.99(43) 8.2(43)	.99(395) 8.8(395)	.98(394) 8.6(394)	.99(38) 7.0(38)	.99(38) 4.9(38)	.99(38) 4.9(38)
6	63-75	.94(77) 5.5(77)	.94(400) 5.5(400)	.94(412) 7.1(412)	.93(412) 9.3(412)	.93(43) 9.0(43)	.93(395) 9.6(395)	.94(411) 9.5(411)	.94(38) 7.2(38)	.95(38) 5.3(38)	.95(38) 5.3(38)
7	75-90	.90(77) 5.1(77)	.90(383) 5.1(383)	.89(412) 7.0(412)	.88(412) 8.9(412)	.86(43) 8.9(43)	.85(378) 9.8(378)	.89(394) 9.7(394)	.90(38) 7.3(38)	.91(38) 5.4(38)	.91(38) 5.4(38)



(b) Spring (Northern Hemisphere).

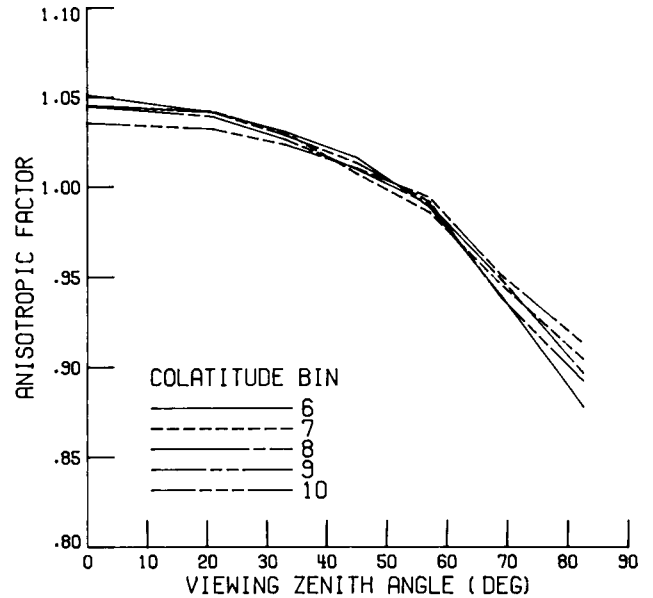
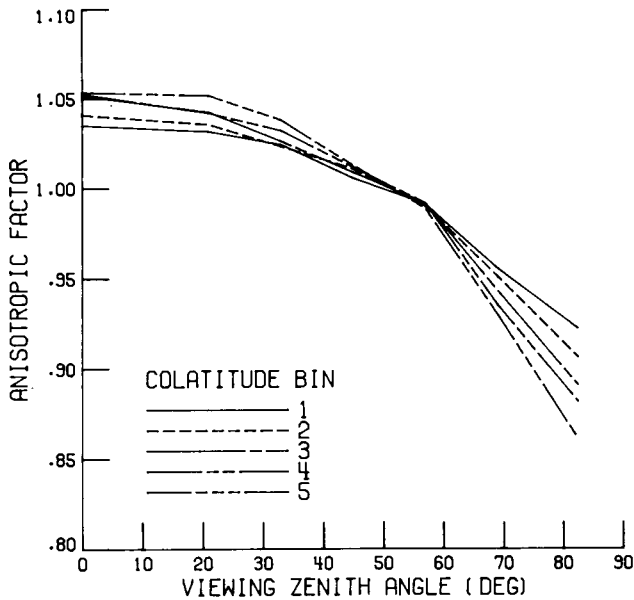
Figure 11. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DeG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN	ANGLE										
NO.	(DEG)										
1	0-15	1.04(400) 4.5(400)	1.04(411) 6.0(411)	1.05(411) 7.8(411)	1.05(411) 9.2(411)	1.05(411) 8.9(411)	1.05(411) 8.3(411)	1.05(413) 8.3(413)	1.04(413) 6.3(413)	1.05(43) 5.5(43)	1.04(41) 5.1(41)
2	15-27	1.03(400) 4.7(400)	1.04(411) 5.9(411)	1.04(411) 8.0(411)	1.04(411) 9.4(411)	1.05(411) 8.3(411)	1.04(411) 8.3(411)	1.04(413) 8.2(413)	1.04(413) 6.4(413)	1.04(43) 5.6(43)	1.03(41) 5.2(41)
3	27-39	1.02(400) 4.2(400)	1.02(411) 5.8(411)	1.03(411) 7.5(411)	1.03(411) 8.8(411)	1.04(411) 7.9(411)	1.03(411) 7.8(411)	1.03(413) 8.3(413)	1.03(413) 6.3(413)	1.03(43) 5.2(43)	1.02(41) 4.8(41)
4	39-51	1.01(213) 4.5(213)	1.01(411) 5.7(411)	1.01(411) 7.8(411)	1.01(411) 8.8(411)	1.01(411) 8.3(411)	1.02(411) 7.6(411)	1.01(413) 8.1(413)	1.01(413) 6.3(413)	1.01(43) 5.3(43)	1.01(41) 4.8(41)
5	51-63	.99(400) 4.6(400)	.99(411) 5.6(411)	.99(411) 7.4(411)	.99(411) 8.5(411)	.99(411) 8.1(411)	.99(411) 7.9(411)	.99(413) 8.1(413)	.99(413) 6.0(413)	.99(43) 5.3(43)	.99(41) 4.7(41)
6	63-75	.96(400) 4.6(400)	.95(411) 5.8(411)	.94(411) 7.6(411)	.94(411) 9.1(411)	.93(411) 8.7(411)	.94(411) 8.5(411)	.95(413) 8.5(413)	.95(413) 6.5(413)	.94(43) 5.9(43)	.95(41) 5.0(41)
7	75-90	.92(383) 4.6(383)	.91(411) 5.8(411)	.89(411) 7.6(411)	.88(411) 8.8(411)	.86(411) 9.1(411)	.88(411) 8.8(411)	.90(413) 8.9(413)	.90(413) 6.6(413)	.89(43) 5.7(43)	.91(41) 4.7(41)



(c) Summer (Northern Hemisphere).

Figure 11. Continued.

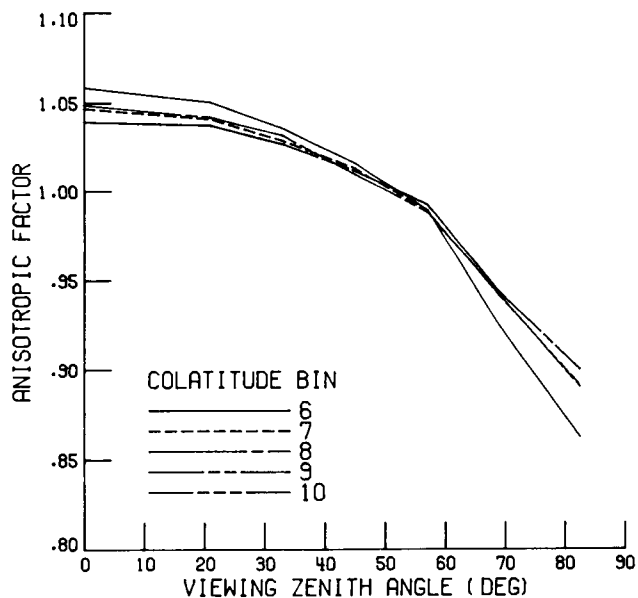
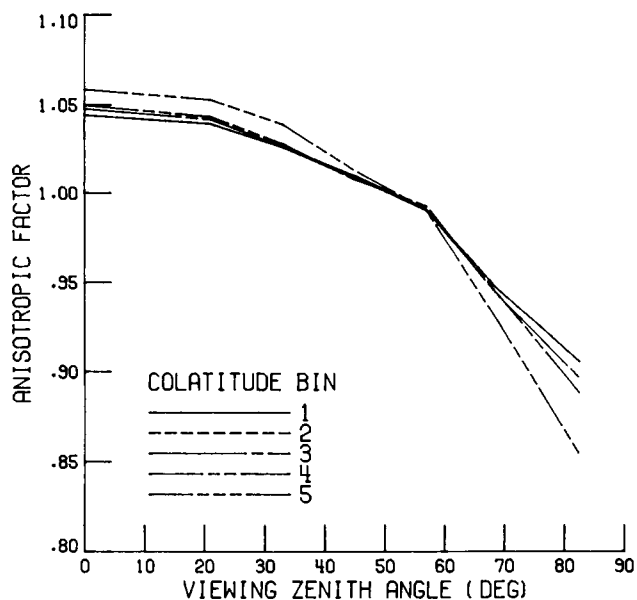
ORIGINAL PAGE IS
OF POOR QUALITY

SCENE TYPE : MOSTLY CLOUDY OVER LAND OR DESERT
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL (SEPT,OCT,NOV)

COLATITUDE

VIEWING ZENITH BIN NO.	VIEWING ZENITH ANGLE (DEG)	NORTH POLE									
		1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
1	0-15	1.04(74)	1.04(411)	1.05(411)	1.05(411)	1.06(412)	1.06(411)	1.05(411)	1.05(43)	1.04(43)	1.04(43)
		5.3(74)	5.3(411)	7.1(411)	9.3(411)	8.3(412)	8.9(411)	9.9(411)	7.0(43)	5.4(43)	5.4(43)
2	15-27	1.04(74)	1.04(411)	1.04(411)	1.04(411)	1.05(412)	1.05(411)	1.04(411)	1.04(43)	1.04(43)	1.04(43)
		5.1(74)	5.1(411)	7.2(411)	9.0(411)	8.7(412)	9.1(411)	10.2(411)	6.8(43)	5.4(43)	5.4(43)
3	27-39	1.03(74)	1.03(411)	1.03(411)	1.03(411)	1.04(412)	1.04(411)	1.03(411)	1.03(43)	1.03(43)	1.03(43)
		5.1(74)	5.1(411)	7.0(411)	8.9(411)	8.6(412)	8.8(411)	10.0(411)	6.8(43)	5.1(43)	5.1(43)
4	39-51	1.01(74)	1.01(411)	1.01(411)	1.01(411)	1.01(412)	1.02(411)	1.01(411)	1.01(43)	1.01(43)	1.01(43)
		5.2(74)	5.2(411)	7.1(411)	8.8(411)	8.6(412)	8.7(411)	9.1(411)	7.2(43)	5.1(43)	5.1(43)
5	51-63	.99(74)	.99(411)	.99(411)	.99(411)	.99(412)	.99(411)	.99(411)	.99(43)	.99(43)	.99(43)
		4.9(74)	4.9(411)	7.0(411)	8.5(411)	8.6(412)	8.4(411)	9.2(411)	6.6(43)	5.1(43)	5.1(43)
6	63-75	.95(74)	.95(411)	.94(411)	.94(411)	.93(412)	.92(411)	.94(411)	.94(43)	.94(43)	.94(43)
		5.3(74)	5.3(411)	7.2(411)	9.0(411)	9.1(412)	9.3(411)	9.5(411)	6.9(43)	5.6(43)	5.6(43)
7	75-90	.91(74)	.91(411)	.90(411)	.89(411)	.85(412)	.86(411)	.89(411)	.89(43)	.90(43)	.90(43)
		5.4(74)	5.4(411)	7.3(411)	9.2(411)	9.7(412)	9.1(411)	9.0(411)	6.9(43)	5.4(43)	5.4(43)



(d) Fall (Northern Hemisphere).

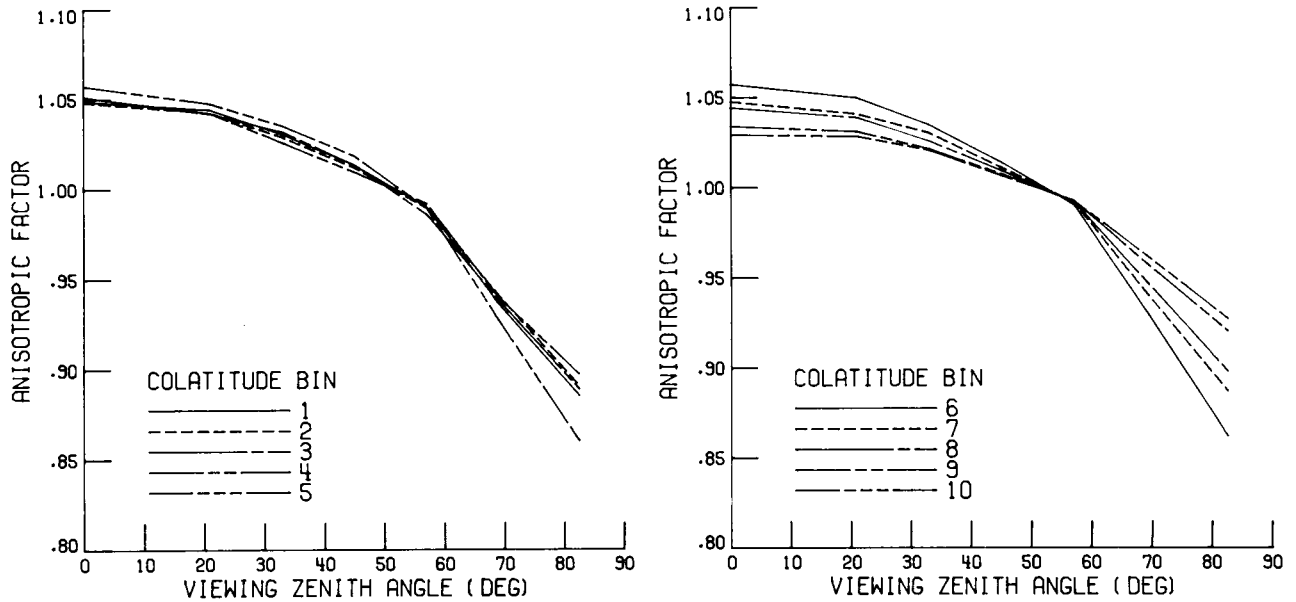
Figure 11. Concluded.

ORIGINAL PAGE IS
OF POOR QUALITY

SCENE TYPE : MOSTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-16	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(3) 7.1(3)	1.05(3) 7.0(3)	1.05(3) 7.2(3)	1.05(3) 8.8(3)	1.06(3) 8.2(3)	1.06(3) 8.7(3)	1.05(3) 9.4(3)	1.04(3) 7.2(3)	1.03(3) 4.9(3)	1.03(3) 4.0(3)
2	15-27	1.04(3) 7.1(3)	1.04(3) 6.9(3)	1.04(3) 7.1(3)	1.04(3) 9.1(3)	1.05(3) 8.8(3)	1.05(3) 8.7(3)	1.04(3) 9.6(3)	1.04(3) 7.5(3)	1.03(3) 4.9(3)	1.03(3) 4.2(3)
3	27-39	1.03(3) 6.8(3)	1.03(3) 6.7(3)	1.03(3) 7.0(3)	1.03(3) 9.1(3)	1.04(3) 8.4(3)	1.03(3) 8.3(3)	1.03(3) 9.1(3)	1.03(3) 7.2(3)	1.02(3) 4.7(3)	1.02(3) 4.1(3)
4	39-51	1.01(3) 6.7(3)	1.01(3) 6.7(3)	1.01(3) 7.2(3)	1.01(3) 8.9(3)	1.02(3) 8.4(3)	1.01(3) 8.6(3)	1.01(3) 9.2(3)	1.01(3) 7.3(3)	1.01(3) 4.7(3)	1.01(3) 4.1(3)
5	51-63	.99(3) 5.8(3)	.99(3) 6.7(3)	.99(3) 7.2(3)	.99(3) 8.6(3)	.99(3) 8.7(3)	.99(3) 8.6(3)	.99(3) 8.8(3)	.99(3) 7.0(3)	.99(3) 4.5(3)	.99(3) 4.0(3)
6	63-75	.94(3) 7.2(3)	.94(3) 7.2(3)	.94(3) 7.5(3)	.94(3) 9.5(3)	.93(3) 10.0(3)	.93(3) 9.5(3)	.94(3) 9.5(3)	.95(3) 7.4(3)	.96(3) 4.7(3)	.96(3) 4.0(3)
7	75-90	.89(3) 6.7(3)	.89(3) 6.8(3)	.89(3) 7.4(3)	.90(3) 9.1(3)	.86(3) 10.3(3)	.86(3) 10.0(3)	.89(3) 9.6(3)	.90(3) 7.4(3)	.92(3) 4.5(3)	.93(3) 4.1(3)



(a) Winter (Northern Hemisphere).

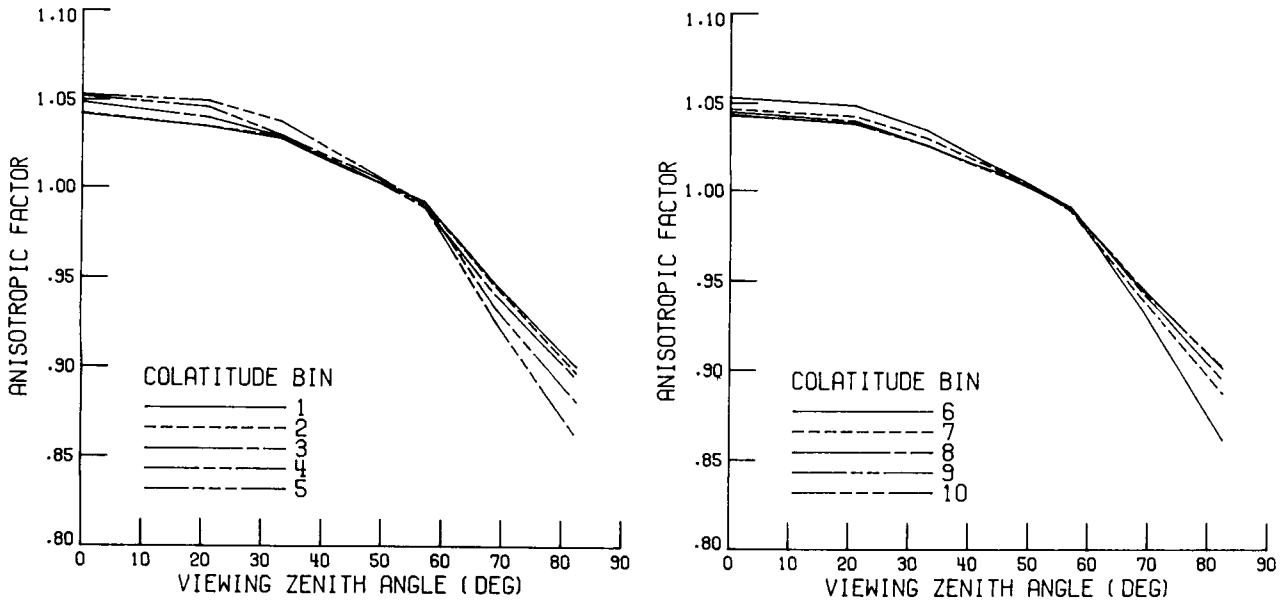
Figure 12. Day-night average limb-darkening model for mostly cloudy over land-ocean mix. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(LW/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR,APR,MAY)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH BIN NO. (DEG)	1	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.05(3)	1.05(3)	1.05(3)	1.05(3)	1.04(3)	1.04(3)
	0-15	4.9(3)	4.9(3)	6.7(3)	8.3(3)	8.5(3)	8.6(3)	8.7(3)	6.9(3)	5.2(3)	5.2(3)
2	15-27	1.04(3)	1.04(3)	1.04(3)	1.05(3)	1.05(3)	1.05(3)	1.04(3)	1.04(3)	1.04(3)	1.04(3)
		5.5(3)	5.2(3)	6.6(3)	8.4(3)	8.7(3)	8.8(3)	8.7(3)	6.9(3)	5.1(3)	5.0(3)
3	27-39	1.03(3)	1.03(3)	1.03(3)	1.03(3)	1.04(3)	1.04(3)	1.03(3)	1.03(3)	1.03(3)	1.03(3)
		5.0(3)	4.8(3)	6.5(3)	8.3(3)	8.2(3)	8.9(3)	8.6(3)	6.8(3)	5.0(3)	5.0(3)
4	39-51	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.02(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)	1.01(3)
		5.1(3)	4.8(3)	6.9(3)	8.3(3)	8.6(3)	8.8(3)	8.6(3)	6.9(3)	5.1(3)	5.1(3)
5	51-63	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)	.99(3)
		5.0(3)	4.8(3)	6.6(3)	8.3(3)	8.4(3)	8.8(3)	8.5(3)	6.7(3)	4.9(3)	4.9(3)
6	63-75	.95(3)	.95(3)	.94(3)	.93(3)	.93(3)	.93(3)	.94(3)	.94(3)	.95(3)	.95(3)
		5.3(3)	5.3(3)	7.0(3)	9.1(3)	9.3(3)	9.8(3)	9.3(3)	7.1(3)	5.3(3)	5.2(3)
7	75-90	.90(3)	.90(3)	.89(3)	.88(3)	.86(3)	.86(3)	.89(3)	.90(3)	.90(3)	.90(3)
		4.9(3)	4.9(3)	6.9(3)	9.0(3)	9.4(3)	10.2(3)	9.5(3)	7.2(3)	5.4(3)	5.2(3)



(b) Spring (Northern Hemisphere).

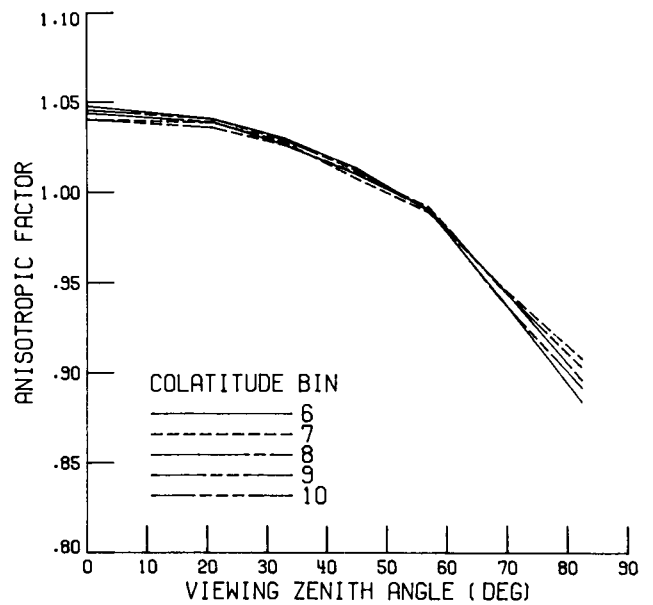
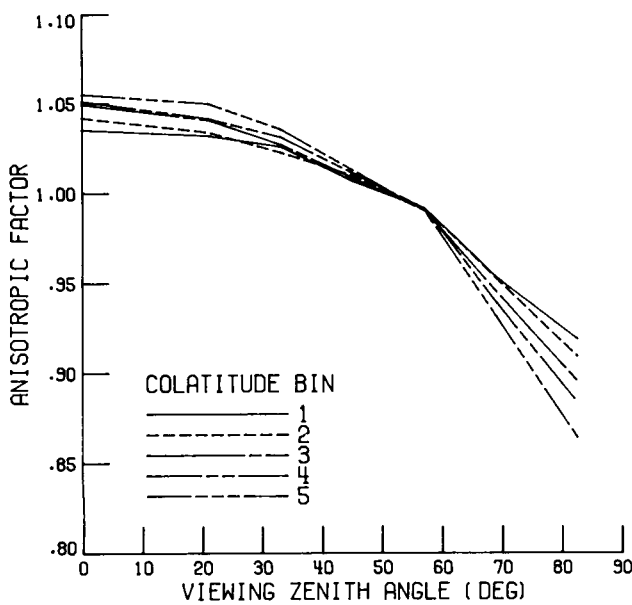
Figure 12. Continued.

ORIGINAL PAGE IS
OF POOR QUALITY

SCENE TYPE : MOSTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER (JUN, JUL, AUG)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(3) 5.1(3)	1.04(3) 5.5(3)	1.05(3) 7.6(3)	1.05(3) 8.6(3)	1.06(3) 8.5(3)	1.05(3) 7.7(3)	1.04(3) 8.0(3)	1.04(3) 6.3(3)	1.05(3) 5.5(3)	1.04(3) 5.9(3)
2	15-27	1.03(3) 5.2(3)	1.03(3) 5.6(3)	1.04(3) 7.7(3)	1.04(3) 8.7(3)	1.05(3) 8.2(3)	1.04(3) 7.8(3)	1.04(3) 7.9(3)	1.04(3) 6.4(3)	1.04(3) 5.5(3)	1.04(3) 5.9(3)
3	27-39	1.03(3) 4.8(3)	1.02(3) 5.5(3)	1.03(3) 7.4(3)	1.03(3) 8.3(3)	1.04(3) 7.8(3)	1.03(3) 7.4(3)	1.03(3) 7.9(3)	1.03(3) 6.3(3)	1.03(3) 5.3(3)	1.03(3) 5.7(3)
4	39-51	1.01(3) 4.9(3)	1.01(3) 5.3(3)	1.01(3) 7.5(3)	1.01(3) 8.4(3)	1.01(3) 8.2(3)	1.01(3) 7.5(3)	1.01(3) 7.9(3)	1.01(3) 6.3(3)	1.01(3) 5.4(3)	1.01(3) 5.8(3)
5	51-63	.99(3) 5.0(3)	.99(3) 5.3(3)	.99(3) 7.3(3)	.99(3) 8.1(3)	.99(3) 7.9(3)	.99(3) 7.6(3)	.99(3) 7.8(3)	.99(3) 6.1(3)	.99(3) 5.4(3)	.99(3) 5.8(3)
6	63-75	.95(3) 5.0(3)	.95(3) 5.5(3)	.95(3) 7.6(3)	.94(3) 8.9(3)	.93(3) 9.0(3)	.94(3) 8.4(3)	.95(3) 8.2(3)	.95(3) 6.6(3)	.94(3) 5.8(3)	.95(3) 6.1(3)
7	75-90	.92(3) 4.9(3)	.91(3) 5.6(3)	.90(3) 7.7(3)	.88(3) 9.1(3)	.86(3) 9.4(3)	.88(3) 8.9(3)	.91(3) 8.3(3)	.90(3) 6.7(3)	.89(3) 5.8(3)	.90(3) 6.1(3)



(c) Summer (Northern Hemisphere).

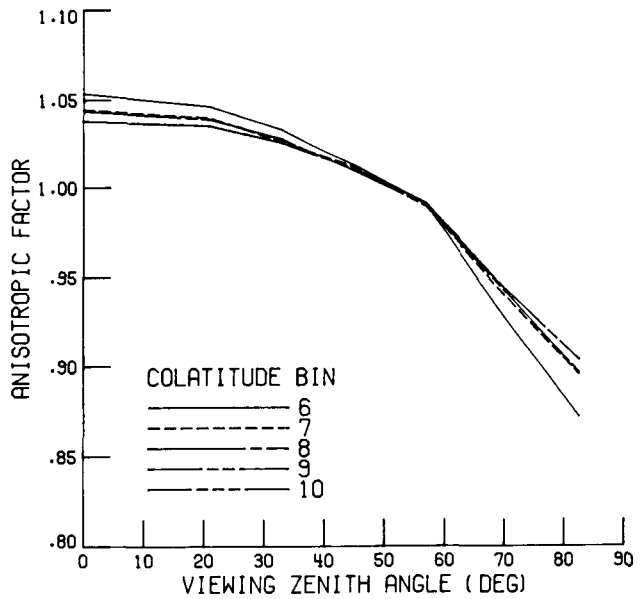
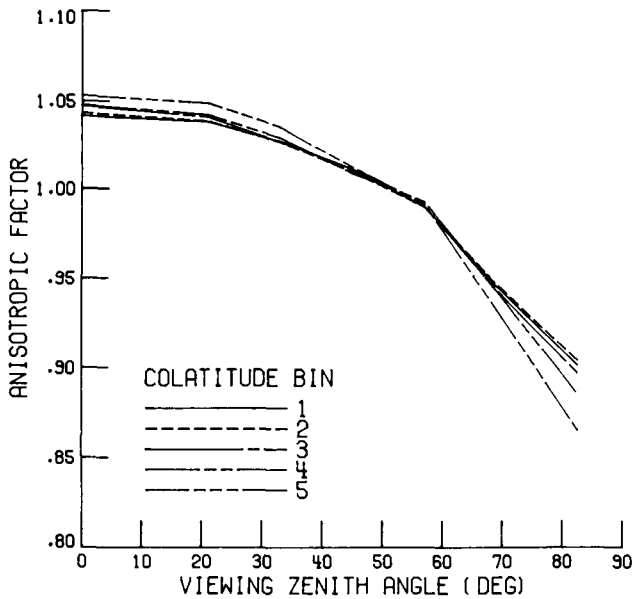
Figure 12. Continued.

ORIGINAL PAGE IS
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SCENE TYPE : MOSTLY CLOUDY OVER LAND-OCEAN MIX
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : FALL(SEPT,OCT,NOV)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE(DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(3) 5.0(3)	1.04(3) 5.4(3)	1.05(3) 7.5(3)	1.05(3) 9.0(3)	1.05(3) 8.1(3)	1.05(3) 8.3(3)	1.04(3) 8.9(3)	1.04(3) 6.5(3)	1.04(3) 5.4(3)	1.04(3) 6.2(3)
2	15-27	1.04(3) 4.7(3)	1.04(3) 5.3(3)	1.04(3) 7.5(3)	1.04(3) 8.8(3)	1.05(3) 8.1(3)	1.05(3) 8.5(3)	1.04(3) 9.0(3)	1.04(3) 6.4(3)	1.04(3) 5.3(3)	1.04(3) 6.2(3)
3	27-39	1.03(3) 4.6(3)	1.03(3) 5.1(3)	1.03(3) 7.4(3)	1.03(3) 8.7(3)	1.04(3) 8.0(3)	1.03(3) 8.2(3)	1.03(3) 8.9(3)	1.03(3) 6.4(3)	1.03(3) 5.1(3)	1.03(3) 6.0(3)
4	39-51	1.01(3) 4.7(3)	1.01(3) 5.3(3)	1.01(3) 7.4(3)	1.01(3) 8.7(3)	1.01(3) 8.1(3)	1.01(3) 8.3(3)	1.01(3) 8.4(3)	1.01(3) 6.7(3)	1.01(3) 5.1(3)	1.01(3) 6.0(3)
5	51-63	.99(3) 4.6(3)	.99(3) 5.1(3)	.99(3) 7.2(3)	.99(3) 8.5(3)	.99(3) 8.0(3)	.99(3) 8.1(3)	.99(3) 8.4(3)	.99(3) 6.4(3)	.99(3) 5.2(3)	.99(3) 6.0(3)
6	63-75	.95(3) 4.9(3)	.95(3) 5.5(3)	.94(3) 7.5(3)	.94(3) 9.1(3)	.93(3) 8.8(3)	.93(3) 9.2(3)	.94(3) 8.9(3)	.95(3) 6.7(3)	.95(3) 5.5(3)	.95(3) 6.1(3)
7	75-90	.90(3) 5.0(3)	.90(3) 5.5(3)	.90(3) 7.5(3)	.89(3) 9.4(3)	.87(3) 9.5(3)	.87(3) 9.5(3)	.90(3) 8.7(3)	.90(3) 6.7(3)	.90(3) 5.4(3)	.90(3) 5.9(3)



(d) Fall (Northern Hemisphere).

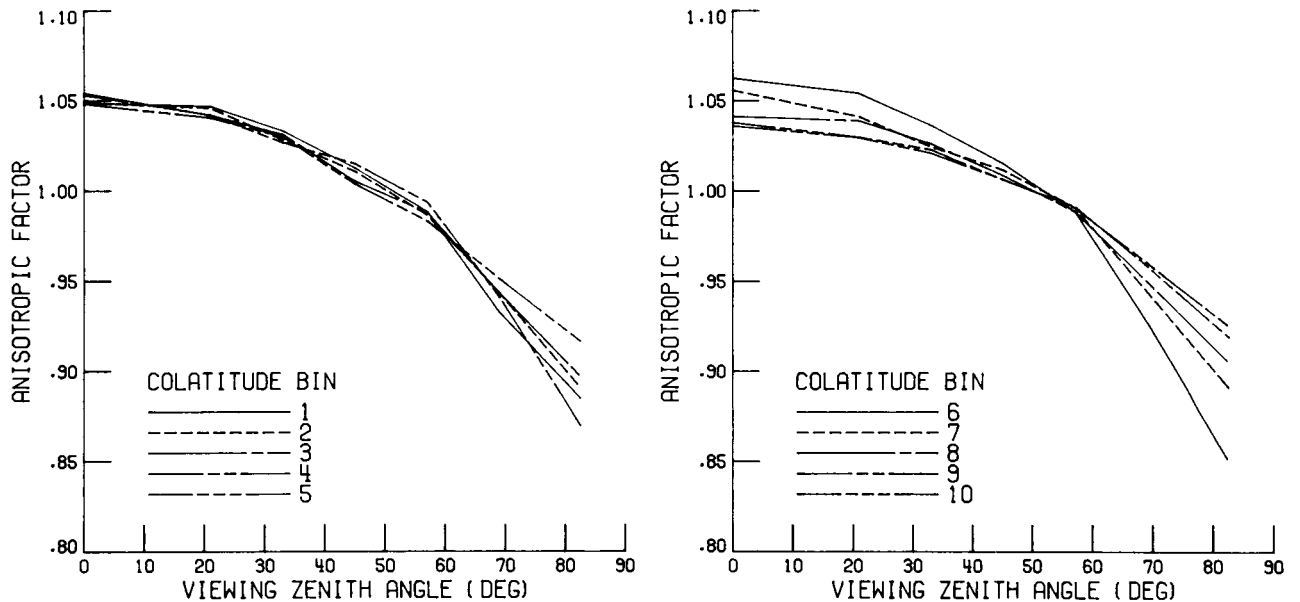
Figure 12. Concluded.

ORIGINAL PAGE IS
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SCENE TYPE : OVERCAST
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : WINTER (DEC, JAN, FEB)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(415) 6.1(415)	1.05(415) 6.6(415)	1.05(415) 8.9(415)	1.05(415) 11.9(415)	1.05(415) 15.5(415)	1.06(415) 14.7(415)	1.06(415) 13.0(415)	1.04(415) 8.3(415)	1.04(415) 5.4(415)	1.04(415) 4.6(415)
2	15-27	1.05(415) 6.5(415)	1.05(415) 6.8(415)	1.04(415) 8.9(415)	1.04(415) 11.8(415)	1.04(415) 15.6(415)	1.05(415) 14.8(415)	1.04(415) 12.9(415)	1.04(415) 8.4(415)	1.03(415) 5.4(415)	1.03(415) 4.7(415)
3	27-39	1.03(415) 6.5(415)	1.03(415) 6.8(415)	1.03(415) 8.8(415)	1.03(415) 11.7(415)	1.03(415) 15.2(415)	1.04(415) 14.7(415)	1.02(415) 12.9(415)	1.03(415) 8.3(415)	1.02(415) 5.4(415)	1.02(415) 4.8(415)
4	39-51	1.01(415) 6.3(415)	1.01(415) 7.0(415)	1.01(415) 8.8(415)	1.00(415) 11.8(415)	1.02(415) 15.1(415)	1.02(415) 14.3(415)	1.01(415) 12.6(415)	1.01(415) 8.3(415)	1.01(415) 5.3(415)	1.01(415) 4.8(415)
5	51-63	.99(415) 6.6(415)	.99(415) 7.0(415)	.99(415) 8.9(415)	.98(415) 11.9(415)	.99(415) 14.7(415)	.99(415) 13.9(415)	.99(415) 12.2(415)	.99(415) 8.3(415)	.99(415) 5.3(415)	.99(415) 4.8(415)
6	63-75	.93(415) 7.3(415)	.94(415) 7.6(415)	.94(415) 8.9(415)	.95(415) 11.9(415)	.94(415) 15.0(415)	.93(415) 14.2(415)	.94(415) 12.5(415)	.95(415) 8.6(415)	.96(415) 5.4(415)	.96(415) 4.9(415)
7	75-90	.88(415) 6.9(415)	.89(415) 7.8(415)	.90(415) 8.6(415)	.92(415) 11.7(415)	.87(415) 14.8(415)	.85(415) 13.6(415)	.89(415) 12.2(415)	.90(415) 8.4(415)	.93(415) 5.4(415)	.92(415) 5.0(415)



(a) Winter (Northern Hemisphere).

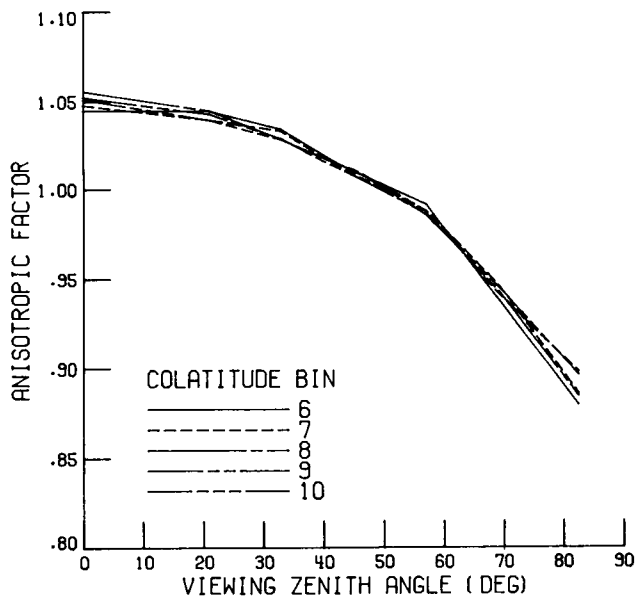
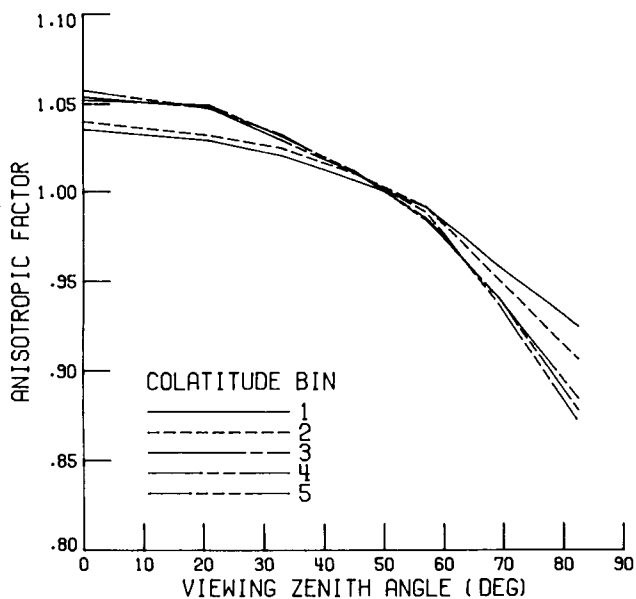
Figure 13. Day-night average limb-darkening model for overcast scene. (See table 4 for explanation of data sources.)

ORIGINAL PAGE IS
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SCENE TYPE : OVERCAST
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES (W/M**2/SR)
() - DATA SOURCE

SEASON : SPRING(MAR, APR, MAY)

		COLATITUDE										
		NORTH POLE										
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10	
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180	
VIEWING ZENITH BIN ANGLE NO. (DEG)	1	0-15	1.04(415) 5.4(415)	1.04(415) 6.2(415)	1.05(415) 8.8(415)	1.05(415) 12.2(415)	1.06(415) 15.6(415)	1.05(415) 14.3(415)	1.05(415) 12.9(415)	1.06(415) 9.5(415)	1.05(415) 6.5(415)	1.05(415) 5.5(415)
	2	15-27	1.03(415) 5.6(415)	1.03(415) 6.2(415)	1.05(415) 8.7(415)	1.05(415) 12.1(415)	1.05(415) 15.8(415)	1.04(415) 14.2(415)	1.04(415) 13.2(415)	1.05(415) 9.5(415)	1.04(415) 6.6(415)	1.04(415) 5.8(415)
3	27-39	1.02(415) 5.5(415)	1.03(415) 6.1(415)	1.03(415) 8.4(415)	1.03(415) 12.2(415)	1.03(415) 15.3(415)	1.03(415) 13.9(415)	1.03(415) 12.8(415)	1.03(415) 9.4(415)	1.03(415) 6.7(415)	1.03(415) 5.5(415)	
		4	39-51	1.01(415) 5.3(415)	1.01(415) 5.8(415)	1.01(415) 8.7(415)	1.01(415) 11.8(415)	1.01(415) 15.5(415)	1.01(415) 14.0(415)	1.01(415) 12.7(415)	1.01(415) 9.6(415)	1.01(415) 6.8(415)
5	51-63	.99(415) 5.4(415)	.99(415) 6.2(415)	.99(415) 8.4(415)	.98(415) 11.5(415)	.99(415) 14.9(415)	.99(415) 14.0(415)	.99(415) 12.6(415)	.99(415) 9.5(415)	.99(415) 6.8(415)	.99(415) 5.7(415)	
		6	63-75	.96(415) 5.7(415)	.95(415) 6.6(415)	.94(415) 8.9(415)	.94(415) 11.9(415)	.94(415) 15.0(415)	.94(415) 14.2(415)	.95(415) 12.8(415)	.94(415) 9.7(415)	.95(415) 7.1(415)
7	75-90	.92(415) 5.4(415)	.91(415) 6.3(415)	.88(415) 8.7(415)	.88(415) 11.5(415)	.87(415) 14.9(415)	.88(415) 13.3(415)	.89(415) 12.5(415)	.88(415) 9.5(415)	.90(415) 7.3(415)	.90(415) 6.1(415)	



(b) Spring (Northern Hemisphere).

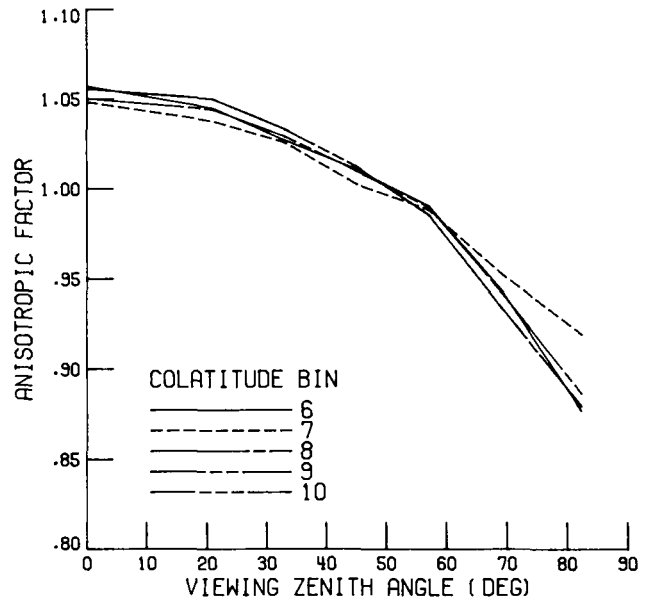
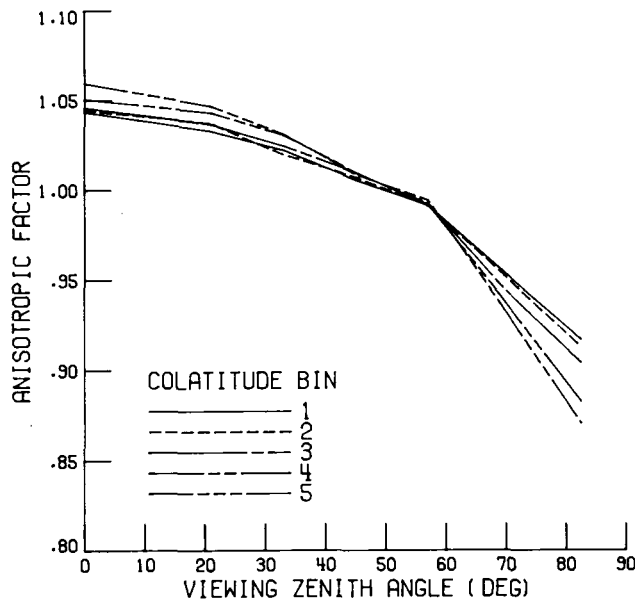
Figure 13. Continued.

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OF POOR QUALITY

SCENE TYPE : OVERCAST
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

SEASON : SUMMER(JUN,JUL,AUG)

		COLATITUDE									
		NORTH POLE	2	3	4	5	6	7	8	9	10
BIN NO.	ANGLE (DEG)	0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.04(415) 5.4(415)	1.04(415) 6.6(415)	1.05(415) 9.2(415)	1.05(415) 12.2(415)	1.06(415) 13.8(415)	1.06(415) 15.5(415)	1.05(415) 12.6(415)	1.05(415) 8.8(415)	1.06(415) 6.9(415)	1.06(415) 6.9(415)
2	15-27	1.03(415) 5.4(415)	1.04(415) 6.6(415)	1.04(415) 9.3(415)	1.04(415) 12.1(415)	1.05(415) 13.8(415)	1.04(415) 15.7(415)	1.04(415) 12.6(415)	1.04(415) 8.7(415)	1.05(415) 6.9(415)	1.05(415) 6.9(415)
3	27-39	1.02(415) 5.6(415)	1.02(415) 6.8(415)	1.02(415) 9.0(415)	1.03(415) 12.0(415)	1.03(415) 13.5(415)	1.03(415) 15.4(415)	1.03(415) 12.6(415)	1.03(415) 8.6(415)	1.03(415) 6.9(415)	1.03(415) 6.9(415)
4	39-51	1.01(415) 5.6(415)	1.01(415) 6.6(415)	1.01(415) 8.8(415)	1.01(415) 11.8(415)	1.01(415) 13.6(415)	1.01(415) 15.2(415)	1.00(415) 12.6(415)	1.01(415) 8.8(415)	1.01(415) 7.2(415)	1.01(415) 7.2(415)
5	51-63	.99(415) 5.6(415)	.99(415) 6.5(415)	.99(415) 8.7(415)	.99(415) 11.6(415)	.99(415) 13.3(415)	.99(415) 14.9(415)	.99(415) 12.4(415)	.99(415) 8.8(415)	.99(415) 7.3(415)	.99(415) 7.3(415)
6	63-75	.96(415) 5.6(415)	.95(415) 6.6(415)	.95(415) 9.0(415)	.94(415) 12.0(415)	.94(415) 13.4(415)	.94(415) 15.1(415)	.95(415) 12.4(415)	.94(415) 9.1(415)	.93(415) 7.9(415)	.93(415) 7.9(415)
7	75-90	.92(415) 5.6(415)	.91(415) 6.4(415)	.90(415) 8.7(415)	.88(415) 11.5(415)	.87(415) 12.7(415)	.88(415) 14.9(415)	.92(415) 12.1(415)	.89(415) 9.1(415)	.88(415) 8.1(415)	.88(415) 8.1(415)



(c) Summer (Northern Hemisphere).

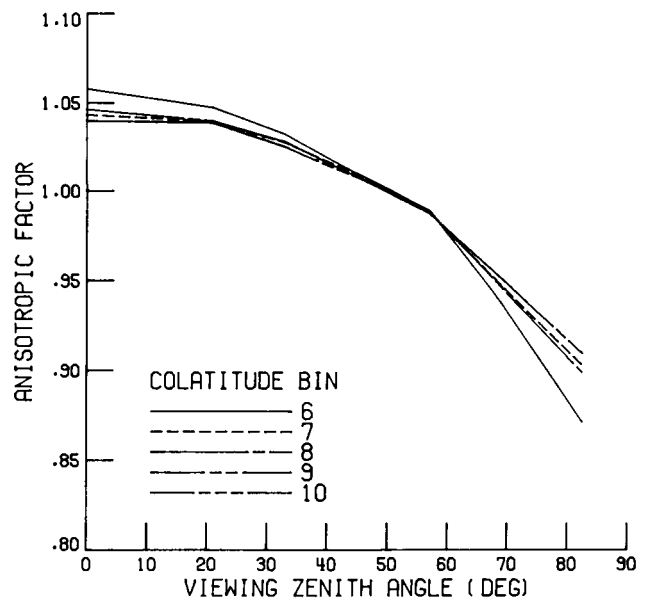
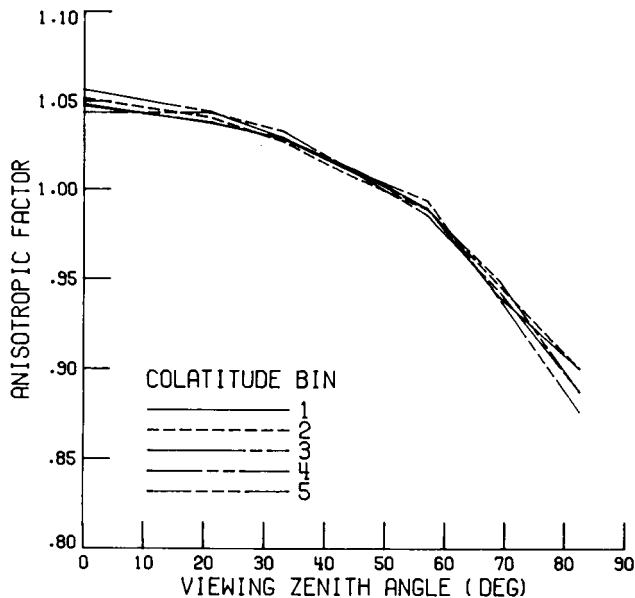
Figure 13. Continued.

ORIGINAL PAGE IS
OF POOR QUALITY

SCENE TYPE : OVERCAST
DATA 1 - LONGWAVE (LW) ANISOTROPIC FACTOR
2 - STANDARD DEVIATION OF LW RADIANCES(W/M**2/SR)
() - DATA SOURCE

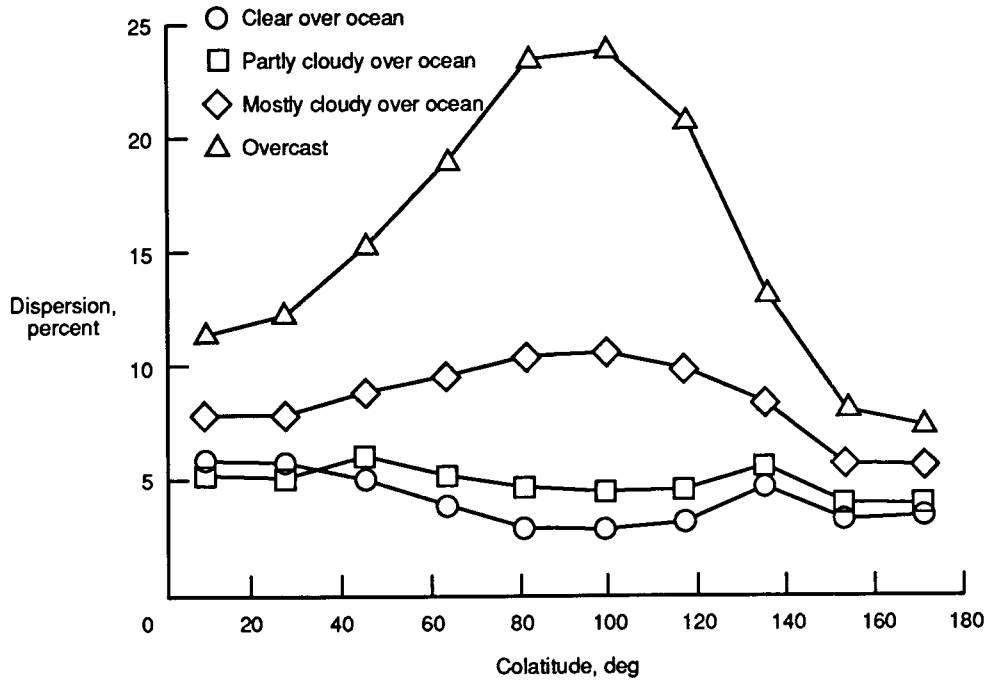
SEASON : FALL(SEPT,OCT,NOV)

		COLATITUDE									
		NORTH POLE									
BIN NO.	ANGLE (DEG)	1	2	3	4	5	6	7	8	9	10
		0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
VIEWING ZENITH											
BIN NO.	ANGLE (DEG)										
1	0-15	1.05(415) 5.1(415)	1.05(415) 6.8(415)	1.06(415) 9.5(415)	1.05(415) 12.4(415)	1.04(415) 14.3(415)	1.06(415) 15.6(415)	1.04(415) 12.4(415)	1.05(415) 8.4(415)	1.04(415) 6.4(415)	1.04(415) 6.4(415)
2	15-27	1.04(415) 5.4(415)	1.04(415) 6.9(415)	1.04(415) 9.7(415)	1.04(415) 12.4(415)	1.04(415) 14.2(415)	1.05(415) 15.8(415)	1.04(415) 12.5(415)	1.04(415) 8.5(415)	1.04(415) 6.3(415)	1.04(415) 6.3(415)
3	27-39	1.03(415) 5.1(415)	1.03(415) 7.0(415)	1.03(415) 9.6(415)	1.03(415) 12.3(415)	1.03(415) 13.8(415)	1.03(415) 15.3(415)	1.03(415) 12.4(415)	1.03(415) 8.5(415)	1.03(415) 6.5(415)	1.03(415) 6.5(415)
4	39-51	1.01(415) 5.3(415)	1.01(415) 7.1(415)	1.01(415) 9.7(415)	1.01(415) 12.1(415)	1.01(415) 13.9(415)	1.01(415) 15.5(415)	1.01(415) 12.5(415)	1.01(415) 8.6(415)	1.01(415) 6.6(415)	1.01(415) 6.6(415)
5	51-63	.99(415) 5.3(415)	.99(415) 7.0(415)	.99(415) 9.7(415)	.99(415) 11.7(415)	.99(415) 13.8(415)	.99(415) 14.9(415)	.99(415) 12.2(415)	.99(415) 8.6(415)	.99(415) 6.8(415)	.99(415) 6.8(415)
6	63-75	.94(415) 5.6(415)	.95(415) 7.3(415)	.94(415) 9.8(415)	.95(415) 12.0(415)	.94(415) 13.9(415)	.94(415) 15.0(415)	.95(415) 12.3(415)	.95(415) 8.8(415)	.95(415) 7.1(415)	.95(415) 7.1(415)
7	75-90	.90(415) 5.6(415)	.90(415) 7.3(415)	.89(415) 9.6(415)	.89(415) 11.6(415)	.88(415) 13.0(415)	.87(415) 14.9(415)	.90(415) 12.0(415)	.90(415) 8.8(415)	.91(415) 7.3(415)	.91(415) 7.3(415)

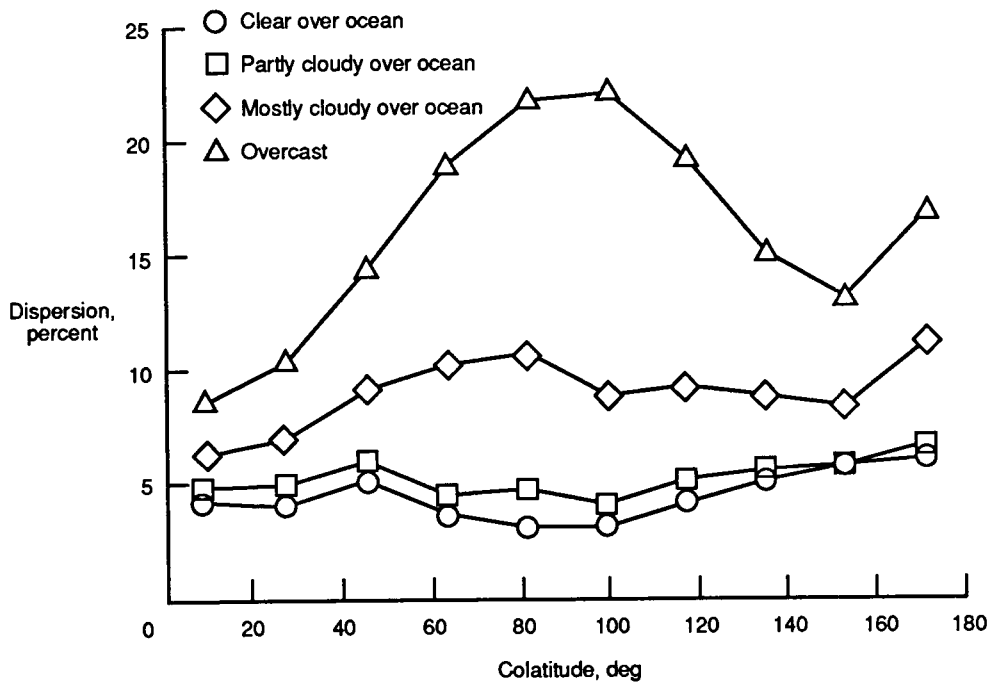


(d) Fall (Northern Hemisphere).

Figure 13. Concluded.

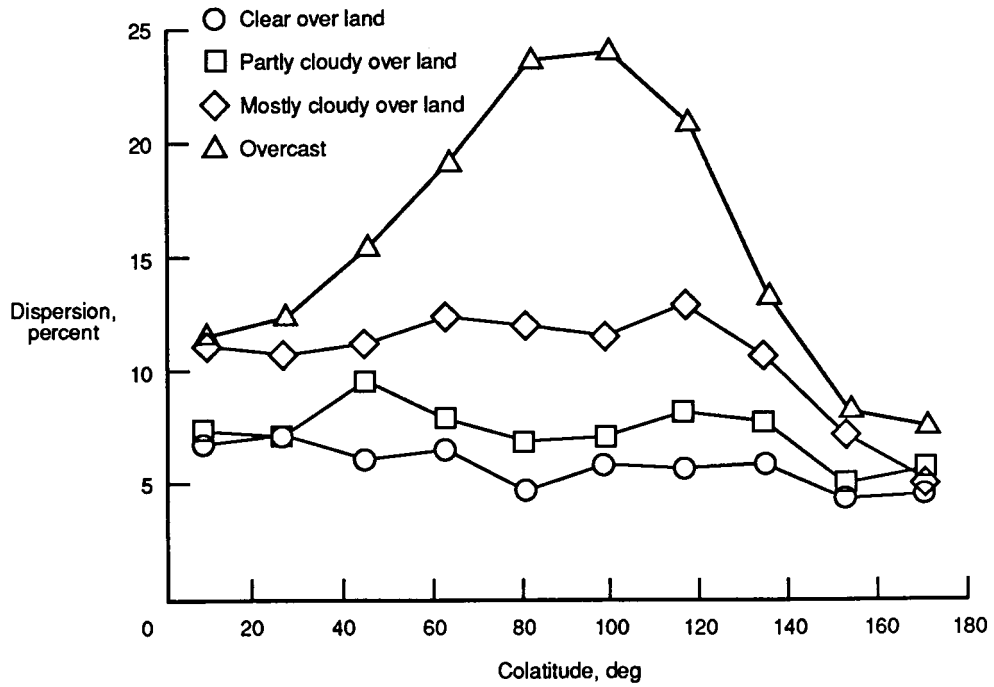


(a) Winter (Northern Hemisphere).

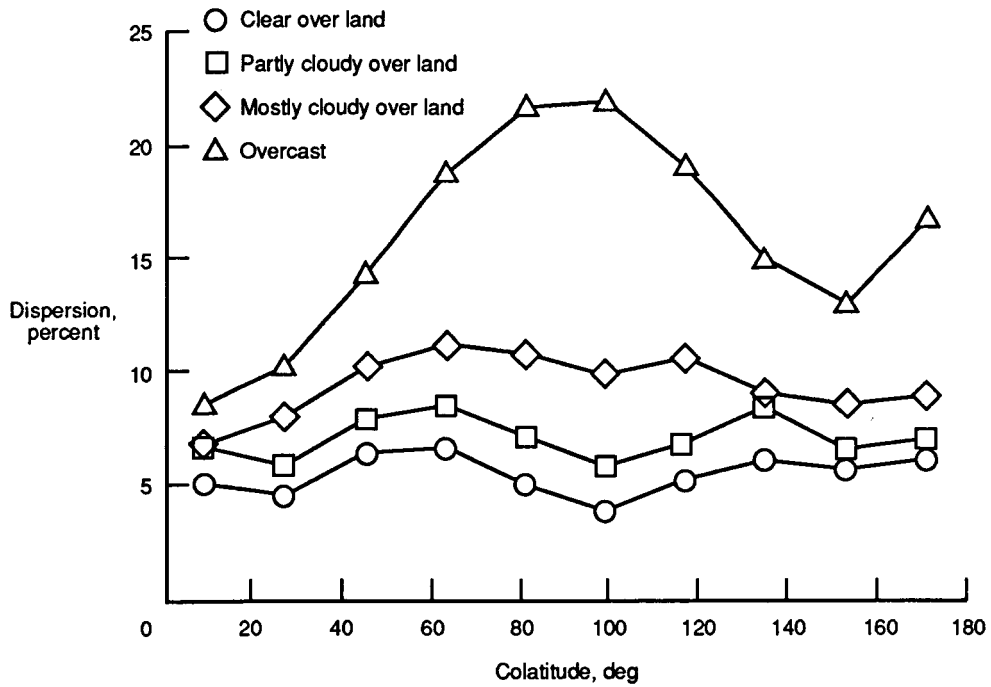


(b) Summer (Northern Hemisphere).

Figure 14. Dispersion of longwave radiance for ocean scenes averaged over day, night, and viewing zenith angles.

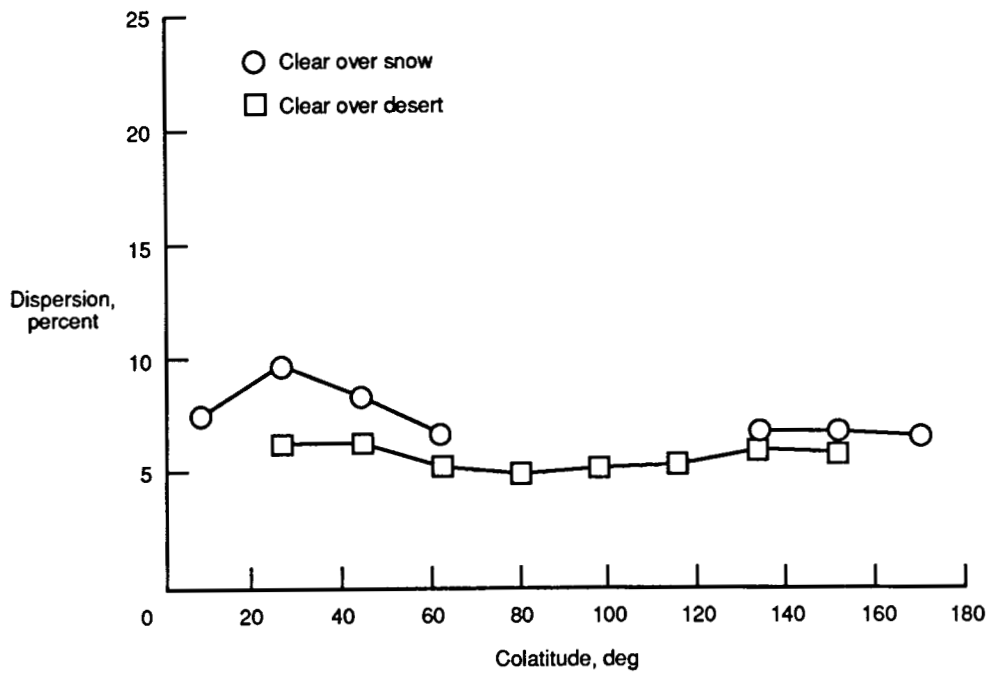


(a) Winter (Northern Hemisphere).

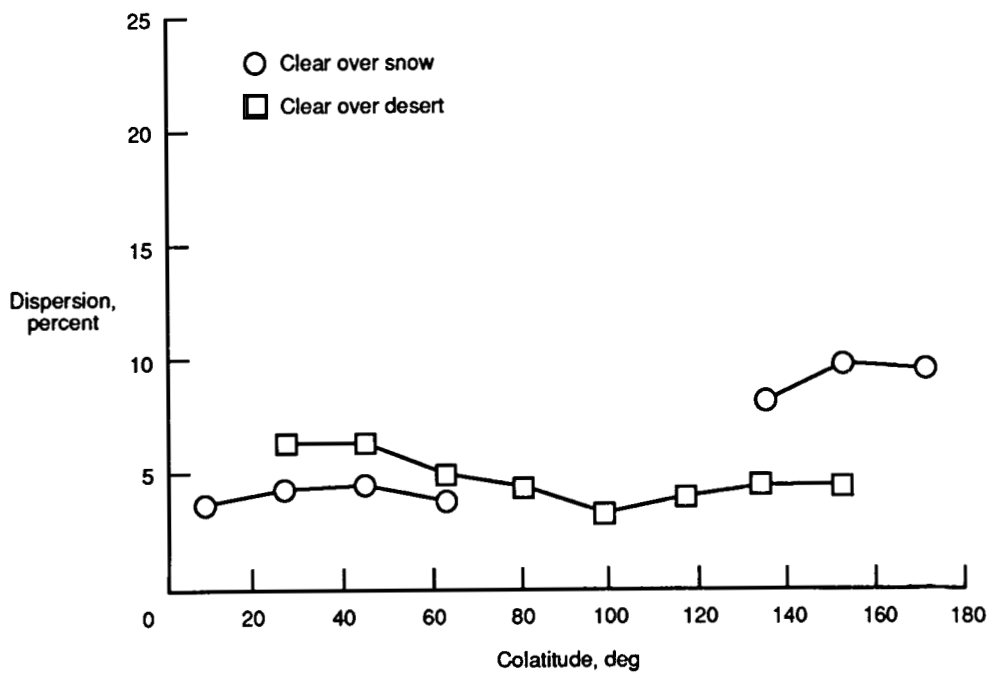


(b) Summer (Northern Hemisphere).

Figure 15. Dispersion of longwave radiance for land scenes averaged over day, night, and viewing zenith angles.



(a) Winter (Northern Hemisphere).



(b) Summer (Northern Hemisphere).

Figure 16. Dispersion of longwave radiance for snow and desert scenes averaged over day, night, and viewing zenith angles.

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	COLATITUDE									
	1	2	3	4	5	6	7	8	9	10
	0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	220.00 (2)	222.91 (4)	258.92 (9)	284.99 (9)	293.11 (9)	289.28 (9)	284.06 (9)	262.72 (9)	237.81 (9)	222.61 (4)
SPRING	223.00 (2)	235.95 (4)	256.02 (9)	281.73 (9)	292.08 (9)	293.92 (9)	284.45 (9)	260.18 (9)	228.97 (4)	213.00 (2)
SUMMER	248.00 (2)	250.39 (9)	273.83 (9)	284.68 (9)	286.95 (9)	294.08 (9)	282.07 (9)	250.80 (9)	223.70 (4)	207.00 (2)
FALL	227.95 (8)	240.59 (8)	267.37 (9)	287.04 (9)	290.58 (9)	293.13 (9)	277.75 (9)	253.18 (9)	232.91 (9)	216.00 (2)

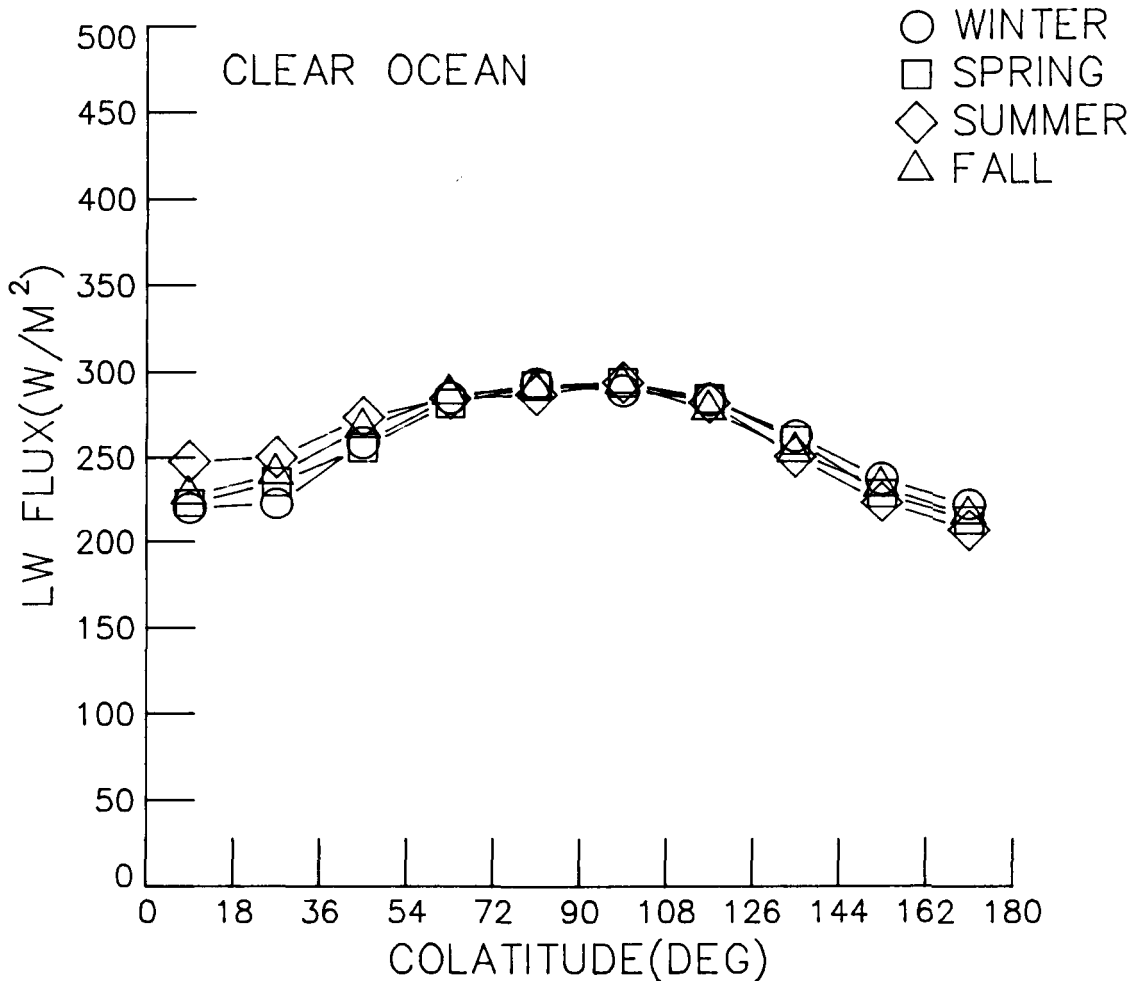


Figure 17. Mean daytime longwave radiation fluxes for clear over ocean. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	203.00 (4)	228.00 (2)	253.10 (9)	292.24 (9)	315.79 (9)	301.27 (9)	326.87 (9)	315.39 (9)	288.00 (4)	273.00 (4)
SPRING	255.00 (2)	268.41 (9)	289.37 (9)	323.44 (9)	324.13 (9)	299.76 (9)	299.66 (9)	295.88 (4)	275.00 (2)	255.00 (2)
SUMMER	263.69 (4)	276.12 (9)	303.62 (9)	319.35 (9)	302.33 (9)	307.88 (9)	305.16 (9)	265.48 (4)	245.00 (2)	225.00 (2)
FALL	243.00 (2)	256.32 (9)	281.84 (9)	298.59 (9)	310.56 (9)	318.86 (9)	321.51 (9)	297.13 (9)	283.00 (4)	263.00 (4)

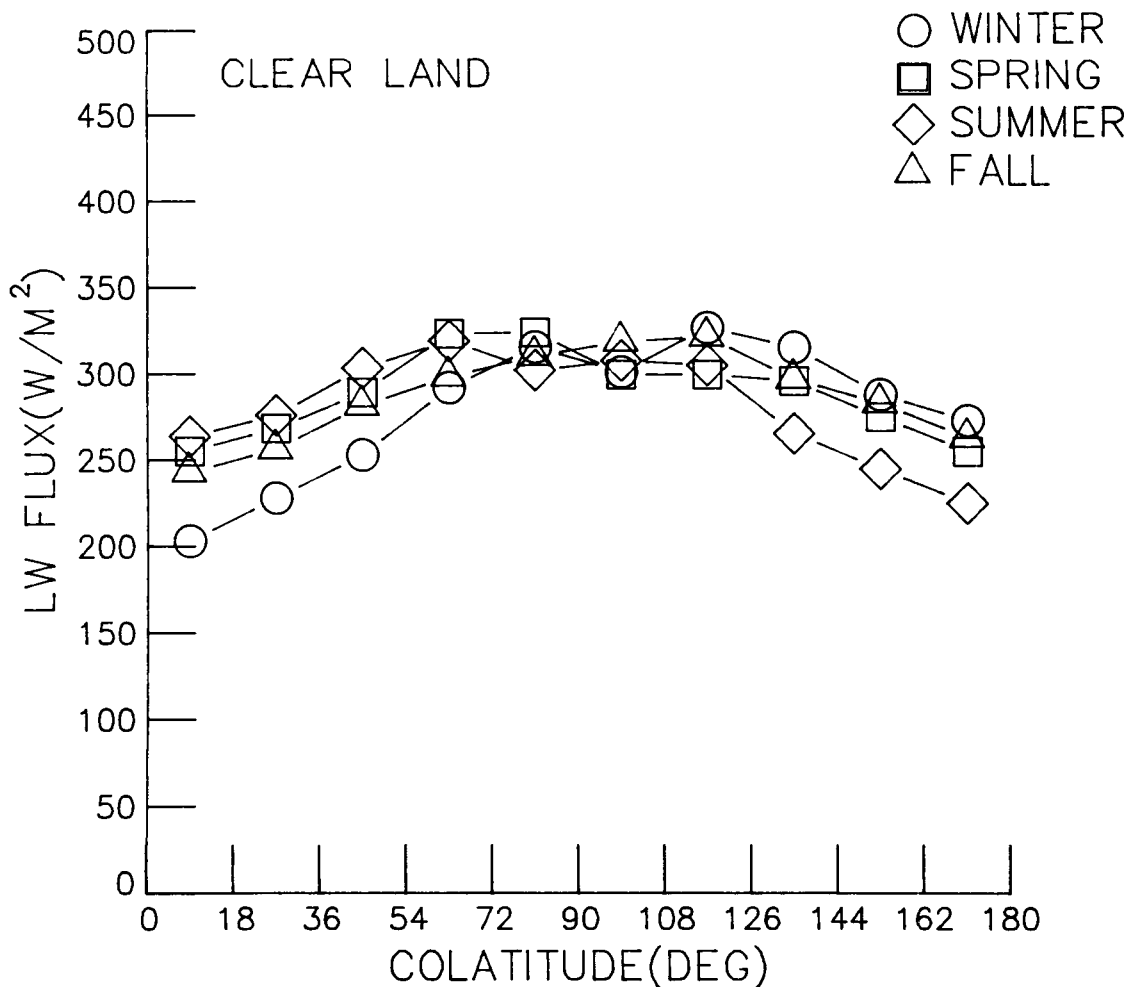


Figure 18. Mean daytime longwave radiation fluxes for clear over land. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE 1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	175.63 (4)	179.04 (9)	195.65 (9)	246.90 (4)	.00 (0)	.00 (0)	.00 (0)	209.90 (4)	209.90 (4)	190.43 (9)
SPRING	191.49 (9)	205.65 (9)	223.20 (4)	256.60 (4)	.00 (0)	.00 (0)	.00 (0)	184.80 (4)	185.44 (9)	162.54 (4)
SUMMER	231.16 (9)	235.54 (9)	224.70 (4)	256.60 (4)	.00 (0)	.00 (0)	.00 (0)	188.21 (4)	168.43 (8)	123.61 (8)
FALL	210.86 (9)	187.70 (9)	206.27 (9)	243.00 (2)	.00 (0)	.00 (0)	.00 (0)	203.00 (2)	196.14 (9)	171.46 (9)

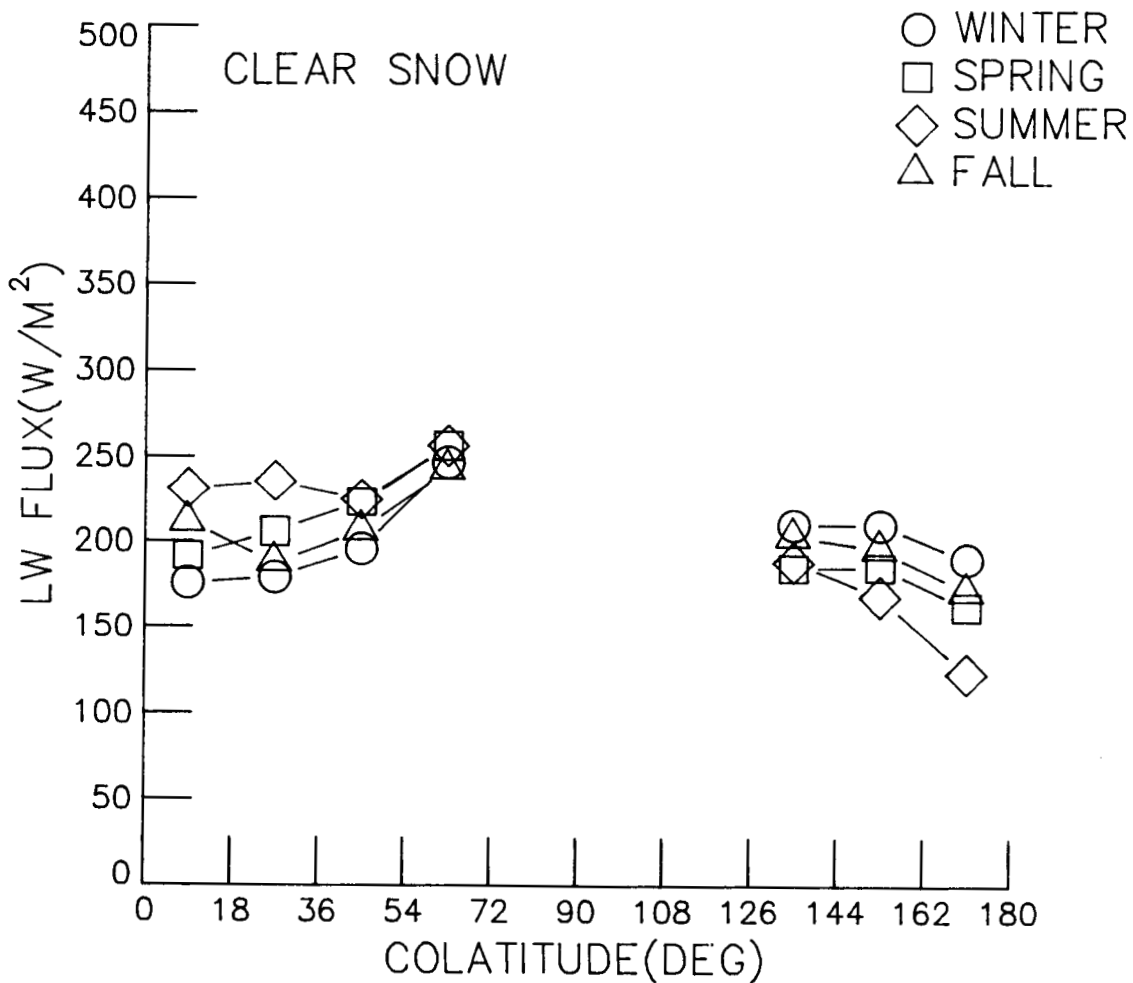


Figure 19. Mean daytime longwave radiation fluxes for clear over snow. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	COLATITUDE									
NORTH POLE	1	2	3	4	5	6	7	8	9	10
0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180	
SEASON										
NORTHERN HEMISPHERE										
WINTER	.00 (0)	243.52 (4)	243.52 (4)	292.88 (9)	312.59 (9)	314.52 (4)	345.54 (9)	325.54 (4)	325.54 (4)	.00 (0)
SPRING	.00 (0)	306.98 (4)	306.98 (9)	329.38 (9)	330.80 (4)	309.57 (4)	303.72 (9)	299.62 (4)	299.62 (4)	.00 (0)
SUMMER	.00 (0)	330.80 (0)	330.80 (9)	338.23 (9)	319.53 (9)	311.97 (9)	302.36 (9)	261.13 (4)	261.13 (0)	.00 (0)
FALL	.00 (0)	296.52 (0)	296.52 (9)	317.01 (9)	323.58 (9)	316.69 (4)	334.29 (9)	306.20 (4)	306.20 (0)	.00 (0)

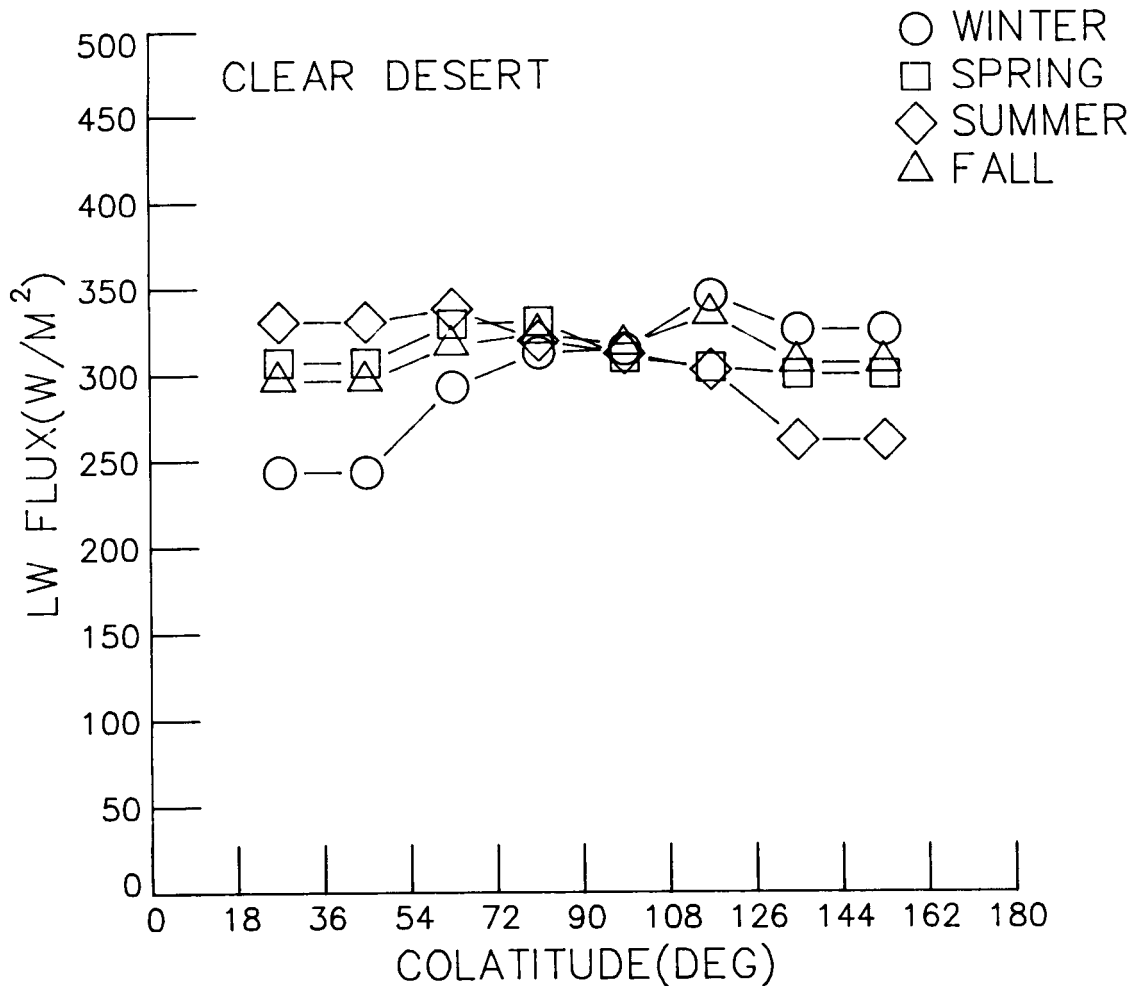


Figure 20. Mean daytime longwave radiation fluxes for clear over desert. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE	COLATITUDE								
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	211.50 (3)	225.46 (3)	256.01 (3)	288.62 (3)	304.45 (3)	295.28 (3)	305.47 (3)	289.06 (3)	262.91 (3)	247.81 (3)
SPRING	239.00 (3)	252.18 (3)	272.70 (3)	302.59 (3)	308.11 (3)	296.84 (3)	292.06 (3)	278.03 (3)	251.99 (3)	234.00 (3)
SUMMER	255.85 (3)	263.26 (3)	288.73 (3)	302.02 (3)	294.64 (3)	300.98 (3)	293.62 (3)	258.14 (3)	234.35 (3)	216.00 (3)
FALL	235.48 (3)	248.46 (3)	274.61 (3)	292.82 (3)	300.57 (3)	306.00 (3)	299.63 (3)	275.16 (3)	257.96 (3)	239.50 (3)

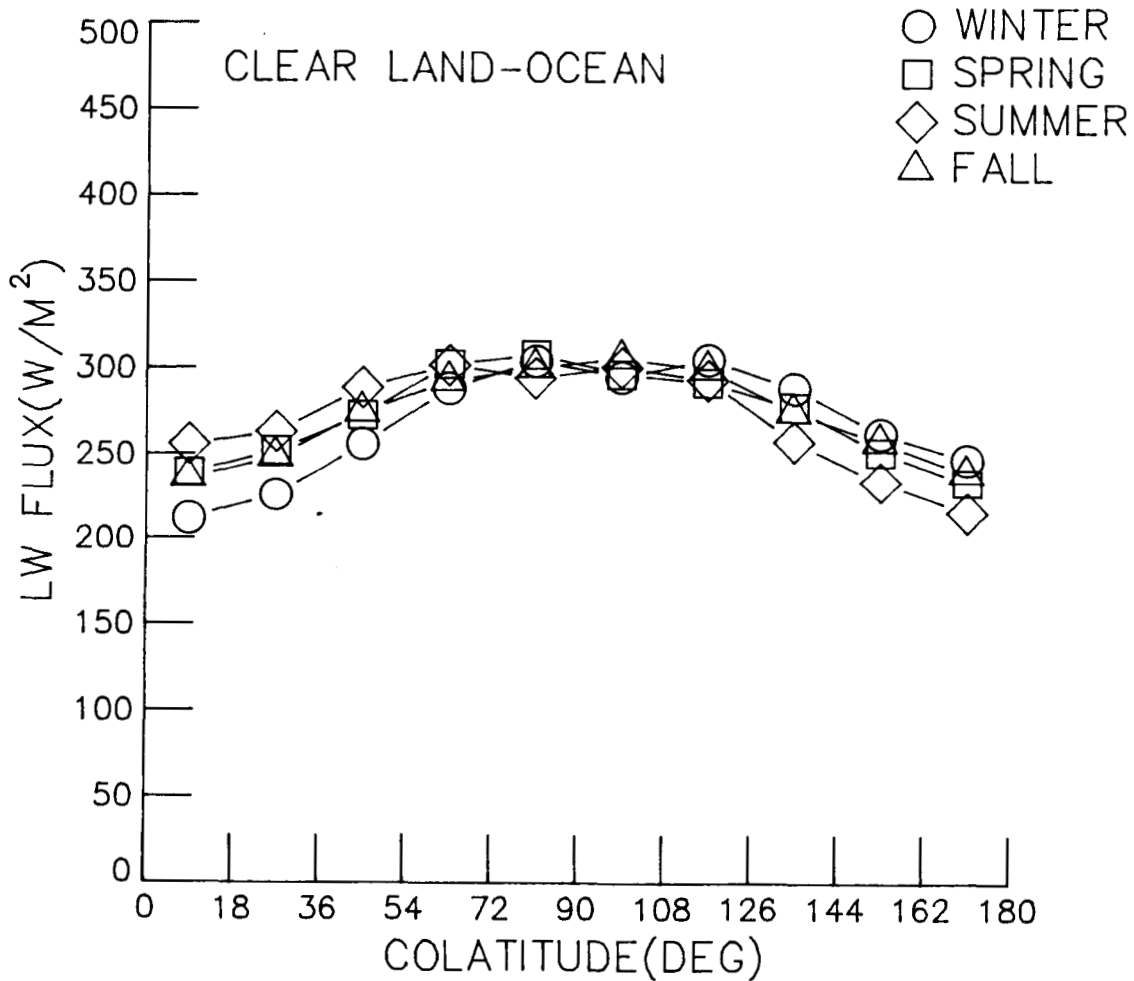


Figure 21. Mean daytime longwave radiation fluxes for clear over land-ocean mix. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2) COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	213.00 (2)	227.06 (9)	241.67 (9)	274.09 (9)	284.11 (9)	281.65 (9)	278.08 (9)	250.50 (9)	229.93 (9)	222.75 (9)
SPRING	218.00 (2)	230.03 (9)	244.70 (9)	273.30 (9)	281.07 (9)	285.70 (9)	275.39 (9)	244.27 (9)	218.26 (9)	207.69 (4)
SUMMER	240.77 (9)	241.94 (9)	263.77 (9)	277.93 (9)	277.74 (9)	286.29 (9)	271.45 (9)	239.93 (9)	216.06 (9)	162.35 (8)
FALL	222.52 (9)	233.64 (9)	254.53 (9)	278.85 (9)	279.44 (9)	284.21 (9)	269.72 (9)	241.24 (9)	223.25 (9)	205.00 (2)

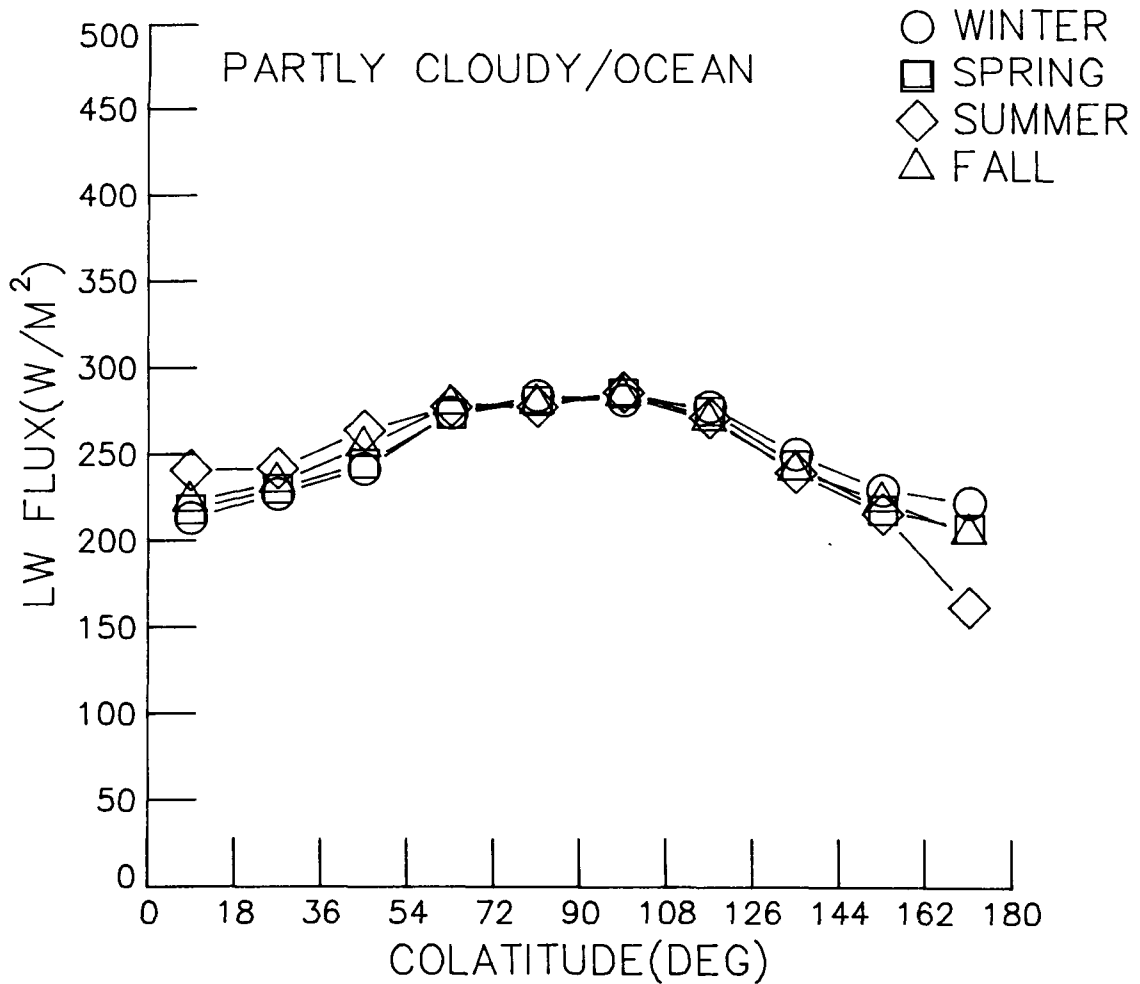


Figure 22. Mean daytime longwave radiation fluxes for partly cloudy over ocean. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	190.00 (4)	208.00 (4)	234.16 (9)	272.22 (9)	283.75 (9)	271.48 (9)	293.18 (9)	278.14 (9)	263.00 (4)	248.00 (4)
SPRING	235.48 (4)	249.52 (9)	267.93 (9)	299.60 (9)	281.41 (9)	274.12 (9)	274.43 (9)	257.42 (4)	243.00 (2)	220.00 (2)
SUMMER	252.41 (9)	259.59 (9)	281.02 (9)	316.61 (9)	277.41 (9)	282.65 (9)	275.54 (9)	243.77 (9)	220.00 (2)	195.00 (2)
FALL	235.48 (4)	239.70 (9)	261.60 (9)	277.05 (4)	278.74 (9)	282.48 (9)	288.04 (9)	258.96 (9)	248.00 (4)	233.00 (4)

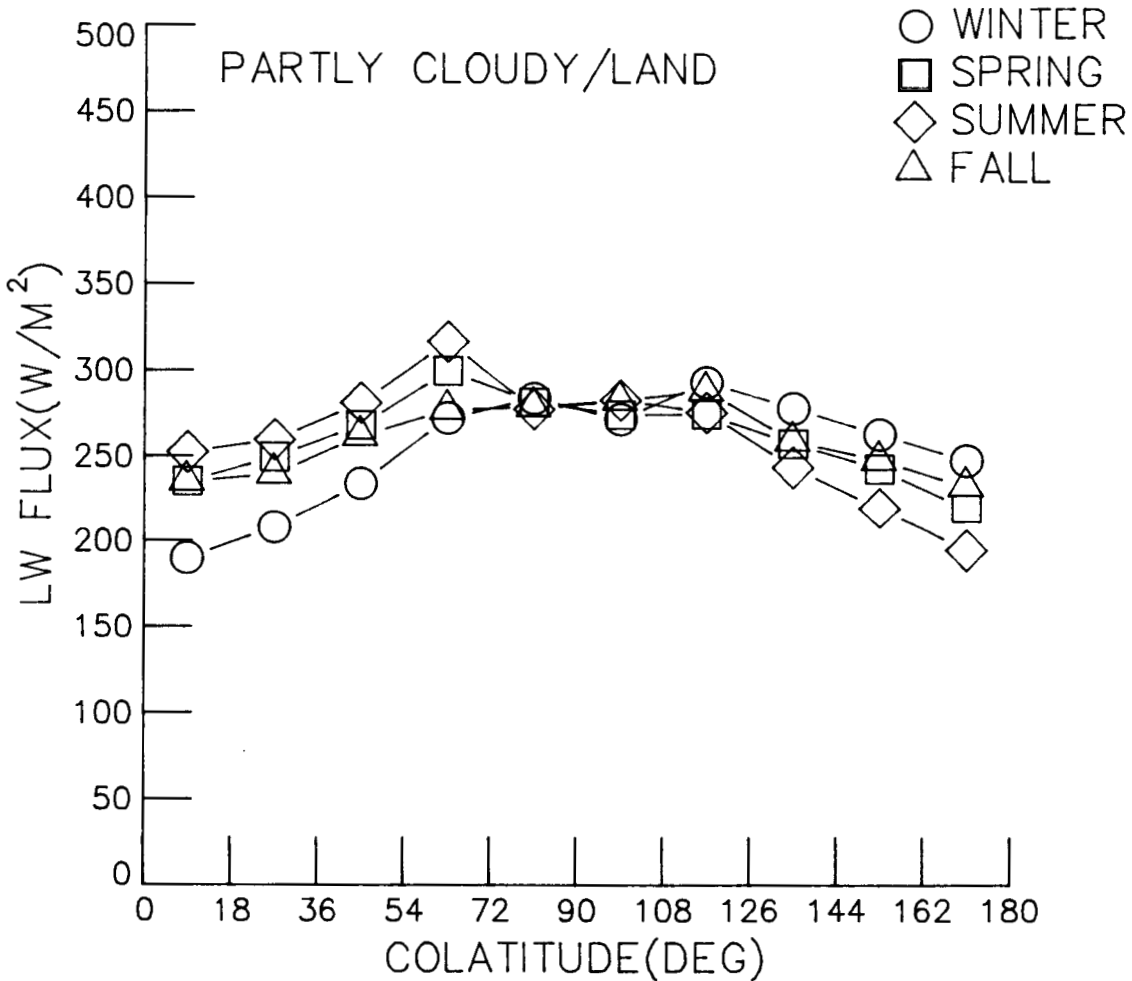


Figure 23. Mean daytime longwave radiation fluxes for partly cloudy over land or desert. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE 1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	201.50 (3)	217.53 (3)	237.92 (3)	273.16 (3)	283.93 (3)	276.57 (3)	285.63 (3)	264.32 (3)	246.47 (3)	235.38 (3)
SPRING	226.74 (3)	239.78 (3)	256.32 (3)	286.45 (3)	281.24 (3)	279.91 (3)	274.91 (3)	250.85 (3)	230.63 (3)	213.85 (3)
SUMMER	246.59 (3)	250.77 (3)	272.40 (3)	297.27 (3)	277.58 (3)	284.47 (3)	273.50 (3)	241.85 (3)	218.03 (3)	178.68 (3)
FALL	229.00 (3)	236.67 (3)	258.07 (3)	277.95 (3)	279.09 (3)	283.35 (3)	278.88 (3)	250.10 (3)	235.63 (3)	219.00 (3)

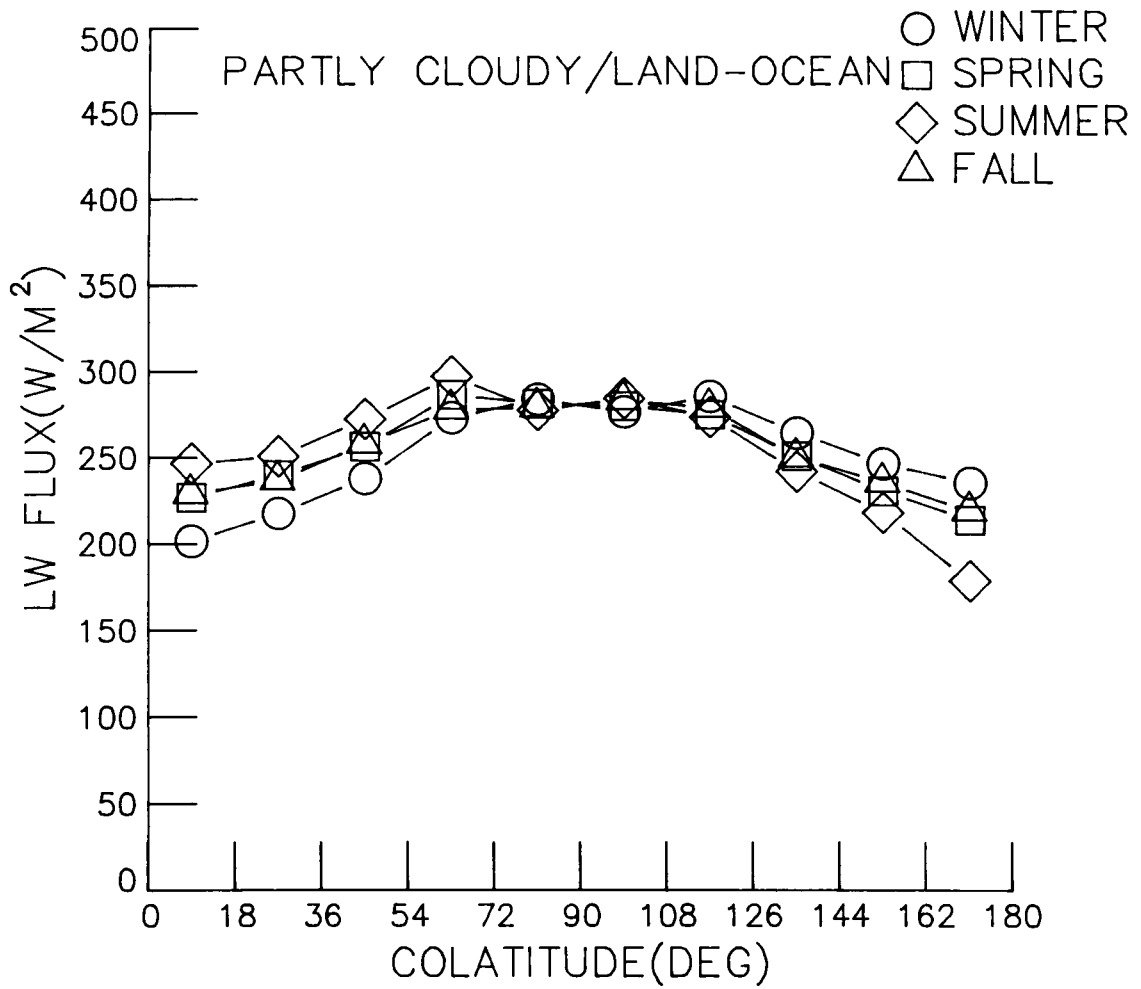


Figure 24. Mean daytime longwave radiation fluxes for partly cloudy over land-ocean mix. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	194.88 (4)	205.93 (9)	220.56 (9)	244.75 (9)	249.12 (9)	248.39 (9)	250.17 (9)	230.22 (9)	216.54 (9)	210.49 (9)
SPRING	202.57 (9)	217.17 (9)	225.72 (9)	240.54 (9)	241.77 (9)	252.66 (9)	247.57 (9)	224.17 (9)	203.99 (9)	193.76 (4)
SUMMER	226.32 (9)	229.98 (9)	241.91 (9)	250.83 (9)	244.12 (9)	261.62 (9)	248.51 (9)	219.38 (9)	199.51 (9)	147.30 (8)
FALL	210.98 (9)	216.47 (9)	232.60 (9)	247.07 (9)	243.87 (9)	256.61 (9)	244.88 (9)	223.47 (9)	208.42 (9)	193.76 (4)

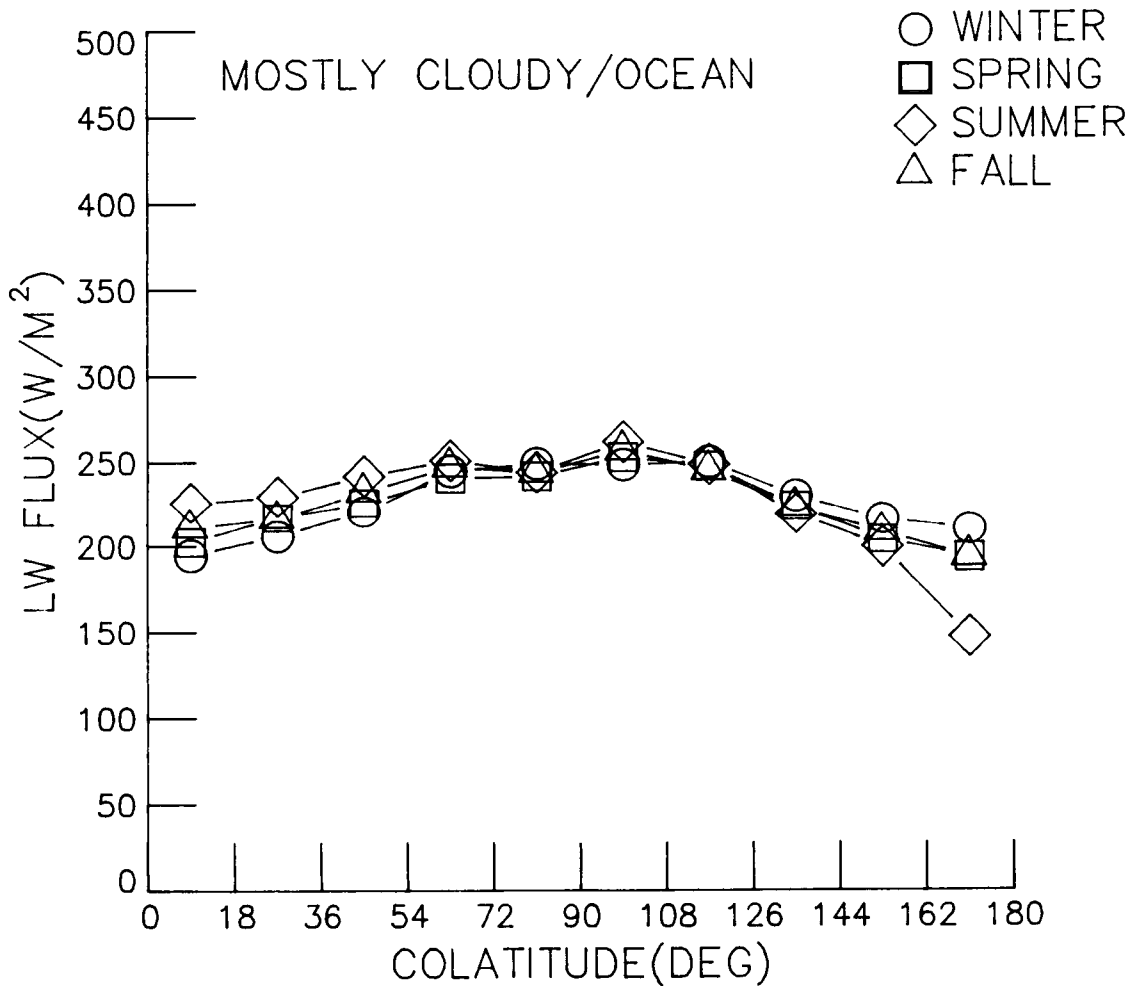


Figure 25. Mean daytime longwave radiation fluxes for mostly cloudy over ocean. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2) COLATITUDE									
	1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	169.00 (4)	183.00 (4)	209.22 (9)	222.81 (9)	243.50 (9)	237.16 (9)	239.29 (9)	220.32 (9)	218.00 (4)	218.00 (4)
SPRING	210.00 (2)	217.38 (9)	217.20 (9)	232.49 (9)	236.15 (9)	240.17 (9)	238.16 (9)	220.28 (4)	211.00 (2)	185.00 (2)
SUMMER	212.91 (9)	228.30 (9)	232.27 (9)	246.85 (9)	242.78 (9)	254.27 (9)	239.38 (9)	212.54 (9)	195.00 (2)	165.00 (2)
FALL	213.00 (4)	216.56 (9)	219.27 (9)	234.90 (9)	239.97 (9)	244.97 (9)	237.21 (9)	216.26 (9)	213.00 (4)	213.00 (4)

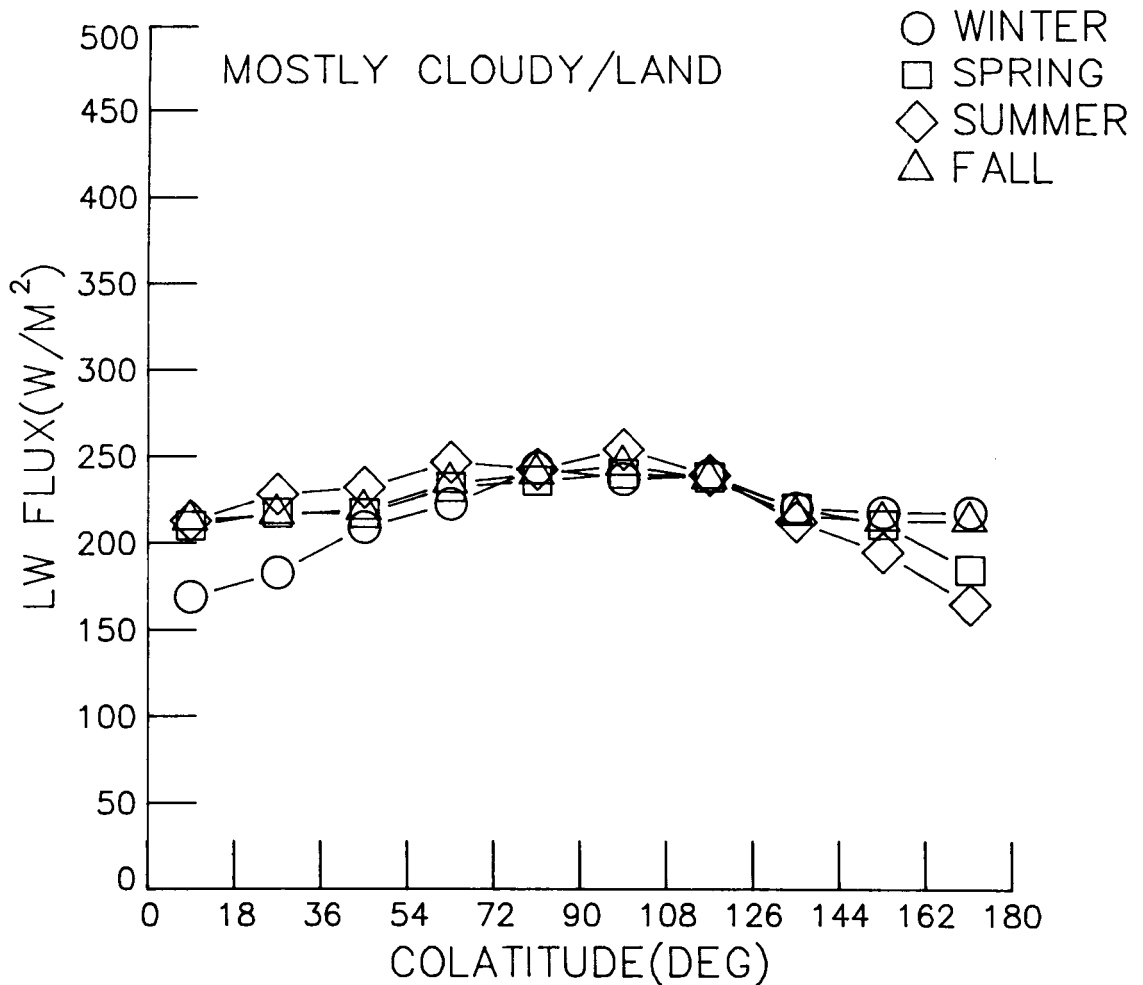


Figure 26. Mean daytime longwave radiation fluxes for mostly cloudy over land or desert. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2)									
	NORTH POLE	2	3	4	5	6	7	8	9	10
	1 0-18	18-36	36-54	54-72	72-90	90-108	108-126	126-144	144-162	162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	181.94 (3)	194.47 (3)	214.89 (3)	233.78 (3)	246.31 (3)	242.78 (3)	244.73 (3)	225.27 (3)	217.27 (3)	214.25 (3)
SPRING	206.29 (3)	217.28 (3)	221.46 (3)	236.52 (3)	238.96 (3)	246.42 (3)	242.87 (3)	222.23 (3)	207.50 (3)	189.38 (3)
SUMMER	219.62 (3)	229.14 (3)	237.09 (3)	248.84 (3)	243.45 (3)	257.95 (3)	243.95 (3)	215.96 (3)	197.26 (3)	156.15 (3)
FALL	211.99 (3)	216.52 (3)	225.94 (3)	240.99 (3)	241.92 (3)	250.79 (3)	241.05 (3)	219.87 (3)	210.71 (3)	203.38 (3)

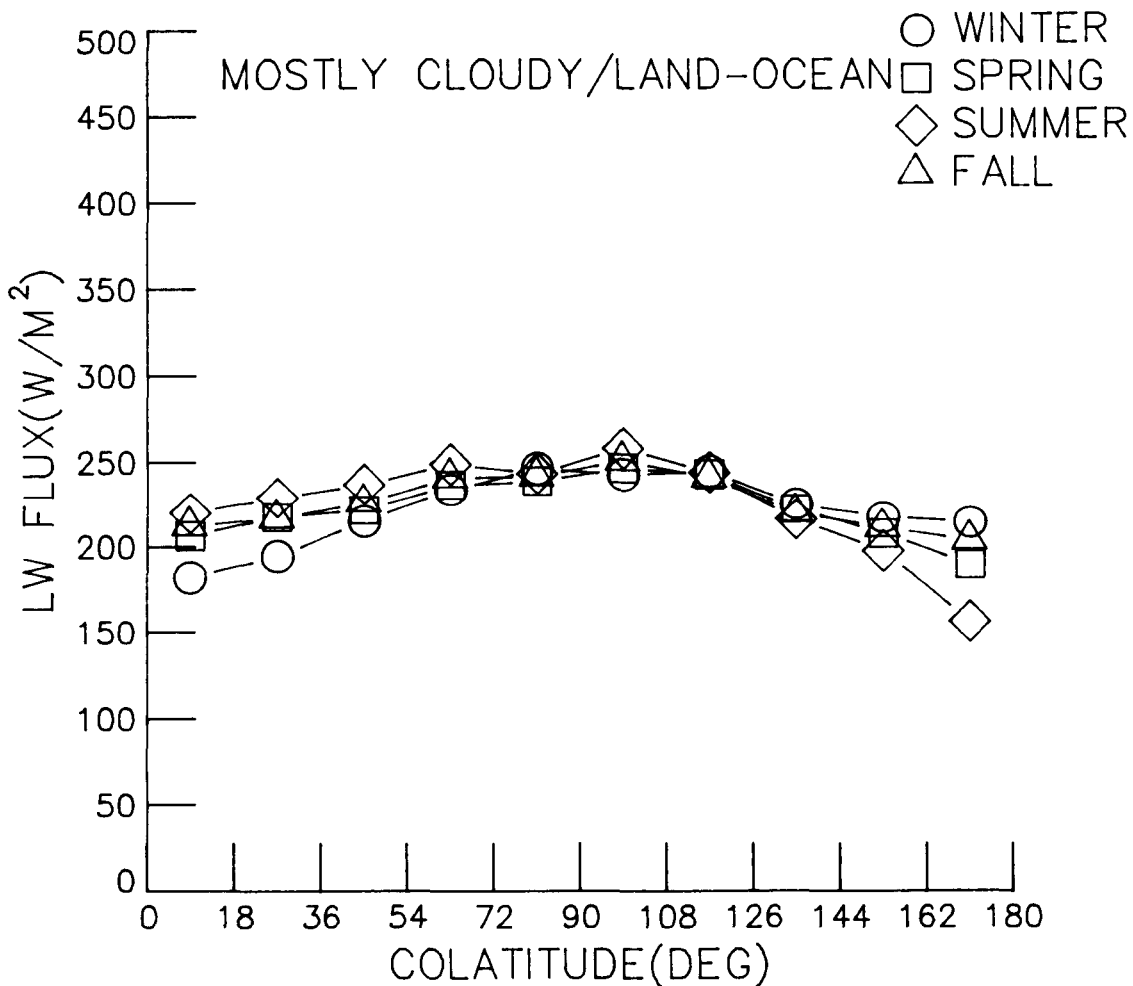


Figure 27. Mean daytime longwave radiation fluxes for mostly cloudy over land-ocean mix. (See table 4 for explanation of data sources.)

BIN NO. ANGLE(DEG)	LONGWAVE FLUX (W/M**2) COLATITUDE									
	NORTH POLE 1 0-18	2 18-36	3 36-54	4 54-72	5 72-90	6 90-108	7 108-126	8 126-144	9 144-162	10 162-180
SEASON										
NORTHERN HEMISPHERE										
WINTER	177.89 (8)	176.63 (9)	177.05 (1)	190.20 (1)	198.66 (1)	184.89 (1)	185.99 (1)	191.62 (9)	196.10 (9)	192.47 (9)
SPRING	177.14 (9)	190.89 (1)	184.17 (1)	195.18 (1)	182.36 (1)	191.15 (1)	187.28 (1)	184.11 (9)	179.10 (9)	151.04 (4)
SUMMER	201.96 (1)	199.82 (1)	193.36 (1)	193.86 (1)	190.76 (1)	213.66 (1)	199.30 (1)	180.43 (9)	170.93 (9)	132.16 (8)
FALL	192.23 (9)	189.45 (1)	185.68 (1)	194.50 (1)	186.84 (1)	199.62 (1)	192.64 (1)	188.53 (9)	184.07 (9)	159.65 (4)

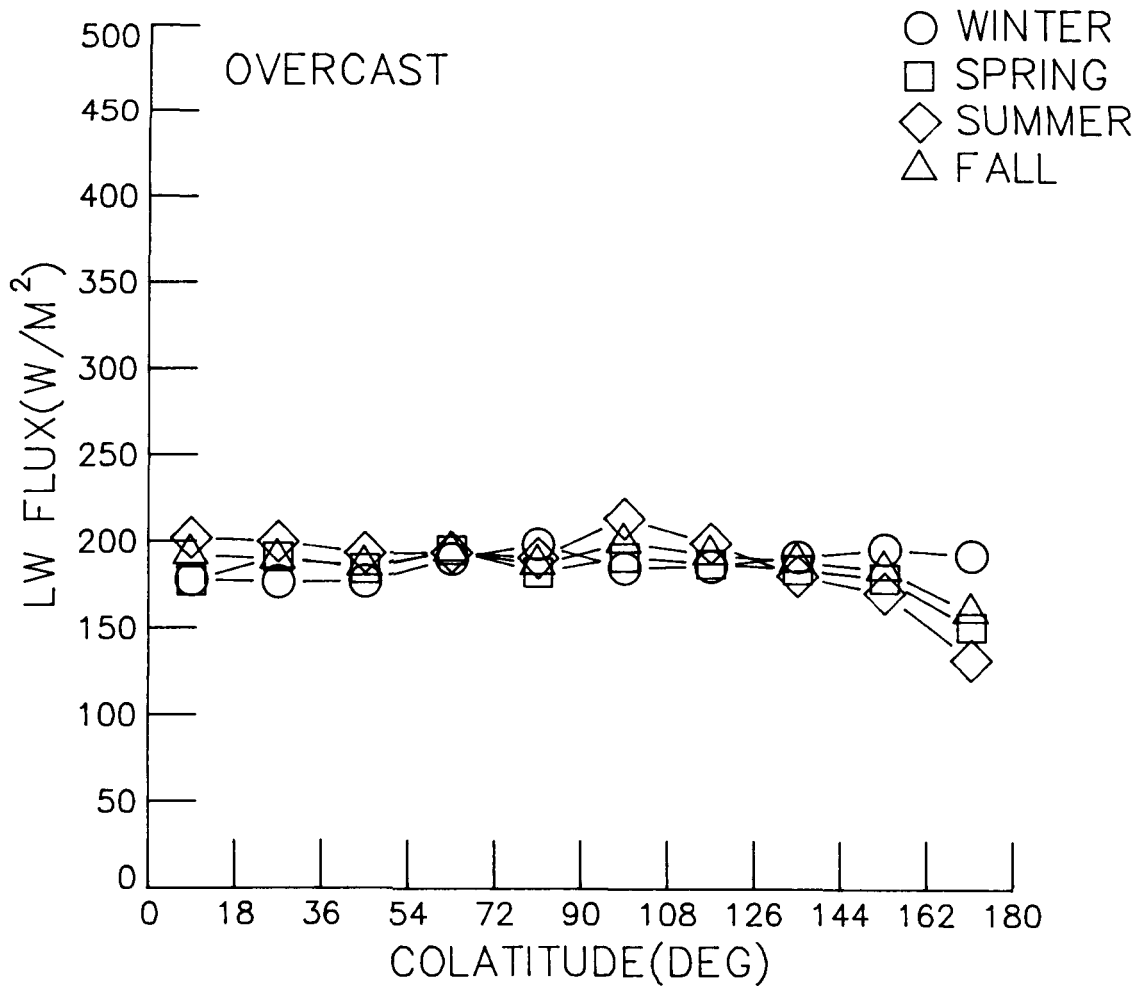


Figure 28. Mean daytime longwave radiation fluxes for overcast scenes. (See table 4 for explanation of data sources.)



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16. Abstract This document presents the longwave angular radiation models that are required for analysis of satellite measurements of Earth radiation, such as those from the Earth Radiation Budget Experiment (ERBE). The models contain limb-darkening characteristics and mean fluxes. Limb-darkening characteristics are the longwave anisotropic factor and standard deviation of the longwave radiance. Derivation of these models from the Nimbus 7 ERB (Earth Radiation Budget) data set is described. Tabulated values and computer-generated plots are included for the limb-darkening and mean-flux models. This report is volume II of a set of two documents; volume I (NASA RP-1184, 1988) describes shortwave angular models.					
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