EW-L1-04190
JSC-17437

AgRISTARS

A Joint Program for Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing

Early Warning and Crop Condition Assessment

February 1982

AREA ESTIMATION OF ENVIRONMENTAL PHENOMENA FROM NOAA-n SATELLITE DATA

G. Tappan and G. E. Miller

Lockheed Engineering and Management Services Company, Inc.
1830 NASA Road 1, Houston, Texas 77058

Lyndon B. Johnson Space Center
Houston, Texas 77058

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
JSC-17437, EW-L1-04190		

4. Title and Subtitle	5. Report Date
Area Estimation of Environmental Phenomena From NOAA-n Satellite Data	February 1982
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
G. Tappan and G. E. Miller	LEMSCO-17312
	10. Work Unit No.

9. Performing Organization Name and Address	11. Contract or Grant No.
Lockheed Engineering and Management Services Company, Inc. 1830 NASA Road 1 Houston, Texas 77058	NAS 9-15800
	13. Type of Report and Period Covered
	Technical Memorandum

12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code
Early Warning/Crop Condition Assessment Project Office U.S. Department of Agriculture, 1050 Bay Area Blvd. Houston, Texas 77058 Technical Monitor: V. S. Whitehead	

15. Supplementary Notes

The Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing is a joint program of the U.S. Department of Agriculture, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration (U.S. Department of Commerce), the Agency for International Development (U.S. Department of State), and the U.S. Department of the Interior.

16. Abstract

The NOAA-n environmental satellites which provide daily radiometric coverage of the Earth in four or five wavebands have potential for monitoring dynamic surface phenomena. Effective monitoring of phenomena such as major floods requires estimation of their areal extent. Because NOAA-n pixels represent varying areas on the ground, calibration is needed before accurate areal estimation can be performed.

Based on Earth-satellite geometry, a function was derived to calculate the effective pixel size (measured in terms of ground area) on any given pixel. Results were tested using NOAA-6 data to estimate the areas of several lakes. Accuracy was generally within 5 percent. Sources of error are discussed.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Environmental satellites Environmental phenomena Area estimation	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	41	

*For sale by the National Technical Information Service, Springfield, Virginia 22161

EW-L1-04190
JSC-17437

AREA ESTIMATION OF ENVIRONMENTAL PHENOMENA FROM NOAA-n SATELLITE DATA

Job Order 72-458

This report describes activities of the Early Warning and Crop Condition Assessment project of the AgRISTARS program.

PREPARED BY

G. Tappan and G. E. Miller

APPROVED BY

USDA	Lockheed-EMSCO
G. O. Boatwright, Manager Early Warning/Crop Condition Assessment Project, AgRISTARS Program	J. K. Oney, Project Manager Early Warning/Crop Condition Assessment Project Office, Crop Applications Department

LOCKHEED ENGINEERING AND MANAGEMENT SERVICES COMPANY, INC.

Contract NAS 9-15800

For

Earth Resources Applications Division

Space and Life Sciences Directorate

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

February 1982

LEMSCO-17312

PREFACE

The Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing is a multiyear program of research, development, evaluation, and application of aerospace remote sensing for agricultural resources, which began in fiscal year 1980. This program is a cooperative effort of the U.S. Department of Agriculture, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration (U.S. Department of Commerce), the Agency for International Development (U.S. Department of State), and the U.S. Department of the Interior.

The authors wish to express their sincere appreciation to Thomas I. Gray of the National Oceanic and Atmospheric Administration for his valuable support and critique.

CONTENTS

FIGURES

1. BACKGROUND

The NOAA-n environmental satellites of the TIROS-N family are currently being investigated as potential tools for the monitoring of worldwide resources. Designed to operate in a near-polar, Sun-synchronous orbit, they each contain an Advanced Very High Resolution Radiometer (AVHRR) from which spectral data are obtained in four or five spectral wavebands. The wide-view angle of the onboard scanners provides daily coverage over the globe. While the spatial resolution of the data is considerably lower than that of Landsat, the frequent rate of coverage is especially conducive to monitoring highly dynamic phenomena on the Earth's surface such as major floods.

Area estimation of dynamic surface phenomena is one of the most important requirements for effective monitoring. Some remote sensing systems such as Landsat provide data which is well-suited to area estimation because of the fairly constant pixel size across the image. Unlike Landsat, ground area represented by a pixel on NOAA-n satellite imagery increases significantly with distance from the satellite ground-track. Therefore, calibration is required before area estimation of surface phenomena can be obtained. This paper describes the derivation and results of a technique for documenting changes in pixel size which can, in turn, be used to perform area calculations for various land cover types from the NOAA-n satellite series.

2. EFFECTIVE PIXEL SIZE

Earth scan data from the NOAA-n satellites are retained within a view angle ±55.4° (nominal) from the subpoint view or nadir (Schwalb, 1978). The instantaneous field of view (IFOV) of each sensor is approximately 1.4 milliradians (Kidwell, 1981) and is produced by a circular aperture which, when mapped on the Earth's surface at the subpoint, represents a pixel having a diameter of about 1.16 kilometers for a nominal altitude of 833 kilometers. Because of the relatively wide scanner view angle and the constant IFOV, pixels along a scan become larger with respect to the ground as distance increases from the satellite subpoint. Also, the pixel's shape changes as a function of distance from

the satellite subpoint, ranging from nearly circular directly below the spacecraft to highly elliptical at the extremities of the view angle (see figure 1).

A significant amount of overlap is evident between adjacent pixels along a scan. This is explained by the fact that the angular displacement between adjacent pixel centerpoints is approximately 0.945 milliradian, while the diameter of the IFOV is about 1.4 milliradians. Pixel overlap is also significant between adjacent scan lines, with overlap increasing toward the scan extremities.

Techniques for area calculation of various land cover types based on pixel counts must take pixel overlap into consideration. The method presented here circumvents the problem of overlap by calculating the ground area of a pixel defined by boundaries which bisect perpendicularly the distance between adjacent pixel centerpoints. The resulting area, which we will refer to as the effective pixel size, is shown in figure 2. Like pixels, effective pixel size increases quasi-exponentially with distance from nadir. By knowing the effective pixel sizes and the number of pixels falling on a surface feature such as a lake, the area of that feature can then be determined.

3. DERIVATION OF A PIXEL SIZE FUNCTION

An exact function for determining the effective pixel size was derived from characteristics of the Earth-satellite geometry (see figure 3). While the effective pixel size is defined by its length and width, the function applies only to the length since the width (distance between adjacent scans) can be considered very nearly constant. The equation is simply an application of the law of sines plus an arclength formula. Calculations are based on the assumption of a spherical Earth.

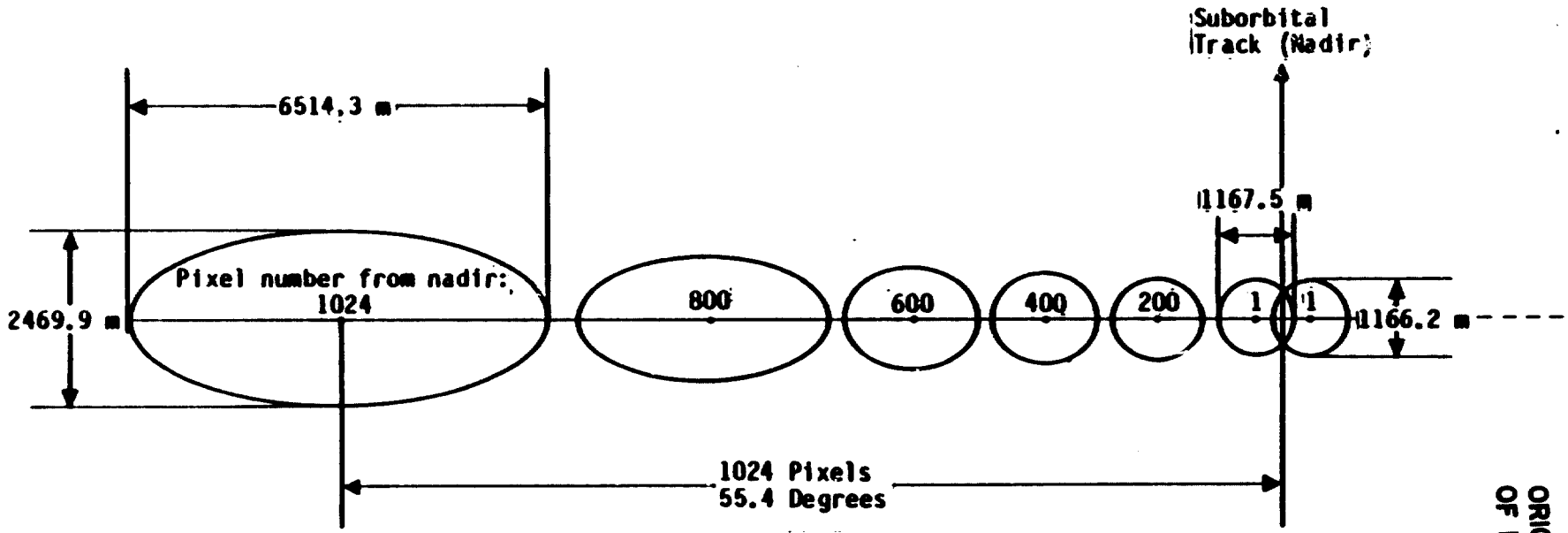
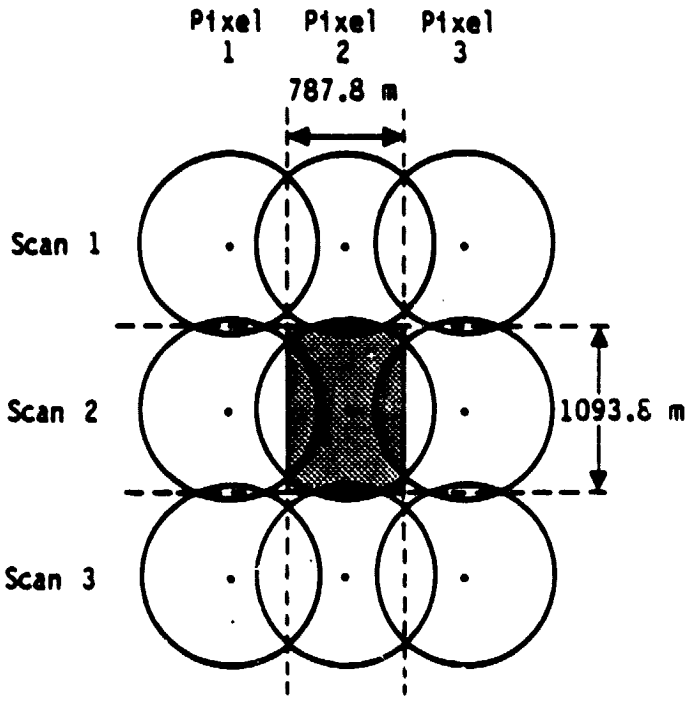


Figure 1.- Relative sizes of selected pixels along a scan line as projected on the Earth.



LEGEND:

Shaded area = The effective pixel size of a pixel near the suborbital track.

Dashed line = The effective pixel boundaries which bisect perpendicularly the distance between adjacent pixel centerpoints.

Figure 2.- The effective pixel size and pixel boundaries of a pixel near the suborbital track.

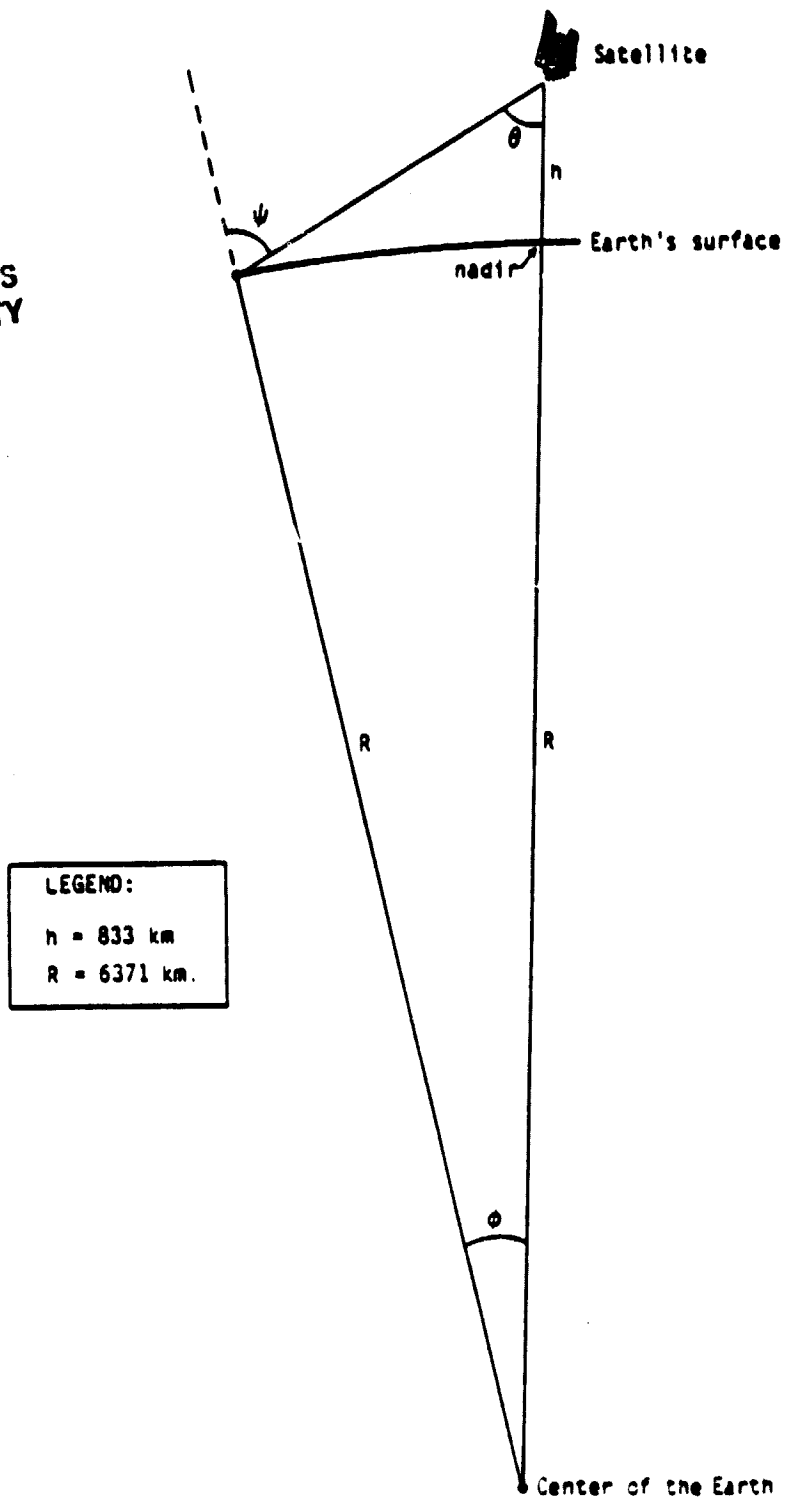


Figure 3.- A view of the Earth-satellite geometry used in determining pixel lengths (drawn to scale).

The measurements shown in figure 3 are as follows:

h = 833 kilometers (nominal height of the NOAA-6 satellite above the Earth)

R = 6371 kilometers (the mean radius of the Earth)

θ = satellite nadir angle

ψ = satellite zenith angle

ϕ = great circle arc

By the Law of Sines, $\frac{\text{SIN } \theta}{R} = \frac{\text{SIN } \psi}{R + h}$.

$\phi = \psi - \theta$ since all angles of a triangle must sum to 180°.

The steps for pixel length determination are as follows (using radians for all angles):

1. Determine $\theta_{x-1} = (x-1)(0.000945 \text{ radian})$ where x = pixel no.
2. Determine ψ_{x-1} using the law of sines
3. Determine $\phi_{x-1} = \psi_{x-1} - \theta_{x-1}$
4. Determine θ_x, ψ_x, and ϕ_x
5. Determine $\Delta_\phi = \phi_x - \phi_{x-1}$
6. Determine $\text{arclength}_x = R\Delta_\phi$.

The above steps are simplified into the following function:

$$\text{Arclength}_x = R\{\arcsin[a \sin(bx)] - bx - \arcsin[a \sin(b(x-1))] + b(x-1)\}$$

where,

arclength_x = pixel length for pixel x

x = pixel number from inside nadir pixel to outside pixel (1-1024)

$a = 1.131 = \frac{R + h}{h} = \frac{6371 + 833}{6371}$

b = 0.000945 radian

R = 6371 km.

A graphic illustration of effective pixel length plotted against the number of pixels from nadir is presented in figure 4(a). It is evident that little change in pixel size (and resolution) occurs within 500 pixels of nadir. In contrast, pixels in the 740 range from nadir have about twice the effective pixel size as those at nadir. Pixels at the far edge of the angle of view (1024 pixels from nadir) are nearly six times the length of the center pixels [fig. 4(b)]. The effective pixel lengths were found to range from 788.5 meters to 4568.5 meters. This corresponds to effective pixel areas ranging from 0.8624 square kilometers to 4.9970 square kilometers [See fig. 4(c)].

The effective pixel lengths, widths, and ground areas for all pixels between nadir and the extreme view angles were calculated and are presented in the appendices. Appendix A lists the results determined for NOAA-6 AVHRR data (satellite was launched June 27, 1979). The NOAA-7 satellite (launched June 23, 1981) was placed in a slightly higher orbit (nominal altitude of 848 kilometers) resulting in slightly larger pixels when mapped on the ground. Appendix B presents results of effective pixel dimensions for NOAA-7 data.

4. ACCURACY ASSESSMENT

Results of the pixel size function were tested on NOAA-6 data to estimate the areal extent of ground features. Several lakes within the continental United States, ranging from 48 square kilometers to 1470 square kilometers were chosen for the test. Since water is generally separable spectrally from land in the AVHRR Channel 2 data (0.725-1.100 micrometers), lakes represent ideal features for testing accuracy of areal mapping. The lakes were selected such that their positions within an image would range from near nadir to near the extreme edges of the view angle. Pixel counts of the lakes were performed from visual displays of NOAA-6 imagery on CRT's. The images were enlarged so that individual pixels could be counted easily. Pixel positions away from the scene center were also obtained for all water pixels.

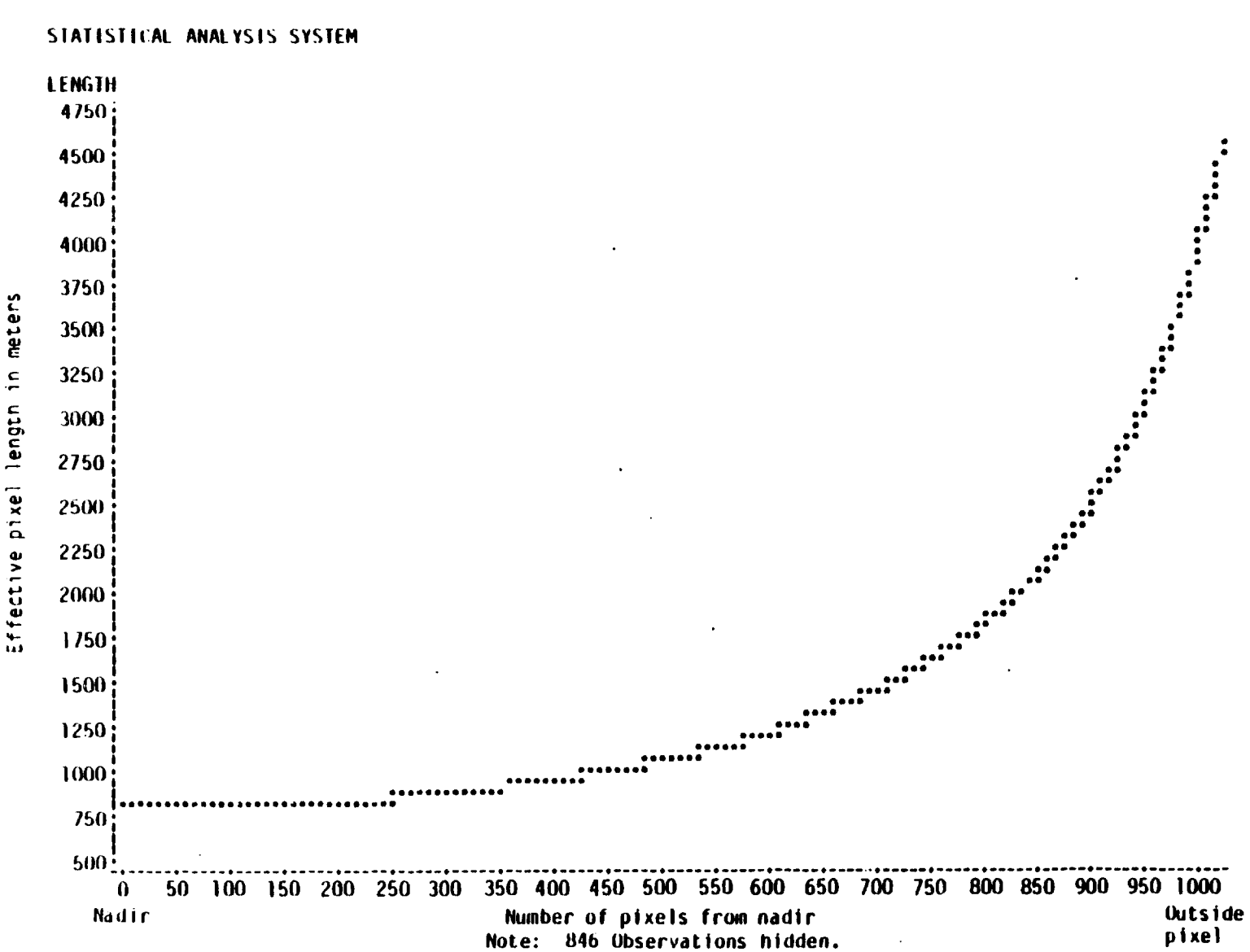


Figure 4(a).- The relationship between effective pixel length (meters) and number of pixels from nadir for NOAA-6 AVHRR data.

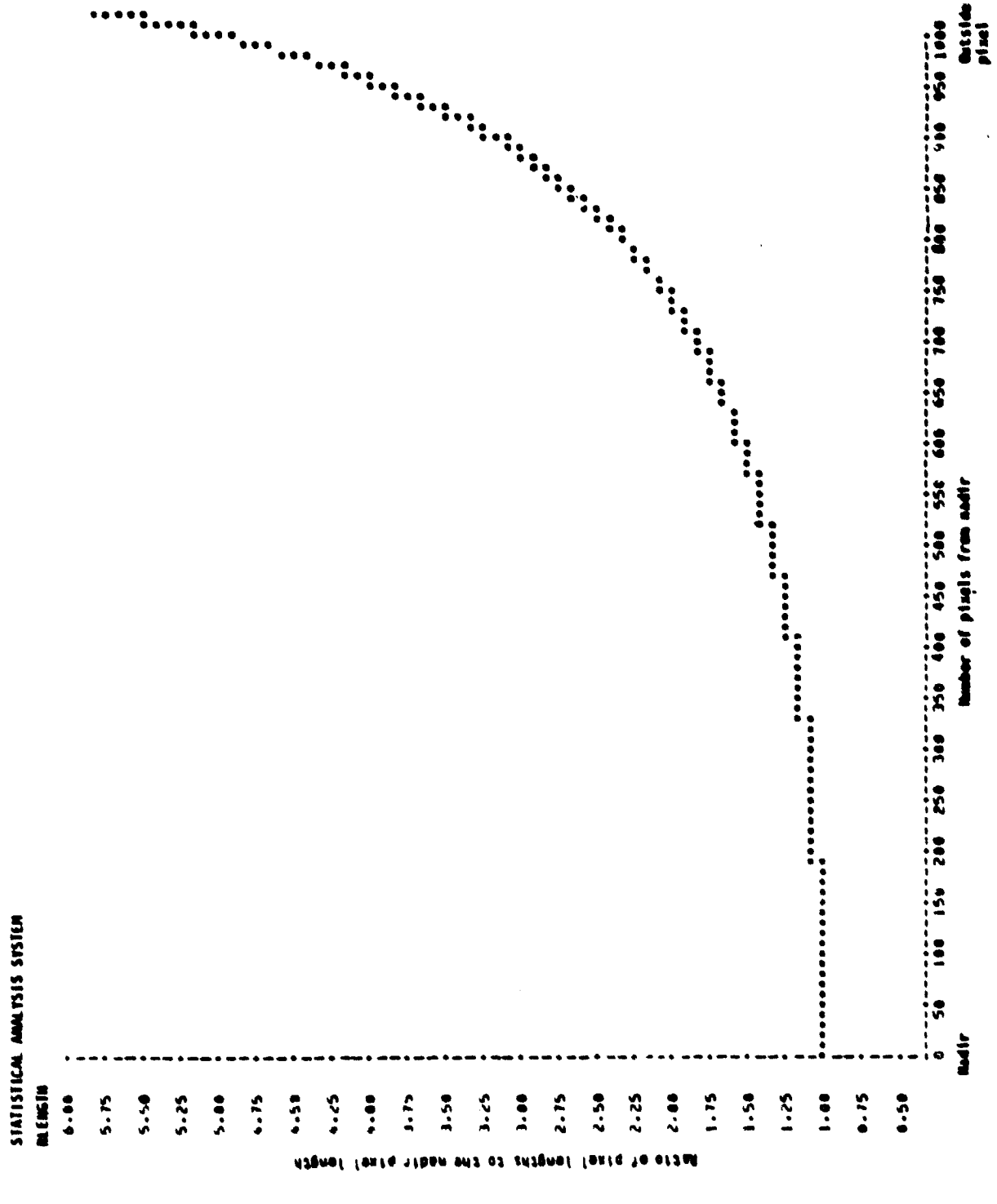


Figure 4(b).- Ratios of effective pixel lengths away from nadir to the effective pixel length at nadir for NOAA-6 AVHRR data.

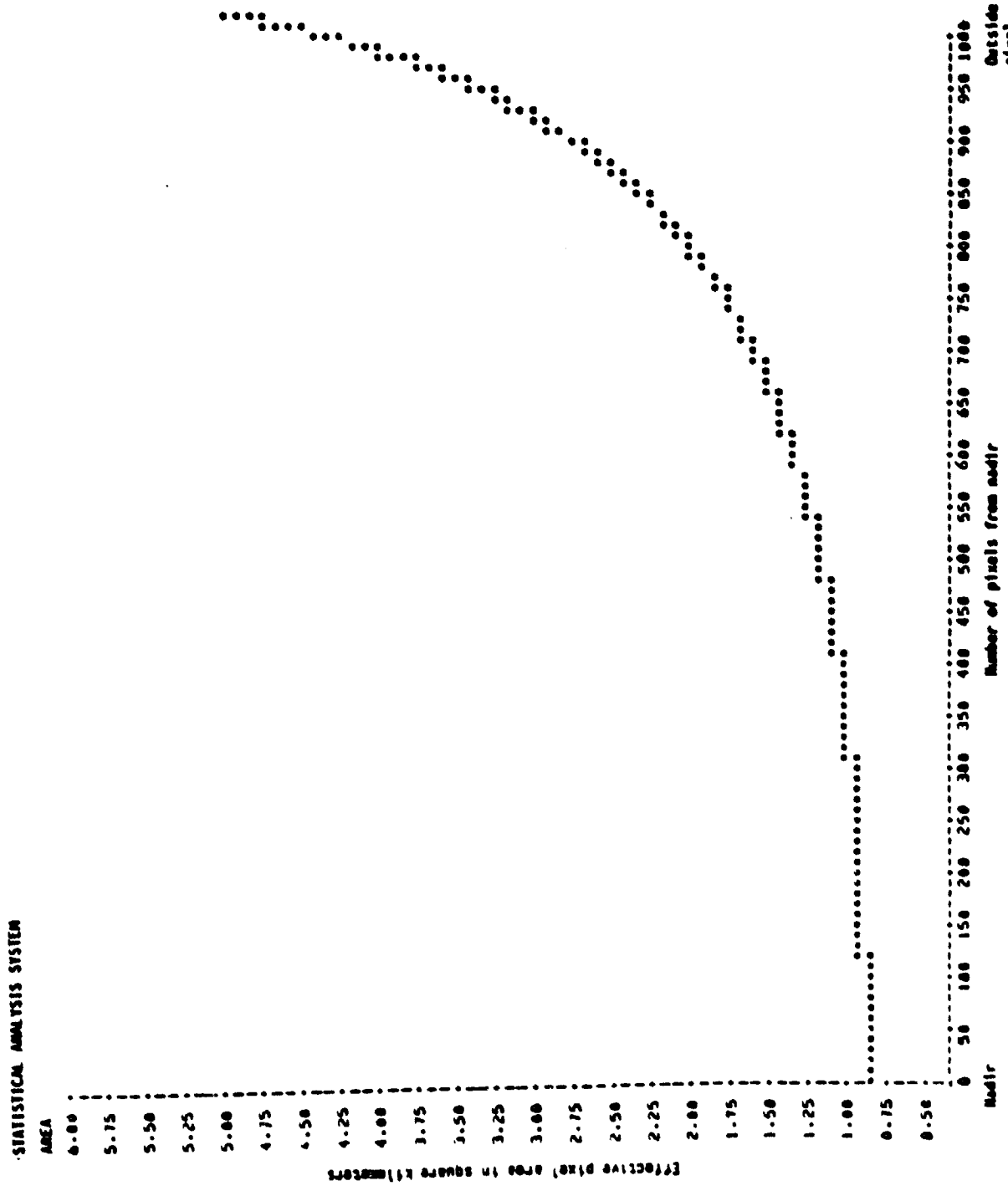


Figure 4(c).- The relationship between effective pixel area (square kilometers) and number of pixels from nadir for NOAA-6 AVHRR data.

Using the pixel counts, pixel positions away from nadir, and the results of the pixel size function, the areal extent of each lake was estimated. These estimates were then compared with areal measurements of the same lakes derived from Operational Navigation Charts (ONC's; scale: 1:1 000 000) using dot grid overlays for areal measurement. The estimates from the NOAA-6 data using the pixel size function compared well to those made from the maps (generally within 5 percent). The main source of error resulted from inconsistency in determining whether pixels falling on lake shores were predominantly land or water; also, error may have resulted from changes in lake size after the lakes were mapped on the ONC's. Automated discrimination of water from land would probably provide more consistent results.

Since subjective judgement contributed significantly to the error found in the tests discussed above, a more theoretical approach was taken to better quantify error associated with the pixel size function. Basically, deviations of actual pixel dimensions from those determined by the function can occur as a result of (a) a nonspherical Earth, and (b) slight variations in the satellite altitude.

Although both alter the distance between the satellite and the ground, the nonspherical nature of the Earth accounts for most of the deviations from the calculated values. At nadir, this contributes a maximum of 1.3 percent error in the calculated pixel dimensions at the poles, and .6 percent at the equator. At the far edges of the view angle, a maximum of 2.9 percent variance occurs at the poles, and 1.4 percent at the equator. The best fit occurs in the middle latitudes. Deviations resulting from variations in the satellite altitude were not considered significant, because the orbits tend to become stable and nearly circular with time about the Earth's center.

5. CONCLUSIONS

The pixel size function promises to be a useful tool for determining areal extent of surface phenomena as detected by the NOAA-n sensors. The function incorporates pixel overlap since it was designed to derive effective pixel

sizes rather than the full ground area within the IFOV. The function can be adapted easily to automated procedures, and has potential for monitoring dynamic phenomena. In addition, the graph and tables of effective pixel sizes provide quick references for manual estimates of data resolution, and areal extent of ground features.

6. REFERENCES

Helfert, M. R.; D. G. McCrary; and T. I. Gray: Utilization of Meteorological Satellite Imagery for Worldwide Environmental Monitoring of the Lower Mississippi River Flood of 1979 - Case 1. NASA, JSC-17144; AgRISTARS Report No. EW-N1-04104, 1981.

Kidwell, K. B.: NOAA Polar Orbiter Data (TIROS-N and NOAA-6) Users Guide. National Oceanic and Atmospheric Administration, Washington, D.C., 1981.

Schwalb, A.: The TIROS-N/NOAA A-G Satellite Series. National Oceanic and Atmospheric Administration, Washington, D.C., 1978.

APPENDIX A

PIXEL POSITION AWAY FROM NADIR AND THE PIXEL LENGTHS, WIDTHS, AND AREAS

APPENDIX A

PIXEL POSITION AWAY FROM NADIR AND THE PIXEL LENGTHS, WIDTHS, AND AREAS

The pixel position away from nadir and the effective pixel lengths, widths, and areas in meters are included in this appendix. The calculations refer to the NOAA-6 AVHRR data.

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
1	788.5	1093.8	862415
2	788.5	1093.8	862417
3	788.5	1093.8	862421
4	788.5	1093.8	862426
5	788.5	1093.8	862434
6	788.5	1093.8	862443
7	788.5	1093.8	862454
8	788.5	1093.8	862467
9	788.5	1093.8	862482
10	788.5	1093.8	862498
11	788.6	1093.8	862517
12	788.6	1093.8	862537
13	788.6	1093.8	862560
14	788.6	1093.8	862584
15	788.6	1093.8	862610
16	788.7	1093.8	862638
17	788.7	1093.8	862667
18	788.7	1093.8	862699
19	788.7	1093.8	862732
20	788.8	1093.8	862768
21	788.8	1093.8	862805
22	788.8	1093.8	862844
23	788.9	1093.8	862885
24	788.9	1093.8	862927
25	789.0	1093.8	862972
26	789.0	1093.8	863018
27	789.1	1093.8	863066
28	789.1	1093.8	863117
29	789.1	1093.8	863169
30	789.2	1093.8	863222
31	789.2	1093.8	863278
32	789.3	1093.8	863336
33	789.4	1093.8	863395
34	789.4	1093.8	863457
35	789.5	1093.8	863520
36	789.5	1093.8	863585
37	789.6	1093.8	863652
38	789.7	1093.8	863721
39	789.7	1093.8	863791
40	789.8	1093.8	863864
41	789.9	1093.8	863938
42	789.9	1093.8	864014
43	790.0	1093.8	864092
44	790.1	1093.8	864172
45	790.1	1093.8	864254
46	790.2	1093.8	864338
47	790.3	1093.8	864424
48	790.4	1093.8	864511
49	790.5	1093.8	864601
50	790.5	1093.8	864692
51	790.6	1093.8	864785
52	790.7	1093.8	864880
53	790.8	1093.8	864977
54	790.9	1093.8	865076
55	791.0	1093.8	865176
56	791.1	1093.8	865279
57	791.2	1093.8	865383
58	791.3	1093.8	865489
59	791.4	1093.8	865598
60	791.5	1093.8	865708
61	791.6	1093.8	865820
62	791.7	1093.8	865933
63	791.8	1093.8	866049
64	791.9	1093.8	866167
65	792.0	1093.8	866286
66	792.1	1093.8	866408
67	792.2	1093.8	866531
68	792.3	1093.8	866656
69	792.5	1093.8	866783
70	792.6	1093.8	866912
71	792.7	1093.8	867043
72	792.8	1093.8	867176
73	792.9	1093.8	867310
74	793.1	1093.8	867447
75	793.2	1093.8	867585
76	793.3	1093.8	867726

OBS	LENGTH	WIDTH	AREA
77	793.4	1093.8	867868
78	793.6	1093.8	868012
79	793.7	1093.8	868158
80	793.8	1093.8	868306
81	794.0	1093.8	868456
82	794.1	1093.8	868608
83	794.3	1093.8	868762
84	794.4	1093.8	868917
85	794.5	1093.8	869075
86	794.7	1093.8	869234
87	794.8	1093.8	869396
88	795.0	1093.8	869559
89	795.1	1093.8	869724
90	795.3	1093.8	869891
91	795.4	1093.8	870060
92	795.6	1093.8	870231
93	795.8	1093.8	870404
94	795.9	1093.8	870579
95	796.1	1093.8	870756
96	796.2	1093.8	870935
97	796.4	1093.8	871116
98	796.6	1093.8	871298
99	796.7	1093.8	871483
100	796.9	1093.8	871669
101	797.1	1093.8	871858
102	797.3	1093.8	872048
103	797.4	1093.8	872240
104	797.6	1093.8	872435
105	797.8	1093.8	872631
106	798.0	1093.8	872829
107	798.2	1093.8	873029
108	798.3	1093.8	873231
109	798.5	1093.8	873435
110	798.7	1093.8	873641
111	798.9	1093.8	873849
112	799.1	1093.8	874059
113	799.3	1093.8	874271
114	799.5	1093.8	874485
115	799.7	1093.8	874701
116	799.9	1093.8	874919
117	800.1	1093.8	875138
118	800.3	1093.8	875360
119	800.5	1093.8	875584
120	800.7	1093.8	875810
121	800.9	1093.8	876037
122	801.1	1093.8	876267
123	801.3	1093.8	876499
124	801.5	1093.8	876732
125	801.8	1093.8	876968
126	802.0	1093.8	877206
127	802.2	1093.8	877445
128	802.4	1093.8	877687
129	802.6	1093.8	877931
130	802.9	1093.8	878178
131	803.1	1093.8	878424
132	803.3	1093.8	878674
133	803.6	1093.8	878925
134	803.8	1093.8	879179
135	804.0	1093.8	879435
136	804.3	1093.8	879692
137	804.5	1093.8	879952
138	804.7	1093.8	880214
139	805.0	1093.8	880478
140	805.2	1093.8	880743
141	805.5	1093.8	881011
142	805.7	1093.8	881281
143	806.0	1093.8	881553
144	806.2	1093.8	881827
145	806.5	1093.8	882103
146	806.7	1093.8	882381
147	807.0	1093.8	882661
148	807.2	1093.8	882943
149	807.5	1093.8	883227
150	807.7	1093.8	883514
151	808.0	1093.8	883802
152	808.3	1093.8	884092

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
153	808.5	1093.8	884385
154	808.8	1093.8	884679
155	809.1	1093.8	884976
156	809.4	1093.8	885274
157	809.6	1093.8	885575
158	809.9	1093.8	885878
159	810.2	1093.8	886183
160	810.5	1093.8	886490
161	810.8	1093.8	886799
162	811.0	1093.8	887110
163	811.3	1093.8	887423
164	811.6	1093.8	887738
165	811.9	1093.8	888056
166	812.2	1093.8	888375
167	812.5	1093.8	888697
168	812.8	1093.8	889021
169	813.1	1093.8	889346
170	813.4	1093.8	889674
171	813.7	1093.8	890004
172	814.0	1093.8	890337
173	814.3	1093.8	890671
174	814.6	1093.8	891007
175	814.9	1093.8	891346
176	815.2	1093.8	891687
177	815.5	1093.8	892029
178	815.8	1093.8	892374
179	816.2	1093.8	892722
180	816.5	1093.8	893071
181	816.8	1093.8	893422
182	817.1	1093.8	893776
183	817.5	1093.8	894132
184	817.8	1093.8	894490
185	818.1	1093.8	894850
186	818.4	1093.8	895212
187	818.8	1093.8	895576
188	819.1	1093.8	895943
189	819.4	1093.8	896312
190	819.8	1093.8	896683
191	820.1	1093.8	897056
192	820.5	1093.8	897431
193	820.8	1093.8	897809
194	821.2	1093.8	898189
195	821.5	1093.8	898571
196	821.9	1093.8	898955
197	822.2	1093.8	899341
198	822.6	1093.8	899730
199	822.9	1093.8	900120
200	823.3	1093.8	900513
201	823.7	1093.8	900909
202	824.0	1093.8	901306
203	824.4	1093.8	901706
204	824.7	1093.8	902108
205	825.1	1093.8	902512
206	825.5	1093.8	902919
207	825.9	1093.8	903327
208	826.2	1093.8	903738
209	826.6	1093.8	904152
210	827.0	1093.8	904567
211	827.4	1093.8	904985
212	827.8	1093.8	905405
213	828.1	1093.8	905827
214	828.5	1093.8	906252
215	828.9	1093.8	906679
216	829.3	1093.8	907108
217	829.7	1093.8	907539
218	830.1	1093.8	907973
219	830.5	1093.8	908409
220	830.9	1093.8	908847
221	831.3	1093.8	909288
222	831.7	1093.8	909731
223	832.1	1093.8	910176
224	832.5	1093.8	910624
225	832.9	1093.8	911074
226	833.4	1093.8	911526
227	833.8	1093.8	911981
228	834.2	1093.8	912438

OBS	LENGTH	WIDTH	AREA
229	834.6	1093.8	912894
230	835.0	1093.8	913353
231	835.5	1093.8	913823
232	835.9	1093.8	914290
233	836.3	1093.8	914759
234	836.7	1093.8	915230
235	837.2	1093.8	915703
236	837.6	1093.8	916179
237	838.0	1093.8	916658
238	838.5	1093.8	917138
239	838.9	1093.8	917621
240	839.4	1093.8	918107
241	839.8	1093.8	918595
242	840.3	1093.8	919085
243	840.7	1093.8	919578
244	841.2	1093.8	920073
245	841.6	1093.8	920571
246	842.1	1093.8	921071
247	842.5	1093.8	921574
248	843.0	1093.8	922079
249	843.5	1093.8	922586
250	843.9	1093.8	923096
251	844.4	1093.8	923608
252	844.9	1093.8	924123
253	845.3	1093.8	924640
254	845.8	1093.8	925160
255	846.3	1093.8	925682
256	846.8	1093.8	926207
257	847.3	1093.8	926734
258	847.7	1093.8	927264
259	848.2	1093.8	927796
260	848.7	1093.8	928331
261	849.2	1093.8	928868
262	849.7	1093.8	929408
263	850.2	1093.8	929950
264	850.7	1093.8	930495
265	851.2	1093.8	931043
266	851.7	1093.8	931593
267	852.2	1093.8	932145
268	852.7	1093.8	932700
269	853.2	1093.8	933258
270	853.7	1093.8	933818
271	854.3	1093.8	934381
272	854.8	1093.8	934946
273	855.3	1093.8	935514
274	855.8	1093.8	936085
275	856.3	1093.8	936658
276	856.9	1093.8	937234
277	857.4	1093.8	937812
278	857.9	1093.8	938393
279	858.5	1093.8	938977
280	859.0	1093.8	939563
281	859.5	1093.8	940152
282	860.1	1093.8	940743
283	860.6	1093.8	941337
284	861.2	1093.8	941934
285	861.7	1093.8	942534
286	862.3	1093.8	943136
287	862.8	1093.8	943741
288	863.4	1093.8	944349
289	863.9	1093.8	944959
290	864.5	1093.8	945572
291	865.0	1093.8	946188
292	865.6	1093.8	946806
293	866.2	1093.8	947427
294	866.7	1093.8	948051
295	867.3	1093.8	948677
296	867.9	1093.8	949307
297	868.5	1093.8	949939
298	869.1	1093.8	950574
299	869.6	1093.8	951211
300	870.2	1093.8	951852
301	870.8	1093.8	952495
302	871.4	1093.8	953141
303	872.0	1093.8	953789
304	872.6	1093.8	954441

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
305	873.2	1093.8	955095
306	873.8	1093.8	955752
307	874.4	1093.8	956412
308	875.0	1093.8	957075
309	875.6	1093.8	957741
310	876.2	1093.8	958409
311	876.8	1093.8	959081
312	877.4	1093.8	959755
313	878.1	1093.8	960432
314	878.7	1093.8	961112
315	879.3	1093.8	961795
316	879.9	1093.8	962480
317	880.6	1093.8	963169
318	881.2	1093.8	963860
319	881.8	1093.8	964555
320	882.5	1093.8	965252
321	883.1	1093.8	965952
322	883.8	1093.8	966656
323	884.4	1093.8	967362
324	885.1	1093.8	968071
325	885.7	1093.8	968783
326	886.4	1093.8	969498
327	887.0	1093.8	970216
328	887.7	1093.8	970937
329	888.3	1093.8	971661
330	889.0	1093.8	972388
331	889.7	1093.8	973118
332	890.3	1093.8	973851
333	891.0	1093.8	974587
334	891.7	1093.8	975327
335	892.4	1093.8	976069
336	893.0	1093.8	976814
337	893.7	1093.8	977562
338	894.4	1093.8	978314
339	895.1	1093.8	979068
340	895.8	1093.8	979826
341	896.5	1093.8	980586
342	897.2	1093.8	981350
343	897.9	1093.8	982117
344	898.6	1093.8	982887
345	899.3	1093.8	983660
346	900.0	1093.8	984437
347	900.7	1093.8	985216
348	901.4	1093.8	985999
349	902.2	1093.8	986785
350	902.9	1093.8	987574
351	903.6	1093.8	988366
352	904.3	1093.8	989161
353	905.1	1093.8	989960
354	905.8	1093.8	990762
355	906.5	1093.8	991567
356	907.3	1093.8	992375
357	908.0	1093.8	993187
358	908.8	1093.8	994001
359	909.5	1093.8	994819
360	910.3	1093.8	995641
361	911.0	1093.8	996466
362	911.8	1093.8	997294
363	912.5	1093.8	998125
364	913.3	1093.8	998959
365	914.1	1093.8	999797
366	914.8	1093.8	1000639
367	915.6	1093.8	1001483
368	916.4	1093.8	1002331
369	917.2	1093.8	1003183
370	917.9	1093.8	1004039
371	918.7	1093.8	1004896
372	919.5	1093.8	1005757
373	920.3	1093.8	1006622
374	921.1	1093.8	1007491
375	921.9	1093.8	1008363
376	922.7	1093.8	1009238
377	923.5	1093.8	1010117
378	924.3	1093.8	1010999
379	925.1	1093.8	1011885
380	925.9	1093.8	1012774

OBS	LENGTH	WIDTH	AREA
381	926.7	1093.8	1013667
382	927.6	1093.8	1014563
383	928.4	1093.8	1015463
384	929.2	1093.8	1016366
385	930.0	1093.8	1017273
386	930.9	1093.8	1018183
387	931.7	1093.8	1019097
388	932.5	1093.8	1020015
389	933.4	1093.8	1020936
390	934.2	1093.8	1021861
391	935.1	1093.8	1022789
392	935.9	1093.8	1023721
393	936.8	1093.8	1024657
394	937.6	1093.8	1025596
395	938.5	1093.8	1026539
396	939.4	1093.8	1027486
397	940.2	1093.8	1028437
398	941.1	1093.8	1029391
399	942.0	1093.8	1030349
400	942.9	1093.8	1031310
401	943.8	1093.8	1032275
402	944.6	1093.8	1033245
403	945.5	1093.8	1034217
404	946.4	1093.8	1035194
405	947.3	1093.8	1036174
406	948.2	1093.8	1037159
407	949.1	1093.8	1038147
408	950.0	1093.8	1039139
409	950.9	1093.8	1040134
410	951.9	1093.8	1041134
411	952.8	1093.8	1042137
412	953.7	1093.8	1043145
413	954.6	1093.8	1044156
414	955.5	1093.8	1045171
415	956.5	1093.8	1046190
416	957.4	1093.8	1047213
417	958.3	1093.8	1048240
418	959.3	1093.8	1049271
419	960.2	1093.8	1050306
420	961.2	1093.8	1051345
421	962.1	1093.8	1052388
422	963.1	1093.8	1053435
423	964.1	1093.8	1054486
424	965.0	1093.8	1055541
425	966.0	1093.8	1056600
426	967.0	1093.8	1057663
427	967.9	1093.8	1058731
428	968.9	1093.8	1059802
429	969.9	1093.8	1060878
430	970.9	1093.8	1061957
431	971.9	1093.8	1063041
432	972.9	1093.8	1064129
433	973.9	1093.8	1065221
434	974.9	1093.8	1066318
435	975.9	1093.8	1067418
436	976.9	1093.8	1068523
437	977.9	1093.8	1069632
438	978.9	1093.8	1070745
439	979.9	1093.8	1071863
440	981.0	1093.8	1072985
441	982.0	1093.8	1074111
442	983.0	1093.8	1075242
443	984.1	1093.8	1076377
444	985.1	1093.8	1077516
445	986.2	1093.8	1078659
446	987.2	1093.8	1079807
447	988.3	1093.8	1080960
448	989.3	1093.8	1082117
449	990.4	1093.8	1083278
450	991.4	1093.8	1084444
451	992.5	1093.8	1085614
452	993.6	1093.8	1086789
453	994.7	1093.8	1087968
454	995.8	1093.8	1089151
455	996.8	1093.8	1090340
456	997.9	1093.8	1091532

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
457	999.0	1093.A	109c730
458	1000.1	1093.A	1093932
459	1001.2	1093.A	1095138
460	1002.3	1093.A	1096350
461	1003.4	1093.A	1097565
462	1004.6	1093.A	1098786
463	1005.7	1093.A	1100011
464	1006.8	1093.A	1101241
465	1007.9	1093.A	1102475
466	1009.1	1093.A	1103715
467	1010.2	1093.A	1104959
468	1011.3	1093.A	1106208
469	1012.5	1093.A	1107461
470	1013.6	1093.A	1108720
471	1014.8	1093.A	1109983
472	1016.0	1093.A	1111251
473	1017.1	1093.A	1112524
474	1018.3	1093.A	1113802
475	1019.5	1093.A	1115085
476	1020.6	1093.A	1116372
477	1021.8	1093.A	1117665
478	1023.0	1093.A	1118962
479	1024.2	1093.A	1120265
480	1025.4	1093.A	1121573
481	1026.6	1093.A	1122885
482	1027.8	1093.A	1124203
483	1029.0	1093.A	1125525
484	1030.2	1093.A	1126853
485	1031.4	1093.A	1128186
486	1032.7	1093.A	1129524
487	1033.9	1093.A	1130867
488	1035.1	1093.A	1132215
489	1036.4	1093.A	1133569
490	1037.6	1093.A	1134927
491	1038.8	1093.A	1136291
492	1040.1	1093.A	1137660
493	1041.4	1093.A	1139035
494	1042.6	1093.A	1140414
495	1043.9	1093.A	1141799
496	1045.2	1093.A	1143189
497	1046.4	1093.A	1144585
498	1047.7	1093.A	1145986
499	1049.0	1093.A	1147392
500	1050.3	1093.A	1148804
501	1051.6	1093.A	1150222
502	1052.9	1093.A	1151644
503	1054.2	1093.A	1153073
504	1055.5	1093.A	1154506
505	1056.8	1093.A	1155946
506	1058.1	1093.A	1157390
507	1059.5	1093.A	1158841
508	1060.8	1093.A	1160297
509	1062.1	1093.A	1161758
510	1063.5	1093.A	1163226
511	1064.8	1093.A	1164699
512	1066.2	1093.A	1166177
513	1067.5	1093.A	1167662
514	1068.9	1093.A	1169152
515	1070.3	1093.A	1170647
516	1071.6	1093.A	1172149
517	1073.0	1093.A	1173657
518	1074.4	1093.A	1175170
519	1075.8	1093.A	1176689
520	1077.2	1093.A	1178214
521	1078.6	1093.A	1179745
522	1080.0	1093.A	1181282
523	1081.4	1093.A	1182825
524	1082.8	1093.A	1184374
525	1084.2	1093.A	1185929
526	1085.7	1093.A	1187490
527	1087.1	1093.A	1189057
528	1088.5	1093.A	1190630
529	1090.0	1093.A	1192209
530	1091.4	1093.A	1193795
531	1092.9	1093.A	1195386
532	1094.3	1093.A	1196984

OBS	LENGTH	WIDTH	AREA
533	1095.A	1093.A	1198588
534	1097.3	1093.A	1200199
535	1098.A	1093.A	1201815
536	1100.2	1093.A	1203438
537	1101.7	1093.A	1205067
538	1103.2	1093.A	1206703
539	1104.7	1093.A	1208345
540	1106.2	1093.A	1209993
541	1107.7	1093.A	1211648
542	1109.3	1093.A	1213310
543	1110.A	1093.A	1214978
544	1112.3	1093.A	1216652
545	1113.9	1093.A	1218333
546	1115.4	1093.A	1220021
547	1116.9	1093.A	1221715
548	1118.5	1093.A	1223416
549	1120.1	1093.A	1225124
550	1121.6	1093.A	1226838
551	1123.2	1093.A	1228559
552	1124.8	1093.A	1230287
553	1126.4	1093.A	1232022
554	1128.0	1093.A	1233763
555	1129.4	1093.A	1235512
556	1131.2	1093.A	1237267
557	1132.A	1093.A	1239030
558	1134.4	1093.A	1240799
559	1136.0	1093.A	1242575
560	1137.6	1093.A	1244358
561	1139.3	1093.A	1246149
562	1140.9	1093.A	1247946
563	1142.6	1093.A	1249751
564	1144.2	1093.A	1251563
565	1145.9	1093.A	1253382
566	1147.6	1093.A	1255208
567	1149.2	1093.A	1257042
568	1150.9	1093.A	1258882
569	1152.6	1093.A	1260731
570	1154.3	1093.A	1262586
571	1156.0	1093.A	1264449
572	1157.7	1093.A	1266319
573	1159.4	1093.A	1268197
574	1161.2	1093.A	1270083
575	1162.9	1093.A	1271976
576	1164.6	1093.A	1273876
577	1166.4	1093.A	1275784
578	1168.1	1093.A	1277700
579	1169.9	1093.A	1279624
580	1171.7	1093.A	1281555
581	1173.4	1093.A	1283494
582	1175.2	1093.A	1285441
583	1177.0	1093.A	1287395
584	1178.8	1093.A	1289358
585	1180.6	1093.A	1291329
586	1182.4	1093.A	1293307
587	1184.2	1093.A	1295293
588	1186.0	1093.A	1297287
589	1187.9	1093.A	1299290
590	1189.7	1093.A	1301301
591	1191.6	1093.A	1303320
592	1193.4	1093.A	1305347
593	1195.3	1093.A	1307382
594	1197.1	1093.A	1309425
595	1199.0	1093.A	1311476
596	1200.9	1093.A	1313535
597	1202.8	1093.A	1315602
598	1204.7	1093.A	1317677
599	1206.6	1093.A	1319759
600	1208.5	1093.A	1321850
601	1210.4	1093.A	1323948
602	1212.4	1093.A	1326054
603	1214.3	1093.A	1328167
604	1216.2	1093.A	1330288
605	1218.2	1093.A	1332417
606	1220.2	1093.A	1334554
607	1222.1	1093.A	1336698
608	1224.1	1093.A	1338850

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
609	1226.1	1093.8	1341101
610	1228.1	1093.8	1343282
611	1230.1	1093.8	1345473
612	1232.1	1093.8	1347673
613	1234.1	1093.8	1349882
614	1236.1	1093.8	1352100
615	1238.2	1093.8	1354327
616	1240.2	1093.8	1356564
617	1242.3	1093.8	1358809
618	1244.3	1093.8	1361065
619	1246.4	1093.8	1363329
620	1248.5	1093.8	1365603
621	1250.6	1093.8	1367887
622	1252.7	1093.8	1370180
623	1254.8	1093.8	1372482
624	1256.9	1093.8	1374794
625	1259.0	1093.8	1377116
626	1261.2	1093.8	1379448
627	1263.3	1093.8	1381789
628	1265.4	1093.8	1384141
629	1267.6	1093.8	1386502
630	1269.8	1093.8	1388873
631	1271.9	1093.8	1391254
632	1274.1	1093.8	1393645
633	1276.3	1093.8	1396047
634	1278.5	1093.8	1398458
635	1280.7	1093.8	1400880
636	1283.0	1093.8	1403312
637	1285.2	1093.8	1405754
638	1287.4	1093.8	1408206
639	1289.7	1093.8	1410669
640	1292.0	1093.8	1413143
641	1294.2	1093.8	1415627
642	1296.5	1093.8	1418122
643	1298.8	1093.8	1420627
644	1301.1	1093.8	1423143
645	1303.4	1093.8	1425670
646	1305.7	1093.8	1428208
647	1308.1	1093.8	1430756
648	1310.4	1093.8	1433316
649	1312.8	1093.8	1435886
650	1315.1	1093.8	1438468
651	1317.5	1093.8	1441061
652	1319.9	1093.8	1443665
653	1322.3	1093.8	1446280
654	1324.7	1093.8	1448907
655	1327.1	1093.8	1451545
656	1329.5	1093.8	1454194
657	1331.9	1093.8	1456855
658	1334.4	1093.8	1459527
659	1336.8	1093.8	1462211
660	1339.3	1093.8	1464907
661	1341.8	1093.8	1467615
662	1344.2	1093.8	1470334
663	1346.7	1093.8	1473066
664	1349.2	1093.8	1475809
665	1351.8	1093.8	1478564
666	1354.3	1093.8	1481332
667	1356.8	1093.8	1484112
668	1359.4	1093.8	1486904
669	1362.0	1093.8	1489708
670	1364.5	1093.8	1492524
671	1367.1	1093.8	1495354
672	1369.7	1093.8	1498195
673	1372.3	1093.8	1501049
674	1374.9	1093.8	1503916
675	1377.6	1093.8	1506796
676	1380.2	1093.8	1509689
677	1382.9	1093.8	1512594
678	1385.5	1093.8	1515512
679	1388.2	1093.8	1518444
680	1390.9	1093.8	1521388
681	1393.6	1093.8	1524345
682	1396.3	1093.8	1527317
683	1399.1	1093.8	1530302
684	1401.8	1093.8	1533299

OBS	LENGTH	WIDTH	AREA
685	1404.6	1093.8	1536311
686	1407.3	1093.8	1539336
687	1410.1	1093.8	1542374
688	1412.9	1093.8	1545427
689	1415.7	1093.8	1548493
690	1418.5	1093.8	1551573
691	1421.3	1093.8	1554667
692	1424.2	1093.8	1557774
693	1427.0	1093.8	1560896
694	1429.9	1093.8	1564031
695	1432.8	1093.8	1567180
696	1435.7	1093.8	1570343
697	1438.6	1093.8	1573520
698	1441.5	1093.8	1576726
699	1444.4	1093.8	1579939
700	1447.4	1093.8	1583160
701	1450.4	1093.8	1586399
702	1453.3	1093.8	1589651
703	1456.3	1093.8	1592922
704	1459.3	1093.8	1596206
705	1462.3	1093.8	1599506
706	1465.4	1093.8	1602821
707	1468.4	1093.8	1606151
708	1471.5	1093.8	1609497
709	1474.5	1093.8	1612858
710	1477.6	1093.8	1616235
711	1480.7	1093.8	1619626
712	1483.9	1093.8	1623037
713	1487.0	1093.8	1626462
714	1490.1	1093.8	1629903
715	1493.3	1093.8	1633361
716	1496.5	1093.8	1636834
717	1499.7	1093.8	1640325
718	1502.9	1093.8	1643831
719	1506.1	1093.8	1647355
720	1509.3	1093.8	1650895
721	1512.6	1093.8	1654452
722	1515.8	1093.8	1658026
723	1519.1	1093.8	1661617
724	1522.4	1093.8	1665225
725	1525.7	1093.8	1668850
726	1529.1	1093.8	1672493
727	1532.4	1093.8	1676154
728	1535.8	1093.8	1679832
729	1539.2	1093.8	1683528
730	1542.6	1093.8	1687241
731	1546.0	1093.8	1690973
732	1549.4	1093.8	1694723
733	1552.8	1093.8	1698491
734	1556.3	1093.8	1702277
735	1559.8	1093.8	1706082
736	1563.3	1093.8	1709905
737	1566.8	1093.8	1713748
738	1570.3	1093.8	1717609
739	1573.9	1093.8	1721489
740	1577.4	1093.8	1725388
741	1581.0	1093.8	1729306
742	1584.6	1093.8	1733243
743	1588.2	1093.8	1737200
744	1591.9	1093.8	1741177
745	1595.5	1093.8	1745174
746	1599.2	1093.8	1749190
747	1602.9	1093.8	1753226
748	1606.6	1093.8	1757283
749	1610.3	1093.8	1761359
750	1614.1	1093.8	1765456
751	1617.8	1093.8	1769574
752	1621.6	1093.8	1773713
753	1625.4	1093.8	1777872
754	1629.2	1093.8	1782052
755	1633.1	1093.8	1786253
756	1636.9	1093.8	1790476
757	1640.8	1093.8	1794720
758	1644.7	1093.8	1798986
759	1648.6	1093.8	1803273
760	1652.5	1093.8	1807582

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
761	1656.5	1093.4	1811914
762	1660.5	1093.4	1816267
763	1664.5	1093.4	1820643
764	1668.5	1093.3	1825041
765	1672.6	1093.4	1829462
766	1676.6	1093.8	1833905
767	1680.7	1093.8	1838373
768	1684.8	1093.4	1842863
769	1688.9	1093.4	1847376
770	1693.1	1093.8	1851913
771	1697.3	1093.4	1856474
772	1701.5	1093.8	1861058
773	1705.7	1093.4	1865666
774	1709.9	1093.8	1870299
775	1714.2	1093.4	1874956
776	1718.4	1093.8	1879637
777	1722.7	1093.8	1884343
778	1727.1	1093.8	1889074
779	1731.4	1093.8	1893830
780	1735.8	1093.8	1898611
781	1740.2	1093.8	1903418
782	1744.6	1093.4	1908250
783	1749.0	1093.4	1913108
784	1753.5	1093.8	1917992
785	1758.0	1093.8	1922903
786	1762.5	1093.8	1927839
787	1767.1	1093.4	1932803
788	1771.6	1093.4	1937793
789	1776.2	1093.4	1942810
790	1780.8	1093.8	1947854
791	1785.5	1093.4	1952926
792	1790.1	1093.8	1958026
793	1794.8	1093.8	1963153
794	1799.5	1093.4	1968308
795	1804.3	1093.4	1973492
796	1809.0	1093.8	1978704
797	1813.8	1093.4	1983944
798	1818.6	1093.8	1989214
799	1823.5	1093.8	1994513
800	1828.3	1093.8	1999841
801	1833.2	1093.4	2005199
802	1838.2	1093.4	2010586
803	1843.1	1093.4	2016004
804	1848.1	1093.8	2021452
805	1853.1	1093.8	2026930
806	1858.1	1093.8	2032439
807	1863.2	1093.8	2037979
808	1868.3	1093.8	2043551
809	1873.4	1093.8	2049154
810	1878.6	1093.8	2054789
811	1883.8	1093.4	2060456
812	1889.0	1093.4	2066155
813	1894.2	1093.4	2071886
814	1899.5	1093.8	2077651
815	1904.8	1093.8	2083448
816	1910.1	1093.4	2089279
817	1915.5	1093.8	2095143
818	1920.9	1093.8	2101042
819	1926.3	1093.8	2106974
820	1931.7	1093.4	2112941
821	1937.2	1093.8	2118943
822	1942.7	1093.8	2124979
823	1948.3	1093.4	2131051
824	1953.9	1093.8	2137159
825	1959.5	1093.4	2143302
826	1965.2	1093.4	2149482
827	1970.8	1093.4	2155698
828	1976.6	1093.4	2161951
829	1982.3	1093.4	2168241
830	1988.1	1093.8	2174568
831	1993.9	1093.4	2180933
832	1999.8	1093.8	2187335
833	2005.6	1093.4	2193777
834	2011.6	1093.8	2200256
835	2017.5	1093.4	2206777
836	2023.5	1093.8	2213336

OBS	LENGTH	WIDTH	AREA
837	2029.6	1093.8	2219934
838	2035.6	1093.4	2226573
839	2041.7	1093.4	2233252
840	2047.9	1093.8	2239971
841	2054.1	1093.4	2246732
842	2060.3	1093.4	2253536
843	2066.5	1093.8	2260374
844	2072.8	1093.4	2267265
845	2079.2	1093.4	2274193
846	2085.5	1093.4	2281167
847	2092.0	1093.4	2288180
848	2098.4	1093.4	2295239
849	2104.9	1093.4	2302342
850	2111.4	1093.4	2309490
851	2118.0	1093.4	2316682
852	2124.6	1093.4	2323920
853	2131.3	1093.4	2331203
854	2138.0	1093.4	2338533
855	2144.7	1093.4	2345909
856	2151.5	1093.4	2353332
857	2158.3	1093.8	2360803
858	2165.2	1093.4	2368321
859	2172.1	1093.8	2375886
860	2179.1	1093.8	2383500
861	2186.1	1093.4	2391161
862	2193.2	1093.4	2398869
863	2200.3	1093.4	2406626
864	2207.4	1093.4	2414433
865	2214.6	1093.4	2422289
866	2221.8	1093.4	2430195
867	2229.1	1093.4	2438151
868	2236.4	1093.4	2446159
869	2243.8	1093.4	2454218
870	2251.3	1093.4	2462329
871	2258.8	1093.8	2470491
872	2266.3	1093.8	2478706
873	2273.9	1093.8	2486973
874	2281.5	1093.8	2495293
875	2289.2	1093.8	2503666
876	2296.9	1093.8	2512092
877	2304.7	1093.8	2520572
878	2312.4	1093.8	2529106
879	2320.4	1093.8	2537694
880	2328.4	1093.4	2546336
881	2336.4	1093.8	2555032
882	2344.5	1093.8	2563784
883	2352.6	1093.4	2572590
884	2360.7	1093.8	2581451
885	2369.0	1093.4	2590367
886	2377.2	1093.4	2599338
887	2385.6	1093.4	2608365
888	2394.0	1093.8	2617448
889	2402.4	1093.8	2626587
890	2411.0	1093.4	2635782
891	2419.5	1093.8	2645033
892	2428.2	1093.4	2654340
893	2436.9	1093.4	2663704
894	2445.7	1093.8	2673125
895	2454.5	1093.4	2682603
896	2463.4	1093.4	2692138
897	2472.3	1093.4	2701730
898	2481.3	1093.4	2711380
899	2490.4	1093.8	2721088
900	2499.5	1093.8	2730854
901	2508.8	1093.8	2740678
902	2518.1	1093.4	2750561
903	2527.4	1093.4	2760503
904	2536.9	1093.4	2770504
905	2546.4	1093.4	2780565
906	2556.0	1093.4	2790686
907	2565.6	1093.4	2800868
908	2575.3	1093.4	2811110
909	2585.0	1093.4	2821415
910	2594.9	1093.4	2831781
911	2604.8	1093.4	2842209
912	2614.8	1093.4	2852700

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
913	2824.9	1093.4	2871124
914	2835.1	1093.4	2888237
915	2845.3	1093.4	2905413
916	2855.6	1093.4	2922715
917	2866.0	1093.4	2940082
918	2876.5	1093.4	2957543
919	2887.0	1093.4	2975090
920	2897.7	1093.4	2992732
921	2908.4	1093.4	3010468
922	2919.2	1093.4	3028298
923	2930.1	1093.4	3046195
924	2941.1	1093.4	3064205
925	2952.2	1093.4	3082311
926	2963.3	1093.4	3100514
927	2974.6	1093.4	3118815
928	2985.9	1093.4	3137215
929	2997.3	1093.4	3155715
930	3008.8	1093.4	3174317
931	3020.5	1093.4	3193023
932	3032.2	1093.4	3211832
933	3044.0	1093.4	3230746
934	3055.9	1093.4	3249763
935	3067.9	1093.4	3268887
936	3080.0	1093.4	3288116
937	3092.2	1093.4	3307445
938	3104.5	1093.4	3326887
939	3116.9	1093.4	3346422
940	3129.4	1093.4	3366071
941	3142.1	1093.4	3385814
942	3154.8	1093.4	3405662
943	3167.6	1093.4	3425605
944	3180.6	1093.4	3445650
945	3193.6	1093.4	3465794
946	3206.8	1093.4	3486047
947	3220.1	1093.4	3506394
948	3233.5	1093.4	3526847
949	3247.0	1093.4	3547400
950	3260.7	1093.4	3568053
951	3274.4	1093.4	3588814
952	3288.3	1093.4	3609669
953	3302.3	1093.4	3630633
954	3316.5	1093.4	3651698
955	3330.7	1093.4	3672861
956	3345.1	1093.4	3694134
957	3359.7	1093.4	3715504
958	3374.3	1093.4	3736984
959	3389.1	1093.4	3758564
960	3404.0	1093.4	3780245
961	3419.1	1093.4	3802026
962	3434.3	1093.4	3823907
963	3449.7	1093.4	3845888
964	3465.2	1093.4	3867969
965	3480.9	1093.4	3890149
966	3496.6	1093.4	3912429
967	3512.5	1093.4	3934809
968	3528.6	1093.4	3957289
969	3544.9	1093.4	3979869
970	3561.3	1093.4	4002549
971	3577.9	1093.4	4025329
972	3594.6	1093.4	4048209
973	3611.5	1093.4	4071189
974	3628.5	1093.4	4094269
975	3645.8	1093.4	4117449
976	3663.2	1093.4	4140729
977	3680.8	1093.4	4164109
978	3698.5	1093.4	4187589
979	3716.4	1093.4	4211169
980	3734.5	1093.4	4234849
981	3752.9	1093.4	4258629
982	3771.4	1093.4	4282509
983	3790.0	1093.4	4306489
984	3808.9	1093.4	4330569
985	3828.0	1093.4	4354749
986	3847.3	1093.4	4379029
987	3866.7	1093.4	4403409
988	3886.4	1093.4	4427889

OBS	LENGTH	WIDTH	AREA
989	3706.3	1093.4	4052469
990	3726.4	1093.4	4077149
991	3746.8	1093.4	4101929
992	3767.3	1093.4	4126809
993	3788.1	1093.4	4151789
994	3809.1	1093.4	4176869
995	3830.3	1093.4	4202049
996	3851.8	1093.4	4227329
997	3873.5	1093.4	4252709
998	3895.5	1093.4	4278189
999	3917.7	1093.4	4303769
1000	3940.1	1093.4	4329449
1001	3962.9	1093.4	4355229
1002	3985.9	1093.4	4381109
1003	4009.1	1093.4	4407089
1004	4032.6	1093.4	4433169
1005	4056.4	1093.4	4459349
1006	4080.5	1093.4	4485629
1007	4104.8	1093.4	4512009
1008	4129.5	1093.4	4538489
1009	4154.4	1093.4	4565069
1010	4179.7	1093.4	4591749
1011	4205.3	1093.4	4618529
1012	4231.1	1093.4	4645409
1013	4257.3	1093.4	4672389
1014	4283.9	1093.4	4699469
1015	4310.7	1093.4	4726649
1016	4337.9	1093.4	4753929
1017	4365.5	1093.4	4781309
1018	4393.3	1093.4	4808789
1019	4421.4	1093.4	4836369
1020	4450.2	1093.4	4864049
1021	4479.2	1093.4	4891829
1022	4508.6	1093.4	4919709
1023	4538.3	1093.4	4947689
1024	4568.5	1093.4	4975769

APPENDIX B

THE EFFECTIVE PIXEL DIMENSIONS ASSOCIATED WITH NOAA-7 AVHRR DATA

ORIGINAL PAGE IS OF POOR QUALITY

```
FILE: GRAYS   [illegible]

DATA ONE;
A=1.133;
B=.9673347604;
C=.0009447117;
W=6371;
DO X=1 TO 1024;
XX=1025-X;
LENGTH=A*(ABS[illegible]
       -A*SI[illegible];
LENGTH=LENGTH*1[illegible] ;
WIDTH=919;
AREA=LENGTH*WIDTH;
LENGTH=ROUND(LENGTH,.1);
AREA=ROUND(AREA,.1);
OUTPUT;
END;
PROC PLOT;
PLOT LENGTH*XX=[illegible];
PROC SORT; BY XX;
DATA TWO (KEEP= [illegible];
PROC PRINT;
```

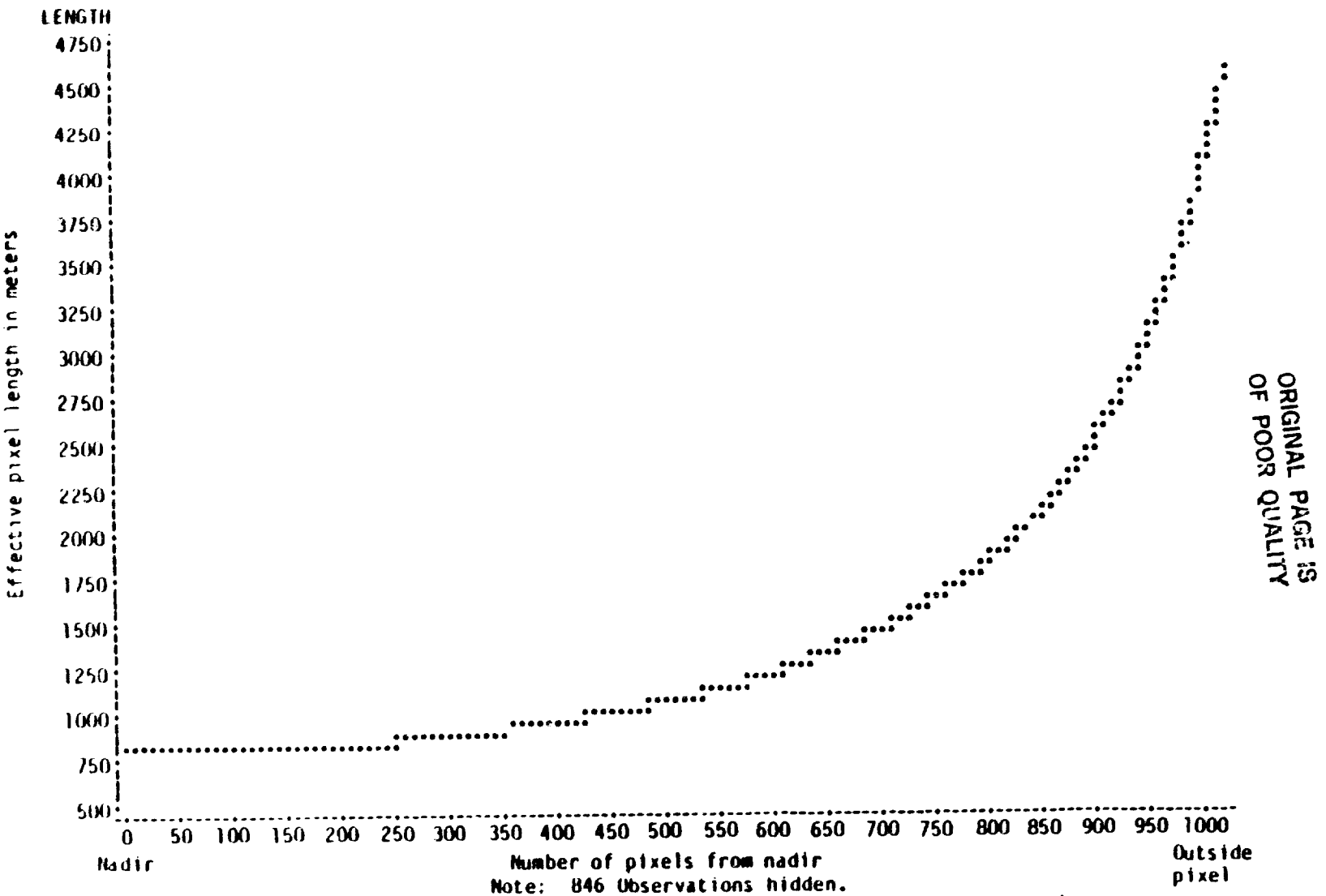


Figure B-1.- The relationship between effective pixel length (meters) and number of pixels from nadir for NOAA-7 AVHRR data.

ORIGINAL PAGE IS
OF POOR QUALITY

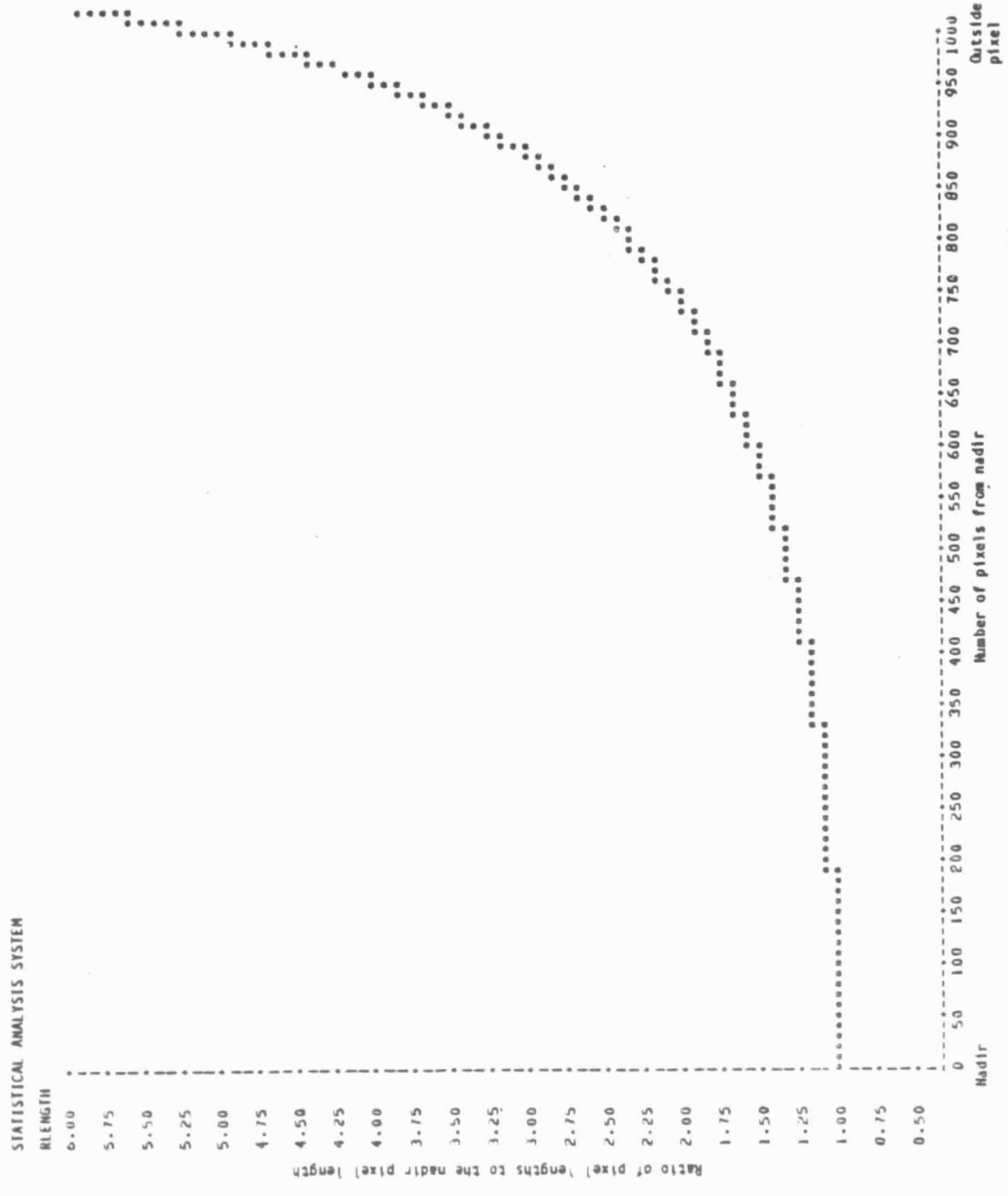


Figure B-2.- Ratios of effective pixel lengths away from nadir to the effective pixel length at nadir for NOAA-7 AVHRR data.

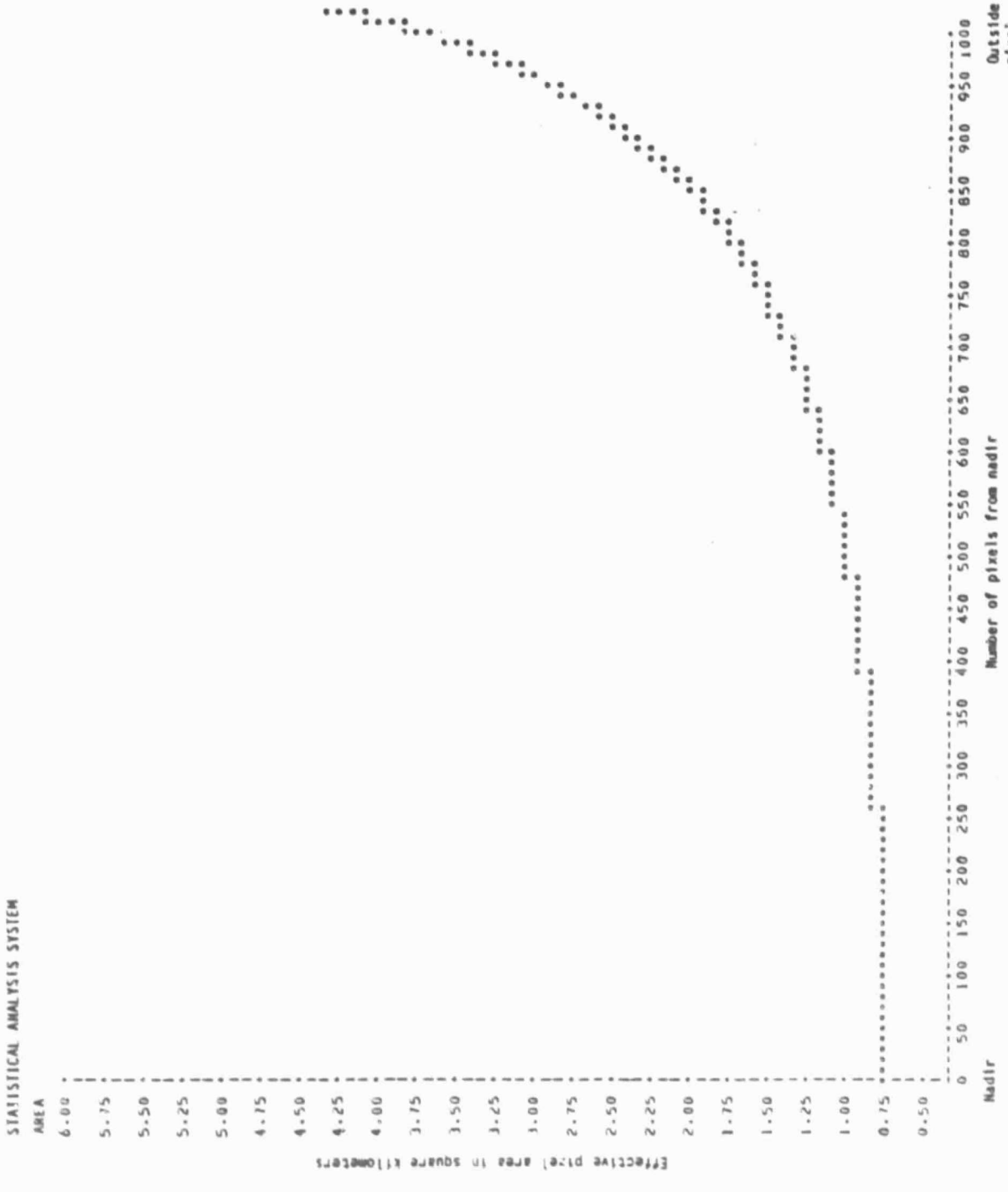
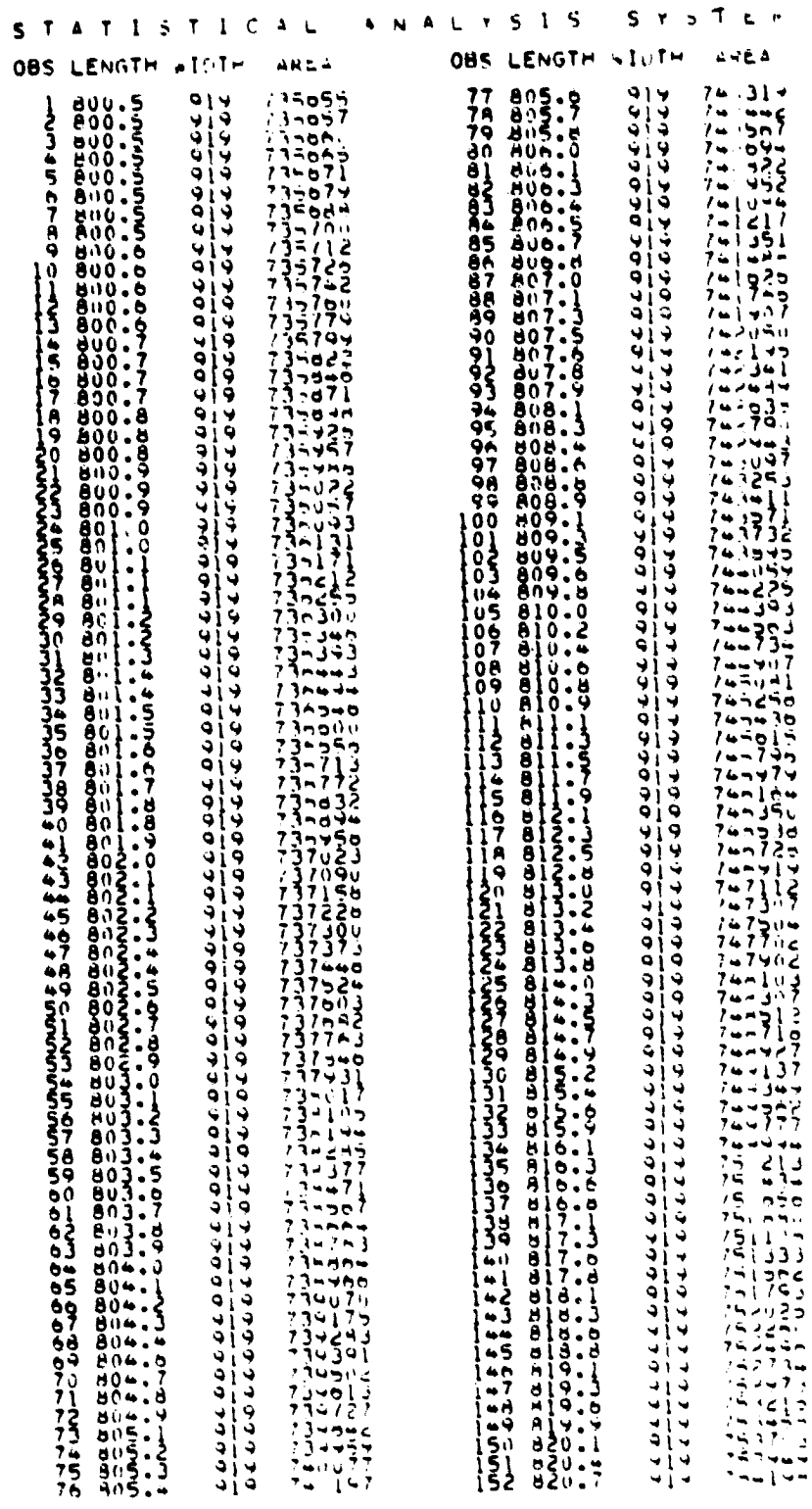


Figure B-3.- The relationship between effective pixel area (square kilometers) and number of pixels from nadir for NOAA-7 AVHPR data.



STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
153	820.9	919	754443
154	821.2	919	754700
155	821.5	919	754953
156	821.8	919	7552[illegible]
157	822.1	919	755460
158	822.3	919	755725
159	822.6	919	755980
160	822.9	919	756243
161	823.2	919	756513
162	823.5	919	756777
163	823.8	919	757047
164	824.1	919	757317
165	824.4	919	757583
166	824.7	919	757801
167	825.0	919	758137
168	825.3	919	758414
169	825.6	919	758692
170	825.9	919	758973
171	826.2	919	759255
172	826.5	919	759539
173	826.8	919	759825
174	827.1	919	760113
175	827.4	919	760403
176	827.7	919	760694
177	828.1	919	760968
178	828.4	919	761283
179	828.7	919	761580
180	829.0	919	761879
181	829.4	919	762179
182	829.7	919	762482
183	830.0	919	762780
184	830.4	919	763042
185	830.7	919	763400
186	831.0	919	763710
187	831.4	919	764022
188	831.7	919	764330
189	832.0	919	764651
190	832.4	919	764969
191	832.7	919	765286
192	833.1	919	765604
193	833.4	919	765932
194	833.8	919	766257
195	834.1	919	766544
196	834.5	919	766912
197	834.9	919	767243
198	835.2	919	767575
199	835.6	919	767910
200	836.0	919	768240
201	836.3	919	768524
202	836.7	919	768924
203	837.1	919	769250
204	837.4	919	769610
205	837.8	919	769956
206	838.2	919	770304
207	838.6	919	770653
208	839.0	919	771005
209	839.3	919	771350
210	839.7	919	771714
211	840.1	919	772071
212	840.5	919	772431
213	840.9	919	772792
214	841.3	919	773155
215	841.7	919	773520
216	842.1	919	773883
217	842.5	919	774257
218	842.9	919	774628
219	843.3	919	775001
220	843.7	919	775376
221	844.1	919	775753
222	844.5	919	776132
223	845.0	919	776513
224	845.4	919	776890
225	845.8	919	777281
226	846.2	919	777660
227	846.6	919	778057
228	847.1	919	778443
229	847.5	919	778841
230	847.9	919	779235
231	848.3	919	779633
232	848.8	919	780033
233	849.2	919	780434
234	849.7	919	780837
235	850.1	919	781242
236	850.5	919	781644
237	851.0	919	782054
238	851.4	919	782470
239	851.9	919	782883
240	852.3	919	783294
241	852.8	919	783710
242	853.2	919	784130
243	853.7	919	784557
244	854.2	919	784981
245	854.6	919	785407
246	855.1	919	785835
247	855.6	919	786263
248	856.0	919	786697
249	856.5	919	787131
250	857.0	919	787567
251	857.5	919	788006
252	857.9	919	788446
253	858.4	919	788884
254	858.9	919	789334
255	859.4	919	789791
256	859.9	919	790230
257	860.4	919	790681
258	860.9	919	791134
259	861.4	919	791589
260	861.9	919	792047
261	862.4	919	792507
262	862.9	919	792964
263	863.4	919	793433
264	863.9	919	793899
265	864.4	919	794367
266	864.9	919	794830
267	865.4	919	795311
268	865.9	919	795786
269	866.4	919	796263
270	867.0	919	796742
271	867.5	919	797224
272	868.0	919	797708
273	868.5	919	798194
274	869.1	919	798682
275	869.6	919	799172
276	870.1	919	799665
277	870.7	919	800160
278	871.2	919	800657
279	871.8	919	801157
280	872.3	919	801656
281	872.9	919	802162
282	873.4	919	802667
283	874.0	919	803177
284	874.5	919	803686
285	875.1	919	804201
286	875.6	919	804716
287	876.2	919	805234
288	876.8	919	805754
289	877.3	919	806276
290	877.9	919	806801
291	878.5	919	807323
292	879.1	919	807857
293	879.6	919	808385
294	880.2	919	808922
295	880.8	919	809447
296	881.4	919	809997
297	882.0	919	810536
298	882.6	919	811081
299	883.2	919	811627
300	883.8	919	812175
301	884.4	919	812720
302	885.0	919	813273
303	885.6	919	813834
304	886.2	919	814341

ORIGINAL PAGE IS
OF POOR QUALITY

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
305	886.8	919	1
306	887.4	919	1
307	888.0	919	1
308	888.6	919	1
309	889.2	919	1
310	889.8	919	1
311	890.5	919	1
312	891.1	919	1
313	891.7	919	1
314	892.3	919	1
315	892.9	919	1
316	893.5	919	1
317	894.1	919	1
318	894.7	919	1
319	895.3	919	1
320	895.9	919	1
321	896.6	919	1
322	897.2	919	1
323	897.8	919	1
324	898.4	919	1
325	899.0	919	1
326	899.6	919	1
327	900.2	919	1
328	900.8	919	1
329	901.4	919	1
330	902.0	919	1
331	902.7	919	1
332	903.3	919	1
333	903.9	919	1
334	904.5	919	1
335	905.1	919	1
336	905.7	919	1
337	906.3	919	1
338	907.0	919	1
339	907.6	919	1
340	908.2	919	1
341	908.8	919	1
342	909.4	919	1
343	910.0	919	1
344	910.7	919	1
345	911.3	919	1
346	911.9	919	1
347	912.5	919	1
348	913.1	919	1
349	913.7	919	1
350	914.3	919	1
351	914.9	919	1
352	915.6	919	1
353	916.2	919	1
354	916.8	919	1
355	917.4	919	1
356	918.0	919	1
357	918.6	919	1
358	919.2	919	1
359	919.8	919	1
360	920.5	919	1
361	921.1	919	1
362	921.7	919	1
363	922.3	919	1
364	922.9	919	1
365	923.5	919	1
366	924.1	919	1
367	924.7	919	1
368	925.4	919	1
369	926.0	919	1
370	926.6	919	1
371	927.2	919	1
372	927.8	919	1
373	928.4	919	1
374	929.0	919	1
375	929.6	919	1
376	930.3	919	1
377	930.9	919	1
378	931.5	919	1
379	932.1	919	1
380	932.7	919	1
381	933.3	919	1
382	934.0	919	1
383	934.6	919	1
384	935.2	919	1
385	935.8	919	1
386	936.4	919	1
387	937.0	919	1
388	937.6	919	1
389	938.2	919	1
390	938.9	919	1
391	939.5	919	1
392	940.1	919	1
393	940.7	919	1
394	941.3	919	1
395	941.9	919	1
396	942.5	919	1
397	943.1	919	1
398	943.8	919	1
399	944.4	919	1
400	945.0	919	1
401	945.6	919	1
402	946.2	919	1
403	946.8	919	1
404	947.4	919	1
405	948.1	919	1
406	948.7	919	1
407	949.3	919	1
408	949.9	919	1
409	950.5	919	1
410	951.1	919	1
411	951.7	919	1
412	952.3	919	1
413	953.0	919	1
414	953.6	919	1
415	954.2	919	1
416	954.8	919	1
417	955.4	919	1
418	956.0	919	1
419	956.6	919	1
420	957.3	919	1
421	957.9	919	1
422	958.5	919	1
423	959.1	919	1
424	959.7	919	1
425	960.3	919	1
426	961.0	919	1
427	961.6	919	1
428	962.2	919	1
429	962.8	919	1
430	963.4	919	1
431	964.0	919	1
432	964.7	919	1
433	965.3	919	1
434	965.9	919	1
435	966.5	919	1
436	967.1	919	1
437	967.7	919	1
438	968.4	919	1
439	969.0	919	1
440	969.6	919	1
441	970.2	919	1
442	970.8	919	1
443	971.4	919	1
444	972.1	919	1
445	972.7	919	1
446	973.3	919	1
447	973.9	919	1
448	974.5	919	1
449	975.1	919	1
450	975.8	919	1
451	976.4	919	1
452	977.0	919	1
453	977.6	919	1
454	978.2	919	1
455	978.8	919	1
456	979.5	919	1
457	980.1	919	1
458	980.7	919	1
459	981.3	919	1
460	981.9	919	1
461	982.5	919	1
462	983.2	919	1
463	983.8	919	1
464	984.4	919	1
465	985.0	919	1
466	985.6	919	1
467	986.2	919	1
468	986.9	919	1
469	987.5	919	1
470	988.1	919	1
471	988.7	919	1
472	989.3	919	1
473	989.9	919	1
474	990.6	919	1
475	991.2	919	1
476	991.8	919	1
477	992.4	919	1
478	993.0	919	1
479	993.6	919	1
480	994.3	919	1
481	994.9	919	1
482	995.5	919	1
483	996.1	919	1
484	996.7	919	1
485	997.3	919	1
486	998.0	919	1
487	998.6	919	1
488	999.2	919	1
489	999.8	919	1
490	1000.4	919	1
491	1001.0	919	1
492	1001.7	919	1
493	1002.3	919	1
494	1002.9	919	1
495	1003.5	919	1
496	1004.1	919	1
497	1004.7	919	1
498	1005.4	919	1
499	1006.0	919	1
500	1006.6	919	1
501	1007.2	919	1
502	1007.8	919	1
503	1008.4	919	1
504	1009.1	919	1
505	1009.7	919	1
506	1010.3	919	1
507	1010.9	919	1
508	1011.5	919	1
509	1012.1	919	1
510	1012.8	919	1
511	1013.4	919	1

S T A T I S T I C A L A N A L Y S I S S Y S T E M

OBS	LENGTH	WIDTH	AREA	OBS	LENGTH	WIDTH	AREA
457	1015.0	919	932600	533	1113.7	917	1023514
458	1016.1	919	933824	534	1115.2	919	1024948
459	1017.3	919	934857	535	1115.7	919	1025281
460	1018.4	919	935901	536	1118.3	919	1027572
461	1019.5	919	936942	537	1119.8	919	1028964
462	1020.7	919	937988	538	1121.3	919	1030471
463	1021.8	919	939037	539	1122.8	919	1031879
464	1022.9	919	940071	540	1124.4	919	1033292
465	1024.1	919	941140	541	1125.9	919	1034711
466	1025.3	919	942211	542	1127.5	919	1036135
467	1026.4	919	943270	543	1129.0	919	1037565
468	1027.6	919	944340	544	1130.6	919	1039001
469	1028.7	919	945342	545	1132.1	919	1040442
470	1029.9	919	946443	546	1133.7	919	1041887
471	1031.1	919	947540	547	1135.3	919	1043342
472	1032.3	919	948607	548	1136.9	919	1044800
473	1033.5	919	949757	549	1138.5	919	1046264
474	1034.7	919	950852	550	1140.1	919	1047734
475	1035.9	919	951951	551	1141.7	919	1049210
476	1037.1	919	953054	552	1143.3	919	1050691
477	1038.3	919	954102	553	1144.9	919	1052179
478	1039.5	919	955274	554	1146.5	919	1053672
479	1040.7	919	956390	555	1148.2	919	1055174
480	1041.9	919	957510	556	1149.8	919	1056677
481	1043.1	919	958634	557	1151.5	919	1058188
482	1044.4	919	959763	558	1153.1	919	1059705
483	1045.6	919	960897	559	1154.8	919	1061226
484	1046.8	919	962036	560	1156.4	919	1062757
485	1048.1	919	963170	561	1158.1	919	1064293
486	1049.3	919	964322	562	1159.8	919	1065834
487	1050.6	919	965474	563	1161.4	919	1067382
488	1051.8	919	966626	564	1163.1	919	1068935
489	1053.1	919	967784	565	1164.8	919	1070495
490	1054.4	919	968945	566	1166.5	919	1072061
491	1055.6	919	970121	567	1168.3	919	1073634
492	1056.9	919	971293	568	1170.0	919	1075213
493	1058.2	919	972472	569	1171.7	919	1076798
494	1059.5	919	973654	570	1173.4	919	1078389
495	1060.8	919	974841	571	1175.2	919	1079987
496	1062.1	919	976033	572	1176.9	919	1081591
497	1063.4	919	977226	573	1178.7	919	1083201
498	1064.7	919	978424	574	1180.4	919	1084818
499	1066.0	919	979626	575	1182.2	919	1086442
500	1067.3	919	980834	576	1184.0	919	1088072
501	1068.6	919	982045	577	1185.8	919	1089708
502	1069.9	919	983262	578	1187.5	919	1091352
503	1071.3	919	984484	579	1189.3	919	1093002
504	1072.6	919	985711	580	1191.1	919	1094658
505	1074.0	919	986944	581	1193.0	919	1096321
506	1075.3	919	988182	582	1194.8	919	1097991
507	1076.7	919	989424	583	1196.6	919	1099668
508	1078.0	919	990673	584	1198.4	919	1101351
509	1079.4	919	991926	585	1200.3	919	1103042
510	1080.7	919	993185	586	1202.1	919	1104739
511	1082.1	919	994449	587	1204.0	919	1106443
512	1083.5	919	995718	588	1205.8	919	1108154
513	1084.9	919	996992	589	1207.7	919	1109872
514	1086.2	919	998272	590	1209.6	919	1111596
515	1087.6	919	999556	591	1211.5	919	1113327
516	1089.0	919	1000846	592	1213.4	919	1115065
517	1090.4	919	1002141	593	1215.3	919	1116810
518	1091.8	919	1003441	594	1217.2	919	1118561
519	1093.2	919	1004747	595	1219.1	919	1120319
520	1094.6	919	1006058	596	1221.0	919	1122084
521	1096.0	919	1007374	597	1222.9	919	1123855
522	1097.4	919	1008696	598	1224.9	919	1125633
523	1098.8	919	1010023	599	1226.8	919	1127418
524	1100.2	919	1011356	600	1228.8	919	1129209
525	1101.6	919	1012694	601	1230.7	919	1131007
526	1103.0	919	1014038	602	1232.7	919	1132811
527	1104.4	919	1015387	603	1234.7	919	1134622
528	1105.8	919	1016742	604	1236.6	919	1136439
529	1107.2	919	1018102	605	1238.6	919	1138263
530	1108.7	919	1019468	606	1240.6	919	1140093
531	1110.1	919	1020839	607	1242.6	919	1141930
532	1111.5	919	1022216	608	1244.6	919	1143774

ORIGINAL PAGE IS
OF POOR QUALITY

S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

OBS	LENGTH	WIDTH	AREA
609	1246.7	919	1145744
610	1248.8	919	1147610
611	1250.8	919	1149496
612	1252.9	919	1151383
613	1254.9	919	1153274
614	1257.0	919	1155162
615	1259.1	919	1157044
616	1261.2	919	1159013
617	1263.3	919	1160945
618	1265.4	919	1162875
619	1267.5	919	1164817
620	1269.6	919	1166771
621	1271.7	919	1168731
622	1273.9	919	1170644
623	1276.0	919	1172675
624	1278.2	919	1174603
625	1280.4	919	1176652
626	1282.5	919	1178654
627	1284.7	919	1180663
628	1286.9	919	1182682
629	1289.1	919	1184700
630	1291.3	919	1186744
631	1293.6	919	1188780
632	1295.8	919	1190840
633	1298.0	919	1192902
634	1300.3	919	1194972
635	1302.6	919	1197050
636	1304.8	919	1199130
637	1307.1	919	1201235
638	1309.4	919	1203340
639	1311.7	919	1205455
640	1314.0	919	1207574
641	1316.3	919	1209711
642	1318.7	919	1211853
643	1321.0	919	1214004
644	1323.4	919	1216164
645	1325.7	919	1218334
646	1328.1	919	1220513
647	1330.5	919	1222701
648	1332.9	919	1224894
649	1335.3	919	1227100
650	1337.7	919	1229323
651	1340.1	919	1231544
652	1342.5	919	1233763
653	1345.0	919	1236031
654	1347.4	919	1238297
655	1349.9	919	1240556
656	1352.4	919	1242827
657	1354.9	919	1245112
658	1357.4	919	1247407
659	1359.9	919	1249713
660	1362.4	919	1252028
661	1364.9	919	1254353
662	1367.5	919	1256687
663	1370.0	919	1259035
664	1372.6	919	1261391
665	1375.1	919	1263758
666	1377.7	919	1266135
667	1380.3	919	1268523
668	1382.9	919	1270921
669	1385.6	919	1273324
670	1388.2	919	1275744
671	1390.8	919	1278174
672	1393.5	919	1280620
673	1396.2	919	1283072
674	1398.8	919	1285535
675	1401.5	919	1288004
676	1404.2	919	1290494
677	1407.0	919	1292990
678	1409.7	919	1295497
679	1412.4	919	1298010
680	1415.2	919	1300540
681	1417.9	919	1303087
682	1420.7	919	1305640
683	1423.5	919	1308204
684	1426.3	919	1310780

OBS	LENGTH	WIDTH	AREA
685	1429.1	919	1313363
686	1432.0	919	1315967
687	1434.8	919	1318578
688	1437.7	919	1321201
689	1440.5	919	1323830
690	1443.4	919	1326403
691	1446.3	919	1329142
692	1449.2	919	1331914
693	1452.1	919	1334447
694	1455.1	919	1337193
695	1458.0	919	1339901
696	1461.0	919	1342622
697	1463.9	919	1345355
698	1466.9	919	1348101
699	1469.9	919	1350860
700	1472.9	919	1353631
701	1476.0	919	1356415
702	1479.0	919	1359212
703	1482.1	919	1362023
704	1485.1	919	1364840
705	1488.2	919	1367662
706	1491.3	919	1370532
707	1494.4	919	1373395
708	1497.6	919	1376272
709	1500.7	919	1379162
710	1503.9	919	1382005
711	1507.1	919	1384952
712	1510.2	919	1387913
713	1513.4	919	1390850
714	1516.7	919	1393917
715	1519.9	919	1396799
716	1523.2	919	1399777
717	1526.4	919	1402770
718	1529.7	919	1405744
719	1533.0	919	1408824
720	1536.3	919	1411800
721	1539.6	919	1414927
722	1543.0	919	1418001
723	1546.3	919	1421084
724	1549.7	919	1424193
725	1553.1	919	1427311
726	1556.5	919	1430444
727	1559.9	919	1433543
728	1563.4	919	1436750
729	1566.9	919	1439935
730	1570.3	919	1443130
731	1573.8	919	1446340
732	1577.3	919	1449500
733	1580.9	919	1452807
734	1584.4	919	1456065
735	1588.0	919	1459330
736	1591.5	919	1462620
737	1595.1	919	1465933
738	1598.8	919	1469255
739	1602.4	919	1472594
740	1606.0	919	1475944
741	1609.7	919	1479320
742	1613.4	919	1482700
743	1617.1	919	1486113
744	1620.8	919	1489530
745	1624.6	919	1492975
746	1628.3	919	1496431
747	1632.1	919	1499915
748	1635.9	919	1503340
749	1639.7	919	1506905
750	1643.6	919	1510431
751	1647.4	919	1513975
752	1651.3	919	1517530
753	1655.2	919	1521118
754	1659.1	919	1524710
755	1663.0	919	1528333
756	1667.0	919	1531798
757	1671.0	919	1535621
758	1675.0	919	1539244
759	1679.0	919	1542995
760	1683.0	919	1546645

ORIGINAL PAGE IS
OF POOR QUALITY

S T A T I S T I C A L   A N A L Y S I S   S Y S T E M

OBS	LENGTH	WIDTH	AREA
761	1687.1	919	1550424
762	1691.2	919	1554173
763	1695.3	919	1557941
764	1699.4	919	1561725
765	1703.5	919	1565535
766	1707.7	919	1569302
767	1711.9	919	1573240
768	1716.1	919	1577073
769	1720.3	919	1580902
770	1724.6	919	1584804
771	1728.8	919	1588747
772	1733.1	919	1592745
773	1737.4	919	1596715
774	1741.8	919	1600705
775	1746.2	919	1604710
776	1750.5	919	1608744
777	1755.0	919	1612803
778	1759.4	919	1616874
779	1763.8	919	1620976
780	1768.3	919	1625095
781	1772.8	919	1629230
782	1777.4	919	1633400
783	1781.9	919	1637500
784	1786.5	919	1641794
785	1791.1	919	1646020
786	1795.7	919	1650230
787	1800.4	919	1654557
788	1805.1	919	1658850
789	1809.8	919	1663182
790	1814.5	919	1667524
791	1819.3	919	1671900
792	1824.0	919	1676240
793	1828.9	919	1680715
794	1833.7	919	1685159
795	1838.5	919	1689627
796	1843.4	919	1694121
797	1848.4	919	1698634
798	1853.3	919	1703182
799	1858.3	919	1707750
800	1863.3	919	1712344
801	1868.3	919	1716404
802	1873.4	919	1721404
803	1878.4	919	1726201
804	1883.5	919	1730974
805	1888.7	919	1735703
806	1893.9	919	1740454
807	1899.1	919	1745233
808	1904.3	919	1750038
809	1909.5	919	1754871
810	1914.8	919	1759731
811	1920.2	919	1764619
812	1925.5	919	1769535
813	1930.9	919	1774400
814	1936.3	919	1779455
815	1941.7	919	1784455
816	1947.2	919	1789405
817	1952.7	919	1794545
818	1958.3	919	1799635
819	1963.8	919	1804754
820	1969.4	919	1809903
821	1975.1	919	1815082
822	1980.7	919	1820242
823	1986.4	919	1825532
824	1992.2	919	1830804
825	1997.9	919	1836100
826	2003.7	919	1841440
827	2009.6	919	1846800
828	2015.5	919	1852204
829	2021.4	919	1857634
830	2027.3	919	1863097
831	2033.3	919	1868543
832	2039.3	919	1874121
833	2045.4	919	1879684
834	2051.4	919	1885274
835	2057.6	919	1890404
836	2063.7	919	1896573
837	2069.9	919	1902272
838	2076.2	919	1908000
839	2082.5	919	1913775
840	2088.8	919	1919574
841	2095.1	919	1925414
842	2101.5	919	1931245
843	2108.0	919	1937200
844	2114.4	919	1943155
845	2120.9	919	1949144
846	2127.5	919	1955100
847	2134.1	919	1961230
848	2140.7	919	1967330
849	2147.4	919	1973404
850	2154.1	919	1979640
851	2160.9	919	1985802
852	2167.7	919	1992110
853	2174.6	919	1998414
854	2181.4	919	2004750
855	2188.4	919	2011127
856	2195.4	919	2017545
857	2202.4	919	2024004
858	2209.5	919	2030505
859	2216.6	919	2037040
860	2223.8	919	2043634
861	2231.0	919	2050202
862	2238.2	919	2056434
863	2245.5	919	[illegible]
864	2252.9	919	2070410
865	2260.3	919	2077214
866	2267.8	919	[illegible]
867	2275.3	919	2090954
868	2282.8	919	2097900
869	2290.4	919	2104807
870	2298.1	919	2111721
871	2305.8	919	2119002
872	2313.5	919	2126131
873	2321.3	919	2133300
874	2329.2	919	2140534
875	2337.1	919	2147804
876	2345.1	919	2155134
877	2353.1	919	2162504
878	2361.2	919	2169934
879	2369.3	919	2177411
880	2377.5	919	2184934
881	2385.8	919	2192517
882	2394.1	919	2200152
883	2402.4	919	2207830
984	2410.9	919	2215570
885	2419.3	919	2223372
886	2427.9	919	2231221
887	2436.5	919	2239120
888	2445.1	919	2247080
889	2453.9	919	2255103
890	2462.7	919	2263177
891	2471.5	919	2271304
892	2480.4	919	2279500
893	2489.4	919	2287744
894	2498.4	919	2296050
895	2507.5	919	2304427
896	2516.7	919	2312850
897	2526.0	919	2321344
898	2535.3	919	2329443
899	2544.6	919	2338052
900	2554.1	919	2347200
901	2563.6	919	2355944
902	2573.2	919	2364754
903	2582.8	919	2373624
904	2592.6	919	2382574
905	2602.4	919	2391574
906	2612.2	919	2400655
907	2622.2	919	2409800
908	2632.2	919	2419[illegible]
909	2642.3	919	2428244
910	2652.5	919	2437654
911	2662.8	919	2447051
912	2673.1	919	2456591

STATISTICAL ANALYSIS SYSTEM

OBS	LENGTH	WIDTH	AREA
913	2683.5	919	2466154
914	2694.0	919	2475846
915	2704.6	919	2485538
916	2715.3	919	2495230
917	2726.0	919	2504922
918	2736.8	919	2514614
919	2747.7	919	2524306
920	2758.7	919	2533998
921	2769.8	919	2543690
922	2781.0	919	2553382
923	2792.3	919	2563074
924	2803.6	919	2572766
925	2815.1	919	2582458
926	2826.6	919	2592150
927	2838.3	919	2601842
928	2850.0	919	2611534
929	2861.8	919	2621226
930	2873.8	919	2630918
931	2885.8	919	2640610
932	2897.9	919	2650302
933	2910.1	919	2659994
934	2922.5	919	2669686
935	2934.9	919	2679378
936	2947.4	919	2689070
937	2960.1	919	2698762
938	2972.8	919	2708454
939	2985.7	919	2718146
940	2998.6	919	2727838
941	3011.7	919	2737530
942	3024.9	919	2747222
943	3038.2	919	2756914
944	3051.7	919	2766606
945	3065.2	919	2776298
946	3078.9	919	2785990
947	3092.6	919	2795682
948	3106.6	919	2805374
949	3120.6	919	2815066
950	3134.7	919	2824758
951	3149.0	919	2834450
952	3163.4	919	2844142
953	3178.0	919	2853834
954	3192.7	919	2863526
955	3207.5	919	2873218
956	3222.4	919	2882910
957	3237.5	919	2892602
958	3252.7	919	2902294
959	3268.1	919	2911986
960	3283.6	919	2921678
961	3299.3	919	2931370
962	3315.1	919	2941062
963	3331.0	919	2950754
964	3347.1	919	2960446
965	3363.4	919	2970138
966	3379.8	919	2979830
967	3396.4	919	2989522
968	3413.2	919	2999214
969	3430.1	919	3008906
970	3447.1	919	3018598
971	3464.4	919	3028290
972	3481.8	919	3037982
973	3499.4	919	3047674
974	3517.1	919	3057366
975	3535.1	919	3067058
976	3553.2	919	3076750
977	3571.5	919	3086442
978	3590.0	919	3096134
979	3608.7	919	3105826
980	3627.6	919	3115518
981	3646.7	919	3125210
982	3666.0	919	3134902
983	3685.5	919	3144594
984	3705.2	919	3154286
985	3725.1	919	3163978
986	3745.2	919	3173670
987	3765.5	919	3183362
988	3786.1	919	3193054

OBS	LENGTH	WIDTH	AREA
989	3806.8	919	3202746
990	3827.8	919	3212438
991	3849.0	919	3222130
992	3870.4	919	3231822
993	3892.0	919	3241514
994	3913.8	919	3251206
995	3935.8	919	3260898
996	3958.0	919	3270590
997	3980.4	919	3280282
998	4003.0	919	3289974
999	4025.8	919	3299666
1000	4048.8	919	3309358
1001	4072.1	919	3319050
1002	4095.5	919	3328742
1003	4119.2	919	3338434
1004	4143.1	919	3348126
1005	4167.2	919	3357818
1006	4191.5	919	3367510
1007	4216.0	919	3377202
1008	4240.8	919	3386894
1009	4265.8	919	3396586
1010	4291.0	919	3406278
1011	4316.4	919	3415970
1012	4342.1	919	3425662
1013	4368.0	919	3435354
1014	4394.1	919	3445046
1015	4420.4	919	3454738
1016	4447.0	919	3464430
1017	4473.8	919	3474122
1018	4500.8	919	3483814
1019	4528.1	919	3493506
1020	4555.6	919	3503198
1021	4583.3	919	3512890
1022	4611.3	919	3522582
1023	4639.5	919	3532274
1024	4668.0	919	3541966
1025	4696.7	919	3551658
1026	4725.7	919	3561350
1027	4754.9	919	3571042
1028	4784.4	919	3580734
1029	4814.1	919	3590426
1030	4844.1	919	3600118
1031	4874.3	919	3609810
1032	4904.8	919	3619502
1033	4935.5	919	3629194
1034	4966.5	919	3638886
1035	4997.7	919	3648578
1036	5029.2	919	3658270
1037	5060.9	919	3667962
1038	5092.9	919	3677654
1039	5125.1	919	3687346
1040	5157.6	919	3697038
1041	5190.3	919	3706730
1042	5223.3	919	3716422
1043	5256.5	919	3726114
1044	5290.0	919	3735806
1045	5323.7	919	3745498
1046	5357.7	919	3755190
1047	5391.9	919	3764882
1048	5426.4	919	3774574
1049	5461.1	919	3784266
1050	5496.1	919	3793958
1051	5531.3	919	3803650
1052	5566.8	919	3813342
1053	5602.5	919	3823034
1054	5638.5	919	3832726
1055	5674.7	919	3842418
1056	5711.2	919	3852110
1057	5747.9	919	3861802
1058	5784.9	919	3871494
1059	5822.1	919	3881186
1060	5859.6	919	3890878
1061	5897.3	919	3900570
1062	5935.3	919	3910262
1063	5973.5	919	3919954
1064	6012.0	919	3929646
1065	6050.7	919	3939338
1066	6089.7	919	3949030
1067	6128.9	919	3958722
1068	6168.4	919	3968414
1069	6208.1	919	3978106
1070	6248.1	919	3987798
1071	6288.3	919	3997490
1072	6328.8	919	4007182
1073	6369.5	919	4016874
1074	6410.5	919	4026566
1075	6451.7	919	4036258
1076	6493.2	919	4045950
1077	6534.9	919	4055642
1078	6576.9	919	4065334
1079	6619.1	919	4075026
1080	6661.6	919	4084718
1081	6704.3	919	4094410
1082	6747.3	919	4104102
1083	6790.5	919	4113794
1084	6834.0	919	4123486
1085	6877.7	919	4133178
1086	6921.7	919	4142870
1087	6965.9	919	4152562
1088	7010.4	919	4162254
1089	7055.1	919	4171946
1090	7100.1	919	4181638
1091	7145.3	919	4191330
1092	7190.8	919	4201022
1093	7236.5	919	4210714
1094	7282.5	919	4220406
1095	7328.7	919	4230098
1096	7375.2	919	4239790
1097	7421.9	919	4249482
1098	7468.9	919	4259174
1099	7516.1	919	4268866
1100	7563.6	919	4278558
1101	7611.3	919	4288250
1102	7659.3	919	4297942
1103	7707.5	919	4307634
1104	7756.0	919	4317326
1105	7804.7	919	4327018
1106	7853.7	919	4336710
1107	7902.9	919	4346402
1108	7952.4	919	4356094
1109	8002.1	919	4365786
1110	8052.1	919	4375478
1111	8102.3	919	4385170
1112	8152.8	919	4394862
1113	8203.5	919	4404554
1114	8254.5	919	4414246
1115	8305.7	919	4423938
1116	8357.2	919	4433630
1117	8408.9	919	4443322
1118	8460.9	919	4453014
1119	8513.1	919	4462706
1120	8565.6	919	4472398
1121	8618.3	919	4482090
1122	8671.3	919	4491782
1123	8724.5	919	4501474
1124	8778.0	919	4511166

*U.S. GOVERNMENT PRINTING OFFICE: 1982—359-011/548