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World Atlas of Large Optical Telescopes

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WORLD ATLAS

OF

LARGE OPTICAL TELESCOPES

by

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ABSTRACT

By 1980 there will be approximately 100 large optical telescopes in the world with mirror or lens diameters of one meter (39-inches) and larger. This atlas gives information on these telescopes and shows their locations on continent-sized maps. Also shown are observatory locations considered suitable for the construction of future large telescopes.

Of the 100 major telescopes listed in this atlas, 79 are situated in the Northern Hemisphere and 21 are located in the Southern Hemisphere. The totals by regions are as follows: Europe (excluding the USSR), 18; Soviet Union, 7; Asia (excluding the USSR), 4; Africa, 5; Australia, 5; The Pacific, 4 (all on Hawaii); South America, 14; North America, 43 (the continental US has 36 of these). In all, the United States has 40 of the world's major telescopes on its territory (continental US plus Hawaii) making it by far the leading nation in astronomical instrumentation.

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AUTHOR'S NOTE

The information on the various telescopes in this atlas was obtained primarily through publications. Consequently the accuracy of the material presented is almost entirely dependent upon the sources selected. Where conflicts arose between sources, the most up-to-date and/or reliable source (in the author's opinion) was used. The major publications consulted are listed in the "References" section on page 43.

The author would appreciate any corrections and/or additions to the information in this atlas which the reader may have. Please send these to: Stephen P. Meszaros, Code 253.3, Goddard Space Flight Center, Greenbelt, Maryland, 20771.

WORLD ATLAS

OF

LARGE OPTICAL TELESCOPES

INTRODUCTION

The purpose of this atlas is to bring together in one place a series of maps and tables giving locations and information on the world's largest telescopes. This material has not been readily available before. A secondary purpose is to show prime observatory locations for the possible establishment of future new observatories.

Only optical telescopes (as opposed to radio telescopes) are considered in this atlas. Telescopes of mirror or lens diameter of one meter (approximately 39-inches) and larger are listed. Observatories having one or more telescopes in this size range are referred to as "Major Observatories" in the atlas. (Smaller telescopes are often present at these observatories too.) Generally, the information presented here represents the world astronomical instrument situation projected to 1980.

"Prime Observatory Locations" are also shown on the atlas maps. These are areas with a combination of both aridity and medium elevation, factors which are very beneficial to telescopic observation. Aridity usually suggests clear skies--a necessity for optical telescopes. Medium elevation places observatories above as much of the earth's moving atmosphere as possible in order to provide steady astronomical seeing (but not so high as to put them into extreme climatic regions).

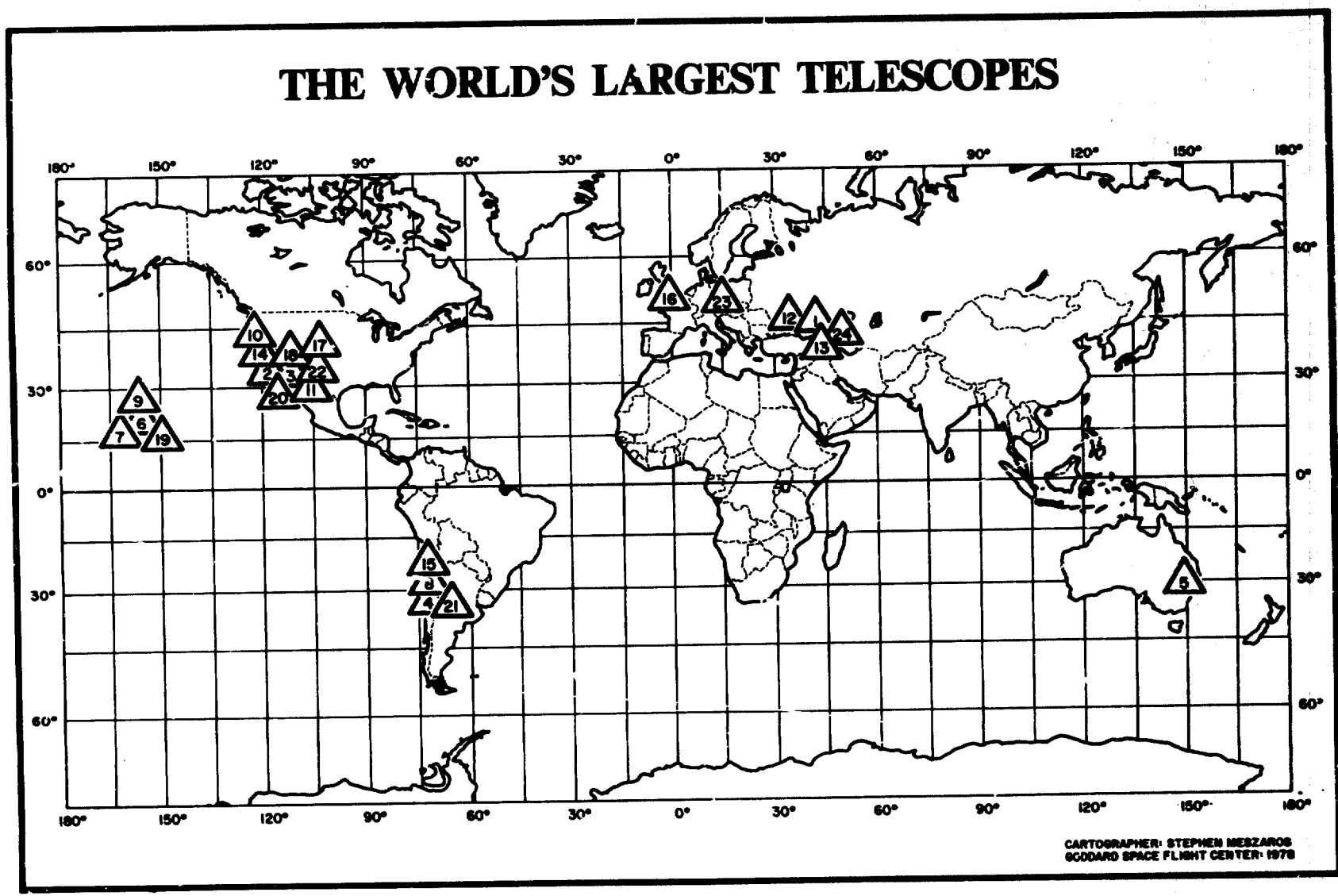
Map 1 lists the 24 largest telescopes in the world and shows their general locations.

Map 1. The World's Largest Telescopes*
Mirror Diameter 2-meters (79-inches) and Greater**

Rank	Size	Location	Rank	Size	Location
1	6.0m (236")	USSR	13	2.6m (102")	USSR
2	5.1m (200")	US	14	2.5m (100")	US
3	4.0m (158")	US	15	2.5m (100")	Chile
4	4.0m (158")	Chile	16	2.5m (98")	England
5	3.9m (153")	Australia	17	2.3m (92")	US
6	3.8m (150")	Hawaii	18	2.3m (90")	US
7	3.6m (144")	Hawaii	19	2.2m (88")	Hawaii
8	3.6m (142")	Chile	20	2.1m (84")	US
9	3.2m (126")	Hawaii	21	2.1m (84")	Argentina
10	3.0m (120")	US	22	2.1m (82")	US
11	2.7m (107")	US	23	2.0m (79")	Czechoslovakia
12	2.6m (102")	USSR	24	2.0m (79")	USSR

*As of 1980.

**In the case of telescopes of the same size, the one to be operational earliest is listed first.



Map 1. The World's Largest Telescopes

GUIDE TO THE ATLAS

The Maps

Maps 2 through 8 cover continent-sized regions of the earth's surface. The Major Observatory locations are indicated by numbered triangles, the numbers referring to the accompanying list of observatories. Prime Observatory Locations are delineated on the maps by a hachured pattern. This pattern shows areas with a combination of less than 51 centimeters (20-inches) of rainfall per year and an elevation range between approximately 1000 and 4000 meters (3000 to 13,000 feet).

The Tables

The tables associated with each of the maps give the following information.

Observatory: the observatory name and/or the name of the sponsoring institution.

Location: The observatory location, either the name of the mountain or a nearby town/city.

Type: the telescope type;

"Re" indicates reflecting telescope,

"Rf" refracting telescope,

"S" Schmidt telescope

"Sol" solar telescope,

"IR" infrared telescope, and

"MMT" multiple-mirror telescope.

Size: the telescope mirror or lens diameter in meters and inches. (For Schmidt telescopes both the mirror and correcting lens diameters are given.)

Date: the year the telescope started operation.

Any information that is questionable or is lacking altogether is indicated by a question mark (?).

Notes

Comments about specific telescopes are indicated by note numbers (1, 2, etc.) immediately after the "Date" column. For additional information refer to the "Notes" section at the end of the atlas, beginning on page 41.

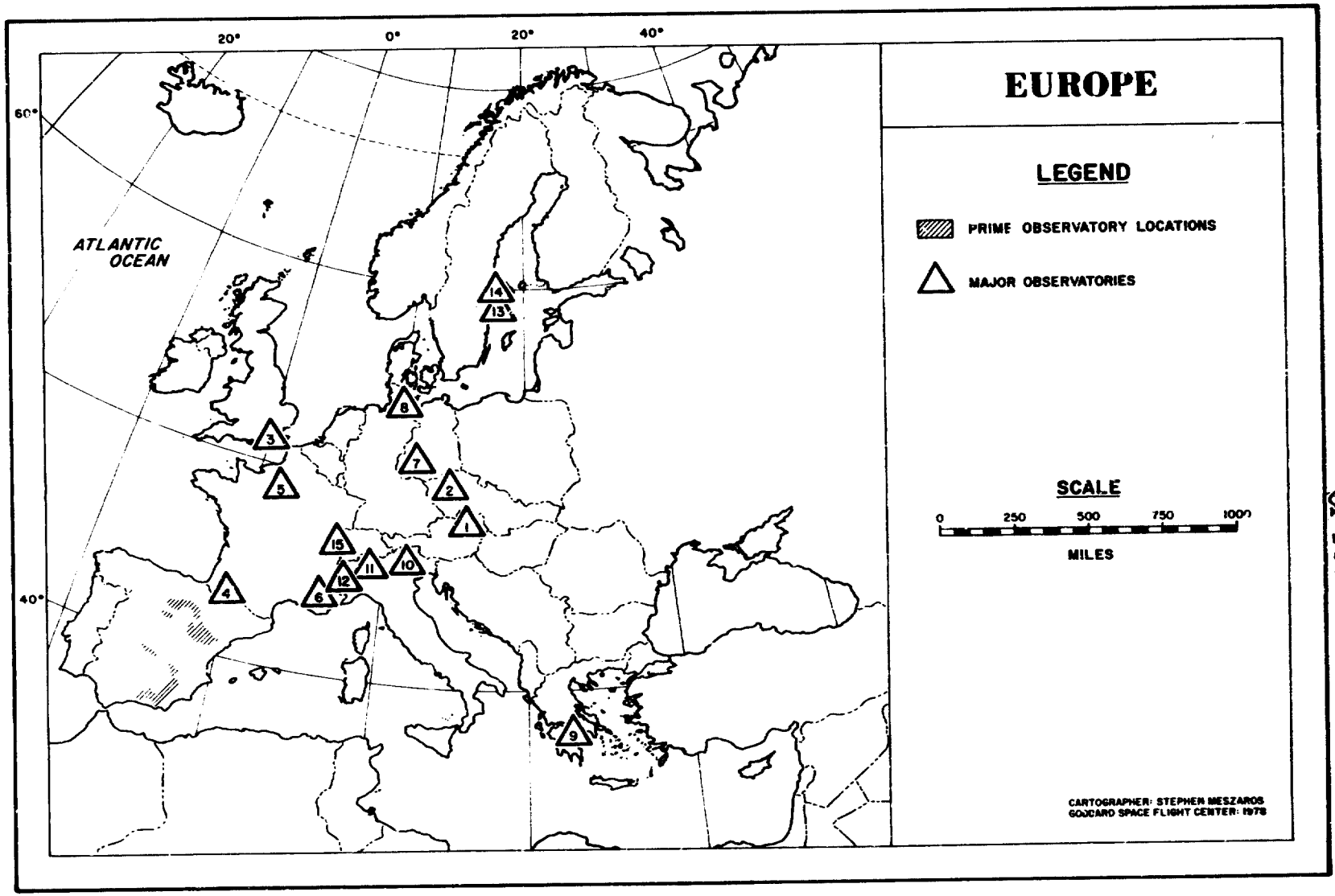
EUROPE (excluding the USSR)

It is perhaps appropriate that this atlas should start with the European Continent, for it was here that the telescope was first invented and used. This fact, along with the early development of Europe, undoubtedly accounts for the numerous European countries having major observatories. There are 18 large telescopes on the continent, the largest being the 2.5 meter (98-inch) reflector of the Royal Greenwich Observatory in England. Of note is the 1.3/2.0 meter (53/79-inch) Schmidt telescope in Germany, the largest of its kind in the world. Major observatory complexes are also present in France and Italy.

Unfortunately most of Europe lies in the Mesothermal and Microthermal climatic realms and thus has excessive cloudiness for optimum observatory performance. In fact, only the relatively limited upland areas of north-central and south-east Spain (part of the Dry-Summer Subtropical zone) are ideal. Consequently, a number of European countries are establishing major observatories beyond the continent (see "Mauna Kea Observatory" under "Australia & The Pacific" and "European Southern Observatory" under "South America").

Map 2. Major European Observatories

Map Number	Observatory	Country
1	Figl Astrophysical	Austria
2	Ondrejov	Czechoslovakia
3	Royal Greenwich	England
4	Pic du Midi	France
5	Paris	France
6	Haute Provence	France
7	Schwarzschild	Germany
8	Hamburg	Germany
9	Athens	Greece
10	Padua University	Italy
11	Milan-Merate	Italy
12	Turin	Italy
13	Stockholm	Sweden
14	Uppsala	Sweden
15	Geneva	Switzerland



Map 2. Major European Observatories

LARGE EUROPEAN TELESCOPES

Observatory	Location	Type	Size	Date	
(European Southern Obs.--see "South America")					(1)
	Austria				
Figl Astrophysical	Vienna	Re	1.5m (60")	1969	
	Czechoslovakia				
Ondrejov	Ondrejov	Re	2.0m (79")	1967	
	England				
(Anglo-Australian Telescope–see "Australia & The Pacific")					(2)
(Mauna Kea Obs.–see "Hawaii" under "Australia & The Pacific")					(3)
Royal Greenwich	Herstmonceux	Re	2.5m (98")	1967	
	France				
(Mauna Kea Obs. –see "Hawaii" under "Australia & The Pacific")					(4)
Haute Provence	Saint Michel	Re	1.9m (76")	1958	
Haute Provence	Saint Michel	Re	1.2m (47")	1943	
Pic du Midi (Univ. of Toulouse)	Bogueres de Bigorre	Re	1.1m (43")	1964	
Paris	Meudon	Re	1.0m (39")	1893	
	Germany				
Schwarzschild	Tautenburg	S	1.3m/2.0m (53"/79")	1960	(5)
Hamburg	Bergedorf	Re	1.0m (40")	1910	

Observatory	Location	Type	Size	Date
	Greece			
National of Athens	Kiaton	Re	1.2m (48")	1975
	Italy			
Astrophysical of Padua Univ.	Asiago	Re	1.8m (72")	1973
Astrophysical of Padua Univ.	Asiago	Re	1.2m (48")	1942
Milan-Merate	Merate, Como	Re	1.4m (54")	1968
Milan-Merate	Merate, Como	Re	1.0m (39")	1929
Turin	Pino Torinese	Re	1.0m (41")	1974
	Sweden			
Stockholm	Saltsjobaden	Re	1.0m (40")	1931
Uppsala	Bro	S	1.0m/1.3m (39"/53")	1962
	Switzerland			
Geneva	Geneva	Re	1.0m (40")	1927

THE SOVIET UNION

The Soviet Union is one of the most active countries engaged in astronomical research today. It has a distinguished history in this discipline and contains some of the world's most modern observatories, including the newly constructed 6.0 meter (236-inch) telescope—the largest reflector in the world.

The best extensive observing regions of the USSR are found along the southern border. These areas are located to the south-east of Lake Balkhash in the Tien Shan Range, and to the east and west of Lake Baykal in the Sayan and Yablonovy Ranges. In addition, some favorable sites are to be found in the Caucasus Mountains between the Black and Caspian Seas.

The seven major telescopes of the Soviet Union are situated within a few hundred miles of each other, in the Crimea and the Caucasus Mountains. This is probably due to the fact that this region is the closest suitable observing area to the cultural center of European Russia.

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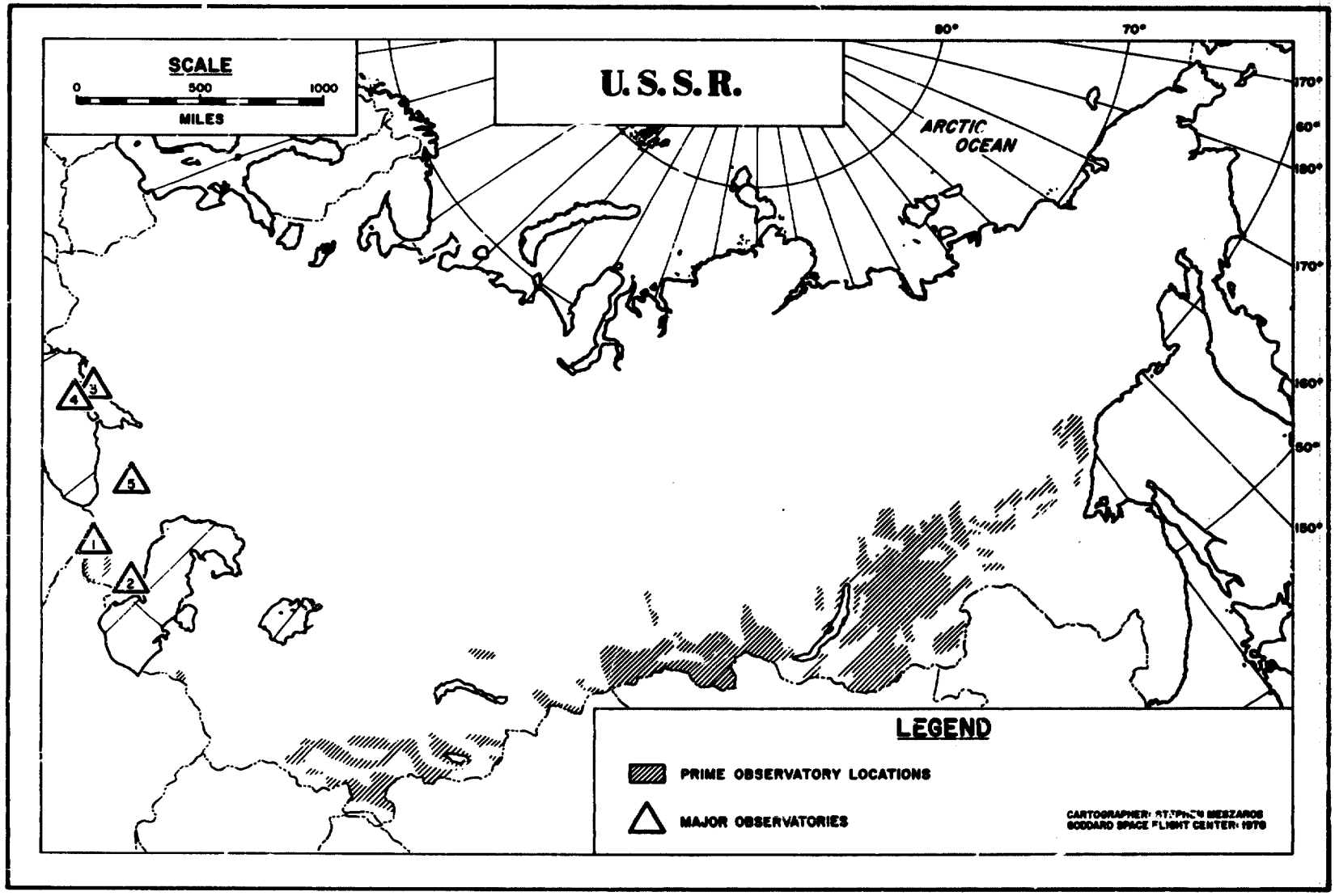
Map 3. Major USSR Observatories

Map Number	Observatory	Location
1	Byurakan	Soviet Armenia
2	Shemakha	Azerbaijan
3	Crimean Astrophysical	Crimea
4	Sternberg Astronomical Institute	Crimea
5	Special Astrophysical	Zelenchukskaya



Map 3. Major USSR Observatories

LARGE USSR TELESCOPES

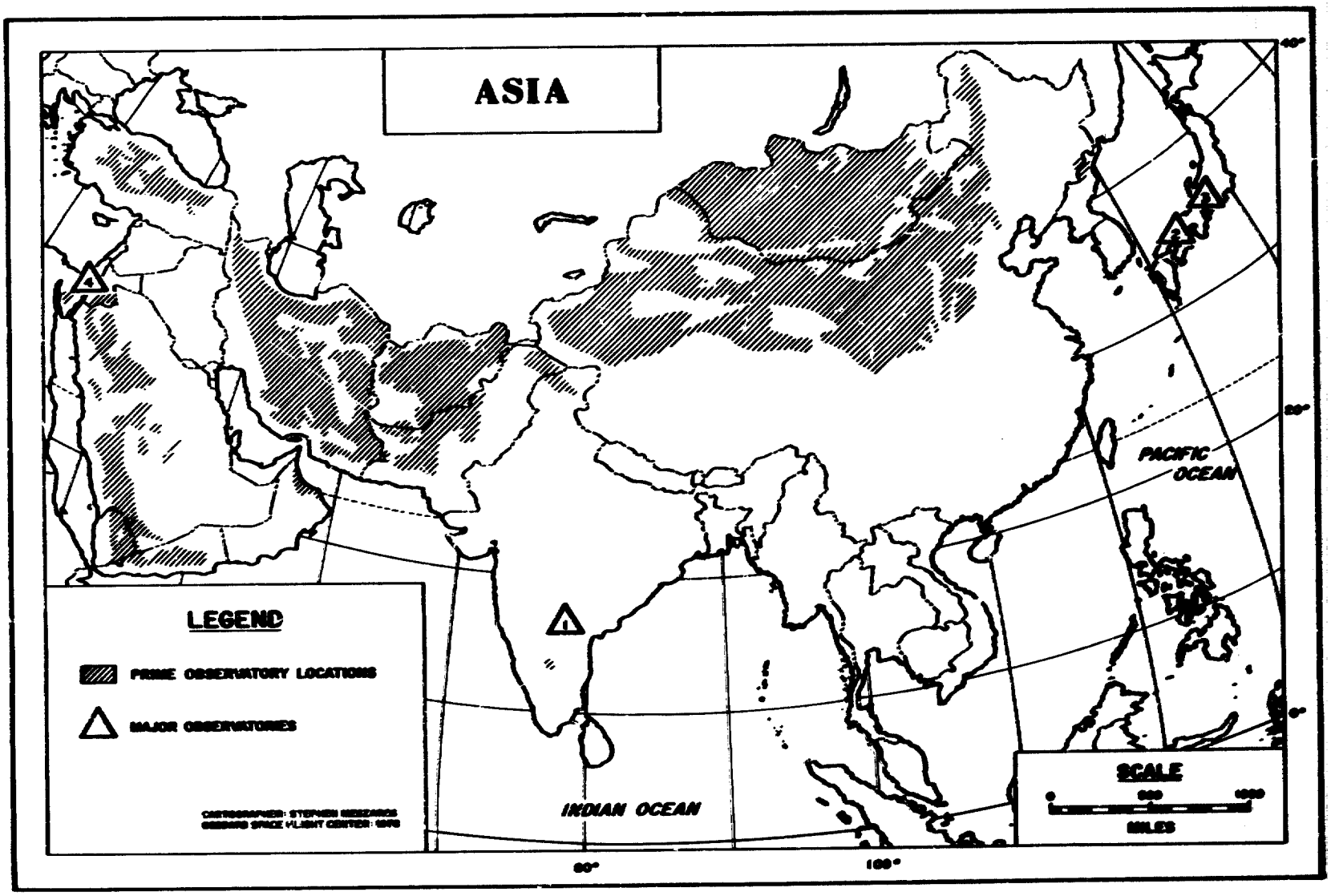
Observatory	Location	Type	Size	Date	
Special Astrophysical	Zelenchukskaya	Re	6.0m (236")	1976	(6)
Crimean Astrophysical	Simeiz	Re	2.6m (102")	1960	
Crimean Astrophysical	Simeiz	Re	1.2m (48")	1952	
Byurakan	Yerevan	Re	2.6m (102")	1976	
Byurakan	Yerevan	S	1.0m/1.3m (40"/52")	1960	
Shemakha Astrophysical	Shemakha	Re	2.0m (79")	1967	
Sternberg Astronomical Institute	Simeiz	Re	1.3m (50")	1960	

ASIA (excluding the USSR)

It is to be expected, with the huge size of Asia, that large sections of its area would provide suitable locations for astronomical observatories. Extensive regions in central Turkey, western Saudi Arabia, Iran, Afghanistan, Pakistan, Mongolia, and northern China contain possible good observing sites. Yet there are only four large telescopes located in the great expanse of Asian territory. Of all the nations in this vast region, only Israel, India, and Japan have major astronomical instruments.

Map 4. Major Asian Observatories

Map Number	Observatory	Country
1	Nizamiah	India
2	Okayama Astrophysical	Japan
3	Kiso	Japan
4	Wise	Israel



Map 4. Major Asian Observatories

LARGE ASIAN TELESCOPES

Observatory	Location	Type	Size	Date
	India			
Nizamiah (Osmania Univ.)	Hyderabad	Re	1.2m (48")	1962
	Israel			
Wise (Tel Aviv Univ.)	Mt. Zin	Re	1.0m (40")	1971
	Japan			
Okayama Astrophysical (Univ. of Tokyo)	Kamogata	Re	1.9m (74")	1960
Kiso	Kiso Mts.	S	1.1m/1.5m (42"/59")	1974

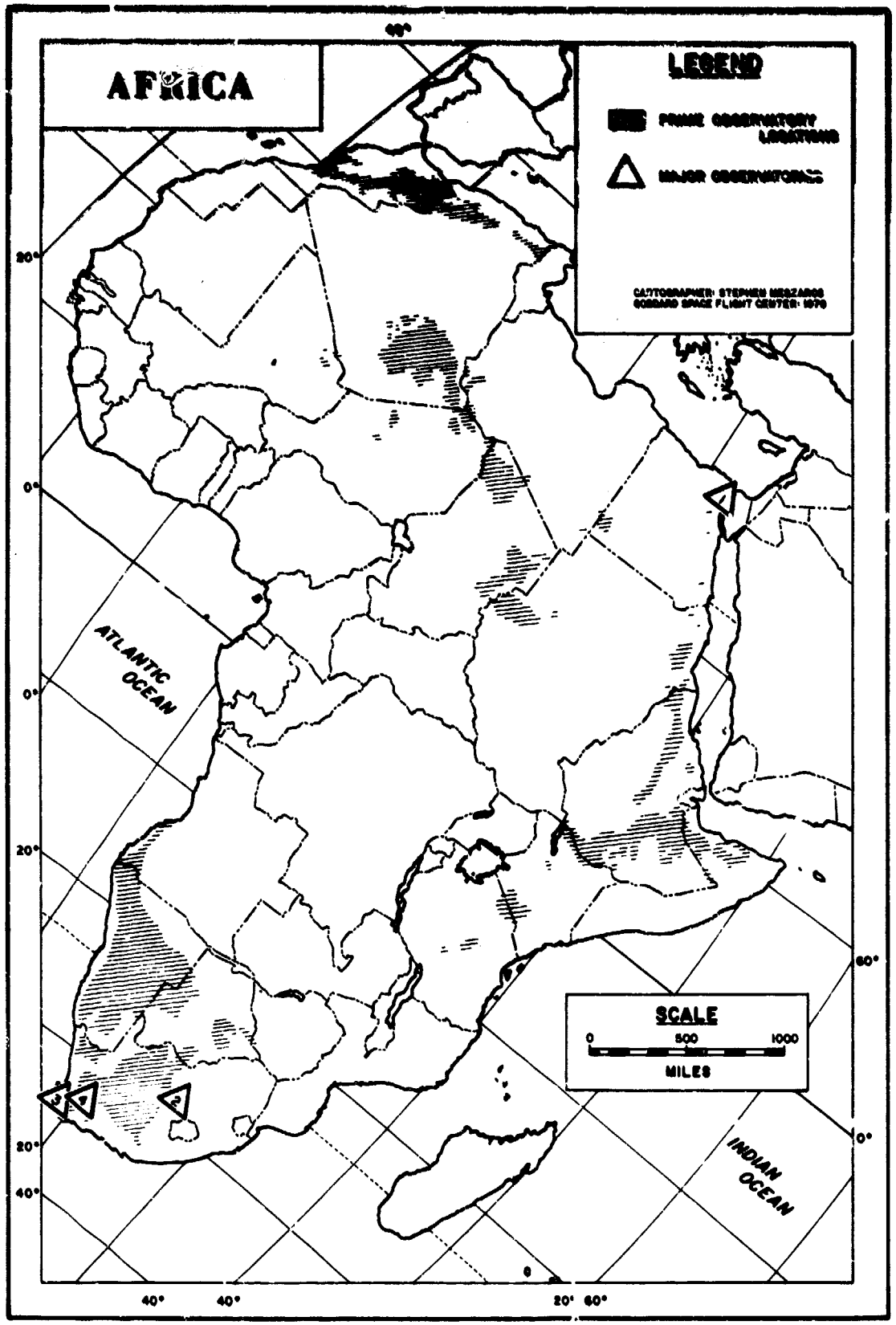
AFRICA

Africa is a large landmass with an abundance of observing areas located in various parts of the continent. Prime possibilities include the Atlas Mountains of Morocco and Algeria in the north-west and the Ethiopian Highlands in the east. The Ahaggar and Tibesti Massifs in the central Sahara may be too rugged and remote for any astronomical use in the foreseeable future. At the tip of the continent South-West Africa, and especially South Africa, include the prime African observing areas which have been most utilized by astronomers to date.

South Africa got an early start as an observatory center because England used it for many years as a southern observing station to study the southern skies. Consequently it is not surprising that four of the five major telescopes on the African Continent are situated here. The fifth one is located in Egypt.

Map 5. Major African Observatories

Map Number	Observatory	Country
1	Helwan	Egypt
2	Boyden	South Africa
3	Royal	South Africa
4	South African Astronomical	South Africa



Map 5. Major African Observatories

LARGE AFRICAN TELESCOPES

Observatory	Location	Type	Size	Date	
	Egypt				
Helwan	Helwan	Re	1.9m (74")	1960	
	South Africa				
South African Astronomical	Sutherland	Re	1.9m (74")	1974?	(7)
South African Astronomical	Sutherland	Re	1.0m (39")	1973	
Boyden Station	Bloemfontein	Re	1.5m (60")	1930	
Royal	Cape of Good Hope	Re	1.0m (40")	1961	

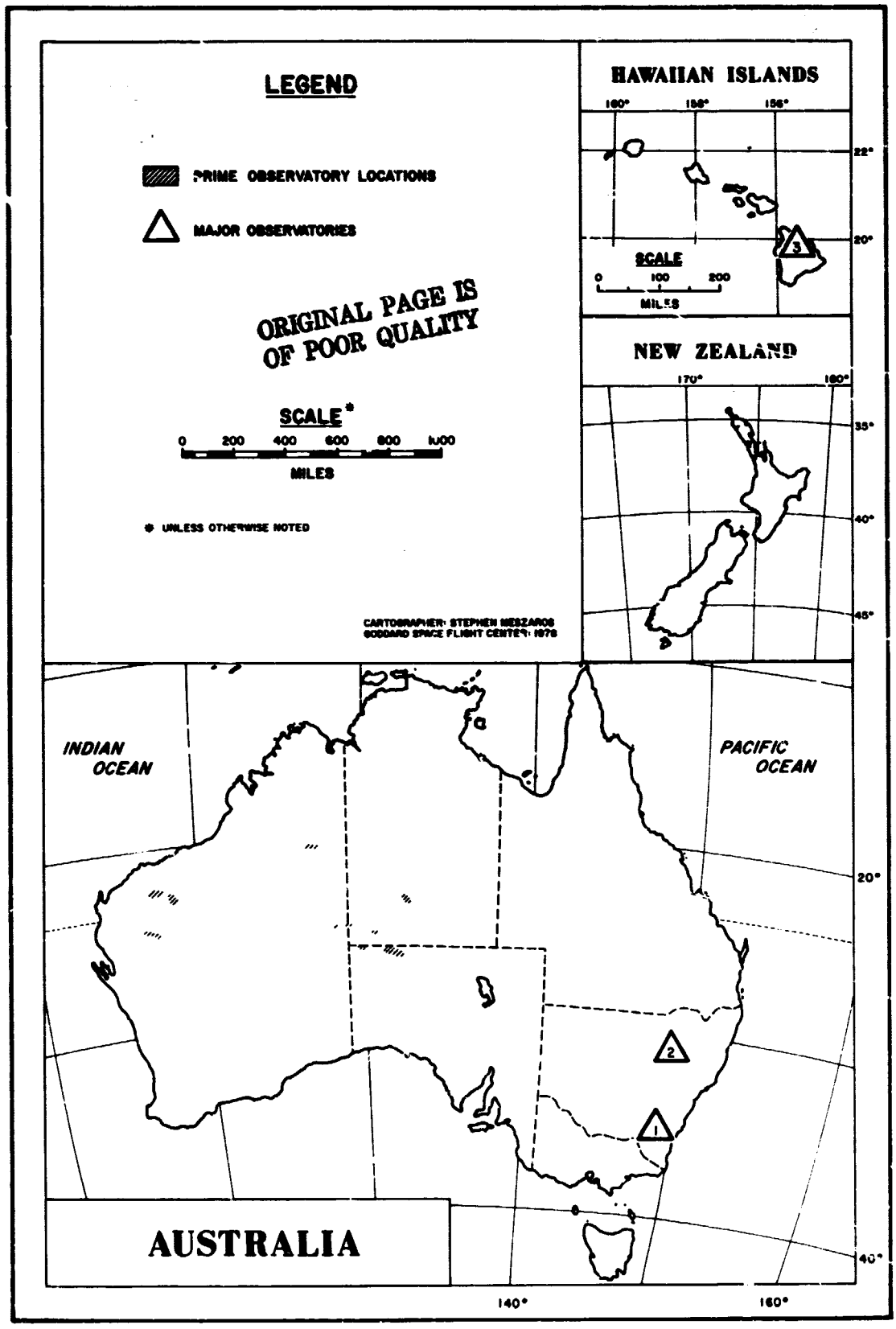
AUSTRALIA AND THE PACIFIC

The continent of Australia contains a minimum of prime observatory sites according to the criteria established in this atlas. Only a few small areas have the ideal combination of both dryness and elevation. Nevertheless, Australia has two of the largest and most advanced observatory complexes in the world today. The Mt. Stromlo Observatory is located in the Great Dividing Range near Canberra and the Siding Spring Observatory—home of the new 3.9 meter (153-inch) Anglo-Australian Telescope—is situated about 300 miles farther north, in an excellent observing region. These two observatories have a total of five major telescopes.

New Zealand and most of the islands of the Pacific contain no really good observing areas and no large observatories. However, Hawaii is the site of one of the newest astronomical research centers in the world. This is the Mauna Kea Observatory which is also the highest major observatory in the world today with an elevation of 13,800 feet above sea level. By 1980 there will be a total of four large telescopes with mirror sizes of 3.8, 3.6, 3.2, and 2.2 meters (150, 144, 126, and 88-inches) operating on the peak.

Map 6. Major Australian and Pacific Observatories

Map Number	Observatory	Location
1	Mt. Stromlo	Australia
2	Siding Spring	Australia
3	Mauna Kea	Hawaii



Map 6. Major Australian & Pacific Observatories

LARGE TELESCOPES OF AUSTRALIA & THE PACIFIC

Observatory	Location	Type	Size	Date	
	Australia				
Siding Spring	Coonabarabran, New South Wales	Re	3.9m (153")	1975	(2)
Siding Spring	Coonabarabran, New South Wales	S	1.2m/1.8m (48"/72")	1973	(8)
Siding Spring	Coonabarabran, New South Wales	Re	1.0m (40")	1964	
Mt. Stromlo	Canberra	Re	1.9m (74")	1955	
Mt. Stromlo	Canberra	Re	1.3m (50")	1954	
	Hawaii				
Mauna Kea Observatory					
(England)	Mauna Kea	IR	3.8m (150")	1978	(3)
(Canada, France, Hawaii)	Mauna Kea	Re	3.6m (144")	1979	(4)
(NASA)	Mauna Kea	IR	3.2m (126")	1979	(9)
(Univ. of Hawaii)	Mauna Kea	Re	2.2m (88")	1970	

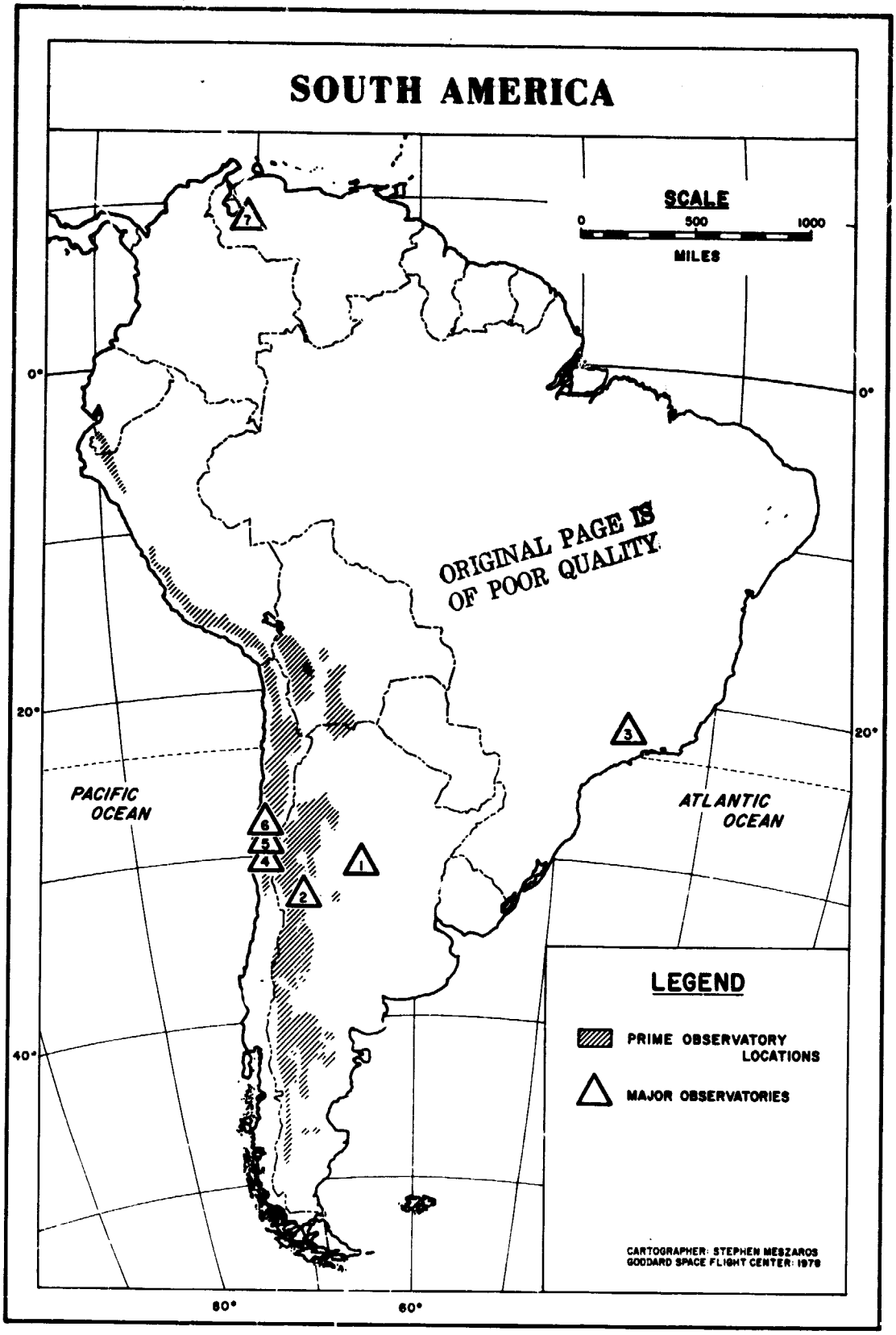
SOUTH AMERICA

During the past decade South America has been the scene of the most active new observatory construction in the world. The best observing region stretches approximately 3000 miles in length down the flanks of the Andes Mountains, through the countries of Ecuador, Peru, Bolivia, Chile, and Argentina. By 1980 there should be a total of 14 large telescopes on the continent in Argentina, Brazil, Chile, and Venezuela.

In north-central Chile the combination of the aridity of the nearby Atacama Desert and the elevations of the Andes Mountains results in excellent sky clarity and transparency. This has stimulated the construction of three entirely new major observatories located within about 100 miles of each other. These are the Cerro Tololo Inter-American Observatory, Cerro La Silla European Southern Observatory, and Cerro Las Campanas Carnegie Southern Observatory. Their largest telescopes are 4.0, 3.6, and 2.5 meters (158, 142, and 100-inches) in size respectively. The 4.0 meter (158-inch) Cerro Tololo telescope is the largest telescope in the Southern Hemisphere.

Map 7. Major South American Observatories

Map Number	Observatory	Country
1	National	Argentina
2	Univ. de La Plata	Argentina
3	National	Brazil
4	Inter-American	Chile
5	European Southern	Chile
6	Carnegie Southern	Chile
7	Astronomical Investigation	Venezuela



Map 7. Major South American Observatories

LARGE SOUTH AMERICAN TELESCOPES

Observatory	Location	Type	Size	Date	
	Argentina				
Univ. de La Plata?	Mendoza	Re	2.1m (84")	?	(10)
National	Bosque Alegre	Re	1.5m (61")	1942	
	Brazil				
National of Rio de Janeiro	Brazopolis	Re	1.6m (63")	1979?	
	Chile				
Inter-American	Cerro Tololo	Re	4.0m (158")	1976	(11,12)
Inter-American	Cerro Tololo	Re	1.5m (60")	1967?	
Inter-American	Cerro Tololo	Re	1.0m (40")	1973	(13)
European Southern	Cerro La Silla	Re	3.6m (142")	1976	(1)
European Southern	Cerro La Silla	Re	1.5m (59")	1968	
European Southern	Cerro La Silla	Re	1.0m (39")	1966	
European Southern	Cerro La Silla	S	1.0m/1.6m (39"/64")	1969	
Carnegie Southern	Cerro Las Campanas	Re	2.5m (100")	1976	(14)
Carnegie Southern	Cerro Las Campanas	Re	1.0m (40")	1971	
	Venezuela				
Astronomical Investigation	Llano Del Hato	Re	1.0m (39")	1975?	
Astronomical Investigation	Llano Del Hato	S	1.0m/1.5m (39"/59")	1975?	

NORTH AMERICA

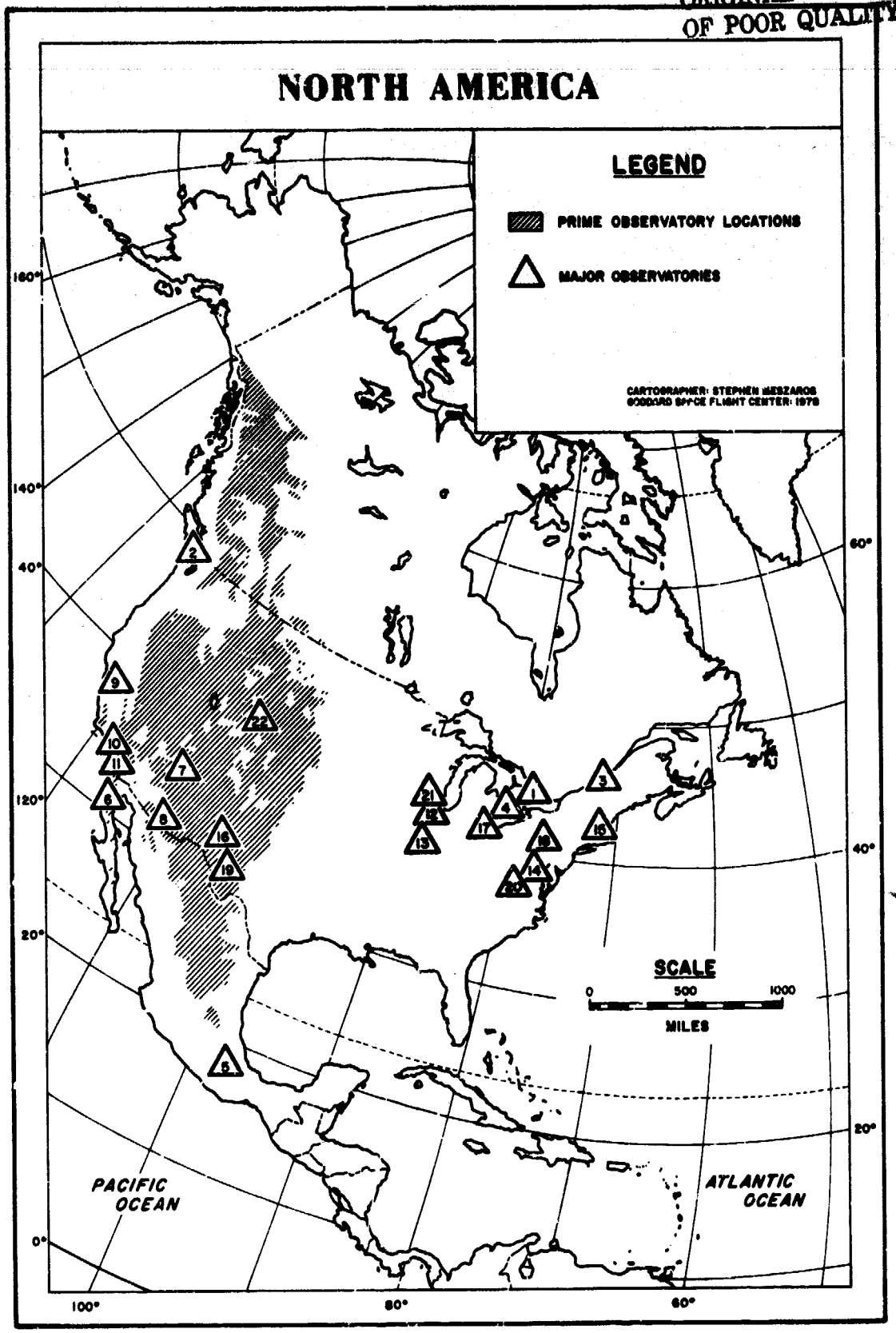
North America contains some of the most advanced astronomical observatories in the world. It also has relatively large areas that are very suitable for these and future observatories in the western part of the continent. There are no less than 43 large telescopes in North America. Of these, 36 are located in the United States, five are in Canada, and two are in Mexico.

The largest telescopes are found in the Southwest and West Coast United States. These include the 5.1 meter (200-inch) Mt. Palomar telescope (second largest in the world), 4.0 meter (158-inch) telescope of Kitt Peak National Observatory (tied for third largest in the world), and the 3.0, 2.7, and 2.5 meter (120, 107, and 100-inch) reflectors of Lick, McDonald, and Mt. Wilson Observatories respectively. Also of note are the 1.0 meter (40-inch) refractor of Yerkes Observatory and the 91 meter (300-foot) focal length solar telescope of Kitt Peak, both the largest telescopes of their kind in the world.

Map 8. Major North American Observatories

Map Number	Observatory	Country
1	David Dunlap	Canada
2	Dominion Astrophysical	Canada
3	Astronomical of Quebec	Canada
4	Univ. of Western Ontario	Canada
5	National Astrophysical	Mexico
6	Univ. of Mexico	Mexico
7	U.S. Naval, Lowell, Perkins	United States
8	Kitt Peak, Mt. Lemmon, Catalina, Smithsonian	United States
9	Lick	United States
10	Hale (Mt. Wilson)	United States
11	Hale (Mt. Palomar)	United States
12	Lindheimer	United States
13	Prairie	United States
14	Goddard Space Flight Center	United States
15	Agassiz Station	United States
16	Sacramento Peak	United States
17	Ritter	United States
18	Penn State Univ.	United States
19	McDonald	United States
20	McCormick	United States
21	Yerkes	United States
22	Wyoming Infrared	United States

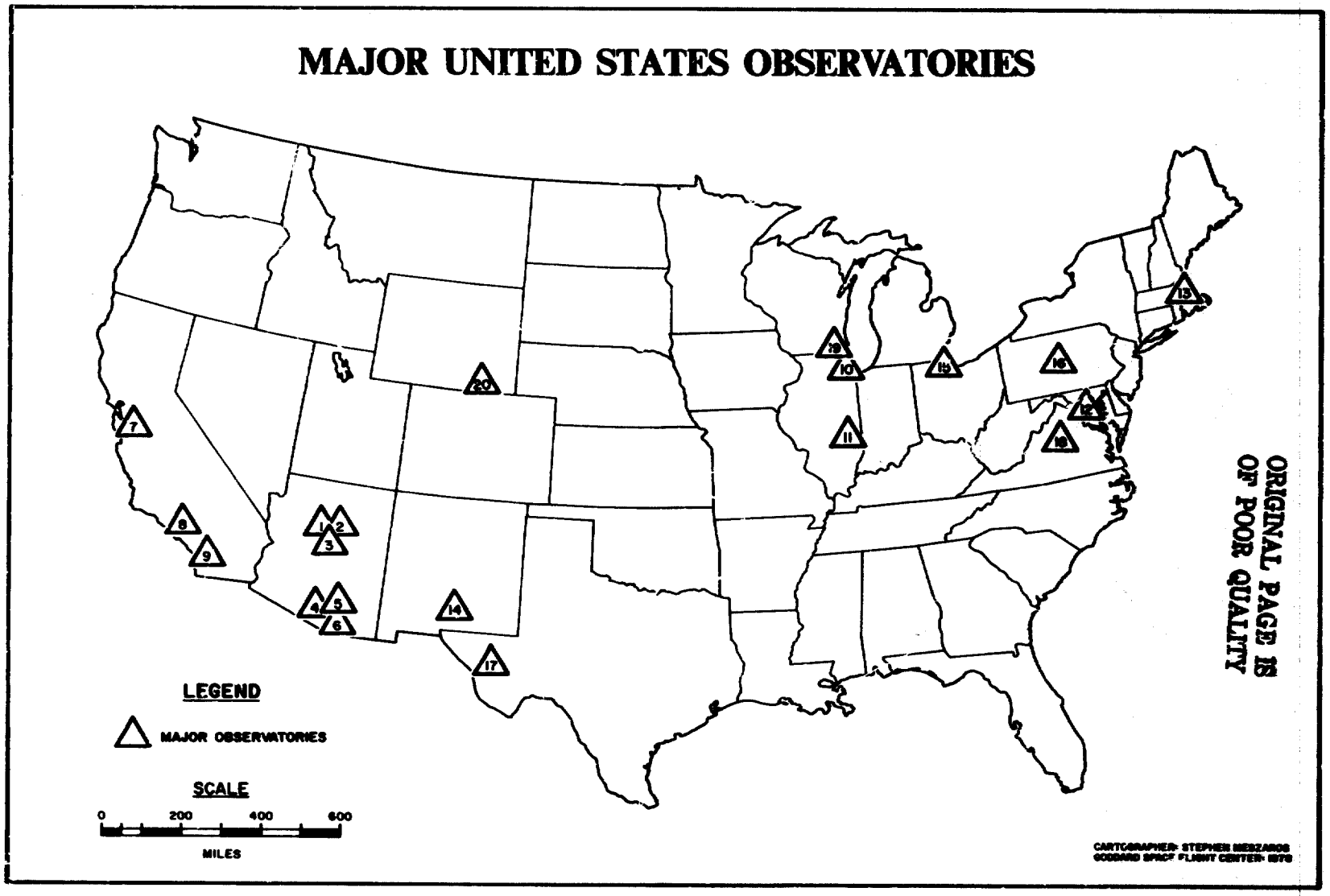
For a more detailed look at United States Observatories see Map 9.



Map 8. Major North American Observatories

Map 9. Major United States Observatories

Map Number	Observatory	State
1	U.S. Naval	Arizona
2	Lowell	Arizona
3	Perkins	Arizona
4	Kitt Peak National	Arizona
5	Mt. Lemmon & Catalina	Arizona
6	Smithsonian Astrophysical	Arizona
7	Lick	California
8	Hale (Mt. Wilson)	California
9	Hale (Mt. Palomar)	California
10	Lindheimer	Illinois
11	Prairie	Illinois
12	Goddard Space Flight Center	Maryland
13	Agassiz Station	Massachusetts
14	Sacramento Peak	New Mexico
15	Ritter	Ohio
16	Penn State Univ.	Pennsylvania
17	McDonald	Texas
18	McCormick	Virginia
19	Yerkes	Wisconsin
20	Wyoming Infrared	Wyoming



Map 9. Major United States Observatories

LARGE NORTH AMERICAN TELESCOPES

Observatory	Location	Type	Size	Date	
	Canada				
(Mauna Kea Obs.–see "Hawaii" under "Australia & The Pacific")					(4)
David Dunlap (Univ. of Toronto)	Richmond Hill, Ontario	Re	1.9m (74")	1935	
Dominion Astrophysical	Victoria, British Columbia	Re	1.9m (73")	1918	
Dominion Astrophysical	Victoria, British Columbia	Re	1.2m (48")	1961	
Astronomical of Quebec (Univ. of Montreal)	Mt. Megantic	Re	1.6m (64")	1978	
Univ. of Western Ontario	London, Ontario	Re	1.2m (48")	1968	
	Mexico				
Univ. of Mexico	Baja, California	Re	1.5m (59")	1971?	
National Astrophysical	Tonantzintla	Re	1.0m (40")	?	
	United States (excluding Hawaii)				
	Arizona				
Lowell	Flagstaff	Re	1.1m (42")	1910	
Perkins	Flagstaff	Re	1.8m (72")	1962	(15)
U.S. Naval	Flagstaff	Re	1.5m (61")	1963	
U.S. Naval	Flagstaff	Re	1.0m (40")	1955	
Smithsonian Astrophysical	Mt. Hopkins	MMT	6:1.8m (6:72")	1979	(16)

Observatory	Location	Type	Size	Date	
	Arizona (continued)				
Smithsonian Astrophysical	Mt. Hopkins	Re	1.5m (60")	1970	
Mt. Lemmon Observatory					
(Univ. of Minnesota & Univ. of California)	Mt. Lemmon	IR	1.5m (60")	1972	
(NASA)	Mt. Lemmon	IR	1.5m (60")	1974	
(Univ. of Arizona)	Mt. Lemmon	IR	1.0m (40")	1970	
Catalina (Univ. of Arizona)	Catalina Site	Re	1.5m (61")	1965	
Steward (Univ. of Arizona)	Kitt Peak	Re	2.3m (90")	1969	
Kitt Peak National	Kitt Peak	Re	4.0m (158")	1973	(17)
Kitt Peak National	Kitt Peak	Re	2.1m (84")	1964	
Kitt Peak National	Kitt Peak	Sol	1.5m (60")	1962	(18)
Kitt Peak National	Kitt Peak	Re	1.3m (50")	?	
McGraw-Hill (Univ. of Michigan)	Kitt Peak	Re	1.3m (52")	1975	(19)
	California				
Hale (Carnegie Institution & Cal. Tech.)	Mt. Palomar	Re	5.1m (200")	1948	(20)
Hale (Carnegie Institution & Cal. Tech.)	Mt. Palomar	Re	1.5m (60")	1970	
Hale (Carnegie Institution & Cal. Tech.)	Mt. Palomar	S	1.2m/1.8m (48"/72")	1948	

Observatory	Location	Type	Size	Date	
	California (continued)				
Hale (Carnegie Institution & Cal. Tech.)	Mt. Wilson	Re	2.5m (100")	1917	
Hale (Carnegie Institution & Cal. Tech.)	Mt. Wilson	Re	1.5m (60")	1908	
Hale (Carnegie Institution & Cal. Tech.)	Mt. Wilson	Re	1.0m (40")	?	
Lick (Univ. of California)	Mt. Hamilton	Re	3.0m (120")	1959	
	Illinois				
Lindheimer (Northwestern Univ.)	Evanston	Re	1.0m (40")	1967	
Prairie (Univ. of Illinois)	Oakland	Re	1.0m (40")	?	
	Maryland				
Goddard Space Flight Center (NASA)	Greenbelt	Re	1.2m (48")	1975	(21)
	Massachusetts				
Agassiz Station (Harvard College)	Harvard	Re	1.5m (61")	1934	
	New Mexico				
Sacramento Peak (National Science Foundation)	Sunspot	Sol	1.6m (64")	1969	
	Ohio				
Ritter (Univ. of Toledo)	Toledo	Re	1.0m (40")	1967	

Observatory	Location	Type	Size	Date	
	Pennsylvania				
Penn State Univ.	Rattlesnake Mt.	Re	1.5m (60")	1974/75	
	Texas				
McDonald (Univ. of Texas)	Fort Davis	Re	2.7m (107")	1968	
McDonald (Univ. of Texas)	Fort Davis	Re	2.1m (82")	1939	
	Virginia				
McCormick (Univ. of Virginia)	Fan Mt. Station	Re	1.0m (40")	1976?	
	Wisconsin				
Yerkes (Univ. of Chicago)	Williams Bay	Re	1.0m (41")	1968	
Yerkes (Univ. of Chicago)	Williams Bay	Rf	1.0m (40")	1897	(22)
	Wyoming				
Wyoming Infrared (Univ. of Wyoming)	Jelm Mt.	IR	2.3m (92")	1977	

CONCLUSION

As can be seen from the maps and tables in this atlas most of the large telescopes in the world today are located in the Northern Hemisphere, particularly on the continents of Europe and North America. This is understandable as these areas were the first to become industrialized and thus were able to build and support major observatories. For logistical and academic reasons many of these observatories were not established in the sites with best astronomical seeing but were located near population and cultural centers instead. Consequently some of the large telescopes are not useable at their full potential.

In the past few years however, the prime observatory locations of the world have been utilized to a much greater degree. This is apparent by comparing the newer observatories with their sites in the prime observatory areas, as shown on the maps in this atlas. Particularly good examples of this correlation are Kitt Peak National Observatory in Arizona, Mauna Kea Observatory in Hawaii, the Inter-American, European, and Carnegie observatory complexes in Chile, and the Siding Spring Observatory in Australia. (It should also be noted that the new observatories in Chile and Australia have been constructed to remedy the lack of major telescopes in the Southern Hemisphere.)

In the future we can expect that this trend to establish new observatories in prime observing locations around the globe will continue, thus utilizing the world's largest telescopes to greatest advantage. As man conquers space and places astronomical instruments in the optimum observing conditions to be found in earth orbit and on the surface of the moon, research will shift in this direction. However, for many years to come the ground-based observatory–situated in the best location–will continue to be the backbone of most observational astronomy.

NOTES

1. The European Southern Observatory is operated by the following countries: Belgium, Denmark, France, Federal Republic of Germany, the Netherlands, and Sweden.
2. England and Australia are joint operators of the 3.9 meter (153-inch) telescope at Siding Spring Observatory in Australia.
3. England will operate a 3.8 meter (150-inch) telescope at Mauna Kea Observatory in Hawaii.
4. Canada, France, and Hawaii will be multiple-operators of the 3.7 meter (144-inch) telescope at Mauna Kea Observatory in Hawaii.
5. The German 1.3/2.0 meter (53/79-inch) telescope is the largest Schmidt telescope in the world today.
6. The Russian 6.0 meter (236-inch) telescope is the largest reflecting telescope in the world today.
7. The 1.9 meter (74-inch) telescope was originally installed in Radcliffe Observatory at Pretoria, South Africa in 1948. It was to be moved to the South African Astronomical Observatory in 1974.
8. The 1.2/1.8 meter (48/72-inch) Schmidt telescope at Siding Spring Observatory in Australia is operated by England.
9. The 3.2 meter (126-inch) telescope of the National Aeronautics and Space Administration will be operated at Mauna Kea Observatory by the University of Hawaii's Institute for Astronomy.
10. The 2.1 meter (84-inch) telescope for the Argentine observatory near Mendoza has been completed but the observatory building has not been constructed yet.
11. The Inter-American Observatory is managed by the Association of Universities for Research in Astronomy (AURA) which also manages Kitt Peak National Observatory in Arizona (see note 17).
12. The 4.0 meter (158-inch) telescope of the Inter-American Observatory in Chile is the largest telescope in the Southern Hemisphere.

13. The 1.0 meter (40-inch) Yale University Observatory telescope was moved to Cerro Tololo in 1973.

14. The Carnegie Southern Observatory is owned by the Carnegie Institution of Washington, D.C. and operated by the Hale Observatories of California.

15. The Perkins Observatory telescope is operated jointly by Lowell Observatory, Ohio State University, and Ohio Wesleyan University.

16. The MMT or "Multiple-Mirror Telescope" is an experimental telescope with the light from six 1.8 meter (72-inch) mirrors being brought to a common focus. The light collecting area of these mirrors is equal to that of one large 4.5 meter (176-inch) mirror. The telescope is scheduled for completion in 1979.

17. Kitt Peak National Observatory is operated by the Association of Universities for Research in Astronomy (AURA). Member universities include the following: University of Arizona, California Institute of Technology, University of California, University of Chicago, Harvard University, Indiana University, University of Michigan, Ohio State University, Princeton University, University of Texas, University of Wisconsin, and Yale University.

18. The McMath solar telescope at Kitt Peak National Observatory is the largest of its type in the world, with a focal length of 91 meters (300 feet).

19. The McGraw-Hill Observatory 1.3 meter (52-inch) telescope was moved from Michigan to Kitt Peak in 1975.

20. The Hale Observatory 5.1 meter (200-inch) telescope on Mt. Palomar is the second largest reflecting telescope in the world today.

21. The 1.2 meter (48-inch) telescope at Goddard Space Flight Center (NASA) is used primarily for laser ranging studies, although some astronomical observing is also done with it.

22. The Yerkes Observatory 1.0 meter (40-inch) telescope is the largest refracting telescope in the world today.

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