Bibliography of Map Projections

Editors of first edition:
John P. Snyder*and
Harry Steward

***Editor of revisions**

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PREFACE

[Although Harry Steward has not participated in the revisions of this bibliography, he contributed in a major manner to the first edition and to this preface. Therefore, a separate preface has not been prepared for the revisions. The numbers and some comments in the original preface have been updated. – *JPS*.]

The discipline of cartography has a rich and complex history and a lengthy literature to accompany it. Cartographers have not only made maps; they have written about them in great detail. One of the foremost of these topics has been that of map projections.

The fascination, however, attendant upon the problems of getting "the round Earth on flat paper," to use a title by Chamberlin (1947), has captured the imagination of many others beyond the realm of practical mapmaking. The writings of cartographers, surveyors, and geodesists are thus accompanied not only by those of geographers, mathematicians, engineers, astronomers, and other physical scientists, but also by contributions from political scientists, artists, sociologists, school teachers, architects, and a host of others. Amateurs and professionals alike have been involved.

The result is a body of literature, covering theory and practice, description and criticism, commentary and advocacy, that can lay good claim to being the most extensively discussed subtopic within the confines of cartography. An accounting of the many articles written not only delineates the considerable extent of these outpourings but also indicates that there are many lines of research yet to be explored. It is to assist the pursuit of such research, rather than to compile a mere inventory, that this bibliography has been assembled.

The work itself has its origins in the earlier concerns of both editors, one having an accumulation of references deriving from a decade or more of active research in projection theory and practice, the other with involvement in a previous bibliographic project and many years of interest in the literature of cartography.

The present compilation is preceded by other bibliographies, but apart from the numerous brief attachments to papers and books these have, for the most part, been sections of larger, more general, works. Chief among these has been the *Bibliography of Cartography* published by the Library of Congress in 1973 with a supplement in 1980 and an unpublished second supplement still in the process of assembly. Similar in significance are the near-annual listings of *Bibliotheca Cartographica* (1957-1972) and its successor, *Bibliographia Cartographica* (1974 to present), both published in Germany but compiled from international contributions.

Additional valuable material has been derived from the published bibliography of the American Geographical Society, the periodic compilations of *Geographisches Jahrbuch*, the card index of the Royal Geographical Society in London, the annual listings of *Zeitschrift für Vermessungswesen*, the relevant sections of *Geographical Abstracts* and *Geo-Abstracts*, the French *Bibliographie Géographique Internationale*, the *International Catalogue of Scientific Literature*, and the Russian publication, *Referativnyy Zhurnal – Geografiya [Реферативный Журнал – География]*. Also of assistance have been the current-literature sections of a number of journals such as *The American Cartographer* (now *Cartography and Geographic Information Systems*), *The Cartographic Journal*, *The Geographical Journal*, *Kartographische Nachrichten* and others, and dozens of minor sources which provided many contributions not captured by the major compilations.

The editors' intention has been to compile a bibliography that is the most comprehensive yet in its subject area. They are confident that with almost 3,000 entries they have done so (there were some 900 entries through the planned but abandoned supplement of the *Bibliography of Cartography* which comprise the most complete previous undertaking). Nevertheless, in the literal sense, they are well aware that this work is not complete. The nature of bibliographical work of such magnitude clearly prevents such an ideal from being attained; to check all journals, all references, all libraries, all sources, and all languages in an exhaustive manner is impossible without the provision of unlimited resources and time.

The number of substantial references that have escaped, however, can be few. Others have been excluded deliberately on a basis of subjective evaluation, such as newspaper articles

of insignificance, reviews unless deemed to add important information, many of the computer programs, and many minor and routine accounts in, for example, geography, navigation, or engineering texts. A few unpublished papers are included if they have been significantly referenced elsewhere. This bibliography still contains articles of lesser significance, but there is usually something special about them, or they bear the recommendation of other workers in this field.

Because of the interrelation of map projections with other disciplines, especially geography and mathematics, somewhat arbitrary lines of separation have been drawn by the editors. A prominent example is the field of conformal mapping, a branch of mathematics often used for the mapping of physical phenomena having nothing to do with the shape of the Earth or its graticule of meridians and parallels. Therefore, with a few exceptions, conformal mapping is included in this bibliography strictly in a geographical (or celestial) context.

A very quick appreciation of the growth and form of the literature may be obtained by a simple breakdown of the figures involved (see tables 1, 2, and 3). The 2,996 citations listed herein (treated for simplicity with equal weighting of the primary listing only) represent some 28 languages which can be conveniently arranged in 4 arbitrary groups. Of the total, 2,544 (some 85 percent) come from an initial group of 4: English, German, Russian, French, and Chinese (table 1). Within these, English citations dominate, having over half the entries (1,249). German is a solid second with 636 (21 percent), while Russian and French follow, each with substantial totals, but having a combined figure less than that of German. The editors recognize that no matter how thoroughly these references have been sought without regard to geographical origin and date, there is a built-in bias tending to favor modern Western publications. This has been substantially overcome in the current printing, but it is still present, but it does not alter the qualitative aspect of the conclusions reached.

The 446 remaining citations fall into some smaller groupings. Italian, Polish, Hungarian, Spanish, and Czech amount to 266 or some 9 percent of the overall total; a smaller number, 143, results from a group of 7 languages, ranging from Bulgarian with 28 entries to Portuguese at 13. Lastly, there is a minor category of 11 languages totaling only 37 entries among them, while 6 bibliographies, not assigned to a particular language, complete the picture.

English, however, has been broken down a little further into 684 of United States origin, 337 emanating from Great Britain, and 228 from miscellaneous other sources. These figures are based mainly on the national origin of the sources, such as the journals, assisted by some judicious interpretation on the part of the editors. They are meant to be no more than a general guide; writers publish outside their own country, English is used commonly as an international medium, some changes in nationality have been noted, and there is the general difficulty of identifying the native home of every individual. They are useful, however, along with the other language totals in seeing how the subject of map projections has varied worldwide over time.

The chronology is summarized in tables 2 and 3 and needs only a few additional remarks. The earliest reference in the bibliography is to the classical work of Ptolemy, which is circa 150 A.D. and has been translated from the original Greek via Arabic and Latin to many modern European languages. There then occurs the familiar literature gap of the Dark Ages, marked only by the ca. 1265 work of Roger Bacon, before the scattered writings of the Renaissance period appear.

There are only 51 references, in 8 languages, before 1800, and it is somewhat of a surprise to find that only 19 are in Latin, the common language of classically based European scholarship. Similarly unexpected is the appearance of 3 citations in Swedish in the 1700s. English, German, and French lead the way with little difference among them in these early years, but it was German that pulled steadily ahead in the first decade of the 19th century. It retained this dominance throughout the 1800s, providing 131 out of 298 recorded entries; French at 72 and English at 60 made up most of the rest.

French was steadily overtaken by English in the early 20th century, but it was German that continued to predominate until the cataclysm of the First World War. Germany recovered this leadership briefly during the 1930's, but from 1940 the majority position has been occupied by the United States with, from 1950, an increasing

number of contributions from Russian sources. That the subject is healthy and thriving is indicated by the fact that over 2,000 of the entries in this bibliography have been published since 1960.

Thanks are due to a number of people. Ronald Grim, bibliographer in the Geography and Map Division, Library of Congress, kindly made available his card-files being prepared for the second (unpublished) supplement of the *Bibliography of Cartography*. John D. Hill, Arthur H. Robinson, and Waldo R. Tobler took time to study the manuscript for the first edition, and we appreciate their suggested additions and corrections. The editors are grateful to reference librarians and facilities at the Library of Congress and at the libraries of the U.S. Geological Survey and of Clark University, and to Carlos B. Hagen. Additional translations have been provided by Karla Anderson, Yang Cheng, Andrew Grosz, Irena Kavalek, Ewa Katarzyna Raines, Nora Tamberg, and Paul Teleki. The editors especially thank Ann Yaeger and also Cynthia L. Sabatino and Joyce E. Yordy for their very considerable typing and formatting for the first edition. Ann Yaeger is supervising the printing of the second USGS edition, and the editor has undertaken the preparation on his computer of the entries with all the diacritical marks and now even Cyrillic equivalents.

For this revision, 446 entries, including 182 Russian and Chinese, have been added to the 2,551 of the first edition, and entries have been renumbered. The editors appreciate entries supplied by Herbert W. Stoughton and Russian and Chinese entries added in connection with East-West book projects in cooperation with Lev. M. Bugayevskiy of MIIGAiK, and with Yang Qihe of Zhengzhou and Hu Yuju of Wuhan, both of the People's Republic of China, and with Yang Cheng, formerly of China, and now at Oak Ridge National Laboratories, Tennessee. Omissions still certainly abound.

Occasionally listings in the source bibliographies were found to have errors; in other cases, errors undoubtedly remain undetected. Similarly, the editorial process itself may have produced additional mistakes and omissions; numerous errors have been corrected since the first edition. The editors, especially the first editor, accept all responsibility for remaining errors and would be grateful to users for any corrections, suggested amendments, and general comments.

The standard U.S. Geological Survey format used will be self-evident. The treatment of language is English-oriented; the family name of an author is given first, followed by a comma, even if local convention is different. Russian, Bulgarian, and Greek are generally transliterated following American/British convention (especially that of the U.S. Board on Geographic Names). English equivalents of Chinese and Japanese are usually given instead of transliteration. The language of the paper is identified if it is either different from that of the title as shown in the citation, or if other than English, French, German, Italian, or Spanish. If the paper is in English, non-English abstracts are not listed. If the paper is not in English, but there is an English, French, German, and/or Russian abstract, the first available language of the four is listed.

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Table 1. – Language totals of references cited

Group I	1a	English (U.S.)	684
(over 100 each)	1b	English (British)	337
	1c	English (other)	228
		Total English	**1,249**
	2	German	636
	3	Russian	343
	4	French	192
	5	Chinese	124
		Total (Group I)	**2,544**
Group II	6	Italian	78
(31 to 100 each)	7	Polish	62
	8	Hungarian	52
	9	Spanish	42
	10	Czech	32
		Total	**266**
Group III	11	Bulgarian	28
(11 to 30 each)	12	Dutch	28
	13	Japanese	23
	14	Latin	19
	15	Swedish	16
	16	Serbo-Croatian	16
	17	Portuguese	13
		Total	**143**
Group IV	18	Danish	8
(1 to 10 each)	19	Norwegian	5
	20	Slovak	5
	21	Greek	4
	22	Romanian	4
	23	Turkish	3
	24	Afrikaans	2
	25	Finnish	2
	26	Latvian	2
	27	Albanian	1
	28	Mongolian	1
		Total	**37**
	29	**Bibliographies**	**6**

Overall total 2,996 (7 articles dual-language, but listed under principal language of author)

Table 2. – Chronological summary of references cited

Language	English														
	U.S.A.	British	Other	**Total**	German	Russian	French	Chinese	Italian	Polish	Hungarian	Spanish	Czech	Others	**Total**
pre 1500	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
1500-99	-	1	-	1	1	-	-	-	-	-	-	-	-	6	8
1600-99	-	1	-	1	-	-	2	-	-	-	-	-	-	3	6
1700-24	-	2	-	2	-	-	3	-	-	-	-	-	-	-	5
1725-49	-	2	-	2	-	-	1	-	-	-	-	-	-	-	3
1750-74	-	2	-	2	5	-	1	-	-	-	-	-	-	3	11
1775-99	-	2	-	2	1	-	1	-	2	-	-	-	-	10	16
1800-09	-	1	-	1	12	-	3	-	-	-	-	-	-	-	16
1810-19	-	-	-	-	3	-	5	-	-	-	-	-	-	-	8
1820-29	3	1	-	4	2	-	2	-	-	-	-	-	-	1	9
1830-39	-	1	-	1	2	-	3	-	-	-	-	-	-	-	6
1840-49	1	2	-	3	-	-	4	-	-	-	-	-	-	-	7
1850-59	3	4	-	7	4	-	7	-	-	-	-	-	-	-	18
1860-69	3	5	-	8	12	-	10	-	1	-	-	1	-	-	32
1870-79	8	6	-	14	15	-	12	-	-	-	-	-	-	1	42
1880-89	7	5	-	12	36	-	15	-	9	-	1	-	-	2	75
1890-99	3	6	2	11	44	2	11	-	14	-	-	1	-	2	85
1900-09	19	11	1	31	62	3	9	-	6	1	3	1	-	3	119
1910-19	19	22	2	43	69	3	10	-	4	-	-	-	-	7	136
1920-29	22	28	8	58	40	2	11	-	4	3	-	1	-	3	122
1930-39	32	33	8	73	82	18	21	1	4	3	-	5	-	10	218
1940-49	103	56	16	175	26	19	9	3	8	2	-	6	1	13	262
1950-59	59	37	24	120	39	74	21	15	11	7	15	9	12	22	345
1960-69	107	26	38	171	45	98	12	14	5	9	13	5	2	35	409
1970-79	108	35	48	191	61	64	5	5	6	25	7	4	4	27	399
1980-89	137	40	56	233	56	49	9	63	3	10	9	5	12	26	475
1990-	50	8	25	83	19	11	4	23	1	2	4	4	1	10	162
	684	337	228	**1,249**	636	343	192	124	78	62	52	42	32	186*	**2,996**

*See breakdown in table 3.

Table 3. – Breakdown of "Others" in table 2

Language

	Bulgarian	Dutch	Japanese	Latin	Swedish	Serbo-Croatian	Portuguese
pre 1870	-	1[1]	-	19[2]	3[3]	-	1[4]
1870-79	-	-	-	-	1	-	-
1880-89	-	1	-	-	1	-	-
1890-99	-	1	-	-	-	-	-
1900-09	-	2	-	-	1	-	-
1910-19	-	2	-	-	1	-	-
1920-29	-	1	-	-	1	-	-
1930-39	-	3	-	-	5	-	-
1940-49	2	1	1	-	1	-	5
1950-59	1	5	4	-	1	3	3
1960-69	10	-	8	-	1	2	2
1970-79	5	5	6	-	-	4	1
1980-89	10	3	4	-	-	3	1
1990-	-	3	-	-	-	4	-
	28	28	23	19	16	16	13

Language

	Danish	Norwegian	Slovak	Greek	Romanian	Turkish	Afrikaans	Finnish	Latvian	**Total**
pre 1870	-	-	-	1[5]	-	-	-	-	-	25
1870-79	-	-	-	-	-	-	-	-	-	1
1880-89	-	-	-	-	-	-	-	-	-	2
1890-99	1	-	-	-	-	-	-	-	-	2
1900-09	-	-	-	-	-	-	-	-	-	3
1910-19	2	1	-	-	-	-	-	1	-	7
1920-29	-	1	-	-	-	-	-	-	-	3
1930-39	-	-	-	-	-	-	-	-	2	10
1940-49	-	2	-	-	-	-	-	1	-	13
1950-59	-	-	1	-	1	1	-	-	-	20
1960-69	-	1	1	1	3	1	2	-	-	32
1970-79	4	-	-	-	-	-	-	-	-	25
1980-89	1	-	-	2	-	1	-	-	-	25
1990-	-	-	3	-	-	-	-	-	-	10
	8	5	5	4	4	3	2	2	2	**178**

[1]1826
[2]1265:1; 1500-99:6; 1600-99:2; 1750-74:2; 1775-99:8
[3]1758, 1782, 1796
[4]1686
[5]A.D. 150 (Ptolemy)

Above total		**178**
Albanian	1967	1
Mongolian	1966	1
Bibliographies	1955	1
	1957	1
	1967	1
	1973	1
	1974	1
	1988	1
Total "Others"		**186**

CONTENTS

TABLES

ABBREVIATIONS

Because of the great variety of journals and publishers listed, most are listed in full, except for obvious abbreviations, such as Amer. In some cases, particularly Russian, lengthy agency names are used several times and are abbreviated. The following are abbreviations used herein:

EVM: electronno-vychislitel’naya mashina [ЭВМ: электронно-вычислительная машина] (electronic computing machine; commonly used in Russian for “computer”)

GUGK: Glavnoye Upravleniye Geodezii i Kartografii [ГУГК: Главное Управление Геодезии и Картографии] (Chief Administration of Geodesy and Cartography)

MIIGAiK: Moskovskiy Institut Inzhenerov Geodezii, Aerofotos”yemki i Kartografii [МИИГАиК: Московский Институт Инженеров Геодезии, Аэрофотосъемки и Картографии] (Moscow Engineering Institute of Geodesy, Aerial Photo Survey and Cartography)

NIIGAiK: Novosibirskiy Institut Inzhenerov Geodezii, Aerofotos”yemki i Kartografii [НИИГАиК: Новосибирский Институт Инженеров Геодезии, Аэрофотосъемки и Картографии] (Novosibirsk Engineering Institute of Geodesy, Aerial Photo Survey and Cartography)

TsNIIGAiK: Tsentral’nyy Nauchno-issledovatel’skiy Institut Geodezii, Aeros”yemki i Kartografii [ЦНИИГАиК: Центральный Научно-исследовательский Институт Геодезии, Аэросъемки и Картографии] (Central Scientific Research Institute of Geodesy, Aerial Survey and Cartography)

UTM: Universal Transverse Mercator

SERIAL PUBLICATIONS AND ORGANIZATIONS SERVING AS MAJOR SOURCES OF PAPERS ON MAP PROJECTIONS

Over 400 periodicals are referenced in this bibliography. Relatively few journals have contained more than a half dozen papers each on the subject of map projections. This listing contains publications, agencies, and sponsors of conferences for which this bibliography contains 8 or more references of any type. In parentheses are the numbers of references, including the journal under its other names. In brackets are the current names of societies publishing the journal, if this is the case and the name is not included in the title. In some cases, a geographic journal contained papers on map projections only until a new cartographic journal began publication.

Australia
Australian Surveyor (12)
Cartography (11) [The Australian Institute of Cartographers]

Austria
Österreichische Zeitschrift für Vermessungswesen und Photogrammetrie (preceded by *Österreichische Zeitschrift für Vermessungswesen*) (10) [Österreichischer Verein für Vermessungswesen und Photogrammetrie]

Canada
The Canadian Surveyor (10) [The Canadian Institute of Surveying and Mapping]
Cartographica (27) (preceded by *The Canadian Cartographer*, preceded by *The Cartographer*)

China
Acta Geodetica et Cartographica Sinica (44)
Bulletin of Surveying and Mapping (14)

Czechoslovakia
Geodetický a Kartografický Obzor (19) [Česky Urad pro Geodesii a Kartografii]

France
Annales Hydrographiques (11) [no longer issued]
Société de Géographie [Paris], Bulletin (19) [no longer issued]

Germany
Allgemeine Vermessungs-Nachrichten (15)
Annalen der Hydrographie und Maritimen Meteorologie (42) [no longer issued]
Geographische Zeitschrift (10) [no longer issued]
Geographisches Jahrbuch (16) [no longer issued]
Gesellschaft für Erdkunde zu Berlin, *Zeitschrift* (19) [no longer issued]
Kartographische Nachrichten (46) [Deutsche Gesellschaft für Kartographie e.V.; Schweizerische Gesellschaft für Kartographie; Österreichische Kartographische Kommission in der Österreichischen Geographischen Gesellschaft]

Nachrichten aus dem Karten- und Vermessungswesen (13) [Institut für Angewandte Geodäsie, Frankfurt-am-Main]
Petermanns Geographische Mitteilungen (preceded by *Petermanns Mitteilungen*, preceded by *Mittheilungen aus Justus Perthes' Geographischer Anstalt...von Dr. A. Petermann*) (66)
Zach's Monatliche Correspondenz zur Beförderung der Erd- und Himmels-Kunde (9) [no longer issued]
Zeitschrift für Vermessungswesen (64) [Deutscher Verein für Vermessungswesen]

Hungary
Acta Technica Academiae Scientiarum Hungaricae (10) [Magyar Tudományos Akadémia]
Geodézia és Kartográfia (35) [Geodéziai és Kartográfiai Egyesulet]

International
Bulletin Géodésique (11) [The International Association of Geodesy]
International Hydrographic Review (preceded by *Hydrographic Review*) (16) [International Hydrographic Organization]
International Yearbook of Cartography (10)

Italy
Bollettino di Geodesia e Scienze Affini (13) [Istituto Geografico Militare, Firenze]
Rivista Geografica Italiana (9) [Società di Studi Geografici e Coloniali]

Japan
Chizu (Map) (13) [Japan Cartographers Association]

Poland
Geodezja i Kartografia (33) [Polska Academia Nauk, Komitet Geodezji]
Polski Przegląd Kartograficzny (9) [Polskie Towarzystwo Geograficzne, Komisja Kartograficzna]

Russia (and former U.S.S.R.)
Akademiya Nauk (Академия Наук) (Imperial or Soviet) (9)
Geodezist (Геодезист) (9)
Geodeziya i Kartografiya (Геодезия и Картография) (42) [Glavnoye Upravleniye Geodezii i Kartografii pri Sovete Ministrov SSSR [Главное Управление Геодезии и Картографии при Совете Министров СССР]]
Izvestiya Vysshikh Uchebnykh Zavedeniy [Известия Высших Учебных Заведений]. *Geodeziya i Aerofotos"yemka (Геодезия и Аэрофотосъемка)* (93)
(English translations in *Geodesy and Cartography*, then *Geodesy, Mapping and Photogrammetry*, and finally *Geodesy and Aerophotography*, no longer published (51 of the above))
Khar'kovskiy Sel'skokhozyaystvenniy Institut [Харьковский Сельскохозяыственний Институт], *Trudy (Труды)* and *Zapiski (Записки)* (11)
MIIGAiK [МИИГАиК], *Trudy (Труды)* (13)
NIIGAiK [НИИГАиК], *Trudy (Труды)* (17)
TsNIIGAiK [ЦНИИГАиК], *Trudy (Труды)* (21)

Spain
Servicio Geográfico del Ejército, *Boletín de Información* (8)

Switzerland
Schweizerische Zeitschrift für Vermessung, Kulturtechnik und Photogrammetrie (preceded by *Schweizerische Zeitschrift für Vermessung, Photogrammetrie und Kulturtechnik*, preceded by *Schweizerische Zeitschrift für Vermessungswesen und Kulturtechnik*) (25) [Schweizerischer Verein für Vermessungswesen und Kulturtechnik; Schweizerischer Gesellschaft für Photogrammetrie]

United Kingdom
The Cartographic Journal (28) [The British Cartographic Society]
The Geographical Journal (60) [The Royal Geographical Society]
Geography (11) [The Geographical Association]
Scottish Geographical Magazine (9) [The Royal Scottish Geographical Society]
Survey Review (preceded by *Empire Survey Review*) (79) [The Commonwealth Association of Surveying and Land Economy]

United States
American Geophysical Union, [*EOS*] *Transactions* (9)
Association of American Geographers, *Annals* (26)
Cartography and Geographic Information Systems (preceded by *The American Cartographer*) (56) [American Congress on Surveying and Mapping]
The Geographical Review (29) [American Geographical Society]
Journal of Geography (23) [The National Council for Geographic Education]
Photogrammetric Engineering and Remote Sensing (preceded by *Photogrammetric Engineering*) (12) [American Society of Photogrammetry and Remote Sensing]
The Professional Geographer (13) [Association of American Geographers]
Surveying and Land Information Systems (preceded by *Surveying and Mapping*) (19) [American Congress on Surveying and Mapping]
U.S. National Oceanic and Atmospheric Administration (preceded generally by U.S. Coast and Geodetic Survey) (33)
U.S. Geological Survey (26)

Other major sources of papers have been proceedings of conferences:

American Congress on Surveying and Mapping (33)
International Cartographic Congress (24) [International Cartographic Association]
International Geographical Congress (15)

BIBLIOGRAPHY OF MAP PROJECTIONS

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Second and third on-line editions 1994 and 1996, respectively, and second printed edition edited by John P. Snyder, U.S. Geological Survey (retired), Sandy Spring, MD 20860.

* An asterisk following a Cyrillic rendering of the Russian title indicates that the Cyrillic is a transliteration of the latinized version and has not been finally checked with the title in Russian Cyrillic letters.

1. Abate-Daga, G., 1928, Sulla applicazione del sistema proiezione Soldner alla formazione delle mappe catastalie italiane: International Congress of Mathematics, Bologna, Sept. 3-10, 1928, *Atti*, v. 6, no. 6, p. 317-325.

2. Abbatt, Richard, 1857, *Orthographic projection of the globe on the plane of a given horizon; or, perspective view of the Earth*: London, Day & Son, 15 p.

3. Abbe, Cleveland, 1906, A modified polar projection adapted to studies in dynamic meteorology: Amer. Geographical Society, *Bulletin*, v. 38, no. 2, p. 126-128. [Polar Azimuthal Equidistant projections, but reversed for south polar map.]

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