Bibliography of Map Projections

U. S. GEOLOGICAL SURVEY BULLETIN 1856

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Bibliography of Map Projections

Edited by JOHN P. SNYDER and
HARRY STEWARD

U.S. GEOLOGICAL SURVEY BULLETIN 1856

DEPARTMENT OF THE INTERIOR
DONALD PAUL HODEL, Secretary

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PREFACE

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been the *Bibliography of Cartography* published by the Library of Congress in 1973 with a supplement in 1980 and an unpublished second supplement still in the process of assembly.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*. Also of assistance have been the current-literature sections of a number of journals such as *The American Cartographer*, *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 over 2,500 entries they have done so (some 900 entries through the second supplement of the *Bibliography of Cartography* 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 2,551 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, 2,120 (some 83 percent) come from an initial group of 4: English, German, Russian, and French (table 1). Within these, English citations dominate, having over half the entries (1,094). German is a solid second with 591 (28 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. It is believed that the effect is minor, however, and does not alter the qualitative aspect of the conclusions reached.

The 431 remaining citations fall into some smaller groupings. Italian, Polish, Hungarian, and Spanish amount to 210 or some 8.2 percent of the overall total; a slightly smaller number, 184, results from a larger group of 9 languages, ranging from Chinese with 30 entries to Serbo-Croatian at 11. Lastly, there is a minor category of 11 languages totaling only 33 entries among them, while 4 bibliographies, not assigned to a particular language, complete the picture.

English, however, has been broken down a little further into 596 of United States origin, 309 emanating from Great Britain, and 189 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 1700's. 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

Table 1.--Language totals of references cited

Group I	1a	English (U.S.)	596
(over 100 each)	1b	English (British)	309
	1c	English (other)	189
		Total English	**1,094**
	2	German	591
	3	Russian	255
	4	French	180
		Total	**2,120**
Group II	5	Italian	72
(30 to 100 each)	6	Polish	56
	7	Hungarian	46
	8	Spanish	36
		Total	**210**
Group III	9	Chinese	30
(10 to 30 each)	10	Bulgarian	27
	11	Czech	26
	12	Dutch	22
	13	Japanese	21
	14	Latin	19
	15	Swedish	16
	16	Portugese	12
	17	Serbo-Croatian	11
		Total	**184**
Group IV	18	Danish	8
(1 to 10 each)	19	Norwegian	5
	20	Greek	4
	21	Romanian	4
	22	Turkish	3
	23	Afrikaans	2
	24	Finnish	2
	25	Latvian	2
	26	Albanian	1
	27	Mongolian	1
	28	Slovakian	1
		Total	**33**
	29	Bibliographies	4

Overall total 2,551 (6 articles dual-language, but listed under principal language of author)

Table 2.--Chronological summary of references cited

Language	English				German	Russian	French	Italian	Polish	Hungarian	Spanish	Others	Total
	U.S.A.	British	Other	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	-	-	-	-	2	-	5	-	-	-	-	-	7
1820-29	3	1	-	4	2	-	3	-	-	-	-	1	10
1830-39	-	1	-	1	2	-	3	-	-	-	-	-	6
1840-49	1	2	-	3	-	-	4	-	-	-	-	-	7
1850-59	3	4	-	7	3	-	7	-	-	-	-	-	17
1860-69	3	5	-	8	10	-	10	1	-	-	1	-	30
1870-79	8	6	-	14	14	-	11	-	-	-	-	1	40
1880-89	7	5	-	12	36	-	14	9	-	1	-	2	74
1890-99	3	5	2	10	44	2	11	15	-	-	1	2	85
1900-09	19	12	-	31	62	3	9	5	1	3	1	4	119
1910-19	20	20	2	42	67	3	10	4	-	-	-	6	132
1920-29	23	28	8	59	38	2	9	4	3	-	1	3	119
1930-39	32	34	8	74	81	10	22	4	3	-	5	9	208
1940-49	100	56	14	170	24	12	9	7	2	-	6	15	245
1950-59	60	33	21	114	44	62	21	11	7	15	9	38	321
1960-69	102	27	37	166	41	95	12	5	9	13	5	41	387
1970-79	104	28	57	189	60	43	5	5	26	7	4	30	369
1980-88	108	31	40	179	42	23	4	-	5	7	3	45	308
	596	309	189	1,094	591	255	180	72	56	46	36	221*	2,551

*See breakdown in table 3.

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

Language	Chinese	Bulgarian	Czech	Dutch	Japanese	Swedish	Latin	Portugese	Serbo-Croatian	Danish	Norwegian	Greek	Romanian	Turkish	Afrikaans	Finnish	Latvian	Totals
pre 1870	-	-	-	1[1]	-	3[2]	19[3]	1[4]	-	-	-	1[5]	-	-	-	-	-	25
1870-79	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
1880-89	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	2
1890-99	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	2
1900-09	-	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	-	4
1910-19	-	-	-	2	-	-	-	-	-	2	1	-	-	-	-	1	-	6
1920-29	-	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	3
1930-39	1	-	-	2	-	5	-	-	-	-	-	-	-	-	-	-	1	9
1940-49	1	2	1	1	1	1	-	5	-	-	2	-	-	-	-	1	-	15
1950-59	5	1	11	5	4	1	-	3	3	-	-	-	1	2	-	-	-	36
1960-69	5	10	2	-	8	1	-	2	2	-	1	1	3	1	2	-	-	38
1970-79	2	4	3	5	6	-	-	-	4	4	-	-	-	-	-	-	-	28
1980-88	16	10	9	2	2	-	-	1	2	1	-	2	-	-	-	-	-	45
	30	27	26	22	21	16	19	12	11	8	5	4	4	3	2	2	2	214

[1]1826

[2]1758, 1782, 1796

[3]1265:1; 1500-99:6; 1600-99:2; 1750-74:2; 1775-99:8

[4]1686

[5]A.D. 150 (Ptolemy)

Above total		214
Albanian	1967	1
Mongolian	1966	1
Slovakian	1958	1
Bibliographies	1957	1
	1967	1
	1973	1
	1974	1
Total "Others"		221

first decade of the 19th century. It retained this dominance throughout the 1800's, providing 125 out of 292 recorded entries; French at 71 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 1,000 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 supplement to the *Bibliography of Cartography*. John D. Hill, Arthur H. Robinson, and Waldo R. Tobler have taken time to study the manuscript, 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, 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.

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; the editors accept all responsibility for such 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.

John P. Snyder
Reston, Va.

Harry Steward
Worcester, Mass.

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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

Cartography (10) [The Australian Institute of Cartographers]

Austria

Österreichische Zeitschrift für Vermessungswesen und Photogrammetrie (preceded by *Österreichische Zeitschrift für Vermessungswesen*) (8) [Österreichischer Verein für Vermessungswesen und Photogrammetrie]

Canada

The Canadian Surveyor (10) [The Canadian Institute of Surveying and Mapping]

Cartographica (17) (preceded by *The Canadian Cartographer*, preceded by *The Cartographer*)

China

Acta Geodetica et Cartographica Sinica (23)

Czechoslovakia

Geodetický a Kartografický Obzor (15) [Cesky Urad pro Geodesii a Kartografii]

France

Annales Hydrographiques (11) [no longer issued]

Société de Géographie [Paris], *Bulletin* (16) [no longer issued]

Germany

Allgemeine Vermessungs-Nachrichten (14)

Annalen der Hydrographie und Maritimen Meteorologie (39) [no longer issued]

Geographische Zeitschrift (10) [no longer issued]

Geographisches Jahrbuch (15) [no longer issued]

Gesellschaft für Erdkunde zu Berlin, *Zeitschrift* (17) [no longer issued]

Kartographische Nachrichten (34) [Deutsche Gesellschaft für Kartographie e.V.; Schweizerische Gesellschaft für Kartographie; Österreichische Kartographische Kommission in der Österreichischen Geographischen Gesellschaft]

Nachrichten aus dem Karten- und Vermessungswesen (12) [Institut für Angewandte Geodäsie, Frankfort-am-Main]

Petermanns Geographische Mitteilungen (preceded by *Petermanns Mitteilungen*, preceded by *Mittheilungen aus Justus Perthes' Geographischer Anstalt...von Dr. A. Petermann*) (64)

Zach's Monatliche Correspondenz zur Beförderung der Erd- und Himmels-Kunde (9) [no longer issued]
Zeitschrift für Vermessungswesen (61) [Deutscher Verein für Vermessungswesen]

Hungary
Acta Technica Academiae Scientiarum Hungaricae (10) [Magyar Tudományos Akadémia]
Geodézia és Kartográfia (30) [Geodéziai és Kartográfiai Egyesulet]

International
Bulletin Géodésique (9) [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 (12) [Istituto Geografico Militare, Firenze]
Rivista Geografica Italiana (9) [Società di Studi Geografici e Coloniali]

Japan
Chizu (Map) (14) [Japan Cartographers Association]

Poland
Geodezja i Kartografia (29) [Polska Academia Nauk, Komitet Geodezji]
Polski Przegląd Kartograficzny (8) [Polskie Towarzystwo Geograficzne, Komisja Kartograficzna]

Russia (U.S.S.R.)
Akademiya Nauk (Imperial or Soviet) (8)
Geodeziya i Kartografiya (35) [Glavnoye Upravlenye Geodezii i Kartografii pri Sovete Ministrov SSSR]
Izvestiya Vysshikh Uchebnykh Zavedeniy. *Geodeziya i Aerofotos'emka* (70)
(English translations in *Geodesy and Cartography*, then *Geodesy, Mapping and Photogrammetry*, and finally *Geodesy and Aerophotography*, no longer published (53 of the above))
Khar'kovskiy Sel'skokhozyaystvenniy Institut, *Trudy* and *Zapiski* (11)
MIIGAiK, *Trudy* (8)
NIIGAiK, *Trudy* (12)
TsNIIGAiK, *Trudy* (16)

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*) (27) [Schweizerischer Verein für Vermessungswesen und Kulturtechnik; Schweizerischer Gesellschaft für Photogrammetrie]

United Kingdom
The Cartographic Journal (21) [The British Cartographic Society]
The Geographical Journal (56) [The Royal Geographical Society]
Geography (9) [The Geographical Association]

Scottish Geographical Magazine (8) [The Royal Scottish Geographical Society]
Survey Review (preceded by *Empire Survey Review*) (70) [The Commonwealth Association of Surveying and Land Economy]

United States

The American Cartographer (28) [American Congress on Surveying and Mapping]
American Geophysical Union, *Transactions* (9)
Association of American Geographers, *Annals* (25)
Geographical Review (24) [American Geographical Society]
Journal of Geography (18) [The National Council for Geographic Education]
Photogrammetric Engineering and Remote Sensing (preceded by *Photogrammetric Engineering*) (9) [American Society of Photogrammetry and Remote Sensing]
The Professional Geographer (12) [Association of American Geographers]
Surveying and Mapping (17) [American Congress on Surveying and Mapping]
U.S. National Oceanic and Atmospheric Administration (preceded generally by U.S. Coast and Geodetic Survey) (36)
U.S. Geological Survey (24)

Other major sources of papers have been proceedings of conferences:

American Congress on Surveying and Mapping (22)
International Cartographic Congress (10) [International Cartographic Association]
International Geographical Congress (19)

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:

GUGK: Glavnoye Upravleniye Geodezii i Kartografii (Chief Administration of Geodesy and Cartography)

MIIGAiK: Moskovskiy Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii (Moscow Engineering Institute of Geodesy, Aerial Photo Survey and Cartography)

NIIGAiK: Novosibirskiy Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii (Novosibirsk Engineering Institute of Geodesy, Aerial Photo Survey and Cartography)

TsNIIGAiK: Tsentral'nyy Nauchno-issledovatel'skiy Institut Geodezii, Aerofotos'emki i Kartografii (Central Scientific Research Institute of Geodesy, Aerial Photo Survey and Cartography)

UTM: Universal Transverse Mercator

BIBLIOGRAPHY OF MAP PROJECTIONS

By John P. Snyder[1] and Harry Steward,[2] Editors

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