

ISSUES IN DIGITAL CARTOGRAPHIC DATA STANDARDS

Report #5

A Working Bibliography for Digital
Cartographic Data Standards

Harold Moellering, Editor

87-305

January, 1984

National Committee for Digital Cartographic Data Standards
Numerical Cartography Laboratory
158 Derby Hall
Ohio State University
Columbus, Ohio
U.S.A. 43210

The Committee operates under the auspices of the American Congress on Surveying and Mapping. This work of the Committee is being funded in part by U.S. Geological Survey Grant #14-08-0001-G-807. Production assistance has been provided by the Ohio State University Research Foundation (RF Project #715367).

PREFACE

During the past two years, the work of the National Committee for Digital Cartographic Data Standards has been involved in defining the issues and examining the alternatives for such standards. During this period of assessing the issues and alternatives, an extensive list of references to the literature has been built up for use by the Committee. This resulting printed bibliography contains more than 600 entries and represents an effort by the Committee to share the results of this effort with the cartographic profession. The bibliography is divided into five major sections: a general section with references of broader interest, and four additional sections, each of which is related to one of the Committee's four Working Groups. Other potential topics for standard efforts not directly related to one of these five areas are not included in this work. It should be noted that the inclusion of a particular reference in this bibliography does not necessarily mean that the Committee endorses the ideas or concepts set forth in that reference.

Many individuals have participated in the process of compiling this work, the foremost of whom is Mr. Charley Hickman, the project assistant for the DCDS Committee headquarters in Columbus, who carried out a large part of the leg work involved. Many members of the Committee and Working Groups contributed material for the effort while the separate Working Group sections were checked by the respective chairmen, Dr. Tim Nyerges, Data Organization; Prof. Nick Chrisman, Data Set Quality; Mr. Warren Schmidt, Cartographic Features; Mr. Dean Edson and Prof. Hal Moellering, Terms and Definitions. A draft version of this work was circulated to the Steering Committee for evaluation and comment. The ultimate responsibility for the accuracy, integrity and completeness of this work, however, rests with the editor.

Although the publication of this bibliography represents a milestone in this effort, the Committee intends to continue its efforts to stay abreast of developments in the literature as they occur by continuing to gather materials, to distribute them to the WG concerned, and to subsequently update the bibliography. There is also an awareness that there probably are items such as research reports and other items in the fugitive literature which will be helpful to the work of the Committee which have not yet been identified or located. Such works are generally rather difficult to unearth with normal bibliographic retrieval methods. Therefore the editor would like to issue a standing request that if any reader of this bibliography is aware of reports or other literature which may be germane to the Committee, but are not listed herein, to please send two copies of the report, article, paper, etc. to the Committee for distribution to the proper WG and possible inclusion in the bibliography. Please send such items to the address listed on the preceding title page.

Harold Moellering
Series Editor

TABLE OF CONTENTS

	<u>Page</u>
General References	1
Working Group I - Data Organization	9
Working Group II - Data Set Quality	33
Working Group III - Cartographic Features	47
Working Group IV - Terms and Definitions	
A) Glossaries and Reports	53
B) Cartographic Objects	54

GENERAL REFERENCES

- Aalders, H., 1980, "Data Base Elements for Geographic Information Systems", ITC Journal, 1980(1), pp. 76-85.
- American National Standards Institute, 1982, Procedures for the Development and Coordination of American National Standards, New York: American National Standards Institute.
- Baines, J., 1982, "A New Kind of Map", Geos, 11(3), pp. 9-11.
- Barr, M., 1982, "Standards for Digital Cartographic Data that Support the Development of Multipurpose Cadastres", in H. Moellering, ed., Papers from the Joint ACSM/ASP Session on Digital Cartographic Data Standards at the 1982 Meeting of the ACSM, Denver, Issues in Digital Cartographic Data Standards, Report No. 1, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 17-25.
- _____, and J. McLaughlin, 1983, "The Development of Standards for Multipurpose Cadastral Systems: The Second N.R.C. Report", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, p. 656.
- Bass, G., 1981, "A Geographic Coordinate Data Base Approach to Nautical Chart Compilation", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 296-305.
- Beck, F. and J. Plasker, 1979, "USGS Digital Cartographic Pilot Projects", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 300-305.
- Blanning, R., and J. Palacios, 1975, "The Management of Intergovernmental Data Sharing", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 88-102.
- Boyle, A., 1982, "The Status of Graphic Data Input to Spatial Data Handling Systems", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 13-20.
- Calkins, H., 1976, "Information System Developments in North America", Proc. Commission on Geographical Data Sensing and Processing, Moscow 1976, Ottawa: IGU, Commission on Geographical Data Sensing and Processing, pp. 93-113.

- Calkins, H., coordinator, and D. Marble, ed., 1980, Computer Software for Spatial Data Handling, Ottawa: International Geographical Union, Commission on Geographical Data Sensing and Processing.
- Caron, L., 1983, "An Inventory of State Natural Resources Data Bases", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 72-80.
- Chrisman, N., 1978, "Concepts of Space as a Guide to Cartographic Data Structures", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Chrisman, N., and H. Moellering, 1983, "Issues Involved in the Development of National Digital Cartographic Data Standards", paper presented at Harvard Computer Graphics Conference, July-August 1983, Cambridge, MA.
- Cooke, D., 1981, "Prospects for a Digitized National Map", URISA, Issue 58, pp. 6-7.
- Dangermond, J., L. Hardison, and L. Smith, 1981, "Some Trends in the Evolution of Geographic Information System Technology", Cartographic Mapping of Natural Resources and the Environment, Harvard Library of Computer Graphics, 1981 Mapping Collection, Vol. 15, pp. 27-34.
- Davies, J., 1982, "Copyright and the Electronic Map", The Cartographic Journal, 19(2), pp. 135-136.
- Defense Mapping School, 1982, Digital Topographic Data, Student Handout, Fort Belvoir, Va: Defense Mapping School.
- Douglas, D., and A. Boyle, eds., 1982, Computer Assisted Cartography and Geographic Information Processing: Hope and Realism, Ottawa: Canadian Cartographic Association.
- Doyle, F., 1978, "Digital Terrain Models: An Overview", Photogrammetric Engineering and Remote Sensing, 44(12), pp. 1481-1485.
- Elassal, A., 1980, "Status of Software in Digital Mapping", International Archives of Photogrammetry, XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 225-237.
- Emery, H., 1982, "Community Geographic Data Base", Journal of the Surveying and Mapping Division, ASCE, 108(SU2), pp. 69-79.
- Feldscher, C., 1980, "A New Manual on Map Uses, Scales, and Accuracies", Journal of the Surveying and Mapping Division, 106(SU1), pp. 143-148.

- Franklin, D., and G. Holmes, 1983, "Overview of Automated Cartography Efforts at DMAAC", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 647-656.
- Gates, W., and R. Hell, 1980, "Geographic Information Systems", Journal of the Surveying and Mapping Division, Proc. ASCE, 106(SU1), pp. 105-117.
- Gordon, K., 1979, "Computer-Assisted Environmental Data Handling: Issues and Implications", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 259-266.
- Green, F., 1983, "Status of Auto Carto at the Defense Mapping Agency", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 85-89.
- Greulich, G., 1982, "Metric Standards in Subdivision and Zoning", Surveying and Mapping, 42(3), pp. 257-264.
- Hwang, K., and K. Fu, 1983, "Integrated Computer Architectures for Image Processing and Database Management", Computer, January 1983, pp. 51-60.
- Johnson, T., 1981, "A Design Model for Large Digital Cartographic Systems", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, p. 283.
- Matthias, H., 1979, "Strukturen und Organization bei der Einfuhrung von Interaktiven Numerisch-Graphischen Systemen", Mensuration Photogrammetrie Genie Rual: Bulletin, vol. 4, pp. 76-79.
- McEwen, R., 1980, "USGS Digital Cartographic Applications Program", Journal of the Surveying and Mapping Division, Proc. ASCE, 106(SU1), pp. 13-22.
- _____, 1983, "Digital Cartography in The U.S. Federal Government, 1983", paper presented at Harvard Computer Graphics Conference, July-August 1983, Cambridge, MA.
- _____, and H. Calkins, 1981, "Digital Cartography in the UGSG National Mapping Division", paper presented at EURO-CARTO I, at New College, Oxford, 1981.
- _____, R. Witmer, and B. Ramey, 1983, "USGS Digital Cartographic Data Standards", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 127-137.
- McKay, E., 1983, "Statistical Considerations Underlying the Design and Use of Standards and Specifications", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, p. 653.

Mikhail, E., moderator, 1978, "Panel Discussion: The Future of DTM", Photogrammetric Engineering and Remote Sensing, 44(12), pp. 1487-1497.

Moellering, H., 1980, "Strategies of Real-Time Cartography", Cartographic Journal, 17(1), pp. 12-15.

_____, 1981, A Proposed Approach to Establish a Set of National Digital Cartographic Data Standards, Report to the National Mapping Division, U.S. Geological Survey.

_____, ed., 1982a, Papers from the Joint ACSM/ASP Session on Digital Cartographic Data Standards at the 1982 Meetings of the ACSM, Denver, Issues in Digital Cartographic Data Standards, Report No. 1, Columbus, Ohio: National Committee for Digital Cartographic Data Standards.

_____, 1982b, "The Challenge of Developing a Set of National Digital Cartographic Data Standards for the United States", in H. Moellering, ed., Papers from the Joint ACSM/ASP Session on Digital Cartographic Data Standards at the 1982 Meeting of the ACSM, Denver, Issues in Digital Cartographic Data Standards, Report No. 1, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 1-15.

_____, ed., 1982c, Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia, August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards.

_____, 1982d, "The Goals of the National Committee for Digital Cartographic Data Standards", in H. Moellering, ed., Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia, August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 1-8.

_____, 1982e, "The Organization and Scope of the National Committee for Digital Cartographic Data Standards", Harvard Computer Graphics Week, Cambridge, MA: Graduate School of Design, Harvard University.

_____, ed., 1983a, Digital Cartographic Data Standards: Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards.

_____, 1983b, "Issues Facing the Development of Digital Cartographic Data Standards: Background and Introduction", in H. Moellering, ed., Digital Cartographic Data Standards; Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic

Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 1-10.

_____, 1983c, "Designing Interactive Cartographic Systems Using The Concepts of Real and Virtual Maps", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 53-64.

_____, 1984, "Real Maps, Virtual Maps and Interactive Cartography", in G. Gaile and C. Willmott, eds., Spatial Statistics and Models, Dordrecht, Holland: D. Reidel Publishing Co., in press.

Moffitt, F., 1979, "Photogrammetric Mapping Standards", Photogrammetric Engineering and Remote Sensing, 45(12), pp. 1637-1640.

Monmonier, M., 1983, "Cartography, Mapping and Geographic Information", Progress in Human Geography, 7(3), pp. 420-428.

Moore, H., 1983, "The Impact of Computer Technology in the Mapping Environment", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 60-68.

Moyer, D., J. Portner, and D. Mezera, 1981, "Overview of a Survey-Based System for Improving Data Compatibility in Land Record Systems", URISA 1981, Urban, Regional, and Environmental Information: Needs, Sources, Systems, and Uses, Washington: URISA, pp. 264-279.

National Research Council, 1980, Need for a Multipurpose Cadastre, Washington: National Academy Press.

_____, 1981, Federal Surveying and Mapping: An Organizational Review, Washington: National Academy Press.

_____, 1983, Procedures and Standards for a Multipurpose Cadastre, Washington: National Academy Press.

Niemann, B., 1976, "Integrated Land Information Systems: Some Perceptions and Suggestions", Proc. Land Records Symposium, Orono, Maine: University of Maine, pp. 179-193.

North American Institute for Modernization of Land Data Systems, 1979, Land Data Systems Now, Proc. Second MOLDS Conference, Washington: ACSM.

Penney, R., 1979, "The Ascendancy of Digital Cartography in DMA's Future", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Falls Church: ASP & ACSM, pp. 236-243.

- Portner, J., 1982, "Beliefs Regarding Issues Relating to Land Information", URISA 1982, Practical Applications of Computers in Government, Washington: URISA, pp. 325-331.
- Reneman, F., 1975, "A System for Digital Mapping", Commission III, Automation in Cartography, Enschede, The Netherlands: International Cartographic Association, pp. 254-269.
- Riordan, W., 1979, "Lessons Learned in Establishing Automated Cartographic Digital Data Bases", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 5-12.
- Roberts, R., 1980, "Cartographic Data: The First Item in a Resource Information System", Cartography, 11(4), pp. 227-233.
- Rodrigue, M., and L. Thompson, 1983, "The Availability and Use of Digital Topographic Data", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 580-587.
- Sharp, J., 1979, "Demonstrating the Value of Landsat Data: A Case for Lowered Expectations", Photogrammetric Engineering and Remote Sensing, 45(11), pp. 1487-1493.
- SIGGRAPH, 1977, "Status Report of the Graphics Standards Planning Committee of SIGGRAPH", Computer Graphics, 11(3).
- Southard, R., 1980, "The Changing Scene in Surveying and Mapping", Surveying and Mapping, XL(4), pp. 397-403.
- Southard, R., and K. Anderson, 1982, "A National Program for Digital Cartography", International Symposium on Computer Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 41-49.
- Starr, L., and K. Anderson, 1982, "Some Thoughts on Cartographic and Geographic Information Systems for the 1980's", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 41-55.
- Starr, L., and R. McEwen, 1983, "The National Digital Cartographic Program of the U.S. Geological Survey", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for the 6th International Symposium on Automated Cartography, pp. 89-99.
- Tomlinson, R., ed., 1972, Geographical Data Handling, Ottawa: International Geographical Union Commission on Geographical Data Sensing and Processing.
- _____, H. Calkins, and D. Marble, 1976, Computer Handling of Geographical Data, Paris: Unesco Press.

U.S. Department of Commerce, National Bureau of Standards, 1968, General Description of the Federal Information Processing Standards Register, Federal Information Processing Standards Publication No. 0, Washington: Government Printing Office.

, 1973a, Objectives and Requirements of the Federal Information Processing Standards Program, Federal Information Processing Standards Publication No. 23, Washington: Government Printing Office.

, 1973b, Standardization of Data Elements and Representations, Federal Information Processing Standards Publication No. 28, Washington: Government Printing Office.

U.S. Department of the Interior, Geological Survey, 1983a, Overview and USGS Activities, by R. McEwen, H. Calkins, and B. Ramey, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-A, Reston, VA: USGS.

, 1983b, Land Use and Land Cover Digital Data, by R. Fegeas, R. Claire, S. Guptill, K. Anderson, and C. Hallam, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-E, Reston, VA: USGS.

U.S. Executive Office of the President, Office of Management and Budget, 1973, Report of the Federal Mapping Task Force on Mapping, Charting, Geodesy and Surveying, July 1973, Washington: Government Printing Office.

1983, Coordination of Federal Digital Cartographic Data Programs, Memorandum for the Heads of Executive Departments, Establishments, and Independent Agencies, M-83-12, April 4, 1983.

U.S. General Accounting Office, Comptroller General, 1982, Duplicative Federal Computer-Mapping Programs: A Growing Problem, Report GAO/RCED-83-19, November 22, 1983, Gaithersburg, Md: General Accounting Office.

Weber, W., 1979, "Geographic Information Systems (GIS) - A Review and Reflections on the Future Development", International Yearbook of Cartography, XIX, pp. 119-138.

Wellar, B., and T. Graff, 1971, Geographic Aspects of Information Systems, Introduction and Selected Bibliography, Monticello, IL: Council of Planning Librarians.

Wellar, B., and T. Parker, 1971, "Standardization: Issues and...?", presented at the Annual Conference, Urban and Regional Information Systems Association - Information Systems and Political Systems, New Orleans.

Williams, O., 1980, "Outlook on Future Mapping, Charting, and Geodesy Systems", Photogrammetric Engineering and Remote Sensing, 46(4), pp. 487-490.

WORKING GROUP I - DATA ORGANIZATION

- Aangeenbrug, R., 1975, "Computer Graphic Editing Urban Maps: A Topologic Classification of Urban Polygon Files", Commission III, Automation in Cartography, Enschede, The Netherlands: International Cartographic Association, pp. 1-9.
- Adams, J., and J. Gary, 1974, "Compact Representation of Contour Plots for Phone Line Transmission", Communications of the ACM, 17(6), pp. 333-336.
- Allam, M., 1982, "Acquisition of Digital Topographic Data and the Need for a Standardized Digital Data Base", Proc. ISPRS Commission IV Symposium 1982, Vol. 24-IV, Falls Church: ASP & ACSM, pp. 1-11.
- American Public Works Association, 1979, "File Format for Data Exchange between Graphic Databases", Vol. 3 of Computer Assisted Mapping and Records Activity System, Chicago: Utility Location and Coordination Council of the American Public Works Association.
- American National Standards Institute, Inc., 1975, American National Standard for the Representation of Numeric Values in Character Strings for Information Interchange, ANSI S3.42-1975, August 4, 1975.
- , 1977, American National Standard Code for Information Interchange, ANSI X3.4-1977, June 9, 1977.
- , 1980, Draft Proposed American National Standard Specification for an Information Interchange Data Descriptive File, ANSI X3L5 Document X3L5/80-16F, March 24, 1980.
- , 1983a, Draft Proposed Relational Database Language, ANSI X3H2 Document X3H2-83-49, February, 1983.
- , 1983b, Draft Proposed Network Database Language with Proposed Introduction and Concepts Section, ANSI X3H2 Document X3H2-83-48, March, 1983.
- Amidon, E. and G. Akin, 1971, "Algorithmic Selection of the Best Method for Compressing Map Data Strings", Communications of the ACM, 14(12), pp. 769-774.
- Aronson, P., and S. Morehouse, 1983, "The ARC/INFO Map Library: A Design for a Digital Geographic Database", Proc. 6th International Sympo-

sium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 372-382.

- Babcock, H., 1978, "Automated Cartography Data Formats and Graphics: The ETL Experience", The American Cartographer, 5(1), pp. 21-29.
- Baker, J., 1979, "GeoModel - Integrated Data Structures for Representing Geographic Entities", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 275-282.
- Barber, D., 1982, "Microcomputer Based Geographic Analysis", URISA 1982, Practical Applications of Computers in Government, Chicago: URISA, pp. 118-125.
- Basoglu, U., and J. Morrison, 1977, "An Efficient Hierarchical Data Structure for the U.S. Historical County Boundary Data File", Proc. ACSM Fall Meetings, Little Rock, Falls Church: ACSM.
- Bathke, W., 1978, "Computer Assisted Mapping and Records Activities Systems - CAMRAS", Land Data Systems Now, Proc. of the Second MOLDS Conference, Falls Church: ACSM, pp. 121-141.
- Baum, R., D. Hsiao, and K. Kannan, 1976, The Architecture of a Database Computer, Part I. Concepts and Capabilities, AD-A034 154, Springfield, VA: National Technical Information Service.
- Baxter, R., 1976, "Some Methodological Issues in Computer Drawn Maps", The Cartographic Journal, 13(2), pp. 145-155.
- _____, 1978, "Data Structure Problems in Interactive Manipulation and Graphical Display of Nested Zone Thematic Maps", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- _____, 1980, "A Computer File and Data Structure for Manipulating Digital Outlines of Polygons", Geo-Processing, 1(1980), pp. 243-255.
- Bennettson, A., 1978, "Computer Aids Systems Map-Based Record Systems", No. 15 Design Automation Conference Proc., New York: IEEE, pp. 34-47.
- Berry, C., R. Holliday, and W. Tuel, 1979, "Data Definition and Management Techniques for Interactive Geo-Facility Applications", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 27-48.
- Berry, J., 1982, "Cartographic Modeling: Procedures for Extending the Utility of Remotely Sensed Data", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 414-424.

- Bie, S., 1982, "Introduction: Cartographic Databases and Raster/Vector Technology", Cartographica, 19(2), p. 110.
- Biggs, R., 1978, "Cartographic Data Structures for Thematic Applications of Automated Cartography", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Billingsley, F., 1980, "Data Base Systems for Remote Sensing", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 299-313.
- _____, and N. Bryant, 1975, "Design Criteria for a Multiple Input Land Use System", NASA Earth Resources Symposium, NASA TM X-58168, Vol. I-B, pp. 1389-1396.
- Blaser, A., ed., 1979, Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag.
- Boehm, B., 1967, Tabular Representations of Multivariate Functions with Applications to Topographic Modeling, Memorandum rm-4636-pr, Santa Monica: The Rand Corporation.
- _____, and J. Rieber, 1967, A Compact Statistical Method of Topographic Representation, Memorandum rm-5081-pr, Santa Monica: The Rand Corporation.
- Bohner, M., 1979, "A Tape Format for Transferral of Image Data and Source Programs", Computer Graphics and Image Processing, 11(2), pp. 185-191.
- Boisvenue, A., and R. Parenteau, 1982, "The Geocoding System in Canada and its Area Master File", URISA 1982, Practical Applications of Computers in Government, Chicago: URISA, pp. 226-232.
- Bossler, J., 1983, "Status of the National Geodetic Survey Data Base", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 738-744.
- Bouille, F., 1976, "Creation et Utilisation d'une Banque de Donnees de Cartes Geologiques", International Yearbook of Cartography, XVI, pp. 44-60.
- _____, 1978, "Structuring Cartographic Data and Spatial Processes with the Hypergraph-Based Data Structure", in G. Dutton, ed., Data Structures: Surficial and Multi-Dimensional, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 5, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.

- _____, 1980, "General Methodology of Maps Digitization and Some Improvements Based upon Pattern Recognition", paper presented at 10th International Conference of the International Cartographic Association, Tokyo, 1980.
- _____, 1981a, "Converting the HBDS Cartographic System to Microprocessors", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, p. 28.
- _____, 1981b, "The Impact of 'ADA' on Cartography and Topological Terrain Modeling", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 289-298.
- _____, 1981c, "A Multi-Layered HBDS with New Extensions", paper presented at the 2nd Annual International HBDS Symposium, March 1981, Richmond, Va.
- _____, 1981d, "General Methodology for Maps Digitization and Digital Images Restructuring", paper presented at the 2nd Annual International HBDS Symposium, March 1981, Richmond, Va.
- _____, 1982, "Actual Tools for Cartography Today", Cartographica, 19(2), pp. 27-32.
- _____, 1983, "A Structured Expert System for Cartography Based on the HBDS", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 202-210.
- _____, and R. Rugg, eds., 1983, Proc. Second International Seminar in Hypergraph-Based Data Structures (HBDS), Vol. 1, Richmond: Center for Public Affairs, Virginia Commonwealth University.
- Boyle, A., 1981, "Concerns About the Present Applications of Computer-Assisted Cartography", Cartographica, 18(1), pp. 31-33.
- Brassel, K., 1978, "A Topological Data Structure for Multi-Element Map Processing", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Breward, R., 1972, "A Mathematical Approach to the Storage of Digitised Contours", The Cartographic Journal, 9(2), pp. 82-86.
- Bright, C., and H. Pywell, 1978, "Data Base Development for the National Wetlands Inventory", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 329-334.

- Brooks, K., 1982, "GIS Database Design Considerations; A Determination of User Tradeoffs", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 147-157.
- Brooner, W., 1982, "An Overview of Remote Sensing Input to Geographic Information Systems", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 318-329.
- Bryant, N., and A. Zobrist, 1978, "An Image Based Information System: Architecture for Correlating Satellite and Topological Data Bases", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- _____, 1979, "An Image Based Information System: Architecture for Integrating Satellite Imagery and Cartographic Data Bases", Mapping Software and Cartographic Data Bases, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 2, pp. 43-48.
- _____, 1982, "Some Technical Considerations on the Evolution of the IBIS System", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 465-475.
- Burkard, R. 1980, "Data Storage Technology Assessment", Proc. ACSM Fall Meetings, Niagara Falls, Falls Church: ACSM, pp. CD-2-D-1 - CD-2-D-9.
- Burrough, P., 1980, "The Development of a Landscape Information System in the Netherlands, Based on a Turn-key Graphics System", Geo-Processing, 1(1980), pp. 257-274.
- Burton, W., 1977, "Representation of Many-Sided Polygons and Polygonal Lines for Rapid Processing", Communications of the ACM, 20(3), pp. 166-171.
- _____, 1979a, "Implementation of the Binary Searchable Grid Chain Representation for Curves and Regional Boundaries", Geo-Processing, 1(1979), pp. 37-52.
- _____, 1979b, "Logical and Physical Data Types in Geographical Information Systems", Geo-Processing, 1(1979), pp. 167-181.
- Canada, Energy, Mines and Resources, 1979, Standard Format for the Transfer of Geocoded Polygon Data, by the Spatial Data Transfer Committee, Ottawa: Canada Centre for Remote Sensing.
- _____, 1982, EDP Standards Applied to Digital Topographic Data, Canadian Council on Surveying and Mapping, National Standards for the Exchange of Digital Topographic Data, Technical Committee No. III, Draft, Ottawa: Topographical Survey Division, Surveys and Mapping Branch.

- Cardenas, A., 1973, "Evaluation and Selection of File Organization - A Model and System", Communications of the ACM, 16(9), pp. 540-548.
- _____, 1975, "Analysis and Performance of Inverted Data Base Structures", Communications of the ACM, 18(5), pp. 253-263.
- Carmichael, J., 1982a, "Content Addressing Technology and Cartographic Data", Cartographica, 19(2), pp. 119-121.
- _____, 1982b, "Further Developments in CAFS (to June 1982)", Cartographica, 19(2), p. 122.
- Cederberg, R., 1979a, "Chain-Link Coding and Segmentation for Raster Scan Devices", Computer Graphics and Image Processing, 10(3), pp. 224-234.
- _____, 1979b, "A Data Structure for a Raster Map Data Base", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 85-92.
- Chang, N., and K. Fu, 1981, "Picture Query Languages for Pictorial Data-Base Systems", Computer, 14(11), pp. 23-33.
- Chang, S., and T. Kunii, 1981, "Pictorial Data-Base Systems", Computer, 14(11), pp. 13-21.
- Chassery, J., 1979, "Connectivity and Consecutivity in Digital Pictures", Computer Graphics and Image Processing, 9(3), pp. 294-300.
- Chrisman, N., 1974, "The Impact of Data Structure on Geographic Information Processing", paper presented to the International Conference on Automation in Cartography, December 10, 1974, Reston, Va.
- _____, 1975, "Topological Information Systems for Geographic Representation", paper presented to the International Symposium on Computer Assisted Cartography (Auto-Carto II), September 22, 1975, Reston, Va.
- _____, 1978, "Concepts of Space as a Guide to Cartographic Data Structures", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Chung, R., 1981, "Forcing Functions and Geo-Referenced Information Systems", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 548-552.
- Claire, D., 1980, "Combining Cartographic Themes Using Data Structuring and Pattern Recognition", paper presented at 10th International Conference of the International Cartographic Association, Tokyo, 1980.

- Claire, R., and S. Guptill, 1982, "Spatial Operators for Selected Data Structures", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 189-200.
- Clark, R., 1980, Cartographic Raster Processing Programs at USAETL, Fort Belvoir, VA: Army Engineer Topographic Labs, AD-A082 236.
- Codd, E., 1972, "Relational Completeness of Data Base Sublanguages", Data Base Systems, Courant Computer Science Symposia Series, Vol. 6, Prentice-Hall.
- _____, 1979, "Extending the Database Relational Model to Capture More Meaning", ACM IODS, 4(4), pp. 397-434.
- _____, 1982, "Relational Database: A Practical Foundation for Productivity", Communications of the ACM, 25(2), pp. 109-117.
- Collins, S., G. Moon, and T. Lehan, 1983, "Advances in Geographic Information Systems", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 324-334.
- Colvocoresses, A., 1973, "Data Referencing by Map Grid Cell", Surveying and Mapping, 33(1), pp. 57-60.
- Comeau, M., 1983, "Compression and Compaction of Binary Raster Images", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 362-371.
- Computer Sciences Corporation, 1979, Spatial Data Integration, I: Concepts, Requirements, and Current Capabilities, CSC/TM-79/6241, by E. Knapp, et al., Computer Sciences Corporation.
- Computer Technology Associates, Inc., 1983, Space Data Systems Operations with Standard Format Data Units (SFDUs), report prepared for Euro-Space Agency, ESTEC/Contract No. 5271/82/NL/HP, October, 1983, McLean, VA: Computer Technology Associates, Inc.
- Cook, B., 1978, "The Structural and Algorithmic Basis of a Geographic Data Base", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Cooke, D., 1978, "Technical Problems in a Multipurpose Land Data System: The Digital Geographic Subsystem", Land Data Systems Now, Proc. of the Second MOLDS Conference, Falls Church: ACSM, pp. 93-95.
- Corbett, J., 1978, "Memoranda on the Subject of the Symposium on Topological Data Structures", in G. Dutton, ed., Summary of Proceedings, First International Advanced Study Symposium on Topological Data

Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.

_____, 1979a, "Topological Models for Architectural and Engineering Projects", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Falls Church: ASP & ACSM, pp. 223-235.

_____, 1979b, Topological Principles in Cartography, U.S. Department of Commerce, Bureau of the Census, Technical Paper No. 48, Washington: Government Printing Office.

_____, and G. Farnsworth, 1971, "Theoretical Basis of Dual Independent Map Encoding (DIME)", paper presented at the URISA Conference, September, 1971, New Orleans, La.

Costanzo, D., 1983, "Mapping Applications of Video Disc Technology", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 396-405.

Cowen, D., 1982, "Using Standard Output Formats for Distributed Geographical Data Handling", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 133-138.

Cowen, D., W. Shirley, and L. Smith, 1979, "Making DIME User Friendly", URISA 79, pp. 411-418.

Cox, N., B. Aldred, and D. Rhind, 1980, "A Relational Data Base System and a Proposal for a Geographical Data Type", Geo-Processing, 1(1980), pp. 217-229.

Dakan, A., 1982, "Microprocessor Based Cartography for Urban Information Systems", URISA 1982, Practical Applications of Computers in Government, Washington: URISA, pp. 147-158.

Dangermond, J., 1983, "ARC/INFO, A Modern GIS System for Large Spatial Data Bases", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 81-89.

Danielsson, P., and S. Levialdi, 1981, "Computer Architectures for Pictorial Information Systems", Computer, 14(11), pp. 53-67.

Date, C., 1982, "A Formal Definition of the Relational Model", ACM SIGMOD Record, 13(1), pp. 18-29.

Dougenik, J., 1979, "WHIRLPOOL: A Geometric Processor for Polygon Coverage Data", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 304-311.

Dueker, K., 1972, "A Framework for Encoding Spatial Data", Geographical Analysis, 4(1), pp. 98-105.

- Dutton, G., ed., 1978a, Summary of Proceedings, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- , ed., 1978b, Data Structures: Surficial and Multi-Dimensional, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 5, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- , 1983, "Geodesic Modelling of Planetary Relief", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six) Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 186-201.
- Edson, D., and G. Lee, 1978, "Structuring Cartographic Data Within a Digital Cartographic Data Base", Commission III Computer-Assisted Cartography, Enschede, The Netherlands: International Cartographic Association, pp. 137-150.
- Edwards, K., and R. Batson, 1980, "Preparation and Presentation of Digital Maps in Raster Format", The American Cartographer, 7(1), pp. 39-49.
- Edwards, R., R. Durfee, and P. Coleman, 1978, "Definition of a Hierarchical Polygonal Data Structure and the Associated Conversion of a Geographic Base File from Boundary Segment Format", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Environmental Systems Research Institute, 1978, Topological Entry of Data for Geographic Information Systems, ESRI Technical Report, January 1978, Redlands, CA: Environmental Systems Research Institute.
- Evatt, B., 1982, "Adapting the GBF/DIME System to a Microcomputer Environment", URISA 1982, Practical Applications of Computers in Government, Washington: URISA, pp. 126-146.
- Fegeas, R., 1978a, "Report on USGS Digitizing", International Symposium on Computer-Assisted Cartography (Auto-Carto III), Falls Church: ASP & ACSM, pp. 457-471.
- , 1978b, "The Graphic Input Procedure - An Operational Line Segment/Polygon Graphic to Digital Conversion", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Foster, H., and J. Bos, 1979, "Integrated Geographic Data Base Technology", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 406-412.

- Frank, T., 1981, "Comprehensive Geo-Data Base Control with an Electronic Coordinate Digitizer", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 497-504.
- Franklin, D., 1982, "Charting Utilization Requirements for a Digital Cartographic Data Base", Proc. ISPRS Commission IV Symposium 1982, Vol. 24-IV, Falls Church: ASP & ACSM, pp. 273-282.
- Frasson, C., 1978, "Generalized Translation in a Data Base System", No. 15 Design Automation Conference Proc., New York: IEEE, pp. 176-181.
- Freeman, H., 1961, "On the Encoding of Arbitrary Geometric Configurations", IRE Transactions on Electronic Computers, Vol. EC-10, pp. 260-268.
- _____, 1978a, "Some New Map Data Encoding Schemes", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 689-696.
- _____, 1978b, Application of the Generalized Chain Coding Scheme to Map Data, Troy, NY: Rensselaer Polytechnic Inst., AD-A054 314.
- _____, 1978c, The Generalized Chain Code for Map Data Encoding and Processing, Troy, NY: Rensselaer polytechnic Inst., AD-A060 690.
- _____, chairman, 1981, "Panel on Map Data Processing", Proc. Conference on Pattern Recognition and Image Processing, Dallas 1981, New York: IEEE, pp. 619-621.
- Fry, J., et al., 1981, Draft Specification for a Structured Data Interchange Form, rep. NBSIR 81-2315, National Bureau of Standards, July, 1981.
- Gligor, V., and G. Luckenbaugh, 1984, "Interconnecting Heterogeneous Database Management Systems", Computer, 17(1), pp. 33-43.
- Gobmann, H., and P. Haberacker, 1980, "Image Processing of HCMM-Satellite Imagery and Topographic and Thematic Maps", International Archives of Photogrammetry, XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 256-271.
- Godfrey, M., 1982, "Cartographic Computing Technology", Cartographica, 19(2), pp. 2-8.
- Goldberg, M., A. Schmidt, and N. Chrisman, 1979, "Integration and Analysis of Multiple Geographic Data Bases: An Application of ODYSSEY", Mapping Software and Cartographic Data Bases, Harvard Library of Computer Graphics, 1979 Collection, Vol. 2, pp. 81-97.
- Gomez, D., and A. Guzman, 1979, "Digital Model for Three-Dimensional Surface Representation", Geo-Processing, 1(1979), pp. 53-70.
- Goodchild, M., and A. Grandfield, 1983, "Optimizing Raster Storage: An Examination of Four Alternatives", Proc. 6th International Sympo-

- sium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 400-407.
- Goodenough, D., and G. Plunkett, 1983, "On the Transfer of Remote Sensing Classifications into Polygon Geocoded Data Bases in Canada", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 598-606.
- Gottschalk, H., 1980, "Standards for the Exchange of Digital Cartographic Data", Paper presented at 10th International Conference of the International Cartographic Association, Tokyo, 1980.
- Graphics Standard Planning Committee, 1979, "Graphics Metafile Description", Computer Graphics Quarterly, 1979.
- Gross, A., 1978, "File Format for Data Exchange Between Graphic Data Bases", No. 15 Design Automation Conference Proc., New York: IEEE, pp. 54-59.
- Guptill, S., 1979a, "The Development and Use of Digital Cartographic Data Bases", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 65-77.
- _____, 1979b, "A Digital Cartographic Data Base for Land Use and Land Cover and Associated Maps", Mapping Software and Cartographic Data Bases, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 2, pp. 99-106.
- _____, 1982, "A Systems Approach to Spatial Data Handling", Proc. ACSM-ASP Fall Meetings, Hollywood, Florida, Falls Church: ACSM & ASP, pp. 170-177.
- Hagan, P., 1980, A Network Data Model for Cartographic Data, D.Sc. Dissertation, Sever Institute of Technology, Washington University, St. Louis, MO.
- _____, 1981, "The Evaluation of a Network Data Structure for Cartographic Features", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 16-27.
- Hallam, C., 1979, "The USGS Geographic Information Retrieval and Analysis System: Overview", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 229-246.
- Hamm, J., 1983, "Engineering Standards and CAD-A Perfect Marriage", Design Graphics World, January 1983, pp. 16-19.
- Haralick, R., and L. Shapiro, 1979, "A Data Structure for a Spatial Information System", International Symposium on Computer-Assisted

Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 291-303.

- Harary, F., 1969, Graph Theory, Reading, MA: Addison-Wesley.
- Harris, J., J. Kittler, B. Llewellyn, and G. Preston, 1982, "A Modular System for Interpreting Binary Pixel Representations of Line-Structured Data on Maps", Cartographica, 19(2), pp. 145-175.
- Holecheck, B., 1983, "Interactive Stereo Display and Manipulation of Raster Contour Data", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 189-198.
- Holland, D., 1979, "Large System Mapping and Related Data Base Experience", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. II, Falls Church: ASP & ACSM, pp. 244-249.
- Hsiao, D., 1971, "A Generalized Record Organization", IEEE Transactions on Computers, C-20(12), pp. 1490-1495.
- _____, and F. Harary, 1970, "A Formal System for Information Retrieval from Files", Communication of the ACM, 13(2), pp. 67-73.
- Hsu, S., and X. Huang, 1982, "Construction of Polygon Maps with Raster-Vector Data Base Conversion Method", Proc. ACSM-ASP Fall Meetings, Hollywood, Florida, Falls Church: ACSM & ASP, pp. 212-215.
- Intergraph Corporation, 1980, Graphics Standard Interchange Format, November 1980.
- International Organization of Standards, 1983, Information Processing - Specification for a Data Descriptive File for Information Interchange, Draft Proposal ISO/DP8211.
- Jancaitis, J., and J. Junkins, 1973, "Modeling Irregular Surfaces", Photogrammetric Engineering, 39(4), pp. 413-420.
- John, R., 1982, "Data Structure Considerations in Topographic Mapping", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 21-29.
- Kansy, K., 1978, "Capture and Encoding of Area-Oriented Geographic Maps", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 705-709.
- Ke, L., L. Yue, and L. Qizhang, 1980, "Multi-Component Mapping in Environmental and its Auto-Analytical and Cartographic Systems", International Yearbook of Cartography, XX, pp. 118-128.
- Keil, C., and E. Holler, 1978, "Architectures for Heterogenous Distributed Database Systems", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 299-309.

- Kelley, J., R. Wolf, P. Kennicott, and R. Nagel, 1981, A Technical Briefing on the Initial Graphics Exchange Specification (IGES), Rep. NBSIR 81-2297, National Bureau of Standards, July 1981.
- Klaver, J., 1983, "The Data Collector and the Digital Data Base", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 501-510.
- Kloosterman, B., and S. Faulkner, 1977, "A Cartographic Data Structure for Efficient Computer Processing", URISA 77, pp. 269-277.
- Knapp, E., and D. Rider, 1979, "Automated Geographic Information Systems and Landsat Data: A Survey", Computer Mapping in Natural Resources and the Environment, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 4, pp. 57-68.
- Korporal, K., 1983, "A Demonstration Transfer of Remotely Sensed Data Utilizing the Standard Format for the Transfer of Geocoded Polygon Data", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 607-615.
- Kozik, E., 1975, "A Data Management Systems Model", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 14-34.
- Kurozumi, Y., and W. Davis, 1982, "Polygonal Approximation by the Minimax Method", Computer Graphics and Image Processing, 19(3), pp. 248-264.
- Landsat Technical Working Group, 1979, The Standard CCT Family of Tape Formats, Document CCB-CCT-0002, available through Ms Lynn Buhler, ORI, Inc., 1300 Spring Street, Silver Spring, MD., 20910.
- Lavallee, L., 1975, "Data Directories and Data Standardization", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 48-59.
- Lee, Y., 1983, "A Data Structure for Resource Mapping with CARIS", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 151-160.
- Lefebvre, D., 1981, "Analysis of Fracturation Field: Contribution of Data Structuring", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 223-233.
- Lefschetz, S., 1975, Applications of Algebraic Topology, New York: Springer-Verlag.
- Light, D., 1983, "Mass Storage Estimates for the Digital Mapping Era", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 152-164.

- Liles, W., and E. Nugent, 1981, "Data Management Considerations for Large Cartographic Information Systems", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 211-222.
- Linders, J., 1978, "Data Base Designs for Cartographic Applications", International Symposium Commission IV New Technology for Mapping, Ottawa: International Society of Photogrammetry, p. 303.
- Lowe, D., 1979, "Use of LANDSAT in Computer Data Bases", Computer Mapping in Natural Resources and the Environment, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 4, pp. 69-75.
- Lucas, D., and L. Gibson, 1982, "Generalized Balanced Ternary An Approach to Handling Spatial Data", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 543-552.
- Maier, R., D. Colville, and D. Rigby, 1983, "Two Way Data Transfer Between Aries Image Analysis System and ARC-INFO Geographic Information System", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 588-597.
- Mark, D., 1978, "Concepts of 'Data Structure' for Digital Terrain Models", Proc. Digital Terrain Models Symposium, Falls Church: ASP, pp. 24-31.
- _____, 1979, "Phenomenon-Based Data-Structuring and Digital Terrain Modelling", Geo-Processing, 1(1979), pp. 27-36.
- McEwen, R., 1979, "U.S. Geological Survey Digital Cartographic Data Acquisition", Mapping Software and Cartographic Data Bases, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 2, pp. 136-142.
- _____, 1980, "USGS Digital Cartographic Applications Program", Journal of the Surveying and Mapping Division, 106(sul), pp. 13-22.
- _____, 1981, "Information Potential of a Digital Cartographic Data Base", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 150-153.
- McEwen, R., and H. Jacknow, 1979, "USGS Digital Cartographic Data Base", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. II, Falls Church: ASP & ACSM, pp. 225-235.
- McEwen, R., and H. Calkins, 1982, "Digital Cartography in the USGS National Mapping Division: A Comparison of Current and Future Mapping Processes", Cartographica, 19(2), pp. 11-26.
- Meagher, D., 1982, "Geometric Modeling Using Octree Encoding", Computer Graphics and Image Processing, 19(2), pp. 129-147.

- Meier, A., 1982, "A Graph Grammar Approach to Geographic Data Bases", Eidgenossische Technische Hochschule, No. 49, Zurich: Institut fur Informatik, pp. 1-21.
- Merrill, R., 1973, "Representation of Contours and Regions for Efficient Computer Search", Communications of the ACM, 16(2), pp. 69-82.
- Miller, S., 1980, "A Compact Raster Format for Handling Spatial Data", Proc. ACSM Fall Meetings, Niagara Falls, Falls Church, ACSM, pp. CD-4-A-1 - CD-4-A-18.
- _____, 1982, "Compressing Interpreted Satellite Imagery for Geographic Information Systems Applications Over Extensive Regions", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 341-358.
- Mirkey, F., 1982, "Defense Mapping Agency Large Scale Data Base Integration", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 537-546.
- Modeleski, M., 1977, "A Fast Chain Gridder", paper submitted to the Special Interest Group on Geoprocessing, Geographic Data File Access and Structure, Urban and Regional Information Systems Association Annual Conference, August 1977, Kansas City, Mo.
- _____, 1978, "Mini Gridding a Large Region: Data Structures and Related Software for the Bay Area Spatial Information System", in G. Dutton, ed., Geographic Information Systems: Cartographic and Analytic Applications, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 3, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Moise, E., 1977, Geometric Topology in Dimension 2 and 3, New York: Springer-Verlag.
- Monmonier, M., 1975, "Internally-stored Scan-lines for Line-printer Mapping", The American Cartographer, 2(2), pp. 145-153.
- _____, 1981, "Trends in Atlas Development", Cartographica, 18(2), pp. 187-213.
- Morehouse, S., 1978, "The ODYSSEY File System", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Morehouse, S., and G. Dutton, 1979, "Extraction of Polygonal Information from Gridded Data", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 320-327.

- Morse, S., 1968, "Computer Storage of Contour-Map Data", Proc. 1968 ACM National Conference, pp. 45-51.
- Mruk, S., 1982, "Systems Analysis and Design of an Interactive Digital Terrain Modelling System", Proc. ACSM-ASP Fall Meetings, Hollywood, Florida, Falls Church: ACSM & ASP, pp. 303-314.
- Muller, J., and R. O'Connor, 1982, "Representing Topologic Properties in Raster Data Structures", Proc. ISPRS Commission IV Symposium 1982, Vol. 24-IV, Falls Church: ASP & ACSM, pp. 473-482.
- Murch, R., 1975, "Data Base Administration: An Outgrowth of Technology", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 1-13.
- Myers, W., 1982, "GIS Information Layers Derived from Landsat Classification", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 366-372.
- Nagata, M., 1981, "A Relational Image Data Base System for Remote Sensing (Land DBMS)", Proc. Conference on Pattern Recognition and Image Processing, Dallas 1981, New York: IEEE, pp. 491-495.
- Nagy, G., and S. Wagle, 1979a, "Geographic Data Processing", Computing Surveys, 11(2), pp. 139-181.
- _____, 1979b, "Approximation of Polygonal Maps by Cellular Maps", Communications of the ACM, 22(9), pp. 518-525.
- Neumann, D., 1983, "A Digital Cartographic Information Utility", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 161-167.
- Nichols, D., 1982, "Conversion of Raster Coded Images to Polygonal Data Structures", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 508-515.
- Noma, A., and N. Spencer, 1978, "Development of a DMATC Digital Terrain Data Base System", Proc. Digital Terrain Models Symposium, Falls Church: ASP, pp. 493-505.
- Nyerges, T., 1979, "A Formal Model of a Cartographic Information Base", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 312-319.
- _____, 1980a, Modeling the Structure of Cartographic Information for Query Processing, unpublished Ph. D. dissertation, Dept. of Geography, Ohio State University.
- _____, 1980b, "Representing Spatial Properties in Cartographic Data Bases", Proc. ACSM Spring Meetings, St. Louis, Falls Church: ACSM, pp. 29-41.

- _____, 1982, "Report on the Activities of Working Group I, Data Set Organization", in H. Moellering, ed., Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 9-10.
- Nyerges, T., and C. Smyth, 1983, "An Integrated Geographic Data Management System", paper presented at 6th International Symposium on Automated Cartography (Auto-Carto Six), Ottawa.
- Nyerges, T., and M. White, 1983, "Issues in Digital Cartographic Data Standards: A Progress Report, Working Group I", in H. Moellering, ed., Digital Cartographic Data Standards: Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 11-21.
- Opheim, H., 1982, "Fast Data Reduction of a Digitized Curve", Geo-Processing, 2(1982), pp. 33-40.
- Ore, O., 1963, Graphs and their Uses, New York: Random House.
- Pellerin, G., 1983, "Fabrication de Bases de Donnees a Reference Spatiale a Partir de Donnees Numeriques de la Carte de Base du Quebec a L'Echelle 1:1 000", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 99-107.
- Peucker, T., and N. Chrisman, 1975, "Cartographic Data Structures", The American Cartographer, 2(1), pp. 55-69.
- Peucker, T., and A. Clement, 1979, "Interactive Computer Mapping", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Falls Church: ASP & ACSM, pp. 165-171.
- Peuquet, D., 1978, "The Need for Raster Processing of Cartographic Data", International Symposium on Computer-Assisted Cartography (Auto-Carto III), Falls Church: ASP & ACSM, pp. 139-147.
- _____, 1979, "Raster Processing: An Alternative Approach to Automated Cartographic Data Handling", The American Cartographer, 6(2), pp. 129-139.
- _____, 1981a, "An Examination of Techniques for Reformatting Digital Cartographic Data/Part 1: The Raster-to-Vector Process", Cartographica, 18(1), pp. 34-48.
- _____, 1981b, "An Examination of Techniques for Reformatting Digital Cartographic Data/Part 2: The Vector-to-Raster Process", Cartographica, 18(3), pp. 21-33.

- _____, 1982, "Vector/Raster Options for Digital Cartographic Data", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 29-35.
- _____, 1983a, "The Application of Artificial Intelligence Techniques to Very Large Geographic Databases", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 419-420.
- _____, 1983b, "A Hybrid Structure for the Storage and Manipulation of Very Large Spatial Data Sets", Computer Vision, Graphics, and Image Processing, 24(1983), pp. 14-27.
- Pfaltz, J., 1976, "Surface Networks", Geographical Analysis, 8(1), pp. 77-93.
- _____, 1979, "Efficient Multi-Attribute Retrieval over Very Large Geographical Data Files", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. II, Falls Church: ASP & ACSM, pp. 54-62.
- _____, and A. Rosenfeld, 1967, "Computer Representation of Planar Regions by Their Skeletons", Communications of the ACM, 10(2), pp. 119-125.
- Pierce, R., 1982, "Evolution of the Defense Mapping Agency's Digital Data Specifications", Proc. ACSM-ASP Fall Meetings, Hollywood, Florida, Falls Church: ACSM & ASP, pp. 320-329.
- Reed, C., 1980, "A Minimum Set of Criteria for Selecting a Turn Key Geographic Information System", URISA 1980, Ends and Means of Urban and Regional Information Systems: Bridging the Gap in the 1980's, Washington: URISA, pp. 144-151.
- Rosenberg, A., 1981, "On Uniformly Inserting One Data Structure into Another", Communications of the ACM, 24(2), pp. 88-90.
- Rosenfeld, A., and H. Samet, 1979, "Tree Structures for Region Representation", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. II, Falls Church: ASP & ACSM, pp. 108-118.
- Rugg, R., 1980, "Pilot Application of HBDS Concepts to Regional Environmental Assessment", paper presented at 10th International Conference of the International Cartographic Association, Tokyo, 1980.
- _____, 1983, "Building a Hypergraph-Based Data Structure: The Examples of Census Geography and the Road System", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 211-220.

- Samet, H., 1982, "Hierarchical Data Structures for Representing Geographical Information", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 36-50.
- Satharanond, V., 1981, "An Application of the Hypergraph-Based Data Structure (HBDS) in an Agricultural Suitability Study", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church, ACSM, pp. 29-38.
- Saulnier, L., 1978, "The Design and Implementation of the Cartographic Data Base (CDB) for the Defense Mapping Agency", Commission III Computer-Assisted Cartography, Enschede, The Netherlands: International Cartographic Association, pp. 179-205.
- Southern California Computer Aided Mapping Association, 1983, General Overview of Common Land Base Requirements, Los Angeles: SCCAMA, Specifications Committee Technical Subgroup.
- Schiro, R., and G. Williams, 1983, "An Adaptive Method for Numerically Modeling Large Numbers of Irregularly Spaced Data", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 252-261.
- Schlichtmann, H., 1979, "Codes in Map Communication", The Canadian Cartographer, 16(1), pp. 81-97.
- Schumacher, H., 1980, "Eine Methode zur Einheitlichen Speicherung und Verarbeitung Geographischer Flachendaten fur die Regional Planung", International Archives of Photogrammetry, XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 623-628.
- Shapiro, L., 1979, "Data Structures for Picture Processing: A Survey", Computer Graphics and Image Processing, 11(2), pp. 162-184.
- _____, and R. Haralick, 1980, "A Spatial Data Structure", Geo-Processing, 1(1980), pp. 313-337.
- Sharman, G., 1979, "A Picture Drawing System Using a Binary Relational Database", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 495-507.
- Sharpley, W., J. Leiserson, and A. Schmidt, 1978, A Unified Approach to Mapping, Charting, and Geodesy (MC & G) Data Base Structure Design, Reading, MA: The Analytic Sciences Corp., AD-B028 228.
- Shiryayev, E., 1977, "Theory and Practice of Cartographic Representation and Analysis of Information in Normalized Form by Computers", International Yearbook of Cartography, XVII, pp. 155-165.

- Shneiderman, B., 1978, "A Framework for Automatic Conversion of Network Database Programs under Schema Transformations", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 279-288.
- Simonsson, G., E. Westermark, and B. Wiberg, 1980, "Digital Mapping", International Archives of Photogrammetry, XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 639-644.
- Sinton, D., 1978, "The Inherent Structure of Information as a Constraint to Analysis: Mapped Thematic Data as a Case Study", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Smedley, B., and B. Aldred, 1979, "Problems with Geo-Data", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 539-554.
- Smith, D., 1981, "Raster Data Development in the National Mapping Division, U.S. Geological Survey", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 284-288.
- Somers, R., 1980, "A Geographic Data Management System for GBF/Dime Related Data", URISA 1980, Ends and Means of Urban and Regional Information Systems: Bridging the Gap in the 1980's, Washington: URISA, pp. 210-220.
- Standards Association of Australia, 1981, Interchange of Feature Coded Digital Mapping Data, Australian Standard 2482-1981, North Sydney, N.S.W.: Standards Association of Australia.
- Stephens, M., 1980, "The USGS 1:2,000,000-Scale Digital Data Base", Proc. ACSM Spring Meetings, St. Louis, Falls Church: ACSM, pp. 436-443.
- _____, M. Domaratz, and W. Schmidt, 1979, "The Development of a National Small-Scale Digital Cartographic Data Base", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 345-352.
- Stockman, D., 1983, Memorandum M-83-12, on the Coordination of Federal Digital Cartographic Data Programs, OMB, April 4, 1983.
- Stoyan, D., H. Stoyan, and Freiberg, 1981, "Quantifizierung von Korrelationen zwischen Geometrischen Strukturen auf Geologischen Karten", Zeitschrift für Angewandte Geologie, 28(5), pp. 240-244.
- Synectics Corporation, 1981, Interactive Raster Data Structuring Techniques, Overview, W-81-A0-003, by J. Muller, Rome, NY: Synectics Corporation.

- Taketa, R., 1981, "Algorithmic Descriptions of Map Symbol, Form and Pattern", paper presented at the American Association of Geographers Meeting, April 1981, Los Angeles.
- Taylor, R., 1982, "Experience Using Generalized Data Translation Techniques for Database Interchange", Computers and Standards 1, pp. 111-118.
- Teng, A., 1983, "Cartographic and Attribute Data Base Creation for Planning Analysis Through GBF/DIME and Census Data Processing", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 348-354.
- Tomlin, C., 1983, "A Map Algebra", paper presented at Harvard Computer Graphics Conference 1983.
- Tomlin, C., and J. Berry, 1979, "A Mathematical Structure for Cartographic Modeling in Environmental Analysis", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 269-283.
- Tomlinson, R., 1978, "Difficulties Inherent in Organizing Earth Data in a Storage Form Suitable for Query", International Symposium on Computer-Assisted Cartography (Auto-Carto III), Falls Church: ASP & ACSM, pp. 181-201.
- Turner, S., 1981, "Polygon to Grid Conversion Using a Y-Coordinate Sorting Technique", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 528-536.
- U.K. Ordnance Survey, 1983, Beginners Guide to Plotting Ordnance Survey Digital Map Data, DO9-DMC, Southampton, U.K.: Ordnance Survey.
- U.S. Department of Commerce, National Bureau of Standards, 1980a, Computer Science & Technology: Data Base Directions-The Conversion Problem, J. Berg, ed., Nat. Bur. Stand. Spec. Publ 500-64, Washington: Government Printing Office.
- U.S. Department of Commerce, National Bureau of Standards, 1980b, Initial Graphics Exchange Specification, now published as ANSI Standard Y14.26M.
- U.S. Department of Defense, Defense Mapping Agency, 1981, DMA Standard Format for Linear Digital Data, St. Louis: Defense Mapping Agency Aerospace Center, Aerospace Cartography Department.
- U.S. Department of Energy, 1978, Geographic Exchange Standard and Primer, prepared by Battelle, Pacific Northwest Laboratory, Interlaboratory Working Group for Data Exchange, PNL-2748, UC-32, Springfield, VA: National Technical Information Service.
- U.S. Department of Housing and Urban Development, Federal Urban Information Systems Inter-Agency Committee, 1970, The Wichita Falls

Consortium Phase II Report, Volume XII - Conceptualization Themes: Transferability, Data Standardization, Confidentiality, and Geographic Information Systems, Springfield, VA: National Technical Information Service, PB-208 485-12.

U.S. Department of the Interior, Geological Survey, 1983a, Overview and USGS Activities, by R. McEwen, H. Calkins, and B. Ramey, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-A, Reston, VA: USGS.

....., 1983b, Digital Line Graphs from 1:2,000,000-Scale Maps, by M. Domaratz, C. Hallam, W. Schmidt, and H. Calkins, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-D, Reston, VA: USGS.

....., 1983c, Land Use and Land Cover Digital Data, by R. Fegeas, R. Claire, S. Guptill, K. Anderson, and C. Hallam, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-E, Reston, VA: USGS.

U.S. Government Accounting Office, 1982, Duplicative Federal Computer-Mapping Programs: A Growing Problem", Report GAO/RCED-83-19, November 22, 1983.

Vaidya, P., L. Shapiro, R. Haralick, and G. Minden, 1982, "An Experimental Relational Database System for Cartographic Applications", Proc. ASP Spring Meetings, Denver, Falls Church: ASP, pp. 133-142.

van Zuylen, L., 1980, "A Standard Format for the Exchange of Cartographic Data", ITC Journal, 1980(1), pp. 95-102.

Vitek, R., 1979, "Data Base Requirements for Geographical Mapping", in A. Blaser, ed., Data Base Techniques for Pictorial Applications, Lecture Notes in Computer Science, Berlin: Springer-Verlag, pp. 1-25.

Vuillemin, J., 1980, "A Unifying Look at Data Structures", Communications of the ACM, 23(4). pp. 229-239.

Weaver, F., 1973, "Virtual Mapping a SIG GBF Working Paper", URISA 1973, Perspectives on Information Systems, Claremont, CA: URISA, pp. 250-264.

Weber, W., 1978, "Three Types of Map Data Structures, Their ANDs and NOTs and a Possible OR", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.

- Wellar, B., 1971, "Paradigms for the Development of Standardized Data Bases", paper presented at the Annual Conference of the American Institute of Planners, October 24-28, 1971, San Francisco.
- _____, 1972, "Information Interchange: Focus on Standards and Compatibility", URISA 1972, Information Research for an Urban Society, Vol. I, Claremont, CA: URISA, pp. 234-238.
- Werner, P., and H. Bruck, 1975, "National Geocoding Systems: Design of a Converter", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 512-527.
- White, M., 1975, "Map Editing Using a Topological Access System", International Symposium on Computer-Assisted Cartography (Auto-Carto II), Falls Church: ASP & ACSM, pp. 422-429.
- _____, 1977, "The Performance of a Topological File Access System", URISA 77, pp. 249-257.
- _____, 1978a, "The Cost of Topological File Access", in G. Dutton, ed., Spatial Algorithms: Efficiency in Theory and Practice, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 6, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- _____, 1978b, "The State of Land Data Systems Technology", Land Data Systems Now, Proc. of the Second MOLDS Conference, Falls Church: ACSM, pp. 276-272.
- _____, 1979, "A Survey of the Mathematics of Maps", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Falls Church: ASP & ACSM, pp. 82-96.
- _____, 1982, "Technical Requirements and Standards for a Multi-purpose Geographic Data System", paper presented to the "M.O.L.D.S." Board, January 7, 1982.
- _____, 1983, "Tribulations of Automated Cartography and How Mathematics Helps", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 408-418.
- _____, and P. Griffin, 1979a, "Coordinate Free Cartography", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 236-245.
- _____, 1979b, "Mapping Without Coordinates", More for Less: Information Systems in an Era of Limits, URISA 79, Chicago: URISA, pp. 431-442.

- Wilson, P., and D. Olmstead, 1979, "The Data Structure of Basis", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 246-253.
- Wilson, P., 1981, "Integration of Local and Regional Data Bases", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 43-50.
- _____, 1983, "Multiple Data Structures in a Regional Data Base", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 221-229.
- Wiseman, N., 1982a, "Data Persistence and Programming Languages", Cartographica, 19(2), pp. 9-10.
- _____, 1982b, "Vectors, Rasters and Cartographic Databases", Cartographica, 19(2), pp. 111-118.
- Yan, J., S. Witiuk, and T. Fisher, 1977, "Exchange Spatial Systems Technology: Related Issues and a Case Study", in D. Douglas, ed., Applications of Geographic Information Processing, Ottawa: National Capital Geographic Information Processing Group, pp. 41-49.
- Youngmann, C., 1978a, "Standards", in G. Dutton, ed., Summary of Proceedings, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- _____, 1978b, "A Linguistic Approach to Map Description", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Ziemann, H., 1978, "The Geographical Referencing System", Land Data Systems Now, Proc. of the Second MOLDS Conference, Falls Church: ACSM, pp. 253-261.
- Zobrist, A., 1979, "Data Structures and Algorithms for Raster Data Processing", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. II, Falls Church: ASP & ACSM, pp. 127-137.
- _____, 1982, "Integration of Landsat Image Data with Geographic Data Bases", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 51-63.
- _____, and G. Nagy, 1981, "Pictorial Information Processing of Landsat Data for Geographic Analysis", Computer, 14(11), pp. 34-41.

WORKING GROUP II - DATA SET QUALITY

- Ackermann, F., 1978, "Experimental Investigation into the Accuracy of Contouring from DTM", Photogrammetric Engineering and Remote Sensing, 44(12), pp. 1537-1548.
- Aeronautical Chart and Information Center, 1962, Principles of Error Theory and Cartographic Applications, ACIC, Tech. Report No. 96, Feb., 1962.
- Allder, W., V. Caruso, R. Pearsall, and M. Troup, 1982, "An Overview of Digital Elevation Model Production at the United States Geological Survey", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 23-32.
- American National Standard Institute, 1974, Control Chart Method of Controlling Quality During Production, ANSI Z1.1-1958(r1974), New York: ANSI.
- _____, 1975, Guide for Quality Control and Control Chart Method of Analyzing Data, ANSI Z1.1-1958(r1975) and Z1.2-1958(r1975), New York: ANSI.
- _____, 1978, Definitions, Symbols, Formulas and Tables for Control Charts, ANSI A1-1978, New York: ANSI.
- Aronoff, S., 1981, "Classification Accuracy - A Review", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 125-136.
- _____, 1982a, "Classification Accuracy: A User Approach", Photogrammetric Engineering and Remote Sensing, 48(8), pp. 1299-1307.
- _____, 1982b "The Map Accuracy Report: A User's View", Photogrammetric Engineering and Remote Sensing, 48(8), pp. 1309-1312.
- Austin, B., 1978, Errors in Practical Measurement in Science, Engineering, and Technology, New York: Wiley & Sons.
- Ayeni, O., 1982, "Optimum Sampling for Digital Terrain Models: A Trend Towards Automation", Photogrammetric Engineering and Remote Sensing, 48(11), pp. 1687-1694.
- Baker, D., B. Gogineni, G. Shepphird, L. Williams, and J. Bethel, 1981, "Linetrac - A Hardware Processor for Scanning and Vectorizing Contours, and Associated Systems Software for Automatically Generating

- Digital Terrain Elevation Data", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 542-557.
- Barnes, J., 1978, "Control Areas and Control Points in Isopleth Mapping", The American Cartographer, 5(1), pp. 65-69.
- Beckett, P., P. Tomlinson, and S. Bie, 1972, "Map Quality: The Second St. Cross Seminar, Oxford, 1971", The Cartographic Journal, 9(2), pp. 80-81.
- Bennett, H., 1976, "Cartographic Veracity - A Variable that Should Be a Constant", Proc. Land Records Symposium, Orono, Maine: University of Maine, pp. 132-137.
- Bennettson, A., 1978, "Computer Aids Systems, Map-Based Record Systems", No. 15 Design Automation Conference Proc., New York: IEEE, pp. 34-47.
- Benson, A., K. Dummer, and J. Hardin, 1981, "Accuracy Assessment of Remote Sensing Derived Information in Wildland Environments", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 584-590.
- Berry, B., and A. Baker, 1968, "Geographic Sampling" in Berry and Marble, eds., Spatial Analysis, Englewood Cliffs, NJ: Prentice Hall, pp. 91-100.
- Bethel, J., and E. Mikhail, 1983, "On-Line Quality Assessment in DTM", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 576-584.
- Billingsley, F., 1982a, "Data vs. Information: A System Paradigm", section 8.3 in N. Bryant, ed., Proc. of the NASA Workshop on Registration and Rectification, JPL pub. no. 82-23, Pasadena: Jet Propulsion Laboratory, pp. 401-409.
- _____, 1982b, "Modeling Misregistration and Related Effects on Multispectral Classification", section 8.4 in N. Bryant, ed., Proc. of the NASA Workshop on Registration and Rectification, JPL pub. no. 82-23, Pasadena: Jet Propulsion Laboratory, pp. 410-427.
- Blakemore, M., 1983, "Generalisation and Error in Spatial Data Bases", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 313-322.
- Boyle, R., 1980, "Scan Digitizing and Drafting", Proc. ACSM Spring Meetings, St. Louis, Falls Church: ACSM, pp. 136-142.
- Bryant, N., ed., 1982, Proceedings of the NASA Workshop on Registration and Rectification, Pasadena: Jet Propulsion Laboratory.

- Bryant, N., and A. Zobrist, 1978, "An Image Based Information System: Architecture for Correlating Satellite and Topological Data Bases", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Burtch, R., 1982, "Photogrammetry - An Essential Element in a Multi-purpose Land Data System", Proc. ACSM Spring Meetings, Denver, pp. 311-318.
- _____, 1983, "Cadastral Accuracy Standards", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, p. 655.
- Campbell, J., 1981, "Spatial Correlation Effects upon Accuracy of Supervised Classification of Land Cover", Photogrammetric Engineering and Remote Sensing, 47(3), pp. 355-363.
- _____, 1983, Mapping the Land, Aerial Imagery for Land Use Information, Washington: Association of American Geographers.
- _____, and F. Henderson, 1981, "Comparisons of Land Cover Classifications from Selected Remote Sensing Systems", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 618-626.
- Canada, Energy, Mines and Resources, 1982, Standards for the Quality Evaluation of Digital Topographic Data, Canadian Council on Surveying and Mapping, National Standards for the Exchange of Digital Topographic Data, Technical Committee No. II, Draft, Ottawa: Topographical Survey Division, Surveys and Mapping Branch.
- Canfield, D., D. Leavitt, and E. Coleman, 1983, "Line Joining of Digitized Stereomodel Data", Proc. ACSM-ASP Fall Meetings, Salt Lake City, Falls Church: ACSM & ASP, pp. 138-146.
- Card, D., 1982, "Using Known Map Category Marginal Frequencies to Improve Estimates of Thematic Map Accuracy", Photogrammetric Engineering and Remote Sensing, 48(3), pp. 431-439.
- Chrisman, N., 1982a, "A Theory of Cartographic Error and its Measurement in Digital Data Bases", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 159-168.
- _____, 1982b, "Beyond Accuracy Assessment: Correction of Misclassification", Proc. ISPRS Commission IV Symposium 1982, Vol. 24-IV, Falls Church: ASP & ACSM, pp. 123-132.
- _____, 1982c, "Estimating the Error of Categorical Maps", Harvard Computer Graphics Week, Cambridge, MA: Graduate School of Design, Harvard University.

- _____, 1982d, Methods of Spatial Analysis Based on Error in Categorical Maps, Ph. D. Dissertation, University of Bristol.
- _____, 1983a, "Issues in Digital Cartographic Quality Standards: A Progress Report, Working Group II", in H. Moellering, ed., Digital Cartographic Data Standards: Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 23-31.
- _____, 1983b, "The Role of Quality Information in the Long-Term Functioning of a Geographic Information System", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 303-312.
- Clarke, A., A. Gruen, and J. Loon, 1982, "The Application of Contour Data for Generating High Fidelity Grid Digital Elevation Models", International Symposium on Computed-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 213-222.
- Clayton, C., and J. Estes, 1980, "Image Analysis as a Check on Census Enumeration Accuracy", Photogrammetric Engineering and Remote Sensing, 46(6), PP. 757-764.
- Congalton, R., and R. Mead, 1981, "A Quantitative Method to Test for Similarity between Photo Interpreters", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 263-266.
- Cook, B., 1982, "Geographic Overlay and Data Reliability", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 64-69.
- Corbett, J., 1979, Topological Principles in Cartography, U.S. Department of Commerce, Bureau of the Census, Technical Paper No. 48, Washington: Government Printing Office.
- Cristy, D., 1975, "Boundary and Annexation Survey and Map Acquisition Program", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 111-116.
- Crossfield, J., 1980, "Proposed Minimum Accuracy Standards for Land Surveying in Arkansas", Proc. ACSM Spring Meetings, St. Louis, Falls Church: ACSM, pp. 459-466.
- _____, and D. Mezera, 1981, "The Westport Section Line Accuracy Study", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 106-115.
- Dangermond, J., and H. Grinnell, 1979, "Development of an Updating System and Procedures for the Land Use Planning Information and Forecasting System at Southern California Edison Company", More

- for Less: Information Systems in an Era of Limits, URISA 79, Chicago: URISA, pp. 236-247.
- Derenyi, E., and J. Drummond, 1979, "Map Quality Control Using Extra Aerotriangulated Points", Proc. ASP Spring Meetings, Washington, Vol. 2, Falls Church: ASP, pp. 591-595.
- Dueker, K., 1975, Geographic Data Encoding Issues, Technical Report No. 43, Iowa City, IA: Institute of Urban and Regional Research.
- , 1979, "Land Resource Information Systems: Spatial and Attribute Resolution Issues", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 328-336.
- Dutton, G., 1983, "Geodesic Modeling of Planetary Relief", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 186-201.
- Eisenhart, C., 1962, "Realistic Evaluation of the Precision and Accuracy of Instrument Calibration Systems", Journal of Research of the National Bureau of Standards, C. Engineering and Instrumentation, 67c(2), pp. 161-187.
- Ellis, T., D. Proffitt, D. Rosen, and W. Rutkowski, 1979, "Measurement of the Lengths of Digitized Curved Lines", Computer Graphics and Image Processing, 10(4), pp. 333-347.
- Fairchild, D., 1981, "The Effect of Enumeration Unit Shape on Isopleth Map Accuracy", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 423-432.
- Fang, A., 1982, "Registration Accuracy and Attitude Accuracy", Proc. ISPRS Commission IV Symposium 1982, Vol. 24-IV, Falls Church: ASP & ACSM, pp. 241-249.
- Federal Geodetic Control Committee, 1977, Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys, Rockville, MD: National Oceanic and Atmospheric Administration.
- , 1978, Specifications to Support Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys, Rockville, MD: National Oceanic and Atmospheric Administration.
- Feldscher, C., 1980, "A New Manual on Map Uses, Scales, and Accuracies", Journal of the Surveying and Mapping Division, 160(SU1), pp. 143-148.
- Fellows, J., and J. Stewart, 1979, "Use of Geocoded Aerial Photography as a Regional Data Base for Water Resources and Environmental Planning Studies", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 1-5.

- Fischler, M., and R. Bolles, 1981, "Random Sample Consensus: A Paradigm for Model Fitting with Applications to Image Analysis and Automated Cartography", Communications of the ACM, 24(6), pp. 381-395.
- Fitzpatrick-Lins, K., 1978a, "Accuracy and Consistency Comparisons of Land Use and Land Cover Maps Made from High-Altitude Photographs and Landsat Multispectral Imagery", U.S. Geological Survey, Journal of Research, 6(1), pp. 23-40.
- _____, 1978b, "Accuracy of Selected Land Use and Land Cover Maps in the Greater Atlanta Region, Georgia", U.S. Geological Survey, Journal of Research, 6(2), pp. 169-174.
- _____, 1978c, "An Evaluation of Errors in Mapping Land Use Changes for the Central Atlantic Regional Ecological Test Site", U.S. Geological Survey, Journal of Research, 6(3), pp. 339-346.
- _____, 1980, "Accuracy of Selected Land Use and Land Cover maps at Scales of 1:250,000 and 1:100,000", U.S. Geological Survey Circular 829, 24 p.
- _____, 1982, "Comparison of Sampling Procedures and Data Analysis for a Land-Use and Land-Cover Map", Photogrammetric Engineering and Remote Sensing, 47(3), pp. 343-351.
- Forstner, W., 1979, "On Internal and External Reliability of Photogrammetric Coordinates", Proc. ASP Spring Meetings, Washington, Vol. 1, Falls Church: ASP, pp. 294-305.
- Gersmehl, P., and D. Napton, 1982, "Interpretation of Resource Data: Problems of Scale and Spatial Transferability", URISA 1982, Practical Applications of Computers in Government, Chicago: URISA, pp. 471-482.
- Gignilliat, R., 1975, "Cleaning Up, Matching and Rectifying Data Files or (Relief from Excedrin Headache No. 37)", URISA 1975, Computers, Local Government and Productivity, Vol. II, Chicago: URISA, pp. 60-73.
- Ginevan, M., 1979, "Testing Land-Use Map Accuracy: Another Look", Photogrammetric Engineering and Remote Sensing, 45(10), pp. 1371-1377.
- Gustafson, G., and J. Loon, 1981, "Updating the National Map Accuracy Standards", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 466-482.
- _____, 1982, "Contour Accuracy and the National Map Accuracy Standards", Surveying and Mapping, 42(4), pp. 385-402.
- Hanigan, F., 1983, "Houston's Metropolitan Common Data Base: Four Years Later", Surveying and Mapping, Vol. 43, pp. 141-151.

- Hannah, M., 1981, "Error Detection and Correction in Digital Terrain Models", Photogrammetric Engineering and Remote Sensing, 47(1), pp. 63-69.
- Hay, A., 1979, "Sampling Designs to Test Land-Use Map Accuracy", Photogrammetric Engineering and Remote Sensing, 45(4), pp. 529-533.
- Heinzen, M., 1979, "Hydrographic Surveys: Geodetic Error Propagation", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 170-179.
- Henderson, F., 1980, "Effects of Interpretation Techniques on Land-Use Mapping Accuracy", Photogrammetric Engineering and Remote Sensing, 46(3), pp. 359-367.
- Hintz, R., and A. Vonderche, 1983, "Closure Limit Determination in General Horizontal Networks using Error Propagation", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 38-46.
- Hixson, M., 1981, "Techniques for Evaluation of Area Estimates", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 84-90.
- Hojovec, V., and L. Jokl, 1981, "Relation Between the Extreme Angular and Areal Distortion in Cartographic Representation", Studia Geoph. et Geod., 25(1981), pp. 132-151.
- Holecheck, B., 1981, "Shaded Relief Validation of Digital Terrain Models", Proc. ASP Spring Meetings, Washington, Falls Church: ACSM, p. 544.
- Hunka, G., 1978, "Aided-Track Cursor for Improved Digitizing Accuracy", Photogrammetric Engineering and Remote Sensing, 44(8), pp. 1061-1066.
- _____, 1979, "Engineering Evaluation of an Aided-Track Digitizing Cursor System", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 522-546.
- Hutchinson, C., 1982, "Techniques for Combining Landsat and Ancillary Data for Digital Classification Improvement", Photogrammetric Engineering and Remote Sensing, 48(1), pp. 123-130.
- Jensen, J., 1978, "Digital Land Cover Mapping Using Layered Classification Logic and Physical Composition Attributes", The American Cartographer, 5(2), pp. 121-132.
- Johannsen, T., 1979, "Genauigkeitstest an Kartographischen Geraten - Erste Ergebnisse", International Yearbook of Cartography, XIX, pp. 65-76.
- Jones, O., 1982, "Building a Geographic Data Base Within a Budget", Harvard Computer Graphics Week, Cambridge, MA: Graduate School of Design, Harvard University.

- Juran, J., ed., 1962, Quality Control Handbook, 2nd edition, McGraw-Hill.
- _____, ed., 1974, Quality Control Handbook, 3rd edition, McGraw-Hill.
- Kalkani, E., 1977, "Evaluation Techniques to Determine Relative Accuracies of Contour Maps", Geophysics, 42(4), pp. 860-867.
- Kellie, A., and D. Bryan, 1981, "A Comparison of Field Methods for Testing the Vertical Accuracy of Topographic Maps", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 275-284.
- Kelmelis, J., 1981, "Statistical Process-Control Techniques, an Introduction", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 82-93.
- Kirby, M., 1979, "A Method to Correct Digitized UTM Map Control Points for Paper Distortions", Proc. ASP Spring Meetings, Washington, Vol. 2, Falls Church: ASP, pp. 339-405.
- Kulpa, Z., and M. Doros, 1981, "Freeman Digitization of Integer Circles Minimizes the Radial Error", Computer Graphics and Image Processing, 17(2), pp. 181-184.
- Leatherdale, J., 1980, "Specification for Mapping at Scales Between 1:1,000 and 1:10,000, First Edition", Royal Institution of Chartered Surveyors, International Archives of Photogrammetry, XXIII (B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 415-441.
- Leberl, F., and D. Olson, 1982, "Raster Scanning for Operational Digitizing of Graphical Data", Photogrammetric Engineering and Remote Sensing, 48(4), pp. 615-627.
- Ley, R., 1981, "An Examination of Various Cartometric Vertical Accuracy Tests", The Cartographic Journal, 18(1), pp. 25-31.
- Likens, W., and K. Maw, 1982, "Updating Landsat-Derived Land-Cover Maps Using Change Detection and Masking Techniques", Proc. ACSM-ASP Fall Meetings, Hollywood, Florida, Falls Church: ACSM & ASP, pp. 256-271.
- Lloyd, P., 1976, "Quantization Error in Area Measurement", The Cartographic Journal, 13(1), pp. 22-25.
- Loelkes, G., 1977, Specifications for Land Use and Land Cover and Associated Maps, Open File 77-555, Reston, VA: USGS.
- MacEachren, A., 1982a, "Thematic Map Accuracy: The Influence of Enumeration Unit Size and Compactness", Proc. ACSM Spring Meetings, Denver, Falls Church: ACSM, pp. 512-521.

- _____, 1982b, "Choropleth Map Accuracy: Characteristics of the Data", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 499-507.
- Maeda, K., and D. Goodenough, 1981, "Data Compression of SAR/MSS Data Sets", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, p. 188.
- Masry, S., J. Gauthier, and Y. Lee, 1980, "Accuracy and Time Comparisons of Digital Maps - An International Test", International Archives of Photogrammetry, XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 493-539.
- Masry, S., and R. McLaren, 1979, "Digital Map Revision", Photogrammetric Engineering and Remote Sensing, 45(2), pp. 193-200.
- Mastin, C., 1982, "Error Induced by Coordinate Systems", Applied Mathematics and Computation, Vol. 10, pp. 31-40.
- Mead, R., and J. Szajgin, 1982, "Landsat Classification Accuracy Assessment Procedures": An Account of a National Working Conference", Photogrammetric Engineering and Remote Sensing, 48(1), pp. 139-141.
- Meiszer, N., 1978, "Technical Problems in the Implementation of a Multipurpose Land Data System/The Fiscal Data System", Land Data Systems Now, Proc. of the Second MOLDS Conference, Falls Church: ACSM, pp. 43-51.
- Merchant, D., 1982a, "Spatial Accuracy Standards for Large-Scale Line Maps", in H. Moellering, ed., Papers from the Joint ACSM/ASP Session on Digital Cartographic Data Standards at the 1982 Meetings of the ACSM, Denver, Issues in Digital Cartographic Data Standards, Report No. 1, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 27-36.
- _____, 1982b, "Report on the Activities of Working Group II, Data Set Quality", in H. Moellering, ed., Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia, August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 11-12.
- Merchant, J., 1982, "Employing Landsat MSS Data in Land Use Mapping: Observations and Considerations", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 71-91.
- Milazzo, V., 1982, "The Role of Change Data in a Land Use and Land Cover Map Updating Program", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 189-200.

- Milbert, D., 1983, "A Specification is Not a Classification Standard", Proc. ACSM Spring meetings, Washington, Falls Church: ACSM, pp. 121-127.
- Moses, R., and J. Passauer, 1979, "National Ocean Survey - Automated Information System", International Symposium on Computer-Assisted Cartography (Auto-Carto IV), Vol. 2, Falls Church: ASP & ACSM, pp. 267-274.
- Muller, J., 1977, "Map Gridding and Cartographic Errors/A Recurrent Argument", The Canadian Cartographer, 14(2), pp. 152-167.
- Napton, D., and J. Luther, 1982, "Transferring Resource Interpretations: Limitations and Safeguards", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 175-186.
- Neumyvakin, Y., and A. Panfilovich, 1982, "Specific Features of Using Large-Scale Mapping Data in Planning Construction and Land Farming", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 733-738.
- Olson, C., 1981, "A Case for Standardized Test Sites", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 20-23.
- Parsons, T., and R. Schultz, 1979, "Land Data Systems and County Survey Programs", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 433-448.
- Petersohn, C., and A. Vonderohe, 1982, "Site-Specific Accuracy of Digitized Property Maps", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 607-619.
- Pope, A., 1983, "Statistical Considerations Underlying the Design and Use of Standards and Specifications", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, p. 652.
- Proffitt, D., and D. Rosen, 1979, "Metrication Errors and Coding Efficiency of Chain-Encoding Schemes for the Representation of Lines and Edges", Computer Graphics and Image Processing, 10(4), pp. 318-332.
- Quirk, B., and F. Scarpace, 1980, "A Method of Assessing Accuracy of a Digital Classification", Photogrammetric Engineering and Remote Sensing, 46(11), pp. 1427-1431.
- Ramapriyan, H., R. Boyd, F. Gunther, and Y. Lu, 1981, "Sensitivity of Geographic Information System Outputs to Errors in Remotely Sensed Data", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 555-566.

- Richards, J., D. Landgrebe, and P. Swain, 1982, "A Means for Utilizing Ancillary Information in Multispectral Classification", Remote Sensing of Environment, 12(6), pp. 463-477.
- Rosenfield, G., 1980, "Comment on Landsat Wildland Mapping Accuracy, by W. J. Todd, D. G. Gehring, and J. F. Haman", Photogrammetric Engineering and Remote Sensing, 46(12), p. 1543.
- _____, 1981a, "Comment on Effects of Interpretation Techniques on Land Use Mapping Accuracy, by F. M. Henderson", Photogrammetric Engineering and Remote Sensing, 47(6), pp. 798-800.
- _____, 1981b, "Analysis of Variance of Thematic Mapping Experiment Data", Photogrammetric Engineering and Remote Sensing, 47(12), pp. 1685-1692.
- _____, 1981c, "Comment on Imaging Radar Applications to Mapping and Charting, by F. Leberl", Photogrammetria, vol. 36, pp. 31-33.
- _____, 1982a, "Sample Design for Estimating Change in Land Use and Land Cover", Photogrammetric Engineering and Remote Sensing, 48(5), pp. 793-801.
- _____, 1982b, "The Analysis of Areal Data in Thematic Mapping Experiments", Photogrammetric Engineering and Remote Sensing, 48(9), pp. 1455-1462.
- _____, 1982c, "Analyzing Thematic Maps and Mapping for Accuracy", URISA 1982, Practical Applications of Computers in Government, Washington: URISA, pp. 483-487.
- Rosenfield, G., K. Fitzpatrick-Lins, and H. Ling, 1982, "Sampling for Thematic Map Accuracy Testing", Photogrammetric Engineering and Remote Sensing, 48(1), pp. 131-137.
- Rosenfield, G., and M. Melley, 1980, "Applications of Statistics to Thematic Mapping", Photogrammetric Engineering and Remote Sensing, 46(10), pp. 1287-1294.
- Scarano, F., and G. Brumm, 1976, "A Digital Elevation Data Collection System", Photogrammetric Engineering and Remote Sensing, 42(4), pp. 489-496.
- Schechter, B., 1978, "Data Preparation and Entry for Computer-Aided Mapping", No. 15 Design Automation Conference Proc., New York: IEEE, pp. 48-52.
- Sinton, D., 1978, "The Inherent Structure of Information as a Constraint to Analysis: Mapped Thematic Data as a Case Study", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.

- Slama, C., 1983, "Specifications and Standards for Photogrammetrically Derived Control", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, p. 654.
- Southard, R., and K. Anderson, 1982, "A National Program for Digital Cartography", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 41-49.
- Sturdevant, J., 1981, "Assessing Accuracy of Digital Land Use and Terrain Data", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 101-112.
- Tempfli, K., 1980, "Spectral Analysis of Terrain Relief for the Accuracy Estimation of Digital Terrain Models", ITC Journal, 1980(1), pp. 478-510.
- Thompson, L., 1981, "Digitizing and Automated Output Mapping Errors", Photogrammetric Engineering and Remote Sensing, 47(10), pp. 1455-1457.
- Todd, W., D. Gehring, and J. Haman, 1980, "Landsat Wildland Mapping Accuracy", Photogrammetric Engineering and Remote Sensing, 46(4), pp. 509-520.
- Troup, M., 1982, "Interactive Correction of Digital Elevation Models", Proc. ASP Spring Meetings, Denver, Falls Church: ASP, pp. 305-316.
- U.S. Bureau of the Budget, 1947, National Map Accuracy Standards, Washington: Government Printing Office.
- U.S. Department of Housing and Urban Development, Federal Urban Information Systems Inter-Agency Committee, 1970, The Wichita Falls Consortium Phase II Report, Volume XII - Conceptualization Themes: Transferability, Data Standardization, Confidentiality, and Geographic Information Systems, Springfield, VA: National Technical Information Service, PB-208 485-12.
- U.S. Department of the Interior, Geological Survey, 1983, Land Use and Land Cover Digital Data, by R. Fegeas, R. Claire, S. Guptill, K. Anderson, and C. Hallam, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-E, Reston, VA: USGS.
- Van Rensburg, P., 1980, "The Accuracy of Thematic Maps Generated from Landsat MSS Data using Computer-Aided Analysis Techniques: A Case Study", South African Geographical Journal, 62(1), pp. 44-61.
- Vossepoel, A., and A. Smeulders, 1982, "Vector Code Probability and Metrication Error in the Representation of Straight Lines of Finite Length", Computer Graphics and Image Processing, 20(1982), pp. 347-364.

- Wehde, M., 1979, "Spatial Quantification of Maps or Images Cell Size or Pixel Size Implications", Proc. ASP-ACSM Fall Meetings, Sioux Falls, Falls Church: ASP & ACSM, pp. 45-64.
- _____, 1982, "Grid Cell Size in Relation to Errors in Maps and Inventories Produced by Computerized Map Processing", Photogrammetric Engineering and Remote Sensing, 48(8), pp. 1289-1298.
- Welch, R., 1982, "Map Accuracy Requirements: The Cartographic Potential of Satellite Image Data", section 6.3 in N. Bryant, ed., Proc. of the NASA Workshop on Registration and Rectification, JPL pub. no. 82-23, Pasadena: Jet Propulsion Laboratory, pp. 215-223.
- Welch, R., and Y. Hsu, 1981a, "Interactive-Statistical Tests and Displays of Landsat Computer Classification Accuracies", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, p. 652.
- _____, 1981b, "Statistical Tests and Interactive Displays of Landsat Classification Accuracies", Seventh International Symposium - Machine Processing of Remotely Sensed Data, West Lafayette: Laboratory for Applications of Remote Sensing, pp. 91-92.
- _____, 1983, "Computer Graphic Representation of Land Use/Cover Classification Accuracy", Professional Geographer, 35(2), pp. 202-206.
- White, M., 1978, "A Geometrical Model for Error Detection and Correction", International Symposium on Computer-Assisted Cartography (Auto-Carto III), Falls Church: ASP & ACSM, pp. 439-456.
- Wilcox, D., 1983, "Classification, Standards of Accuracy, and Specifications for Cadastral Surveying", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 277-286.
- Wilson, P., 1981, "Comparing Sources of Terrain Data for a Geographical Information System", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 201-210.
- Wong, C., 1982, "Refinement of Dense Digital Elevation Models", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 703-714.
- Wong, K., and Y. Siyam, 1981, "Accuracy of Earthwork Calculations from Digital Elevation Data", Proc. ASP Fall Meetings, San Francisco & Honolulu, Falls Church: ASP, pp. 399-408.
- Zilkoski, D., 1983, "Justification of FGCC Vertical Control Specifications and Procedures", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 128-143.
- Zobrist, A., and N. Bryant, 1979, "Map Characteristics of Landsat Mosaics", Proc. ASP Spring Meetings, Washington, Vol. 1, Falls Church: ASP, pp. 261-273.

WORKING GROUP III - CARTOGRAPHIC FEATURES

- Adams, T., and D. Rhind, 1981, "The Projected Characteristics of a National Topographic Digital Databank", The Geographical Journal, 147(1), pp. 38-53.
- Boekee, D., and J. Van der Lubbe, 1979, "Some Aspects of Error Bounds in Feature Selection", Pattern Recognition, 11(5/6), pp. 353-360.
- Bryant, J., and L. Guseman, 1979, "Distance Preserving Linear Feature Selection", Pattern Recognition, 11(5/6), pp. 347-352.
- Canada, Energy, Mines and Resources, 1982, Standards for the Classification of Topographic Features, Canadian Council on Surveying and Mapping, National Standards for the Exchange of Digital Topographic Data, Technical Committee No. 1, Draft, Ottawa: Topographical Survey Division, Surveys and Mapping Branch.
- Canada, Statistics, 1981, Standard Geographical Classification, Vol. 1, Ottawa: Statistics Canada, Standards Division.
- Chang, K., 1976, "Data Differentiation and Cartographic Symbolization", The Canadian Cartographer, 13(1), pp. 60-68.
- Eichelberger, P., 1982, "Land Use and Space Use - Data Standardization Issues in Data Base Management", URISA 1982, Practical Applications of Computers in Government, Chicago: URISA, pp. 434-443.
- Fegeas, R., 1982, "Modularization of Digital Cartographic Data Capture", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 297-306.
- Feldman, A., 1981, "The National Ocean Survey's Aeronautical Radar Video Map: A Unique Cartographic Product", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 443-454.
- Granlof, E., 1980, "Generation of Symbols in Computer-Aided Map Production", International Archives of Photogrammetry, XIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 294-302.
- Grzeda, S., and A. Feldman, 1982, "A Cinematographic Histo-Cartographic Approach on the National Ocean Survey Low Altitude Chart Series", Proc. ACSM Spring Meetings, Denver, Falls Church: ACSM, pp. 92-99.

- Guptill, S., 1983, "An Intermediate-Scale Digital Cartographic Data Base for National Needs", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 563-569.
- Hagan, P., 1980, A Network Data Model for Cartographic Data, D.Sc. Dissertation, Sever Institute of Technology, Washington University, St. Louis, MO.
- _____, 1981, "The Evaluation of a Network Data Structure for Cartographic Features", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 16-27.
- Holmes, G., 1982, "Computer Assisted Chart Symbolization at the Defense Mapping Agency Aerospace Center", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 387-396.
- Hsu, M., 1979, "The Cartographer's Conceptual Process and Thematic Symbolization", The American Cartographer, 6(2), pp. 117-127.
- Hsu, S., 1979, "Automation in Cartography with Remote Sensing Methodologies and Technologies", The Canadian Cartographer, 16(2), pp. 183-194.
- Jacober, R., 1979a, Standardization of Map Symbology for Large Scale Maps, Master's Thesis, Dept. of Geodetic Science, Ohio State Univ.
- _____, 1979b, "Standardization and Computerization of Symbology for Engineering Scale Maps", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 410-415.
- _____, 1980, "Map Content and Symbols: Chapter V of Proposed Manual on Map Uses, Scales, and Accuracies for Engineering and Associated Purposes", Journal of the Surveying and Mapping Division, 106(SU1), pp. 41-72.
- Jensen, J., 1979, "Computer Graphic Feature Analysis and Selection", Photogrammetric Engineering and Remote Sensing, 45(11), pp. 1507-1512.
- Kleckner, R., 1982, "Classification Systems for Natural Resource Management", Proc. Pecora VII Symposium, Falls Church: ASP, pp. 65-70.
- Kulhavy, R., N. Schwartz, and S. Shaha, 1982, "Interpretative Framework and Memory for Map Features", The American Cartographer, 9(2), pp. 141-147.
- Leatherdale, J., 1980, "Specification for Mapping at Scales Between 1:1,000 and 1:10,000, First Edition", The Royal Institution of Chartered Surveyors, International Archives of Photogrammetry,

- XXIII(B4), Commission IV, Hamburg: International Society for Photogrammetry, pp. 415-441.
- Leberl, F., and W. Kropatsch, 1980, "Experiments with Automatic Feature Analysis Using Maps and Images", International Archives of Photogrammetry, XXIII(B4), Commission III, Hamburg: International Society for Photogrammetry, pp. 451-457.
- Lewis, E., 1981, "Geocodes in Commercial Applications", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 1-9.
- Masry, S., 1981, "Digital Mapping Using Entities: A New Concept", Photogrammetric Engineering and Remote Sensing, 47(11), pp. 1561-1565.
- Morrison, J., 1981, "National Atlas Map Symbolization Changes", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 72-81.
- _____, 1982, "Report on the Activities of Working Group III, Cartographic Features", in H. Moellering, ed., Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia, August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 13-14.
- Peters, C., 1979, "Feature Selection for Best Mean Square Approximation of Class Densities", Pattern Recognition, 11(5/6), pp. 361-364.
- Reneman, F., 1975, "A System for Digital Mapping", Commission III, Automation in Cartography, Enschede, The Netherlands: International Cartographic Association, pp. 254-269.
- Saltman, R., 1982, "Developing the Class Code Structure for an Extensive Geographic Data File", URISA 1982, Practical Applications of Computers in Government, Washington: URISA, pp. 214-225.
- Schlichtmann, H., 1979, "Codes in Map Communication", The Canadian Cartographer, 16(1), pp. 81-97.
- Schmidt, W., 1983a, "Report of Working Group III: Cartographic Features", in H. Moellering, ed., Digital Cartographic Data Standards: Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 33-36.
- _____, 1983b, "The Study of Digital Cartographic Data Features in Preparation for a National Standard", paper presented at 6th International Symposium on Automated Cartography (Auto-Carto Six), Ottawa.
- Smith, R., 1980, "Improved Areal Symbols for Computer Line-Printed Maps", The American Cartographer, 7(1), pp. 51-57.

- Smith, R., and M. Johnson, 1979, "Computer Generated Areal Symbols: Some Design Considerations", Proc. ACSM Spring Meetings, Washington, Falls Church: ACSM, pp. 161-169.
- Standards Association of Australia, 1981, Interchange of Feature Coded Digital Mapping Data, Australian Standard 2482-1981, North Sydney, N.S.W.: Standards Association of Australia.
- Stockman, G., 1978, Toward Automatic Extraction of Cartographic Features, Silver Spring, MD: L N K Corp., AD-A059 942.
- Tom, H., 1981, "Geographic Codes: Federal Information Processing Standards", Proc. ACSM Fall Meetings, San Francisco & Honolulu, Falls Church: ACSM, pp. 10-15.
- U.S. Department of Commerce, Coast and Geodetic Survey, 1963, Nautical Chart Manual, 6th edition, by W. Bruder, ed., pub 83-1, Washington: Government Printing Office.
- U.S. Department of Commerce, National Bureau of Standards, 1970, States and Outlying Areas of the United States, Federal General Data Standard Representations and Codes, Federal Information Processing Standards Publication 5-1, Springfield, VA: National Technical Information Service.
-
- _____, 1974, Standard Metropolitan Statistical Areas, Federal General Data Standard Representations and Codes, Federal Information Processing Standards Publication 8-4, Washington: Government Printing Office.
-
- _____, 1979, Counties and County Equivalent of the States of the United States and the District of Columbia, Federal General Data Standard Representations and Codes, Federal Information Processing Standards Publication 6-3, Springfield, VA: National Technical Information Service.
- U.S. Department of Commerce, National Ocean Survey, 1979, Nautical Chart Manual, NOS TM No. 1(NDM 75-01), 7th edition, Washington: Government Printing Office.
- U.S. Department of Defense, Defense Mapping Agency, 1977, Standard Cartographic Feature, Digital-Identification Catalog, Washington: Defense Mapping Agency.
-
- _____, 1979, Product Specifications for a Prototype Data Base to Support High Resolution Sensor Simulation, First Edition, Stock No. SPECXVDB, Washington: Defense Mapping Agency.
- U.S. Department of Defense, Hydrographic/Topographic Center and U.S. Department of Commerce, National Ocean Survey, 1979, Chart No. 1, United States of America, Nautical Chart Symbols and Abbreviations, 7th edition, Washington: Defense Mapping Agency, HTC.

U.S. Department of the Interior, Geological Survey, 1983a, Overview and USGS Activities, by R. McEwen, H. Calkins, and B. Ramey, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-A, Reston, VA: USGS.

-----, 1983b, Digital Line Graphs from 1:2,000,000-Scale Maps, by M. Domaratz, C. Hallam, W. Schmidt, and H. Calkins, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-D, Reston, VA: USGS.

-----, 1983c, Land Use and Land Cover Digital Data, by R. Fegeas, R. Claire, S. Guptill, K. Anderson, and C. Hallam, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-E, Reston, VA: USGS.

-----, 1983d, Geographic Names Information System, by R. Payne, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-F, Reston, VA: USGS.

-----, 1983e, Digital Line Graph Attribute Coding Standards, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-G, Reston, VA: USGS, Draft-unpublished at submission time.

U.S. Department of Transportation, 1974, A Survey of National Geocoding Systems, by P. Werner, Report no. DOT-TSC-OST-74-26, Washington: Government Printing Office.

U.S. Naval Oceanographic Office, 1966, Glossary of Oceanographic Terms, SP-35, 2nd edition, by B. Baker, W. Deebel, and R. Geisenderfer, eds., Washington: Government Printing Office.

-----, 1969, Navigation Dictionary, H.O. Pub. No. 220, 2nd edition, Washington: Government Printing Office.

Werner, P., and H. Bruck, 1975, National Geocoding Systems: Design of a Converter, Urban Systems Laboratory, MIT, Cambridge, MA.

Wood, B., and D. Douglas, 1983, "Cartographic Feature Coding", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 2, Ottawa: Steering Committee for 6th International Symposium on Automated Cartography, pp. 616-626.

Yoeli, P., 1978, "The Drawing of Topographical Maps with Basic Cartographic Subroutines", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 697-703.

WORKING GROUP IV - TERMS AND DEFINITIONS

A. Glossaries and Reports

- American National Standards Institute, 1970, Vocabulary for Information Processing, ANSI X3.12-1970, New York: ANSI.
- Edson, D., 1983, "Digital Cartographic Data Standards: Issues in Terms and Definitions, A Progress Report", in H. Moellering, ed., Digital Cartographic Data Standards: Defining the Issues, Completion of the First Year of Work, Issues in Digital Cartographic Data Standards, Report No. 3, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 37-40.
- Edson, D., and J. Denegre, 1980, A Glossary of Technical Terms in Computer Assisted Cartography, International Cartographic Association, Commission III, Falls Church: ACSM.
- Hubbard, S., 1983, The Computer Graphics Glossary, Phoenix, AZ: The Oryx Press.
- Lincoln Institute of Land Policy, 1982, Glossary of Terms in Land Data Systems, Cambridge, MA: Lincoln Institute of Land Policy.
- Moellering, H., 1982, "Report on the Activities of Working Group IV, Terms and Definitions", in H. Moellering, ed., Selected Papers from the Session on Digital Cartography - Planning and Standards at the Fifth International Symposium on Computer-Assisted Cartography, Crystal City, Virginia, August 23, 1982, Issues in Digital Cartographic Data Standards, Report No. 2, Columbus, Ohio: National Committee for Digital Cartographic Data Standards, pp. 15-16.
- SIGGRAPH, 1977, "Glossary", section 1.5 in Status Report of the Graphics Standards Planning Committee of SIGGRAPH, Computer Graphics, 11(3), pp. II-15 to II-17.

B. Cartographic Objects

- Alexandroff, P., 1965, Elementary Concepts of Topology, translated by A. Obolensky, New York: Federick Ungar Publishing Co.
- Anderson, K., and H. Calkins, 1982, "Cartographic Data Standards: Implications for GISs", paper presented at 42nd annual meeting of the American Congress on Surveying and Mapping, Denver, CO.
- Anon., 1978, "Proposed Terminology for Symposium Discussion", in G. Dutton, ed., Summary of Proceedings, First International Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 1, Cambridge, MA: Laboratory for Computer Graphics, Harvard University, pp. 128-131.
- Biggs, R., 1978, "Cartographic Data Structures for Thematic Applications of Automated Cartography", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Billingsley, F., P. Anuta, J. Carr, C. McGillem, D. Smith, and T. Strand, 1983, "Data Processing and Reprocessing", Chap 17 in R. Colwell, D. Simonett, and F. Ulaby, eds., Manual of Remote Sensing 2nd ed., Vol. I, Falls Church: ASP, pp. 719-724.
- Brassel, K., 1978, "A Topological Data Structure for Multi-Element Map Processing", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Chinn, W., and N. Steenrod, 1966, First Concepts of Topology, New York: Random House.
- Claire, R., and S. Guptill, 1982, "Spatial Operators for Selected Data Structures", International Symposium on Computer Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 189-200.
- Cook, B., 1978, "The Structural and Algorithmic Basis of a Geographic Data Base", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Corbett, J., 1979, Topological Principles in Cartography, U.S. Department of Commerce, Bureau of the Census, Technical Paper No. 48, Washington: Government Printing Office.
- Coxeter, H., 1961, Introduction to Geometry, New York: John Wiley & Sons.

- Dangermond, J., 1982, "A Classification of Software Components Commonly used in Geographic Information Systems", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 70-91.
- Dueker, K., 1972, "A Framework for Encoding Spatial Data", Geographical Analysis, 4(1), pp. 98-105.
- Dueker, K., and J. Noynaert, 1978, "Interactive Digitizing, Editing, and Mapping: Data Structure Considerations", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Edwards, R., R. Durfee, and P. Coleman, 1978, "Definition of a Hierarchical Polygonal Data Structure and the Associated Conversion of a Geographic Base File from Boundary Segment Format", in G. Dutton, ed., Data Structures: Hierarchical and Overlaid, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 4, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- Fegeas, R., 1978, "The Graphic Input Procedure - An Operational Line Segment/Polygon Graphic to Digital Conversion", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard University.
- _____, 1982, "Modularization of Digital Cartographic Data Capture", International Symposium on Computer-Assisted Cartography (Auto-Carto V), Falls Church: ASP & ACSM, pp. 297-306.
- Freeman, H., 1961, "On the Encoding of Arbitrary Geometric Configurations", IRE Transactions on Electronic Computers, Vol. EC-10, pp. 260-268.
- _____, 1978, "Some New Map Data Encoding Schemes", in J. Moneta, ed., Information Technology, Amsterdam: North Holland, pp. 689-696.
- Harary, F., 1969, Graph Theory, Reading, MA: Addison-Wesley.
- Henderson, T., 1983, "Efficient 3-D Object Representations for Industrial Vision Systems", IEEE Transactions on Pattern Analysis and Machine Intelligence, PAMI-5(6), pp. 609-618.
- Huang, X., and S. Hsu, 1983, "A Chained Data Structure for Efficient Extraction and Display of Information from Polygon Maps", Proc. ASP Spring Meetings, Washington, Falls Church: ASP, pp. 171-176.

- Morehouse, S., 1979, "An Application of ODYSSEY to DIME File Mapping", Mapping Software and Cartographic Data Basès, Harvard Library of Computer Graphics, 1979 Mapping Collection, Vol. 2, pp. 157-162.
- Nyerges, T., 1980, Modeling the Structure of Cartographic Information for Query Processing, unpublished Ph. D. dissertation, Dept. of Geography, Ohio State University.
- Peuquet, D., 1982, "Vector/Raster Options for Digital Cartographic Data", Proc. US/Australia Workshop on the Design and Implementation of Computer Based GISs, Honolulu: IGU, Commission on Geographical Data Sensing and Processing, pp. 29-35.
- _____, 1983, "A Hybrid Structure for the Storage and Manipulation of Very Large Spatial Data Sets", Computer Vision, Graphics, and Image Processing, 24(1983), pp. 14-27.
- Pfaltz, J., 1976, "Surface Networks", Geographical Analysis, 8(1), pp. 77-93.
- Requicha, A., and H. Voelcker, 1982, "Solid Modeling: A Historical Summary and Contemporary Assessment", IEEE Computer Graphics and Applications, 2(2), pp. 9-24.
- Taketa, R., 1979, Structure and Meaning in Map Generalization, unpublished Ph. D. dissertation, Dept. of Geography, University of Washington.
- U.S. Department of Energy, 1978, "Appendix A - Structures for Representing Geographical Features", in Geographic Exchange Standard and Primer, prepared by Battelle, Pacific Northwest Laboratory, Interlaboratory Working Group for Data Exchange, PNL-2748, UC-32, Springfield, VA: National Technical Information Service.
- U.S. Department of the Interior, Geological Survey, 1983a, Digital Line Graphs from 1:2,000,000-Scale Maps, by M. Domaratz, C. Hallam, W. Schmidt, and H. Calkins, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-D, Reston, VA: USGS.
- _____, 1983b, Land Use and Land Cover Digital Data, by R. Fegeas, R. Claire, S. Guptill, K. Anderson, and C. Hallam, in R. McEwen, R. Witmer, and B. Ramey, eds., USGS Digital Cartographic Data Standards, Circular 895-E, Reston, VA: USGS.
- White, M., 1979, "A Survey of the Mathematics of Maps", International Symposium on Computer Assisted Cartography (Auto-Carto IV), Falls Church: ASP & ACSM, pp. 82-96.
- _____, 1983, "Tribulations of Automated Cartography and How Mathematics Helps", Proc. 6th International Symposium on Automated Cartography (Auto-Carto Six), Vol. 1, Ottawa: Steering Committee

for 6th International Symposium on Automated Cartography, pp. 408-418.

White, M., and P. Griffin, 1979, "Mapping Without Coordinates", Proc. Urban and Regional Information Systems Association, pp. 431-442.

Youngmann, C., 1978, "A Linguistic Approach to Map Description", in G. Dutton, ed., Spatial Semantics: Understanding and Interacting with Map Data, First International Advanced Study Symposium on Topological Data Structures for Geographic Information Systems, Vol. 7, Cambridge, MA: Laboratory for Computer Graphics, Harvard Univ.