

THE HISTORY OF CARTOGRAPHY
VOLUME SIX

VOLUME SIX
EDITORIAL ADVISORS

James R. Akerman	John R. Hébert	Ferjan Ormeling
Kevin G. Barnhurst	Wolfgang Kainz	Gilles Palsky
Christopher Board	†Ingrid Kretschmer	John Pickles
John D. Bossler	Mary Lynette Larsgaard	Alexey V. Postnikov
William Cartwright	Duane F. Marble	David Rhind
Keith C. Clarke	Geoffrey J. Martin	Susan Schulten
Peter Collier	Gerald McGrath	D. R. F. Taylor
Jeremy W. Crampton	Joel L. Morrison	Norman J. W. Thrower
Roger M. Downs	Francesc Nadal	Waldo R. Tobler
Matthew H. Edney	Judy M. Olson	John R. G. Townshend
James Roger Fleming	Harlan Joseph Onsrud	Deborah Jean Warner
David Harvey		Anthony G. O. Yeh

THE HISTORY OF CARTOGRAPHY

J. B. Harley and David Woodward, Founding Editors
Matthew H. Edney, Project Director

1

Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean

2.1

Cartography in the Traditional Islamic and South Asian Societies

2.2

Cartography in the Traditional East and Southeast Asian Societies

2.3

Cartography in the Traditional African, American, Arctic, Australian, and Pacific Societies

3

Cartography in the European Renaissance

4

Cartography in the European Enlightenment

5

Cartography in the Nineteenth Century

6

Cartography in the Twentieth Century

THE HISTORY OF CARTOGRAPHY

VOLUME SIX

Cartography in the Twentieth Century

Edited by
MARK MONMONIER

Associate Editors
PETER COLLIER
KAREN SEVERUD COOK
A. JON KIMERLING
JOEL L. MORRISON

THE UNIVERSITY OF CHICAGO PRESS • CHICAGO AND LONDON

Mark Monmonier is Distinguished Professor of Geography at
Syracuse University's Maxwell School of Citizenship and Public Affairs.

The University of Chicago Press, Chicago 60637
The University of Chicago Press, Ltd., London

© 2015 by The University of Chicago
All rights reserved. Published 2015.
Printed in Canada

24 23 22 21 20 19 18 17 16 15 1 2 3 4 5

SET

ISBN-13: 978-0-226-53469-5 (cloth)
ISBN-13: 978-0-226-15212-7 (e-book)

PART 1

ISBN-13: 978-0-226-53470-1 (cloth)

PART 2

ISBN-13: 978-0-226-53471-8 (cloth)

This material is based on editorial work supported in part by
the National Science Foundation under Grant Nos. 0322129,
0322200, 0749522, 0749687, 8812674, 9320895,
9975699, and 9975705. *The History of Cartography*
has also been made possible by major grants from the
National Endowment for the Humanities. For a complete
list of financial supporters, see pages [v–viii] of part 1.

DOI: 10.7208/chicago/9780226152127.001.0001

Library of Congress Cataloging-in-Publication Data

The History of cartography.

Includes bibliographical references and indexes.

Contents: v. 1. Cartography in prehistoric, ancient, and medieval Europe and the
Mediterranean — v. 2, bk. 1. Cartography in the traditional Islamic and South Asian
societies — v. 2, bk. 2. Cartography in the traditional East and Southeast Asian societies —
v. 3. Cartography in the European Renaissance — v. 6, pt. 1. Cartography in the
twentieth century, part 1 — v. 6, pt. 2. Cartography in the twentieth century, part 2.

1. Cartography—History. I. Harley, J. B. (John Brian), 1932–91.

II. Woodward, David, 1942– III. Monmonier, Mark, 1943–

GA201.H53 1987

526'.09

86-6995

ISBN 0-226-31633-5 (v. 1; alk. paper)

ISBN 0-226-31635-1 (v. 2, bk. 1; alk. paper)

ISBN 0-226-31637-8 (v. 2, bk. 2; alk. paper)

ISBN 978-0-226-90732-1 (v. 3; alk. paper)

ISBN 978-0-226-53469-5 (v. 6; alk. paper)

ISBN 978-0-226-53470-1 (v. 6, pt. 1; alk. paper)

ISBN 978-0-226-53471-8 (v. 6, pt. 2; alk. paper)

ISBN 978-0-226-15212-7 (v.6; e-book)

Any opinions, findings, and conclusions or recommendations expressed in this material are those
of the editors and authors and do not necessarily reflect or represent the views of the National
Science Foundation, the National Endowment for the Humanities, or other sponsors.

Ⓒ This paper meets the requirements of
ANSI/NISO Z39.48-1992 (Permanence of Paper).

Financial Support

Federal Agencies

Geography and Spatial Sciences Program
and Science, Technology, and Society
Program of the National Science Foundation

Division of Preservation and Access of the
National Endowment for the Humanities

Foundations and Institutions

Richard B. Arkway, Inc., and Cohen & Taliaferro, LLC	The Muriel and Norman B. Leventhal Family Foundation, Inc.*
Caxambas Foundation	Maxwell School of Citizenship and Public Affairs at Syracuse University
College of Letters & Science and Graduate School of the University of Wisconsin–Madison	Andrew W. Mellon Foundation
The Gladys Krieble Delmas Foundation	National Geographic Society
Geography Knowledge Fund in the Idaho Community Foundation	Jack Ringer Family Foundation
T. Lloyd Kelly Foundation	Salus Mundi Foundation
Jay I. Kislak Philanthropic Foundation, in honor of Matthew Edney	Dorothy, Louis, Susan and Richard Sigel Family Fund
	The Hermon Dunlap Smith Center for the History of Cartography, The Newberry Library

Organizations and Corporations

California Map Society	Page Stockwell Old Maps & Prints
Chicago Map Society	Rand McNally
International Map Collectors' Society	The Rocky Mountain Map Society
Martayan, Lan, Augustyn Inc.	Snap-on Incorporated
The New York Map Society	Western Association of Map Libraries

Matching gifts from

BD Matching Gifts Program	Cray Research Foundation	Samuel H. Kress Foundation
The Capital Group Companies	ExxonMobil Foundation	Lehman Brothers
Charitable Foundation	General Motors Foundation	Norfolk Southern Foundation

Associates

Arthur and Janet Holzheimer*
John Taylor

Sponsors

Roger and Julie Baskes	Barry L. MacLean	David Rumsey
William B. Ginsberg	Glen McLaughlin	Clark L. Taber
Arthur L. Kelly	Mr. and Mrs. Kenneth Nebenzahl*	Rosalind Woodward*
Bernard Lisker	Estate of Walter W. Ristow	

Founders

W. Graham Arader III	Robert A. Highbarger	Harold L. Osher*
Richard Brown	Duane F. Marble	George Parker*
Rand and Patricia Burnette*	Douglas W. Marshall	Mary Sponberg Pedley*
Ralph and Tess Ehrenberg	Barbara Backus McCorkle	Brian D. Quintenz
Joseph H. and Monica G. Fitzgerald	Thomas McCulloch	William Sherman Reese
Warren Heckrotte	Harold Moellering	Steve Ritchie
	Erhan Oner	Rudy L. Ruggles, Jr.

Thomas F. Sander
Joseph and Françoise Shein
Rodney W. Shirley

Jeanne K. Snyder, in memory of
John P. Snyder
William S. Swinford
Sarah Tyacke*

Albert R. Vogeler
Edward Alex Wiegner
William C. Wooldridge

Benefactors

R. K. B.
Christopher and Barbara Baruth
Francis Anthony Benevento II
Barbara E. Butler
John G. L. Cabot
Mr. and Mrs. Kenneth A. Chambers*
W. N. Davis, Jr.
Catherine Delano-Smith
Clark and Agnes Eide
Peter M. Enggass
Loretta Freiling
John W. Galiardo
Bob Gordon
Linda Grable-Curtis
Dr. and Mrs. Robert W. Graebner
J. Scott Hamilton

Francis Herbert
Robert A. Holland
Bert and Mary Lee Johnson, in memory
of Dick Stephenson
Roger Kain
In memory of Jonathan T. Lanman
Andrew J. LeRoy
Dee Longenbaugh, in memory of J.
Brian Harley*
Judith and Scott Loomer
Mark Monmonier
Joel L. and Beverly S. Morrison
Victoria M. Morse and Bill North*
Judy M. Olson
Frank T. Padberg, Jr.
Theodore W. Palmer

David Parsons
Jeremy Pool
Jonathan Potter
Marsha L. Selmer
Robert Shilkret
Ronald E. Sjogren
Trudy A. Suchan
Norman J. W. Thrower
Mel and Irene Tremper
Edward R. Tufte
Richard Umansky
Steven James Vogel, in memory of
Heidi Faye Vogel
Barbara Whalen and
Richard G. Wagner
Clifford H. and Alberta A. Wood*

Patrons

Cyrus Ala'i
Michele Aldrich
William J. H. Andrewes*
Stanley K. and Patricia L. Arnett II
Sarah E. Battersby
Sanford H. Bederman, in memory
of Louis De Vorsey
Karen Beidel and Greg Carbone, in
memory of Susan MacKerer
Judith F. Bell
Jeffery A. Bernard
Aníbal A. Biglieri
Jens P. Bornholt
David C. Bosse
Carlo Luigi Brambilla
Christian Brannstrom and
Wendy E. Jepson
Stephen A. Bromberg
Wesley and Linda Brown
Tony Campbell
Edward (Joe) Carrington
Martin M. Cassidy
Harold C. Conklin
Tom and Verena Conley
Jeremy Crampton
Joyce W. Crim
Christina Elizabeth Dando
Gerald A. Danzer
Mark David
Louis and Rosalyn De Vorsey,
in memory of William P. Cumming

Dick DePagter
John W. Docktor
Geoffrey Dreher
Jane Drummond
Gary S. Dunbar
Donald G. Dunn
Edgar R. Echevarria
Evelyn Edson, in memory of
Dick Stephenson
Constance A. Fairchild
Jeffrey S. Falk
Bruce Fetter, in memory of
J. Brian Harley*
Robert L. Fisher
Richard and Dorothy Fitch,
in memory of Ellen Fitch
Allen N. Fitchen, in memory of
J. Brian Harley*
Gail E. and James A. Flatness
Gregory J. Gajda
Suzanne Carol Graham
Sara S. Gronim
John M. Gubbins, F.R.G.S.
Bob Gurda
Stan and Nancy Morbeck Haack,
in memory of
Barbara Bartz Petchenik
Adele J. Haft*
Joan H. and George E. Hall*
John K. Hall
John H. and Corbin C. Harwood

Guntram Herb and
Patricia LeBon-Herb*
Al Herman
Marianne Hinckle
Philip Hoehn
Tracy L. Honn and Mark R. Bernstein
Daniel P. Hopkins
Bangbo Hu
Alice C. Hudson
Nikolas K. Huffman
Antti Jakobsson
Penelope Kaiserlian
Anne Kelly Knowles*
Josef W. Konvitz
Joel and Deborah Kovarsky
John G. Krisilas
Carl Kupfer
Mary L. Larsgaard, in memory of
Alice Brooks
George E. Leonard III and
Susan Hanes Leonard
Jon M. Leverenz*
G. Malcolm Lewis*
Jack Lowell
Jane C. and Louis J. Maher, Jr.*
Paul C. Marengo and
Joan P. Simmons
Darrel L. McDonald
Marianne M. McKee
Jack and Carmen Miller
P. J. Mode

Virginia S. Morbeck, in memory of
 Barbara Bartz Petchenik
 Frederik Muller
 Barbara Mundy
 In memory of Oscar I. Norwich
 R. Michael Peterson
 Christine M. Petto
 Peter and Bernice Porrazzo
 Thomas Ports
 Margaret Power, in memory of
 Robert H. Power
 Brian Prodin
 M. Reilly and B. K. Schnee
 Dennis and Judy Reinhartz
 George and Mary Ritzlin*
 Martha E. Robinson

Curtis L. Roy
 Constantine B. Scarvelis, in memory of
 K. Polites and B. Scarvelis*
 Joseph E. Schwartzberg*
 Sinclair A. Sheers, in honor of Mr. and
 Mrs. David B. Findlay, Jr.
 Robert B. Silberman
 Neil Smith
 Bruce N. Spring
 David and Deirdre Stam, in memory of
 J. Brian Harley*
 Richard W. Stephenson
 Robert W. Stocker II
 Julie Sweetkind-Singer
 Richard J. A. Talbert
 Daniel M. Tapiero

J. Thomas Touchton, in honor of
 David Buisseret
 Florence I. and John E. Townsend,
 in memory of Anthony Dolphin
 William L. Unger
 Larry A. Vos
 James Walker
 Ann Harwell Wells, in memory of
 Charles Edmon Wells
 Ray Wolf
 John A. Wolter
 Thomas B. and Amy Worth
 Cordell D. K. Yee and
 Ingrid Hsieh-Yee
 Lindley Kirksey Young

Friends

Joseph A. Abel
 William R. Adler*
 Joseph Aieta III
 Jonathan Alexander
 Randy Anders
 Michael D. and Pamela S. Barrett*
 Anita C. Been, in memory of
 George Parker
 In memory of Marie Braun
 Alan R. Brill
 Christian Brun and Jane Fristoe Brun,
 in memory of Alexander O. Vietor
 David Buisseret
 Lawrence C. Caldwell
 James R. Carter
 Vivian C. Carter
 Barbara M. Christy
 Karen Severud Cook
 Brock R. Covington
 James Cox
 Robert Dahl
 Christiaan Debrauw
 Peter H. Van Demark
 In memory of Jan Dixon
 Jordana Dym
 Nancy Farrell-Rose
 Norman Fiering
 John Fondersmith
 Richard V. Francaviglia
 Warren W. Furth
 James Gifford

Mason P. Goldman
 Fred J. Goldsmith
 Thomas D. Goodrich
 Ronald E. Grim
 Suzanne A. Haffner
 Robert L. Hall
 Linda Halvorson, in memory of
 Robert and Jane Halvorson
 Brad Hanson
 Francis Heller
 In memory of John Hitchcock
 Steve Horowitz
 Fuad Issa
 Barbara A. Jenkin*
 Constance Jordan
 Chris Karcher
 Megan A. Kealy
 Elton R. Kerr
 Valerie Ann Kivelson
 Christopher and Margaret Kleinhenz
 Richard and Jane Knowles*
 Valerie Krejcie
 Melanie, Lucy, and Kenneth Langa
 Antonia Harman Macon
 Roberto L. Mayer
 T. K. McClintock
 William A. McKinstry
 Mary Murphy
 Samir and Suzy Murty
 Curt Musselman*
 Andre J. Navez

Robert A. O'Connor
 Donald J. Orth
 Vytautas Petronis
 Richard R. Randall
 Paula Rebert and Philip Melnick
 Penny L. Richards and Peter Turley*
 In memory of Arthur H. Robinson and
 David Woodward
 Floyd D. Roos
 Gwen Schultz
 Kirsten A. Seaver
 Peter J. Severud*
 Jack Stadler
 David and Ingrid Stallé
 Paul F. Starrs
 G. Thomas Tanselle
 John A. and Anne C. Tedeschi
 Brian A. Turk
 Carol Urness
 Richard C. Veit and
 Yolanda Theunissen
 Herbert M. Vogler, M.D.
 Rainer Vollmar
 Bruce A. Warren
 Gregory A. Waselkov
 James M. Wells*
 James A. Welu*
 W. Ken Westray
 Scott D. Westrem, in memory of
 Mary Ann Westrem
 H. Lawrence Wilsey

Additional support from

Leslie J. Anderson
 Miervaldis and Ausma Balodis
 Charles A. Burroughs
 Malcolm L. Campbell

Timothy C. Coss
 Edward Espenshade, in memory of
 Arthur H. Robinson*
 Julia E. Gillett

Corbin C. Harwood
 Clair W. Iverson
 John T. Juricek
 Robert Karrow

Kristen Overbeck Laise*
Evelyn Lincoln*
John and Sally Long
Ilsia B. Martin
Lisa and James Meassick
Dennis L. Merritt*
Bernardo Michael
Harry and Geraldine Montgomery

John R. Moore
Maurice A. O'Connor III
Karl Offen
Barbara Parmenter
John W. and Nancy H. Pollock
Feng Qi
James Henry Romer
Peter L. Siems*

Theo Sinnema
Dava Sobel*
Benjamin Spaier
C. E. Van Norman
Barbara Weisman
John M. Weiss
Liz Wing

*A portion or all of this donation was given in memory of David Woodward (1942–2004).