

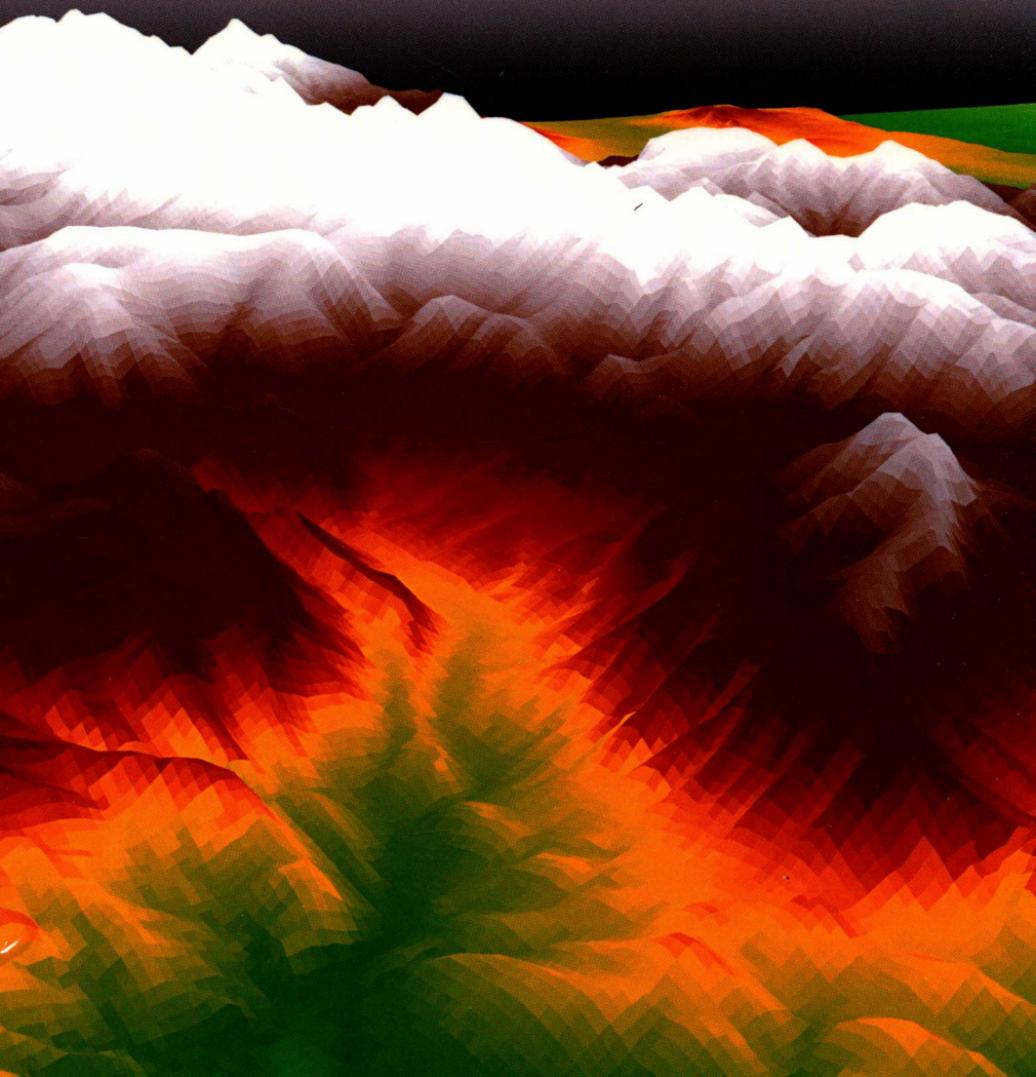
Chandos Information Professional Series

CP
CHANDOS
PUBLISHING

Map Librarianship

A Guide to Geoliteracy, Map and GIS Resources and Services

Susan Elizabeth Ward Aber and Jeremy Ward Aber



MAP LIBRARIANSHIP

A Guide to Geoliteracy, Map and GIS Resources and Services

SUSAN ELIZABETH WARD ABER

JEREMY WARD ABER



AMSTERDAM • BOSTON • CAMBRIDGE • HEIDELBERG
LONDON • NEW YORK • OXFORD • PARIS • SAN DIEGO
SAN FRANCISCO • SINGAPORE • SYDNEY • TOKYO
Chandos Publishing is an imprint of Elsevier

CP
CHANDOS
PUBLISHING

Chandos Publishing is an imprint of Elsevier
50 Hampshire Street, 5th Floor, Cambridge, MA 02139, United States
The Boulevard, Langford Lane, Kidlington, OX5 1GB, United Kingdom

Copyright © 2017 Susan Elizabeth Ward Aber and Jeremy Ward, Published by Elsevier Ltd.
All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Details on how to seek permission, further information about the Publisher's permissions policies and our arrangements with organizations such as the Copyright Clearance Center and the Copyright Licensing Agency, can be found at our website: www.elsevier.com/permissions.

This book and the individual contributions contained in it are protected under copyright by the Publisher (other than as may be noted herein).

Notices

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our understanding, changes in research methods, professional practices, or medical treatment may become necessary.

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

To the fullest extent of the law, neither the Publisher nor the authors, contributors, or editors, assume any liability for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

Library of Congress Cataloging-in-Publication Data

A catalog record for this book is available from the Library of Congress

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library

ISBN: 978-0-08-100021-2 (print)

ISBN: 978-0-08-100045-8 (online)

For information on all Chandos publications
visit our website at <https://www.elsevier.com/>



Working together
to grow libraries in
developing countries

www.elsevier.com • www.bookaid.org

Publisher: Glyn Jones

Acquisition Editor: Glyn Jones

Editorial Project Manager: Lindsay Lawrence

Production Project Manager: Omer Mukthar

Cover Designer: Victoria Pearson

MAP LIBRARIANSHIP

CHANDOS
INFORMATION PROFESSIONAL SERIES

Series Editor: Ruth Rikowski

(email: Rikowskigr@aol.com)

Chandos' new series of books is aimed at the busy information professional. They have been specially commissioned to provide the reader with an authoritative view of current thinking. They are designed to provide easy-to-read and (most importantly) practical coverage of topics that are of interest to librarians and other information professionals. If you would like a full listing of current and forthcoming titles, please visit www.chandospublishing.com.

New authors: we are always pleased to receive ideas for new titles; if you would like to write a book for Chandos, please contact Dr Glyn Jones on g.jones.2@elsevier.com or telephone +44 (0) 1865 843000.

DEDICATION

James S. Aber, a caring husband/father. He is the one who started us on the journey of using, collecting, and creating maps as we traveled the U.S. and beyond. Throughout the process of writing this book, we had the opportunity to learn from him and benefit greatly from his expert editorial guidance and steadfast encouragement.

Amy A. Harris-Aber, a loving wife/daughter-in-law. She was always there with constant support, help, and advice, and put up with the long hours of writing and editing.

Jay T., a one-of-a-kind son/brother, Lauren R. and Rose E. Aber, completing this amazing family. The travelers who keep us busy simply finding all the wonderful places they visit and explore by foot, bicycle, car, train, boat, and plane.

R. Kenneth Aber, the best father-in-law/granddad in the world. For continually orienting and inspiring us to travel both physically and intellectually.

In memory of parents/grandparents, Marian M. and Henry A. Ward, and Sarajane S. Aber. You gave us unconditional support, artistic direction, and so much more.

Finally, we hereby dedicate this book to all of the past and present map librarians, who perform their jobs quietly with efficiency and care, fighting to retain and catalog the map and geospatial data collections, which are often relegated to basements or outsourced beyond imagination.

PREFACE

WHY MAP LIBRARIANSHIP AND GEOLITERACY?

This book was inspired by teaching an elective reference resources and services course focused on maps and Geographic Information Systems (GIS) offered in a large university library and information science (LIS) program. The syllabus stated that no prior knowledge of geography and geoscience or maps and GIS was needed or assumed. Furthermore, all students were welcomed whether they navigated the world with landmarks or maps, geography-bee winners or not. Through informal observations about one-fourth of all students had some geography course work or degree; of those degree holders, approximately half of the geography majors stated they never had a geography course that was specific to maps. This surprised us, yet we know geography programs in universities may be aligned with geoscience or social science departments.

Students were sent *into the field* to meet map/GIS users and librarians. The first assignment asked students to engage in a 5- to 10-minute informal conversation and get to know some people who used maps in personal or profession life. Participants described occupational duties and named the map and data resources used to accomplish tasks as well as identified where the resources were acquired. The latter resulted in the second surprising observation, an overwhelming majority of participants were unaware that libraries had any cartographic resources or services and that these maps and data might be useful to them.

For the second assignment, some students found that librarians assigned to maps were sometimes reluctant to speak and repeated that they were not real map librarians. In contrast, other students found map and geospatial librarians who were knowledgeable, confident, and encouraging as well as ready to show off the collection and give valued advice to students on their career direction. Unfortunately, the exemplary map librarian was a bit harder to find and this was another surprise to both teacher and student.

This is why we identified the need for this book in addition to the fact that there was no single source that focused on geoliteracy and map librarianship. We designed the book to be a practical guide for students and librarians, who may want to build confidence and enhance their geoliteracy knowledge so as to apply it to traditional librarian skills. As map librarians, they have to

not only promote resources and services to clients, but also to library colleagues and administration. Yet, we were asked why maps and why us?

WHY MAPS?

Maps are everywhere. We carry them digitally in our phones and vehicle dashboards. We have them physically on the book shelf, and folded or bound slipped into glove box of the car. Maps have scale and compass direction, and as such they provide the best hiking and biking paths. They can also show the movement of hurricanes in order to detour and direct traffic during evacuations. Anyone navigating land, air, and water depends upon the most accurate and current maps and charts. Do you know how to maximize success through reading your map? Map librarians provide instructional services. Although navigation is primary, it is only one purpose for maps.

Reading and following a map could lead to adventures and problem solving. Old and new maps help in visualizing patterns and documenting change over time. Old maps show former channels in the river, which help archeologists today find buried treasure among sunken paddle boats. Medical researchers may map particular genes among generations of families or follow disease outbreaks tracking infestations of insects. Maps have assisted astronomers, attorneys, business owners, climatologists, collectors, criminologists, doctors, drivers, engineers, entrepreneurs, firefighters, genealogists, geoscientists, historians, librarians, pilots, pirates, police, politicians, soldiers, teachers, and writers, to name a few.

Maps are created to define the extent of solar system and galaxies, observe election results, or depict contours in an agricultural field. Maps identify flood-prone areas or demonstrate underserved regions where city services such as parks and public libraries are needed. Interpreting maps is contingent upon data defined in the legend and once reviewed may clarify solutions. It follows then that maps may be thought of as works of art or tools of the trade, which originally were the exclusive domain of cartographers and geographers. The shift from a physical to digital world of maps happened at the end of the 20th century and a geospatial revolution took hold early in the 21st century.

Yet, both maps and librarians seem to be in the middle of the print and digital worlds. We have followed the explosive use of maps and applications for GIS and mapping programs, which have grown phenomenally in the last two decades. Librarians are perfectly situated with valuable collections

in place. The library could play a huge role in the geospatial revolution, but instead seems to be content to let this opportunity pass by. LIS programs briefly recognized their chance in the 1980s, but with little recruiting effort for science majors the programs seemed easy to cut from the budget. This misstep has resulted in map users bypassing the library and allowing Internet searching and mapping to become the norm. Libraries are valued institutions, but need to recognize that the geospatial revolution includes maps, data resources, and services in their libraries.

Our lives are intertwined with maps and depend upon geoliteracy, whether we are aware of it or not. Like the fish that is ignorant of water or the bird the wind, people define boundaries, prove ownership, and navigate Earth using maps and depend on geoliteracy, whether by tacit knowledge or physical guidance of mapping programs. Maps scale to the size we need and vary in topic or subject to cover every imaginable situation. We have watched maps evolve as a combination of art and science over millennia.

WHY LIBRARIES AND LIBRARIANS?

Many people associate books and libraries. However, the global WorldCat library catalog added new information records for nearly 5 million unique maps held in libraries in 2015 alone. Libraries are more than a repository of books. In addition to adding maps into the collection, map librarians care and preserve for these physical and digital resources. One of the first cartographers to create a map of the world in the 3rd century AD was also one of the earliest map librarians at the great Library of Alexandria. Eratosthenes created maps and curated geographic information for future generations. Besides preserving maps, the Library of Congress now has about 17,000 maps available online from its collection of 5.5 million maps. Stanford University has been the recipient of major donations through digital philanthropy. There are 71,000 maps viewable online as well as 150,000 in donations overall.

The public's ignorance of map collections in libraries may come as no surprise, as not all map collections are included in library catalogs, essentially rendering maps invisible to electronic searching. In addition, map collections are physically hidden when outsourced to other buildings or stored in basements of main library building. Maps may be cared for by grumpy librarians who are quick to explain their position was inherited. This indifferent attitude toward a map collection is easily explained, as few library schools offer any course on maps and GIS resources and services.

Finally, visual information presents another conundrum to librarians who are steeped in textual literacy; that is, the need for citing maps is misunderstood and the procedures for referencing maps, aerial imagery, and geospatial data are difficult to find among the numerous referencing styles. Hence, map collections remain as gems in the rough until user-driven demand for access and improved services prevail.

WHY THIS BOOK AND THESE CO-AUTHORS?

Jeremy is a geography/GIS teacher and researcher. Susie is a teacher and researcher with an insatiable curiosity and appreciation for maps and librarianship. We have a common bond and compass in that our entire family shares a passion for traveling to new and unfamiliar places, immersing in different cultures and peoples, for exploring landscapes and natural resources, and preserving a balance between natural and human constructions. We value maps and geospatial data and want to help turn map resources in libraries from *problem children* to treasured collections. We want to make a difference and give back to the professions showing geography students a new career direction and ensuring library students and librarians that a text resource exists. Our goal is to enhance geoliteracy as well as reference and instruction skills by providing details on finding, downloading, delivering, and assessing map, remotely sensed imagery, and other geospatial resources and services, primarily from trusted government sources.

ACKNOWLEDGMENTS

The authors wish to thank many colleagues, librarians both map and generalists, and students, who over the years have contributed content, photographs, editorial help, and inspirational ideas in preparation and completion of this endeavor. Some of them are listed here: James Aber, Jay Aber, Amy Harris-Aber, Mary Larsgaard, Eva Dodsworth, Beth Hanschu, Zada Law, Wade Bishop, Cara Bertram, Julie Sweetkind-Singer, Cynthia Karpa McCarthy, Igor Drecki, Benjamin Jones, Joyce Monsees, Linda Koistinen, Kathleen Weessies, Pete Reehling, Patrice A. Day, Meagan Duever, Jennifer Ann Haegle, G. Salim Mohammed, Jon Jablonski, Angie Cope, Jennifer Davis, Katherine Weimer, Linda Main, Debbie Faires, Irene Owens, Chad Morgan, George Knott, Harriet Clayton, Julie Hallmark, Julie Williams, Linda Zellmer, Patrick McGlamery, Hallie Pritchett, Tassanee Chitcharoen, Suzanne Harter, Sandra Hirsh, Linda Lillard, Linda Musser, Paige Andrews, Marcy Bidney, Emily Prince, Susie Oh Quinn, Andrew Carlos, Jeffrey Franks, Trish Garcia, Mary Fran Griffin, and Earle McCartney.

Support was given during the writing of this book by the following institutions: Middle Tennessee State University (MTSU), North Carolina Central University (NCCU), San José State University (SJSU), and Emporia State University (ESU).

CONTENTS

<i>Preface</i>	<i>xi</i>
<i>Acknowledgments</i>	<i>xv</i>
1. Introduction to Maps and Librarians	1
1.1 Maps: Our Spatial Compass	1
1.2 What is Geography?	3
1.3 Historic Progression of Maps and Cartographers	4
1.4 What are NeoGeography and NeoCartography?	8
1.5 Historic Progression of Map Librarianship	10
1.6 What is NeoMap Librarianship?	11
References	12
2. Spatial Thinking and Geo-Literacy	17
2.1 Geo-Literacy: Location-Based Spatial Thinking	17
2.2 What is a Map?	18
2.3 Reference and Thematic Maps	19
2.4 Mapping Data—Map Symbology Techniques	20
2.5 The Choropleth Map	20
2.6 The Dot Density Map	22
2.7 The Proportional Symbol Map	23
2.8 The Cartogram	23
2.9 Mapping Terrain	25
2.10 Mapping Data—Map Types	25
2.11 Aeronautical Charts	26
2.12 Atlas and Gazetteers	28
2.13 Bird's-Eye View	29
2.14 Coal, Oil, and Natural Gas Investigation Maps	30
2.15 Geologic and Mining	31
2.16 Historic	35
2.17 National Parks	36
2.18 Nautical Charts	37
2.19 Physiographic	38
2.20 Planimetric	40
2.21 Political	40
2.22 Soil	40

2.23	Topographic	41
2.24	Globes and Raised-Relief Models	45
2.25	Aerial Photography	47
2.26	Conclusions	47
	References	48
3.	Basic Map Concepts—The Science of Cartography	53
3.1	Scale and Resolution	53
3.2	Geodesy	56
3.3	Projections	58
3.4	North Defined	61
3.5	Legends	63
3.6	Grids and Graticules	63
3.7	Latitude and Longitude	64
3.8	Universal Transverse Mercator Coordinate System	65
3.9	State Plane Coordinate System	66
3.10	Public Land Survey System	66
3.11	Conclusions	69
	References	69
4.	Geographic Information Systems and Remote Sensing	71
4.1	What is a Geographic Information System?	71
4.2	Layering the Data	72
4.3	What is Remote Sensing?	75
4.4	The Difference Between Vector and Raster Data	76
4.5	Sources of Raster Data	79
4.6	Web GIS as a Component of NeoGeography	81
4.7	Volunteered Geographic Information	82
4.8	The Role of GPS in VGI	83
4.9	Conclusions	84
	References	85
5.	Terrain Mapping Meets Digital Data	87
5.1	Digitally Representing Terrain	87
5.2	Digital Raster Graphics	87
5.3	Digital Line Graphs	89
5.4	Digital Elevation Models	91
5.5	Conclusions	93
	References	94

6. Map and Geospatial Librarianship	95
6.1 Introduction	95
6.2 Academic Preparation and Continuing Education	96
6.3 History and Transitions in Map and Geospatial Librarianship	96
6.4 GEOWEB and Geospatial Librarianship	98
6.5 Historical Beginnings—ALA and MAGIRT	100
6.6 Core Competencies: ALA and MAGIRT	100
6.7 History of Academic Curriculum to Support Map Librarianship	102
6.8 Transitions in Academic Curriculum to Support Map Librarianship	105
6.9 Job Opportunities and Challenges in Map and Geospatial Librarianship	108
6.10 Map Library Work Space and Equipment	114
6.11 Conclusions	117
References	118
7. Geospatial Resources and Instruction Services	123
7.1 Introduction	123
7.2 Navigating the Labyrinth—Legal Considerations	123
7.3 Navigating the Labyrinth—Where to Go to Get What?	130
7.4 Guide Through GIS and Remote Sensing Software	131
7.5 Guide to Finding Maps, Data, and Other Geospatial Resources	142
7.6 Conclusions	167
References	168
8. Reference Desk	173
8.1 Introduction	173
8.2 Location Matters	173
8.3 Reference Librarian Duties	177
8.4 Types of Questions	179
8.5 Support Groups for Map Librarianship	183
8.6 Citing and Referencing Maps and Geospatial Data	190
8.7 Conclusions	200
References	201
9. Collection Development	205
9.1 Introduction	205
9.2 Knowing Users and Use of Map and GIS Resources	205
9.3 Collection Development Policy	212
9.4 CDP Examples	214
9.5 Conclusions	217
References	217

10. Cataloging and Classifying	221
10.1 Introduction	221
10.2 A Brief History of Cataloging Maps	221
10.3 A Brief History of Classifying Maps	224
10.4 Classification Systems and Maps	225
10.5 Cataloging Cartographic Resources	232
10.6 Conclusions	237
References	238
11. Promotion and Summary of Map and GIS Resources and Services	241
11.1 Information Challenges	241
11.2 Promotion of Library Resources	242
11.3 Geography Awareness Week, GIS Day, and Earth Science Week	246
11.4 Geocaching and GPS Activities	247
11.5 Conclusion	248
11.6 In Summary of Map Librarianship	249
References	251
<i>Appendix A</i>	253
<i>Appendix B</i>	263
<i>Appendix C</i>	265
<i>Index</i>	271

CHAPTER 1

Introduction to Maps and Librarians

1.1 MAPS: OUR SPATIAL COMPASS

Maps are ubiquitous and can record a *sense of place* in life. Maps situate the reader to a location on Earth through cardinal points of a compass providing the direction in space. Stephen Hall (2004) assumed that we travel with maps “neatly folded and tucked away in the glove compartment of memory”; we orient ourselves back and forth between time and landscapes, emotion and geography, and it all happens in the span of a few moments (p. 15). In fact, three-dimensional compass cells have been identified in bats, used to perform complex flight without disorientation (Finkelstein et al., 2015, p. 159). Costandi (2014) summarized research that suggests all mammals, which likely include humans, have head-direction cells or an internal global positioning system used to create these mental maps of the environment. Aber (2012) found that with short exposures to a novel place, individuals can recall the spatial layout of an environment to some degree, with a few capable of creating an incredibly accurate mental map of the space. Consequently, maps play a role in the place in which we were raised and reside, serving as our internal spatial compass.

Maps are pervasive and people rely on numerous types of maps daily. Maps are produced in print or electronic formats, accessed in print books and single sheets or via mobile phone and computer devices. Planimetric or topographic maps may be used for navigation. Reading and interpreting maps help to create a route to travel from point A to B, whether driving unfamiliar roads or hiking over new trails. Likewise, interpreting digital data via electronic maps in real-time helps to anticipate traffic delays and predict changing weather conditions. Professional politicians might study past voting patterns on choropleth maps or cartograms while observing data on electronic maps showing present election results as polling stations report. Geologic maps are used to locate and interpret rock layers and tectonic structures when prospecting for valuable natural resources from coal to diamonds.

More recently, humans in the wake of natural disasters have benefited with quicker disaster response when participating volunteers come together

to monitor social media channels and share information regarding infrastructure destruction and human-injury levels. These efforts result in maps, which provide emergency aid officials with valued current, yet ephemeral, information for a focused response. Subsequently, maps have become second nature. This is especially true when accessing and displaying mobile, electronic versions.

In Oct. 2013, American politicians disrupted our traditional spatial compass. The Legislature forced a Federal Government shutdown by refusing to pass a national budget for 16 days in order to stop implementation of legislation that created affordable health care insurance opportunities (The White House, Office of Management and Budget, 2013; Roberts, 2013). This political tactic cut off the world's access to one of the primary sources for maps and geospatial data by closing nearly all of the United States Geological Survey (USGS), the National Oceanic and Atmospheric Administration (NOAA), National Aeronautics and Space Administration (NASA), National Geospatial-Intelligence Agency (NGA), and other federally funded science groups (Rosenberg, 2013). The only USGS web sites remaining online were those deemed necessary to protect lives including maps of disease, earthquakes, volcanoes, erosional hazards, landslide hazards, geomagnetism, and water, see Figure 1.1. Likewise, NOAA maintained some capability for weather forecasts and warnings, while NASA satellites currently in orbit were allowed to operate (Freedman, 2013).

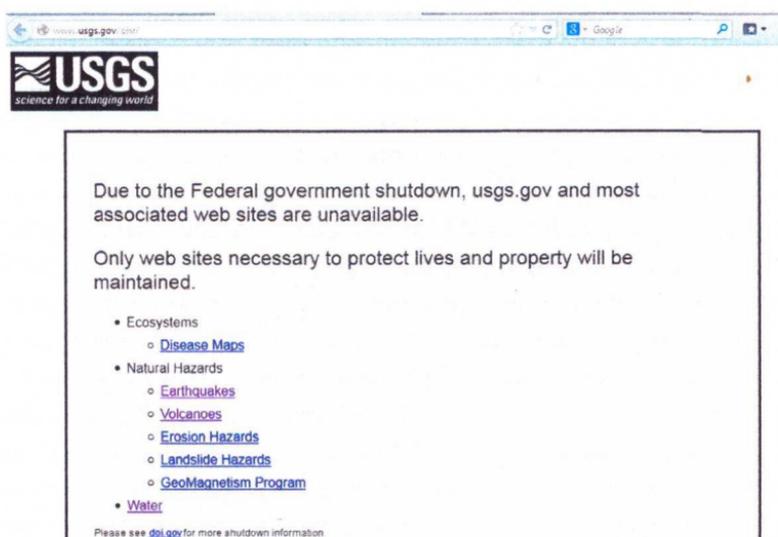


Fig. 1.1 Screenshot showing the USGS website during the 2013 U.S. government shutdown.