



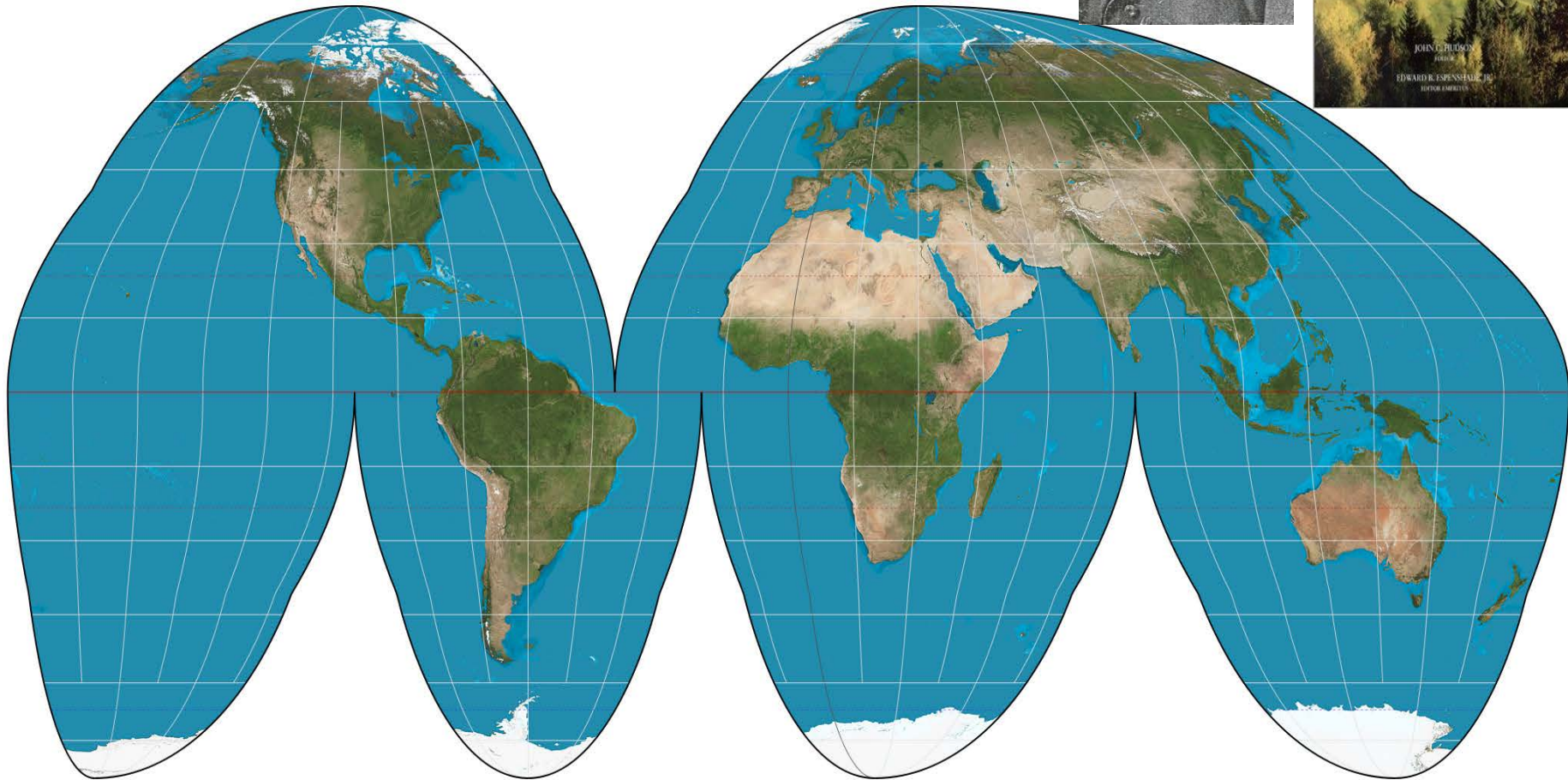
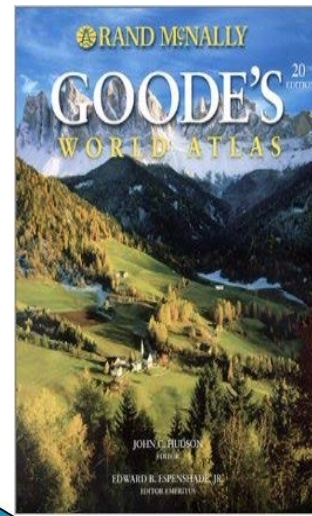
Analytical and Computer Cartography Winter 2017

Lecture 13: Cartography's Institutions and Past

History of US Academic Cartography

- Slocum's 4 periods
- Incipient (JP Goode (Chicago), Erwin Raisz (Harvard), Guy-Harold Smith (Ohio St), RE Harrison (Life))
- Post-war (Wisconsin, Kansas, Washington)
- Growth of Secondary Programs (1960s-80s)
 - (UCLA, Michigan, South Carolina, Syracuse)
- Integrated curriculum with GIS (since 1990s)
 - UCSB, Penn State, SUNY Buffalo, South Carolina

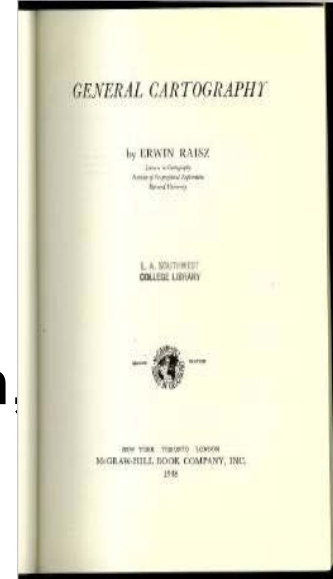
J.P. Goode



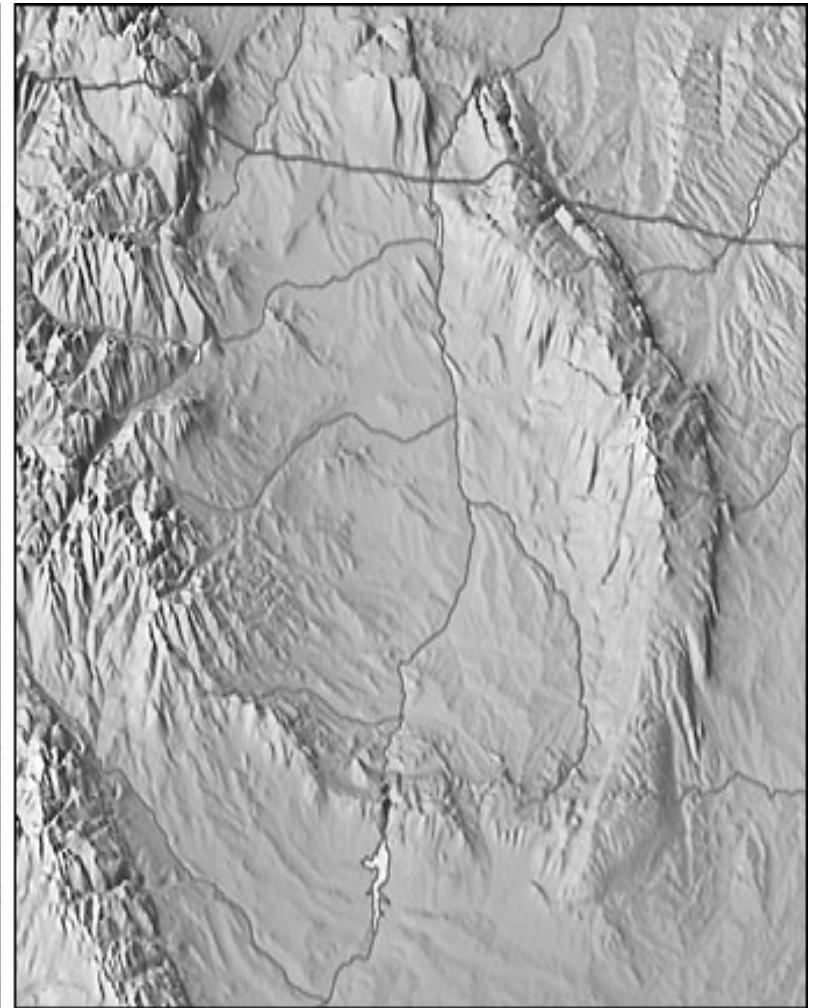
Goode Homolosine 1923 Source: Wikipedia

Erwin Raisz

- Author of the first cartography textbook in English, *General Cartography* (1938)
- Known for detailed hand-drawn physiographic maps, distinct style
- While a student, offered the first cartography class in the US (Columbia University)
- In 1931 he joined the Institute of Geographical Exploration at Harvard University
- Taught cartography and was curator of the Harvard map collection for 20 years



Erwin Raisz



Bighorn Basin, Wyoming, drawn by Erwin Raisz (left) and the same area rendered as plan oblique relief from Shuttle Radar Topography Mission data (right).

Source: <http://www.shadedrelief.com/physical/pages/about.html>

Richard Edes Harrison



Source: Library of Congress, Map Division

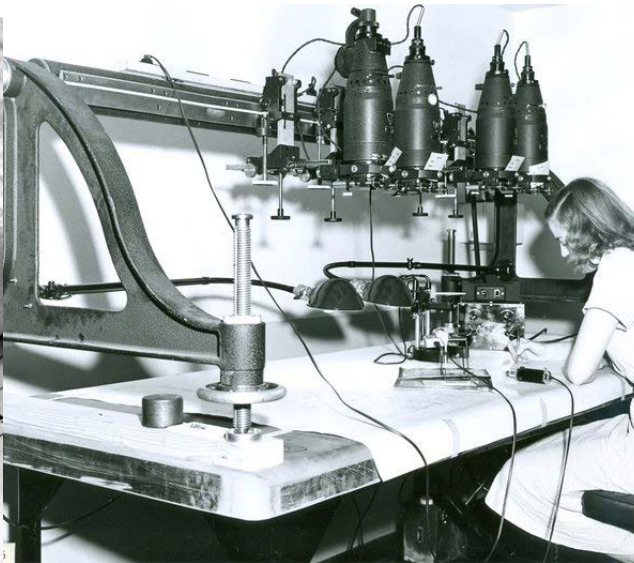
Slocum's Observations on period 4

- Integration of cartography and GIS
- Completion of the digital transition
- Less emphasis on coding, more on the user interface
- More attention to dynamics, animation and multimedia
- Emergence of Analytical Cartography
- Close relationship between academic mentors and new programs

Major Changes

- Digital transition complete
- Proprietary software to Open Source
- Code to scripts to mash-ups
- Rise of Web Mapping
- Crowdsourcing
- Convergence of remote sensing, photogrammetry and mapping
- Accurate positioning from GNSS
- Mobility and immediacy
- Geovisual analytics and information graphics
- Virtual and augmented reality

Cartography as a changing profession



Changing job description

Skills Employers Value

For successful employment, you will need:

- Knowledge of a **programming language**
- **Spatial** thinking
- Good oral and written **communication** skills
- **Organizational** skills
- Good sense of **design**
- Analytical and **critical thinking** skills
- Ability to meet deadlines and **work independently**



Former undergraduate students now engaged in professional careers in cartography.

CAREERS / BEST JOBS / ENGINEERING



Cartographer Overview

#3 In Best Engineering Jobs | Overall Score 6.6 / 10

[Overview](#) [Salary](#) [Reviews and Advice](#) [Job Listings](#)

Overview

Ptolemy was a cartographer. Leonardo da Vinci was one too. You might expect to find mapmakers back in the 2nd century, even the 15th and 16th centuries. But you might not expect to find them in 21st century America.



And yet demand for cartographers is high. And it's really no wonder. Tanya Buckingham, assistant director of the Cartography Lab at the University of Wisconsin – Madison, says the field has seen incredible change, even in the last decade. "Since [2001], we have seen the explosion of interactive maps; the democratization of cartographic tools, cloud-based tools and data storage; print on demand; as well as the ever changing trends in screen size," she writes in an email.

Apple, Google, ESRI, Maps.com
NGA, USGS, USDA, FEMA

Largest US employer

The image shows a screenshot of a web browser displaying the homepage of the National Geospatial-Intelligence Agency (NGA). The browser's address bar shows the URL <https://www.nga.mil/Pages/Default.aspx>. The page features the NGA logo on the left, which includes a globe and the text "NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY". To the right of the logo is the text "NGA.mil" and "NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY". Below the logo and text is a dark blue navigation bar with the following menu items: HOME, ABOUT, CAREERS, PARTNERS, MISSION, and NEWS. The main content area features a large photograph of a modern building with a glass facade, partially obscured by snow-covered tree branches. Overlaid on the bottom of this photograph is the text "THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY". Below the photograph are two smaller images: one showing a 3D topographic map and another showing a satellite image of a coastal area. The Windows taskbar is visible at the bottom of the screen, showing various application icons and the system clock indicating 10:12 AM on 2/23/2017.

NGA Facilities Operating Status »
Contact Us »

HOME ABOUT CAREERS PARTNERS MISSION NEWS

THE NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY

SURVIVING

10:12 AM
2/23/2017

Cartography's Professional Societies

- International Cartographic Association
- Cartography and Geographic Information Society
- North American Cartographic Information Society
- ASPRS The Imaging & Geospatial Information Society
- American Association of Geographers: Cartography Specialty Group
- Canadian Cartographic Association
- British Cartographic Society
- International Federation of Surveyors
- The International Society for the History of the Map
- National Geographic Society

The image shows a screenshot of a web browser displaying the International Cartographic Association (ICA) website. The browser's address bar shows the URL icaci.org. The website header features the ICA logo (a globe with 'ICA' above and 'ACI' below) and the text 'International Cartographic Association' and 'Association Cartographique Internationale'. A navigation menu includes links for 'News', 'Calendar', 'Publications', 'The Association', 'Members', 'Commissions', 'Research Agenda', and 'ICC Conferences ?'. A large banner below the menu contains the text 'Advancing the disciplines of cartography and GIScience in an international context' and a globe graphic. A secondary banner reads 'Welcome to the website of the International Cartographic Association'. A main content area on the left features a document icon and the title 'Invitation to the Joint ICC Pre-Conference Workshop Different Fields - One Cartography', accompanied by an aerial photograph of a city and a poster for 'ICC 2017 WASHINGTON JULY 22-29 2017'. On the right, there is a search bar with a 'Search' button and an 'About ICA' section. The 'About ICA' section states: 'The mission of the International Cartographic Association (ICA) is to promote the disciplines and professions of cartography and GIScience in an international context.' The Windows taskbar at the bottom shows various application icons and the system clock indicating 3:47 PM on 2/22/2017.

International Cartographic Association
Association Cartographique Internationale

News Calendar Publications The Association Members Commissions Research Agenda ICC Conferences ?

Advancing the disciplines of
cartography and GIScience
in an international context

Welcome to the website of the International Cartographic Association

Invitation to the Joint ICC Pre-Conference Workshop Different Fields - One Cartography

ICC 2017
WASHINGTON
JULY 22-29 2017

Search

Search

About ICA

The mission of the International Cartographic Association (ICA) is to promote the disciplines and professions of cartography and GIScience in an international context.

3:47 PM
2/22/2017

CAGIS

The screenshot shows a web browser window displaying the homepage of the Cartography and Geographic Information Society (CaGIS). The browser's address bar shows the URL www.cartogis.org. The website features a dark header with the CaGIS logo (a globe with the text 'CaGIS') and the full name of the organization. A navigation menu includes links for Home, About, News, Awards, Publications, AutoCarto, USNC-ICA, IMY, Contact Us, and Membership. The main content area is divided into two columns. The left column has a 'Welcome' section with a paragraph describing the society's mission. The right column has a 'News' section with two items: 'USNC solicits maps for ICC2017 cartographic exhibit' and 'CaGIS Past President Kari Craun receives Gannett Award'. Below the news is a 'Join CaGIS' section with a call to action and a link. At the bottom right, there is a section for 'ICC 2017 in Washington, DC, USA' with a date and a link to the conference website. A map of a campus area is visible on the left side of the lower section. The browser's taskbar at the bottom shows various application icons and the system clock indicating 3:48 PM on 2/22/2017.

Cartography and Geogra x

Keith

www.cartogis.org

Apps Google Google Calendar Breaking News, U.S., V Breaking News and O Web of Science [v.5.17] The New GauchoSpac Course Login | Online eGrades ScholarOne Manuscri

Google™ Custom Search Search

CaGIS Cartography and Geographic Information Society

Home About | News | Awards | Publications | AutoCarto | USNC-ICA | IMY | Contact Us | Membership

Welcome

Welcome: The Cartography and Geographic Information Society (CaGIS) is composed of educators, researchers and practitioners involved in the design, creation, use and dissemination of geographic information. CaGIS provides an effective network that connects professionals who work in the broad field of Cartography and Geographic Information Science both nationally and internationally.

News

USNC solicits maps for ICC2017 cartographic exhibit
The U.S. National Committee (USNC - www.cartogis.org/ica.php) to the International Cartographic Association (ICA - www.icaci.org) is soliciting maps and other cartographic items for the United States entries in the 28th International Cartographic Exhibition to be held in conjunction with the [International Cartographic Conference \(ICC\)](#). [Please see this PDF for more details. More...](#)

CaGIS Past President Kari Craun receives Gannett Award
Kari Craun, a Past President of CaGIS, has been selected as the first

Join CaGIS

Join the largest network of professionals who are at the leading edge of education, research and practice in Cartography and Geographic Information Science. This network provides a wealth of opportunities to advance your career. [Click here](#) to learn what you should know about CaGIS.

ICC 2017 in Washington, DC, USA

Learn more about the upcoming 28th International Cartographic Conference, July 2-7, 2017.
www.icc2017.org

CAGIS Student Activity

- Fellowships
- Travel grants, conference helper
- Internships
- Career Guide
- Map design competitions
- News, events



NACIS

The image shows a browser window displaying the NACIS website. The browser's address bar shows 'nacis.org'. The website header features the 'nacis' logo and the text 'North American Cartographic Information Society'. Navigation buttons for 'LOGIN' and 'BECOME MEMBER' are visible. A dark navigation bar contains links for 'HOME', 'ANNUAL MEETING', 'AWARDS', 'COMMUNITY', and 'INITIATIVES'. The main content area features a large image of Earth with a 'CARTOTALK' section. The text in this section reads: 'Join cartographers from all over the world and talk about maps! Get your questions answered, share your work, help others, be part of the community.' Below this is a 'JOIN THE DISCUSSION' button. At the bottom of the page, the text says 'Do you #lovemaps? Welcome home.' The browser's taskbar at the bottom shows various application icons and the system clock indicating 10:11 AM on 2/23/2017.

NACIS.ORG

nacis.org

Apps Google Google Calendar Breaking News, U.S. Breaking News and O Web of Science [v.5.1 The New GauchoSpac Course Login | Online eGrades ScholarOne Manuscri

nacis North American Cartographic Information Society

LOGIN BECOME MEMBER

HOME ANNUAL MEETING AWARDS COMMUNITY INITIATIVES

CARTOTALK

Join cartographers from all over the world and talk about maps!
Get your questions answered, share your work, help others,
be part of the community.

JOIN THE DISCUSSION →

Do you #lovemaps? Welcome home.

nacis.org/#myCarousel

10:11 AM 2/23/2017

Key Cartographic Journals

- Cartography and Geographic Information Science
- International Journal of Geographic Information Science
- GeoJournal
- Transactions in GIS
- Cartographic Perspectives
- The Cartographic Journal
- International Journal of Cartography
- Journal of Geographical Sciences
- GPS Solutions
- Journal of Maps
- Cartographica

Journal of Maps

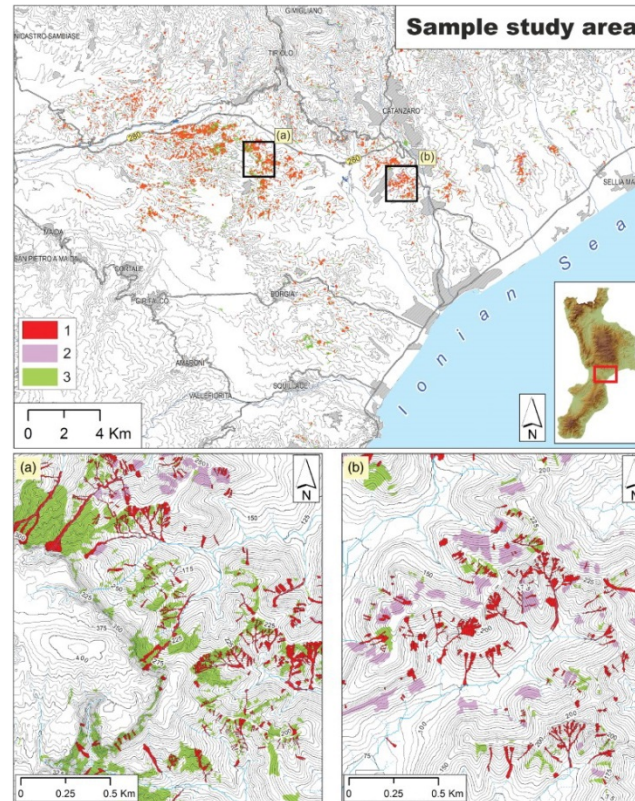


Figure 7. Map of shallow landslides triggered by the 2008–2010 rainfall events and other geomorphological features related to slope processes: (a) and (b) details of two representative zones. Legend: (1) shallow landslides; (2) zones of incipient shallow landslides; and (3) soil erosion (*sensu lato*).

Cartography and Geographic Information Science



Sample issue

Latest articles

Article

What path and how fast? The effect of flight time and path on user spatial understanding in map tour animations >

Treves et al.

Published online: 17 Feb 2017 ✓

Article

A novel approach to leveraging social media for rapid flood mapping: a case study of the 2015 South Carolina floods >

Li et al.

Published online: 9 Feb 2017 ✓

Article

A geovisual analytics exploration of the OpenStreetMap crowd >


Quinn et al.

Published online: 27 Jan 2017 ✓

Article

The effect of acquisition error and level of detail on the accuracy of spatial analyses >

Biljecki et al.

Published online: 26 Jan 2017 

Informal Institutions

- Openstreetmap
- Google Earth Community (retired 2015)
- Google Earth Hacks
- Google Maps
- Geohack
- Wikimapia
- Everyscape
- Bing Maps
- Apple Maps
- Acme maps

Mapping Services

- ACME
- CalTopo
- GPS Visualizer
- MapQuest
- MSR Maps (TerraServer-USA)
- National Weather Service
- TerraFly
- TopoQuest
- Trails.com
- US EPA
- USGS National Map Viewer
- MarineTraffic.com, VesselFinder.com, Sailwx.com etc.
- Flightradar24, planefinder, flightview, flightaware

Flights

The screenshot displays the FlightAware website interface. At the top, the browser address bar shows the URL <https://flightaware.com/live/>. The website header includes the FlightAware logo, a search bar with the placeholder text "Search for flight, tail, airport, or city", and a "Track" button. Below the header, a navigation menu lists various features: LIVE FLIGHT TRACKING, PRODUCTS, ADS-B, PHOTOS, SQUAWKS, DISCUSSIONS, ABOUT, and CONTACT. The main content area is dominated by a large map of Europe, densely populated with orange airplane icons representing live flight data. Several airports are highlighted with green dots and labeled with their IATA codes, including PRB, SBP, SMX, BFC, WJY, XBA, OXR, MA, WHP, BUR, EMT, POA, CMT, CNO, EMU, DHR, TOA, LGB, FUL, and ANA. To the right of the map is a vertical advertisement for T. Rowe Price. The ad features a photograph of the Eiffel Tower in Paris and contains the following text: "BEING ACTIVE CAN TAKE YOU PLACES." in large white letters, "Being active can also help you reach your retirement goals." in blue text, and "T. Rowe Price's active investment approach can help you go further in retirement." in black text. The Windows taskbar at the bottom of the screen shows various application icons and the system clock indicating 10:42 AM on 2/23/2017.

GE Community

Google Earth Community

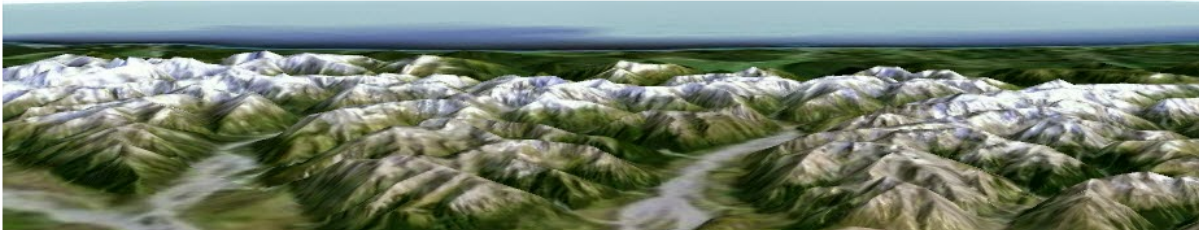
Search for messages

Sign in

Google Earth Community public

Actions

NEW TOPIC



Google Earth Community

You've reached the retired Google Earth Community forum. As of May 1st, 2015 this forum has been retired, and will remain as a Read Only resource. You'll be able to search, browse and read existing posts, along with downloading the attached KML files for exploration in Google Earth. Thank you all for your amazing discoveries and contributions over the years!

You can join the new Google Earth Community, created and hosted by the GEC moderators at the below link:

New Google Earth Community

GEC Forum Links:

- [Earth - Moderator Selected](#)
- [Earth](#)
- [Off World](#)

10:32 AM 2/23/2017

OpenStreetMap

The screenshot displays the OpenStreetMap web interface. At the top, the browser's address bar shows the URL <https://www.openstreetmap.org/#map=4/40.21/-107.67>. The page header includes the OpenStreetMap logo, navigation buttons for 'Edit', 'History', and 'Export', and a menu with options like 'GPS Traces', 'User Diaries', 'Copyright', 'Help', 'About', 'Log In', and 'Sign Up'. A search bar with the placeholder text 'Where am I?' is located on the left side of the map area. The main map shows a satellite-style view of North America, with labels for major cities and countries: Los Angeles, Phoenix, Ciudad de México, México, United States of America, Toronto, Ottawa, Washington, New York, La Habana, The Bahamas, Cuba, and República Dominicana. A scale bar in the bottom-left corner indicates 500 km and 300 mi. The Windows taskbar at the bottom shows various application icons, and the system tray in the bottom-right corner displays the time as 10:43 AM on 2/23/2017.

User community

The image shows a browser window displaying the OpenStreetMap website. The main page is titled "Public GPS traces" and lists several recent uploads by user F5ZV, including "Riervescemont_6.gpx", "Riervescemont_5.gpx", "Riervescemont_4.gpx", "Riervescemont_3.gpx", "Riervescemont_2.gpx", and "Riervescemont_1.gpx".

An inset window shows the "Changesets" list on the OpenStreetMap history page. The list includes:

- beacon:type=VORTAC**: Closed about 11 hours ago by geozelsig - #46328810
- beacon:type=NDB**: Closed about 11 hours ago by geozelsig - #46328676
- Imafinac**: Closed about 20 hours ago by pablopedia - #46321719
- #maproulette Fix_roundabouts**: Closed 1 day ago by 25or6to4 - #46293136
- Maproulette #1495**: Closed 2 days ago by Michi - #46287871
- Added maxspeed with mapillary**: Closed 2 days ago by Tom_Holland - #46280928

The bottom of the image shows a Windows taskbar with the system clock indicating 10:45 AM on 2/23/2017.

Google Street View

The image is a screenshot of a Google Street View page. At the top, the browser's address bar shows the URL: <https://www.google.com/maps/@34.4172406,-119.8459979,3a,75y,157.24h,80.87t/data=!3m6!1e1!3m4!1sIGNImUfu5wK4PI9BuP-7QA!2e0!7i3328!8i1664>. The browser tabs include "Ship Locations Map" and "Isla Vista, California - Go". The main content area displays a 360-degree panoramic view of a paved road in Isla Vista, California, captured in November 2007. The scene features a brick-paved area, a pergola structure on the left, and a large building on the right. A navigation bar at the bottom of the Street View window includes a compass, zoom controls, and a "Hide imagery" button. Below the Street View window is a horizontal strip of image thumbnails, including a map view, an "Earth" thumbnail, and several panoramic views of campus buildings, with labels for "Physical Sciences Quad", "Performing Arts Building", and "Information Kiosk". The Windows taskbar is visible at the very bottom, showing icons for various applications and the system clock displaying "10:51 AM 2/23/2017".

Cartography's Role in Federal Government

- NRC: Mapping Sciences Committee
- USGS: National Mapping Program
- Federal Geographic Data Committee: GeoPlatform.gov, Data.gov
- National Geospatial Advisory Committee
- National States Geographic Information Council

National Map Viewer

The screenshot displays the USGS National Map Viewer interface. At the top, the browser window shows the URL <https://viewer.nationalmap.gov/viewer/>. The application header includes the USGS logo and a search bar. Below the header, a toolbar contains navigation and tool options, with the active tool set to "None (Map Navigation)".

The left sidebar is titled "Base Data Layers" and lists several categories of data:

- US Topo Availability
- Geographic Names (GNIS)
- Structures
- Transportation
- Governmental Unit Boundaries
- Map Indices
- Hydrography - Cached
- Hydrography (NHD)
- FWS Wetlands - Topo Symbols
- National Land Cover Database (NLCD)
- Elevation Index - 3DEP
- Elevation Contours
- Imagery - 1 meter (plus)
- Imagery - 1 foot

Below these layers are sections for "Natural Hazards", "Other Featured Data", "User Added Content", and "Favorites".

The main map area shows a topographic view of the United States with state boundaries and major cities labeled. A scale bar at the bottom indicates 0, 300, and 600 miles. The map's coordinates are $34^{\circ} 02' 24.221'' N$ and $60^{\circ} 59' 16.878'' W$. The USNG coordinates are $20S PC 85728 68423 (NAD 83)$. The scale is $1:36,978,595$. The map is titled "The National Map".

At the bottom of the browser window, the Windows taskbar is visible, showing the time as 10:53 AM on 2/23/2017.

The National Academy of Science

- Civil War *Act of Incorporation*, signed by President Lincoln on March 3, 1863, established service to the nation as its dominant purpose
- 1916 Academy establishes the *National Research Council* at the request of President Wilson to recruit specialists from the larger scientific and technological communities to participate in war advising
- President Wilson issues executive order at the close of WWI asking the Academy to perpetuate the National Research Council
- Subsequent executive orders, by Presidents Eisenhower in 1956 and Bush in 1993, have affirmed the importance of the National Research Council and further broadened its charter
- President Obama addressed the NAS on Apr 27, 2009 stressing value of expert scientific advice to the nation

The National Academies today

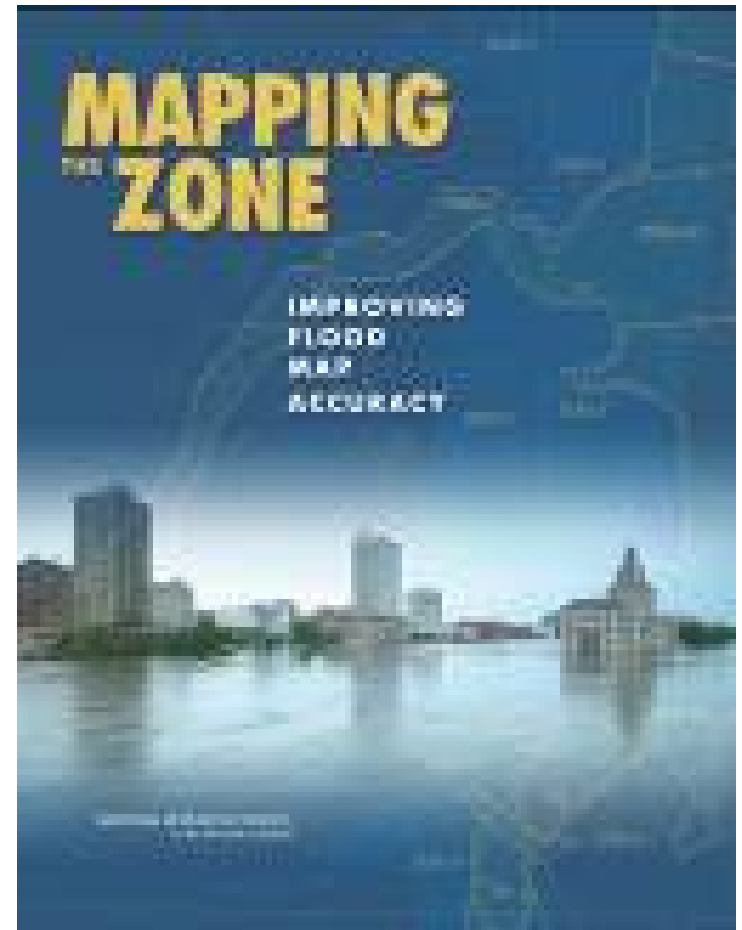
- The National Academies perform an unparalleled public service by bringing together committees of experts in all areas of scientific and technological endeavor
- Experts serve *pro bono* to address critical national issues and give advice to the federal government and the public
- Four organizations comprise the Academies: the *National Academy of Sciences*, the *National Academy of Engineering*, the *Institute of Medicine* and the *National Research Council*

MSC Origins

- In 1989, the National Research Council established the Mapping Science Committee to provide *"independent advice to society and to government at all levels on scientific, technical, and policy matters related to spatial information. It promotes the informed and responsible development and use of spatial data for the benefit of society"*.
- **From: The Role of the Mapping Science Committee in assisting the mapping of the United States** David J. Cowen

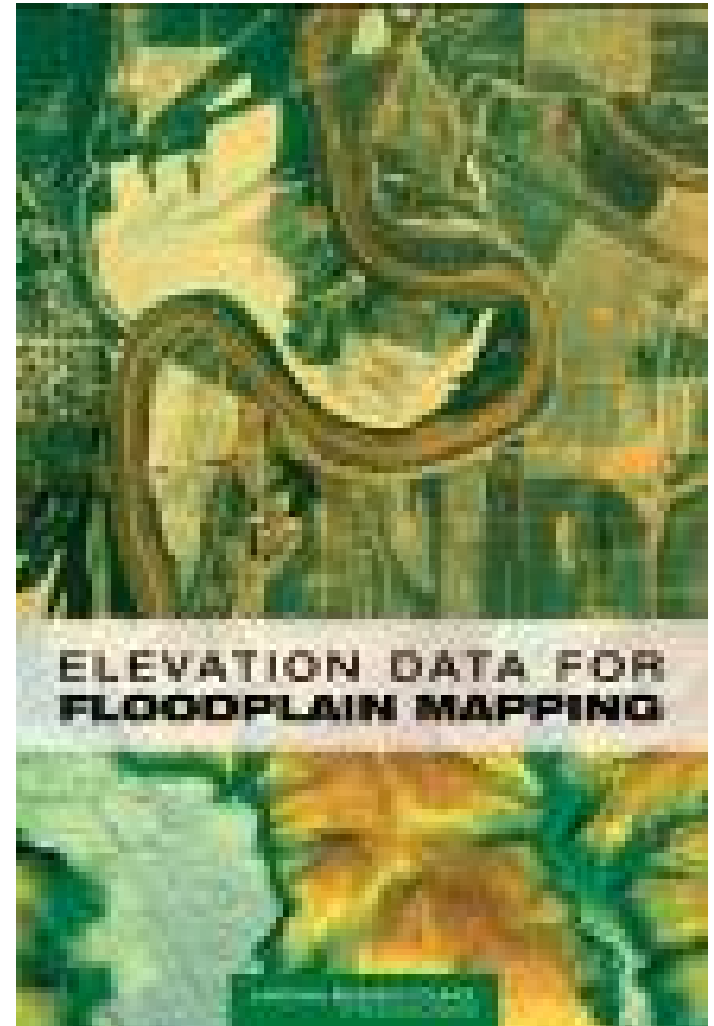
Mapping the Zone: Improving Flood Map Accuracy (2009)

- Examines the factors that affect the quality and accuracy of flood maps, assesses the costs and benefits of map improvement efforts, and recommends ways to improve flood mapping, communication, and management of flood-related data.
- Concludes that even the most expensive aspect of making more accurate maps—collecting high-accuracy, high resolution topographic data—yields more benefits than costs, and that FEMA should continue to invest in updating and improving its flood maps.
- Sponsors: FEMA and NOAA



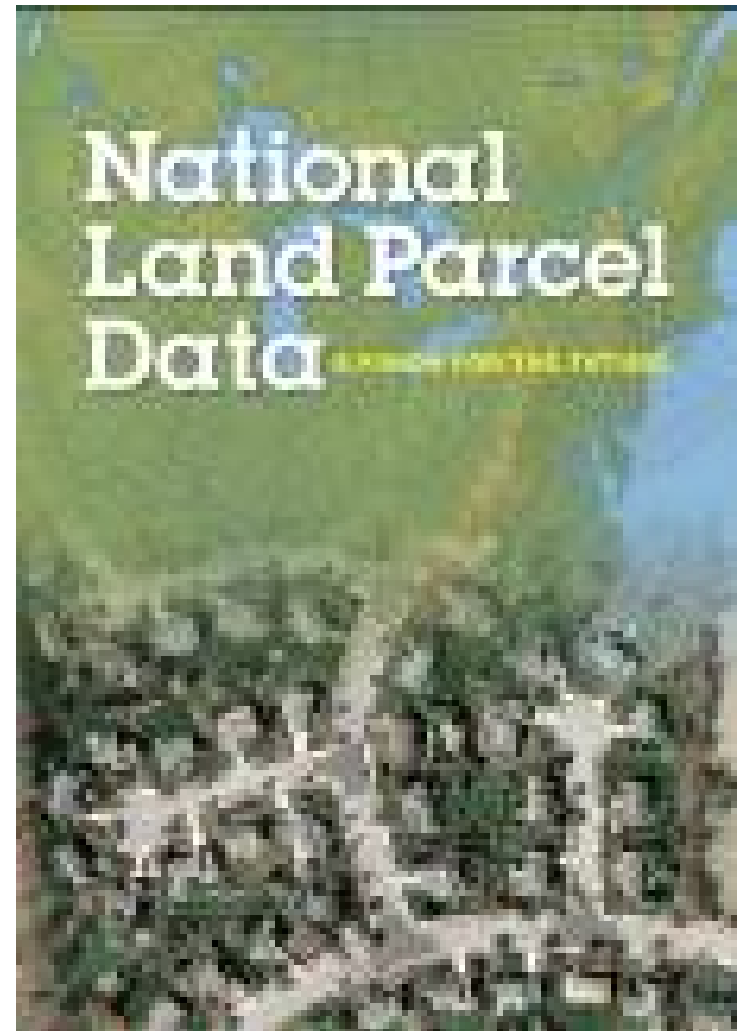
Elevation Data for Floodplain Mapping (2007)

- Examines the adequacy of the base map information available to support FEMA's floodplain map modernization program.
- Concludes that existing land surface elevation data are not adequate to determine whether a building should have flood insurance.
- Recommends that high-accuracy LiDAR data be collected nationwide and incorporated into the National Elevation Dataset that the USGS maintains for flood mapping and other applications.
- Sponsor: National Academies



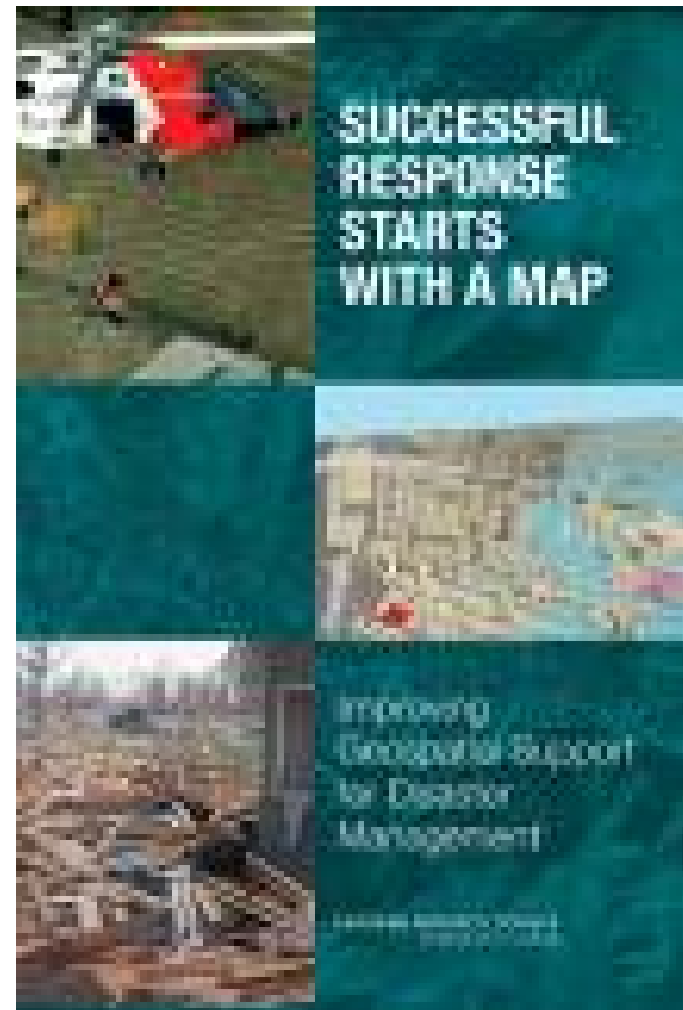
National Land Parcel Data: A Vision for the Future (2007)

- Assesses the status of land parcel data (also known as cadastral data) in the United States.
- Concludes that nationally-integrated land parcel data is necessary, feasible, and affordable, and recommends ways to establish a practical framework for sustained intergovernmental coordination and funding required to develop a nationally integrated land parcel data system.
- Sponsors: BLM, Census, DHS, ESRI, and FDGC



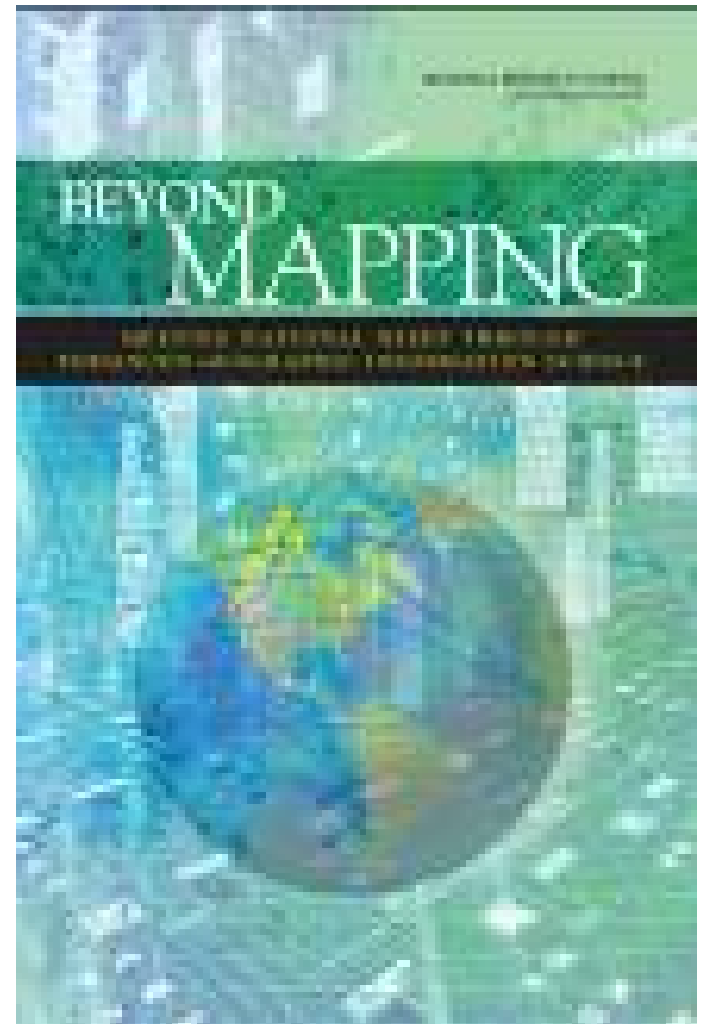
Successful Response Starts with a Map: Improving Geospatial Support for Disaster Management (2007)

- Assesses the use of geospatial data, tools, and infrastructure in disaster management
- Recommends significant investments be made in training of personnel, coordination among agencies, sharing of data and tools, planning and preparedness, and development of tools
- Sponsors: NASA, NGA, NOAA, and USGS



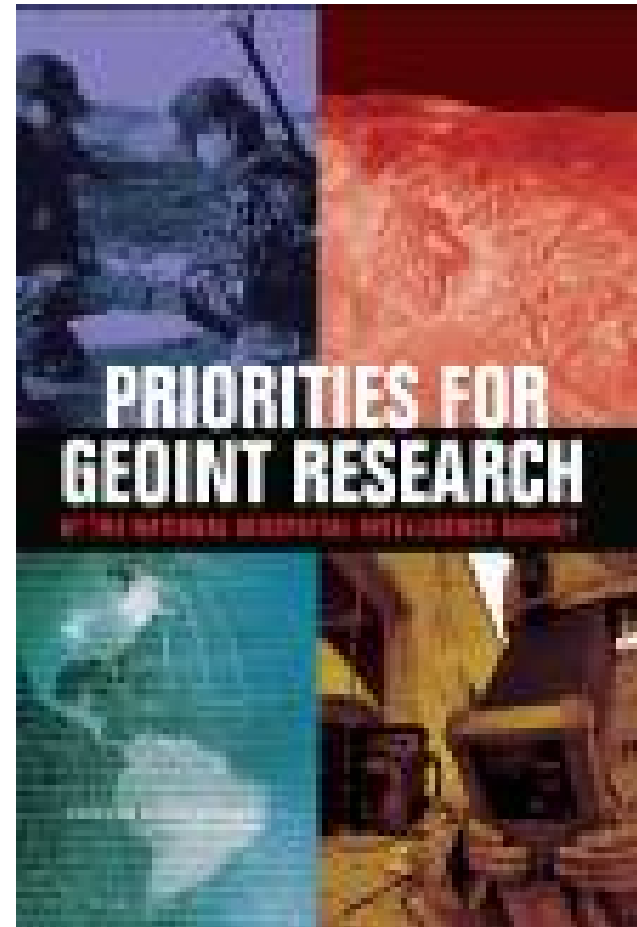
Beyond Mapping: Meeting National Needs Through Enhanced Geographic Information Science (2006)

- Assesses the state of mapping sciences and identifies national needs for GIS and GIScience professionals
- Recommends increased collaboration among academic disciplines, private companies, and government agencies; the implementation of GIS/GIScience at all levels of education; and the development of a coherent, comprehensive research agenda for the mapping sciences
- Sponsors: Census, NGA, NOAA, NSF, and USGS



Priorities for GEOINT Research at the National Geospatial-Intelligence Agency (2006)

- Defines 12 hard problems in geospatial science that NGA must resolve to meet future needs
- Many of these are related to data integration and the handling of spatio-temporal data
- Also suggests promising approaches in geospatial science and related disciplines for meeting these challenges
- Sponsor: NGA



A Few Cartographic Blogs

- Andy Woodruff <http://www.cartogrammar.com/blog/>
- Big Map Blog <http://www.bigmapblog.com/>
- A Cartographers Toolkit <http://www.gretchenpeterson.com/blog/>
- Radical Cartography <http://www.radicalcartography.net/>
- Making Maps DIY Cartography: <https://makingmaps.net/>
- Strange Maps <http://bigthink.com/articles?blog=strange-maps>
- Ken Field <http://cartonerd.blogspot.com/>
- Something About Maps <https://somethingaboutmaps.wordpress.com/>
- The Map Room <http://www.maproomblog.com/2016/01/persuasive-cartography/>
- Map Hugger <http://maphugger.com/>

Summary

- Academic cartography is surprisingly new as a discipline
- Cartography as a profession has undergone major changes
- Drafting to spatial analyst
- Covered major professional organizations
- Cartographic research relies on journals, many from professional societies
- Informal mapping organizations and map services
- Cartographers can impact government
- Covered NAS Mapping Science Committee
- Many blogs and much information available