

DIGITAL MAPPING TECHNIQUES 2020

The following was presented at DMT'20
(June 8 - 10, 2020 - A Virtual Event)

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2020)

<http://ngmdb.usgs.gov/info/dmt/>

The USGS-AASG National Geologic Map Database

Dave Soller (U.S. Geological Survey)

Public Law 102-285
102d Congress

An Act

May 18, 1992

[H.R. 2763]

National
Geologic
Mapping
Act of 1992.
Conservation.
Environmental
protection.
43 USC 31a
note.
43 USC 31a.

To enhance geologic mapping of the United States, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Geologic Mapping Act of 1992".

SEC. 2. FINDINGS AND PURPOSE.

(a) **FINDINGS.**—The Congress finds and declares that—

(1) during the past 2 decades, the production of geologic maps has been drastically curtailed; . . .

(8) a comprehensive nationwide program of geologic mapping is required in order to systematically build the Nation's geologic-map data base at a pace that responds to increasing demand.

(b) **PURPOSE.**—The purpose of this Act is to expedite the production of a geologic-map data base for the Nation, to be located within the United States Geological Survey, which can be applied to land-use management, assessment, and utilization, conservation of natural resources, groundwater management, and environmental protection.

facilitate planning and information exchange and to avoid redundancy.

SEC. 7. NATIONAL GEOLOGIC-MAP DATA BASE.

(a) **ESTABLISHMENT.**—The Survey shall establish a national geologic-map data base. Such data base shall be a national archive that includes all maps developed pursuant to this Act, the data bases developed pursuant to the investigations under sections (4)(d)(2) (C), (D), (E), and (F), and other maps and data as the Survey deems appropriate.

(b) **STANDARDIZATION.**—Geologic maps contributed to the national archives should have standardized format, symbols, and technical attributes so that archival information can be assimilated, manipulated, accessed, exchanged, and compared efficiently and accurately.

Historic
preservation.
43 USC 31f.



We stand on the shoulders of giants



“...the maps are designed not so much for the specialist as for the people, who justly look to the official geologist for a classification, nomenclature, and system of convention so simple and expressive as to render his work immediately [understandable]...”

– USGS Director J.W. Powell,
3RD IGC (Berlin, 1885)

[Home](#)

[Catalog](#)

[Lexicon](#)

[MapView](#)

[New Mapping](#)

[Standards](#)

[Comments](#)



The National Geologic Map Database

Developing a distributed archive of standardized geoscience information for the nation.

Map Catalog

Find over 90,000 products from over 600 publishers



Stratigraphy

Find geologic names, charts, and guidelines



MapView

Discover geologic maps through our map interface



TopoView

Access the Historical Topographic Map Collection





geologic maps



All

Images

Maps

News

Shopping

More

Settings

Tools

About 2,400,000 results (0.64 seconds)

USGS National Geologic Map Database

<https://ngmdb.usgs.gov/> ▼

USGS (U.S. Geological Survey) National **Geologic Map** Database.

[mapView](#) · [Geolex](#) · [NGMDB Info Page](#) · [Comments](#)

150,900 users made 327,000+ visits in May, 2020
(~ 10,500 visits / day)



The NGMDB project staff












Alex Acosta, Steve Cahan, Joe East, Chris Garrity,
Chuck Mayfield, Dennis McMacken, Christine Nguyen,
Andy Park, Dave Soller, Nancy Stamm, Rob Wardwell

Total Full-Time Equivalents: ~5.5

map: Bartholomew and others, 2019, VA Dept Geol Min Res OFR 2019-10



NGMDB Technical Advisory Working Group:

-  Jen Athey and Ken Papp (AK DGGGS)
-  Carlos Gutierrez and Jeremy Lancaster (CA GS)
-  Lillian Wang, Sandy Schenck, Jaime Tomlinson (DE GS)
-  Alan Baker and Rick Green (FL GS)
-  Mark Yacucci and Dick Berg (IL State GS)
-  John Dunham and Anthony Layzell (KS GS)
-  Doug Curl and Drew Andrews (KY GS)
-  Greg Barker and Rick Chormann (NH GS)
-  Jeff Paine and Michael Young (TX BEG)
-  Kent Brown, Grant Willis, Zach Anderson (UT GS)
-  Jessica Czajkowski and Casey Hanell (WA GS)

map: Osborne and others, 2019, Geol Survey AL Quad Map 70

NGMDB Technical Advisory Working Group:

- ❏ Improve / restore NGMDB's connections with State partners
- ❏ Identify how to better incorporate the NGMDB into State business plans (i.e., help each State find more value in the NGMDB)
- ❏ Assist with long-term NGMDB planning (e.g., staffing, stability, new directions)

map: Phillips and others, 2019, ID Geol. Survey DWM-186

A commonly-held vision for the NGMDB, ca. 1996

The NGMDB should be a repository of GIS data for geologic maps and related information, managed in a complex system distributed among the USGS and State geological surveys.

It should offer public access to attributed vector and raster geoscience data, and allow users to perform queries online, create derivative maps, and download source and derived map data.

Further, all information (including GIS features) in the database would retain metadata that clearly indicates its source.

... an inspiring vision that was not feasible in 1996. But now...

map: Scarberry, 2019, MT Bur Mines Geol, Geol Map 72

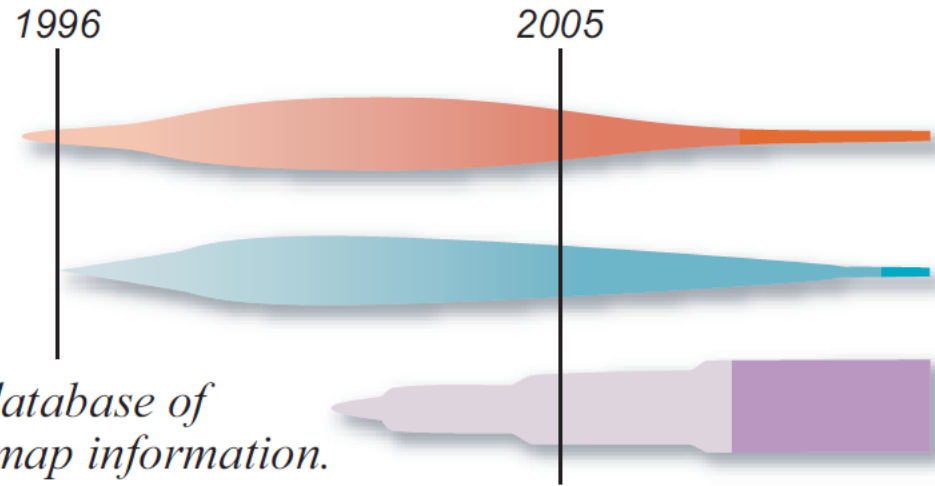
The general plan for the NGMDB, ca. 1996 -

PROGRESS

PHASE 1 build the map catalog, and related databases.

PHASE 2 develop standards for maps and databases.

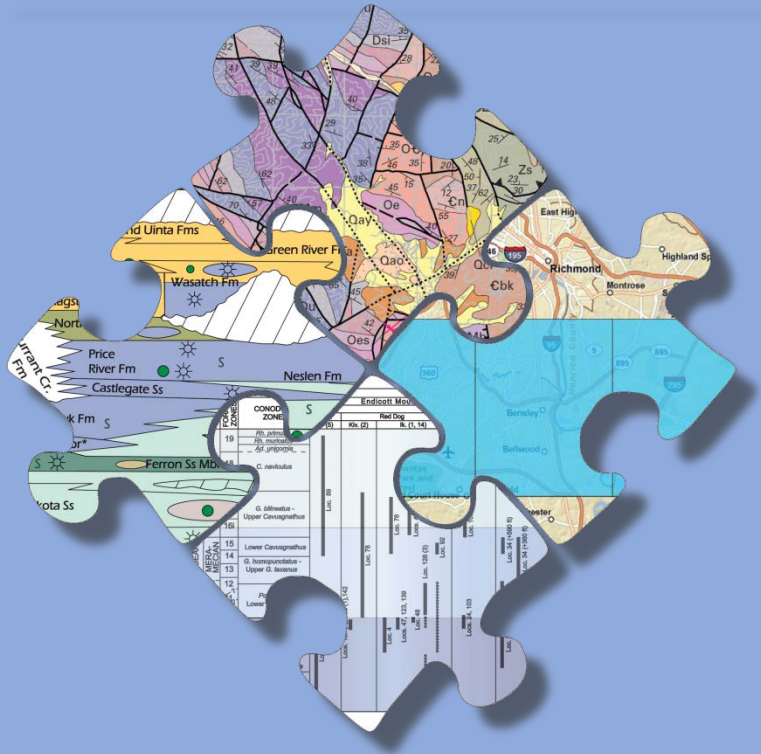
PHASE 3 build an online database of digital geologic map information.



from NGMDB Progress Report, DMT'05 Proceedings <http://pubs.usgs.gov/of/2005/1428/soller1/>

Database contents

- Geoscience Map Catalog
- Geologic Names Lexicon
- NCGMP Mapping In Progress
- USGS Biostratigraphy Archives (in prep.)



Geoscience Map Catalog

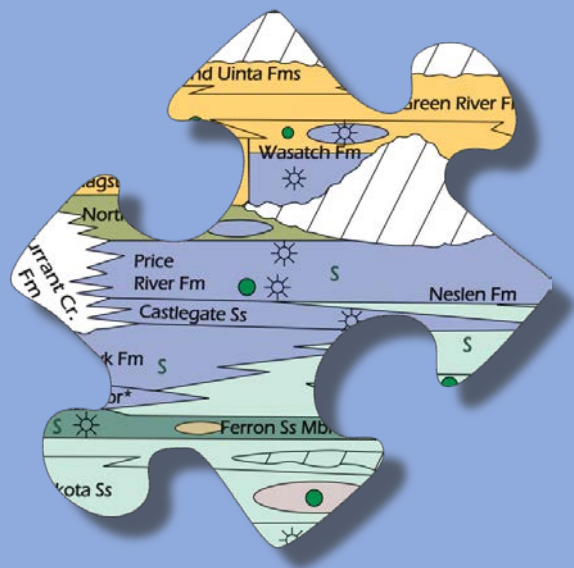


- ∞ 105,500 products
- ∞ 650+ publishers
- ∞ 70,500 are “digital”
 - >30,000 are geologic maps
 - 39,000 are resource-related
 - 12,000 are hazards-related

We provide bibliographies and links to where you can buy, borrow, or download these products.

US Geologic Names Lexicon GEOLEX

A compilation of the definitions -and redefinitions- of geologic names applied to the rocks and sediments of the US, its possessions and territories, 1823-Present.



- ☞ 16,500+ geologic names
- ☞ 10,200+ references
- ☞ 38,500+ synopses
- ☞ 4,600,000+ words

Supplemented by: scanned GNC index card catalogs, links to State lexicons, correlation charts, guidelines

National Geologic Map Database

Geolex — Stratigraphic Resources

A collection of stratigraphic and related resources for scientists,
and for compiling and maintaining Geolex.



North American Stratigraphic Code

This Code describes how to classify and name all formally defined geologic units shown on maps and sections. It is the basis for the stratigraphic terminology used in the U.S. and compiled into Geolex.

See also:

[NACSN website](#)

[Revision to Article 37 \(Complex\) of The Code \(Easton and others, 2016\)](#)



Correlation Charts

Correlation charts and stratigraphic sections provide essential two- and three-dimensional context for the geologic names described in Geolex and in statewide and regional lexicons. Selected charts, sections, and lexicons are provided here.



USGS Index Cards

The Geologic Name Committee's (GNC) large collection of index cards citing references for geologic names (maintained ca. 1900-1990), here offered as a supplemental source of information on geologic names.



USGS Lexicons

Since the late 1800's, the U.S. Geological Survey has been responsible for maintaining a lexicon of geologic names for the Nation. Copies of previously published USGS lexicons are provided here, for quick reference.



Geologic time scales

A brief list of current and past geologic time scales



AAPG Geologic Provinces

For stratigraphic records in Geolex, we continue the established practice of assigning one or more "Geologic Provinces", to indicate where the geologic unit is known to occur. These provinces were defined by the Association of Petroleum Geologists; this province map is shown here.

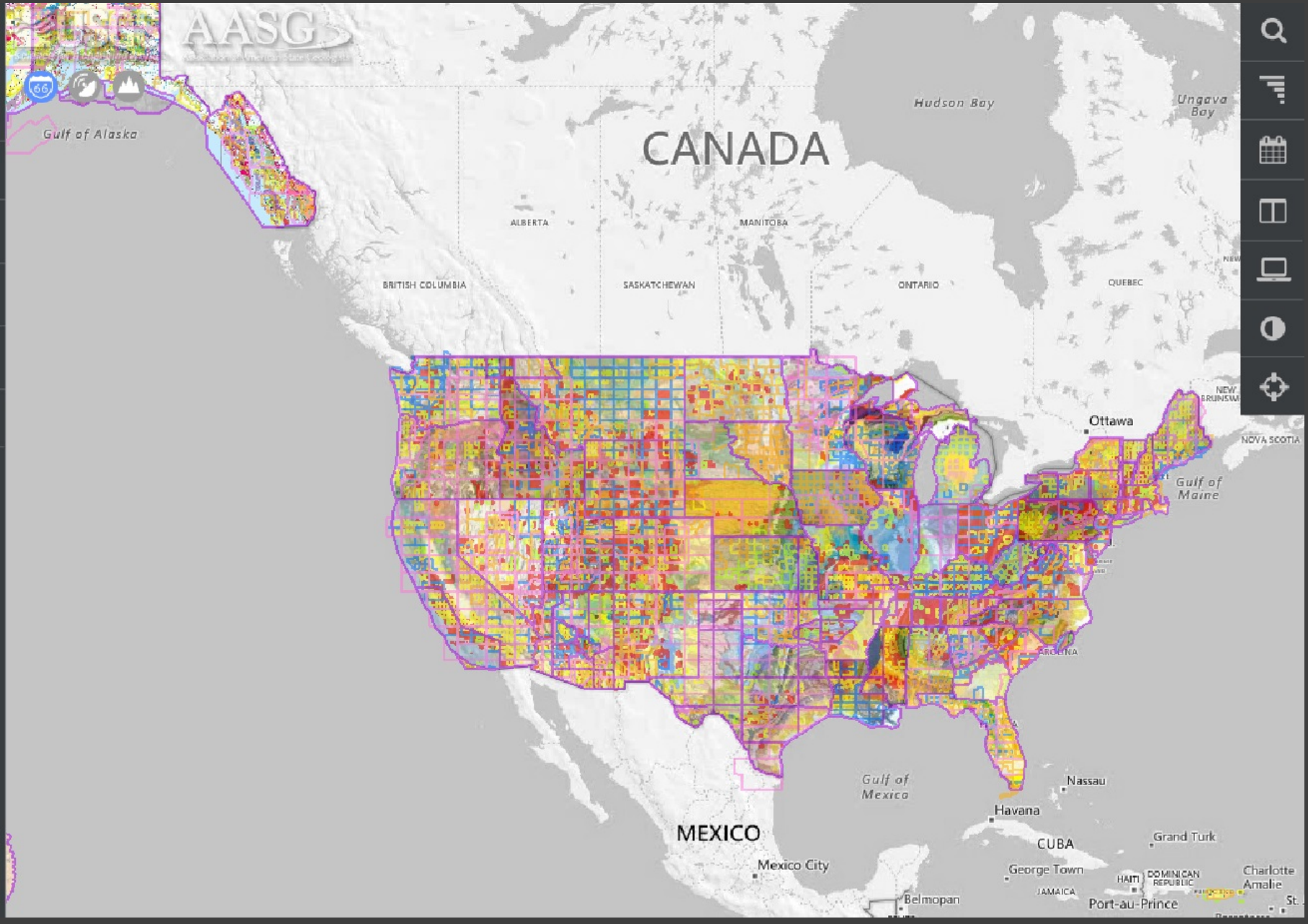


List of Journals

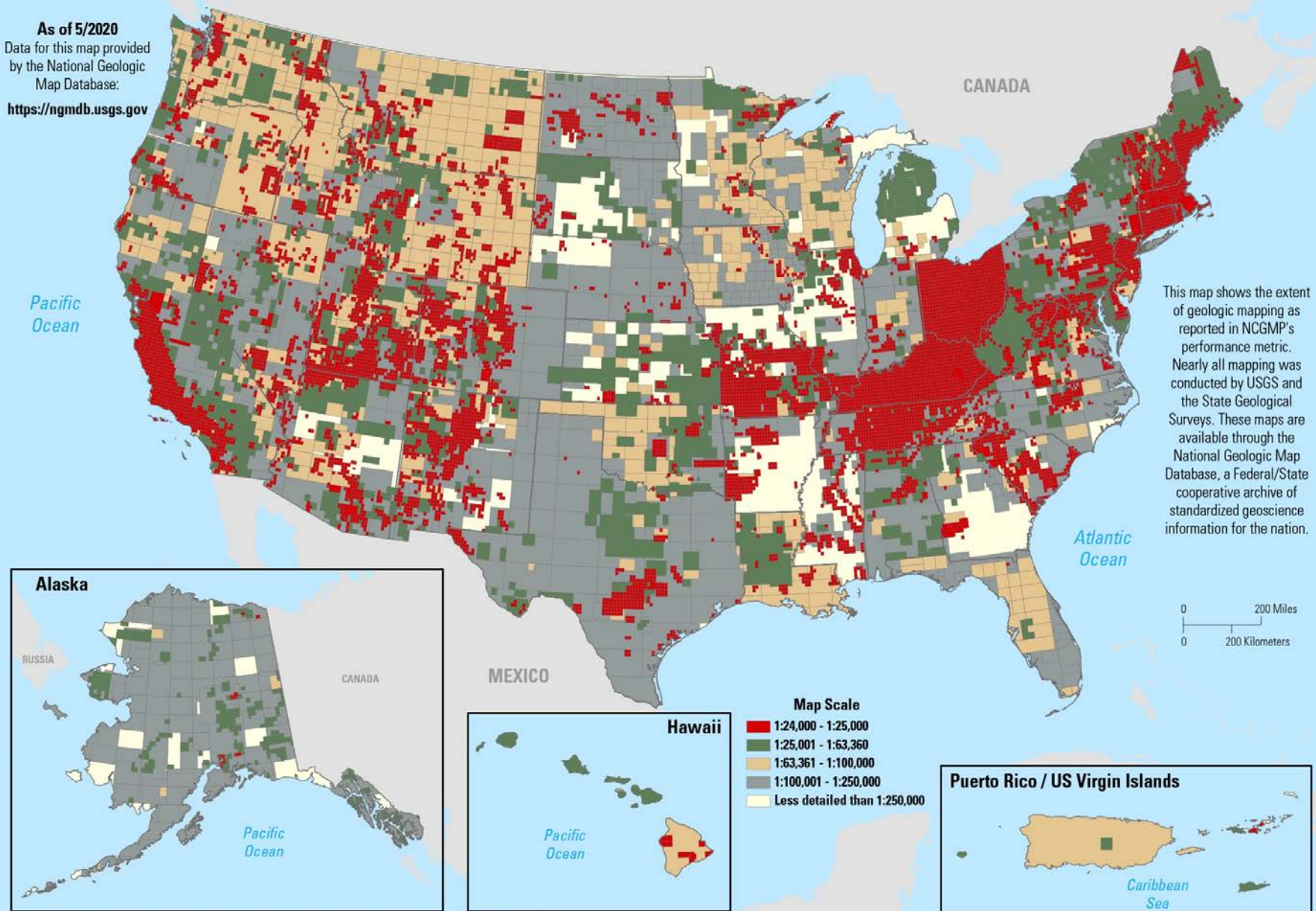
Articles in scientific journals and society publications are checked periodically for stratigraphic information that could be included in Geolex. This list of journals is provided as an additional resource for your stratigraphic studies.



mapView



As of 5/2020
Data for this map provided
by the National Geologic
Map Database:
<https://ngmdb.usgs.gov>

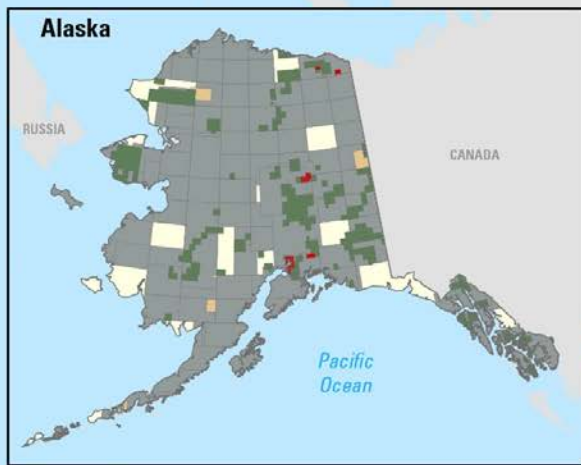


This map shows the extent of geologic mapping as reported in NCGMP's performance metric. Nearly all mapping was conducted by USGS and the State Geological Surveys. These maps are available through the National Geologic Map Database, a Federal/State cooperative archive of standardized geoscience information for the nation.



Map Scale

- 1:24,000 - 1:25,000
- 1:25,001 - 1:63,360
- 1:63,361 - 1:100,000
- 1:100,001 - 1:250,000
- Less detailed than 1:250,000



Mapping In Progress i

Source: [NGMDB - Progress Reports](#)



Mapping in Progress provides information on current mapping projects, prior to inclusion of their products in the NGMDB map catalog. Click any map or table record for contact information.

ALL STATEMAP EDMAP FEDMAP

Showing **23** projects on screen.

Filter by quad, project, or affiliation name

Project Affiliation Program Scale

Appalachian Basin Geologic Mapping Project, U.S. Geological Survey F

Scale: Various | Mapping Year: 2019

Bombay Hook Island (DE-NJ) Quadrangle, Delaware Geological Survey S

Scale: 24000 | Mapping Year: 2019

Broad Top (part 2) Project, Pennsylvania Bureau of Topographic and Geologic Survey S

Scale: 24000 | Mapping Year: 2019

Cartersville (VA) Quadrangle, Virginia Division of Mineral Resources S

Scale: 24000 | Mapping Year: 2019

Gaithersburg (MD) Quadrangle, Maryland Geological Survey S

Scale: 24000 | Mapping Year: 2019

Contact Name: **David K. Brezinski**

Contact Phone: 410-554-5526

Contact Mail: david.brezinski@maryland.gov

[Contact](#) [Website](#) [Comment](#)

Gladstone (VA) Quadrangle, College of William and Mary E

Scale: 24000 | Mapping Year: 2019

Green Bank (NJ) Quadrangle, New Jersey Geological Survey S

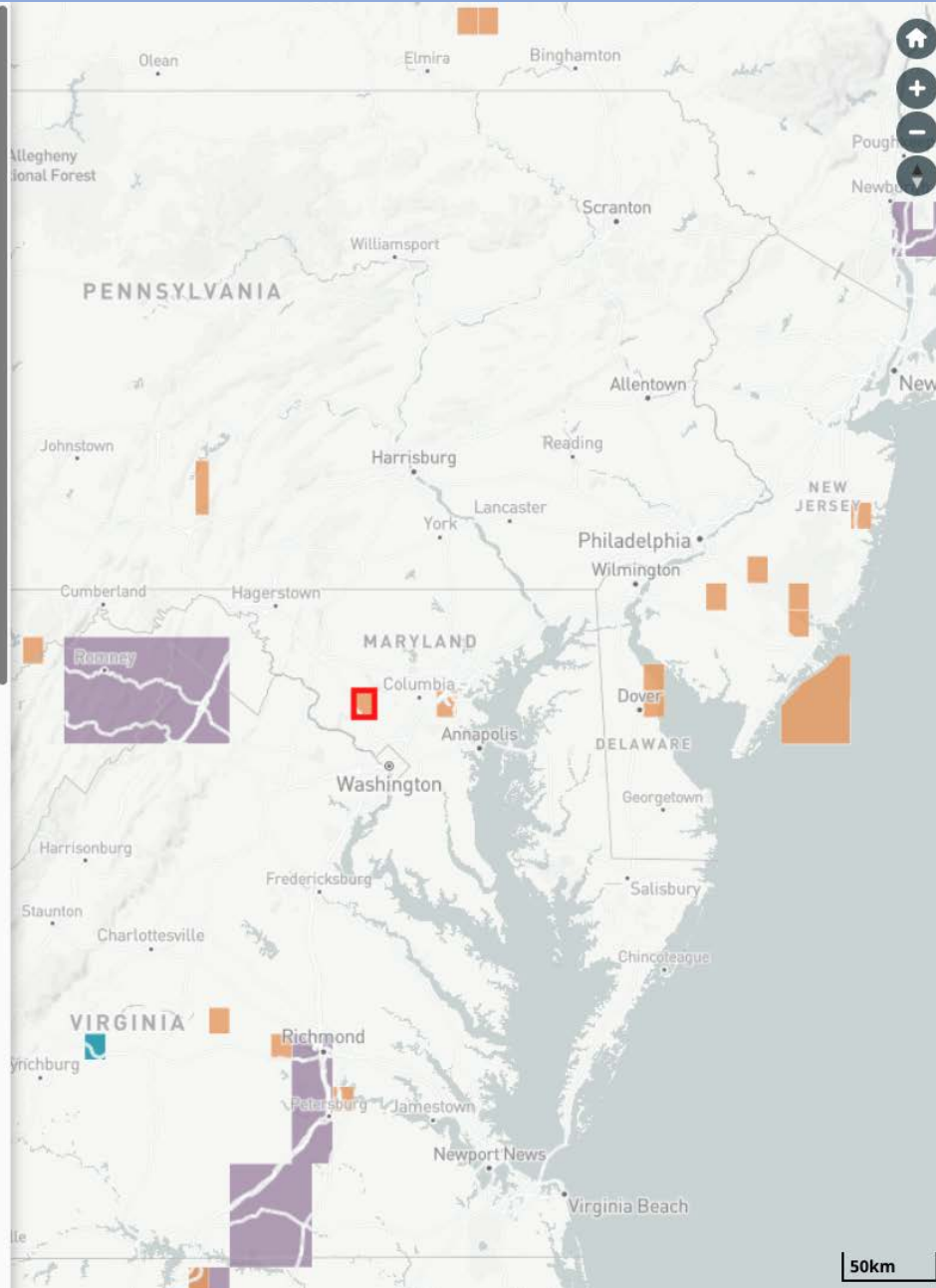
Scale: 24000 | Mapping Year: 2019

Hopewell (VA) Quadrangle, Virginia Division of Mineral Resources S

Scale: 24000 | Mapping Year: 2019

Jenkins (NJ) Quadrangle, New Jersey Geological Survey S

Scale: 24000 | Mapping Year: 2019



<https://ngmdb.usgs.gov/mip/>

Earth MRI Acquisitions Map

Source: [Earth Mapping Resources Initiative \(Earth MRI\)](#)
Metadata & Data Services: [MRData](#), [NGMDB](#)

Earth MRI began in 2019 and is a partnership between the USGS and State Geological Surveys to acquire new geologic maps, geophysical surveys, and LIDAR data to better understand the fundamental geologic framework of areas across the Nation with potential for hosting critical mineral resources. Click any map area or table record to learn more.

All Geology Geophysics LIDAR

Showing 17 projects on screen.

Filter by project, affiliation, or state name

Project Affiliation Theme Year

Blue Ridge area, Maryland | Maryland Geological Survey

Year Started: 2019 | Year Complete: In Progress

GE

Charleston area, South Carolina | USGS Geology, Geophysics, and Geochemistry Science Center

Year Started: 2018 | Year Complete: In Progress

GP

Fluorspar District, Kentucky | USGS 3D Elevation Program (3DEP)

Year Started: 2019 | Year Complete: In Progress

LI

Hicks Dome and Fluorspar District, Illinois | USGS 3D Elevation Program (3DEP)

Year Started: 2019 | Year Complete: In Progress

LI

Hicks Dome area, southeastern Illinois | Illinois State Geological Survey

Year Started: 2019 | Year Complete: In Progress

GE

Hicks Dome area, southeastern Illinois | USGS Geology, Geophysics, and Geochemistry Science Center

Year Started: 2019 | Year Complete: In Progress

GP

Hicks Dome area, southwestern Kentucky | Kentucky Geological Survey

Year Started: 2019 | Year Complete: In Progress

GE

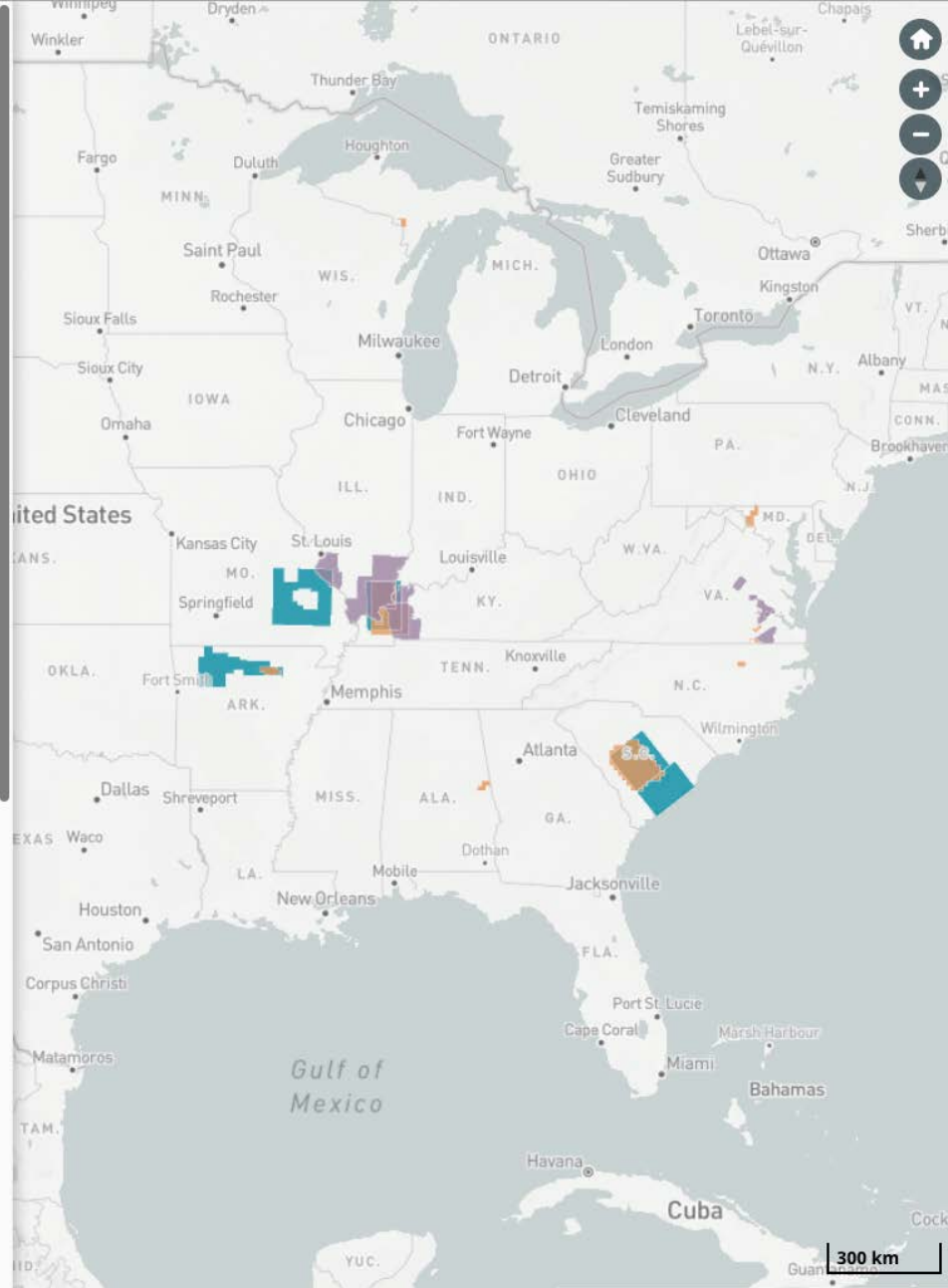
Marine phosphate deposits of Arkansas | Arkansas Geological Survey

Year Started: 2019 | Year Complete: In Progress

GE

Ozarks, Ouachita, and southern lowlands of Arkansas | USGS Geology, Geophysics, and

GP



<https://ngmdb.usgs.gov/emri/>

topoView

Location: Butte, MT

1880 ————— 2019

All 250K 100K 63K 48K 24K HTMC UST All

41 maps here | Scale: All, Date: 1880-2019, Series: All
 1324 Harrison Ave, Butte, MT 59701 | Elev: 5,474 ft

Filter records: Name Date Scale State

Helena, MT
 1889 (HTMC, 1889 ed.) Scale 1:250000
 JPEG (2 MB) GeoTiff (7 MB)
 KMZ (3 MB) GeoPDF (9 MB)
 SHOW INFO ZOOM PAN PIN FIX

Dillon, MT
 1893 (HTMC, 1929 ed.) Scale 1:250000

Dillon, MT
 1893 (HTMC, 1917 ed.) Scale 1:250000

Dillon, MT
 1893 (HTMC, 1909 ed.) Scale 1:250000

Dillon, MT
 1893 (HTMC, 1901 ed.) Scale 1:250000

Helena, MT
 1893 (HTMC, 1889 ed.) Scale 1:250000

Helena, MT
 1893 (HTMC, 1893 ed.) Scale 1:250000

Dillon, MT
 1893 (HTMC, 1893 ed.) Scale 1:250000

Helena, MT
 1899 (HTMC, 1956 ed.) Scale 1:250000

Helena, MT
 1903 (HTMC, 1929 ed.) Scale 1:250000

Helena, MT
 1903 (HTMC, 1929 ed.) Scale 1:250000

Lat: 46° 48' 20" N Long: 113° 16' 38" W
 Scale 1:1,155,581
 Map Records: 333,385
 Rain showers, 53° near Walkerville, MT.

<https://ngmdb.usgs.gov/topoview/>

National Geologic Map Database

Standards and guidelines

Background

Background

"GeMS"

Recommended Database Design

Related But Older Database Designs

FGDC Cartography Standards

Geologic Time Scales

Science Terminologies

Base Maps and Projections

Tools and Techniques

Publication Guidelines

To create, manage, and disseminate digital earth-science information, it is increasingly clear to data producers and users that certain widely-accepted standards are essential. In the past, many organizational units (e.g., projects or programs) have of necessity developed their own standard practices for creating and managing digital map data. Because the resources needed to develop widely-accepted standards are difficult for a single organizational unit to justify, many of these standard practices developed in an ad hoc fashion, with scant input from other groups.

Two notable mechanisms now exist in the United States to promote the coordination of widely-accepted standards: 1) the National Geologic Mapping Act of 1992 stipulates that necessary standards be developed by USGS and the Association of American State Geologists (AASG) to support the National Geologic Map Database (NGMDB); and 2) the Federal Geographic Data Committee (FGDC), through its Geologic Data Subcommittee, is responsible for development of standards to support geologic data management at the Federal level.

The links below contain information pertinent to the development of standards and guidelines for geologic mapping. Many of these works stemmed from discussions held at the annual [Digital Mapping Techniques](#) workshop, sponsored by the NGMDB and the Association of American State Geologists. The beginning stages of this work (ca. 1996-1997) are documented and preserved in an [archival site](#) and in the [earliest NGMDB reports of progress](#).

"GeMS" — standard Geologic Map Schema

"GeMS" (formerly named NCGMP09) is the standard schema for geologic maps funded by the USGS National Cooperative Geologic Mapping Program (NCGMP). Its design specifies encoding the content analogous to that contained in a single, traditional geologic map. GeMS is intended to provide a stepping stone toward development of multimap databases, in particular the National Geologic Map Database (NGMDB). Please visit our [GeMS site](#).

<http://ngmdb.usgs.gov/Info/standards>



FGDC Document Number FGDC-STD-013-2006

FGDC Digital Cartographic Standard for Geologic Map Symbolization

Geologic Data Subcommittee

Federal Geographic Data Committee

August 2006

Prepared by the U.S. Geological Survey for the Federal Geographic Data Committee

https://ngmdb.usgs.gov/fgdc_gds/

Paper Copies Are
Still Available !

National Geologic Map Database

"GeMS" — Geologic Map Schema (formerly "NCGMP09")

Documentation and Tools

Resources

Examples published in NCGMP09 format

Collaborate

Background

Archive of previous versions and presentations

In 2014-2017, this database design was extensively reviewed and test-implemented by the U.S. Geological Survey and the State Geological Surveys. During this process, certain modifications and clarifications to the current version (NCGMP09v1.1) were identified. A new version is now being prepared for formal publication by the USGS. This new version is given a new, more pronounceable name — "GeMS" (Geologic Map Schema). Questions or comments may be directed [here](#).

Documentation and Tools

- [GeMS draft manuscript](#) — "GeMS" (Geologic Map Schema) is the latest version of NCGMP09 (see the [Archive](#), below, for NCGMP09 documentation). This draft manuscript is still provisional; however, it has passed Peer Review, and it is now being prepared for technical edit and, ultimately, for formal publication by the USGS. Please contact us at gems@usgs.gov with questions and comments.
- [Toolbox for ArcMap](#) — ArcMap geoprocessing tools for GeMS schema, version 1.0.4 (pulled 5/21/20 from Github repository) 3.5 MB
- [Toolbox for ArcGIS Pro](#) — ArcGIS Pro geoprocessing tools for GeMS schema, version 2.0.3 (pulled 5/21/20 from Github repository) 1.5 MB
- [GitHub repository for ArcMap GeMS Toolbox](#)
- [GitHub repository for ArcGIS Pro GeMS Toolbox](#)
- [Archive of previous versions and presentations](#)
- [Progress Report](#) on the evaluation and implementation of NCGMP09 (Sept. 25, 2013)

Resources

- [Notes and resources for a short course on making geologic maps with the NCGMP09 schema](#) — includes file "NCGMP09v1_Toolbox3b" (Ralph Haugerud, USGS, 5/23/2016) 322MB
- [Building an enterprise GeMS database](#) (Alaska Division of Geological and Geophysical Surveys)
- [NCGMP09 Migration Pilot Project](#) (Washington State Division of Geology and Earth Resources)
- [ESRI Style implementation of FGDC Standard](#) (Geological Survey of Canada; requires administrator privileges to install the included fonts) 5.7 MB
- [ESRI Style implementation of FGDC Standard](#) (Alaska Division of Geological and Geophysical Surveys) 33.4 MB
- [FGDC Digital Cartographic Standard for Geologic Map Symbolization](#)
- [Gitter chat room](#) — discussion space for questions about using the GeMS schema

Collaborate

- If your project or agency has tools, workflows, or documentation you would like to share, please consider having links posted here. Write to gems@usgs.gov to discuss.

Background

"GeMS"

Recommended
Database Design

Related But Older
Database Designs

FGDC Cartography
Standards

Geologic Time
Scales

Science
Terminologies

Base Maps and
Projections

Tools and
Techniques

Publication
Guidelines

- [The Public Land Survey System \(PLSS\)](#) [The National Atlas, 2013]
- [Principal Meridians and Base Lines](#) [Bureau of Land Management]
- [Map Projections](#) [Center for Spatially Integrated Social Science, 2014]

Tools and Techniques

A few handy coordinate-conversion utilities and other resources are provided below. Suggestions for additional links are welcome.

- [Coordinate conversion utilities](#) ["Graphical Locator", Montana State University]
- [Additional coordinate conversion utilities](#) [Montana State University]
- [Coordinate conversion utilities](#) [Earth Point]
- [State Plane - Lat/Long converter](#) [National Geodetic Survey]
- [Geodetic tool kit](#) [National Geodetic Survey]
- [Pick sets of colors \(by hex, HSV, RGB\)](#) [colorpicker.com]
- [Pick sets of colors \(by hex\)](#) [hailpixel.com]
- [Pick a color scheme](#) [colorbrewer2.org]
- [Comparison of digital geologic field systems](#) [Wikipedia]
- [Formal metadata: information and software](#) [U.S. Geological Survey]
- [Metadata wizard](#) [U.S. Geological Survey]
- [Various reports in the Digital Mapping Techniques Proceedings](#) [U.S. Geological Survey, 1997-present]

Publication Guidelines for Geologic Maps

- [Geologic Nomenclature and Description](#) -- DRAFT document for inclusion in "USGS Suggestions to Authors of the Reports of the United States Geological Survey, Eighth Edition" (STA8)
- [Suggestions to Authors of the Reports of the United States Geological Survey](#) [U.S. Geological Survey, 1991]
- [Guidelines for Digital Review of a Geological Map Database](#) [U.S. National Cooperative Geologic Mapping Program, 2010]
- [Guidelines for Peer Review of a Geologic Map Product](#) [U.S. National Cooperative Geologic Mapping Program, 2010]
- [Recommended Citations for Unpublished GIS Files — Summary of a Discussion Session](#) [Digital Mapping Techniques Proceedings, 2010]
- [Map Authorship and Citation Guidelines: Summary of a Discussion Session](#) [Digital Mapping Techniques Proceedings, 2001]

ACCESSIBILITY

FOIA

PRIVACY

POLICIES AND NOTICES



Geologic Nomenclature and Description

[DRAFT document for inclusion in “USGS Suggestions to Authors of the Reports of the United States Geological Survey, Eighth Edition” (STA8)]

Version 1.0, March 14, 2018

This document was prepared for the U.S. Geological Survey by a working group comprised of members of the Science Publishing Network and the U.S. Geologic Names Committee.

Working group members are (listed alphabetically): Katherine Burgy, Julie A. Herrick, Katherine D. Jacques, Claire M. Landowski, David A. Shields, and Nancy R. Stamm (Geologic Names Committee Secretary).

This document will be included in STA8, which is planned for publication in 2018 or 2019.

For reference, the seventh edition of STA is available at https://www.nwrc.usgs.gov/lib/lib_sta.htm.

For questions or comments about this document, contact:

Nancy Stamm and Claire Landowski (STA8geolnomen@usgs.gov). Because a final copyedit will be done prior to STA8 publication, we request that you limit your editorial comments to identifying missing or incorrect content, and to issues of general comprehension.

[Document accessed at https://ngmdb.usgs.gov/info/docs/USGS-STA8_GeolNomenChapterDRAFT.pdf.]



What is Phase Three?

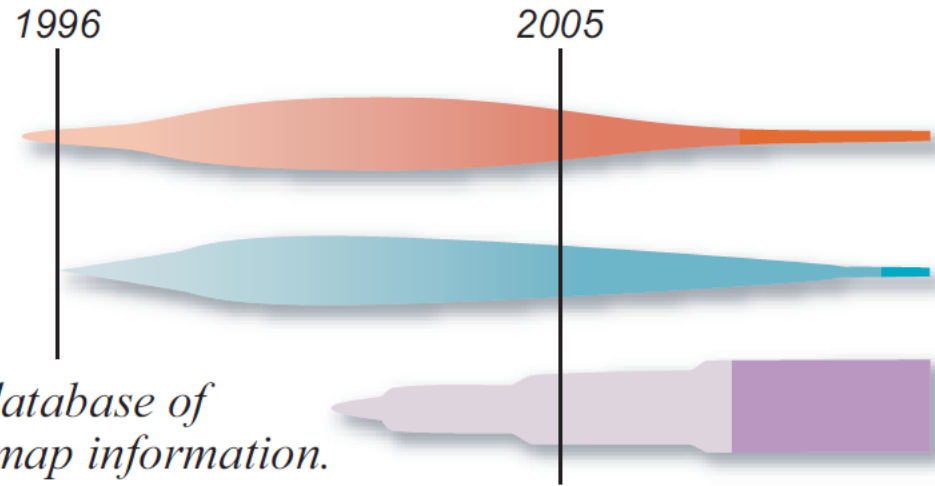
The general plan for the NGMDB, ca. 1996 -

PROGRESS

PHASE 1 build the map catalog, and related databases.

PHASE 2 develop standards for maps and databases.

PHASE 3 build an online database of digital geologic map information.



from NGMDB Progress Report, DMT'05 Proceedings <http://pubs.usgs.gov/of/2005/1428/soller1/>

A commonly-held vision for the NGMDB, ca. 1996

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Further, all information (including GIS features) in the database would retain metadata that clearly indicates its source.

... an inspiring vision that was not feasible in 1996. But now...

map: Houston and others, 2018, OR Dept Geol Min Ind, Geol Map 121



DEPARTMENT OF THE INTERIOR, ENVIRONMENT, AND RELATED AGENCIES APPROPRIATIONS BILL, 2020

"...This increase provides an additional \$10,000,000 to support launch of Phase Three of the National Geologic Map Database that will bring together detailed national and continental-resolution 2D and 3D information produced throughout the Survey and by federal and state partners..." (p. 48)

Two new NCGMP-funded projects:

(1) NGMDB Phase Three

(2) Nationwide Geologic Synthesis

map: Tassier-Surine, 2019, IA Geol Survey OFM-19-2



NGMDB Phase Three Tasks:

1. Extend the NGMDB's Trusted Digital Repository
2. GeMS support and development for map compilations
3. Convert high-priority geologic maps to GeMS format
4. NGMDB Catalog enhancement
5. Assistance in addressing stratigraphic nomenclature issues across map boundaries
6. Development and support of ancillary databases
7. Data delivery


map: Heinrich and McCulloh, 2019, LA Geol Survey OFM-2019-1

NGMDB Phase Three Tasks:

1. Extend the NGMDB's Trusted Digital Repository

- ❏ To efficiently accept, manage, and deliver the GeMS-formatted GIS map compilations and other science content received from State Geological Surveys and USGS
- ❏ Develop technical guidance, workflows, documentation

map: Wykel and Doar, 2019, SC Geol. Survey OFR 237



Including the NGMDB Trusted Digital Repository,
USGS has only four:



* Certification according to ICSU (International Council for Science) Program for
Trusted Data Services for Global Science

NGMDB Phase Three Tasks:

2. GeMS support and development for map compilations

- ❑ Develop and maintain GeMS validation tools
- ❑ Maintain the GeMS Web and GitHub sites
- ❑ Assist in coordinating GeMS implementation among the States
- ❑ Provide technical assistance to States and USGS as needed

map: Green and others, 2019, FL Geol. Survey OFM 111

NGMDB Phase Three Tasks:

3. Convert high-priority geologic maps to GeMS format

- ❑ To assist in developing a "critical mass" of GeMS-compliant maps
- ❑ To support geologic map compilation projects
- ❑ Document workflows, tools, lessons learned in order to support Task 2
- ❑ Ensure that older "born digital" maps are not lost

map: Walsh and others, 2020, USGS SIM 3440

NGMDB Phase Three Tasks:

4. NGMDB Catalog enhancement

- ▣ To assist with improving the Catalog's content and searchability for Phase Three Plus projects
- ▣ Supported in part by STATEMAP Supplemental

map: Smith and Dunham, 2019, KS Geol. Survey OFR 2019-13



NGMDB Phase Three Tasks:

5. Assistance in addressing stratigraphic nomenclature issues across map boundaries

- ❏ To assist in compilation of Geolex and to continue our development of standard stratigraphic nomenclatural guidelines for seamless map compilation
- ❏ Supports objectives of the U.S. Geologic Names Committee

map: Mattheus and others, 2020, DE Geol Survey Geol Map 25



NGMDB Phase Three Tasks:

6. Development and support of ancillary databases

First, identify "who has what" -- i.e., conduct nationwide inventories, for:

- 🔍 Geochronology
- 🔍 Borehole and well data
- 🔍 Geophysical logs and seismic lines
- 🔍 Engineering properties

Second, increase accessibility to these data, in some cases by building databases

map: Thompson and others, 2020, USGS SIM 3447

NGMDB Phase Three Tasks:

7. Data delivery

- Initially, delivery of content will be relatively straightforward, relying on the codebase and current and newly-released NGMDB interfaces
- As the multi-map GeMS-compliant database is developed, the new system will build upon the prototype released ca. 2009 (the Pacific Northwest Data Portal)

GG-K map: Lynds and others, 2020, WY Geol Survey OFR 19-3