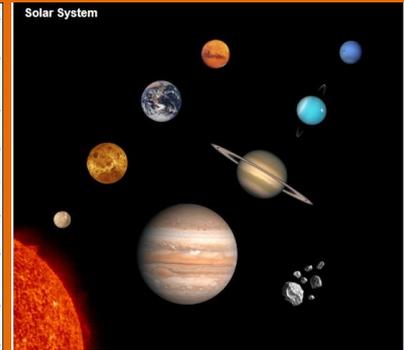
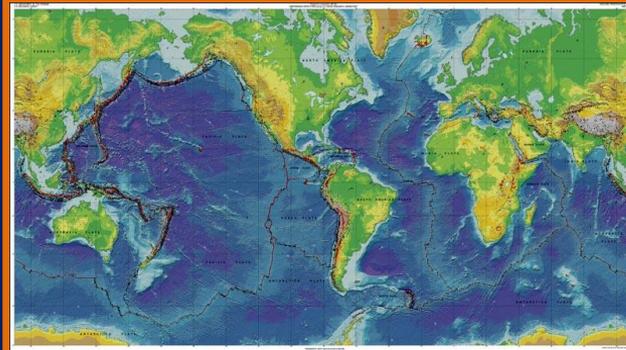
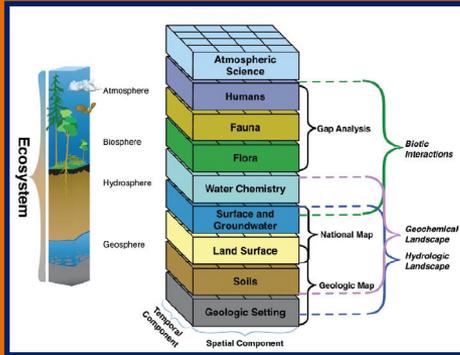
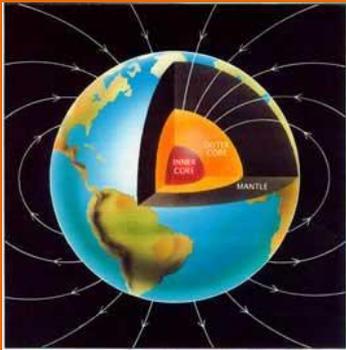


Introduction to Geosciences Library Research

January 23, 2020

Emily C. Wild, Chemistry, Geosciences and Environmental Studies Librarian
ewild@princeton.edu 609-258-5484





Emily C. Wild
Lewis Science Library
Princeton University
ewild@princeton.edu
609-258-5484

Help Schedule:
9:00 am – 5:00 pm , Eastern
Monday – Friday

- **Princeton University Library, 2018-Present**
Chemistry, Geosciences and Environmental Studies Librarian
<https://library.princeton.edu/staff/ewild>
ORCID: <https://orcid.org/0000-0001-6157-7629>
- **U.S. Geological Survey, Denver, Colorado : 2008-2018**
Librarian (Physical Scientist) : Water, Minerals, Energy & Hazards research services, instruction, and outreach
- **U.S. Geological Survey, NH-VT & MA-RI: 1996-2008**
Hydrologist: Water Use, Surface Water, Groundwater, Water Quality, Bibliographic Databases, NWIS Groundwater Database Administrator
- **Reference Desk at Providence College (2005-7), University of Rhode Island (1998-2000), and Hartwick College (1995)**
- **Environmental Law Intern at New York State Department of Conservation (NYSDEC), 1994**
- **Education: MLIS, University of Rhode Island ; BA Geology, Hartwick College ; Paralegal Certificate & Legal Investigations Certificate, and currently taking classes in legal studies**

March 27, 2018 - " U.S. Geological Survey Library Materials for Natural Hazards (and Land Change)" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

March 27, 2018 - "USGS Library Materials for Water Resources Information" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

March 6, 2018 - "USGS Library Materials for Earth's Age" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

September 19, 2017 - "USGS Library - Indexes, Catalogs, and Other Bibliographic Tools, A day in the life of a reference librarian" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

August 3, 2017 - "USGS Library - Oil, Gas, Coal, Uranium, and Minerals Maps and Data" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

May 10, 2017 - "USGS Library - Using USGS Image, Map, and Data Products for Information Inquiries" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

December 7, 2016 - "USGS Library: Geoscience Outreach and Instruction" presentation for the U.S. Government Publishing Office (GPO), FDLP Federal Agency Webinars

August 2014 - U.S. Government Printing Office (GPO) Federal Depository Library Program (FDLP), "Tricks and Tips for Finding and Using USGS Topographic Maps" : <http://www.fdlp.gov/all-newsletters/community-insights/2045-tricks-and-tips-for-finding-and-using-usgs-topographic-maps>

May 2014 - "U.S. Geological Survey Library: Access and Outreach," presentation for the U.S. Government Printing Office (GPO), FDLP Federal Agency Webinars



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U.S. Geological Survey

Archive of USGS Web Content



The USGS Web Content Archive contains scientific information websites formerly maintained by the U.S. Geological Survey. The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth, minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

Search... Search

- access.usgs.gov
- alaska.usgs.gov
- amli.usgs.gov
- apps.usgs.gov
- ar.water.usgs.gov
- ca.water.usgs.gov

<https://archive.usgs.gov/>

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Home Search (i)

Downloads

- [abstract_submission.html](#)
- [conference_agenda.html](#)
- [Fact Sheets on Places USGS Did Human Health Related Studies](#)
- [Places with USGS Human Health Related Studies](#)
- [USGS Human Health Related Data Sources](#)
- [USGS Human Health Related Activities](#)
- [Earth Science and Public Health: Second National Conference on USGS Health-Related Research](#)
- [earth_materials_health.html](#)
- [index.html](#)
- [Human Health and Environment Health Fact Sheets](#)
- [USGS Human Health News](#)
- [usgs_role.html](#)
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- [physical_processes.html](#)
- [pathogen_analysis.html](#)
- [source_tracking.html](#)
- [Avian Influenza](#)
- [Chemical and Pathogen Exposure Through Recreational Waters: Forecasting Beach Conditions](#)
- [west_nile.html](#)
- [Monkeypox](#)
- [Elaeus](#)
- [Vector-borne Diseases and Zoonotic Diseases](#)
- [Tick-borne Lyme Disease](#)
- [Rabies](#)
- [emc.html](#)
- [mtbe.html](#)
- [Drinking Water Exposure to Chemical and Pathogenic Contaminants: Disinfection-By-Products](#)
- [Drinking Water Exposure to Chemical and Pathogenic Contaminants: Arsenic](#)
- [Drinking Water Exposure to Chemical and Pathogenic Contaminants](#)
- [Drinking Water Exposure to Chemical and Pathogenic Contaminants: Lignite-Coal Deposits, Groundwater, and Potential Relations to Kidney Disease](#)

<https://archive.usgs.gov/archive/sites/health.usgs.gov/downloads.html>

Home Archived December 12, 2018 Search... Search (i)

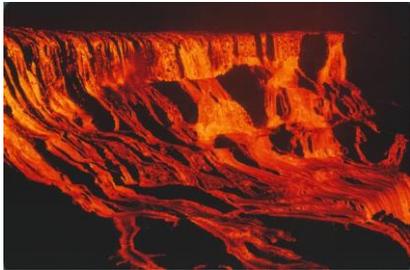


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Geology Research and Information

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<https://archive.usgs.gov/archive/sites/geology.usgs.gov/data.htm>



Part 1. The Geosciences

- What is Geoscience?
- Who is a Geoscientist?
- Geological Surveys & Societies
- Geosciences Publication Databases

Part 2. Princeton University Library (Geosciences) and the U.S. Geological Survey Library

Part 3. Future In-Depth Library Research Presentations

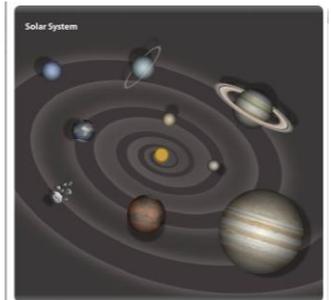
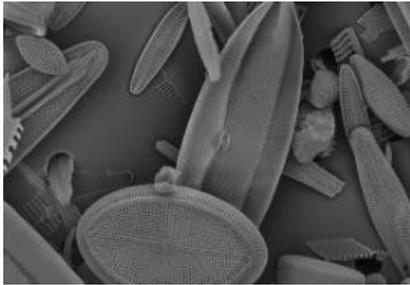
What is Geoscience?

From American Geosciences Institute (AGI) :

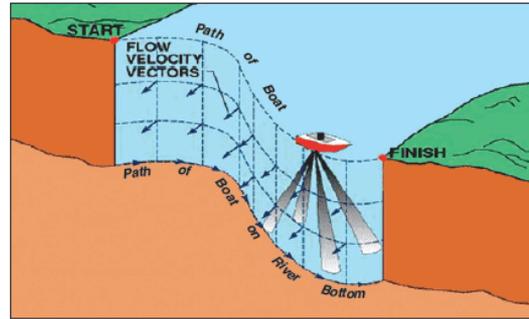
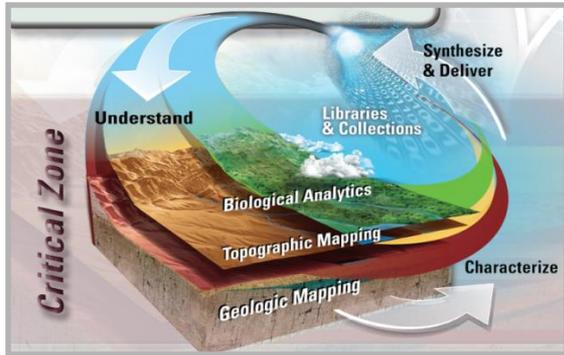
<https://www.americangeosciences.org/critical-issues/faq/what-is-geoscience>

Geoscience is the study of the Earth - **its oceans, atmosphere, rivers and lakes, ice sheets and glaciers, soils, its complex surface, rocky interior, and metallic core**. This includes many aspects of how living things, including humans, interact with the Earth. Geoscience has many tools and practices of its own but is intimately linked with the biological, chemical, and physical sciences.

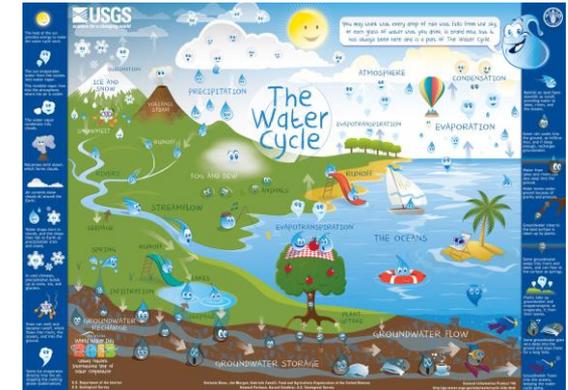
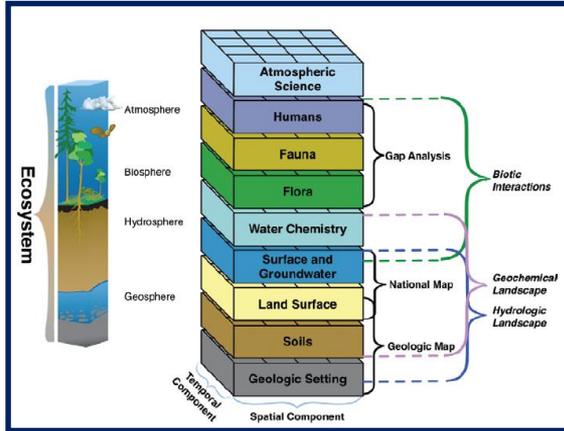
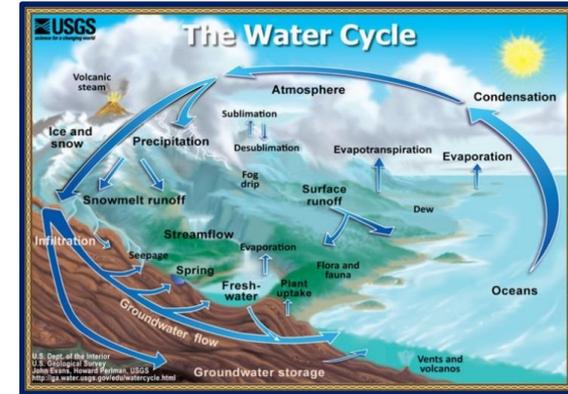
Geoscience investigates the past, measures the present, and models the future behavior of our planet. But it also involves the study of other planets, asteroids, and solar systems, both to better understand the Earth and to expand our knowledge of the universe.



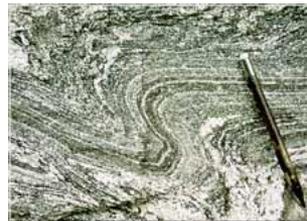
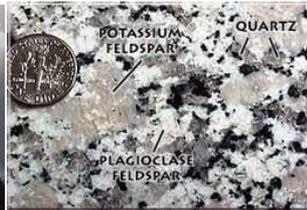
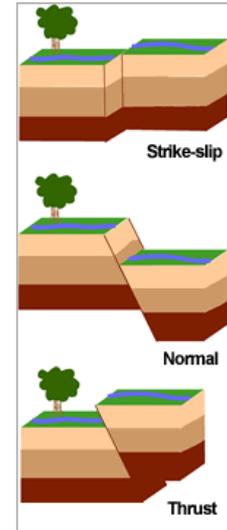
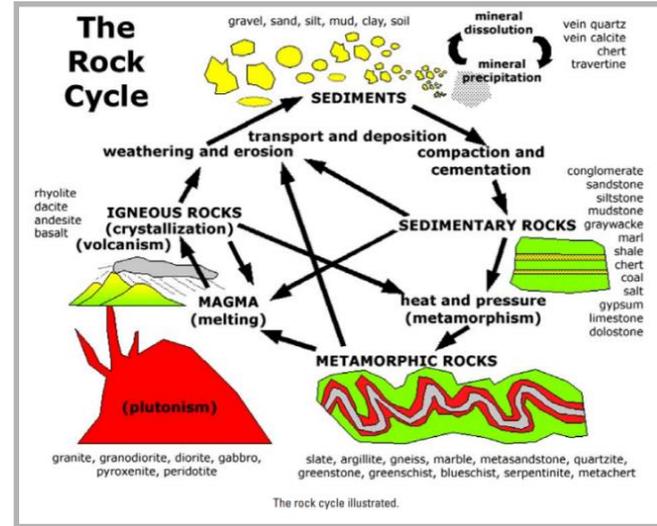
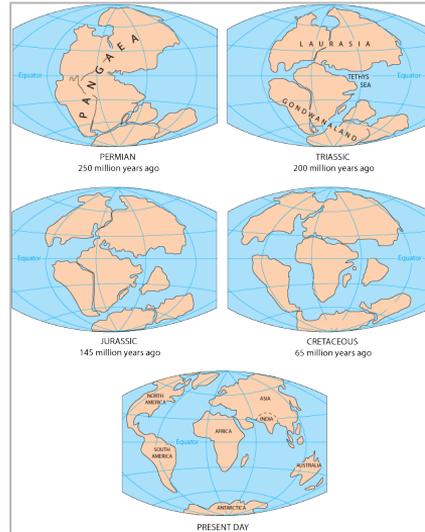
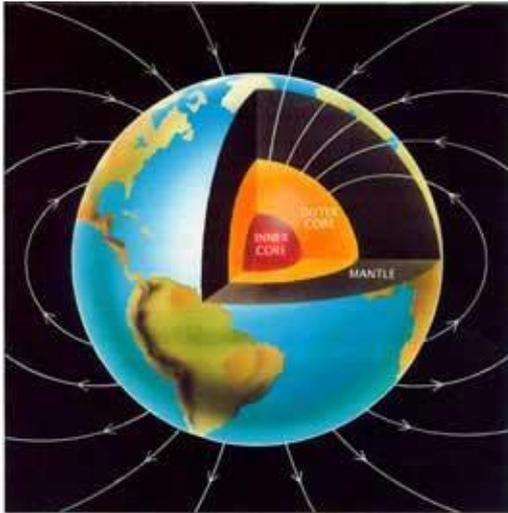
Geoscience is the study of the Earth - its oceans, atmosphere, rivers and lakes, ice sheets and glaciers, soils... = Atmospheric Science, Biology, Hydrology & Oceanography



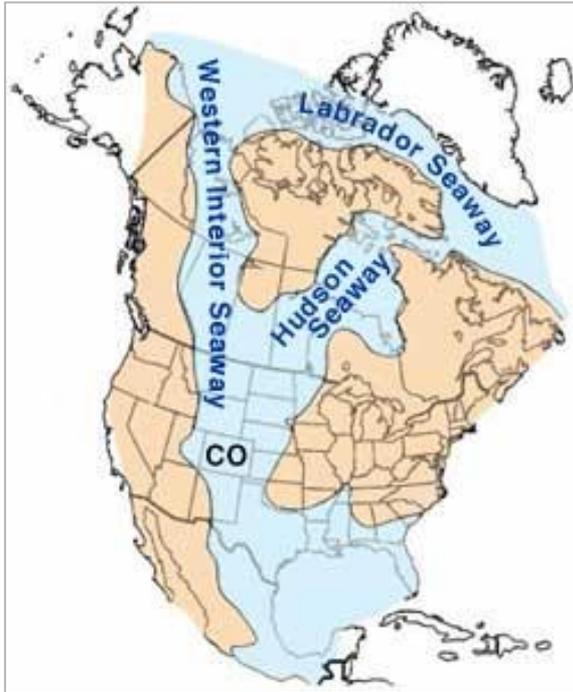
Acoustic Doppler Current Profiler (ADCP) mounted in a small watercraft, is used for measuring the discharge of a river. The ADCP acoustic beams are directed down into the water as it is guided across a river channel.



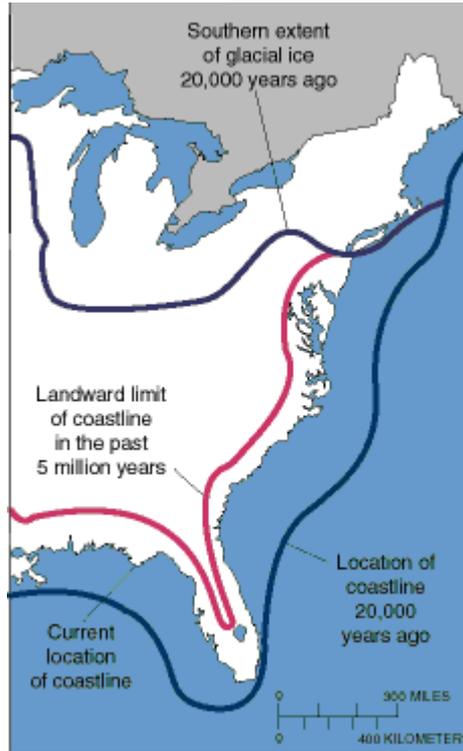
Geoscience is the study of the Earth - ...its complex surface, rocky interior, and metallic core... = structural, earthquakes, mineralogy, petrology, geomagnetism, geochemistry, and geophysics



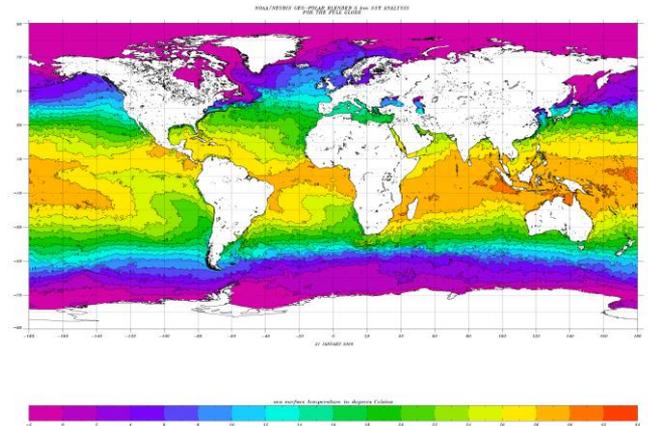
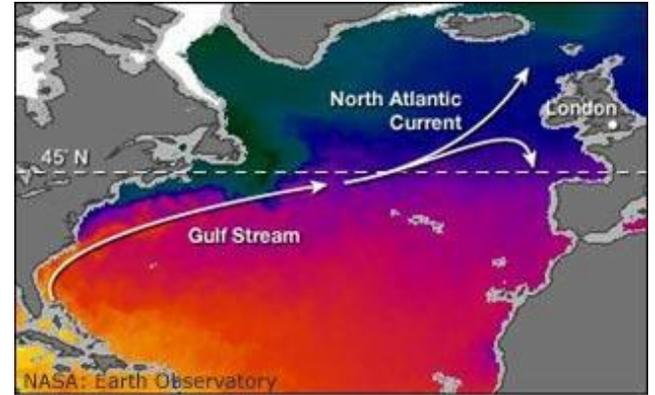
Oceans



Cretaceous Western Interior Seaway
<https://pubs.usgs.gov/pp/1561/report.pdf>



https://www.usgs.gov/special-topic/water-science-school/science/oceans-and-seas-and-water-cycle/qt-science_center_objects=0#qt-science_center_objects



<https://www.ospo.noaa.gov/Products/ocean/sst/contour/>

Who is a Geoscientist?

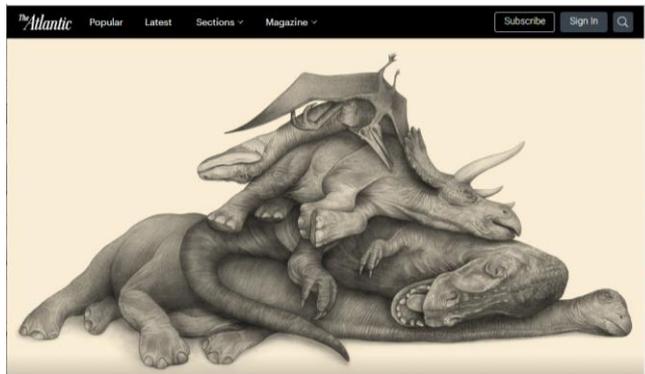
Example: Princeton University:
[Department of Geosciences](#)



[Climate scientist Gabriel Vecchi: Climate crisis contributes to intensity of storms](#)

[How Has Climate Change Affected Hurricane Dorian?](#)

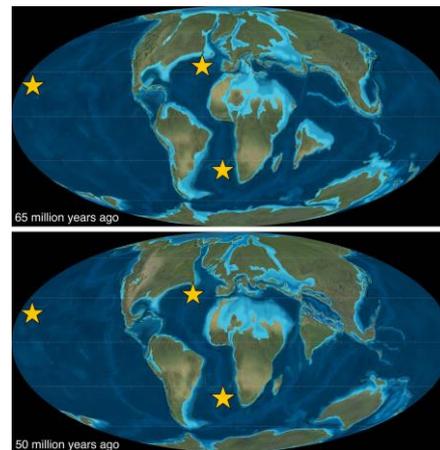
[Princeton University/Geophysical Fluid Dynamics Laboratory](#)



[The Nastiest Feud in Science](#)

[A Princeton geologist has endured decades of ridicule for arguing that the fifth extinction was caused not by an asteroid but by a series of colossal volcanic eruptions. But she's reopened that debate.](#)

When the landmass that is now the Indian subcontinent slammed into Asia about 50 million years ago, the collision changed the configuration of the continents, the landscape, global climate and more. Now a team of Princeton University scientists has identified one more effect: the oxygen in the world's oceans increased, altering the conditions for life.



[Princeton geoscientists find new fallout from 'the collision that changed the world'](#)

Who is a geoscientist?

- ❖ Biologists
- ❖ Biogeochemists
- ❖ Cartographers
- ❖ Chemists
- ❖ Engineers
- ❖ Geologists
- ❖ Hydrologists
- ❖ IT Specialists
- ❖ Librarians
- ❖ Mathematicians
- ❖ Physicists
- ❖ Physical Scientists
- ❖ Seismologists
- ❖ Volcanologists
- ❖ And more!



USGS
science for a changing world

SCIENCE PRODUCTS NEWS CONNECT ABOUT

SEARCH

Susan M Hall



Susan Hall is the uranium resource specialist at the US Geological Survey. She leads a project that estimates uranium remaining unmined in the US to help determine if potential supply is adequate to fuel US nuclear reactors.

Biography

Career History and Highlights:

Dr. Hall is an economic geologist at the USGS Central Energy Resources Science Center based in Denver, Colorado. She is the uranium resource specialist for the USGS, leading the uranium resource evaluation project for the US and also working on uranium environmental issues. She began her career with USGS in 2000 after 20 years working in the mining industry. Both in industry and at USGS she strongly advocates applied science—using cutting edge analytic techniques to help answer important questions of ore deposit genesis and mining impacts.

Geologist

Central Region
Email: susanhall@usgs.gov
Phone: 303-236-1656
Fax: 303-236-0459
<https://orcid.org/0000-0002-0931-8694>

Dr. Hall has revitalized the USGS uranium resources program; planning, securing funding and initiating the first comprehensive, domestic uranium resource assessment since 1980. When she began this project, the efficacy of the USGS mineral resource assessment methodology was in question. She designed a unique proof-of-concept assessment, independently applying and/or evaluating the most widely accepted methods to evaluate uranium in the southern Texas Coastal Plain. She then analyzed the results, and for older methodology was able to test the predictions against production, to select an assessment methodology. Through a network of collaborators, she is now working to expand more traditional resource assessments to include assessments of

<https://www.usgs.gov/staff-profiles/susan-m-hall>

<https://pubs.er.usgs.gov/search?q=susan+hall>

Critical analysis of world uranium resources

<https://pubs.er.usgs.gov/publication/sir20125239>

Is this citation in GeoRef? **Yes**

Web of Science? **No**

Scopus? **No**

GeoscienceWorld? **No**

AAPG Datapages? **No**

Princeton University Library? **Yes** with link!

USGS Library? **No** (in Pubs Warehouse)



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science for a changing world

SCIENCE PRODUCTS NEWS CONNECT ABOUT

SEARCH

Peter George Chirico



Pete Chirico is the Associate Director of the U.S. Geological Survey's Geology and Paleoclimate Science Center in Reston, VA. He also leads the USGS Special Studies project as a research scientist focused on terrain analysis and geomorphological mapping.

Biography

Pete Chirico is the Associate Director of the U.S. Geological Survey's Geology and Paleoclimate Science Center in Reston, VA. In over 20 years at USGS, he has focused his research on the geography and geomorphology of elicit small-scale mining of diamonds and mineral deposits in conflict zones and during complex emergencies. He has worked extensively with the U.S. Department of State, U.S. Department of Defense, U.S. Agency for International Development, the United Nations, and the Kimberley Process to understand how diamonds and other natural resource exploitation contribute to funding conflicts. While his regional expertise is Sub-Saharan Africa, he has led or been a member of more than 30 field expeditions throughout Central America and the Caribbean, the Middle East, and Africa. He is author or co-author of over 50 peer reviewed scientific reports and journal articles in the fields of geography, geomorphology, remote sensing, and natural resources in conflict zones. Pete also serves as scientific and technical advisor to the Office of Threat Finance Countermeasures in the Department of State's Bureau of Economic and Business Affairs.

Associate Director and Supervisory Geographer

Florence Bascom
Geoscience Center
Email: pchirico@usgs.gov
Phone: 703-648-6900

ResearchGate Profile: https://www.researchgate.net/profile/Peter_Chirico

<https://www.usgs.gov/staff-profiles/peter-george-chirico>

<https://pubs.er.usgs.gov/search?q=Peter+Chirico>

The Central African Republic Diamond Database—A geodatabase of archival diamond occurrences and areas of recent artisanal and small-scale diamond mining

<https://pubs.er.usgs.gov/publication/ofr20181088>

Is this citation in GeoRef? **Yes**

Web of Science? **No**

Scopus? **No**

GeoscienceWorld? **No**

AAPG Databases? **No**

Princeton University Library? **No**

USGS Library? **No** (in Pubs Warehouse)

Geological Surveys & Societies



U.S Geological Survey (USGS)

<http://www.usgs.gov>

American Association of State Geologists (AASG)

<http://www.stategeologists.org/>

**Geological Survey of Japan's
Directory of Geoscience Organizations of the World**

<https://www.gsj.jp/en/gsj-link/directory/index.html>



American Geosciences Institute (AGI)

<https://www.americangeosciences.org/>

Member Societies

<https://www.americangeosciences.org/member-societies>

Geological Society of America (GSA)

<http://www.geosociety.org/>

American Geophysical Union (AGU)

<https://sites.agu.org/>

Geoscience Information Society (GSIS)

<http://www.geoinfo.org/>

U.S. Geological Survey (USGS) Coalition:

<http://www.usgscoalition.org/>

The Member Societies of AGI

[AAASP - The Palynological Society](#)
[American Association of Geographers](#)
[American Association of Petroleum Geologists](#)
[American Geophysical Union](#)
[American Institute of Hydrology](#)
[American Institute of Professional Geologists](#)
[American Meteorological Society](#)
[American Rock Mechanics Association](#)
[Association for the Sciences of Limnology and Oceanography](#)
[Association for Women Geoscientists](#)
[Association of American State Geologists](#)
[Association of Earth Science Editors](#)
[Association of Environmental & Engineering Geologists](#)
[Clay Minerals Society](#)
[Council on Undergraduate Research](#)
[Geo-Institute of the American Society of Civil Engineers](#)
[Geochemical Society](#)
[Geological Association of Canada](#)
[Geological Society of America](#)
[Geological Society of London](#)
[Geoscience Information Society](#)
[History of Earth Sciences Society](#)
[International Association of Hydrogeologists/U.S. National Chapter](#)
[International Medical Geology Association](#)

[Karst Waters Institute](#)
[Mineralogical Society of America](#)
[Mineralogical Society of Great Britain and Ireland](#)
[National Association of Black Geoscientists](#)
[National Association of Geoscience Teachers](#)
[National Association of State Boards of Geology](#)
[National Cave and Karst Research Institute](#)
[National Earth Science Teachers Association](#)
[National Ground Water Association](#)
[National Speleological Society](#)
[Paleobotanical Section of the Botanical Society of America](#)
[Paleontological Research Institution](#)
[Paleontological Society](#)
[Petroleum History Institute](#)
[Seismological Society of America](#)
[SEPM \(Society for Sedimentary Geology\)](#)
[Society for Mining, Metallurgy & Exploration](#)
[Society of Economic Geologists](#)
[Society of Exploration Geophysicists](#)
[Society of Independent Professional Earth Scientists](#)
[Society of Mineral Museum Professionals](#)
[Society of Vertebrate Paleontology](#)
[Soil Science Society of America](#)
[The Society for Organic Petrology](#)
[United States Permafrost Association](#)

1. [AASP - The Palynological Society](#)
2. [American Association of Petroleum Geologists](#) (AAPG)
3. [American Geophysical Union](#) (AGU)
4. [American Institute of Professional Geologists](#) (AIPG)
5. [American Quaternary Association](#) (AMQUA)
6. [American Rock Mechanics Association](#) (ARMA)
7. [Association for the Sciences of Limnology and Oceanography](#) (ASLO)
8. [American Water Resources Association](#) (AWRA)
9. [Asociación Geológica Argentina](#) (AGA)
10. [Association for Women Geoscientists](#) (AWG)
11. [Association of American State Geologists](#) (AASG)
12. [Association of Earth Science Editors](#) (AESE)
13. [Association of Environmental & Engineering Geologists](#) (AEG)
14. [Association of Geoscientists for International Development](#) (AGID)
15. [Blueprint Earth](#) (BE)
16. [The Clay Minerals Society](#) (CMS)
17. [Colorado Scientific Society](#) (CSS)
18. [Council on Undergraduate Research Geosciences Division](#) (CUR)
19. [Cushman Foundation](#) (CF)
20. [Environmental & Engineering Geophysical Society](#) (EEGS)
21. [European Association of Geoscientists & Engineers](#) (EAGE)
22. [European Geosciences Union](#) (EGU)
23. [Geobiological Society](#) (GBS)
24. [Geochemical Society](#) (GS)
25. [Geologica Belgica](#) (GB)
26. [Geological Association of Canada](#) (GAC)
27. [Geological Society of Africa](#) (GSAF)
28. [Geological Society of Australia](#) (GSAus)
29. [Geological Society of China](#) (GSC)
30. [Geological Society of London](#) (GSL)
31. [Geological Society of South Africa](#) (GSSA)
32. [Geoscience Information Society](#) (GISIS)
33. [Geoscience Society of New Zealand](#) (GSNZ)
34. [German Geological Society](#) (GV)
35. [Groundwater Resources Association of California](#) (GRA)
36. [History of Earth Sciences Society](#) (HESS)
37. [International Association for Geoscience Diversity](#) (IAGD)
38. [International Association for Promoting Geoethics](#) (IAPG)
39. [International Association of Emergency Managers](#) (IAEM)
40. [International Association of GeoChemistry](#) (IAGC)

41. [International Association of Hydrogeologists](#) (IAH)
42. [International Association of Limnogeology](#) (IAL)
43. [International Medical Geology Association](#) (IMGA)
44. [International Society for Aeolian Research](#) (ISAR)
45. [Israel Geological Society](#) (IGS)
46. [Karst Waters Institute](#) (KWI)
47. [Microanalysis Society](#) (MAS)
48. [Mineralogical Association of Canada](#) (MAC)
49. [The Mineralogical Society](#) (MS)
50. [Mineralogical Society of America](#) (MSA)
51. [Minnesota Ground Water Association](#) (MGWA)
52. [National Association of Black Geoscientists](#) (NABG)
53. [National Association of Geoscience Teachers](#) (NAGT)
54. [National Association of State Boards of Geology](#) (ASBOG®)
55. [National Cave and Karst Research Institute](#) (NCKRI)
56. [National Earth Science Teachers Association](#) (NESTA)
57. [National Ground Water Association](#) (NGWA)
58. [National Speleological Society](#) (NSS)
59. [Nepal Geological Society](#) (NGS)
60. [Nigerian Society of Physical Sciences](#) (NSPS)
61. [Paleontological Research Institution](#) (PRI)
62. [Paleontological Society](#) (PS)
63. [Seismological Society of America](#) (SSA)
64. [Sigma Gamma Epsilon](#) (SGE)
65. [Sociedad Geológica Mexicana, A.C.](#) (SGM)
66. [Società Geologica Italiana](#) (SGI)
67. [Society for American Archaeology](#) (SAA)
68. [Society for Environmental Geochemistry and Health](#) (SEGH)
69. [Society for Mining, Metallurgy & Exploration](#) (SME)
70. [SEPM](#) (Society for Sedimentary Geology)
71. [Society for the Preservation of Natural History Collections](#) (SPNHC)
72. [Society of Economic Geologists](#) (SEG)
73. [Society of Exploration Geophysicists](#) (SEG)
74. [Society of Vertebrate Paleontology](#) (SVP)
75. [Soil Science Society of America](#) (SSSA)
76. [Western Interior Paleontological Society](#) (WIPS)

GeoRef (AGI):

<https://www.americangeosciences.org/information/georef>

The GeoRef database covers the **geology of North America from 1666 to the present** and the geology of the rest of the world from 1933 to the present. The database includes references to all publications of the U.S. Geological Survey. Masters' theses and doctoral dissertations from U.S. and Canadian universities are also covered.

Princeton University Library, GeoRef via Proquest

USGS Library, GeoRef via Ebsco

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- 1. **Prospecting the USGS library materials for GIS nuggets**
Wild, Emily C; Anonymous.
Abstracts with Programs - Geological Society of America Vol. 48, Iss. 7, (2016): Abstract no. 222-4.
Abstract/Details **Find it@PUL** Preview
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USGS Bulletin 1370: Bibliography of North American geology, 1970 <https://pubs.er.usgs.gov/publication/b1370>

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Standard Methods for the Examination of Water
and Wastewater

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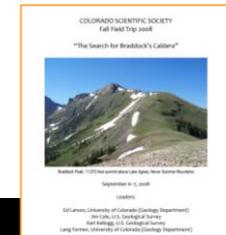
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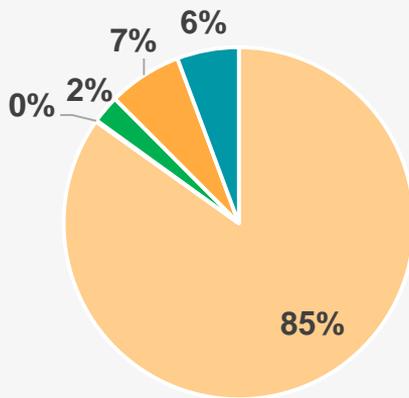
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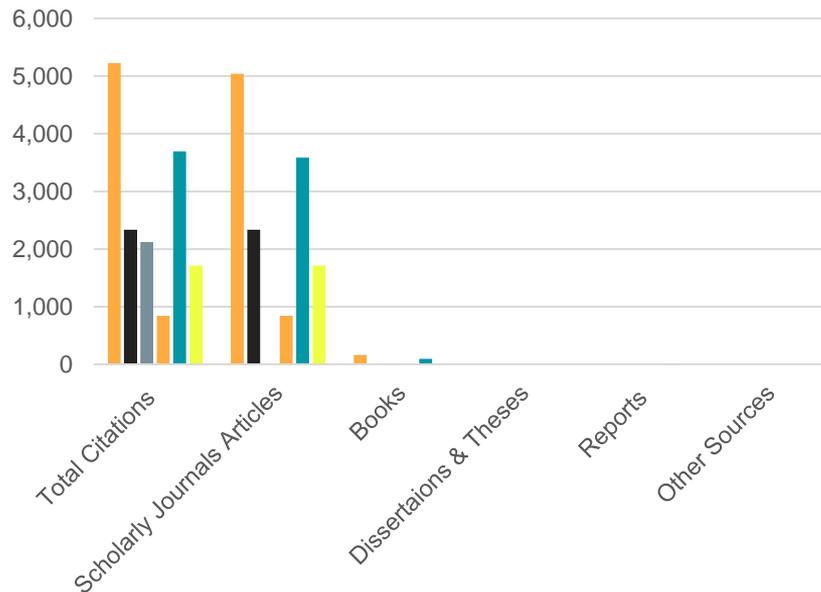


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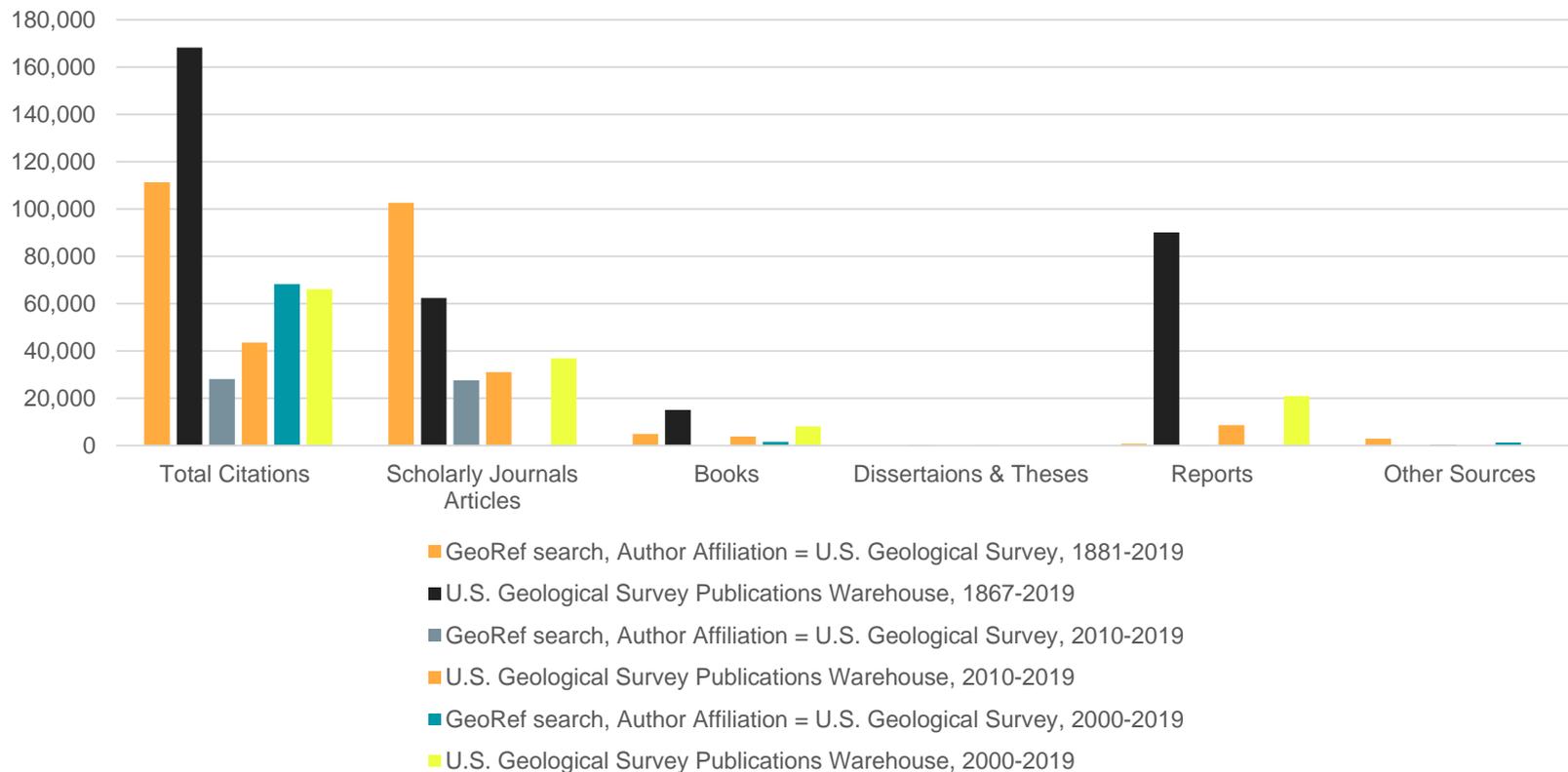
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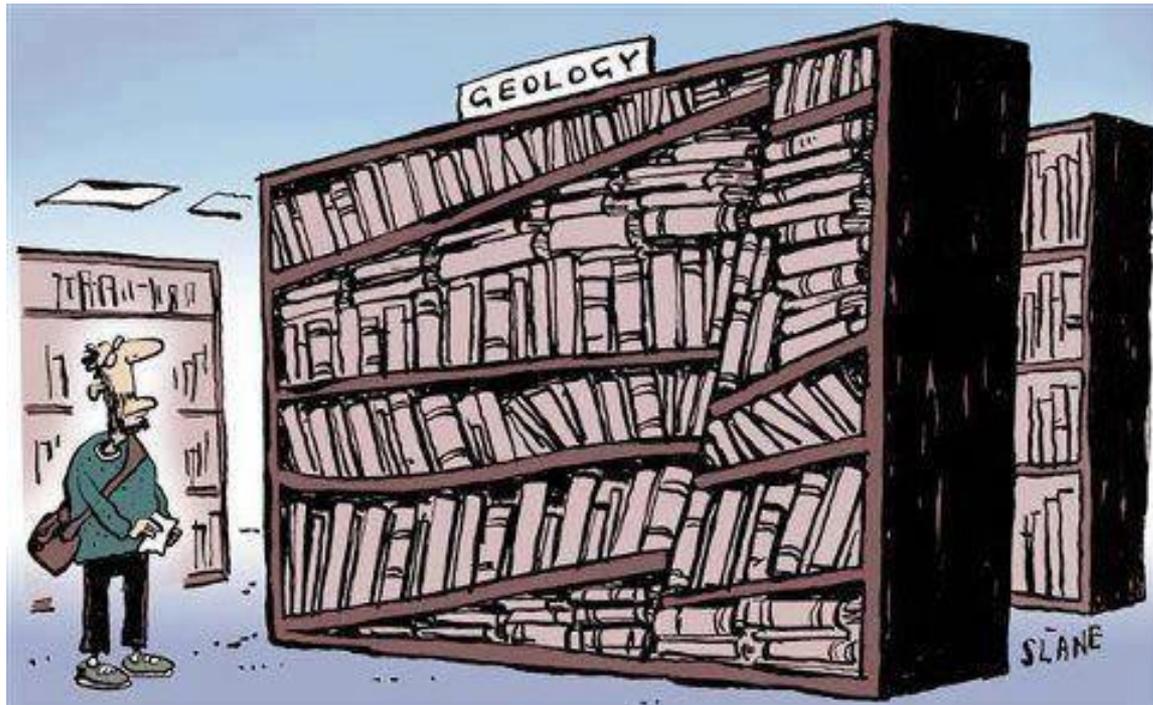
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U.S. Geological Survey Publications Warehouse, 1867-2019	168,370	62,384	15,072	151	90,115	0
GeoRef search, Author Affiliation = U.S. Geological Survey, 2010-2019	28,164	27,554	214	0	2	394
U.S. Geological Survey Publications Warehouse, 2010-2019	43,602	31,064	3868	12	8,658	0
GeoRef search, Author Affiliation = U.S. Geological Survey, 2000-2019	68,305	65,165	1,620	0	157	1,363
U.S. Geological Survey Publications Warehouse, 2000-2019	66,109	36,994	8099	54	20,962	0

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Summary of hydrogeologic controls on ground-water flow at the Nevada Test Site, Nye County, Nevada	1996	https://pubs.er.usgs.gov/publication/wri964109	https://pubs.usgs.gov/wri/wri964109/Plate4.pdf	119,068
Challenge theme 5: Current and future needs of energy and mineral resources in the Borderlands and the effects of their development: Chapter 7 in United States-Mexican Borderlands: Facing tomorrow's challenges through USGS science	2013	https://pubs.er.usgs.gov/publication/cir13807	https://pubs.usgs.gov/circ/1380/downloads/Chapter7.pdf	90,826
Map scales	1992	https://pubs.er.usgs.gov/publication/70039582	https://pubs.usgs.gov/unnumbered/70039582/report.pdf	58,584
2018 update to the U.S. Geological Survey national volcanic threat assessment	2018	https://pubs.er.usgs.gov/publication/sir20185140	https://pubs.usgs.gov/sir/sir/2018/5140/sir20185140.pdf	49,964
Features shown on topographic maps	1955	https://pubs.er.usgs.gov/publication/cir368	https://pubs.usgs.gov/circ/1955/0368/report.pdf	43,950
Minerals of Washington, D.C. and vicinity	1976	https://pubs.er.usgs.gov/publication/ofr76849	https://pubs.usgs.gov/of/1976/0849/report.pdf	37,407
Map showing lava-flow hazard zones, Island of Hawaii	1992	https://pubs.er.usgs.gov/publication/mf2193	https://pubs.usgs.gov/mf/1992/2193/mf2193.pdf	34,466
Map projections: A working manual	1987	https://pubs.er.usgs.gov/publication/pp1395	https://pubs.usgs.gov/pp/1395/report.pdf	33,519
Ground water and surface water; a single resource	1998	https://pubs.er.usgs.gov/publication/cir1139	https://pubs.usgs.gov/circ/circ1139/pdf/circ1139.pdf	30,417

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Glaciers of Asia	2010	https://pubs.er.usgs.gov/publication/p1386F	https://pubs.usgs.gov/pp/p1386f/pdf/F4_Pakistan.pdf	181,334
Contributions to economic geology, 1910, Part II, Mineral fuels--The Little Powder River coal field, Campbell County, Wyoming	1912	https://pubs.er.usgs.gov/publication/b471F	https://pubs.usgs.gov/bul/0471f/report.pdf	151,119
Topographic map symbols	2005	https://pubs.er.usgs.gov/publication/70039164	https://pubs.usgs.gov/gip/TopographicMapSymbols/topomapsymbols.pdf	100,233
Summary of hydrogeologic controls on ground-water flow at the Nevada Test Site, Nye County, Nevada	1996	https://pubs.er.usgs.gov/publication/wri964109	https://pubs.usgs.gov/wri/wri964109/Plate4.pdf	67,152
Challenge theme 5: Current and future needs of energy and mineral resources in the Borderlands and the effects of their development: Chapter 7 in United States-Mexican Borderlands: Facing tomorrow's challenges through USGS science	2013	https://pubs.er.usgs.gov/publication/circ13807	https://pubs.usgs.gov/circ/1380/downloads/Chapter7.pdf	54,209
Map scales	1992	https://pubs.er.usgs.gov/publication/70039582	https://pubs.usgs.gov/unnumbered/70039582/report.pdf	38,815
Ground water and surface water; a single resource	1998	https://pubs.er.usgs.gov/publication/circ1139	https://pubs.usgs.gov/circ/circ1139/pdf/circ1139.pdf	27,260
It is raining plastic	2019	https://pubs.er.usgs.gov/publication/ofr20191048	https://pubs.usgs.gov/of/2019/1048/ofr20191048.pdf	26,509
Features shown on topographic maps	1955	https://pubs.er.usgs.gov/publication/circ368	https://pubs.usgs.gov/circ/1955/0368/report.pdf	23,673
2018 update to the U.S. Geological Survey national volcanic threat assessment	2018	https://pubs.er.usgs.gov/publication/sir20185140	https://pubs.usgs.gov/sir/2018/5140/sir20185140.pdf	22,969



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VIEW	0373	Selective depository library	Monmouth University	Library	West Long Branch	New Jersey
VIEW	0373A	Selective depository library	Ocean County College	Library	Toms River	New Jersey
VIEW	0374	Selective depository library		Johnson Public Library	Hackensack	New Jersey
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2		<p>BOOK</p> <p>Level II scour analysis for bridge 5 (WOLCTH00150005) on Town Highway 15, crossing the Wild Branch Lamoille river, Wolcott, Vermont</p> <p>Wild, Emily C., author.; Geological Survey (U.S.), issuing body. 1997</p> <p>■ Available at Reston Annex ((200) R29o no.97-808) ></p>	   ...
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Contacts

- Emily C. Wild
- U.S. Geological Survey
- Ronda L. Burns
- Mark T. Nimiroski
- Matthew A. Weber

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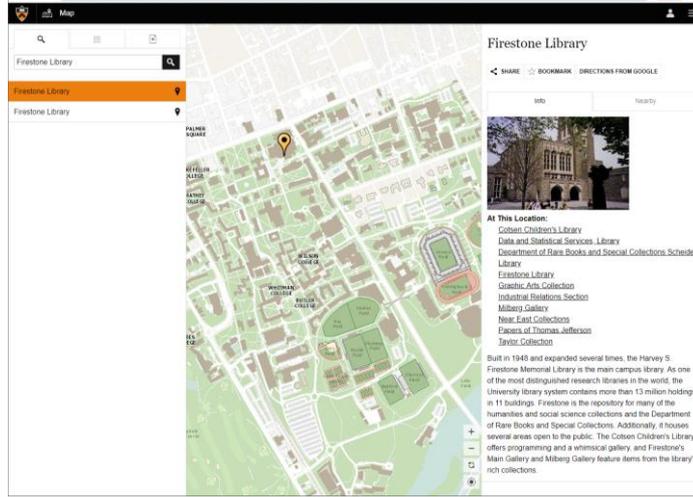
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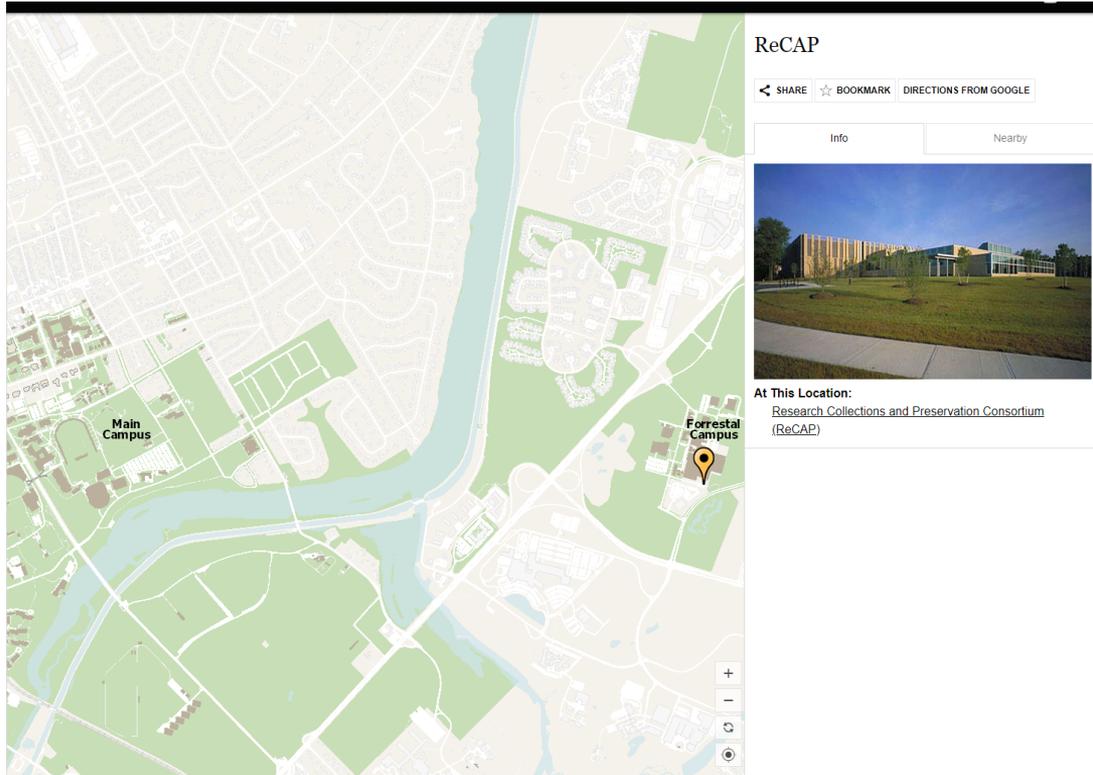


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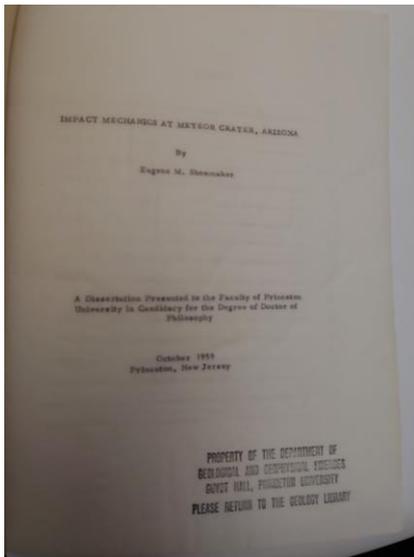
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Impact mechanics at Meteor Crater, Arizona

USGS Publications Warehouse

Impact mechanics at Meteor Crater, Arizona

Open-File Report 59-108
By: Eugene Merle Shoemaker
<https://doi.org/10.3133/ofr59108>

Links

- More information: [National Geologic Map Database Index Page \(html\)](#)
- Document: [Document \(pdf\)](#)
- Plates:
 - [Plate 1 \(pdf\)](#)
 - [Plate 2 \(pdf\)](#)
 - [Plate 3 \(pdf\)](#)
 - [Plate 4 \(pdf\)](#)
 - [Plate 5 \(pdf\)](#)
 - [Plate 6 \(pdf\)](#)
 - [Plate 7 \(pdf\)](#)
- Download citation as: [RIS](#) | [Dublin Core](#)

<https://pubs.er.usgs.gov/publication/ofr59108>

Gene Shoemaker - Founder of Astrogeology

ASTRO PEDIA
Lunar and Planetary Cartographic Catalog

April 28, 1928 - July 18, 1997

He once said he considered himself a scientific historian, one whose mission in life is to relate geologic and planetary events in a perspective manner. A modest statement coming from a legend of a man who almost single-handedly created planetary science as a discipline distinct from astronomy. He brought together geologic principles to the mapping of planets, resulting in more than 3 decades of discoveries about the planets and asteroids of the Solar System. He was a 1992 recipient of the National Medal of Science, the highest scientific honor bestowed by the President of the United States, then George Bush. His family, friends, former students, and the scientific community are in shock as they hear the news and feel the loss of "SuperGene."

Dr. Gene Shoemaker died Friday, July 18, 1997 (Australian Time) in Alice Springs, Australia in a car accident. He was in the field, pursuing his lifelong passion of geologic studies to help understand impact craters with his wife and science partner, Carolyn Shoemaker. Carolyn survived the accident sustaining various injuries.

A longtime resident of Flagstaff, Arizona, in 1961 Gene invented the

<https://astrogeology.usgs.gov/rpif/Gene-Shoemaker>

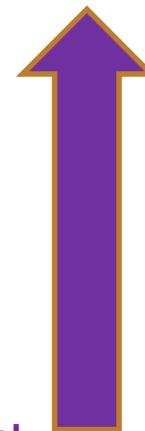
Geoscience Library Inquiry = Data Inquiry

Geoscience Investigations



- **Raw Data:** Real-Time, Continuous, Recent Partial Records, Historical
- **Calculated Data:** Equations, Software Results, Lab Results, and Model Results
- **Map Data:** Specific Location Information & other Metadata
- **Citation Data:** Bibliographic Information for Reference Lists & TO FIND THE PUBLICATION

Library Research



Tables & Figures/Images

Geosciences Library Research

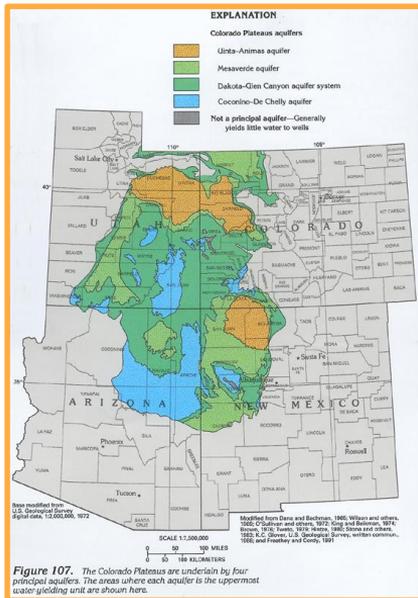
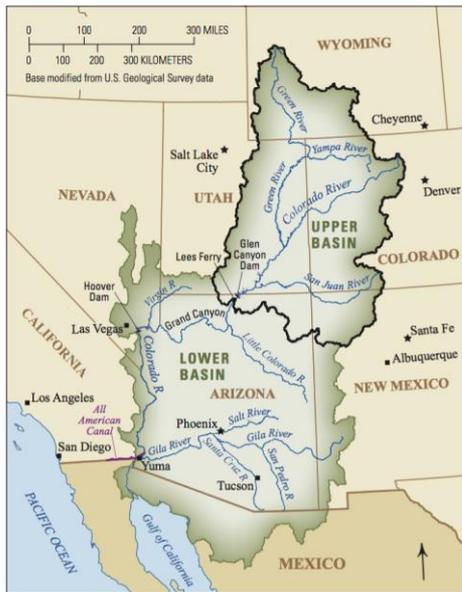
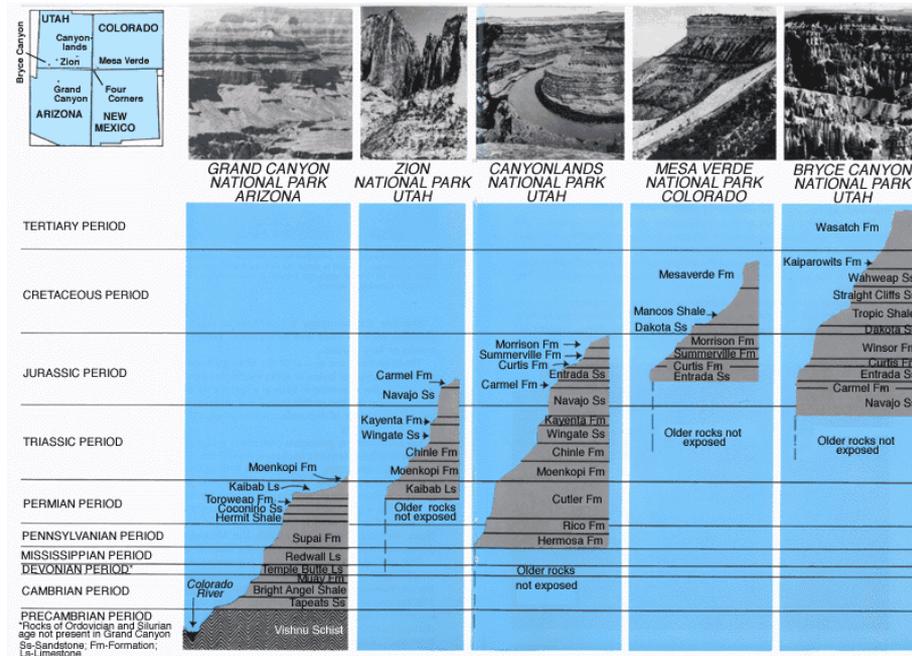


Figure 107. The Colorado Plateau is underlain by four principal aquifers. The areas where each aquifer is the uppermost water-yielding unit are shown here.



[Climate Science](#)

[Geochemistry](#)

[Geology](#)

[Geophysics](#)

[Paleoclimate](#)

Student Film: Seismology - A Documentary Film Directed by James Tralie

<https://www.youtube.com/watch?v=VK8x7DhwW0&feature=youtu.be>

“Many people believe seismology is solely about catastrophic earthquakes, but this documentary presents a case study of all that is possible with seismic records. This exploration communicates the importance of seismology in understanding Earth processes, the efforts being undertaken to improve our knowledge of earthquake events, and the use of seismic research in medical applications and for studying other planets.”

PEI Videos: <https://environment.princeton.edu/videos/>

PEI Podcast: <https://allforearth.princeton.edu/>

Undergraduate Research:

<https://geosciences.princeton.edu/undergraduate/undergraduate-research>

Geosciences Associated Programs

- [Program in Atmospheric and Oceanic Sciences \(AOS\)](#)
- [Princeton University BIOS Graduate Program in Ocean Studies \(BIOS\)](#)
- [Princeton Environmental Institute \(PEI\)](#)
- [Princeton Institute for the Science and Technology of Materials \(PRISM\)](#)
- [Geophysical Fluid Dynamics Laboratory \(NOAA/GFDL\)](#)
- [Princeton Institute for Computational Science and Engineering \(PICSciE\)](#)
- [Southern Ocean Carbon and Climate Observations and Modeling \(SOCCOM\)](#)
- [Program in Science, Technology, and Environmental Policy \(STEP\)](#)



The screenshot shows the Princeton Environmental Institute website. At the top left is the PEI logo and name. A navigation menu includes ABOUT PEI, RESEARCH, EDUCATION, EVENTS, NEWS, and PEOPLE. A search icon is on the right. The main content area has a dark green background with a white box containing the text "Video Archive". Below this is a white section with a "Back To All Videos" link. A sidebar on the left lists "Events", "Video Archives", and "Media". The main content area features a card for the "Princeton Environmental Forum — Full Conference" with the following details:

- PUBLISH DATE:** December 6, 2019
- LINK TO VIDEO:** <http://www.kaltura.com/tiny/zfc2p>
- VIDEO LENGTH:** 9:16:54

The card also includes a brief description: "The Oct. 24-25 Princeton Environmental Forum featured Princeton faculty and alumni environmental leaders in a series of discussions addressing urgent environmental issues for the

<https://environment.princeton.edu/>

<https://environment.princeton.edu/videos/>



<https://environment.princeton.edu/videos/princeton-environmental-forum-full-conference/>

U.S. Geological Survey (USGS)



Ecosystems

- Status and Trends Program
- Fisheries Program
- Wildlife Program
- Environments Program
- Invasive Species Program

Energy and Mineral Resources

- Mineral Resources Program
- Energy Resources Program

Natural Hazards

- Earthquake Hazards Program
- Volcano Hazards Program
- Landslide Hazards Program
- Global Seismographic Network
- Geomagnetism
- Coastal/Marine Hazards and Resources

Core Science Systems

- National Geospatial Program
- National Cooperative Geologic Mapping Program
- Science Synthesis, Analysis, and Research Program



Water Resources

- Groundwater and Streamflow Information Program
- National Water Quality Program
 - National Water-Quality Assessment Project (NAWQA)
 - National Atmospheric Deposition Program
 - USGS-National Park Service Water-Quality Partnership
- Water Availability and Use Science Program
- Water Resources Research Act Program



DEPARTMENT OF ENVIRONMENTAL PROTECTION



NY Power Authority

USGS Geologic Time

2018 Divisions of Geologic Time— Major Chronostratigraphic and Geochronologic Units

EONOTHEM / EON	ERATHEM / ERA	SYSTEM/SUBSYSTEM / PERIOD/SUPERPERIOD	SERIES / EPOCH	Age estimates of boundaries in mega-annum (Ma) unless otherwise noted	
Cenozoic (Cz)	Quaternary (Q)	Holocene			
			Pleistocene		
	Neogene (N)	Pliocene		2.588*	
		Miocene		5.332 ± 0.005	
		Eocene			
	Tertiary (T)	Paleogene (P)	Oligocene		23.03 ± 0.05
			Eocene		33.9 ± 0.1
		Paleocene	Eocene		55.8 ± 0.2
			Oligocene		65.5 ± 0.3
			Paleocene		

EONOTHEM / EON	ERATHEM / ERA	SYSTEM/SUBSYSTEM / PERIOD/SUPERPERIOD	SERIES / EPOCH	Age estimates of boundaries in mega-annum (Ma) unless otherwise noted
Phanerozoic	Mesozoic (Mz)	Cretaceous (K)	Upper / Late	65.5 ± 0.3
			Lower / Early	99.6 ± 0.9
	Jurassic (J)	Upper / Late	145.5 ± 4.0	
		Middle	161.2 ± 4.0	
		Lower / Early	175.6 ± 2.0	
	Triassic (Tr)	Upper / Late	199.6 ± 0.6	
		Middle	228.7 ± 2.0*	
		Lower / Early	245.0 ± 1.5	
		Lower / Early	251.0 ± 0.4	

~4.6 Billion Years

EONOTHEM / EON	ERATHEM / ERA	SYSTEM/SUBSYSTEM / PERIOD/SUPERPERIOD	SERIES / EPOCH	Age estimates of boundaries in mega-annum (Ma) unless otherwise noted
Paleozoic (Pz)	Carboniferous (C)	Permian (P)	Lopingian	251.0 ± 0.4
			Guadalupian	260.4 ± 0.7
		Pensylvanian (P)	Cisuralian	270.6 ± 0.7
			Upper / Late	299.0 ± 0.8
			Middle	307.2 ± 1.0*
		Mississippian (M)	Lower / Early	311.7 ± 1.1
			Upper / Late	318.1 ± 1.3
		Devonian (D)	Middle	328.3 ± 1.6*
			Lower / Early	345.3 ± 2.1
			Upper / Late	359.2 ± 2.5
	Middle		385.3 ± 2.6	
	Lower / Early		397.5 ± 2.7	
	Silurian (S)	Pridoli	416.0 ± 2.8	
		Ludlow	418.7 ± 2.7	
		Wenlock	422.9 ± 2.5	
		Llandovery	428.2 ± 2.3	
		Upper / Late	443.7 ± 1.5	
	Cambrian Ordovician (O)	Middle	460.9 ± 1.6	
		Lower / Early	471.8 ± 1.6	
		Upper / Late	488.3 ± 1.7	
Middle		501.0 ± 2.0		
Lower / Early		513.0 ± 2.0		
		542.0 ± 1.0		

EONOTHEM / EON	ERATHEM / ERA	SYSTEM / PERIOD **	Age estimates of boundaries in mega-annum (Ma) unless otherwise noted
Proterozoic (E)	Neoproterozoic (Y)	Ediacaran	635*
		Cryogenian	
		Tonian	850
		Stenian	1000
		Ectasian	1200
	Paleoproterozoic (X)	Calyimian	1400
		Statherian	1600
		Orosirian	1800
		Rhyacian	2050
		Siderian	2300
		2500	

EONOTHEM / EON	ERATHEM / ERA	SYSTEM / PERIOD **	Age estimates of boundaries in mega-annum (Ma) unless otherwise noted
Hadean (pA)	Eoarchean		-4600*
Archean (A)	Paleoarchean		
	Neoproterozoic (Y)		2500
Mesoproterozoic (Y)	Mesoarchean		
Paleoproterozoic (X)	Neoarchean		
			2800
			3200
			3600

Lexicon: United States, Canada, and Mexico (North America) <https://ngmdb.usgs.gov/Geolex/search>

Geologic Time - International Chronostratigraphic Chart, 2019:

<http://www.stratigraphy.org/index.php/ics-chart-timescale>

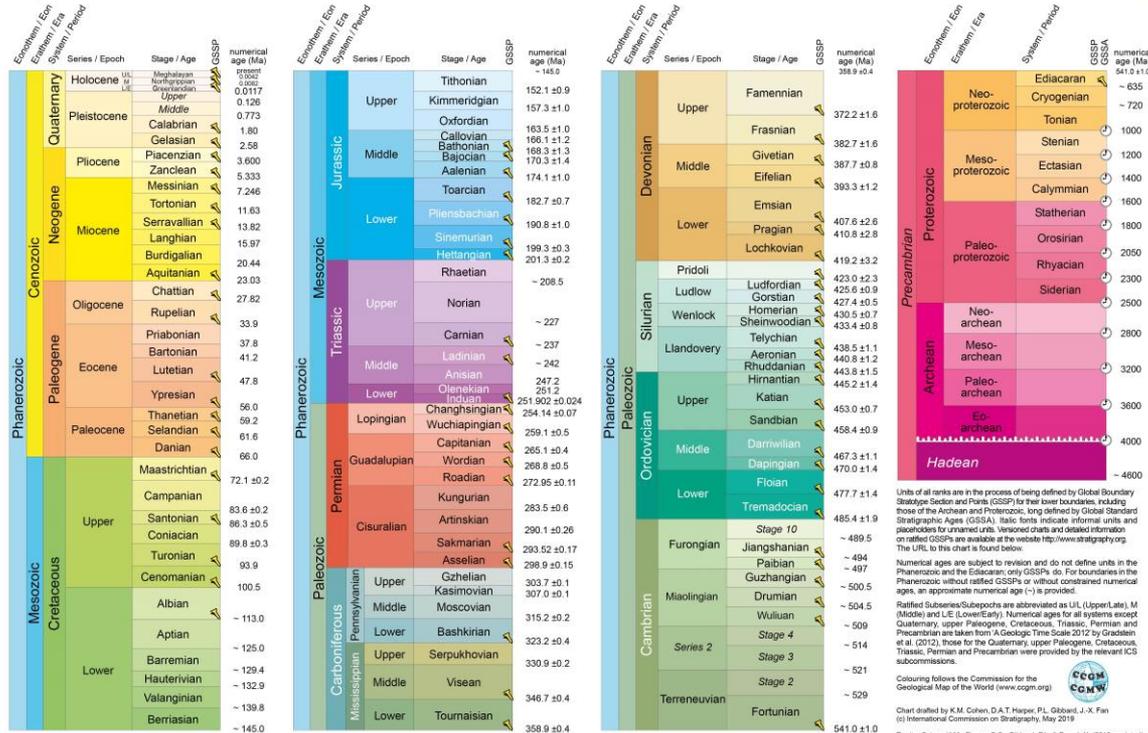


INTERNATIONAL CHRONOSTRATIGRAPHIC CHART

www.stratigraphy.org

International Commission on Stratigraphy

v 2019/05



Units of all ranks are in the process of being defined by Global Boundary Stratotype Section and Point (GSSP) for their lower boundaries, including those of the Archean and Proterozoic, long defined by Global Standard Stratigraphic Ages (GSSAs). Italic fonts indicate informal units and pleistochrones for unranked units. Versioned charts and detailed information on ratified GSSPs are available at the website <http://www.stratigraphy.org>. The URL to this chart is found below.

Numerical ages are subject to revision and do not define units in the Phanerozoic and the Ediacaran; only GSSPs do. For boundaries in the Phanerozoic without ratified GSSPs or without constrained numerical ages, an approximate numerical age (±) is provided.

Ratified Subseries/Subepochs are abbreviated as U/L (Upper/Late), M (Middle) and L/E (Lower/Early). Numerical ages for all systems except Quaternary, upper Paleogene, Cretaceous, Triassic, Permian and Precambrian are taken from *A Geologic Time Scale 2012* by Gradstein et al. (2012), those for the Quaternary, upper Paleogene, Cretaceous, Triassic, Permian and Precambrian were provided by the relevant ICS submissions.

Colouring follows the Commission for the Geological Map of the World (www.cgmw.org)

Chart drafted by K.M. Cohen, D.A.T. Harper, P.L. Gibbard, J.-X. Fan (c) International Commission on Stratigraphy, May 2019

To cite: Cohen, K.M., Finney, S.C., Gibbard, P.L., & Fan, J.-X. (2013), updated. The ICS International Chronostratigraphic Chart. *Episodes* 36, 189-204.

URL: <http://www.stratigraphy.org/ICSChart/ChronostratChart2019-05.pdf>

Labs & Periodic Table of Elements

Abundant Elements in the Earth's Crust

Oxygen, O

Silicon, Si

Aluminum, Al

Iron, Fe

Calcium, Ca

Sodium, Na

Potassium, K

Magnesium, Mg

Periodic Table of Elements
A Resource for Elementary, Middle School, and High School Students

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Period 1	1 H 1.008																	2 He 4.003
Period 2	3 Li 6.94	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
Period 3	11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
Period 4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.79
Period 5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.96	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
Period 6	55 Cs 132.9	56 Ba 137.3	*	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.5	81 Tl 204.38	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
Period 7	87 Fr (223)	88 Ra (226)	**	104 Rf (265)	105 Db (268)	106 Sg (271)	107 Bh (270)	108 Hs (277)	109 Mt (276)	110 Ds (281)	111 Rg (280)	112 Cn (285)	113 Uut (284)	114 Fl (289)	115 Uup (288)	116 Lv (293)	117 Uus (294)	118 Uuo (294)
Lanthanide Series*	57 La 138.9	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.2	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0			
Actinide Series**	89 Ac (227)	90 Th 232	91 Pa 231	92 U 238	93 Np (243)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)			

Alkali metals	Lanthanides
Alkaline earth metals	Actinides
Transition metals	Nonmetals
Post-transition metals	Halogens
Metalloid	Noble gases

Los Alamos National Laboratory

<http://periodic.lanl.gov/>

Chemistry!

Frank Wigglesworth Clarke: A chemist that determined the composition of Earth's Crust ; "Father of Geochemistry"

- One of the Founders of the American Chemical Society (ACS), (President of ACS in 1901)
- Worked at USGS from 1873 to 1925, USGS Atomic Weights Series

U.S. Geological Survey Publications: <https://pubs.er.usgs.gov/search?q=Frank+Wigglesworth+Clarke>

Examples:

1895: The constitution of the silicates, USGS Bulletin 125

<https://pubs.er.usgs.gov/publication/b125>

1903: Mineral analyses from the laboratories of the United States Geological Survey, 1880 to 1903, USGS Bulletin 220:

<https://pubs.er.usgs.gov/publication/b220>

1908: The data of geochemistry, USGS Bulletin 330 <https://pubs.er.usgs.gov/publication/b330>

1924: The composition of the river and lake waters of the United States, USGS PP 135

<https://pubs.er.usgs.gov/publication/pp135>

Biographical Memoir of Frank Wigglesworth Clarke 1847-1931:

<http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/clarke-frank-w-1847-1931.pdf>



Beryl (a beryllium-aluminum silicate)



Uranophane. Monoclinic crystallography. Uranophane is one of the many secondary uranium minerals. It is unusual in being a silicate but it shows the bright yellow color of the secondary uranium ores.

The Water on Earth

All Earth's freshwater, liquid fresh water, and water in lakes and rivers

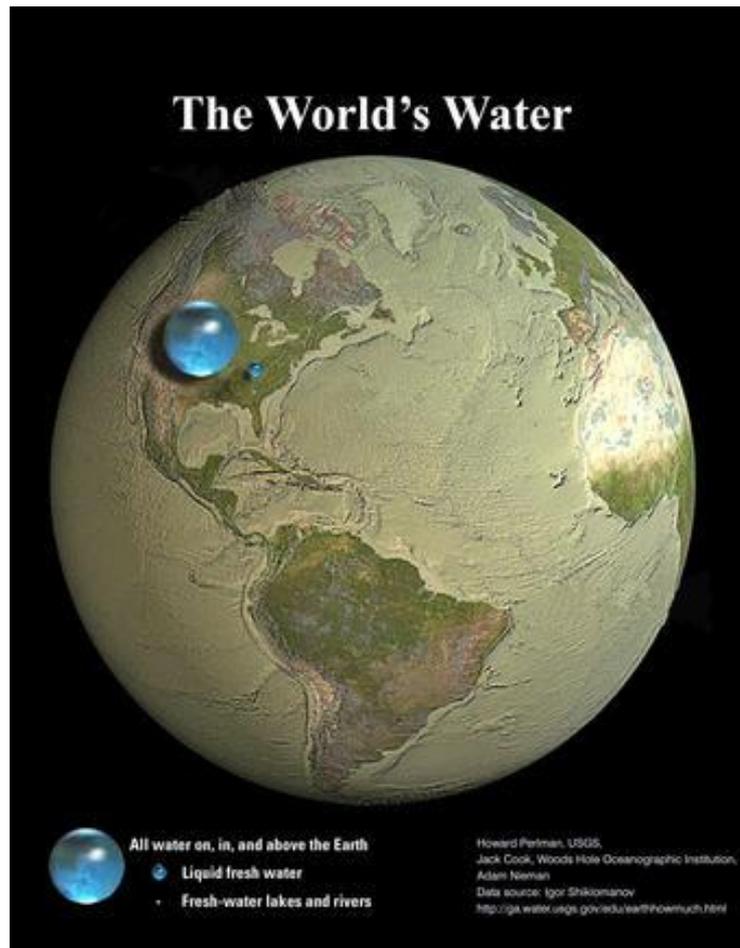
Spheres showing:

(1) All water (sphere over western U.S., 860 miles in diameter)

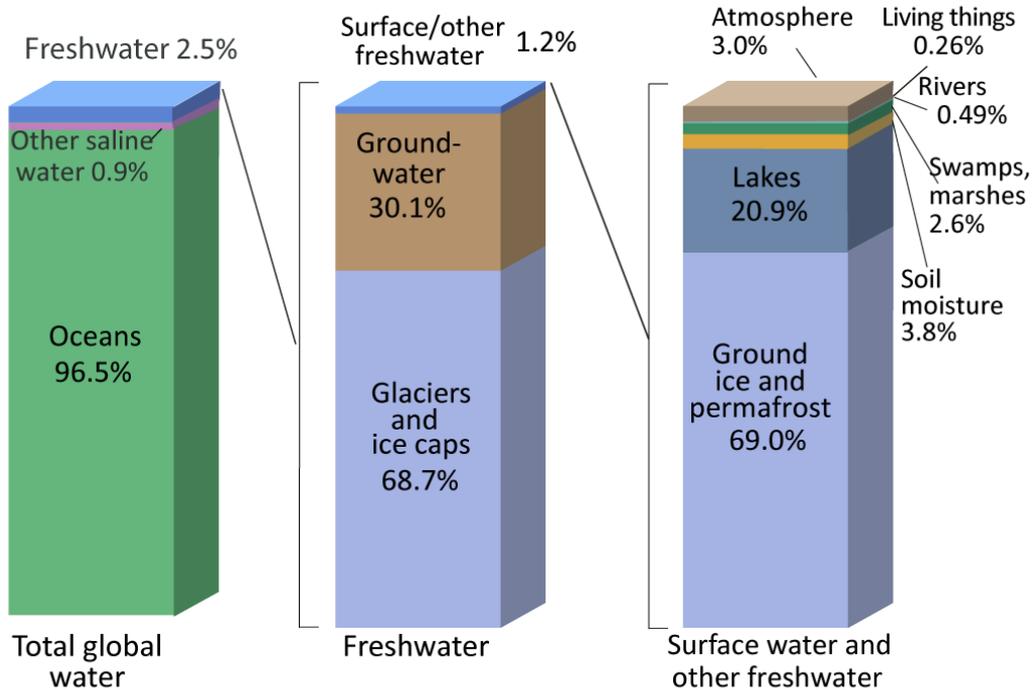
(2) Fresh liquid water in the ground, lakes, swamps, and rivers (sphere over Kentucky, 169.5 miles in diameter), and

(3) Fresh-water lakes and rivers (sphere over Georgia, 34.9 miles in diameter).

<https://www.usgs.gov/media/images/all-earths-water-a-single-sphere>

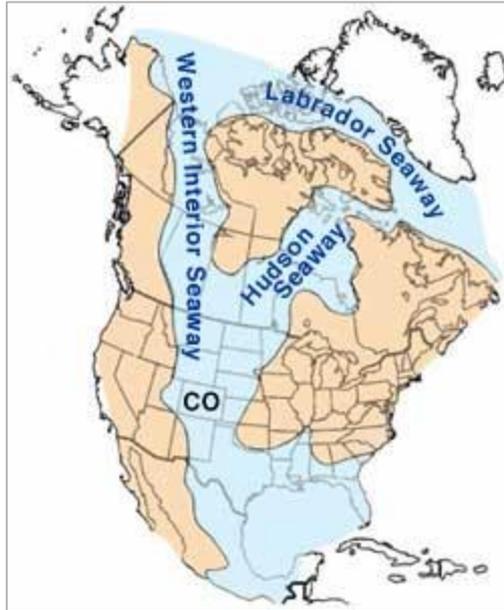


Where is Earth's Water?

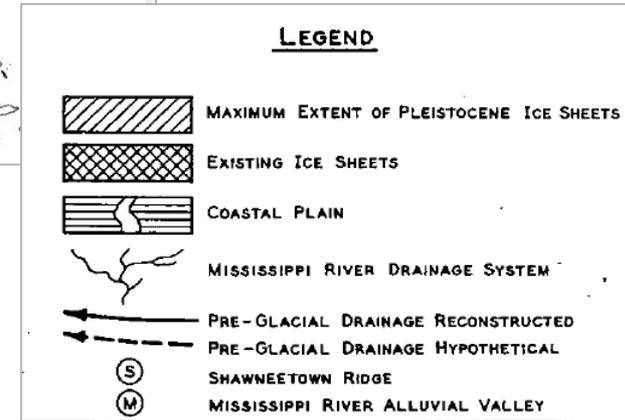
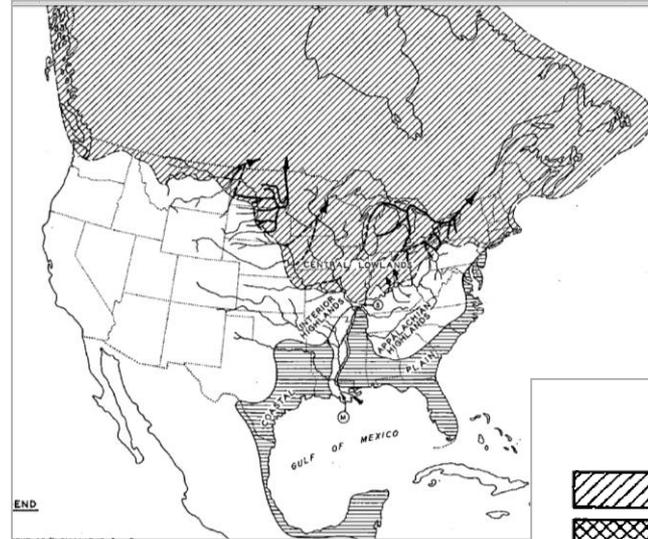


Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, *Water in Crisis: A Guide to the World's Fresh Water Resources*. (Numbers are rounded).

https://www.usgs.gov/special-topic/water-science-school/science/where-earths-water?qt-science_center_objects=0#qt-science_center_objects



Cretaceous Western Interior Seaway.
Colorado was covered by a shallow, temperate sea.
<https://pubs.usgs.gov/pp/1561/report.pdf>



Select a Water Resources Region.



Hydrologic Units: HUCs



Watershed Boundary Dataset

The [National Hydrography Dataset \(NHD\)](#), [Watershed Boundary Dataset \(WBD\)](#), and [NHDPlus High Resolution \(NHDPlus HR\)](#) are digital geospatial datasets that map and model the surface water of the United States.

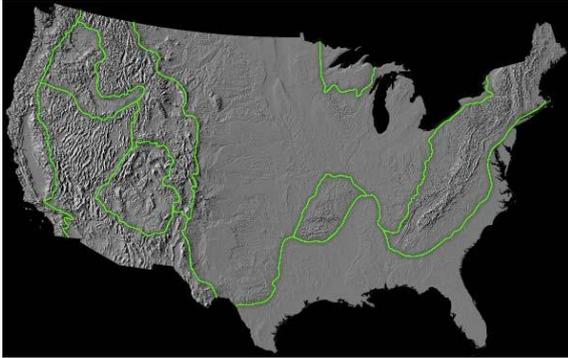
The NHD represents the nation's drainage networks and related features, including rivers, streams, canals, lakes, ponds, glaciers, coastlines, dams, and streamgages. The [NHD](#), at 1:24,000 scale or better, is the most up-to-date and detailed hydrography dataset for the Nation. The [WBD](#) represents drainage areas of the country in eight nested levels.

<https://www.usgs.gov/core-science-systems/ngp/national-hydrography>

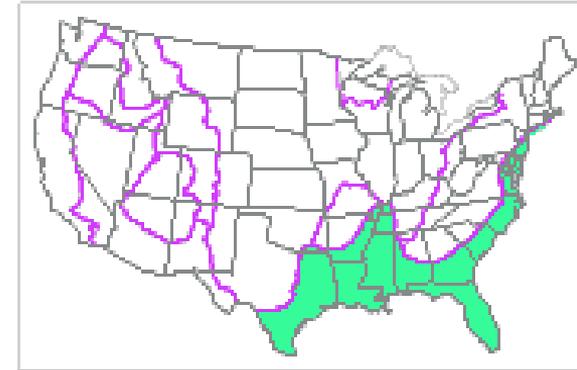
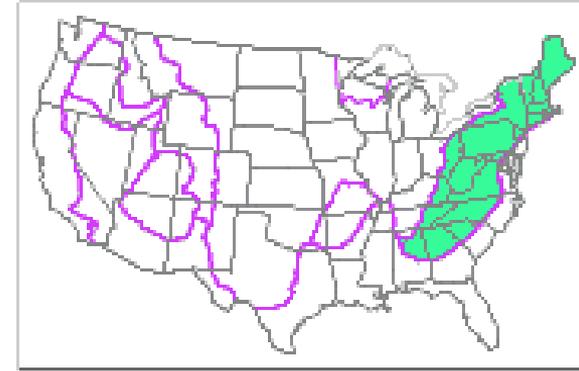
Hydrologic Unit Codes (HUCs)

- [Region 01](#) New England
- [Region 02](#) Mid-Atlantic
- [Region 03](#) South Atlantic-Gulf
- [Region 04](#) Great Lakes
- [Region 05](#) Ohio
- [Region 06](#) Tennessee
- [Region 07](#) Upper Mississippi
- [Region 08](#) Lower Mississippi
- [Region 09](#) Souris-Red-Rainy
- [Region 10](#) Missouri
- [Region 11](#) Arkansas-White-Red
- [Region 12](#) Texas-Gulf
- [Region 13](#) Rio Grande
- [Region 14](#) Upper Colorado
- [Region 15](#) Lower Colorado
- [Region 16](#) Great Basin
- [Region 17](#) Pacific Northwest
- [Region 18](#) California
- [Region 19](#) Alaska (Old numbering system)
- [Region 20](#) Hawaii
- [Region 21](#) Caribbean

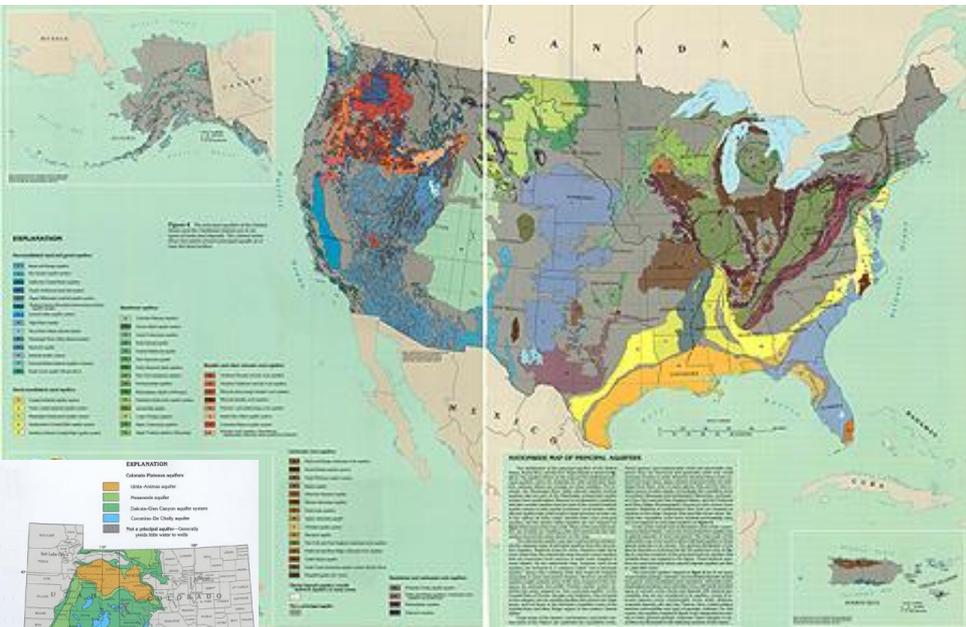
Geologic Provinces



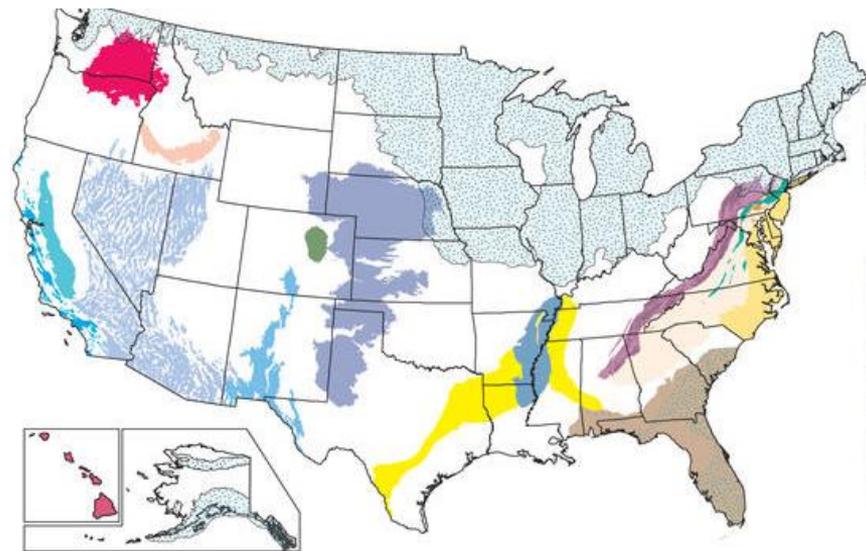
- Atlantic Plain Province
- Appalachian Highlands Province
- Laurentian Upland Province - Superior Upland
- Interior Plain Province
- Ouachita-Ozark Interior Highlands
- Rocky Mountains
- Colorado Plateau Province
- Columbia Plateau Province
- Basin and Range Province
- Pacific Province
- Alaska
- Hawai'i



<https://water.usgs.gov/ogw/aquifer/atlas.html>



<https://www.usgs.gov/mission-areas/water-resources/science/groundwater-quality-principal-aquifers-nation-1991-2010>



- High Plains aquifer—Circular 1337
- Glacial aquifer system—Circular 1352
- Northern Atlantic Coastal Plain surficial aquifer system—Circular 1353
- Piedmont, Blue Ridge, and Valley and Ridge aquifers—Circular 1354
- Piedmont and Blue Ridge carbonate-rock aquifers
- Piedmont and Blue Ridge crystalline-rock aquifers
- Valley and Ridge siliciclastic-rock aquifers
- Valley and Ridge carbonate-rock aquifers
- Early Mesozoic basin aquifers
- Upper Floridan aquifer and overlying surficial aquifers—Circular 1355
- Mississippi embayment-Texas coastal uplands aquifer system—Circular 1356
- Mississippi River Valley alluvial aquifer
- Denver Basin aquifer system—Circular 1357
- Southwest Principal Aquifers—Circular 1358
- California Coastal Basin aquifers
- Central Valley aquifer system
- Basin and Range basin-fill aquifers
- Rio Grande aquifer system
- Western Volcanics—Circular 1359
- Hawaiian volcanic-rock aquifers
- Snake River Plain basin-fill and basaltic-rock aquifers
- Columbia Plateau basin-fill and basaltic-rock aquifers

Examples at Princeton University:

Writing Seminars Sessions

■ Climate Science Fictions: Climate Supporters vs. Climate Deniers

Journal of Higher Education : Princeton Climate Scientists Tried to Ignore a Campus Skeptic. Then He Went to the White House. <https://www.chronicle.com/article/Princeton-Climate-Scientists/246971>

PAW articles: A White House Role: Physicist Happer *64 Takes Position as Senior Science, Technology Adviser <https://paw.princeton.edu/article/white-house-role-physicist-happer-64-takes-position-senior-science-technology-adviser> vs. Alarms Should Be Going Off <https://paw.princeton.edu/inbox/alarms-should-be-going> and <https://paw.princeton.edu/inbox/response-my-critics>

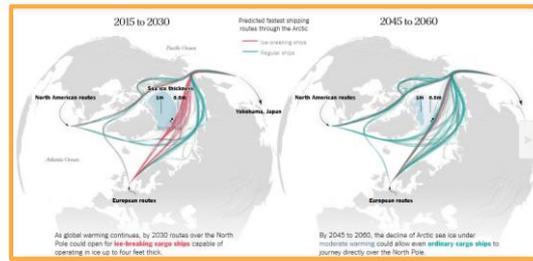
And the NPR story:

Meet The White House's New Chief Climate Change Skeptic

<https://www.npr.org/2019/03/01/698073442/heres-the-white-houses-top-climate-change-skeptic>

September 12, 2019: Why a high-profile climate science opponent quit Trump's White House

<https://www.sciencemag.org/news/2019/09/why-high-profile-climate-science-opponent-quit-trump-s-white-house>



As Arctic Ice Vanishes,
New Shipping Routes Open

<https://www.nytimes.com/interactive/2017/05/03/science/earth/arctic-shipping.html>

Bears Ears class, Spring 2019 ENV 426

Presidential Proclamation -- Establishment of the Bears Ears National Monument
December 26, 2016

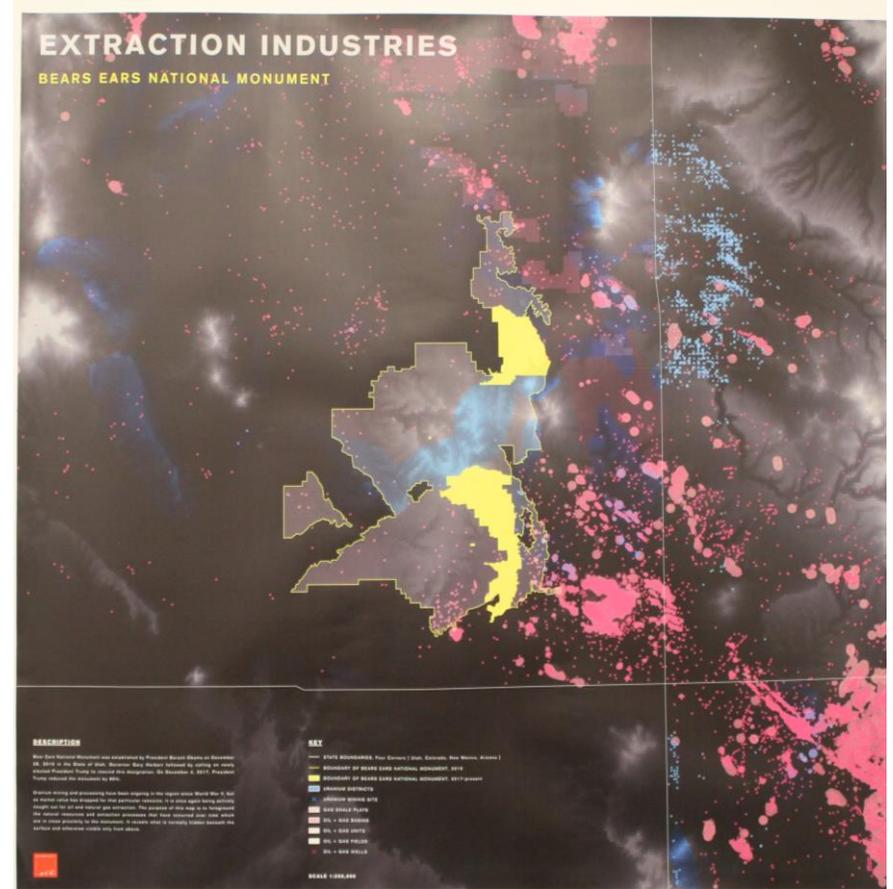
Presidential Proclamation Modifying the Bears Ears National Monument
December 6, 2017

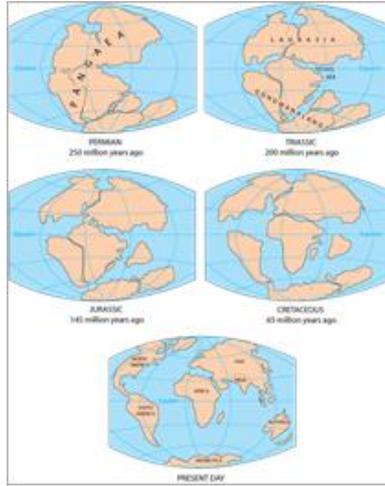
Exposure:

Fazal Sheikh <https://www.fazalsheikh.org/news-stories.html>

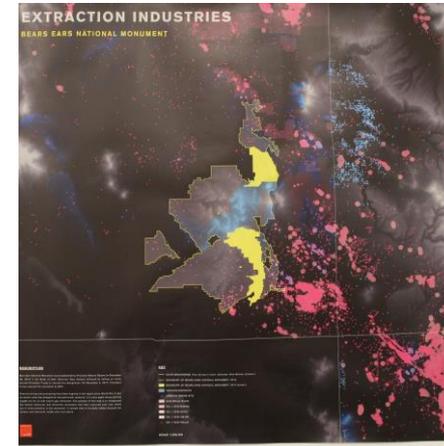
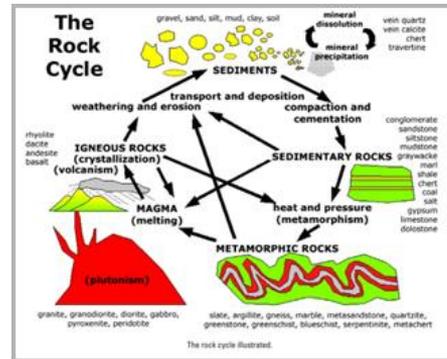
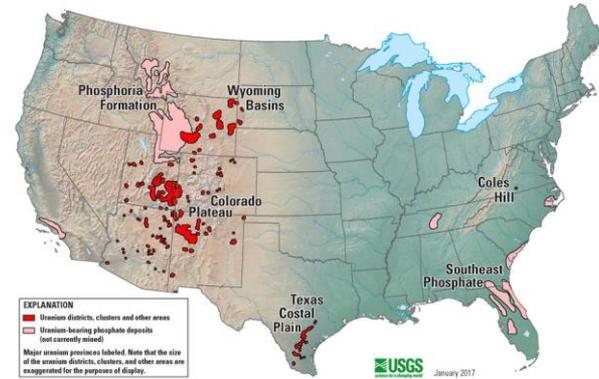
“Exposure was created in solidarity with the Citizen's Rally held at the Utah State Capital in Salt Lake City on Saturday, December 2, 2017. As artists, we wanted to support the Bears Ears Intertribal Coalition and the protection of Bears Ears and Grand Staircase-Escalante National Monuments slated to be radically reduced by President Donald J. Trump.”

Princeton University, Spring 2019 = ENV 426
Exposure: The Storied Landscape of Bears Ears National Monument and America's Public Lands





Uranium Resources of the United States





Uranium Resources of the United States

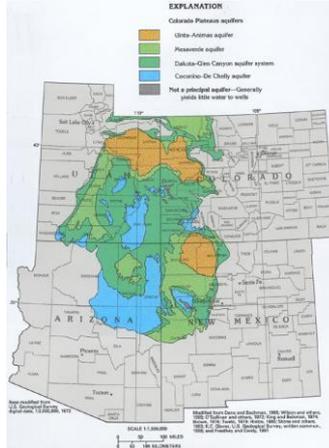
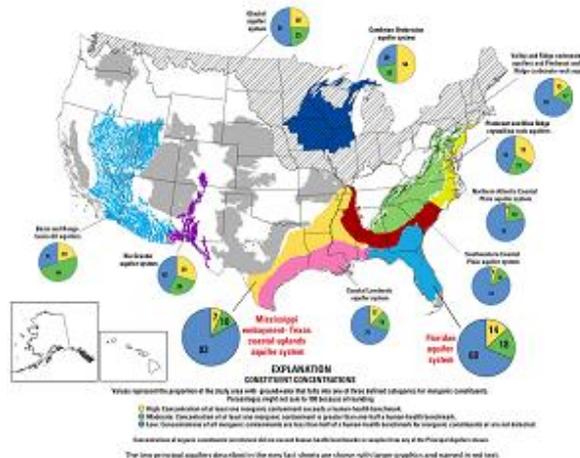
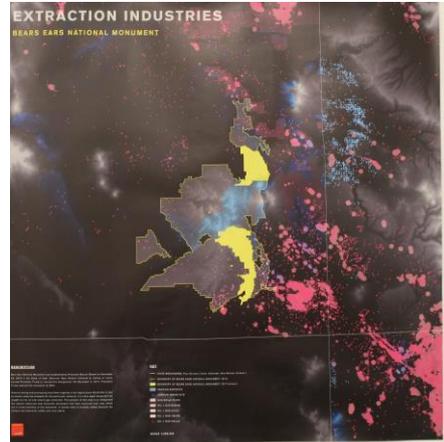


Figure 107. The Colorado Plateau is underlain by four principal aquifers. The colors on the map indicate the uppermost aquifer underlying each area shown here.

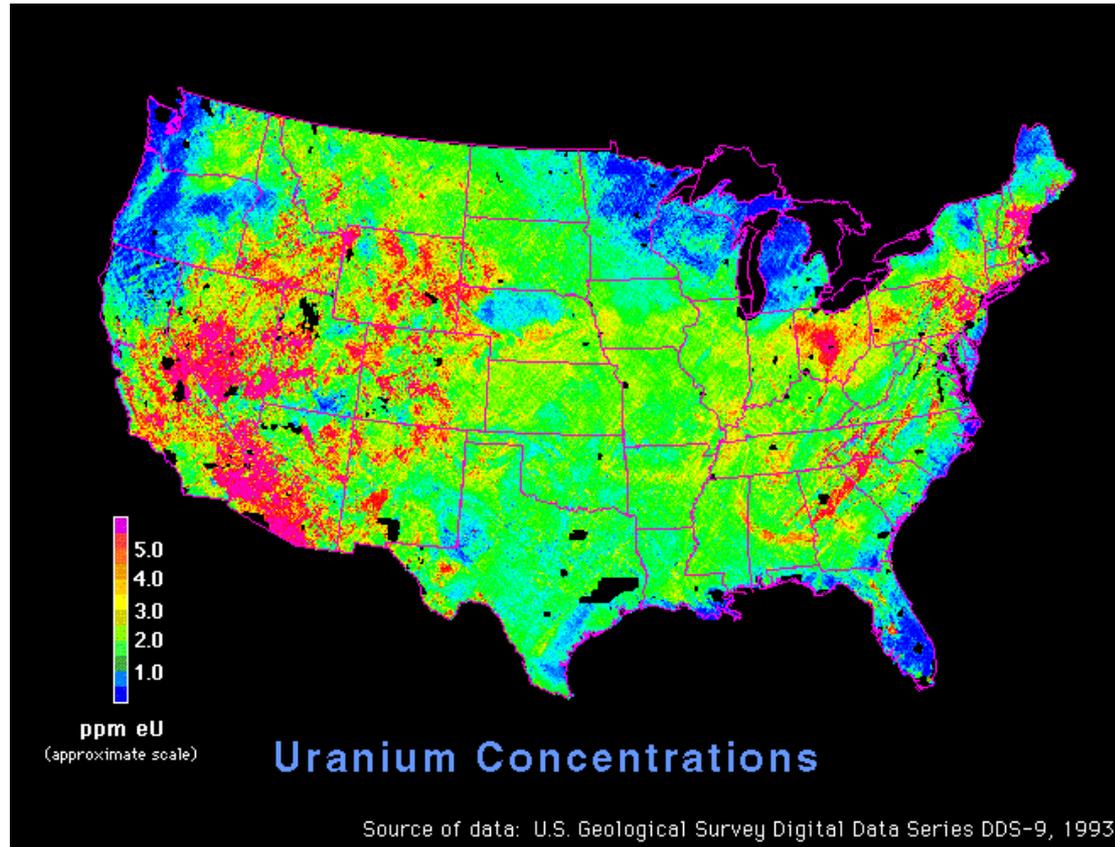
OVERVIEW OF WATER QUALITY IN PRINCIPAL AQUIFERS
Exceedences of human-health benchmarks by one or more inorganic constituents



Is Uranium in Water Resources near the Grand Canyon a Health Hazard?



Uranium-238 Concentrations across United States from NURE



Water Quality: The Birth of “Emily the Uranium Librarian” in 2004

Geohydrologic data for a low-level radioactive contamination site, Wood River Junction, Rhode Island

Open-File Report 84-725 By: Barbara J. Ryan <https://pubs.er.usgs.gov/publication/ofr84725>

Low-level radioactive ground-water contamination from a cold scrap recovery operation, Wood River Junction, Rhode Island Open-File Report 84-66 By: B.J. Ryan and K.L. Kipp

<https://pubs.er.usgs.gov/publication/ofr8466>

[Tragic Death Gives Way to Environmental Rebirth](#) January 06, 2016

“WOOD RIVER JUNCTION, R.I. — Fifty-two years ago this July an explosion rocked this rural village and devastated a local family.

On July 24, 1964, a [criticality accident](#) occurred at the United Nuclear Corp.’s fuels recovery plant, killing a 37-year-old production technician. On the evening of the accident, Robert Peabody was reportedly pouring what he thought was a bottle of trichloroethylene, to remove organics, into a mechanical mixer when he saw a blue flash. He had accidentally poured a concentrated uranium solution into the mixer, which contained sodium carbonate, resulting in a critical nuclear reaction.

With so much uranium in one container, it reached critical mass and reacted, knocking Peabody to the floor, splashing him with radioactive liquid and exposing him to a fatal radiation dose of 10,000 rads (1 rad equals 0.01) — 1,000 times the lethal dose and the equivalent of 700,000 chest X-rays. Peabody, bombarded by neutrons and gamma rays, had been exposed to more radiation than anyone outside of Hiroshima or Nagasaki, Japan, two decades earlier.

Peabody died two days later. His wife and their nine children were left with a small cash settlement. The accident was blamed on a combination of factors, including incorrect procedures approved by supervisors. The **Atomic Energy Commission** eventually charged United Nuclear Corp. with 14 violations of nuclear-safety regulations, eight directly involved in Peabody’s accident, but no fines were ever imposed.”

2013- BACK TO THE FUTURE:
URANIUM INFORMATION AT THE
USGS DENVER LIBRARY

<https://gsa.confex.com/gsa/2013AM/webprogram/Paper225430.html>

2013- THE PAST IS THE KEY TO THE
FUTURE: URANIUM RESEARCH AT
THE USGS DENVER LIBRARY

<https://gsa.confex.com/gsa/2013AM/webprogram/Paper222073.html>

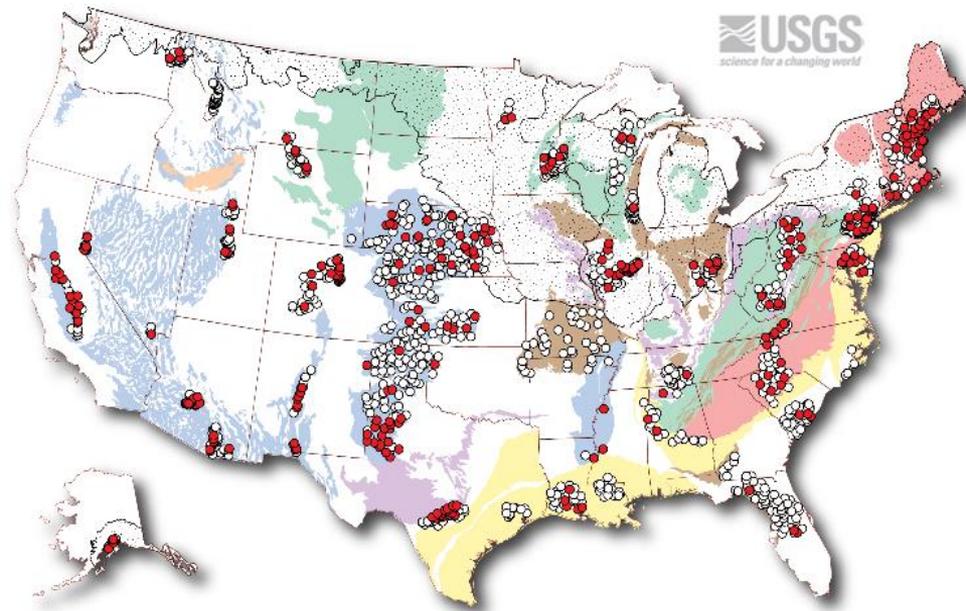
2012 - Critical analysis of world
uranium resources

<https://pubs.er.usgs.gov/publication/sir20125239>

2011 - Review and Interpretation of
Previous Work and New Data on the
Hydrogeology of the Schwartzwalder
Uranium Mine and Vicinity, Jefferson
County, Colorado

<https://pubs.usgs.gov/of/2011/1092/>

Domestic (Private) Well Water Quality



EXPLANATION

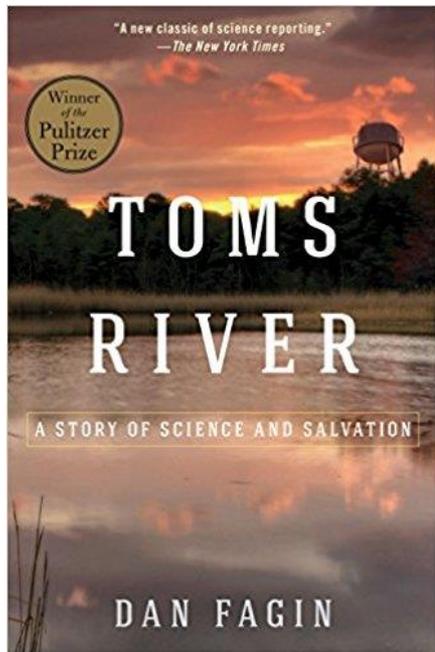
- At least one contaminant concentration greater than a human-health benchmark
- No contaminant concentration greater than a human-health benchmark

Health-Based Screening Levels for Evaluating Water-Quality Data

Water Quality of Domestic Wells: (1991-2004)

In a [study of 2,100 domestic wells](#), water pumped from about one in five wells contained one or more contaminants at a concentration greater than a human-health benchmark for drinking water.

- The contaminants most often found at these elevated concentrations were inorganic chemicals, such as [metals](#), [radionuclides](#), and [nitrate](#); all of these but nitrate are derived primarily from natural sources.
- Man-made organic compounds, such as [pesticides](#) and [solvents](#), were detected in more than half (60 percent) of the domestic wells sampled, but concentrations were seldom greater than human-health benchmarks (less than 1 percent of wells).
- About half of the wells had at least one “nuisance” contaminant—a compound that impairs [taste, odor, or other aesthetic considerations](#)—at a level or concentration outside the range of values recommended by the U.S. Environmental Protection Agency.
- Microbial contaminants (for example, bacteria) were detected in about one-third of the approximately 400 wells that had their water analyzed for those contaminants.
- Contaminants found in domestic wells usually co-occurred with other contaminants as mixtures, rather than alone, which is a potential concern because the total toxicity of a mixture can be greater than that of any single contaminant.



[Toms River: A Story of Science and Salvation by Dan Fagin](#)

Toms River Township Childhood Cancer Investigation: <https://www.state.nj.us/health/ceohs/environmental-occupational/hazardous-waste-sites/ocean/dovertwp.shtml>

Beginning in 1995, the New Jersey Department of Health (NJDOH) and the Agency for Toxic Substances and Disease Registry (ATSDR) examined childhood cancer incidence in Dover Township, Ocean County, and its relationship to environmental contamination. Most of the documents prepared during the course of that investigation are available below. For further information, please [contact us](#).

[Summary of the investigation and findings](#)

[Chronology of activities](#)

Summary of the investigation and findings

Background

The occurrence of childhood cancer has been a concern in the Dover Township/Toms River area of Ocean County for many years. In 1995, the NJDOH released an analysis of childhood cancer using State Cancer Registry data for the period 1979 through 1991. The finding of a statistically significant elevation in overall childhood cancer heightened community concerns about cancer in children, and its possible relationship to environmental pollution issues in and around the township.

Public Health Response Plan

The NJDOH has worked closely with the federal [Agency for Toxic Substances and Disease Registry \(ATSDR\)](#) to evaluate possible risk factors (including environmental exposures), that may be related to the elevated incidence of childhood cancer in Dover Township. The NJDOH and ATSDR, with community-based input from the Citizens Action Committee on Childhood Cancer Cluster (CACCCC) and the Ocean County Health Department, developed a Public Health Response Plan. The Plan included an update and re-evaluation of childhood cancer rates, public health evaluations of potential environmental exposures to hazardous chemicals in the environment, and public health education efforts. Public health activities were later expanded to include a case-control epidemiologic study. *For more information, please go to the full [Public Health Response Plan](#) or to [Health Care Provider Update #1](#).*

New Jersey sues DuPont, 3M over toxic firefighting foam

https://www.nj.gov/oag/newsreleases19/AFFF_Complaint.pdf

May 14, 2019

NRDC Advises Tougher Standards for PFAS in NJ Drinking Water, May 15, 2019

<https://www.nrdc.org/experts/kimberly-ong/nrdc-advises-tougher-standards-pfas-nj-drinking-water>

USGS : Per- and Polyfluoroalkyl Substances (PFASs) detected in Source Waters and Treated Public Water Supplies

https://www.usgs.gov/mission-areas/environmental-health/science/and-polyfluoroalkyl-substances-pfass-detected-source?qt-science_center_objects=0#qt-science_center_objects

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a group of man-made chemicals that includes PFOA, PFOS, GenX, and many other chemicals. PFAS have been manufactured and used in a variety of industries around the globe, including in the United States since the 1940s. PFOA and PFOS have been the most extensively produced and studied of these chemicals. Both chemicals are very persistent in the environment and in the human body – meaning they don't break down and they can accumulate over time. There is evidence that exposure to PFAS can lead to adverse human health effects.

PFAS can be found in:

- **Food** packaged in PFAS-containing materials, processed with equipment that used PFAS, or grown in PFAS-contaminated soil or water.
- **Commercial household products**, including stain- and water-repellent fabrics, nonstick products (e.g., Teflon), polishes, waxes, paints, cleaning products, and fire-fighting foams (a major source of groundwater contamination at airports and military bases where firefighting training occurs).
- **Workplace**, including production facilities or industries (e.g., chrome plating, electronics manufacturing or oil recovery) that use PFAS.
- **Drinking water**, typically localized and associated with a specific facility (e.g., manufacturer, landfill, wastewater treatment plant, firefighter training facility).
- **Living organisms**, including fish, animals and humans, where PFAS have the ability to build up and persist over time.

<https://www.epa.gov/pfas/basic-information-pfas>

Water Quality Investigation

Accident Description

Accident: Freedom Industries Chemical Release

Location: Location: Charleston, WV

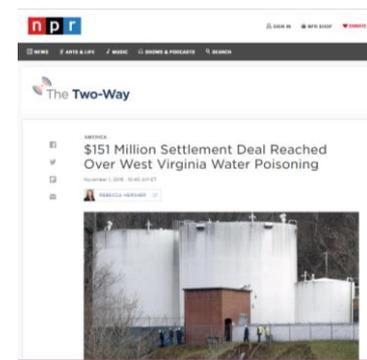
Accident Occurred On: 01/09/2014 | **Final Report Released On:** 05/11/2017

Accident Type: Release

Investigation Status: The CSB's final investigation report was released on 5.11.2017

A leak originating from a storage tank at Freedom Industries contaminated the local water supply leaving hundreds of thousands of West Virginia residents without clean drinking water.

<https://www.csb.gov/freedom-industries-chemical-release/>

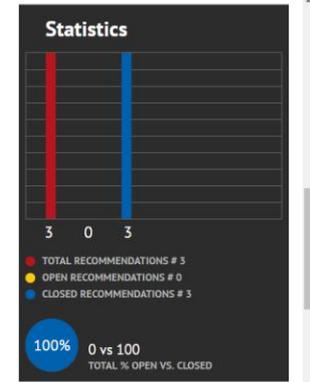


Related Video

Freedom Industries Tank Dismantling

7/16/2014 6:13:00 PM

[VIEW ALL VIDEOS](#)



INVESTIGATION REPORT

CHEMICAL SPILL CONTAMINATES PUBLIC WATER SUPPLY IN CHARLESTON, WEST VIRGINIA

On 1/9/2014, a release of the toxic chemical, perchloroethylene (PCE), from a storage tank at Freedom Industries contaminated the local water supply for over 600,000 residents.

KEY ISSUES:

- Risk Assessment and Mitigation
- Risk Communication
- Public Notice, Incident Summary and Site Assessment
- Enforcement of Standards

Report No. 2014-01-001
February 2017

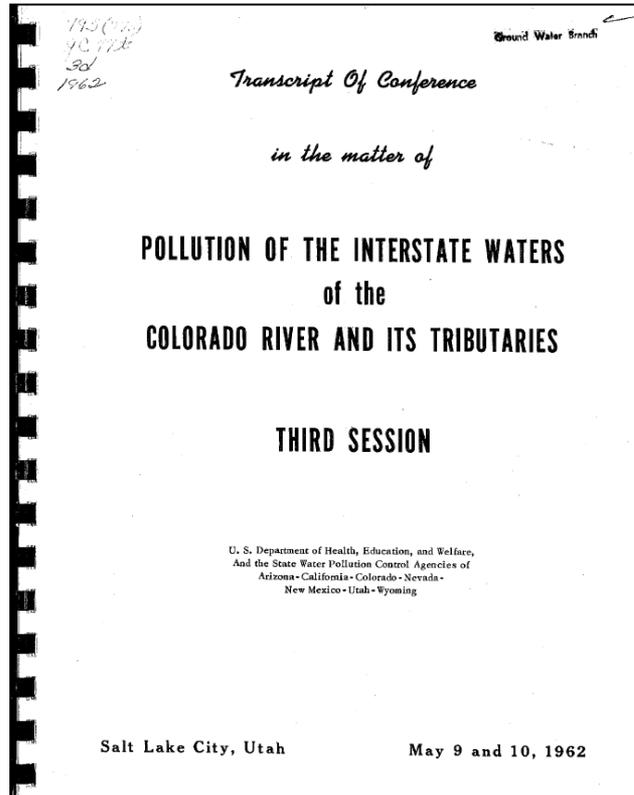
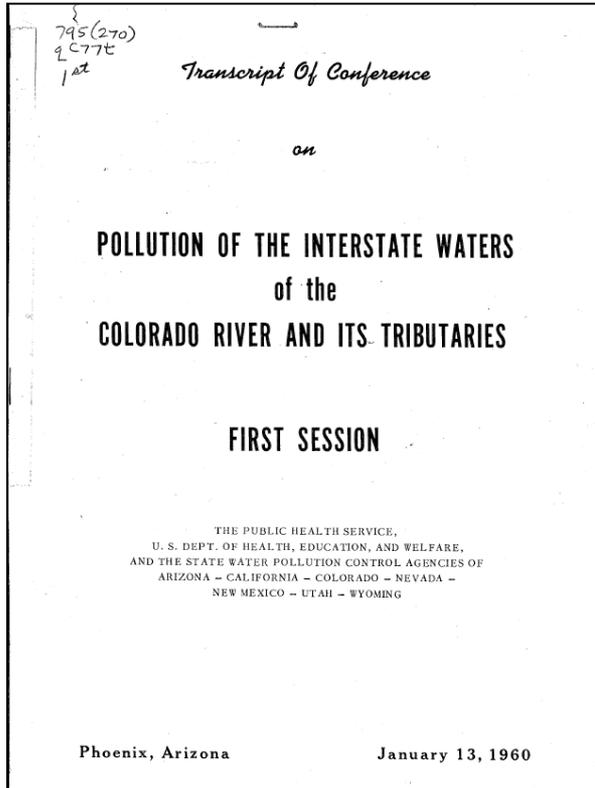
Freedom Industries Chemical Release

Google Scholar

Freedom Industries Chemical Release CSB

Next 1,000 results (8/8) out of 10

- Residential tap water contamination following the Freedom Industries chemical spill: perceptions, water quality, and health impacts. [PITM | ACS.org](#)
- As a consequence, more than 600,000 gallons of municipal drinking water had to be shut off for several days. [PITM | hsk.gov](#)
- Crisis and emergency risk communication: lessons from the Elk River spill. [PITM | hsk.gov](#)
- How to improve risk communication: lessons from the Elk River spill. [PITM | hsk.gov](#)
- Strategic targeting of industrial chemical facilities: Strategic institutions and the implications for US security. [PITM | tandfonline.com](#)



Reports include
Raw & Calculated
USGS data

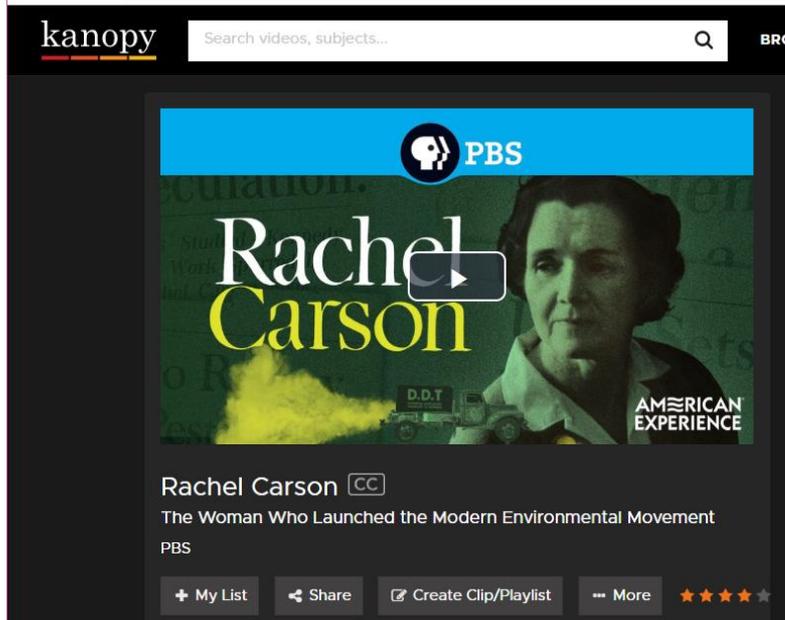
These are the Pre-EPA
reports: EPA created on
December 2, 1970

<https://www.epa.gov/history>

Rachel Carson: Silent Spring

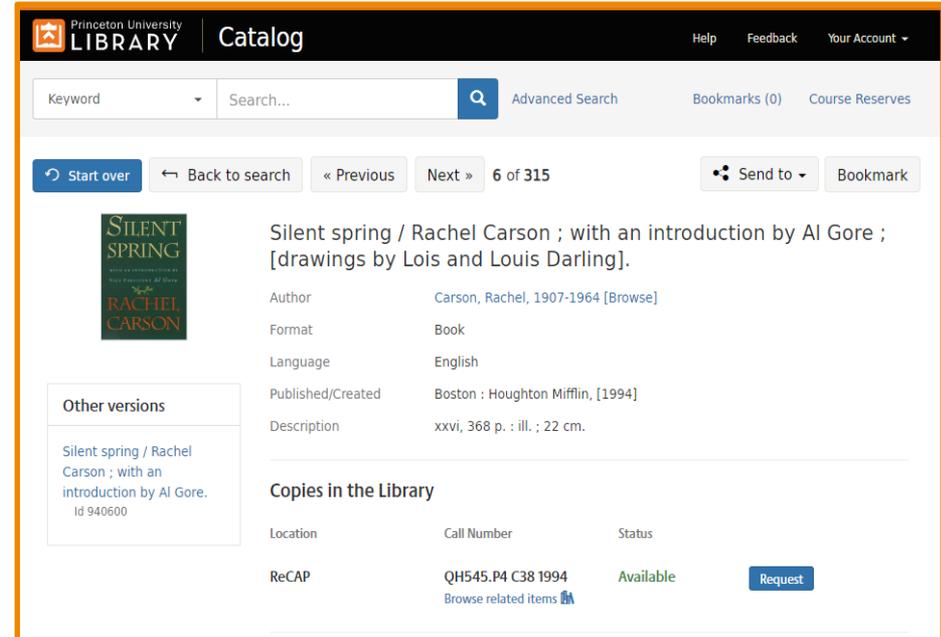
<http://www.rachelcarson.org/>

“Perhaps the finest nature writer of the Twentieth Century, [Rachel Carson \(1907-1964\)](#) is remembered more today as the woman who challenged the notion that humans could obtain mastery over nature by chemicals, bombs and space travel than for her studies of ocean life. Her sensational book [Silent Spring](#) (1962) warned of the dangers to all natural systems from the misuse of chemical pesticides such as DDT, and questioned the scope and direction of modern science, initiated the contemporary environmental movement.”



The screenshot shows a Kanopy video player interface. At the top, there is a search bar with the text "Search videos, subjects...". Below the search bar, the video player displays a thumbnail for a PBS video titled "Rachel Carson". The thumbnail features a portrait of Rachel Carson and the text "D.D.T." and "AMERICAN EXPERIENCE". Below the thumbnail, the video title "Rachel Carson" is displayed, along with a Creative Commons license icon (CC) and the subtitle "The Woman Who Launched the Modern Environmental Movement". At the bottom of the player, there are buttons for "My List", "Share", "Create Clip/Playlist", and "More", along with a star rating.

<https://princeton.kanopy.com/video/rachel-carson>



The screenshot shows the Princeton University Library Catalog page for the book "Silent Spring" by Rachel Carson. The page includes a search bar, navigation buttons, and a detailed record for the book. The record includes the title, author, format, language, published/created date, and description. It also lists other versions and provides information about the copies in the library, including location, call number, and status.

Location	Call Number	Status
ReCAP	QH545.P4 C38 1994	Available

Request

<https://catalog.princeton.edu/catalog/SCSB-3303611>

Abandoned Mine vs. No Mining

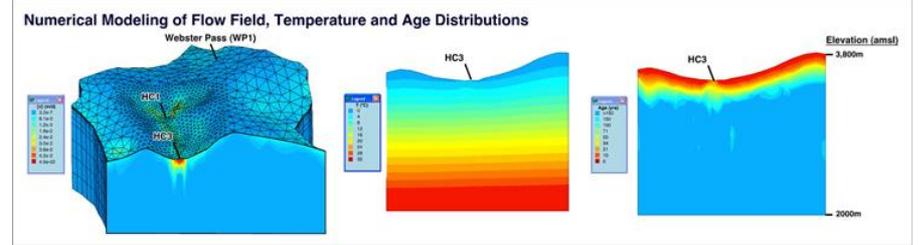
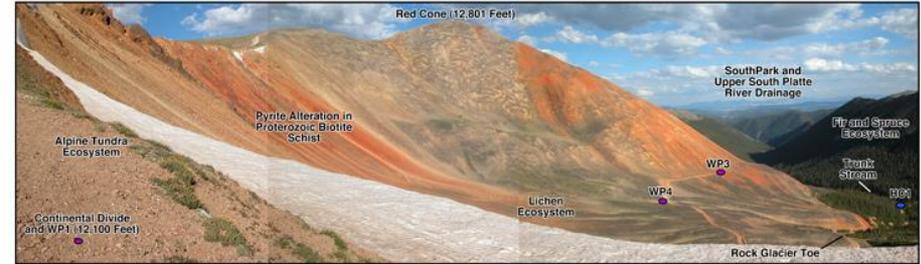
<https://water.usgs.gov/owq/gkm/>



<https://www.usgs.gov/media/galleries/usgs-site-visit-and-sampling-gold-king-mine-august-11-13-2015>



<https://www.usgs.gov/media/images/usgs-scientists-monitor-animas-river>

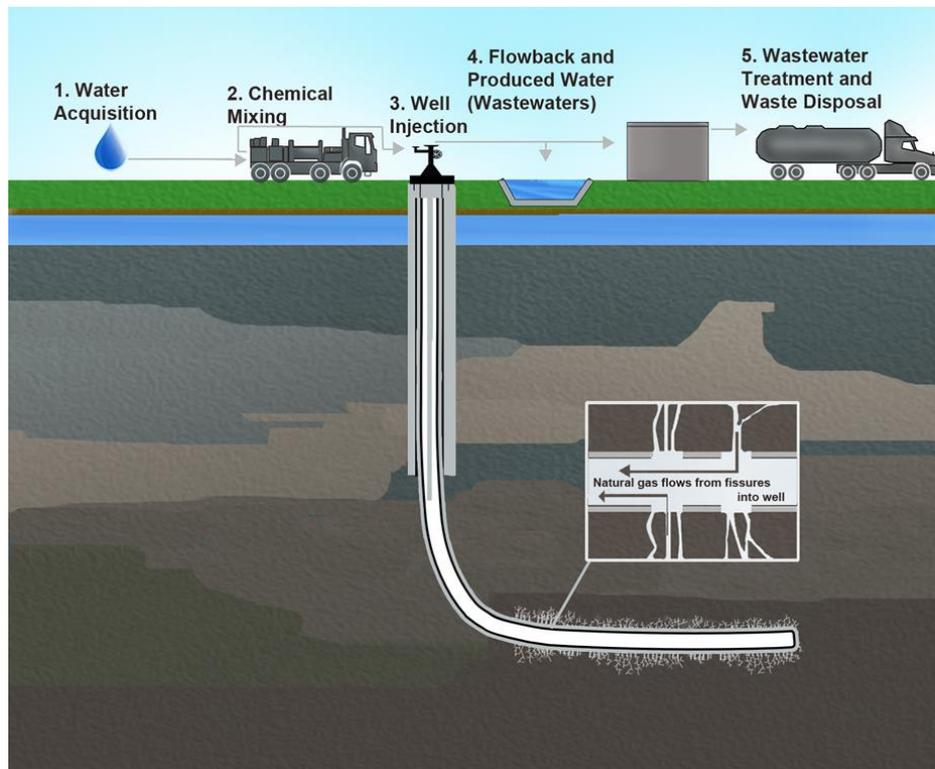


https://crustal.usgs.gov/projects/Handcart_Gulch/watershed.html



ROCKS WEATHER AND WATER IS FRIENDLY

<https://water.usgs.gov/edu/>



Hydraulic fracturing (informally known as hydrofracking, fracking, fracing, or hydrofracturing) is a process that typically involves injecting water, sand, and (or) chemicals under high pressure into a bedrock formation via a well. This process is intended to create new fractures in the rock as well as increase the size, extent, and connectivity of existing fractures.

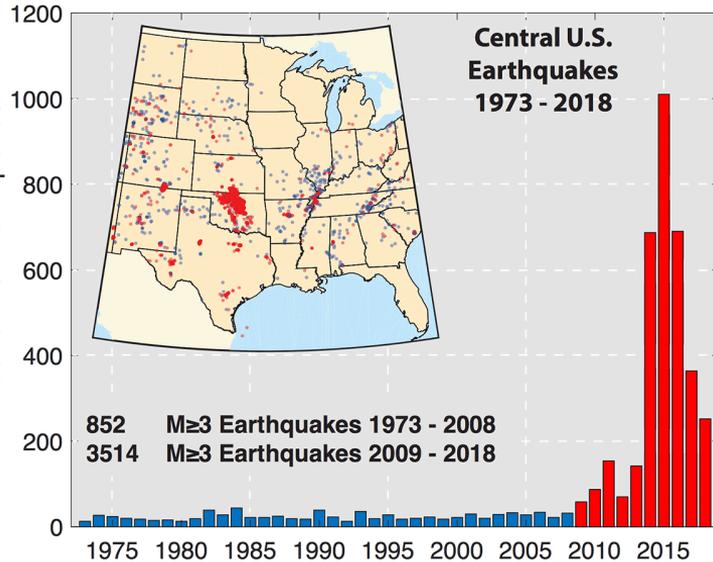
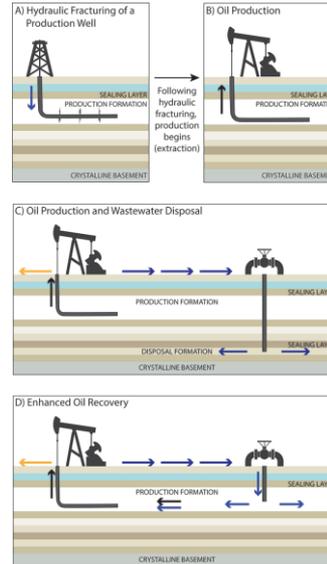
Hydraulic fracturing is a well-stimulation technique used commonly in low-permeability rocks like tight sandstone, shale, and some coal beds to increase oil and/or gas flow to a well from petroleum-bearing rock formations. A similar technique is used to create improved permeability in underground geothermal reservoirs. A form of hydraulic fracturing is also used in low permeability sediments and other tight subsurface formations to increase the efficiency of soil vapor extraction and other technologies used in remediating contaminated sites.

Energy Program: Environmental Aspects



Produced Waters Database

The primary objective of this project is to provide information on the volume, quality, impacts, and possible uses of water produced during generation and development of energy resources (particularly hydrocarbons) as well as related fluids injected into reservoirs for energy development and associated waste disposal.

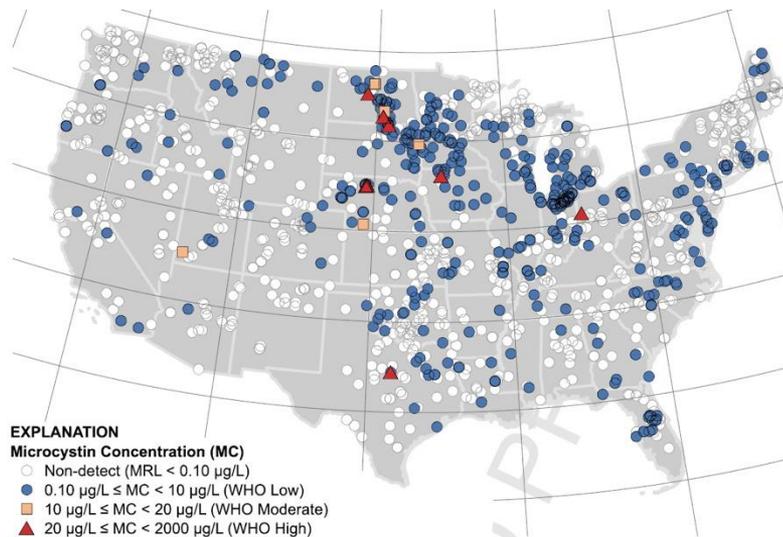


<https://earthquake.usgs.gov/research/induced/overview.php>

Water Quality – Algal Toxins



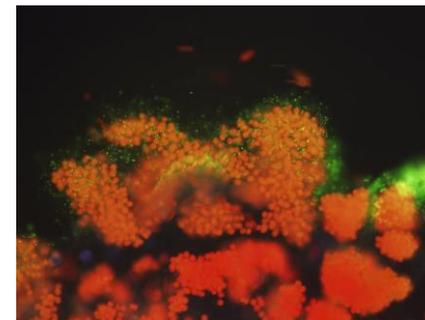
https://toxics.usgs.gov/highlights/2016-05-31-cyanotoxins_in_lakes.html



<https://www.sciencedirect.com/science/article/pii/S1568988315300883?via%3Dihub>

May 15, 2019: USGS Kicks Off Innovative Project to Study Harmful Algal Blooms in New York

<https://www.usgs.gov/news/usgs-kicks-innovative-project-study-harmful-algal-blooms-new-york>



USGS Publications Access Points

National Geologic Map Database:
<https://ngmdb.usgs.gov>

Geology and Hydrology Maps

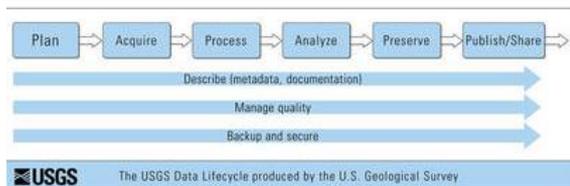
TopoView = Topographic Maps

Publications Warehouse:
<https://pubs.usgs.gov>

ScienceBase.gov

Data.usgs.gov

DataOne (Earth Data)
<https://www.dataone.org/>



Faundeen, J.L., Burley, T.E., Carlino, J.A., Govoni, D.L., Henkel, H.S., Holl, S.L., Hutchison, V.B., Martín, Elizabeth, Montgomery, E.T., Ladino, C.C., Tessler, Steven, and Zolly, L.S., 2013, The United States Geological Survey Science Data Lifecycle Model: U.S. Geological Survey Open-File Report 2013–1265, 4 p., <http://dx.doi.org/10.3133/ofr20131265>

Earth As Art!

Earth As Art 1 : <https://eros.usgs.gov/image-gallery/earth-art-1>

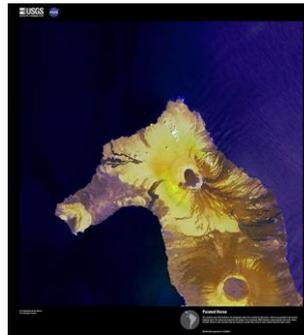
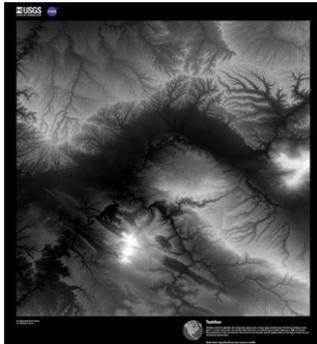
Earth As Art 2 : <https://eros.usgs.gov/image-gallery/earth-art-2>

Earth As Art 3 : <https://eros.usgs.gov/image-gallery/earth-art-3>

Earth As Art 4 : <https://eros.usgs.gov/image-gallery/earth-art-4>

Earth As Art 5 : <https://eros.usgs.gov/image-gallery/earth-art-5>

Earth As Art 6 : <https://eros.usgs.gov/image-gallery/earth-art-6>



E&E News (Subscription):
<https://www.eenews.net/>

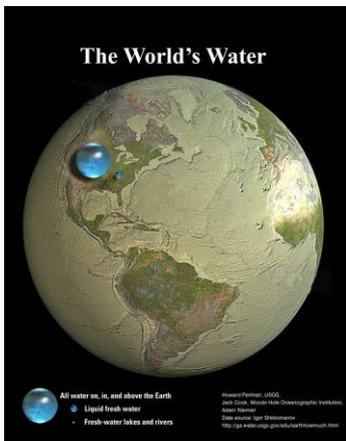
Eos: <https://eos.org/>

Eureka!:
<https://www.eureka!org/>

Earth Science:
<https://www.eureka!org/bysubject/earthscience.php>

Rocky Mountains:
<https://www.rmag.org/publications/publications/>

The screenshot shows the E&E DAILY website interface. At the top, there is a navigation bar with links for E&E Home, About, Contact, Start a Trial, and Subscribe. Below this are several category buttons: Energywire, Climatewire, E&E Daily, Greenwire, E&E News PM, and Reports. The main header features the E&E DAILY logo and a background image of the U.S. Capitol building, with the tagline 'CONGRESS. LEGISLATION. POLITICS.' on the right. A secondary navigation bar includes date links for Fri., Sep. 20 (selected), Thu., Sep. 19, Wed., Sep. 18, Tue., Sep. 17, and an Edition Archive link. A search bar is located on the right with the placeholder text 'enter keyword' and a 'go!' button. The main content area is dated 'Friday, September 20, 2019 — 7:05 AM' and includes a 'READ FULL EDITION' link. The primary article is titled '1. HOUSE Lawmakers jockey for power on Energy and Commerce' and includes a sub-headline 'Announced and potential retirements could amount to an exodus of lawmakers who have long held sway over energy policy on Capitol Hill. Some members are already looking to fill the void.' Below this is a 'TOP STORIES' section with three items: '2. BORDER WALL Land transfers anger lawmakers, threaten spending bills', '3. EPA Wheeler walks back two initiatives but gives little ground', and 'POLITICS'. On the right side, there is a 'MOST READ' section with five items: '1. OIL AND GAS Is U.S. shale facing an 'unmitigated disaster'? Energywire: Thursday, September 19, 2019', '2. WHITE HOUSE 'I want to look better.' For Trump, climate is a laugh line Climatewire: Thursday, September 19, 2019', '3. INTERIOR Bernhardt hands border lands to Army Greenwire: Thursday, September 19, 2019', '4. EPA Facing fines, polluters turn to Trump's enforcement fixer Greenwire: Wednesday, September 18, 2019', and '5. APPROPRIATIONS Senators hope to sidestep trouble on Interior-EPA bill E&E Daily: Thursday, September 19, 2019'.



January – Introduction to Geosciences Library Research

March – Library Research for Water Resources

TBD – Library Research for Climate Change

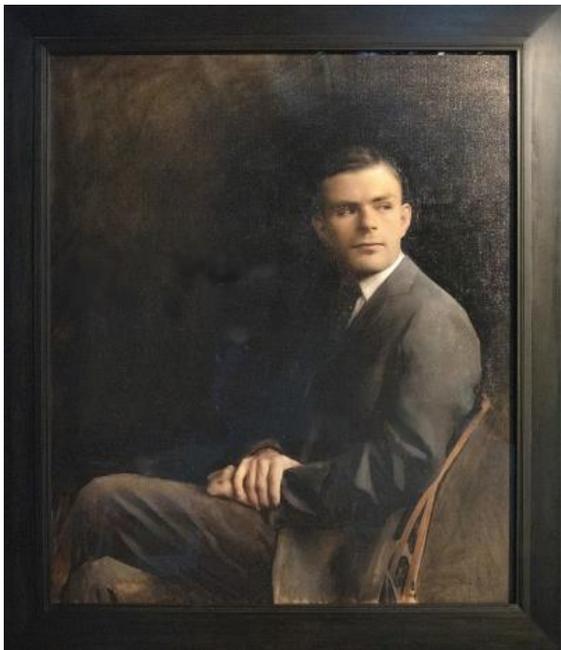
TBD – Library Research for Atmospheric and Oceanic Sciences

TBD – Library Research for Energy, Mineral, and Uranium Resources

TBD – Library Research for Natural Hazard Events: Earthquakes, Hurricanes, Volcanoes, and Wildfires

TBD – Using Art to Teach Chemistry, Geosciences and Environmental Studies in the Library

Thank You!



Alan Turing's portrait near front entrance to Lewis Science Library:
<https://www.cs.princeton.edu/news/alan-turings-portrait-unveiled-ceremony>

Emily C. Wild
ewild@princeton.edu
609-258-5484

Princeton University Library
<http://library.princeton.edu>

Princeton University Geosciences
<http://geosciences.princeton.edu>
Geophysical Fluid Dynamics Laboratory
<https://www.gfdl.noaa.gov/>
Princeton Environmental Institute
<http://environment.princeton.edu>

Princeton University Chemistry
<https://chemistry.princeton.edu/>

Andlinger Center for Energy and the Environment
<https://acee.princeton.edu/>