

WHAT IS GEOSCIENCE?

Geoscience is the study of the Earth and the complex geologic, marine, atmospheric, and hydrologic processes that sustain life and the economy. Understanding the Earth's surface and subsurface, its resources, history, and hazards allows us to develop solutions to critical economic, environmental, health, and safety challenges.



Satellite image: NASA/USGS Landsat Program. State outline (not to scale): Matt Battison.

By the numbers: MINNESOTA

- 6,639 geoscience employees (excludes self-employed)¹
- 776 million gallons/day: total groundwater withdrawal³
- \$3.18 billion: value of nonfuel mineral production in 2017⁴
- 60 total disaster declarations, including 25 flood, 24 severe storm, and 3 tornado disasters (1953-2017)⁶
- \$16.7 million: NSF GEO grants awarded in 2017¹⁴

WORKFORCE IN MINNESOTA

- 6,639 geoscience employees (excludes self-employed) in 2017¹
- \$69,746: average median geoscience employee salary¹
- 13 academic geoscience departments²

WATER USE IN MINNESOTA

- 776 million gallons/day: total groundwater withdrawal³
- 2.45 billion gallons/day: total surface water withdrawal³
- 515 million gallons/day: public supply water withdrawal³
- 276 million gallons/day: water withdrawal for irrigation³
- 259 million gallons/day: industrial fresh water withdrawal³
- 79% of the population is served by public water supplies³

ENERGY AND MINERALS IN MINNESOTA

- \$3.18 billion: value of nonfuel mineral production in 2017⁴
- Iron ore, sand and gravel (construction), sand and gravel (industrial): top three nonfuel minerals in order of value produced in 2017⁴
- 10.9 million megawatt hours: wind produced in 2017⁵
- 1.26 million megawatt hours: hydroelectricity produced in 2017⁵

NATURAL HAZARDS IN MINNESOTA

- 60 total disaster declarations, including 25 flood, 24 severe storm, and 3 tornado disasters (1953-2017)⁶
- \$26 million: individual assistance grants (2005-2017)⁶
- \$63 million: mitigation grants (2005-2017)⁶
- \$290 million: preparedness grants (2005-2017)⁶
- \$290 million: public assistance grants (2005-2017)⁶
- 32 weather and/or climate events, each with costs exceeding \$1 billion (inflation adjusted) (1980-2017)⁷

¹ U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2017
² American Geosciences Institute, Directory of Geoscience Departments, 53rd Edition (2018)
³ U.S. Geological Survey, Estimated Use of Water in the United States in 2015

⁴ U.S. Geological Survey, Mineral Commodity Summaries 2018
⁵ U.S. Energy Information Administration
⁶ FEMA Data Visualization: Summary of Disaster Declarations and Grants (accessed May 2, 2018)
⁷ NOAA National Centers for Environmental Information, U.S. Billion-Dollar Weather and Climate Disasters from 1980 to 2018 (accessed April 6, 2018)

Geoscience, Minnesota, and Federal Agencies

U.S. GEOLOGICAL SURVEY (USGS)

- \$1.15 billion: total USGS budget in FY 2018 (5.8% increase from FY 2017)⁸
- The National Cooperative Geologic Mapping Program funds geologic mapping projects with federal (FEDMAP), state (STATEMAP), and university (EDMAP) partners
- \$2.47 million: Minnesota STATEMAP funding (1993-2016)⁹
- University of Minnesota, University of Minnesota at Duluth, and University of St. Thomas have participated in EDMAP⁹
- USGS streamgages collect real-time or recent streamflow, groundwater, and water-quality data in Minnesota

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

- \$20.7 billion: total NASA budget in FY 2018 (5.5% increase from FY 2017)¹⁰
- \$1.9 billion: total NASA Earth Science budget in FY 2018 (0% change from FY 2017)¹⁰
- Gravity Recovery and Climate Experiment (GRACE) satellites measure groundwater changes in Minnesota
- Soil Moisture Active Passive (SMAP) satellite measures soil moisture in Minnesota

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

- \$5.9 billion: total NOAA budget in FY 2018 (4.1% increase from FY 2017)¹¹
- Next-generation geostationary (GOES) and polar orbiting (JPSS) satellites provide weather forecasting for Minnesota
- Deep Space Climate Observatory (DISCOVER) satellite monitors radiation and air quality over Minnesota
- 15 National Weather Service Automated Surface Observing Systems (ASOS) stations in Minnesota¹²
- 215 National Weather Service Cooperative Observer Program (COOP) sites in Minnesota¹²

NATIONAL SCIENCE FOUNDATION (NSF)

- \$7.8 billion: total NSF budget in FY 2018 (4% increase from FY 2017)¹³
- \$1.4 billion: total NSF Geosciences Directorate (GEO) awards in FY 2017 (7.2% increase from FY 2016)¹⁴
- 53 NSF GEO awards in Minnesota totaling \$16.7 million in 2017¹⁴
- \$13.6 million: NSF GEO grants awarded to University of Minnesota Twin Cities in 2017¹⁴

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

- \$8.1 billion: total EPA budget in FY 2018 (0% change from FY 2017)¹⁵
- 25 active Superfund sites in Minnesota in 2018¹⁶
- \$14.8 million: Drinking Water State Revolving Fund (DWSRF) grants in Minnesota in 2017¹⁷

FEDERAL FACILITIES IN MINNESOTA

- USGS Minnesota Water Science Center, Mounds View
- EPA National Health and Environmental Effects Research Laboratory, Mid-Continent Ecology Division, Duluth
- NSF National Center for Earth-surface Dynamics, St. Anthony Falls
- USDA Forest Service Center for Research on Ecosystem Change, Grand Rapids

YOUR STATE SOURCE FOR GEOSCIENCE INFORMATION

Minnesota Geological Survey
2609 West Territorial Road
St. Paul, MN 55114
<https://www.mngs.umn.edu/>
612-626-2969

⁸ U.S. Department of the Interior, FY 2019 Budget in Brief

⁹ U.S. Geological Survey, National Cooperative Geologic Mapping Program

¹⁰ National Aeronautics and Space Administration, FY 2019 Budget Estimates

¹¹ National Oceanic and Atmospheric Administration, FY 2019 Bluebook

¹² NOAA In Your State and Territory

¹³ U.S. House of Representatives, FY 2018 Omnibus Spending Bill (Division B) – Commerce, Justice, Science, and Related Agencies Appropriations Act, 2018

¹⁴ National Science Foundation, Budget Information System

¹⁵ U.S. House of Representatives, FY 2018 Omnibus Spending Bill (Division G) – Department of the Interior, Environment, and Related Agencies Appropriations Act, 2018

¹⁶ U.S. Environmental Protection Agency, Superfund Sites

¹⁷ U.S. Environmental Protection Agency, Drinking Water State Revolving Fund National Information Management System Reports

AGI's Geoscience Policy and Critical Issues programs support well-informed public policy and decision making by providing information and facilitating dialogue between the geoscience community and decision makers at all levels.

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