

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: MICHIGAN

- 9,569 geoscience employees (excludes self-employed)¹
- 767 million gallons/day: total groundwater withdrawal³
- \$2.45 billion: value of nonfuel mineral production in 2017⁴
- 36 total disaster declarations, including 11 flood, 8 severe storm, and 6 tornado disasters (1953-2017)⁶
- \$11.8 million: NSF GEO grants awarded in 2017¹⁴

WORKFORCE IN MICHIGAN

- 9,569 geoscience employees (excludes self-employed) in 2017¹
- \$72,830: average median geoscience employee salary¹
- 17 academic geoscience departments²

WATER USE IN MICHIGAN

- 767 million gallons/day: total groundwater withdrawal³
- 9.29 billion gallons/day: total surface water withdrawal³
- 1.03 billion gallons/day: public supply water withdrawal³
- 332 million gallons/day: water withdrawal for irrigation³
- 518 million gallons/day: industrial fresh water withdrawal³
- 74% of the population is served by public water supplies³

ENERGY AND MINERALS IN MICHIGAN

- \$2.45 billion: value of nonfuel mineral production in 2017⁴
- Iron ore, portland cement, sand and gravel (construction): top three nonfuel minerals in order of value produced in 2017⁴
- 5.07 million megawatt hours: wind produced in 2017⁵
- 1.61 million megawatt hours: hydroelectricity produced in 2017⁵
- 5.43 million barrels: crude oil produced in 2017⁵

NATURAL HAZARDS IN MICHIGAN

- 36 total disaster declarations, including 11 flood, 8 severe storm, and 6 tornado disasters (1953-2017)⁶
- \$157 million: individual assistance grants (2005-2017)⁶
- \$63 million: mitigation grants (2005-2017)⁶
- \$491 million: preparedness grants (2005-2017)⁶
- \$36 million: public assistance grants (2005-2017)⁶
- 31 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)

AGI is a network of 52 member societies, representing more than 260,000 geoscientists.

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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
- \$1.11 million: Michigan STATEMAP funding (1993-2016)⁹
- 7 Michigan universities, including recent recipients Michigan Tech, Wayne State, Western Michigan University, and Michigan State University, have participated in EDMAP⁹
- USGS streamgages collect real-time or recent streamflow, groundwater, and water-quality data throughout Michigan

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 Michigan
- Soil Moisture Active Passive (SMAP) satellite measures soil moisture in Michigan

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 Michigan
- Deep Space Climate Observatory (DISCOVER) satellite monitors radiation and air quality over Michigan
- 27 National Weather Service Automated Surface Observing Systems (ASOS) stations in Michigan¹²
- 265 National Weather Service Cooperative Observer Program (COOP) sites in Michigan¹²

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
- 55 NSF GEO awards in Michigan totaling \$11.8 million in 2017, including \$8.6 million to the University of Michigan Ann Arbor¹⁴

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

- \$8.1 billion: total EPA budget in FY 2018 (0% change from FY 2017)¹⁵
- 65 active Superfund sites in Michigan in 2018¹⁶
- \$125.7 million: Drinking Water State Revolving Fund (DWSRF) grants in Michigan in 2017¹⁷
- \$200,000: Brownfield cleanup grants awarded to Michigan in 2018¹⁸

FEDERAL FACILITIES IN MICHIGAN

- USGS Great Lakes Science Center, Ann Arbor
- NSF National Superconducting Cyclotron Laboratory, East Lansing
- NOAA Great Lakes Environmental Research Laboratory, Ann Arbor

YOUR STATE SOURCE FOR GEOSCIENCE INFORMATION

Michigan Geological Survey
Western Michigan University
1903 W. Michigan Ave
Kalamazoo, MI 49008-5241
<http://wmich.edu/geologysurvey>
269-387-8649

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

¹⁸ U.S. Environmental Protection Agency, Brownfields and Land Revitalization, Brownfields Grant Fact Sheet Search

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

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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