
The Importance of Teaching Earth Science

Position Statement. The Geological Society of America (GSA) recognizes that basic knowledge of Earth science is essential to meeting the environmental challenges and natural resource limitations of the twenty-first century. It is critical that earth-science education begin at the kindergarten level and include advanced offerings at the secondary school level, and that highly qualified earth-science teachers provide the instruction. GSA recommends that the study of earth science be an integral component of science education in public and private schools at all levels, from kindergarten through twelfth grade.

Purpose. This position statement (1) summarizes the consensus views of GSA on the importance of teaching of earth science at the K–12 levels; (2) advocates for training at the college level that will produce highly qualified earth-science teachers; and (3) provides specific recommendations and opportunities for advocacy and action by GSA members.

RATIONALE

This is a critical time for students to understand how Earth works as a system and how humans interact with Earth. Understanding the causes and potential societal consequences of natural Earth processes (e.g., earthquakes, floods, landslides, tsunamis, volcanic eruptions, weather, and global climate change) and the production, availability, and potential depletion of natural resources (e.g., water, soil, mineral, and energy) is of particular importance. These processes and resources impact our economy, our security, and the safety and sustainability of our environment. The context for understanding modern Earth processes lies in deciphering records of Earth's past. Investigating these records, as well as human interaction with modern Earth processes and resources, is therefore critical to the wellbeing of humanity and the planet. Empowering students with scientific knowledge and skills to make informed decisions as citizens of our common home is a vital undertaking and a key responsibility for science educators and geoscientists.

Earth science is an integrated science, bringing together biology, chemistry, and physics as they apply to the workings of Earth. The applied, and often visual, nature of earth science helps learners see its relevance to their lives and to their communities. Engaging students in learning about Earth supports the development of problem solving and critical thinking skills and highlights the importance of science, technology, engineering, and math (STEM) careers to society. Therefore, earth science can serve as an introduction to the life and physical sciences or as a capstone course requiring students to apply their knowledge of these sciences. Earth science can also serve as a framework for investigating life and physical sciences in museums and other informal education venues.

RECOMMENDATIONS

GSA encourages and supports the following:

- Teaching earth science at all levels of K–12 school systems;
- Teaching earth science at the same academic level as physics, chemistry, and biology;
- Teaching earth science as a high-school laboratory capstone science course that contributes toward college credit and college admission;
- Development of Advanced Placement (AP) courses and the acceptance of an AP examination in the earth sciences;
- Inclusion of undergraduate and/or graduate geoscience courses in the educational training of all teacher candidates seeking elementary and middle childhood licensures, depending upon state and institutional requirements;
- Inclusion of earth science as a category in science fairs;
- Teaching earth science as part of a common core as developed by the National Academies;
- Adoption of the Next Generation Science Standards by all public and private school systems, including incorporation of earth science into all educational levels, from kindergarten through twelfth grade;

SCIENCE ■ STEWARDSHIP ■ SERVICE

- Support of dual- credit geology or earth science courses at school, district, state, and national levels;
- Increased research on all aspects of earth-science education;
- Innovative teaching by highly qualified teachers of relevant, modern earth-science models, concepts, and theories that contribute to informed public decision making.

OPPORTUNITIES FOR ALL TO BROADEN THE TEACHING OF EARTH SCIENCE

GSA encourages the following actions:

SCIENTISTS:

- Develop a Research Experience for Teachers program in your field or laboratory research;
- Provide talks to audiences of all ages in a variety of venues such as schools, museums, libraries, scouting events, and other appropriate events;
- Provide support for student science competitions, such as Science Olympiad, science fairs, or knowledge bowls;
- Partner with educators in your local area: Visit their school in person or virtually and take on the role of an informal mentor to a student;
- Provide talks to teachers at state or national science teachers meetings;
- Partner with K–12 faculty: Provide data and tools to support the engagement of their students in geoscience investigations by working with educators to create lessons and activities;
- Partner with municipal, state, and national park officials to develop interpretive programs and engage volunteers;
- Participate in a “communicating science to the public” workshop offered at a GSA, AGU, or AAAS meeting.

K–12 EDUCATORS:

- Participate in online professional development opportunities, such as the Science Educational Resource Center’s (SERC) Teach the Earth, Earth Exploration Toolbook, Digital Library for Earth Science Education (DLESE), and others;
- Get involved in professional organizations, such as GSA, NAGT, NSTA, and NESTA; attend their meetings and participate in workshops and field trips that they sponsor;
- Partner with geoscience faculty at local colleges and universities and learn about their research and the tools they use;
- Assist colleagues of all grade levels with earth-science content and pedagogy to ensure that best practices are employed.

SCHOOL ADMINISTRATORS:

- Require earth science in the district program of studies and require all students to take earth-science courses along with chemistry, physics, and biology;
- Support curricular decisions that include rigorous high-school–level earth-science courses.

SCHOOL BOARDS AND PARENT-TEACHER ASSOCIATIONS/ORGANIZATIONS:

- Invite earth-science professionals to speak to the school board about the role of earth-science education in preparing students for college, careers, and their future;
- Support teacher initiatives that promote and celebrate earth-science education.

PARENTS AND STUDENTS:

- Request a rigorous, dual-credit geology or earth-science course at the high school level;
- Participate in discussions about global and local earth-science–related topics that you see in the news;
- Seek out informal science venues to continue learning about earth-science topics outside school settings.

PUBLIC OFFICIALS:

- Educate yourself on the role of research in earth science.
- Promote a thorough and comprehensive education that includes earth science.

ABOUT THE GEOLOGICAL SOCIETY OF AMERICA

The Geological Society of America, founded in 1888, is a scientific society with over 26,000 members from academia, government, and industry in 115 countries. Through its meetings, publications, and programs, GSA advances the geosciences, enhances the professional growth of its members, and promotes the geosciences in the service of humankind. GSA encourages cooperative research among Earth, life, planetary, and social scientists, fosters public dialogue on geoscience issues, and supports all levels of earth-science education. Inquiries about the GSA or this position statement should be directed to GSA’s Director for Geoscience Policy, Kasey S. White, at +1-202-669-0466 or kwhite@geosociety.org.

OPPORTUNITIES FOR GSA AND ITS MEMBERS TO HELP IMPLEMENT RECOMMENDATIONS

The Geological Society of America encourages its members to:

- Support the adoption of the Earth Science Literacy Principles (ESLP) and the Next Generation Science Standards (NGSS) by all public and private school systems and by other science education organizations. Use these documents as guiding frameworks to support your efforts in teaching and communicating about the importance and relevance of earth science to society and the environment;
- Become involved with earth-science certification programs for pre-service teachers at institutions of higher education;
- Become involved with teacher candidate programs at their institutions or in their region to help formalize required undergraduate/graduate coursework in the geosciences in their pre-service tracks;
- Encourage states to include earth-science laboratory courses in high school science curricula and require that earth-science content be part of proficiency exams for graduating high school seniors;
- Encourage colleges and universities to recognize high school earth-science courses as fulfilling college admissions requirements for laboratory science;
- Form partnerships with earth-science educators (formal and informal) focused on promoting the use of earth-science data, specimens, and supplies to develop engaging, level-appropriate activities and lessons;
- Become involved in local school activities (running for school board, joining ad hoc district or curriculum committees, judging science fairs, participating in parent-teacher organizations);
- Demonstrate the value of geoscience education and outreach by elevating the importance of the broader impacts in funded geoscience research;
- Encourage institutions to recognize engagement in education and outreach activities as contributing toward awarding tenure and promotions;
- Engage in communicating earth science to the public, including local school communities. The research findings of the scientific community must be clearly communicated to non-scientists, including students, the general public, and policy makers, to enable informed decision making.