

GEO-Chem: Infusing Geochemical Systems into High School Chemistry Classrooms

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The GEO-Chem program was developed as a partnership between the University of New Hampshire Earth Sciences Department and the Joan and James Leitzel Center for Mathematics, Science and Engineering Education (LC). The central goal of the program was to collaborate with high school teachers to develop inquiry-based instruction in chemistry classrooms using examples from local, place based, biogeochemical systems. Participating teachers were recruited using existing structures, namely LC networks, including the STEM Teachers Collaborative network. Selected participants were then offered the opportunity to attend a one-week summer workshop at the University of New Hampshire where teachers worked with university faculty and a graduate student to learn about current topics in biogeochemistry and how they might align with Next Generation Science Standards (NGSS). Topics addressed included water chemistry, weathering, and related phenomena and Earth's carbon cycle and used researchers' data for support. To investigate the mobilization of arsenic from the natural environment participants gained experience collecting, preparing, and running samples for arsenic concentrations on the labs' inductively coupled plasma mass spectrometer (ICP-MS). During the workshop, the Earth's carbon cycle was addressed with participants using field equipment used to measure CO₂. These two aforementioned program themes can be aligned well within NGSS in the Disciplinary of Physical Science and cross cutting concepts including Energy and Matter and Systems and System Models. Additionally, investigating current topics of research allows students to engage with NGSS practices including: analysing and interpreting data, planning and carrying out investigations, and engaging in argument from evidence. The GEO-Chem program allowed teachers to gain experience in the lab and field with local biogeochemical systems and supported the integration of these geochemical topics in to high school chemistry and Earth science classrooms.