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# Leveraging Earth and Planetary Datasets to Support Student Investigations in an Introductory Geoscience Course

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Engaging undergraduates in discovery-based research during their first two years of college was a listed priority in the 2012 Report of the USA President's Council of Advisors on Science and Technology (PCAST), and has been the focus of events and publications sponsored by the National Academies (NAS, 2015). Challenges faced in moving undergraduate courses and curricula in this direction are the paired questions of how to effectively provide such experiences to large numbers of students, and how to do so in ways that are cost- and time-effiicient for institutions and instructional faculty.

In the geosciences, free access to of a growing number of global earth and planetary data resources and associated visualization tools permits one to build into introductory-level courses straightforward data interrogation and analysis activities that provide students with valuable experiences with the compilation and critical investigation of earth and planetary data.

Google Earth provides global Earth and planetary imagery databases that span large ranges in resolution and in time, permitting easy examination of earth surface features and surface features on Mars or the Moon. As well, "community" data sources (i.e. Gigapan photographic collections and 3D visualizations of geologic features, as are supported by the NSF GEODE project) allow for intensive interrogation of specific geologic phenomena. Google Earth Engine provides access to rich satellite-based earth observation data, supporting studies of weather and related student efforts. GeoMapApp, the freely available visualization tool of the Interdisciplinary Earth Data Alliance (IEDA), permits examination of the seafloor and the integration of a range of third-party data. The "Earth" meteorological website (earth.nullschool.net) provides near real-time visualization of global weather and oceanic conditions, which in combination with weather option data from Google Earth permits a deeper interrogation of atmospheric conditions. In combination, these freely accessible data resources permit one to transform general-audience geoscience courses into extended investigations, in which students discover key information about the workings of our planet.