

Geodesy Data-rich Undergraduate Teaching Materials and Instructor Professional Development

The NSF-funded GEodesy Tools for Societal Issues (GETSI) project has developed teaching resources and instructor professional development opportunities that emphasize a broad range of geodetic data and quantitative skills applied to societally important issues such as natural hazards, water resources, and climate change (serc.carleton.edu/getsi/). The resources consist of modules for introductory through majors-level courses in classrooms and field settings. GETSI makes teaching with geodetic data more accessible to instructors and students through flexible materials that can be adapted to many contexts. GETSI modules contain ~2 weeks of material, divided into 3-6 units. The types of data include: GPS, InSAR, gravity, sea level and ice altimetry, lidar, and structure from motion, as well as a variety of non-geodetic methods from ground water levels to temperature. GETSI collaborating institutions are UNAVCO (which runs NSF's Geodetic Facility), Indiana University, Mt San Antonio College, and Idaho State University. Other partners include National Science Teachers Association and American Geophysical Union

GETSI is in the process of publishing six new modules on topics from modeling flood hazards to monitoring volcanoes, bringing the collection of modules to thirteen (serc.carleton.edu/getsi/). Modules were designed by teams of faculty and content experts and underwent rigorous classroom testing and review using the process developed by the Science Education Resource Center's InTeGrate Project (serc.carleton.edu/integrate/). All modules are aligned to Earth Science and Climate literacy principles. To promote successful instructor use of the data-rich modules, GETSI has run ten in-person short courses with ~240 total participants and five webinars totaling nearly 200 people. Participant satisfaction is typically 9 out of 10. Many more short courses and webinars will be conducted over the next two years. A variety of assessment instruments give insights into student and faculty experience. Findings indicate that the materials have been successfully implemented in multiple contexts, that instructors perceive the materials as useful and of good quality, and that students achieve the learning goals. GETSI has collected assessment data from over 500 students in 36 courses. Four hundred paired responses on an attitudinal survey explore students' career interest and motivation around environmental sustainability, and over 360 paired on the geoscience literacy questions serve as a benchmark measure to gauge geoscience knowledge gains over a term. Feedback from 30 instructors over 35 implementations indicates that implementation varies widely, from adopting materials closely to significant modifications or omissions. Prior experience with relevant geodetic technique also varies. Despite the different adaptations, 100% indicate that they would likely or very likely use the materials again and that the materials were high quality (average 8.9/10).

