Geophysical Research Abstracts
Vol. 20, EGU2018-19501, 2018
EGU General Assembly 2018

Classroom Connections to NASA's Operation IceBridge: Leveraging Teacher-Researcher Collaborations Through the PolarTREC Program

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NASA's Operation IceBridge (OIB), the largest airborne survey of Earth's polar ice uses remote sensing methods including laser altimetry, snow and ice penetrating radar, infrared imaging, and high resolution digital imaging to collect information on changing sea and land ice. PolarTREC teacher Kelly McCarthy joined the team in the spring of 2016 during their Arctic Campaign over the Greenland Ice Sheet. This presentation explores ways in which k-12 students were engaged in the research process and demonstrated knowledge of the work being done by the OIB, and the significance of that work.

During the 2016 expedition digital communication via NASA's Mission Tools Suite for Education (MTSE) platform was leveraged along with live virtual events from the field to engage students in the work of OIB. Two lessons were piloted with student groups during the 2016-2017 academic year. Students reached included those who actively engaged in communications with the team during the expedition and those who had no prior connections to the field. Both lessons allowed students an opportunity to explore the day-to-day world of Operation IceBridge while being exposed to science, technology, engineering, and mathematics practices in accordance with NGSS and Common Core.

All of the data collected on OIB missions is stored for public use in a digital portal on the National Snow and Ice Data Center (NSIDC) website. In one lesson, 10th-12th grade students were guided through a tutorial to learn how to access data and begin to develop a story about Greenland's Jakobshavn Glacier using pre-selected data sets, Google's MyMaps app, and independent research methods. In the second lesson, 8th grade students were introduced to remote sensing, first through a discussion on vocabulary using productive talk moves and then via a demonstration using Vernier motion detectors and a graph matching simulation. Students worked in groups to develop procedures to map a hidden surface region (boxed assortment of miscellaneous objects) using a Vernier motion sensor to simulate sonar. Students translated data points collected from the motion sensor into a vertical profile of the simulated surface region.

Both lessons allowed students a way to engage in two of the most important components of OIB. The ability to work with real data collected by the OIB team provided a unique context through which students gained skill and overcame challenges in Excel, Google Apps, construction of graphs, and data analysis. The remote sensing simulation allowed students to practice and gain hands-on knowledge of the components of OIB discussed in the digital communications described above that may have felt unclear to students who have had limited or no exposure to remote sensing technologies.