Goddard Space Flight Center 2009 Sample Student Projects

Required Academic Level

Graduate/Doctorate

Category

Earth Sci

Subcategory

Cryospheric Science

Project Title

Investigating the Effects of Topography on Ice Cloud & Land Elevation Satellite/Geospcience Laser Altimeter System (ICESat/GLAS) Waveforms Using Airborne Laser Scanning Data

Project Description

The ICESat/GLAS instrument provides measurements of the vertical structure of forest canopies worldwide. These data may be used to estimate forest biomass and carbon, but unfortunately the waveform measurements are altered by topopgraphy. Steep terrain tends to expand or increase the vertical extent of the waveform response, leading to overestimates of canopy height on forested targets. Topographic effects compromise the utility of GLAS as a sampling tool for regional, continental, and global forest biomass and carbon estimation. The intern will use airborne laser scanning (ALS) data and ICESat/GLAS waveform data (1) to investigate the effects of topography on the GLAS waveform responses and (2) to develop and test algorithms to mitigate the effects of topography on the GLAS waveform response. ALS data have been extracted on 596 GLAS footprints acquired over the Aurskog forest located 40-60 km east of Oslo, Norway in 2003. The intern will use the ALS data to quantitatively characterize the local topography and to extract forest canopy measurements on each GLAS footprint. The intern will also extract topographic and forest canopy metrics from the GLAS waveform data. These ALS and GLAS measurements will be analyzed to develop and test procedures which may be used to remove or at least mitigate the effects of topographic variability on the GLAS forest canopy measures.

Mentor's Expectation of Student

The intern will interact with the GSFC mentor and with a visiting scientist, Professor Erik Næsset from the Norwegian University of Life Sciences, in order to develop potentially useful techniques for minimizing the effects of local topography on GLAS waveform responses. At a minimum, this research will lead to a report detailing promising topographic mitigation algorithms. It is our hope that this research will lead to a joint refereed publication, with the intern as primary author, reporting substantive results.

Discipline of Project and/or Background Needed to successfuly complete the project

Environmental Science; Earth Science

Skills

Computer Modeling/Simulation