



NASA's ICESat-2 and GEDI missions for land and vegetation applications

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Laser altimetry is a critical remote sensing component in understanding vegetation structure and spatial distribution. The laser measurements allow for canopy and terrain elevation retrievals that go beyond the capability of imagery and provide greater spatial resolution than radar systems. Taking the measurements from the vantage point of space allows for a global assessment of biomass in addition to facilitating a better understanding of other ecological contributors to our Earth's climate dynamics. NASA's Ice, Cloud, and land Elevation Satellite (ICESat-2) was successfully launched in September 2018 and completed its commissioning phase with nominal performance. ICESat-2 carries a unique, multi-beam photon counting laser altimeter designed for enhanced spatial and temporal coverage relative to its predecessor, ICESat (2003-2009). The preliminary data indicate that even in tropical ecosystems the instrument is able to penetrate the canopy for terrain measurements to facilitate derived tree heights. Other regions show amazing detail in the vertical and horizontal resolution of vegetation regardless of tree type and seasonal characteristics. In December of 2018 NASA placed the GEDI (Global Ecosystem Dynamics Investigation) full-waveform, multi-beam laser altimeter on the International Space Station. This dedicated vegetation remote sensing mission will provide measurements of forest structure over the mid-latitudes (up to ~51 degrees) and is focused on mapping forest carbon content toward constraining the global carbon cycle, and exploring relationships between structure and biodiversity. Combined, these two missions will allow for enhanced coverage and improved accuracy by leveraging the advantages of the individual instrument technologies and spatial coverage. This presentation will provide a detailed description of ICESat-2 and GEDI missions, the current status and discuss the terrain and vegetation data products relevant to the biogeoscience community.