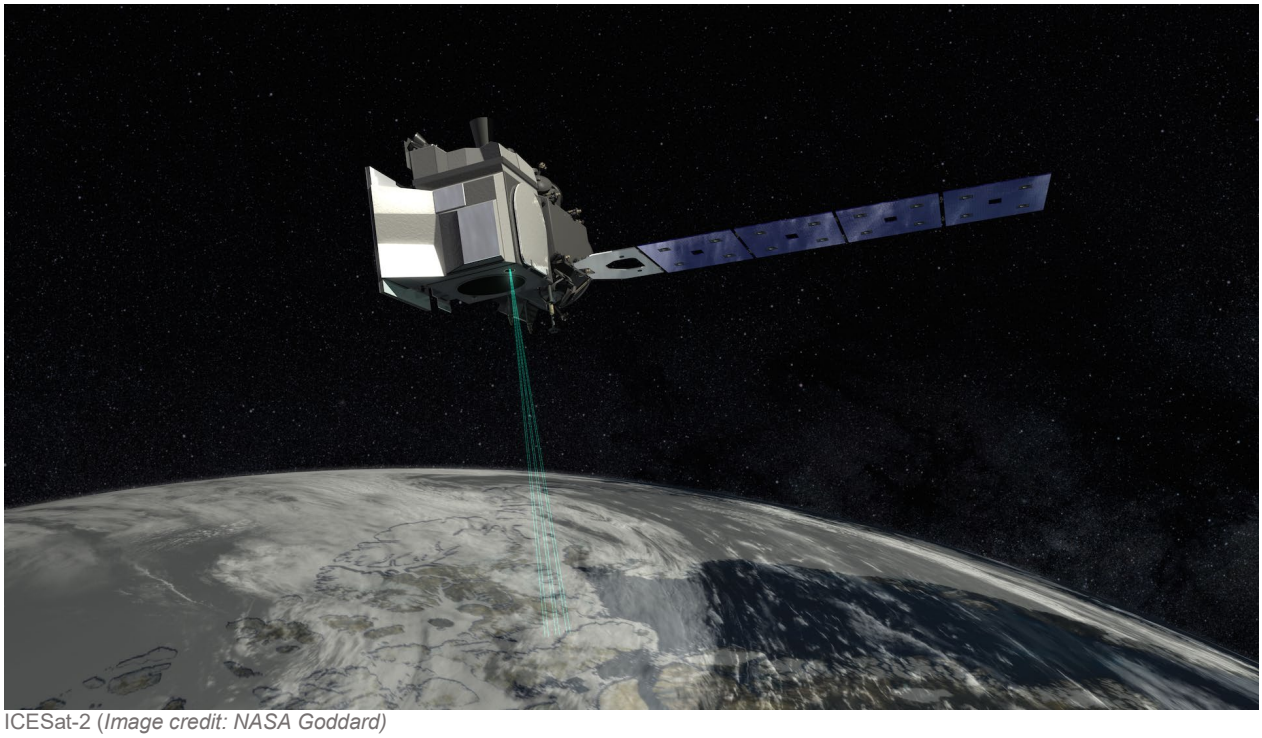
Factsheet – AAAS 2019

Spaceborne Data

Mapping and Monitoring the Carbon Content of Earth's Forests

Climate Change: Understanding Feedback from Nature, Culture and Society
Saturday, February 16, 2019; 3:30 PM - 5:00 PM; Marriott Wardman Park, Delaware Suite



ICESat-2 (*Image credit: NASA Goddard)*

Laura Duncanson, Assistant Professor University of Maryland; NASA Goddard Space flight Center presents recent NASA laser missions – the ICESat-2 satellite and the Global Ecosystem Dynamics Investigation (GEDI) – and their contributions to mapping global forest biomass, to guide forest management programs and inform climate mitigation plans. Duncanson will show how data from forests located both in boreal, tropical and temperate areas can improve carbon measurements.

Earth's forests are one of our biggest natural allies in the effort to mitigate climate change. As trees grow, they amass carbon through photosynthesis, acting as carbon sponges that suck CO2 from the atmosphere and store it in soils and woody vegetation. When forests burn, this carbon is released back to the atmosphere, acting as a carbon source. When managed sustainably, forests can serve as long term sinks of atmospheric CO2, but when deforestation or degradation occur, and trees are burned or felled and left to decompose, forests can be a source of even more atmospheric CO2.

Monitoring the carbon flux of Earth's forests is critical for improving our carbon cycle and climate models, and implementing climate mitigation strategies such as the United Nations' Re-

duced Emissions from Deforestation and Degradation (REDD+) program. However, we have not been able to effectively monitor forest carbon flux because we have never had sufficient data to map forest carbon stocks - we cannot monitor what we have not yet mapped.

Taking stock of the carbon content of Earth's forests is one of the primary objectives of a new NASA mission, GEDI (Global Ecosystem Dynamics Investigation), which is the first space-borne laser mission specifically designed to measure Earth's forests in 3D. NASA's GEDI launched on December 5th, 2018, and has recently started collected science data. GEDI is a lidar mission (Light Detection and Ranging) which sends laser beams from the International Space Station (ISS) to the Earth's surface, and records the time elapsed between when a beam is emitted and reflected back to the ISS. The time elapsed equates to the distance between the ISS and surface, and the amount of stretching of the emitted laser beam tells us the height of trees on the surface. We take these reflected beams (called Lidar waveforms) and translate them into estimates of aboveground carbon storage.

GEDI is on the ISS, which never travels over Earth's poles – its highest latitude measurements are ~51 degrees. This would leave us with a big gap in carbon mapping of high latitude forests, but fortunately, we can fill this gap with a second NASA laser mission, ICESat-2. ICESat-2 launched on September 15th, 2018, and although it was designed to map Earth's ICE in 3D (and thus track loss in glacier and sea ice), its data can also be used to measure vegetation heights to some degree.

Duncanson gives an overview of how GEDI and ICESat-2 can be used to map global forest carbon in 3D, and how we are using these datasets in tandem with ongoing forest cover monitoring through passive optical data to track forest carbon fluxes through time.

More information

Laura Duncanson, Assistant Professor, University of Maryland, College Park; NASA Goddard Space Flight Center, Greenbelt, MD, USA

Spaceborne Data: Mapping and Monitoring the Carbon Content of Earth's Forests
https://aaas.confex.com/aaas/2019/meetingapp.cgi/Paper/23740

Links to more information, animations, video, and image material:

NASA Goddard – GEDI Media Resources:	https://svs.gsfc.nasa.gov/13090
University of Maryland GEDI Ecosystem Lidar	https://gedi.umd.edu
NASA Scientific Visualization Studio – ICESat-2	https://svs.gsfc.nasa.gov/Gallery/icesat2.html

Contact

Laura Ours, Director of Communications & Marketing, University of Maryland
lours@umd.edu / Tel. +1 (301) 405-5722