National Aeronautics and Space Administration

NASA Carbon Monitoring System

UNIVERSITY OF MARYLAND

Beyond MRV: combining remote sensing and ecosystem modeling for geospatial monitoring and attribution of forest carbon fluxes over Maryland, USA

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Science Questions

- What are the magnitude, variations and drivers of forest above ground carbon fluxes over Maryland from 1985 to the present?
- How can remote sensing and mechanistic ecosystem modeling be integrated for high-resolution forest monitoring?

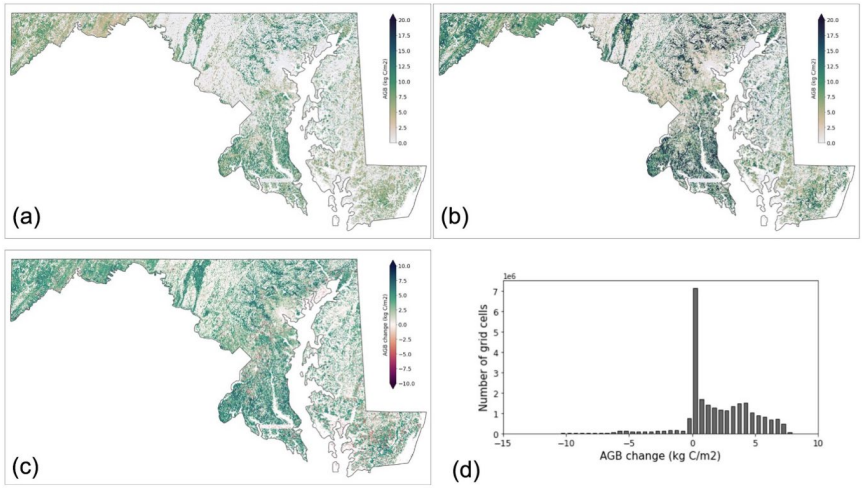
Methods

- Reconstructed forest structure and carbon changes at 30-m from 1985 to the present by incorporating airborne LiDAR (circa 2011), NAIP imagery, and Landsat data into EDv3 as a constraint.
- Estimated statewide fluxes and attributed them to growth, recovery, and disturbance, as well as drivers including meteorology, CO_2.

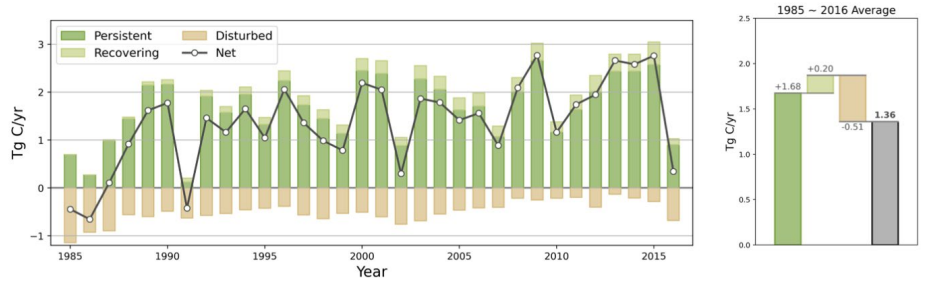
Result/Significance

- Statewide, forested land had an average annual net aboveground carbon sink of 1.37 TgC yr^{-1}, comparable to prior estimates. However, unlike previous estimates, statewide fluxes exhibited strong interannual variation, ranging from −0.65 to 2.77 TgC yr^{-1}.
- Attribution indicate the primary importance of persistent and regrowing forests, vegetation structure, local disturbance, and rising CO_2 to the mean flux, and the primary importance of weather to the large-scale interannual variability.
- Officially adopted by the state of MD for annual forest inventory reporting.

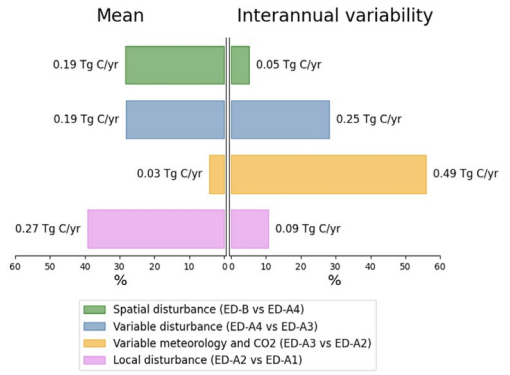
- **Maps of AGB in (a) 1984 and (b) 2016. (c) AGB change from 1984 to 2016 and (d) histogram of AGB change in forested grid cells**



- **Statewide net AGB fluxes and partition to persistent growth, recovery and disturbance**



- **Partition of the mean and interannual variability of net AGB fluxes by drivers**



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