GEDI GPP/ET: A gridded daily GPP and ET across the contermious United States (CONUS) derived from GEDI, MODIS, SMAP, and Daymet meteorology data

Description:

Upscaling carbon and water fluxes from eddy covariance (EC) sites with machine learning (ML) enables assessment of land–atmosphere exchange across broad scales. We developed new gridded flux products that incorporate canopy structure and diversity, which have been largely overlooked in previous upscaling studies. Using canopy height (RH) and foliage height diversity (FHD) from NASA's GEDI mission, flux data from over 90 AmeriFlux and NEON sites, MODIS NIRv, and Daymet meteorology data, we trained ML models to predict gross primary production (GPP) and evapotranspiration (ET) (GPP: $R^2 = 0.91$, RMSE = 1.14 gC m^{-2} d^{-1}; ET: $R^2 = 0.85$, RMSE = 0.68 mm d^{-1}). Based on these models, we generated 1 km, daily GPP and ET datasets across the conterminous United States for 2019-2023. The products capture effects of canopy structural complexity on fluxes, seasonal dynamics, and drought resilience, providing new resources for ecosystem and Earth system studies. The methodology, validation, and spatial and temporal patterns of this product are described in our paper (Bu and Xiao, 2025).

Fair Data Use Policy:

We make this data product available to the research community as we believe that the dissemination of this data set will lead to advancement in science. If you plan to use our data in a manuscript or presentation, we request that you inform us at an early stage of your work. You should ensure that your research does not significantly overlap with what we are currently working on with this product. In addition, if this data set is essential to your work, or if an important result or finding depends on the GEDI GPP/ET data, co-authorship may be appropriate. You should inform us of your analysis and publication plans well in advance of submission of a paper, give us an opportunity to read and intellectually contribute to the manuscript, and, if appropriate, offer co-authorship.

Contact: Drs. Jingfeng Xiao (j.xiao@unh.edu) and Jingyi Bu (jingyi.bu@unh.edu).

Metadata:

Spatial resolution: 1 km	Spatial extent: CONUS
Temporal resolution: Daily (and monthly)	Temporal extent: 2019-2023
File format: GeoTIFF	Units: GPP (gC m^{-2} d^{-1}); ET (W m^{-2})
Scale factor: 1	Fill values: -9999

Map projection: Lambert Conformal Conic (Same as Daymet meteorology data, https://daymet.ornl.gov/overview)

Citation:

Bu, J., Xiao, J. (2025) Upscaling eddy covariance measurements of carbon and water fluxes to the continental scale by incorporating GEDI-derived canopy structural complexity metrics. Remote Sensing of Environment, 329, 114930. https://doi.org/10.1016/j.rse.2025.114930.