Global Evaluation of the Ecosystem Demography Model (ED v3.0)

Lei Ma, George Hurtt, Lesley Ott, Ritvik Sahajpal, Justin Fisk, Rachel Lamb, Hao Tang, Steve Flanagan, Louise Chini, Abhishek Chatterjee, and Joseph Sullivan, *Geosci. Model Dev.,* *https://doi.org/10.5194/gmd-2021-292.*

Science Questions

o What is the role of terrestrial ecosystems in global carbon dynamics past-future?

o How can processes-based models be improved to increase accuracy and reduce uncertainties in carbon stocks and fluxes?

Method

o Revised, updated and expanded domain of the ED model from regional to global scale.

o Accounted for broad range of forcing/input data (transient meteorology, CO_2, and land use history).

o Evaluated against a comprehensive set of >10 important benchmarking datasets (including PFT, C fluxes, C stocks and vegetation vertical structure).

Result/Significance

o Model estimates were within observational constraints for all key variables accessed.

o First global calibration and evaluation of the new ED model explicitly tracking vegetation structure.

o ED v3.0 is ready for use in forest carbon monitoring and modeling system applications across a range of scales from local to global.
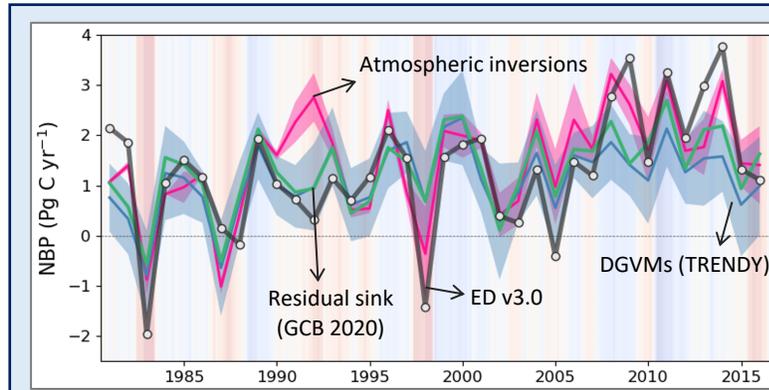
Top left: global annual NBP comparison between ED v3.0 and atmospheric inversions, DGVMs, and residual sink from Global Carbon Budget 2020.
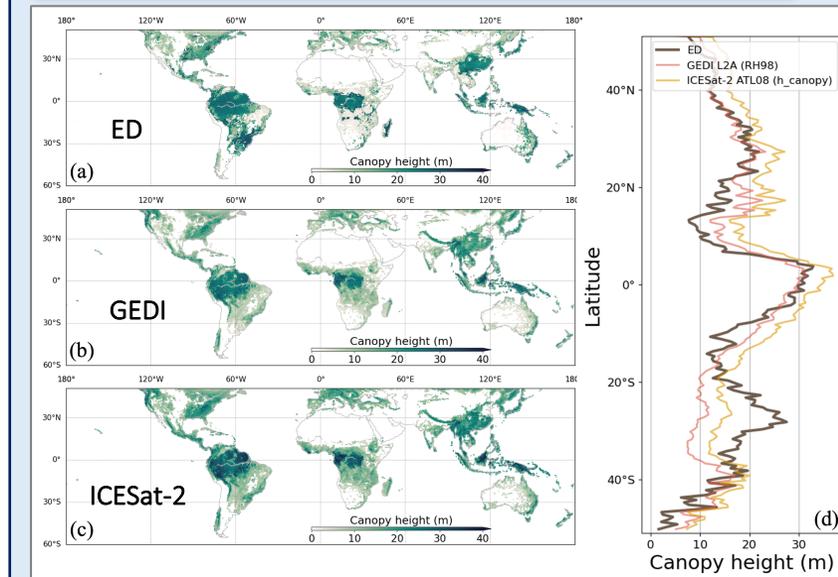
Bottom left: canopy height comparison between ED v3.0 and lidar observations of GEDI and ICESat-2.

Bottom right: LAI vertical profile comparison between ED v3.0 and GEDI observations.