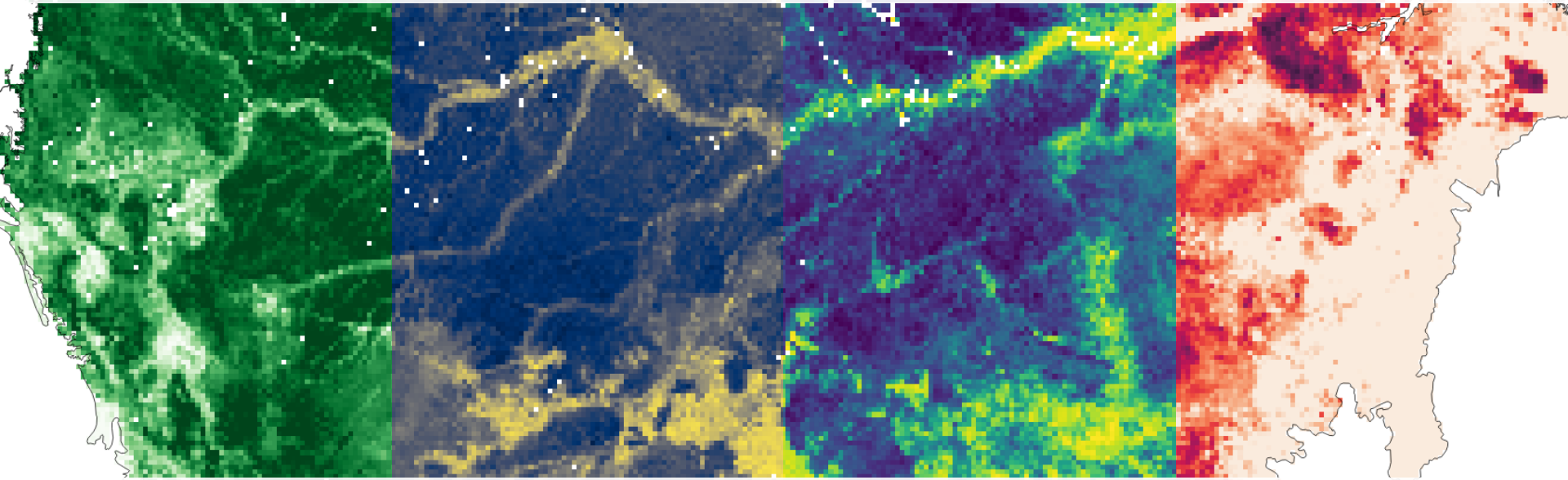
Amazon forest structure using GEDI

Ovidiu Csillik [1], Michael Keller [1,2], Marcos Longo [3]

[1] Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

[2] International Institute of Tropical Forestry, USDA Forest Service, Río Piedras, Puerto Rico

[3] Climate and Ecosystem Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA



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Jet Propulsion Laboratory
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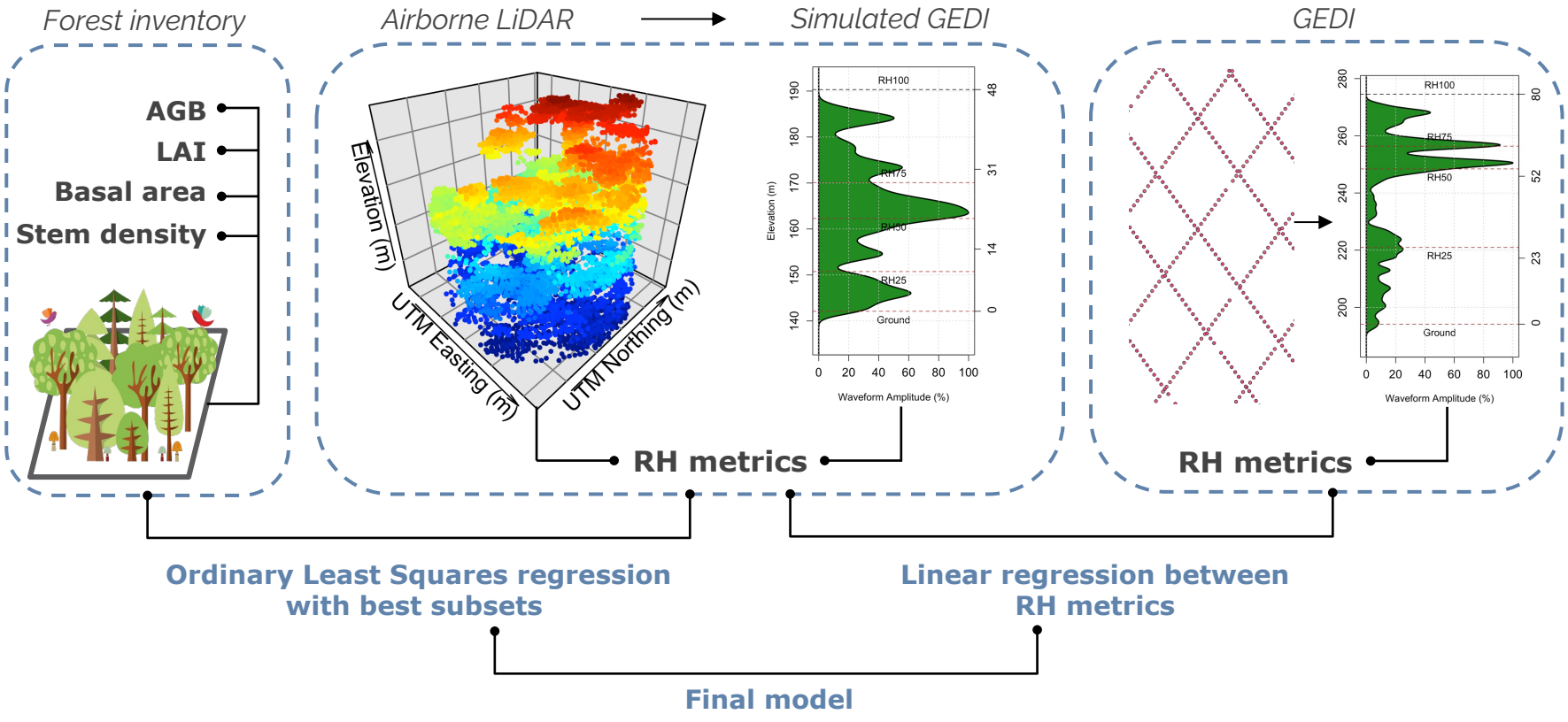
Research gap

- Field inventories of tropical forests are sparse.
- Large uncertainties when extrapolating to vast regions.
- Tropical forests are structurally diverse and forest structure is known to impact the water and carbon cycles.

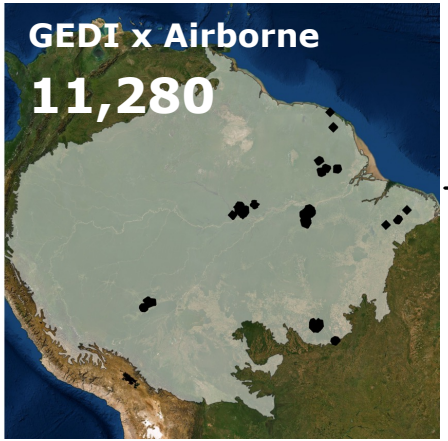
Objective

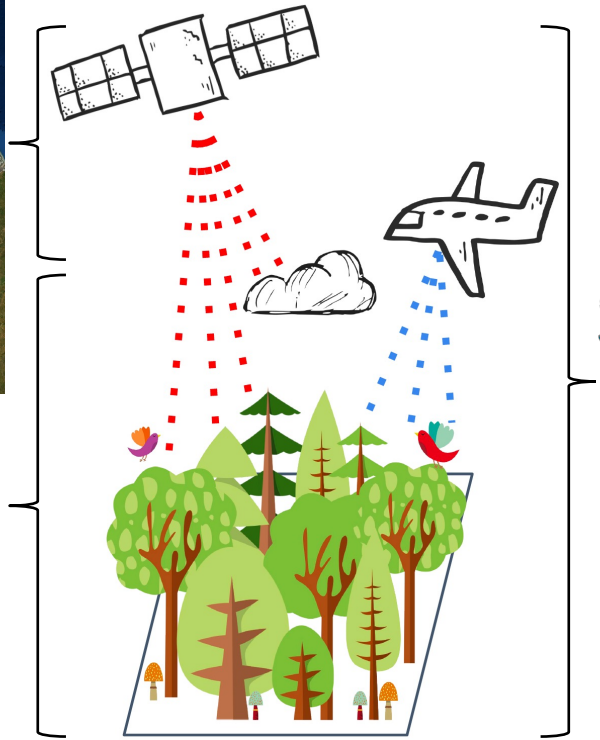
- To produce Amazon-wide estimates of forest structure.
- Aboveground biomass, basal area, leaf area index, and stem density.
- Develop projections of potential tropical carbon budgets.

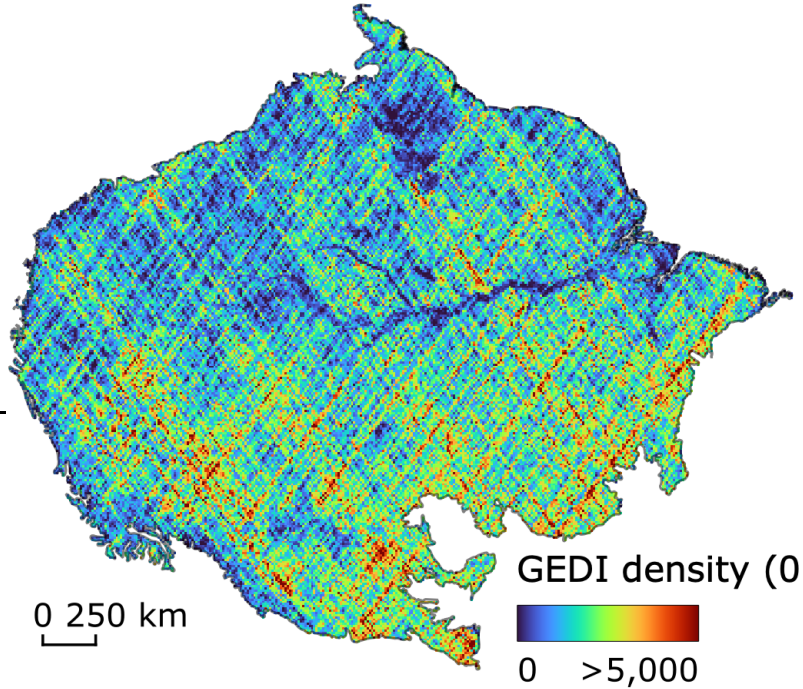
Two-step methodology



Nested data from plot to airborne to spaceborne







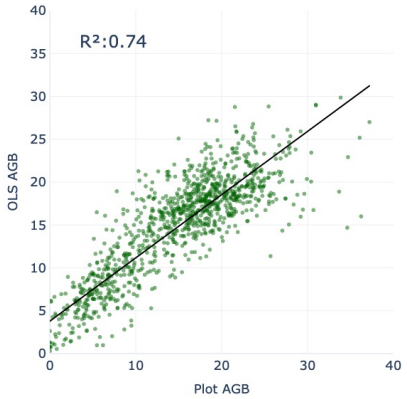
96,179,337

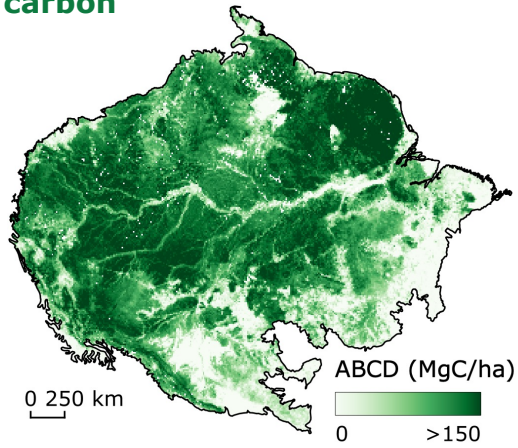
GEDI quality shots over the Amazon

Forest structure modeling results

Aboveground carbon

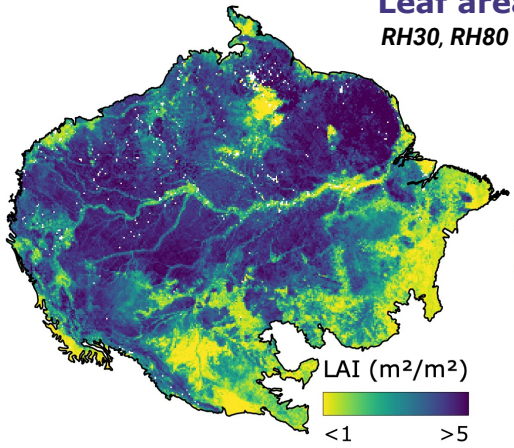
RH30, RH80

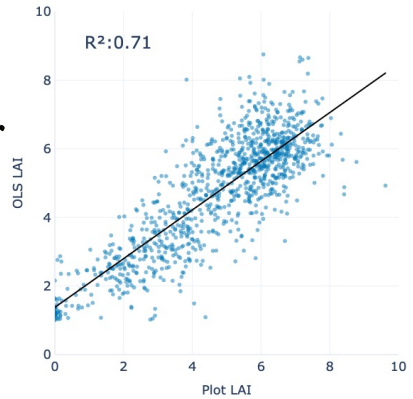




Leaf area index

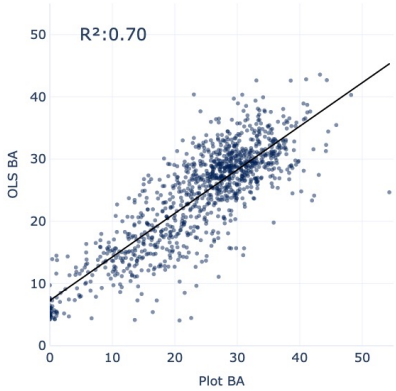
RH30, RH80

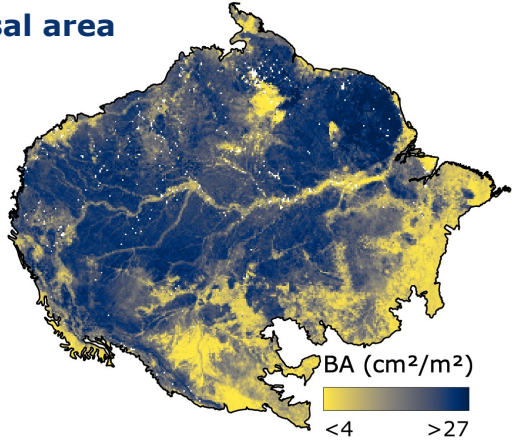




Basal area

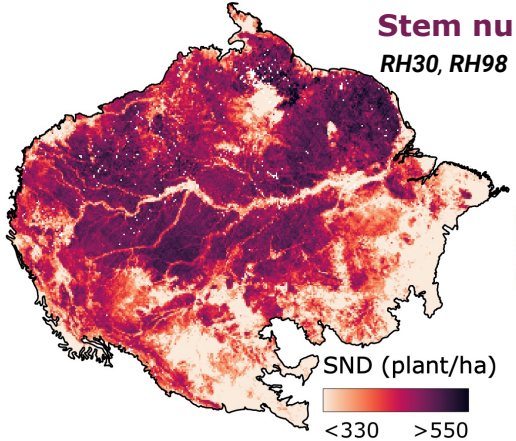
RH30, RH80

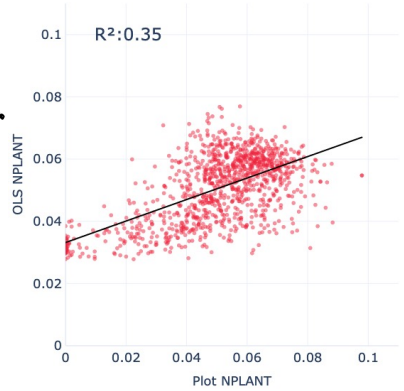




Stem number density

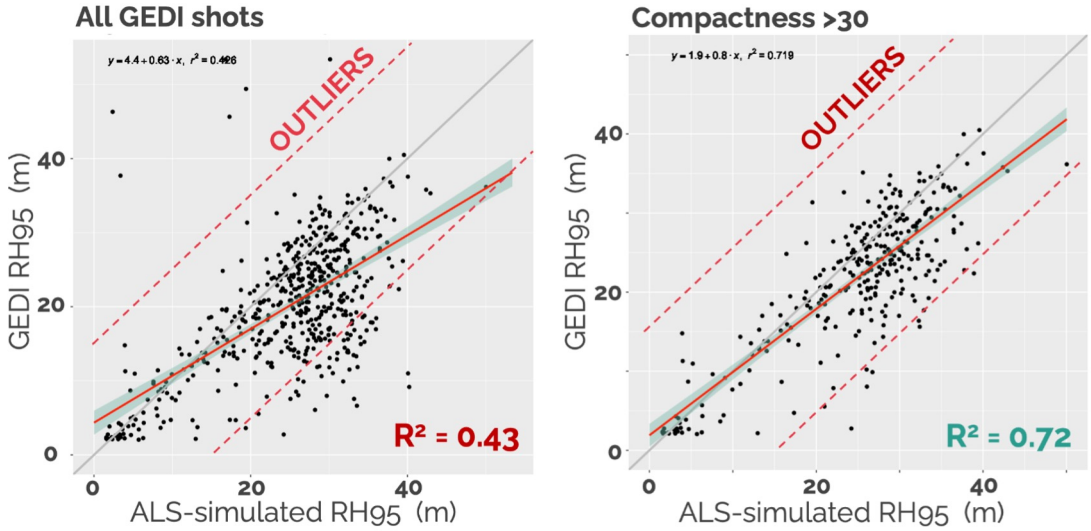
RH30, RH98

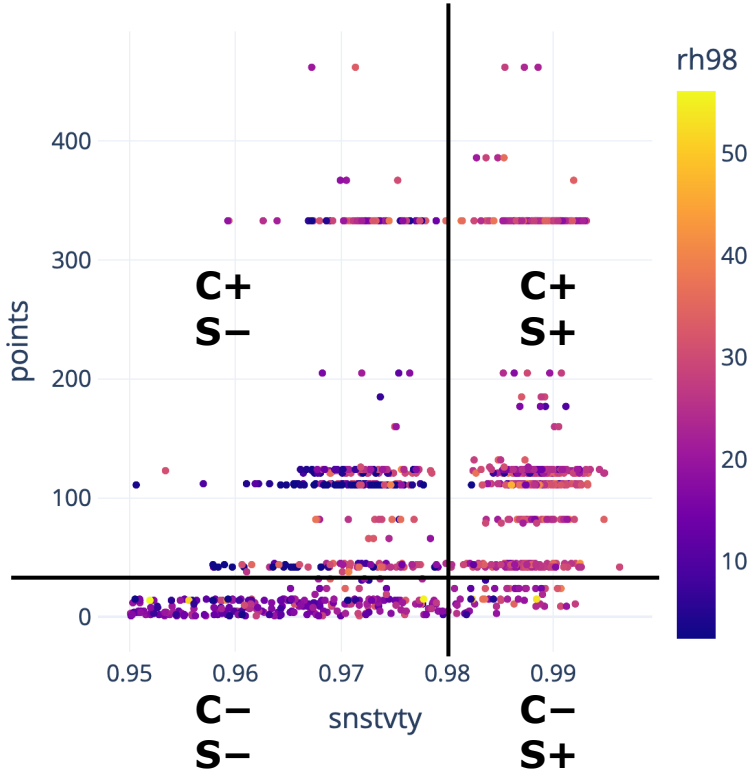




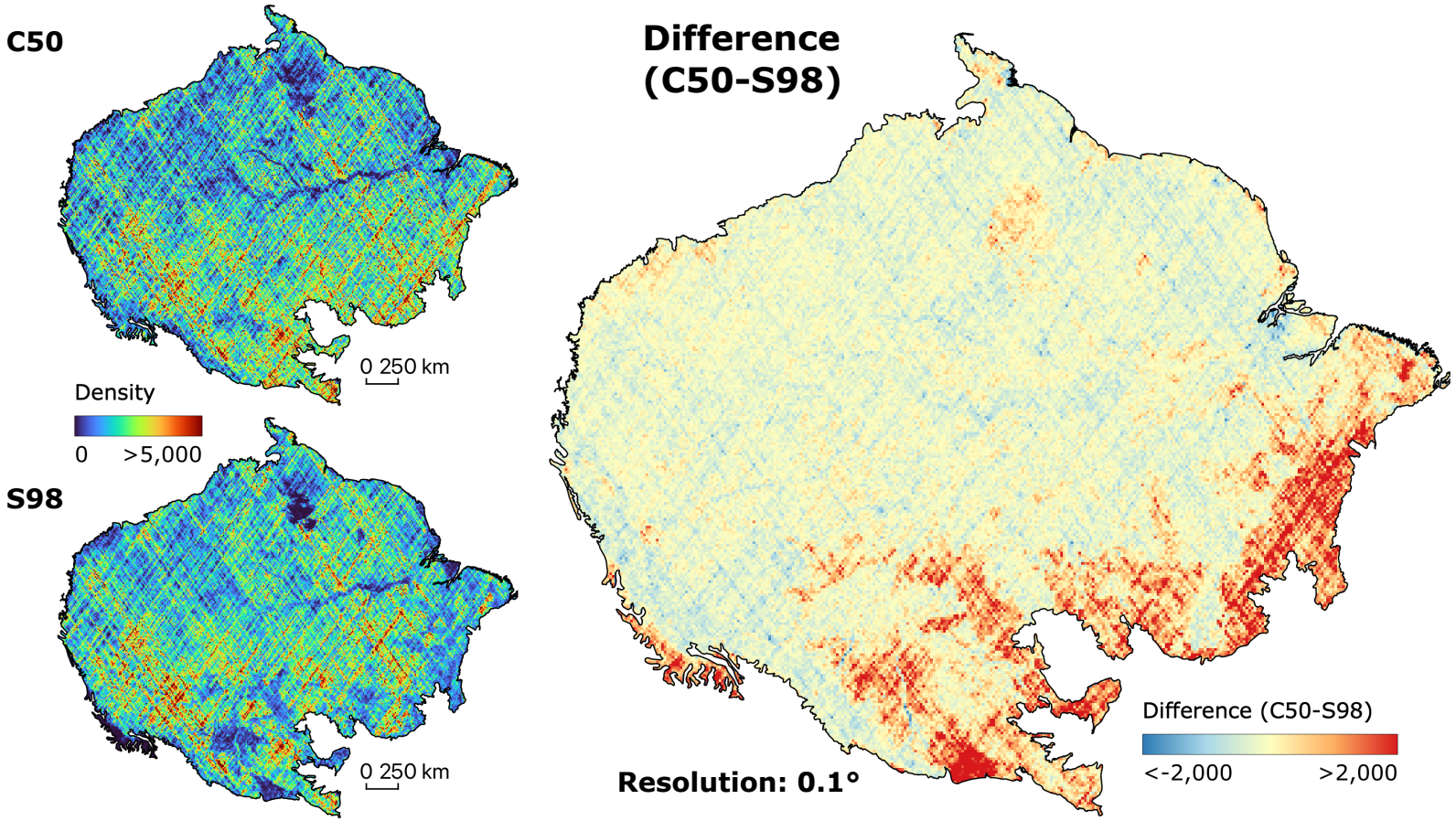
Discussions: filtering

sensitivity > 0.95 VS
sensitivity > 0.95 + compactness

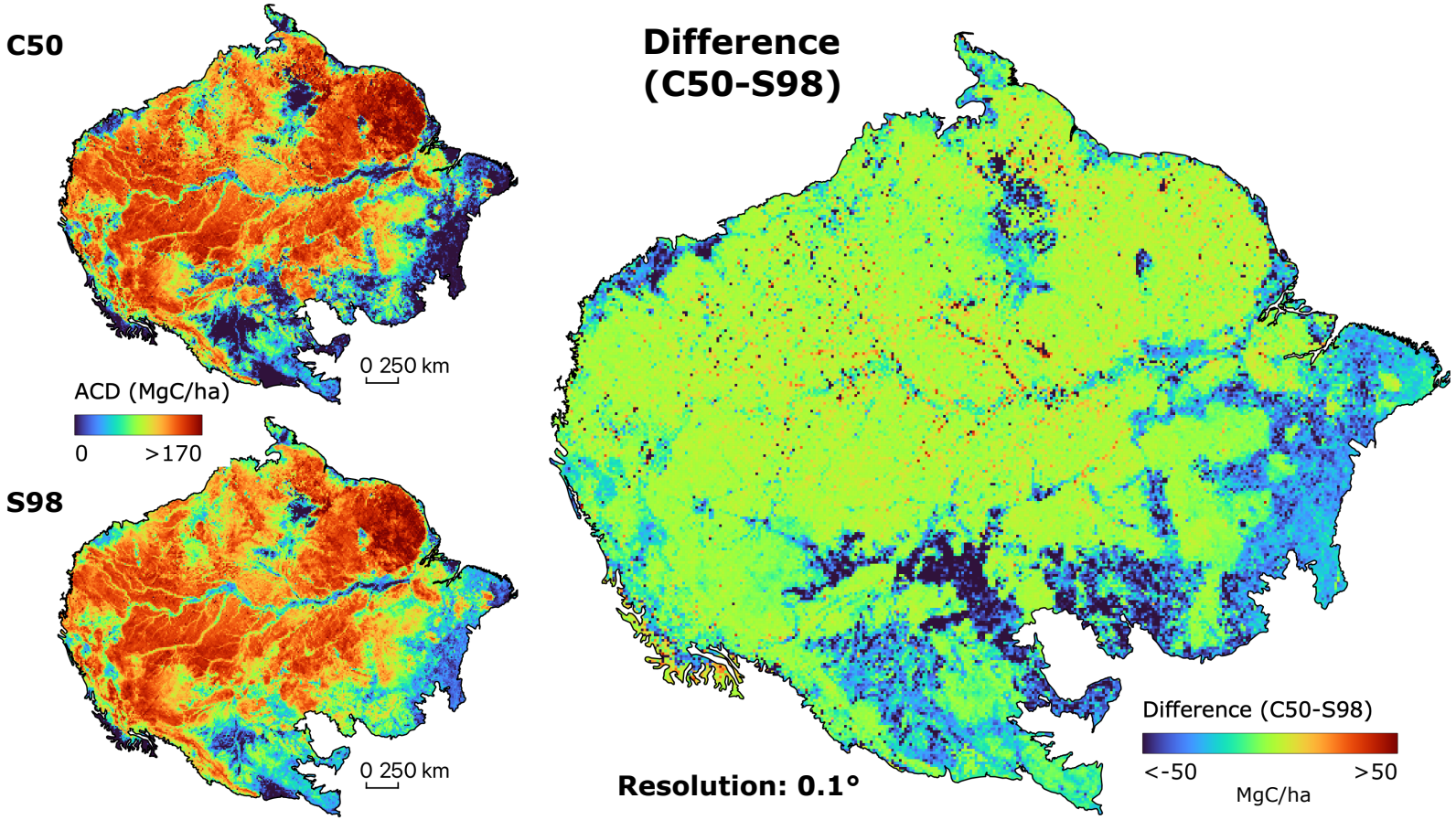




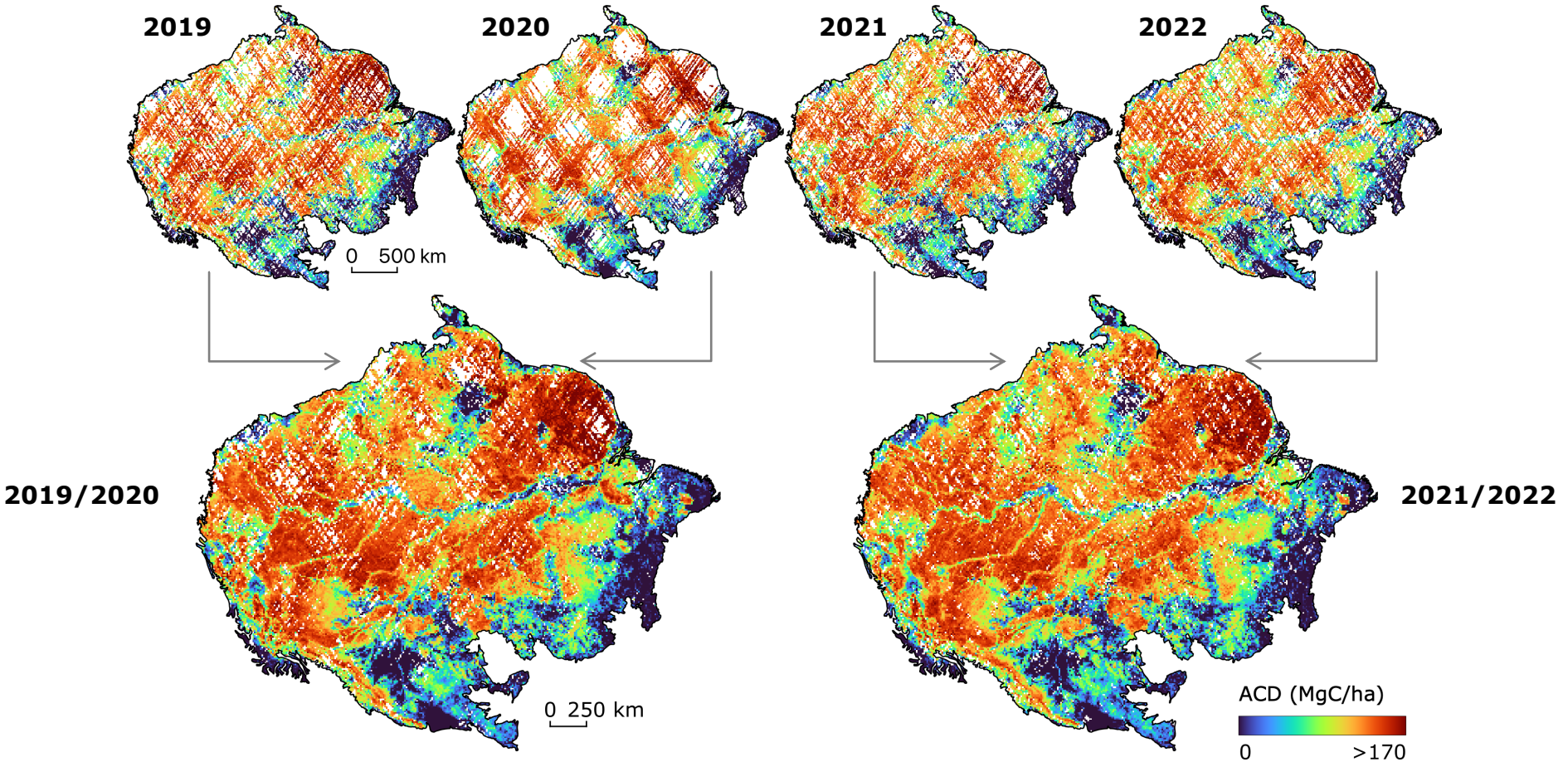
Different filtering, different density of GEDI shots



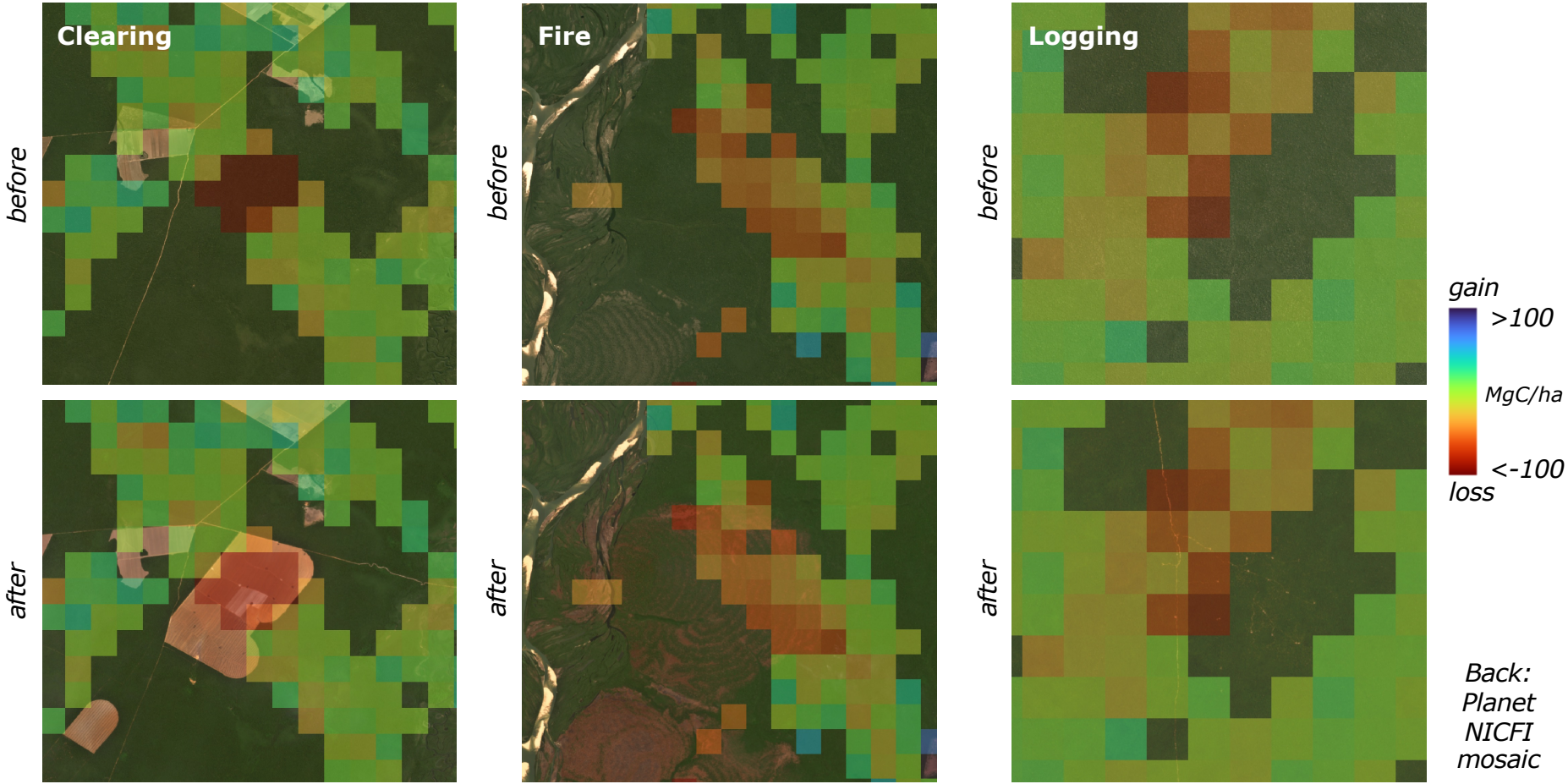
Different filtering, different distribution of ACD



GEDI – D is for Dynamics



GEDI – D is for Dynamics (1 cell = 1 km)



Summary

What we have

- An extensive calibration-validation datasets for the Amazon.
- The forest structure products fill a gap where systematic forest inventories are lacking.
- The choice of GEDI filtering affects the model accuracy and final estimates.
- Fast HPC workflow for large-scale results using the entire GEDI archive.

What’s next

- Climatic, edaphic, and anthropogenic factors explaining the gradients of estimated forest structure.
- Use of the data product for regional model initialization of carbon budgets predictions.
- Expand the analysis across the tropics.

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Rodolfo Vasquez Martinez
Barbara Vicenti
María Isabel Villalba Valdivia
Grégoire Vincent

Jet Propulsion Laboratory
California Institute of Technology

jpl.nasa.gov

ovidiu.csillik@jpl.nasa.gov