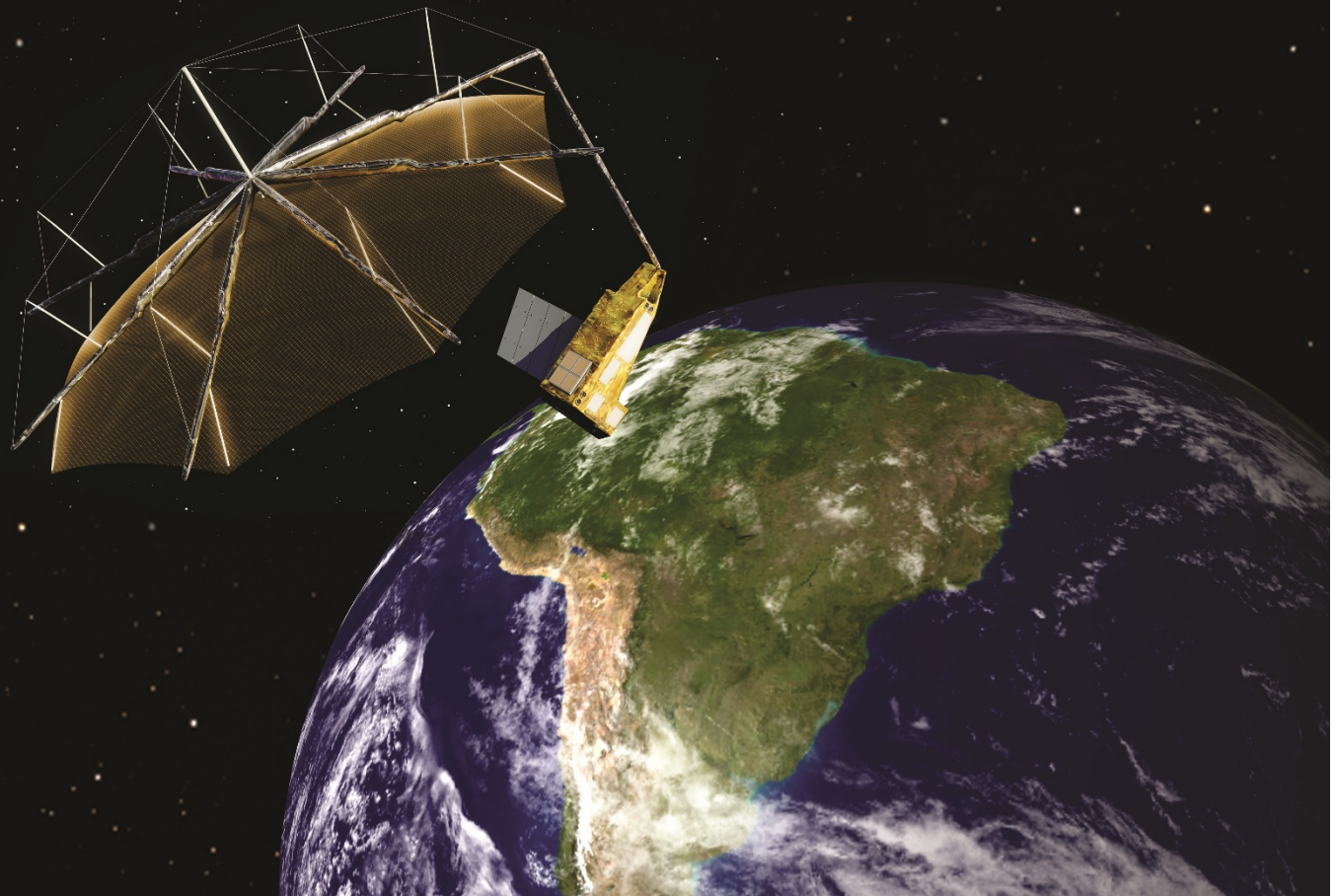
BIOMASS: ESA's 7th Earth Explorer mission

Primary objective: weighing the world's forests from space and clarifying the role of forests and their changes in the Earth's carbon cycle and climate; launch 2023

Science Lead: Shaun Quegan
Industrial Lead: Airbus UK (£192M contract)



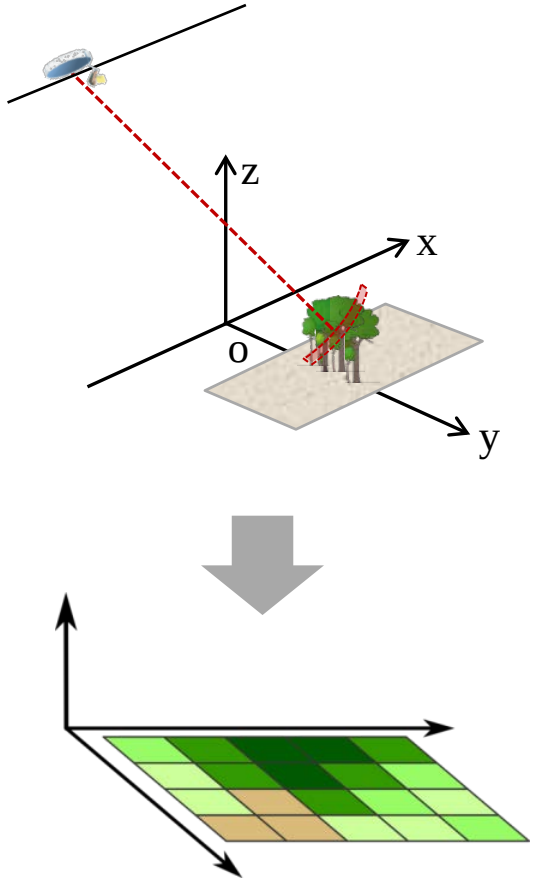
Biomass matters in climate science and politics:

- Forest biomass is a key way of storing CO2 sequestered from the atmosphere.
- Loss of forest causes emissions of atmospheric CO2.

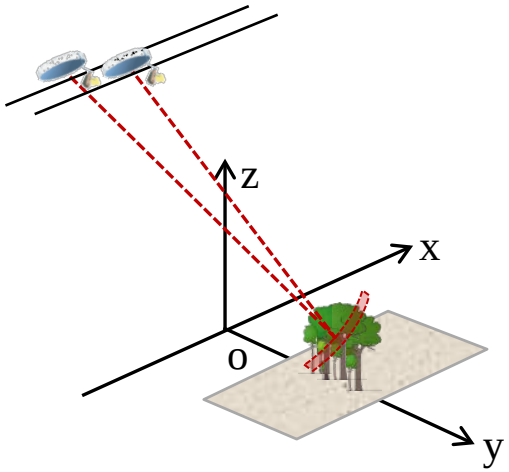
- Forest biomass plays a major role in Nationally Determined Contributions in the Paris Agreement, especially for developing countries, which often have little inventory data

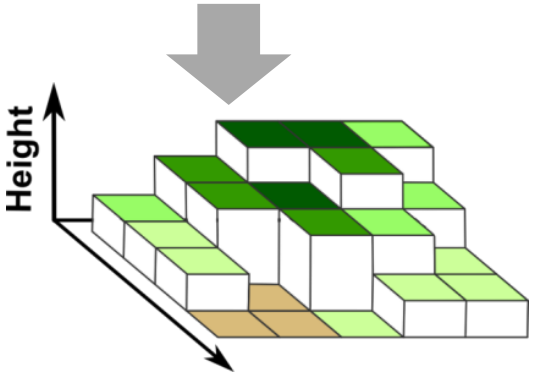
Radical new technology: the 1st P-band radar in space, 1st full polarimetry, 1st systematic use of Pol-InSAR for forest height, 1st tomographic mission

Polarimetry

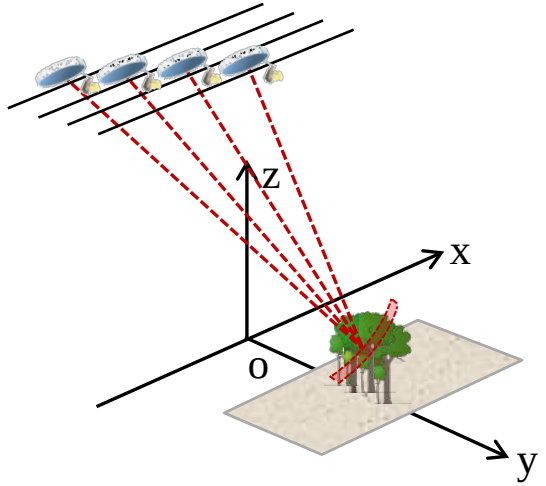


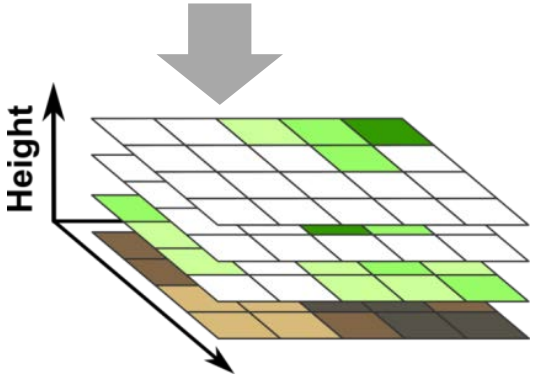
Polarimetric Interferometry





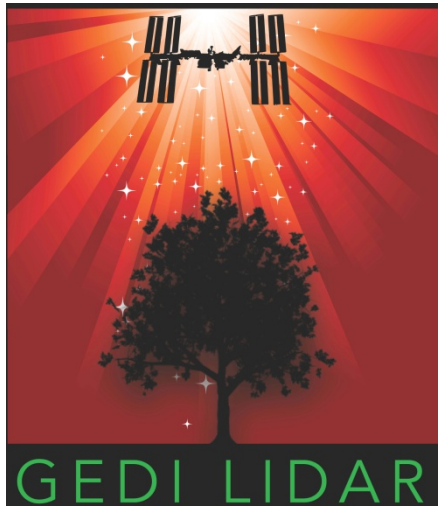
Tomography
(layers in the canopy)





Upcoming golden age for forest biomass & structure from space

Forest biomass & height (2023-2028)



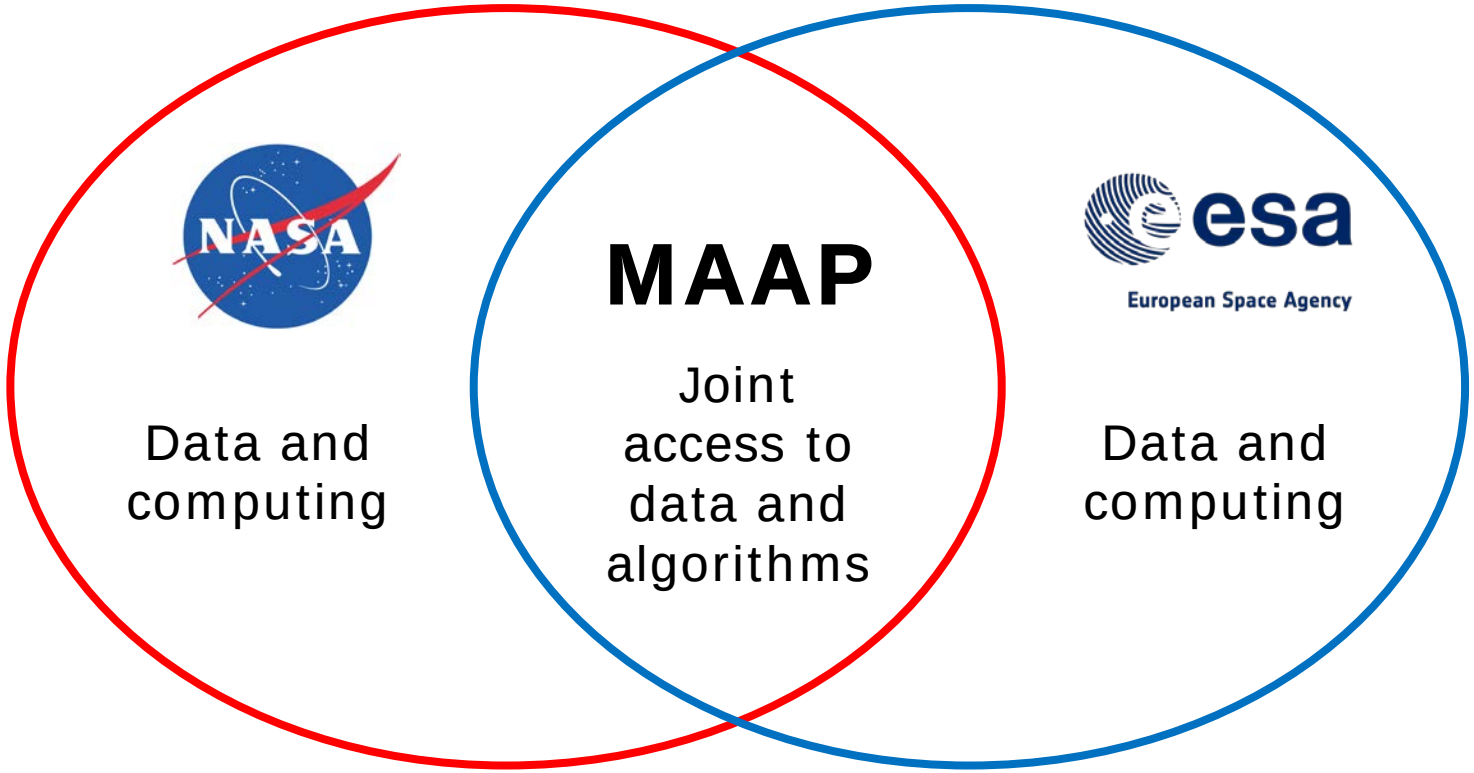
Forest structure & biomass (2018-2023)

Forest structure & above-ground biomass < 100 t/ha (2022-32)

The "4th mission": in situ networks

- 3 new missions dedicated to measuring forest properties.
- Major support from ground networks.
- Other L-band and C-band SAR data, & L-band radiometry
- The combined capability is far greater than its parts.

Full power of the 3 missions harnessed in the joint ESA/NASA Mission Algorithm and Analysis Platform model



NISAR
NASA - ISRO SAR Mission

GEDI
ECOSYSTEM LIDAR

biomass

Up to date data and algorithms + Collaborative community

Unified user access to all space and ground data in a single open access platform that supports data processing: **Move user activities to the data, not data to the users**

Summary

We are entering a period of unprecedented richness of information on forest structure and biomass from space.

A key issue is to turn this into evidence-based action on forest management (in the widest sense).