

Data and model limitations

Data acquisition - terrestrial

Haryana
Forest, India
(2023)



Rothwald,
Austria (2024)

Data acquisition - UAV

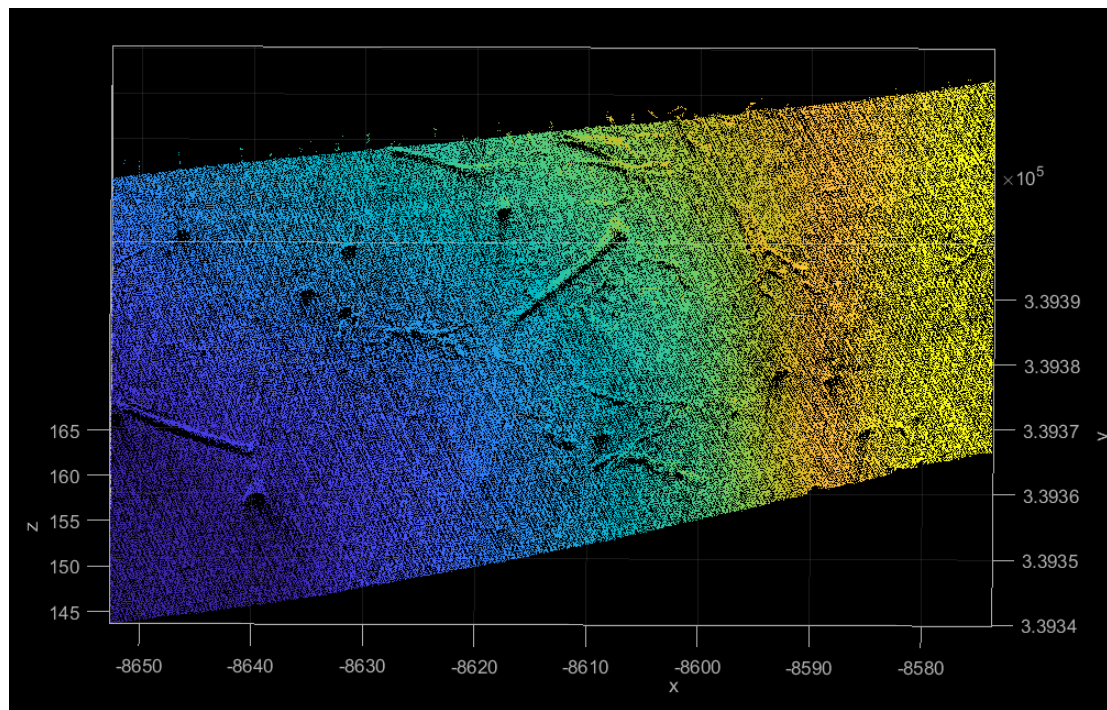


Data acquisition - UAV

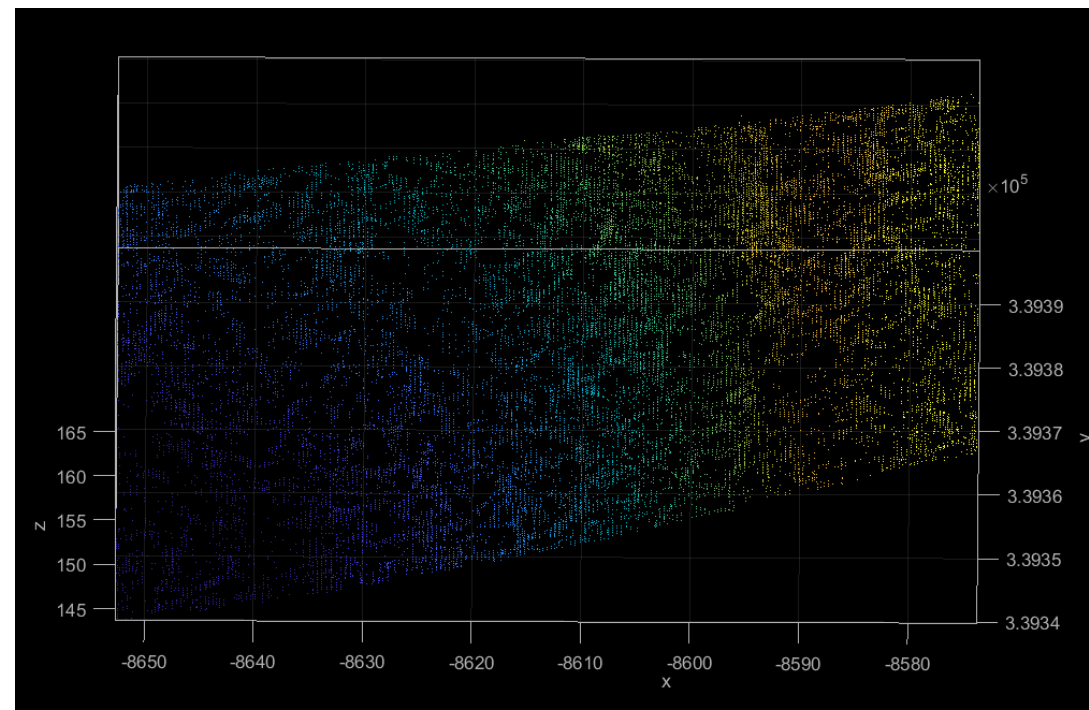
- Weather conditions
- Battery life
- Data volume, storage, and processing
- Data accuracy and consistency (e.g. changes in lighting, altitude, and sensor calibration)
- Airspace restrictions
- Signal interference and connectivity



Using provided data

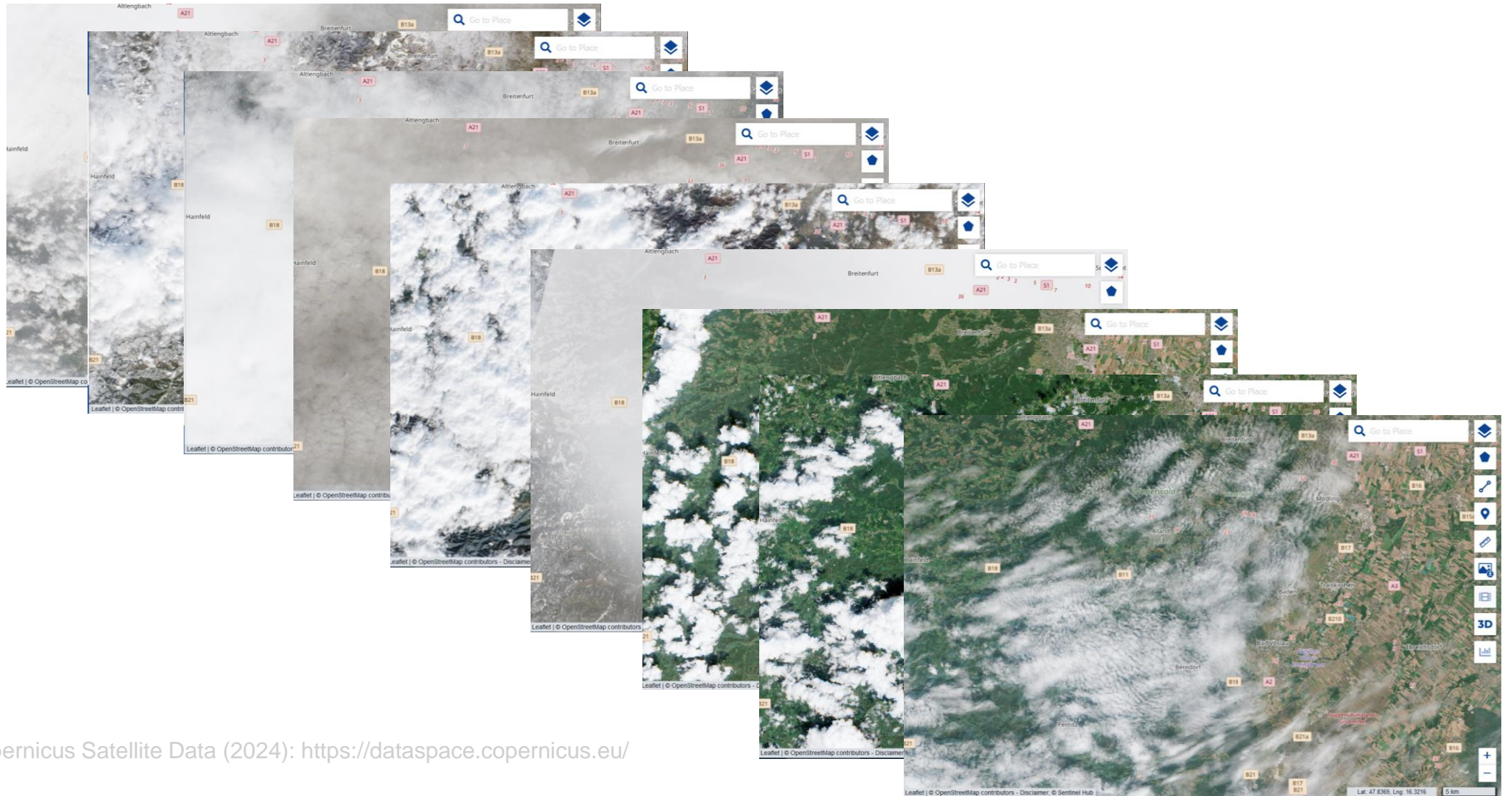


Airborne Laser Scanning 2015
(November)



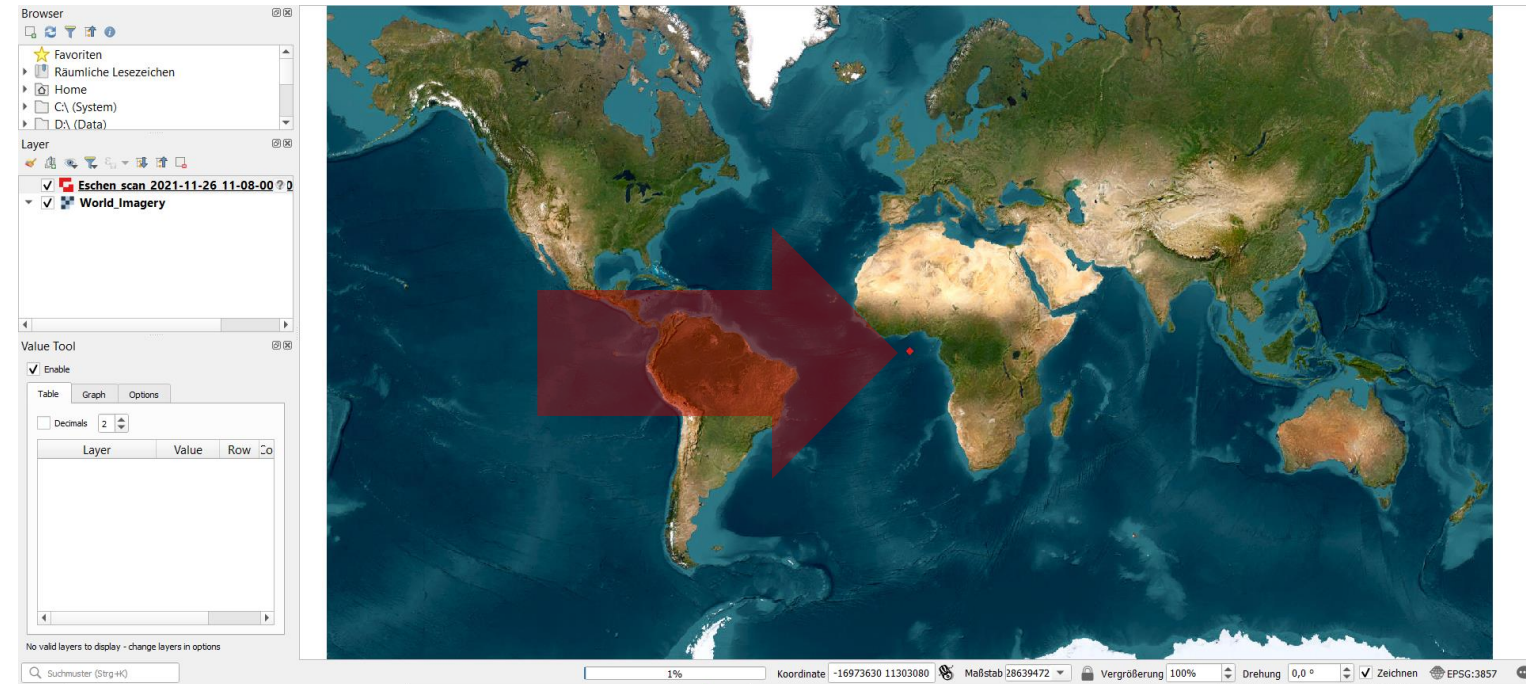
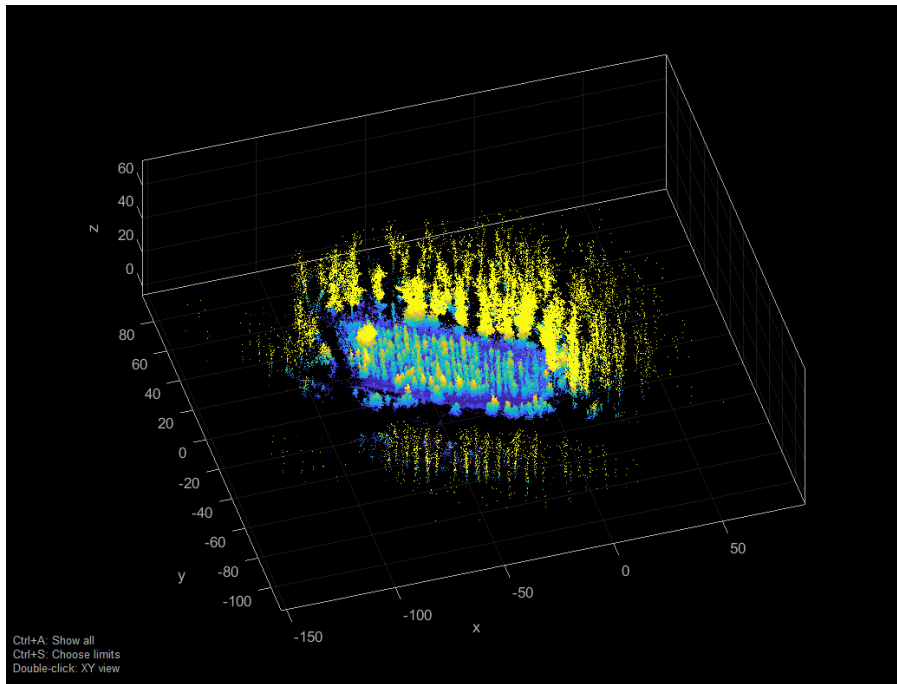
Airborne Laser Scanning 2023
(June)

Using provided data



Source: Copernicus Satellite Data (2024): <https://dataspace.copernicus.eu/>

Using provided data



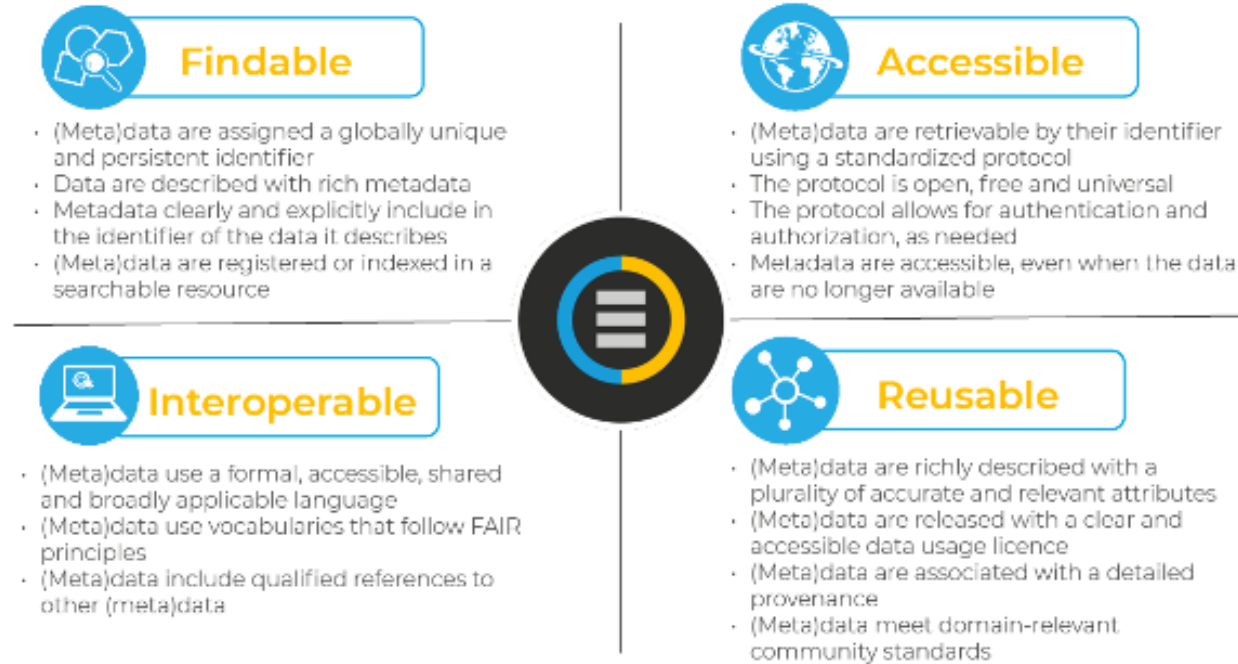
Take home message

Use scientific guidelines, and document rigorously your choices.

There are always challenges, but what makes us successful is our ability to overcome these

The "FAIR Guiding Principles for scientific data management and stewardship

<https://www.nature.com/articles/sdata201618>



Source:

<https://www.ccdc.cam.ac.uk/>

Potential data and model problems

- Increment, biomass, and age structure must be consistent for initialising the virtual forest correctly
 - Rate the input data by uncertainty and give the model some flexibility to initialise correctly.
- In a balance model, the initial size of the pools must be consistent with input and output flows, otherwise we'll observe the transition effect instead of the model response to the studied driver.
 - Spin up and check that the equilibrium is reached.
- A map (RS product) declares a certain statistical accuracy but does not promise that any particular place is correct. Usually, finer resolution increases the risk of inconsistency of spatial layers.
 - Model resolution should be coarser than the input data, so we average multiple input cells for one model cell.
- Time consistency of input data (what year(s) does a RS product / forest inventory represent? Does harvest statistics represent wood removals?)
- Wrong reporting and miscommunication (roundwood in FAOSTAT sometimes changes a few times per year; roundwood reported overbark or underbark? EUROSTAT uses a definition of gross increment as net increment; When we ask for increment data what do we get, gross / net / mean / current / periodic? What is growing stock? What forest area is correct FAO FRA / UNFCCC / Forest Europe / RSs? Why does not forest product statistics match roundwood statistics?)
 - Always clarify with your partners....

Climate data

Models require complete climate data for the whole simulated period

Any gaps in data need to be filled

Each model has its own demands on climate data.

If some variables are missing they need to be estimated from the available data

Soil data

Most process-based models require information about soil – soil depth, soil texture, etc.

If no observations are available, this information needs to be estimated

Different soil databases can be used: e.g. HSWD, SoilGrid

but their uncertainty is high

Tree species representation

Models are calibrated for certain species

If other species occur within a simulated plot, they need to be assigned to a similar species or excluded from simulations

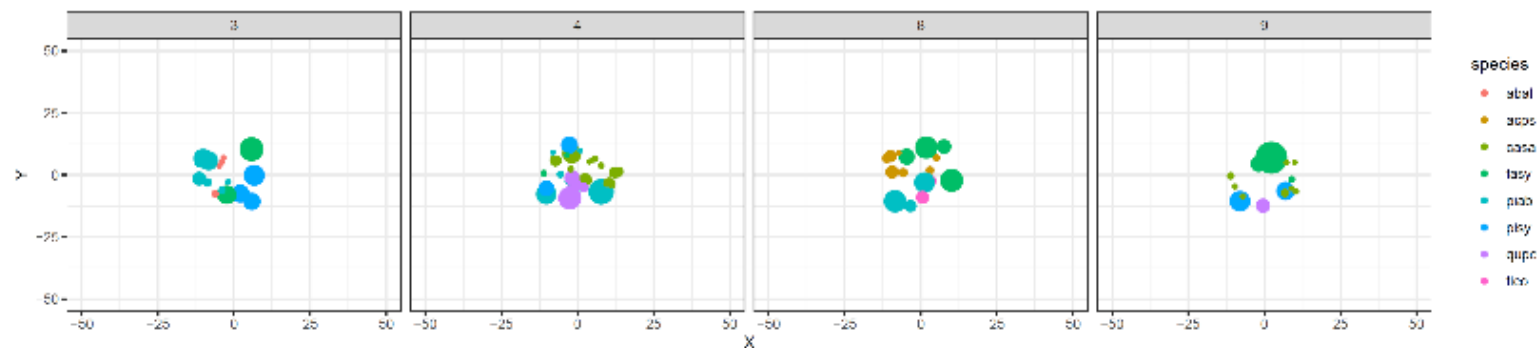
Stand characterisation

Models require certain input and produce certain output

This input and output does not necessarily match observations

We need to set minimum of 1 ha forested area for iLand

Inventory



Inventory +
generated
trees

