

Challenges in the Validation of Land Use and Land Cover Change (LULC) Maps

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IIASA in collaboration with VITO, IGNFI, and Google DeepMind

6th May 2026, ESA StatEO26, Italy

Our land cover/land use change validation experience



Horizon Europe



Copernicus Global Land Cover and Tropical Forest Mapping and Monitoring service (LCFM)



Natural Lands Map

Mapping natural land to help companies eliminate the conversion of these ecosystems from their supply chains.

Global Pasture Watch

Mapping & monitoring Global Grasslands and Livestock



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Data Descriptor | [Open access](#) | Published: 13 November 2025

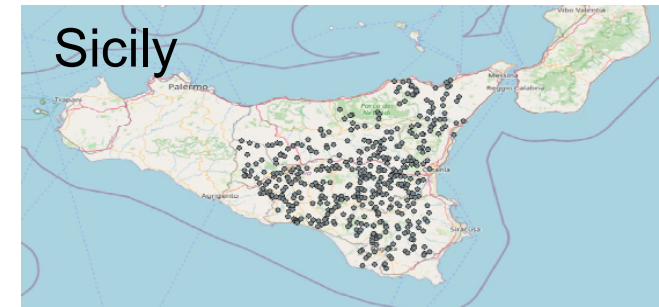
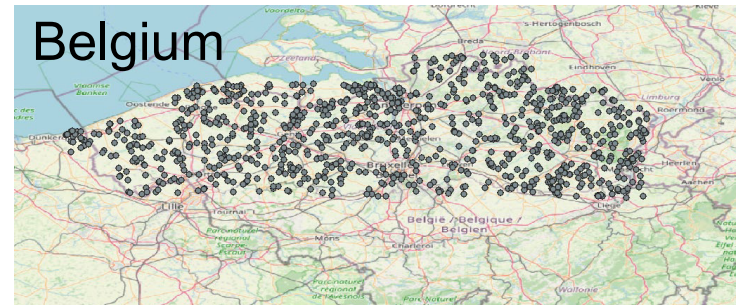
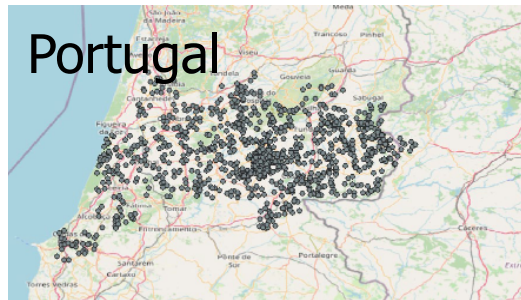
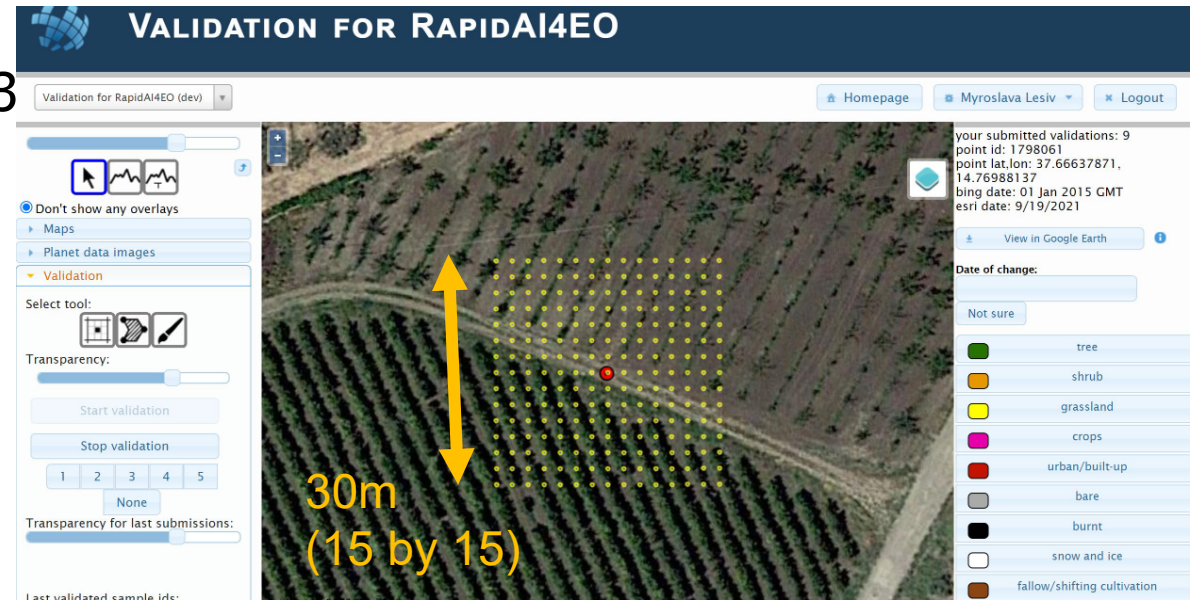
Natural forests of the world – a 2020 baseline for deforestation and degradation monitoring

[Maxim Neumann](#) , [Anton Raichuk](#), [Yuchang Jiang](#), [Mélanie Rey](#), [Radost Stanimirova](#), [Michelle J. Sims](#), [Sarah Carter](#), [Elizabeth Goldman](#), [Keith Anderson](#), [Petra Poklukar](#), [Katelyn Tarrío](#), [Myroslava Lesiv](#), [Steffen Fritz](#), [Nicholas Clinton](#), [Charlotte Stanton](#), [Dan Morris](#) & [Drew Purves](#)

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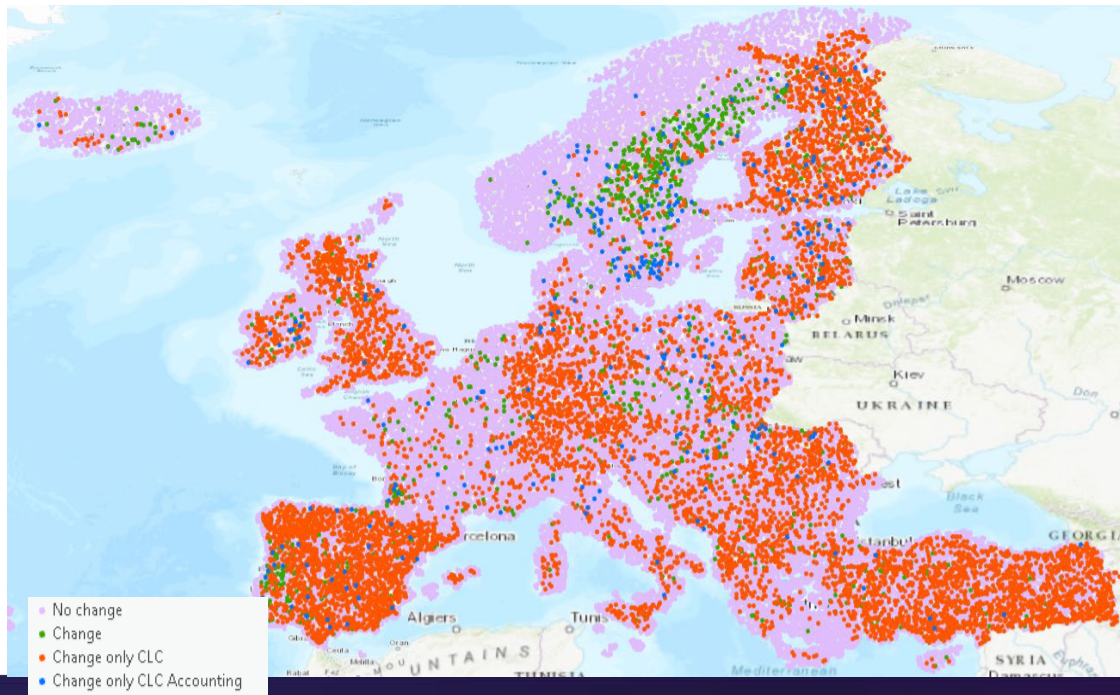
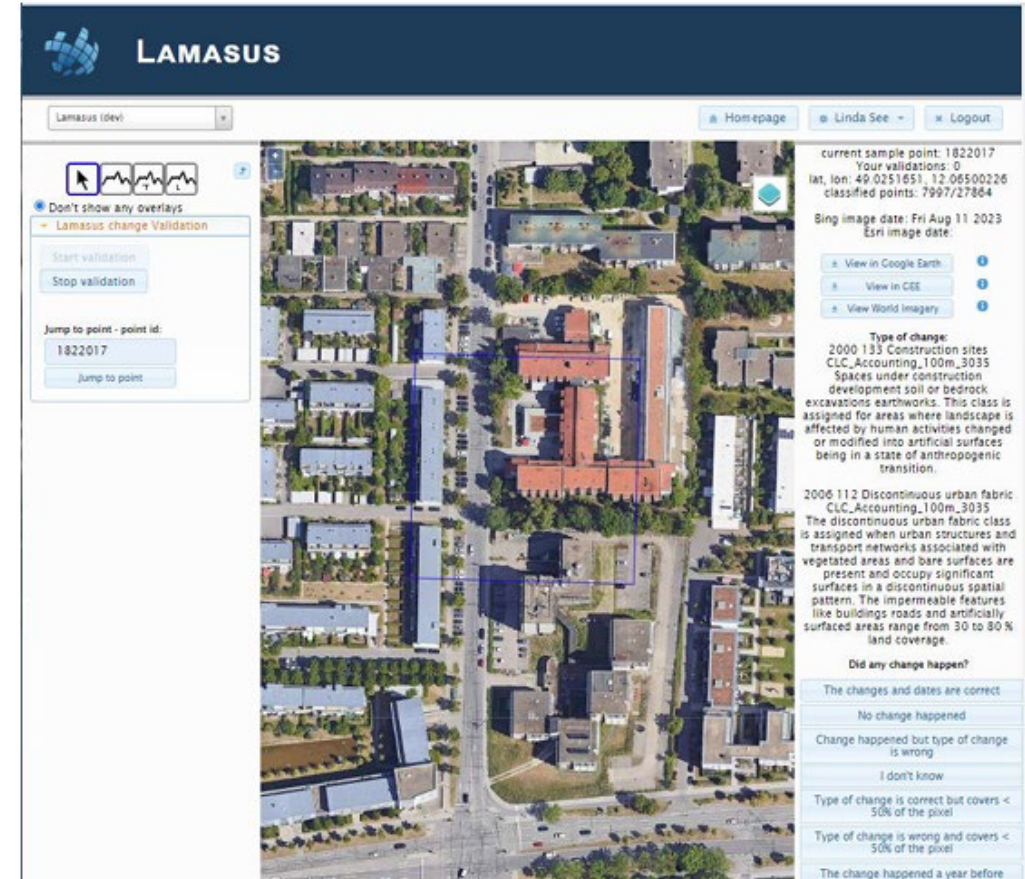
RapidAI4EO: validation of high resolution changes

- Blind validation of change maps on 3 AOI at 3 and 10m resolution (2018-2021)
- Annual and monthly changes
- Planet images+ Google Earth historical images+ Sentinel-2 time series
- Challenge: interpreter omission errors



LAMASUS: Validating Corine Land Cover maps

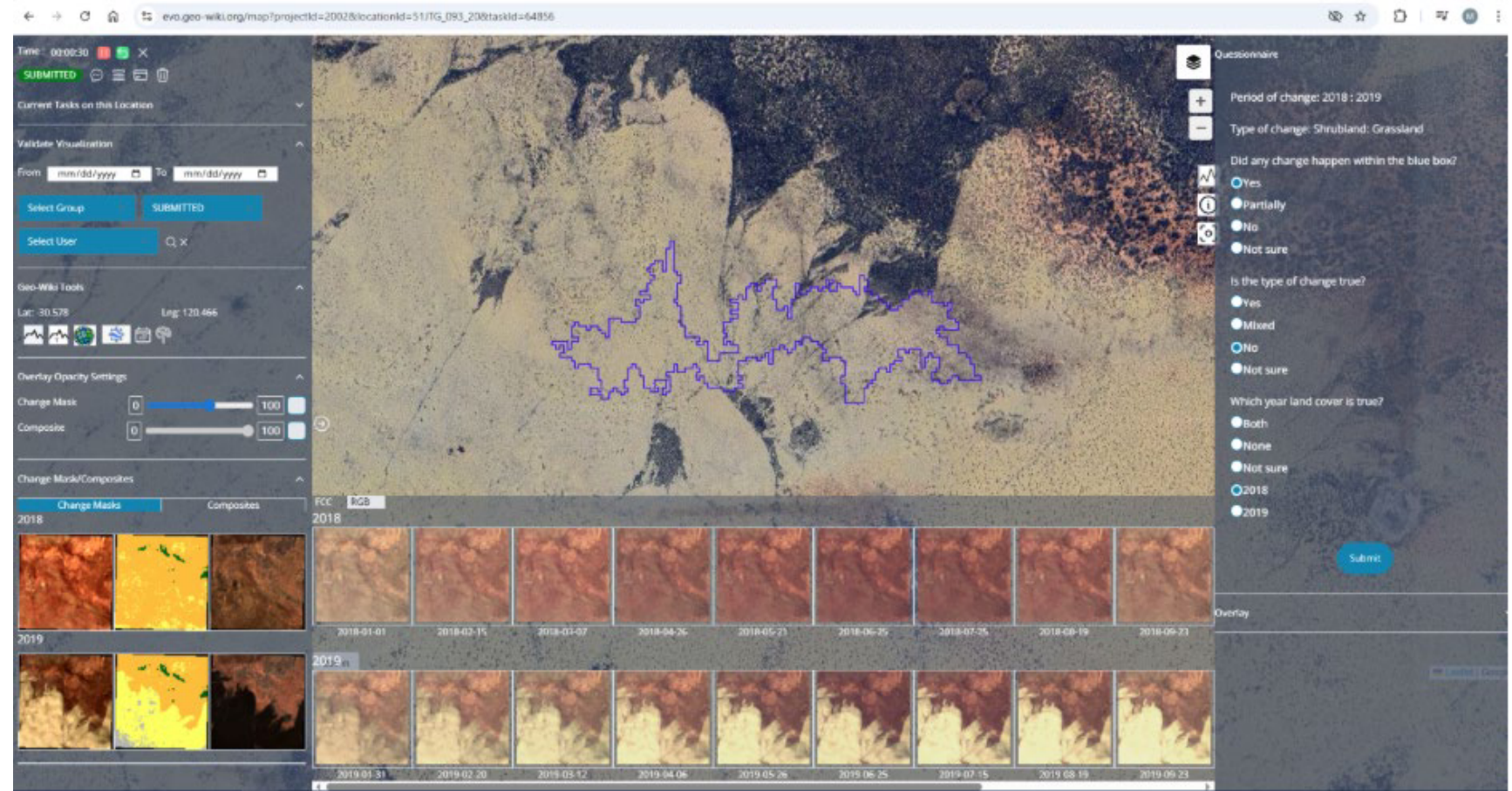
- Plausibility validation of changes at 100m resolution over the period 1990-2018
- Google Earth Historical images+ Sentinel- 2 time series = Landsat time series

- Challenge: interpretation of definitions and lack of data going back in time

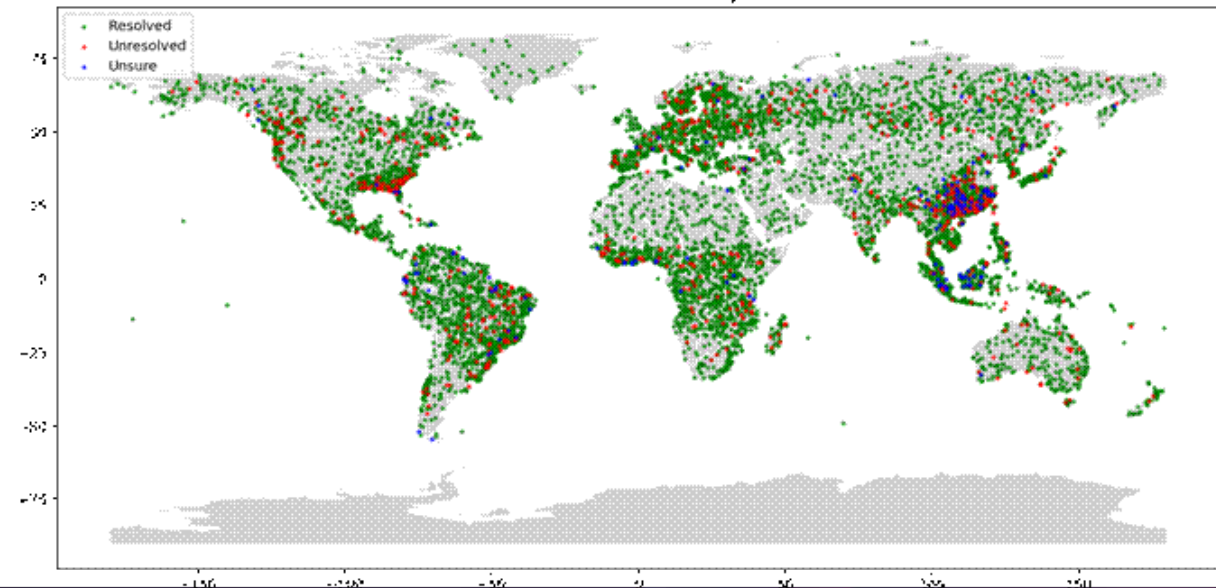
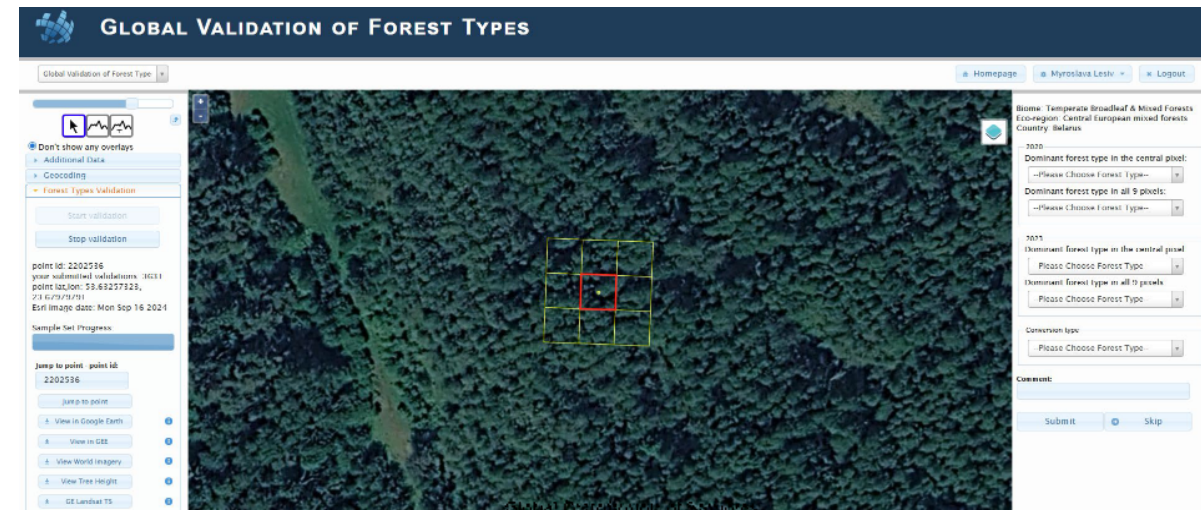
LCFM: annual land cover change verification

- Segment based verification if changes are true
- On-going
- ~40K segments
- Challenge: definitions
 - Land cover vs land use
 - Time dimension



Global map of forest land use

- Global validation of forest land use
- EUDR & FAO based classes
- 2020-2023
- 9100 sample sites
- Expert-based
- Challenges:
 - land use vs land cover and individual expert bias
 - lack of historical data

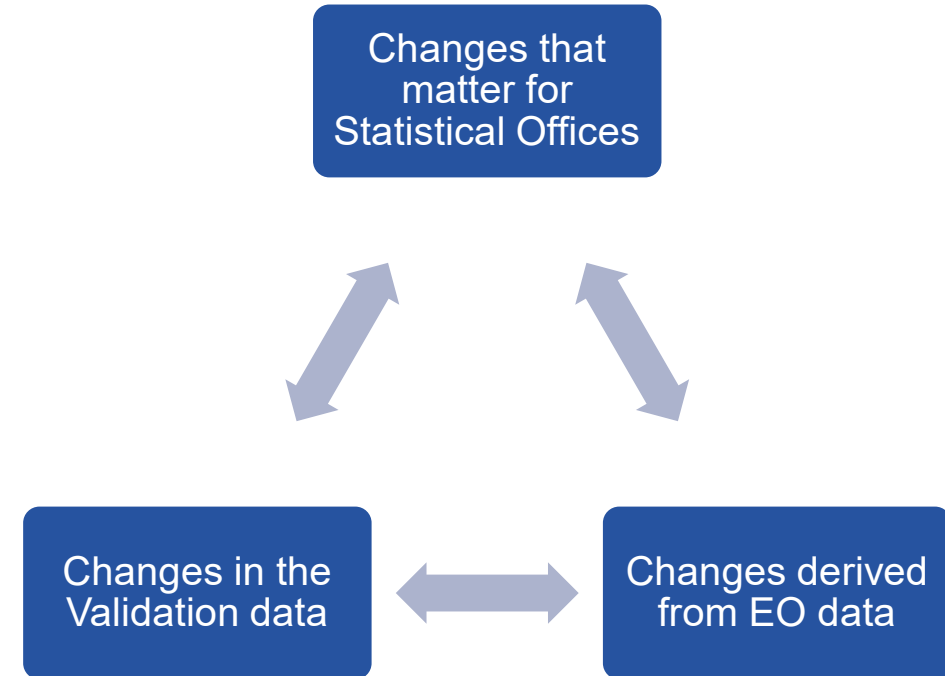


Challenges

- Statistical Officers and Map Producers:
 - Availability of validation data set
 - Quality of validation data
 - Definitions: land cover vs land use
 - Definitions of change: time dimension
 - ...
- Validation teams (in-situ and remote):
 - Sampling design considering Omission errors
 - User interface (response design) for validation data collection
 - Quality assurance of validation data including plausibility analysis

Concluding remarks

- We are in a transitional phase:
 - We have remote sensing data, good AI models, and tools
 - What is still missing = reference data and better understanding of what is possible to map with high confidence
- Developing a validation data set of high quality is a significant effort (and costly) but this is the only way to increase our trust in the maps derived from remote sensing data
- Necessary to build the bridge between definitions =>





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