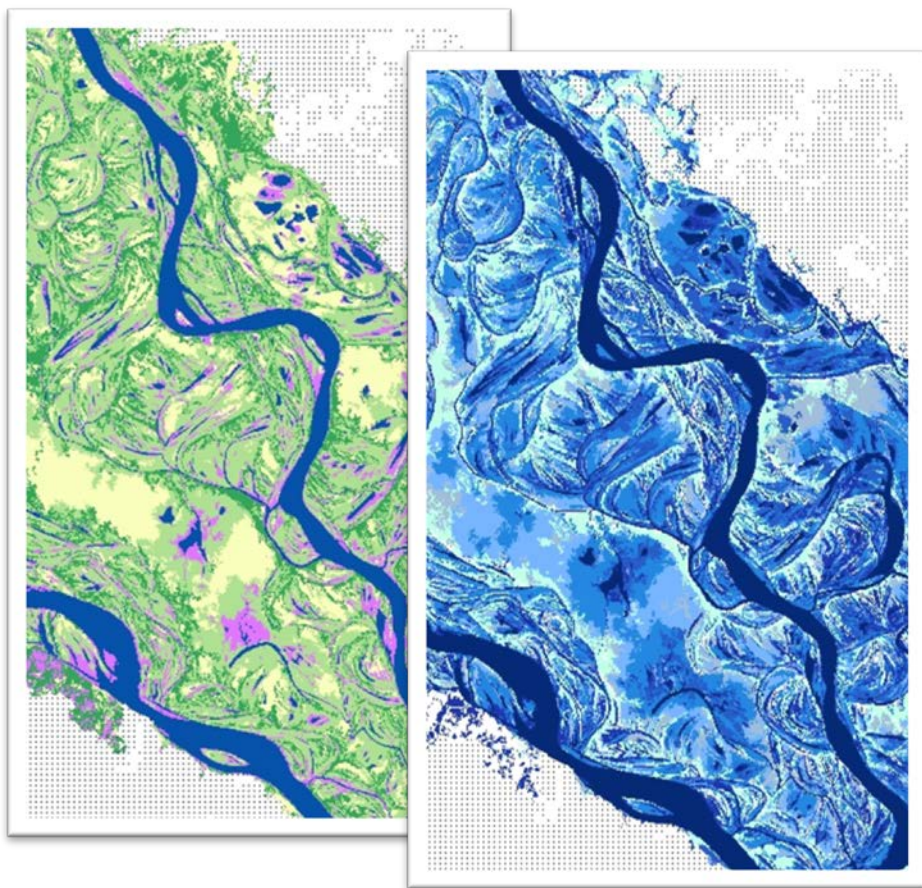


The use of ALOS imagery to investigate the carbon dynamics of the Amazon river system

(K&C 20 - December 2013)



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Project objectives

We proposed to use a combination of **field measurements** and **classified ALOS imagery** to:

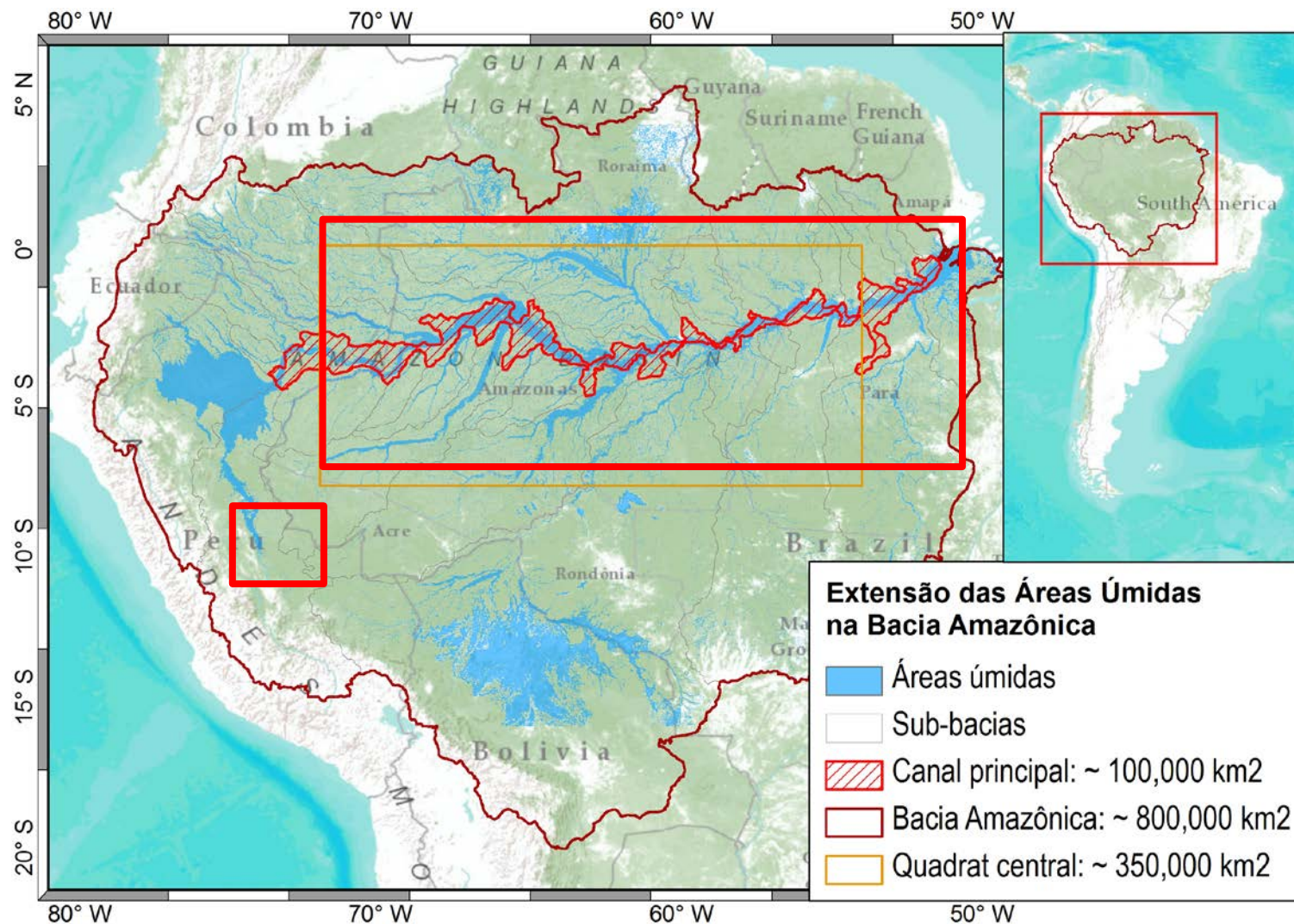
- 1) investigate the effects of seasonal flooding in interfluvial and alluvial wetlands on the export and dynamics of dissolved organic carbon in the Amazon river system,
- 2) estimate the carbon balance for select regions of the Amazon floodplain and,
- 3) use these results and regional ALOS mosaics to estimate the carbon balance of alluvial wetlands across the entire Amazon basin.

PALSAR use and K& C support

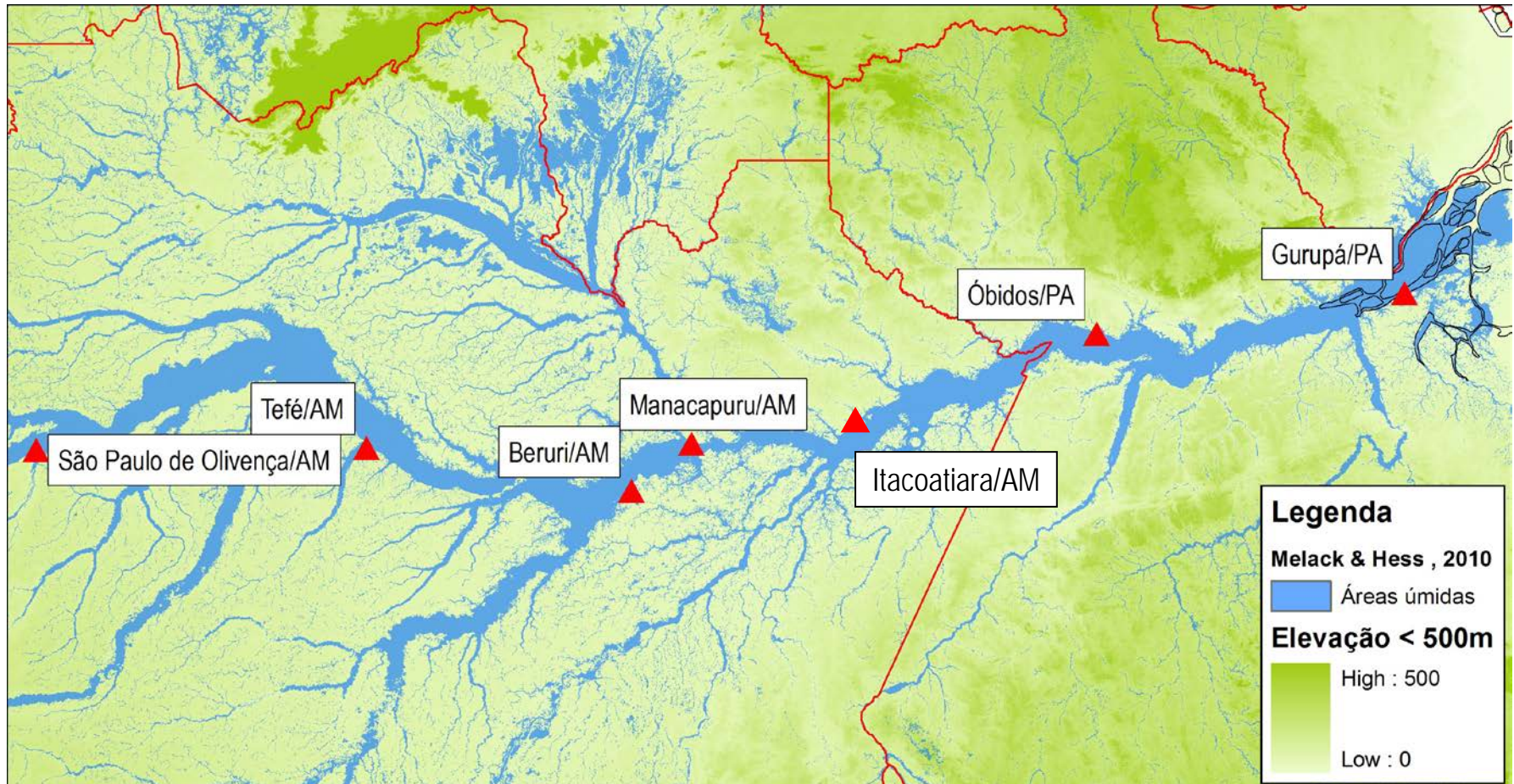
Current work: vegetation and inundation mapping at finer scales, to derive habitat distribution at the landscape level

- Habitat stratification as a proxy to capture heterogeneity in C cycling
- Detailed knowledge on landscape structure and habitat distribution still lacking for the majority of the floodplain
- This knowledge is necessary to support legal and operational aspects of wetland conservation in the Amazon.
- Fine scale data will support validation of large scale estimates

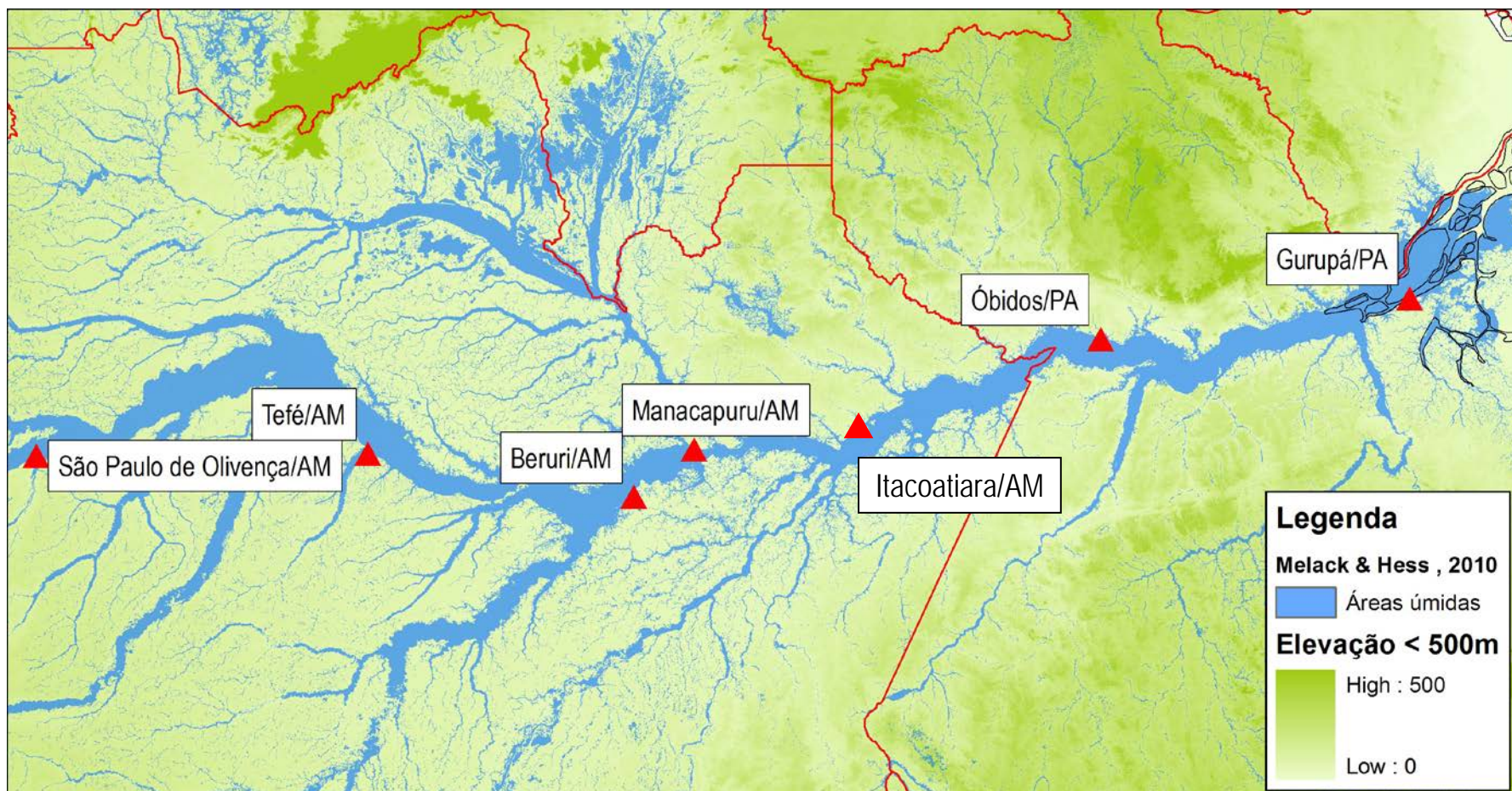
Project study area(s)



Project study area(s)



Project study area(s)



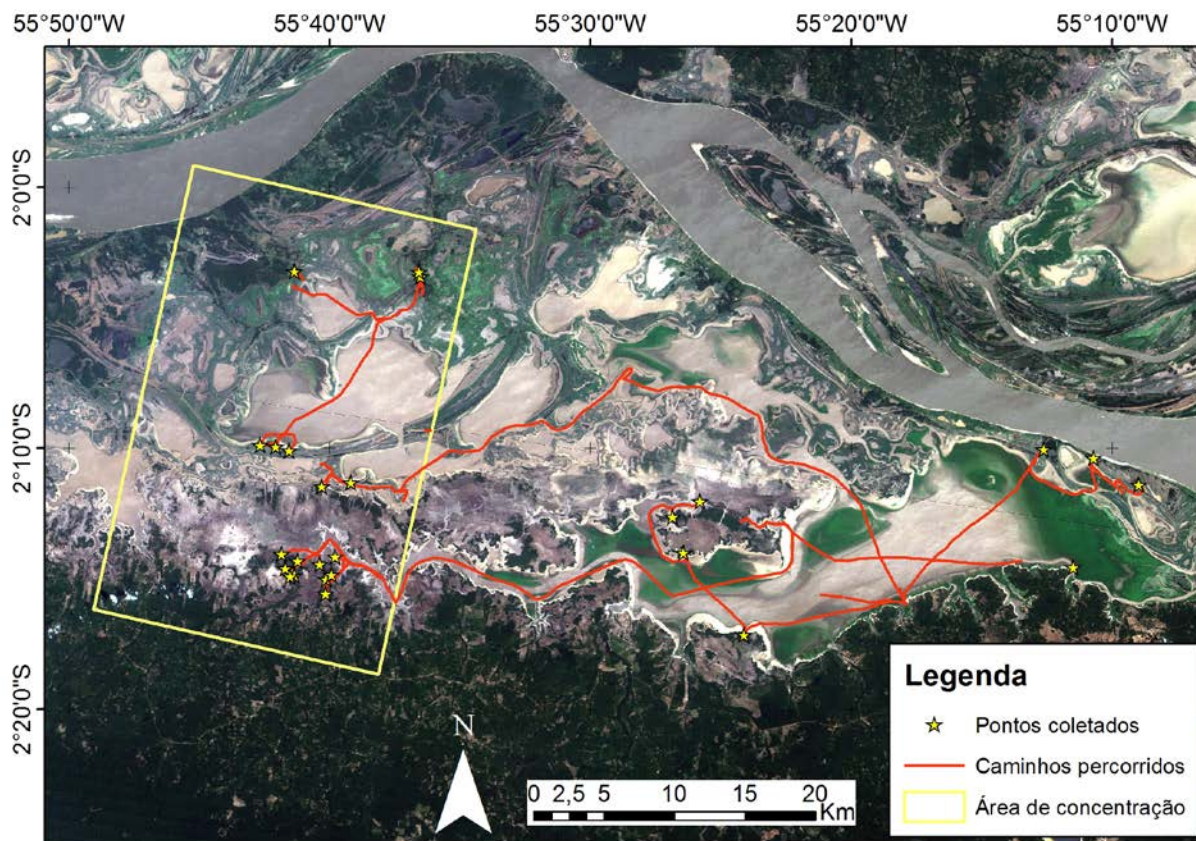
Synergy with ongoing funded research projects

Support to JAXA's global forest mapping effort

Forest structure and diversity data for most areas shown in the previous slide (CNPq/GEOMA)

New inventory initiatives planned specifically for remote sensing analysis

We expect newer data to be made openly available to the community



Ecosystem processes - uncertainty and variability

Arnesen AS, Silva TSF, Hess LL, Novo EMLM, Rudorff CM, Chapman BD, McDonald KC (2013)

Monitoring flood extent in the lower Amazon River floodplain using ALOS/PALSAR ScanSAR images.

Remote Sensing of Environment, **130**, 51–61.

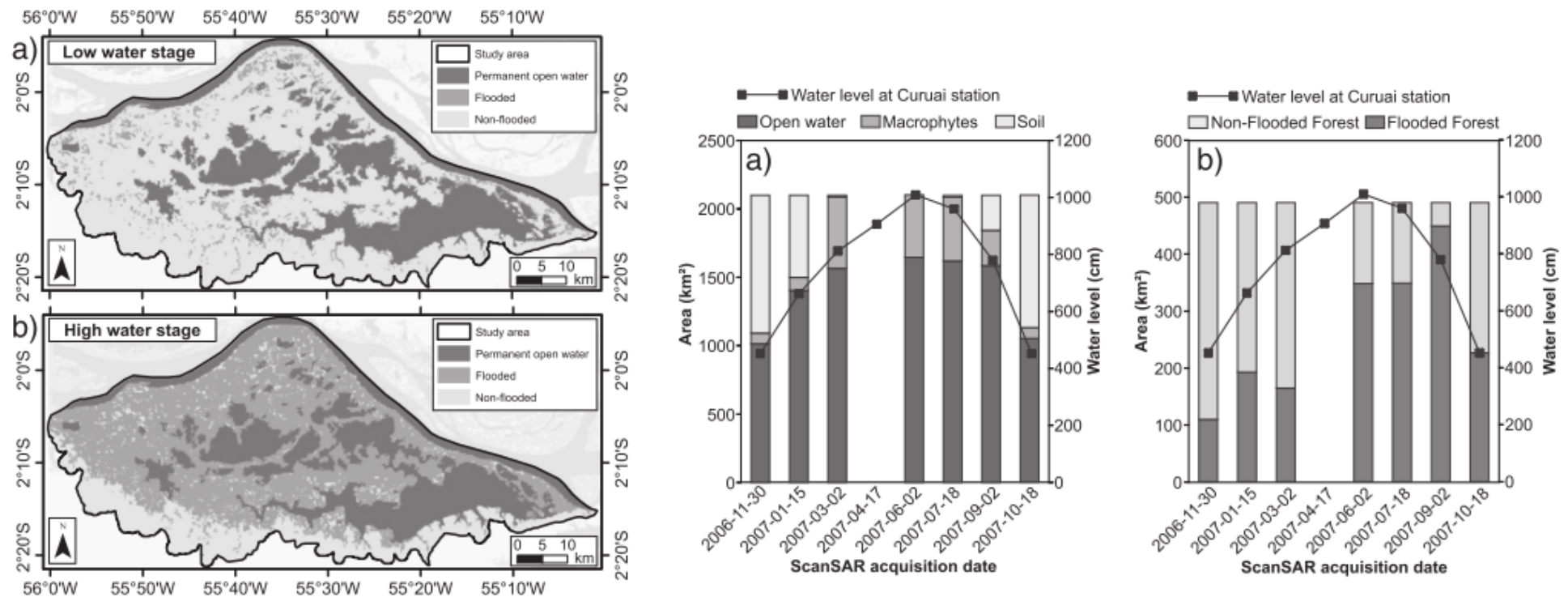
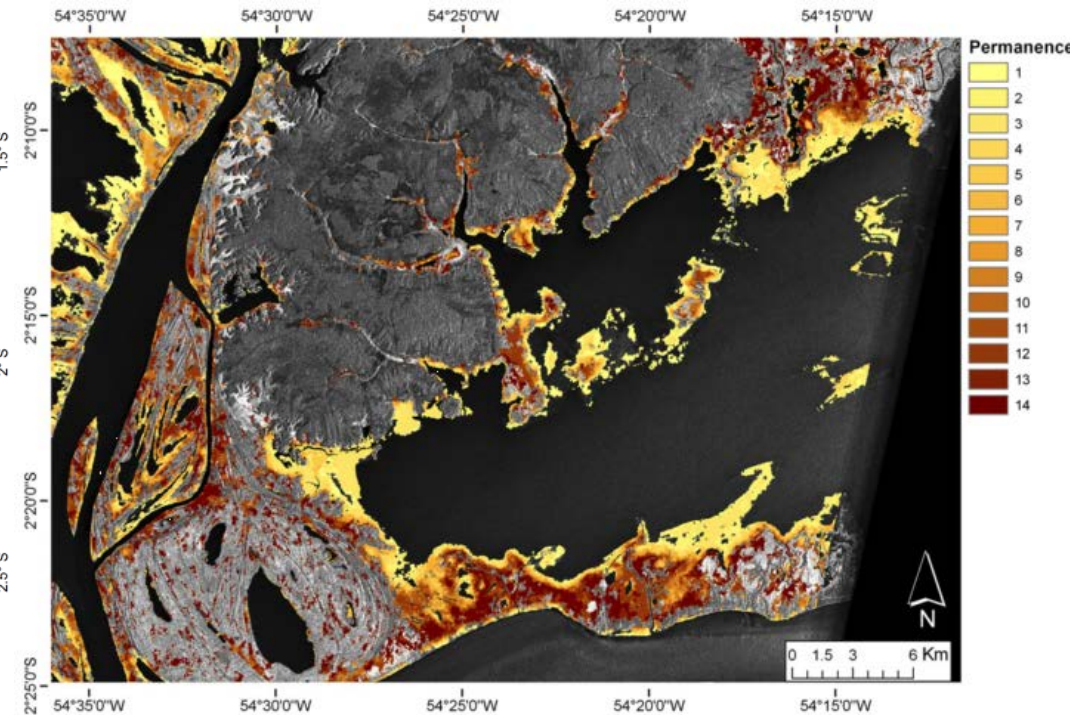
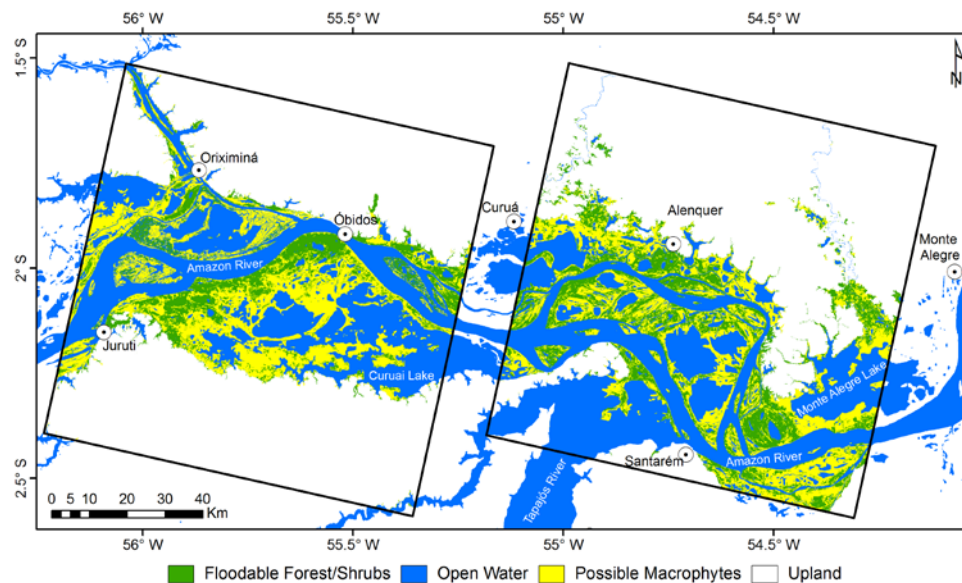


Fig. 8. Flood extent mapped for the Curuai Lake floodplain (Lower Amazon River, Brazil) for two dates: 2006-11-30 representing the low water stage (a) and 2007-07-18 representing the high water stage (b). The black line indicates the polygon considered for flooded area calculations.

Ecosystem processes - uncertainty and variability

Silva TSF, Melack JM, Novo EMLM (2013) Responses of aquatic macrophyte cover and productivity to flooding variability on the Amazon floodplain. *Global Change Biology*, 19, 3379–3389.



Ecosystem processes - uncertainty and variability

Silva TSF, Melack JM, Novo EMLM (2013) Responses of aquatic macrophyte cover and productivity to flooding variability on the Amazon floodplain. *Global Change Biology*, **19**, 3379–3389.

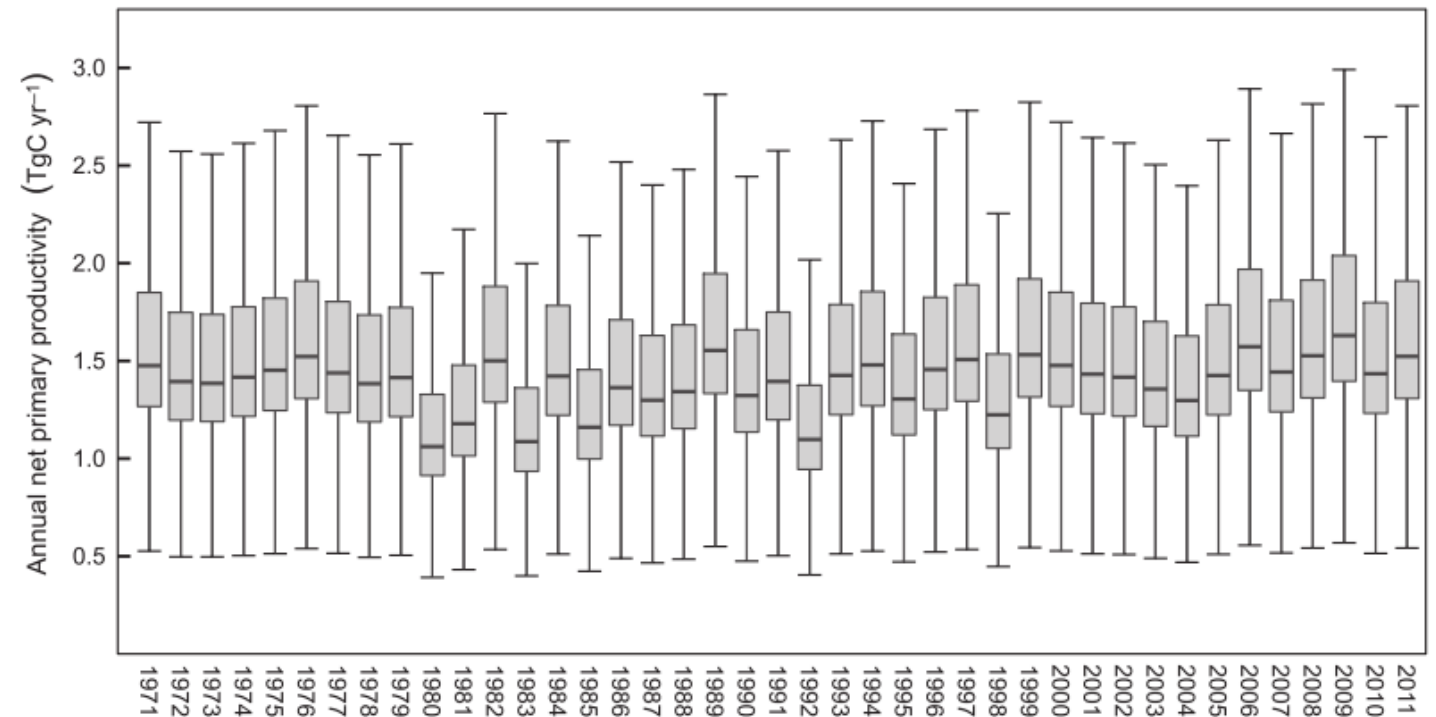
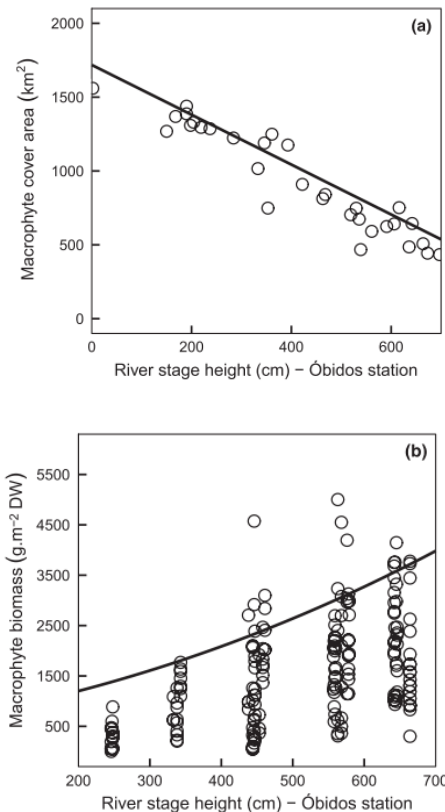


Fig. 5 Box and whisker plot of simulated annual aboveground net primary productivity for macrophytes at Curuai and Monte Alegre regions, lower Amazon floodplain, Brazil.

Habitat mapping – connecting field knowledge to remote sensing

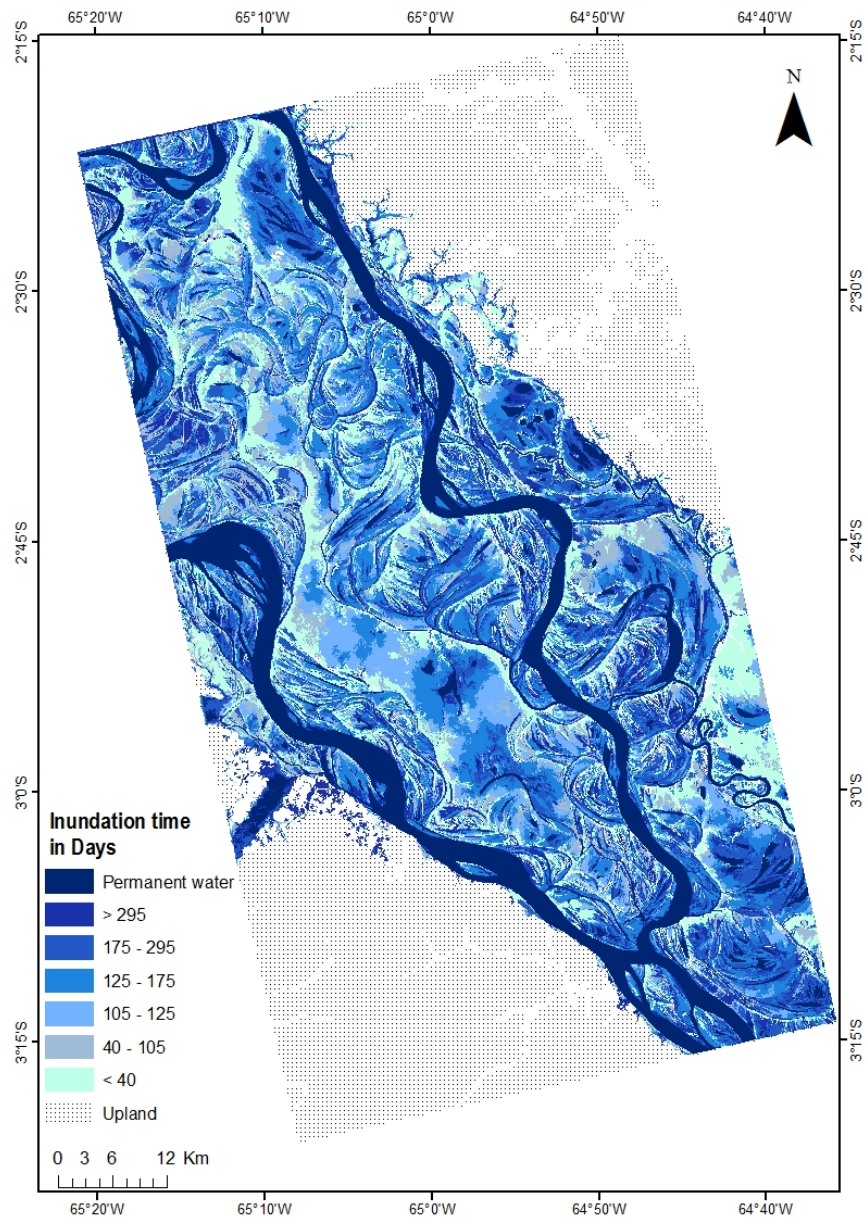
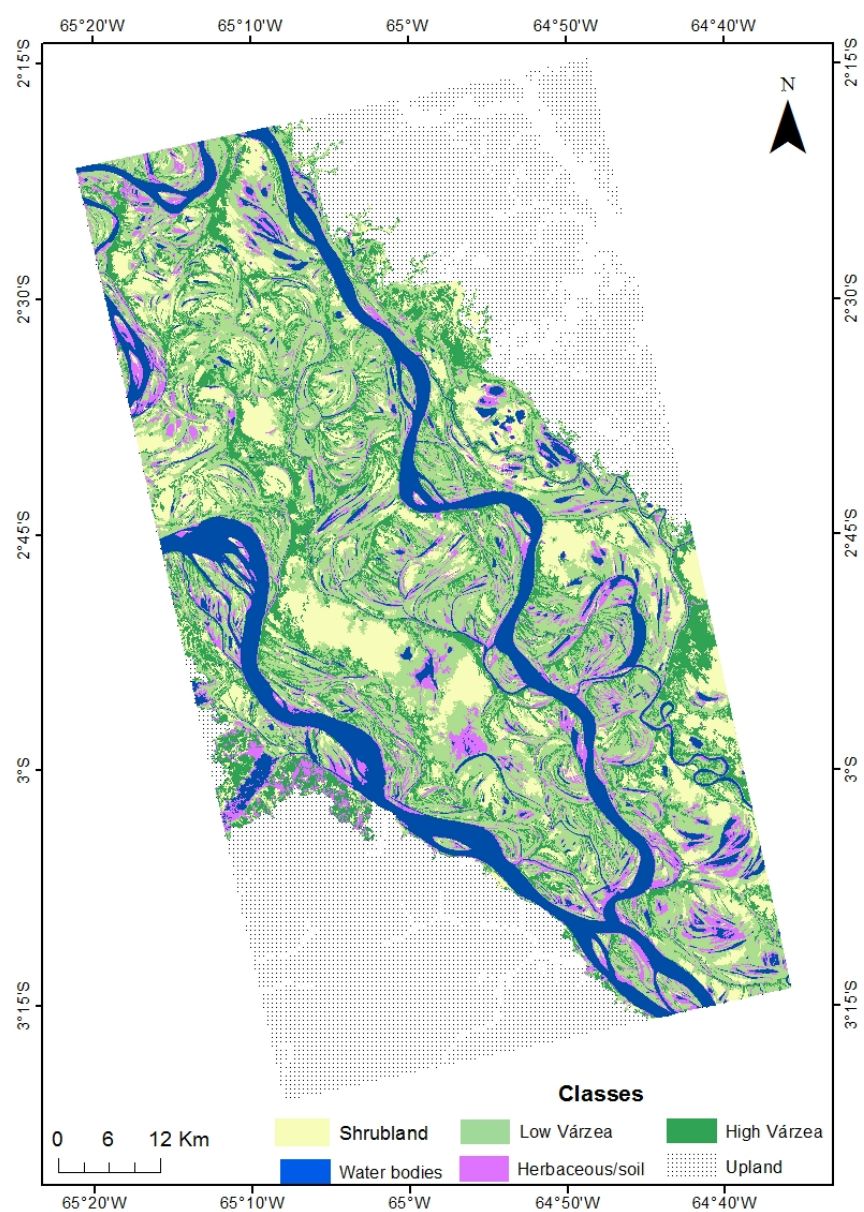
- Most studies have looked at either vegetation or flooding
- Vegetation classes do not correspond to what field biologists see/want

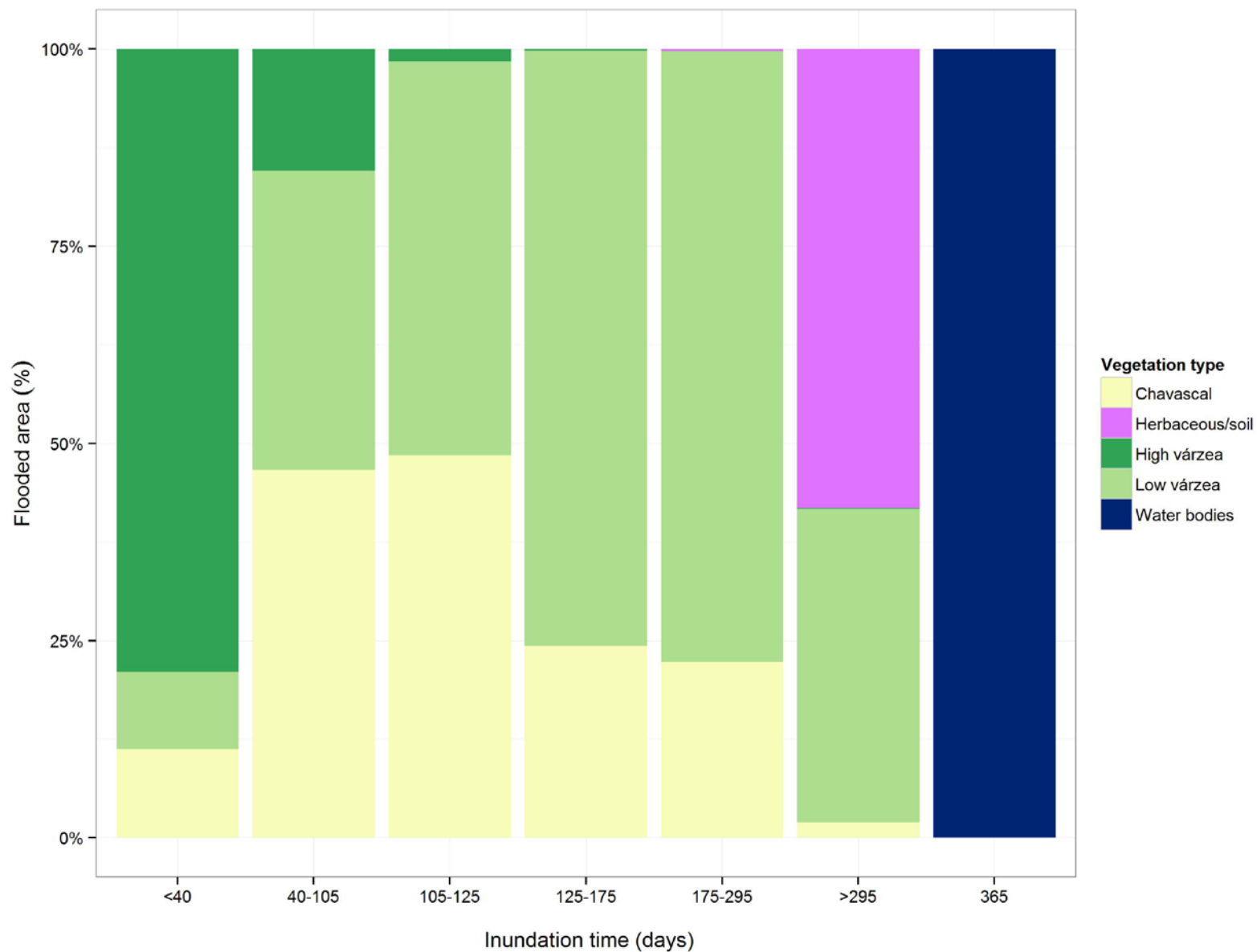
Pilot study: Mamirauá reserve (MSDR), near Tefé (AM)

- Demand for accurate floodplain vegetation and flooding maps for management and conservation purposes
- Must address recognized habitat units (High Várzea, Low Várzea, etc.)
- Opportunity to combine our approaches from previous studies
- Focus on developing a replicable approach, with the least amount of user input as possible (and the least amount of proprietary software)

ALOS

K&C Initiative
An international science collaboration led by JAXA





Habitat mapping – connecting field knowledge to remote sensing

- **Unlikely combinations:** classification errors or rare habitats?
- Can these habitats be associated with specific phenological and biogeochemical processes?
- Current results submitted to WEM Special Edition – Lisa, Ake, & Maycira

Next steps:

- Refine and automate the methodology
- Measurement of ecosystem variables, stratified by habitat (PhD project)
- Extend analysis to basin wide scale (mosaics?)

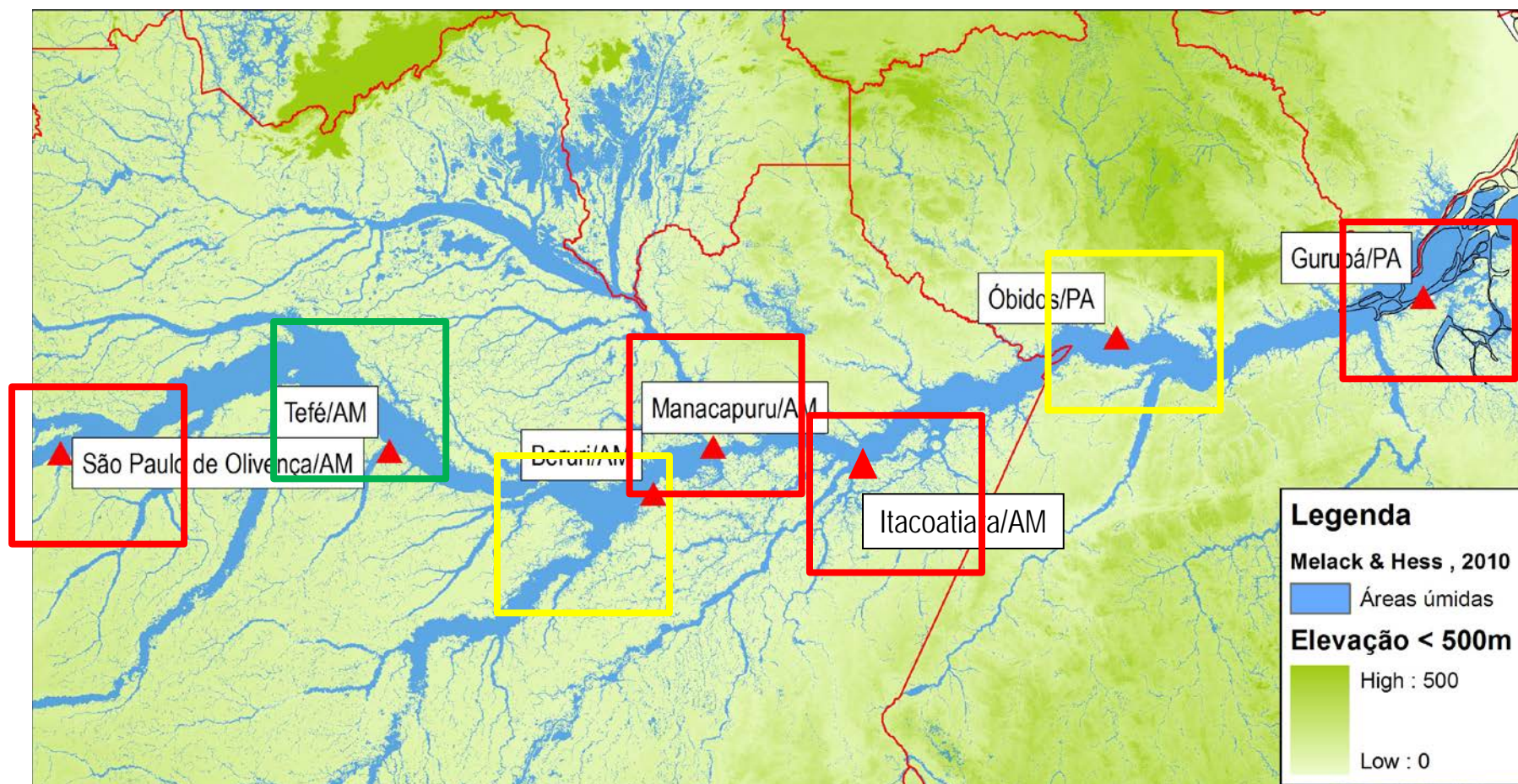
Challenges:

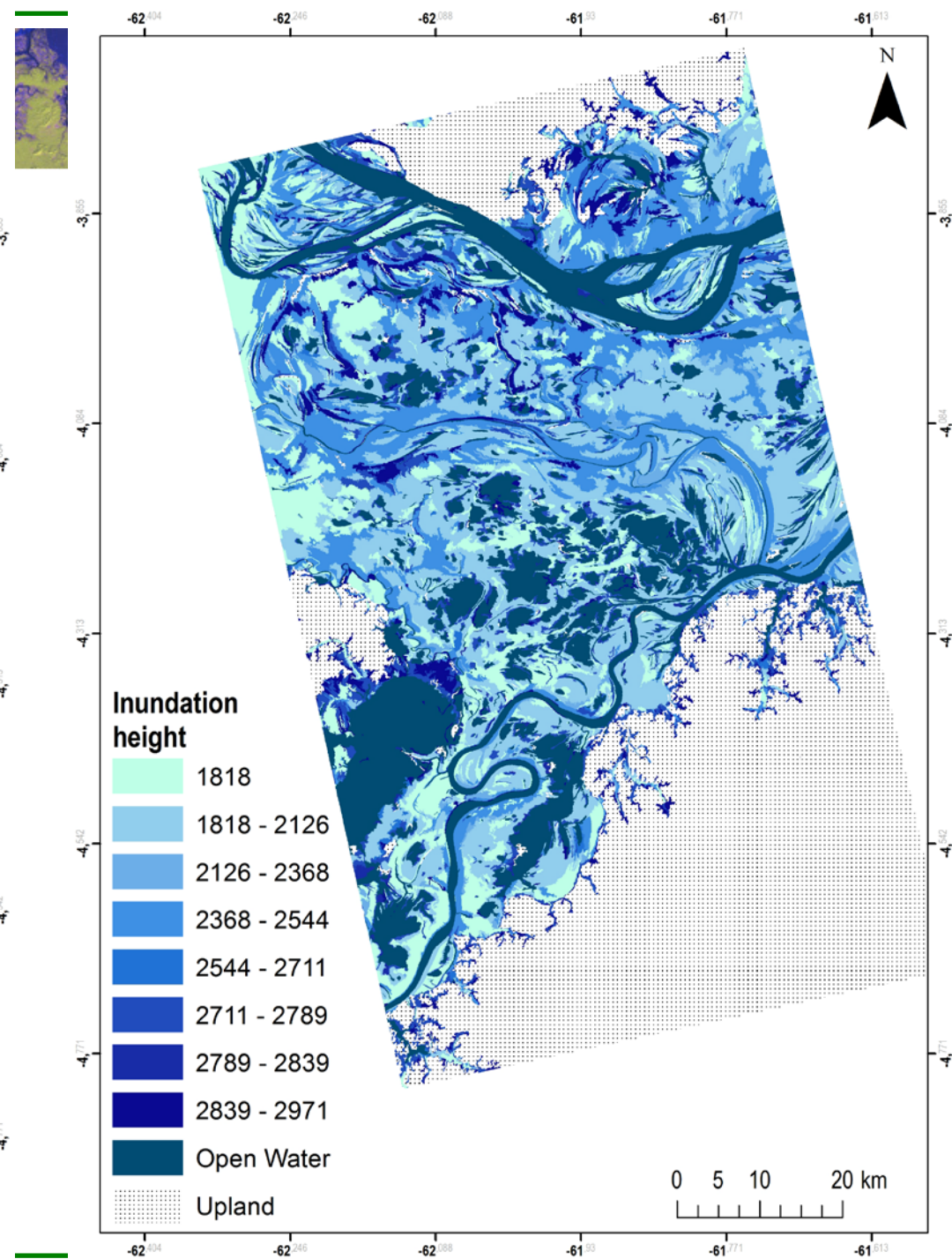
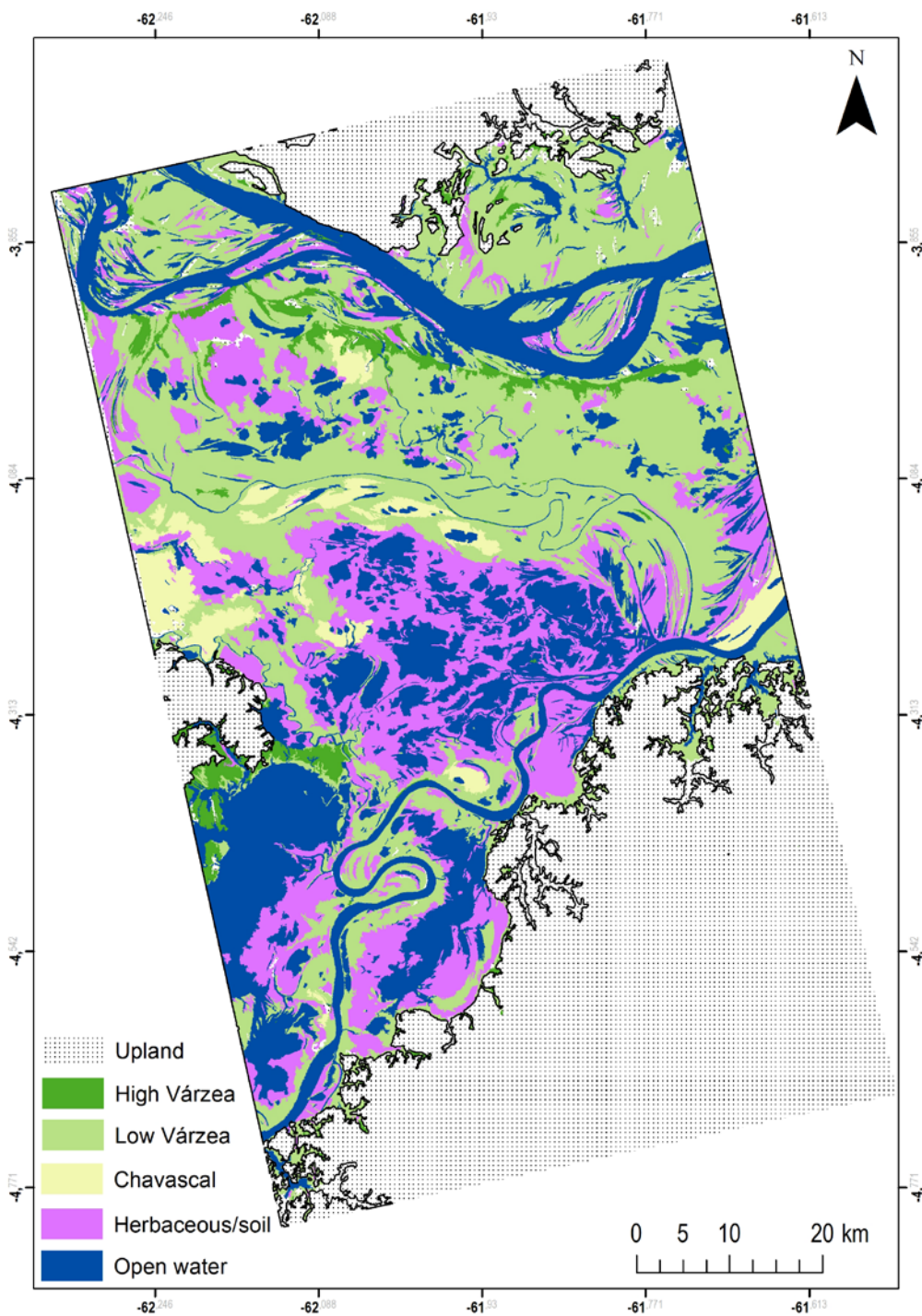
- How generalizable is the Amazon floodplain landscape? Can one size fit all?

Habitat Mapping – status

Testing methodology on multiple locations

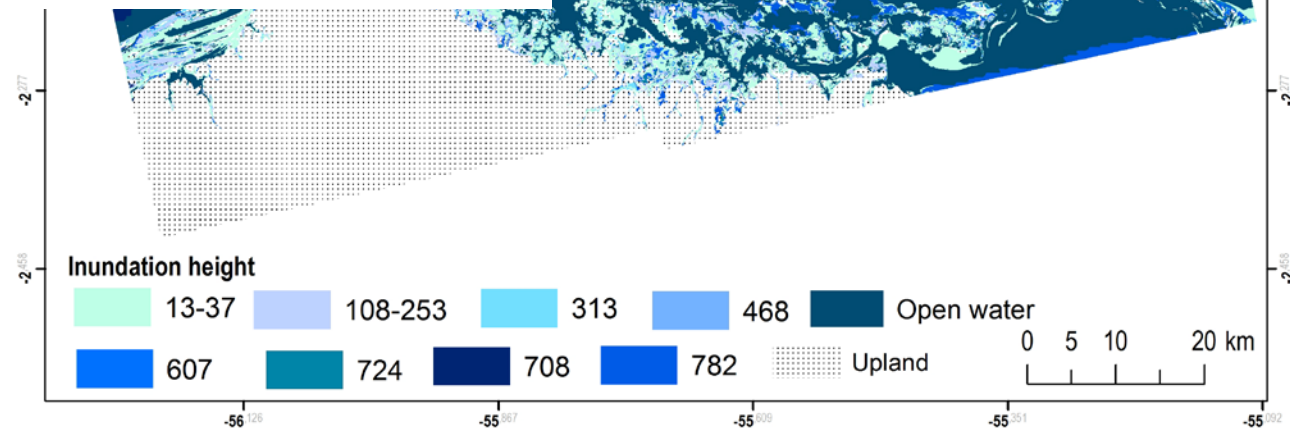
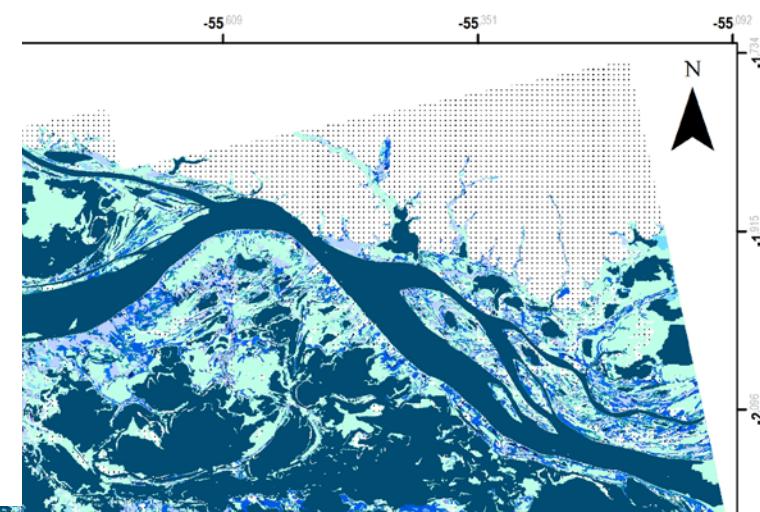
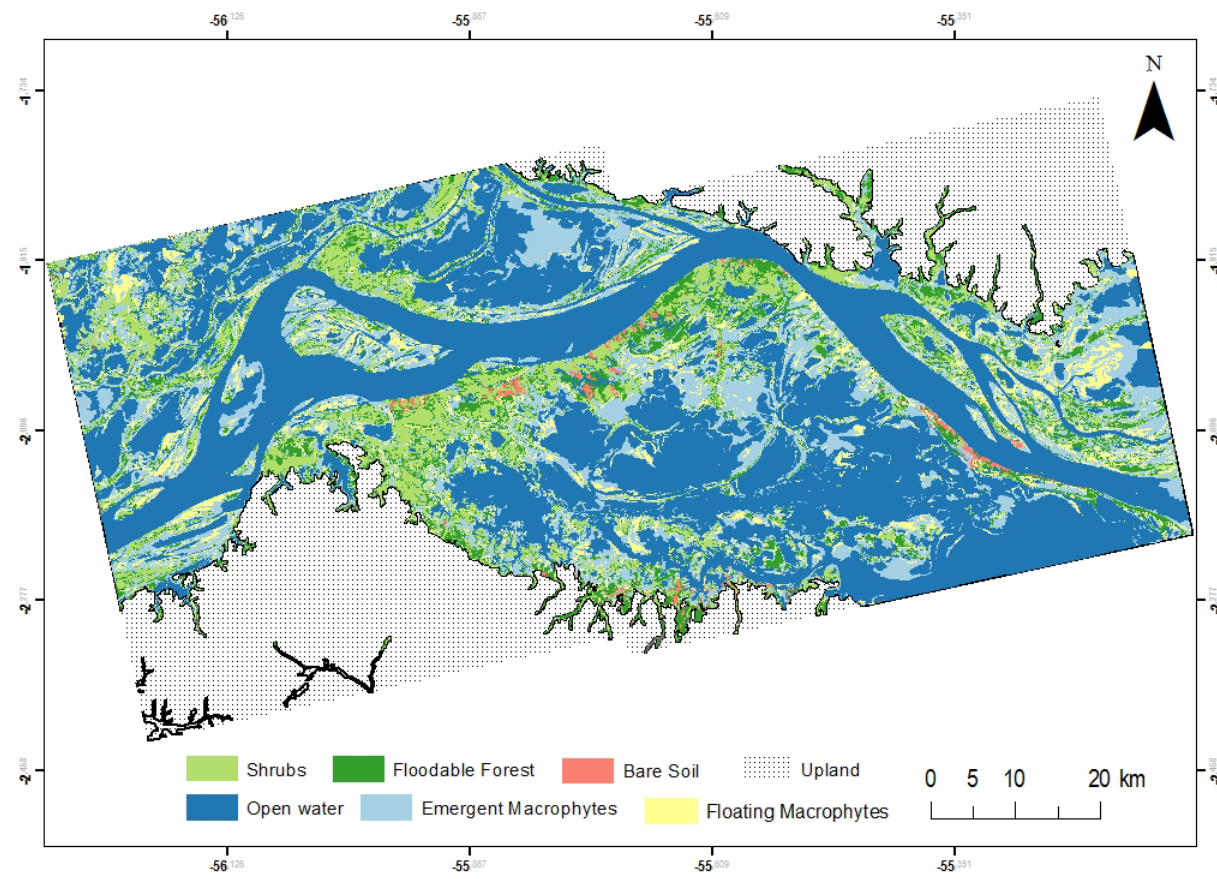
Done
Ongoing
Soon...

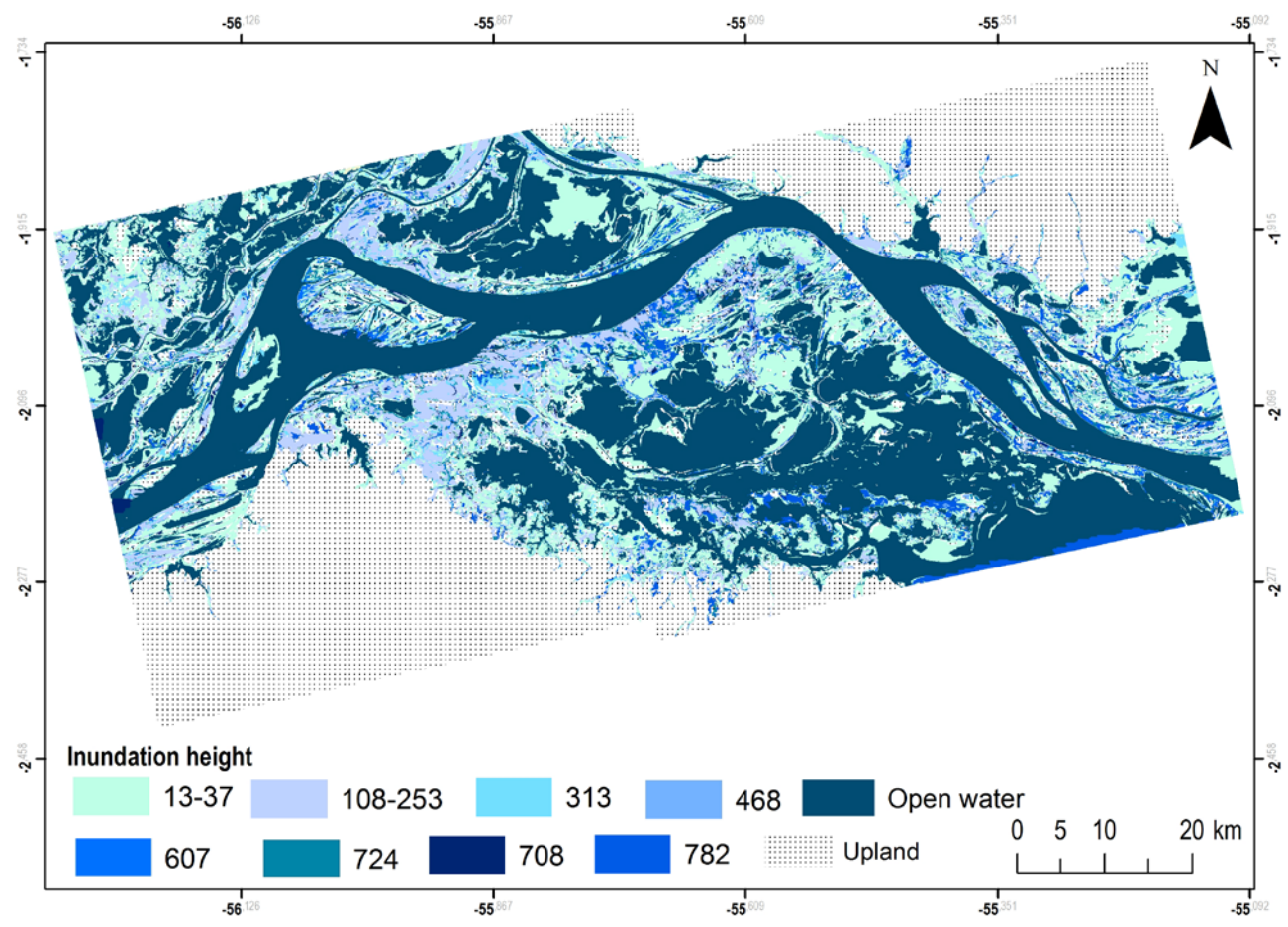
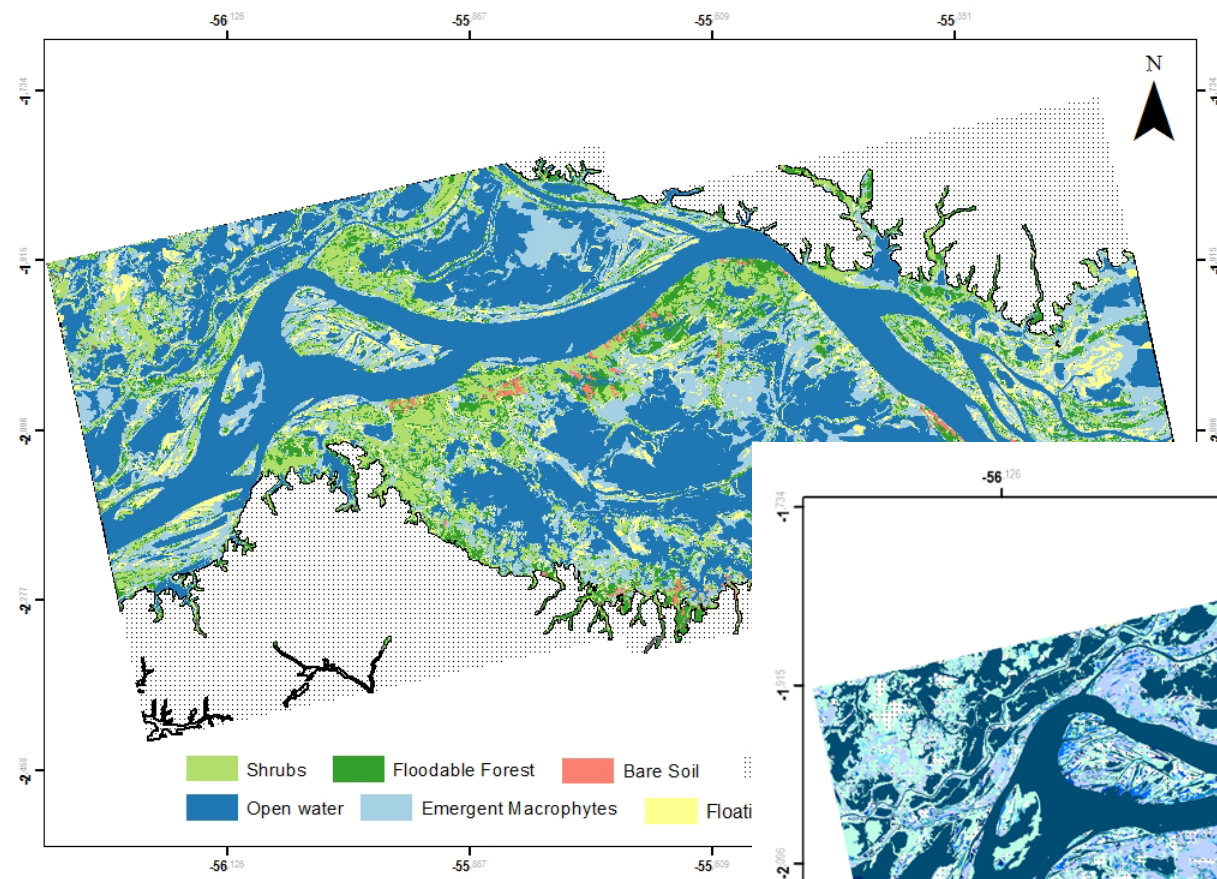




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Thank you

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