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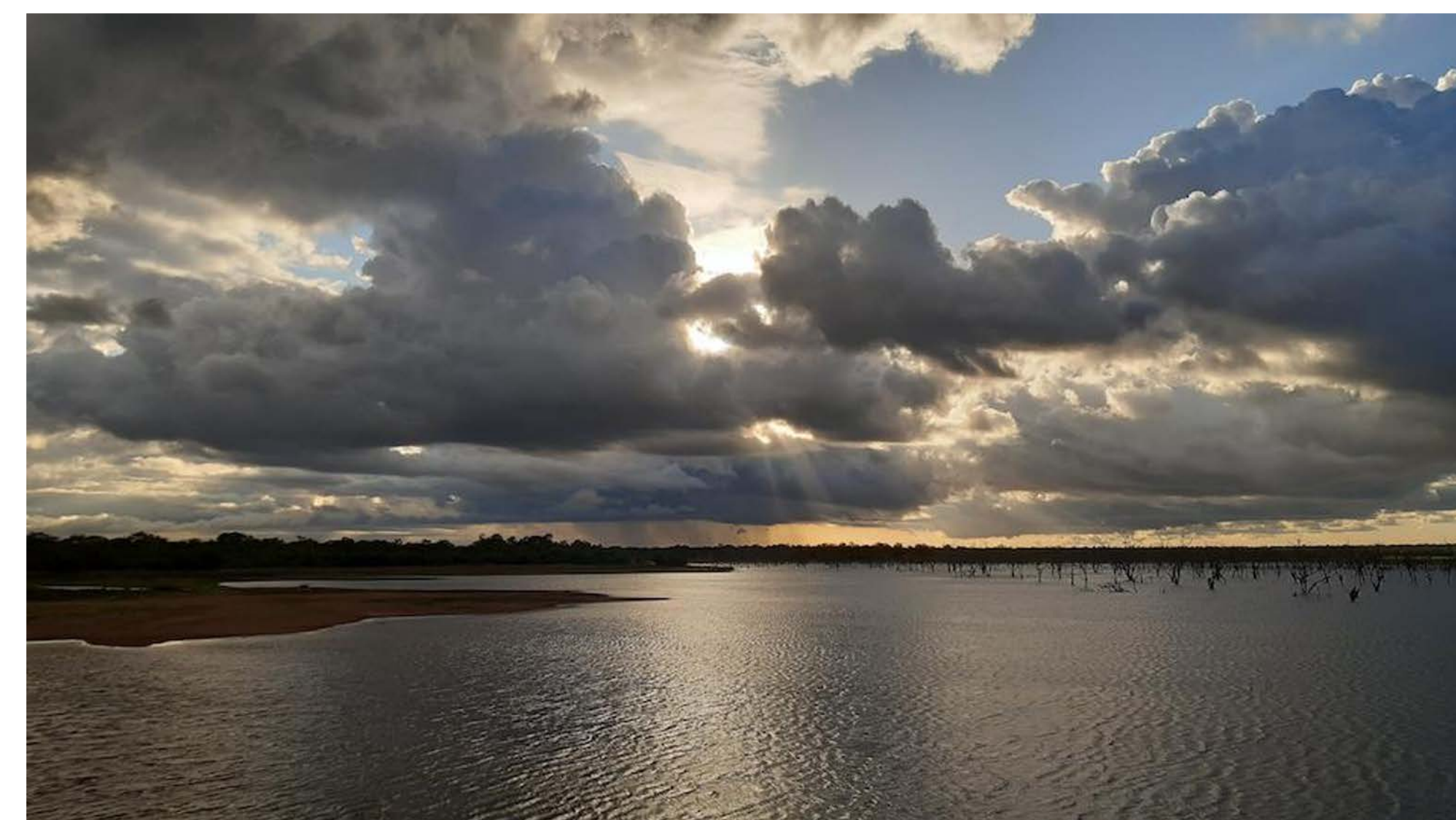
Objectives

Water resource management in West Africa is a crucial issue in the context of global change. Population growth and global warming are expected to lead to a significant increase in water demand in the region. In addition, significant climate variability and episodes of flooding and drought make water resource planning and management more complex. Finally, the impact of climate and human-induced changes on the quality of surface water, in a region where water-borne diseases are a major problem, remain poorly known.

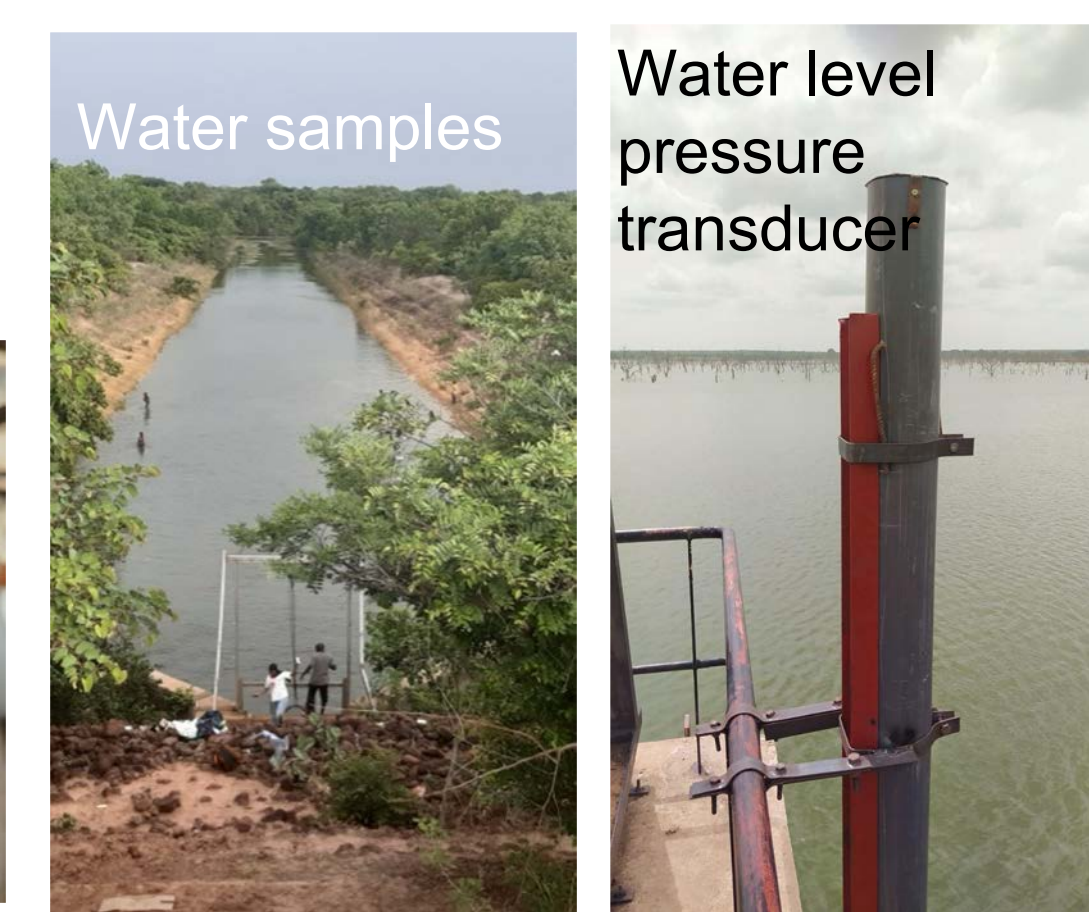
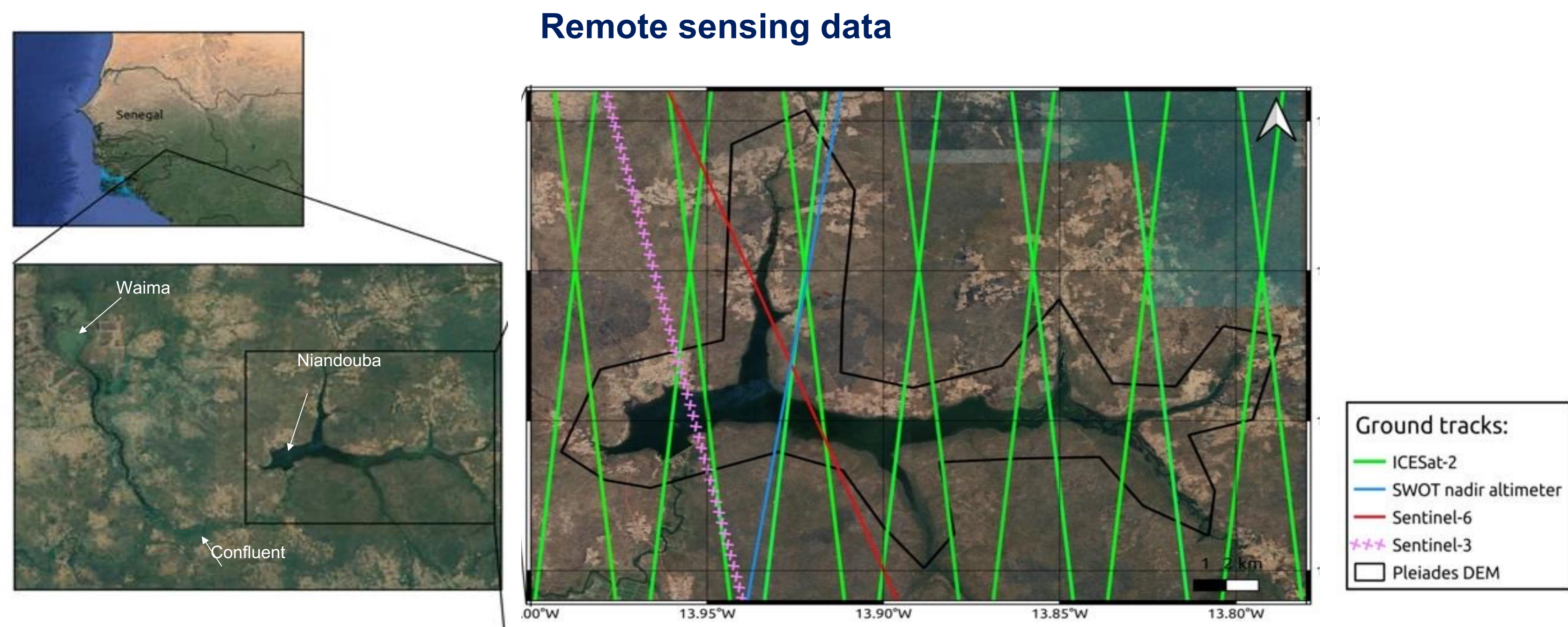
The objective of the VOQUALISE project is to assess the capacity of the agricultural reservoirs in Upper Casamance region to meet hydro-agricultural demand in the coming years.

Main goals:

- provide estimates of the water balance in the reservoirs of the Anambé-Kayanga basin;
- assess water quality parameters;
- characterise water uses and public policies;
- analyse future evolution scenarios



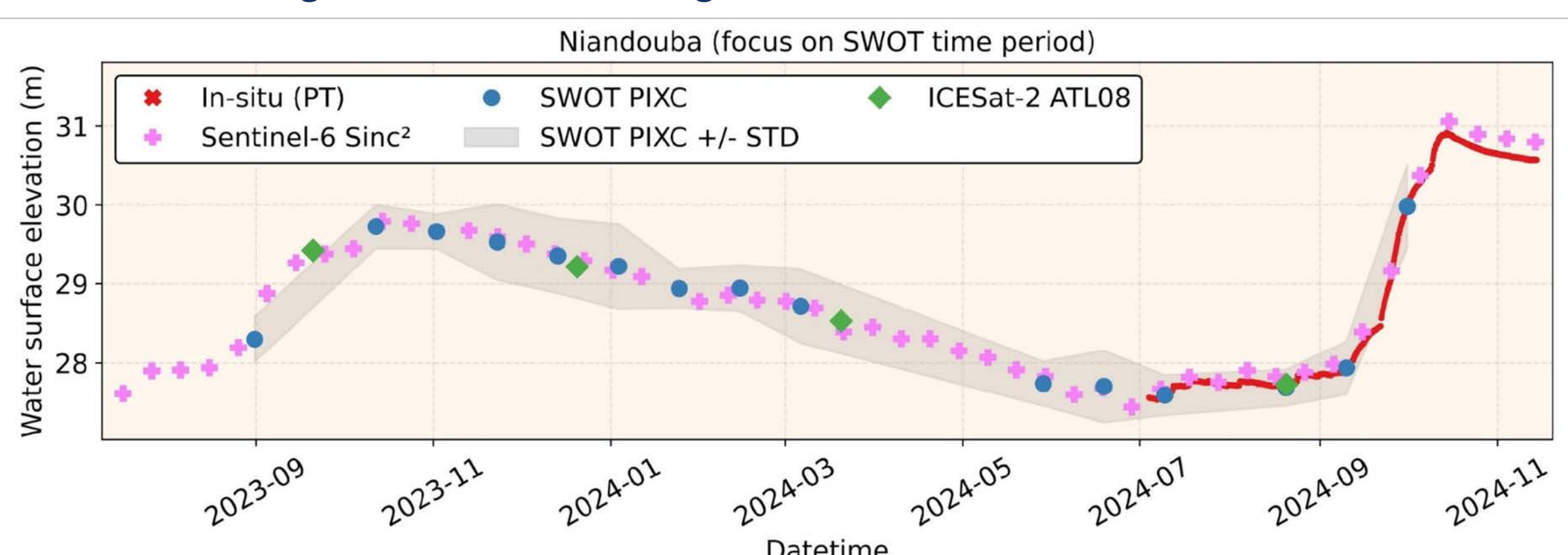
Study site and data



First results

1- Estimation of volume changes

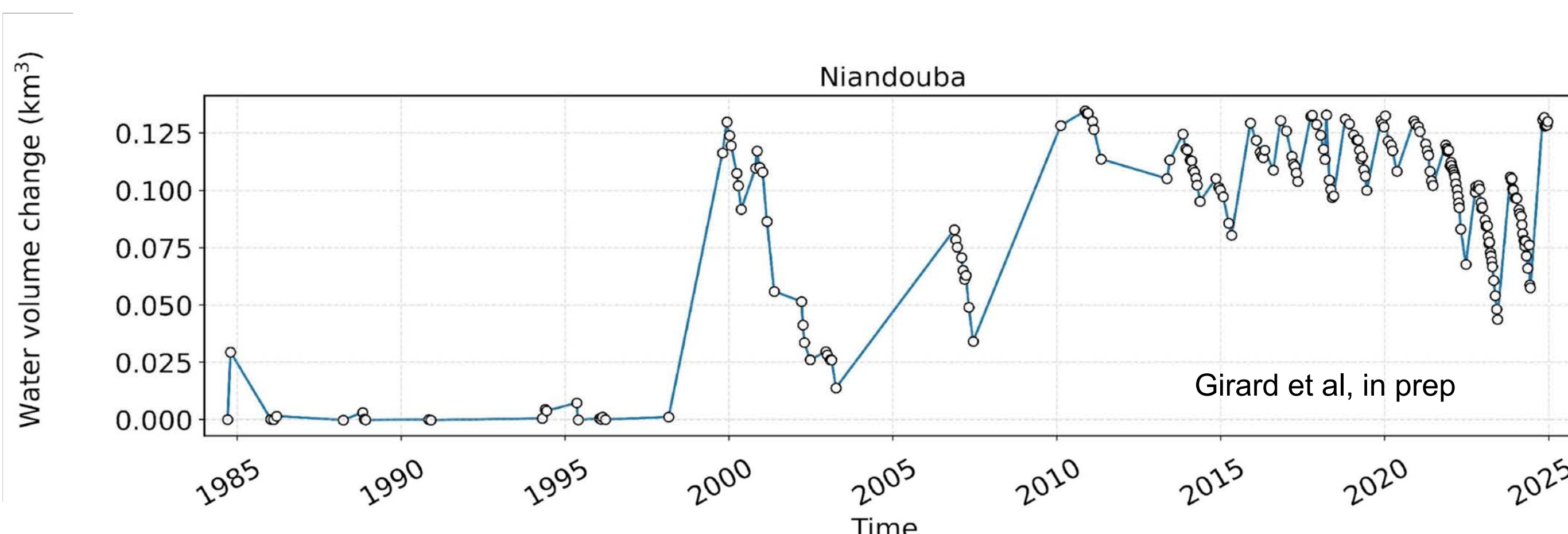
- Assessing water level changes



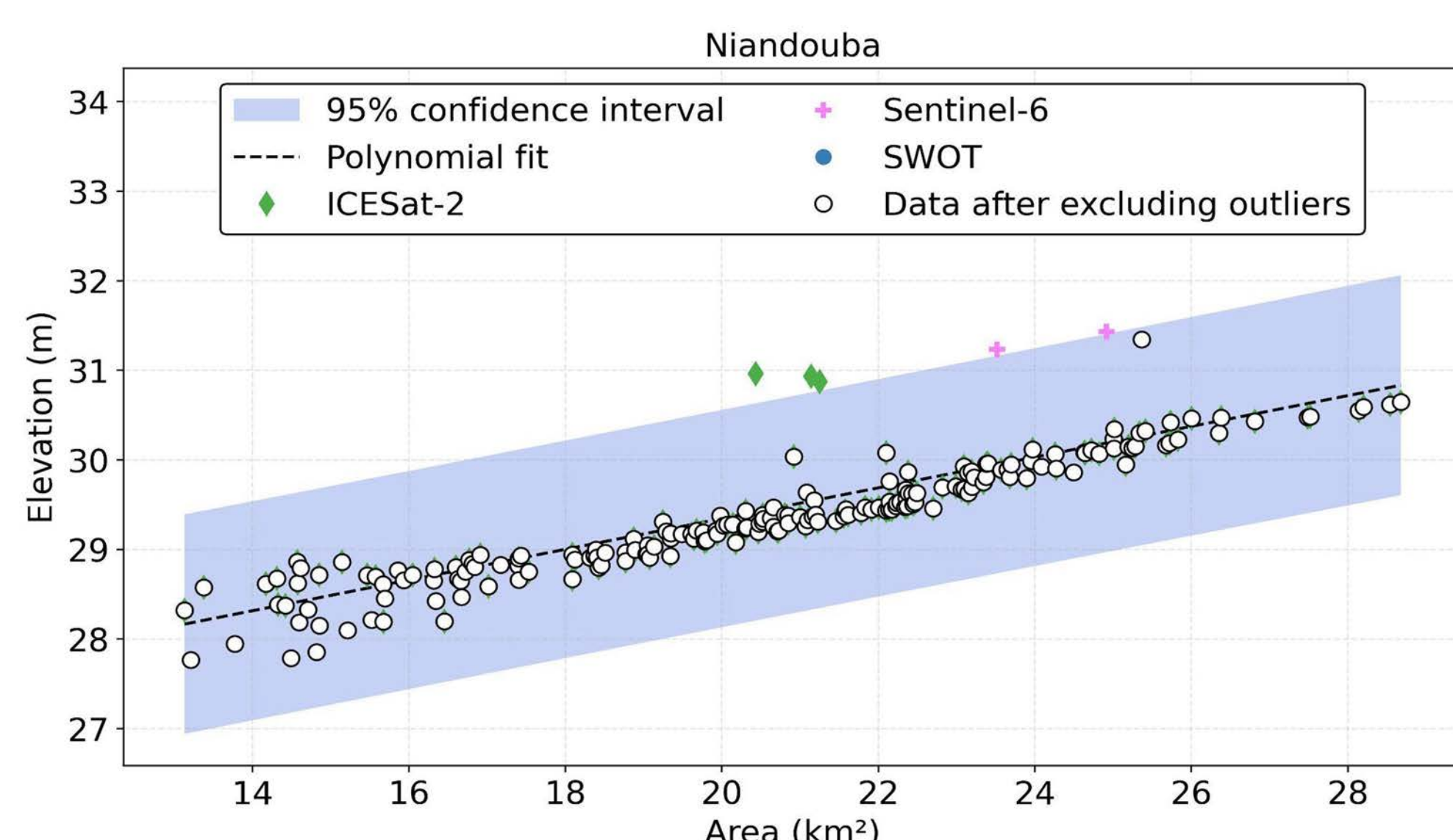
Very good accuracy of SWOT for water level retrieval :
 1- σ error of 0.02 m (3 matchups)
 Sentinel-6 (nadir altimeter) accuracy = 0.16 m

2- Assessing long term evolution of water volume changes

From V-H-A relationship and historical water areas by the Landsat archive (CNN U-Net algorithm, de Fleury et al. 2025)



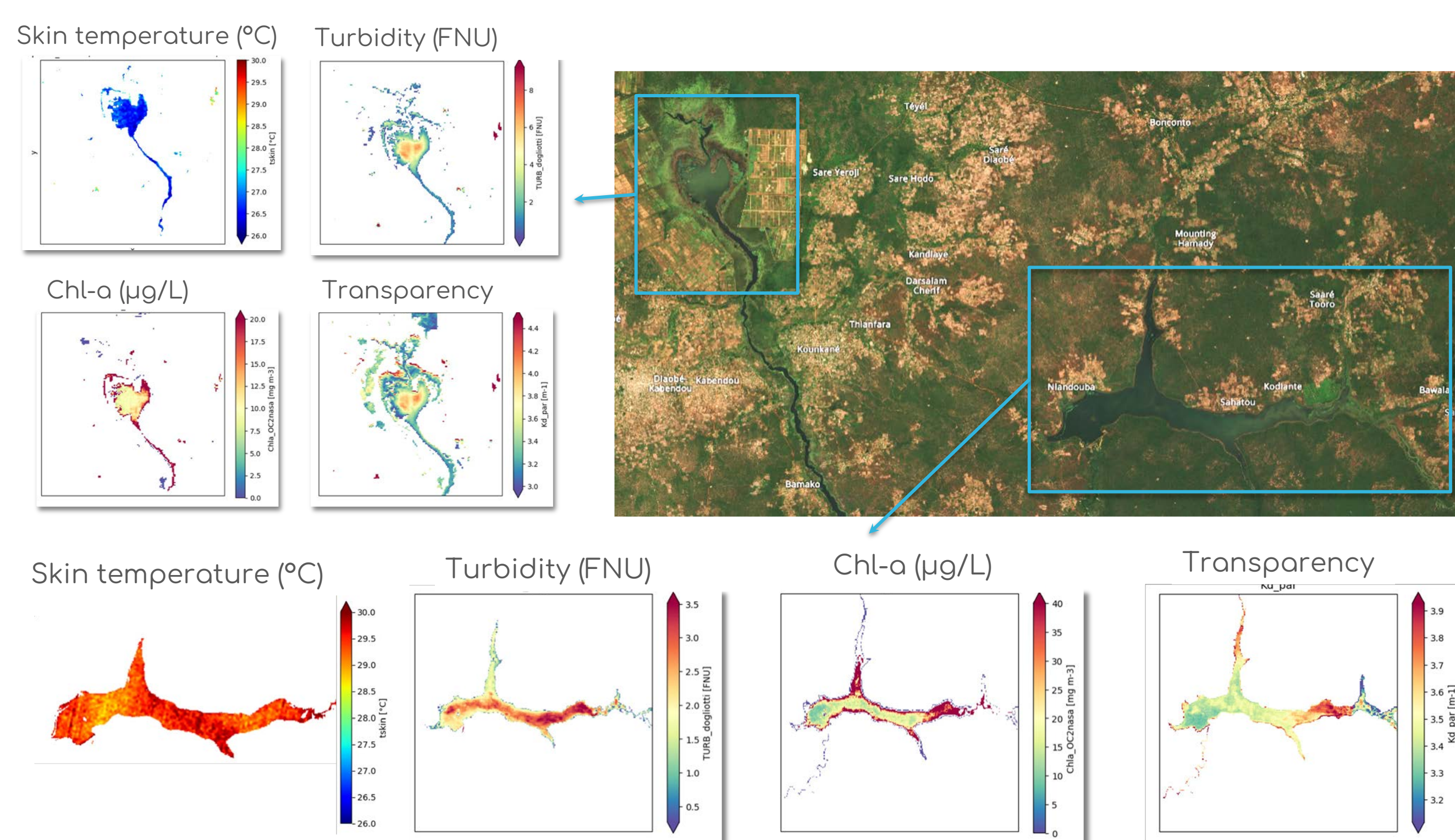
- Water level vs water area relationships \rightarrow volume changes



3- Monitoring water quality characteristics

Illustration of water quality products retrieved from Sentinel-2 and Landsat 8 and 9 satellite mission.

From atmospheric correction (GRS) to parameters retrievals: water surface temperature, turbidity and concentration in chlorophyll-a (phytoplankton biomass)...



References

- Girard et al 2025: "F. Girard, L. Kergoat, I. Mainassara, M. Wubda, H. Nikiema, A. Abdourhamane Touré, J. Renou, M. Vayre, N. Taburet, N. Picot and M. Grippa (2025) "Performance of the Surface Water and Ocean Topography (SWOT) Mission for Monitoring Small Lakes in West Africa." IEEE J-STARS, in press
- Girard et al 2025: "F. Girard, L. Kergoat, H. Nikiema, M. Wubda, R. Yonaba, T. Fowé, A. Abdourhamane Touré, I. Mainassara, M. de Fleury and M. Grippa (2025) "Comparison of methods to derive the height-area relationship of shallow lakes in West Africa using remote sensing." Water Resources Research, 61,e2024WR037411. <https://doi.org/10.1029/2024WR037411>
- de Fleury et al. 2025: M. de Fleury, M. Grippa, M. Brandt, R. Fensholt, F. Reiner, G. Matle Kovacs and L. Kergoat (2025). "Highly turbid and eutrophic small water bodies in West Africa well identified by a CNN U-Net algorithm." Remote Sensing Applications: Society and Environment <https://doi.org/10.1016/j.rsase.2024.101412>