



Continued support for estimation and monitoring of land change and forest degradation in West Africa



The lack of usable satellite data in West Africa has greatly limited our understanding of how the landscape changed in the 21st Century. The project aims to build capacity for monitoring deforestation and forest degradation. We developed time-series models integrating optical and SAR data to estimate deforestation and forest degradation and attribute their drivers while also providing near real-time monitoring capacity in West Africa.

Background

The availability of usable satellite data in West Africa is considerably less than in many other parts of the tropics. The ability of decision-makers to curb and mitigate environmentally destructive processes, such as the conversion of forestlands to plantations, farmlands, mines, and wood extraction for fuel and charcoal, is hard without geographical and statistical data. We develop a monitoring system that integrates optical and SAR data to adapt to the variability of data density in space and time.

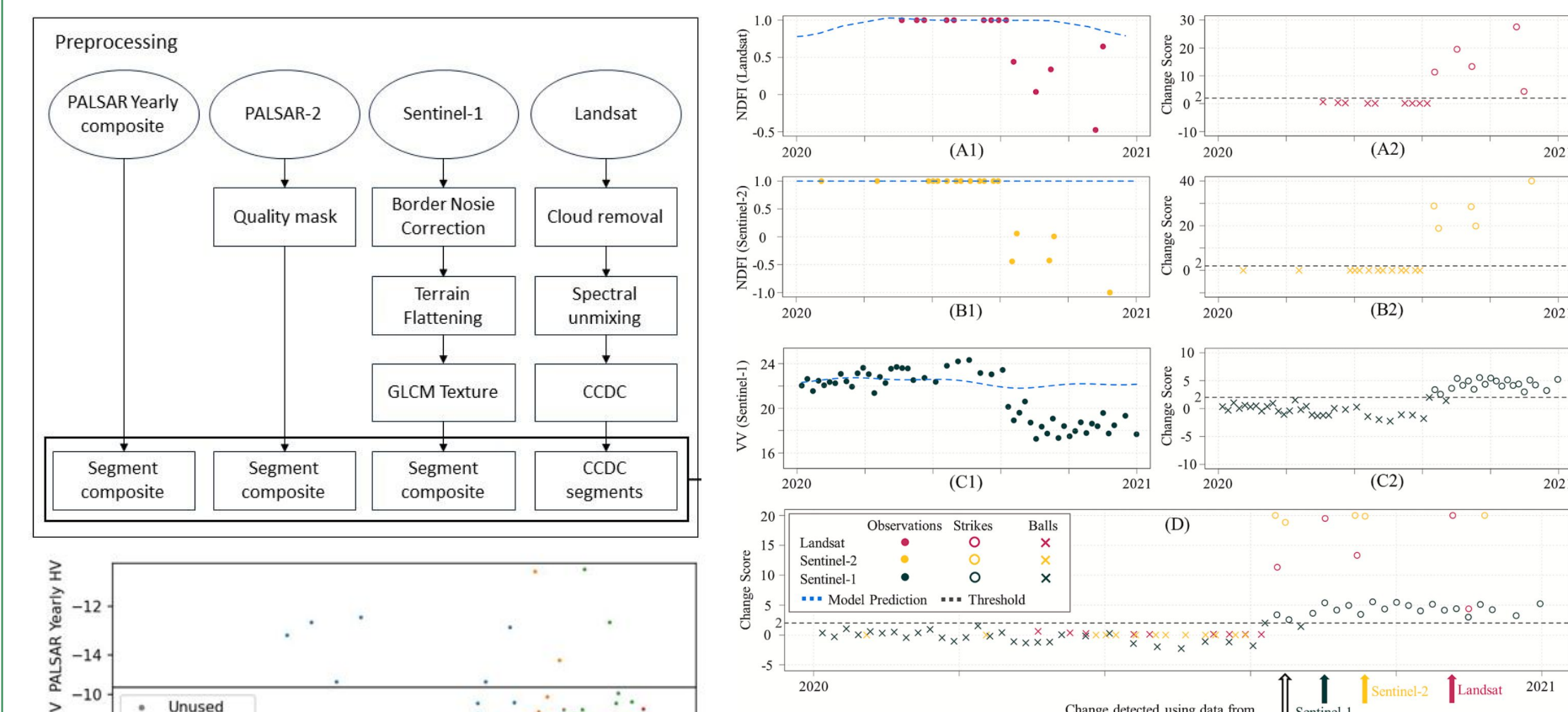


Fig. 1: Multi-sensor fusion allows faster and more accurate detection of forest disturbance in near real-time

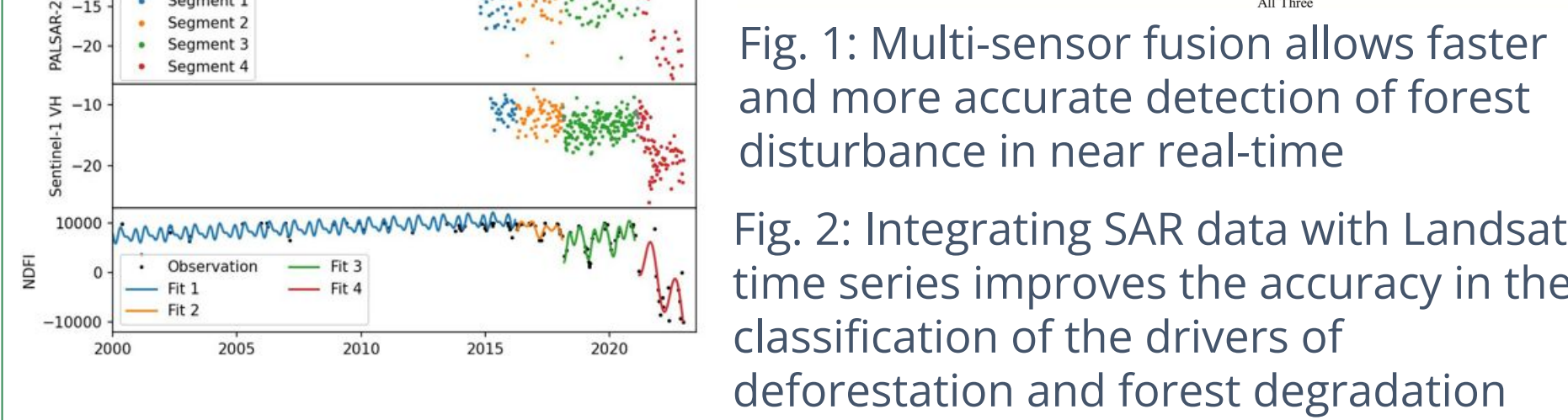


Fig. 2: Integrating SAR data with Landsat time series improves the accuracy in the classification of the drivers of deforestation and forest degradation

Partners & Collaborators

- CERSGIS, University of Ghana
- ICRISAT
- AFRIGIST
- A ROCHA Ghana

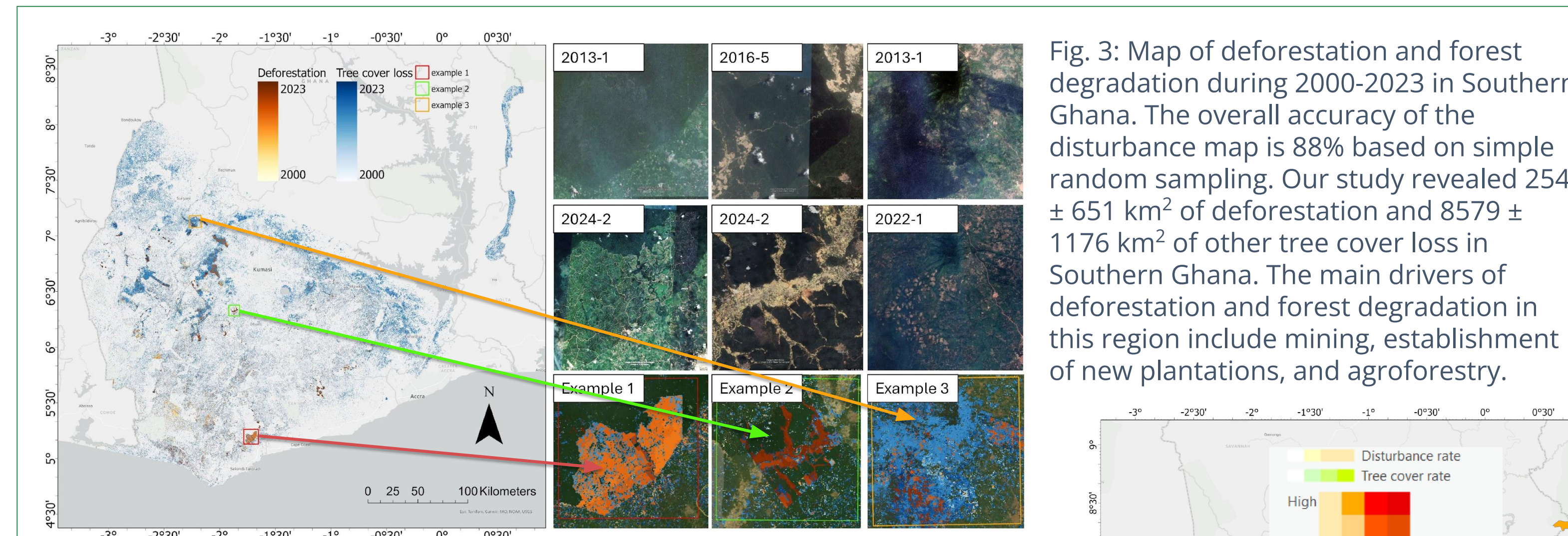


Fig. 3: Map of deforestation and forest degradation during 2000-2023 in Southern Ghana. The overall accuracy of the disturbance map is 88% based on simple random sampling. Our study revealed 2543 ± 651 km² of deforestation and 8579 ± 1176 km² of other tree cover loss in Southern Ghana. The main drivers of deforestation and forest degradation in this region include mining, establishment of new plantations, and agroforestry.

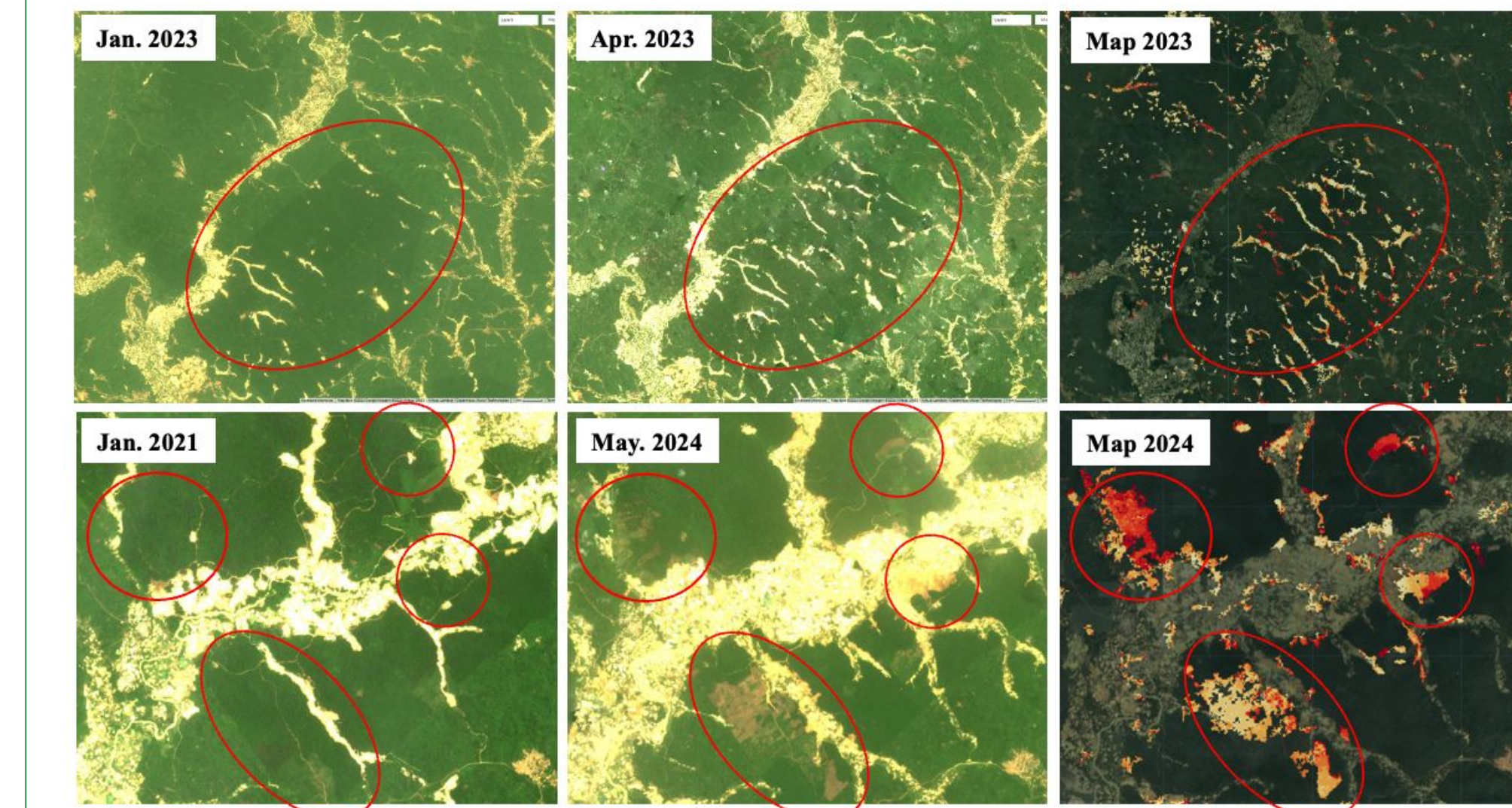


Fig. 5: Near real-time map of forest disturbance shows increased mining activities within the forest reserves in 2023 and 2024.

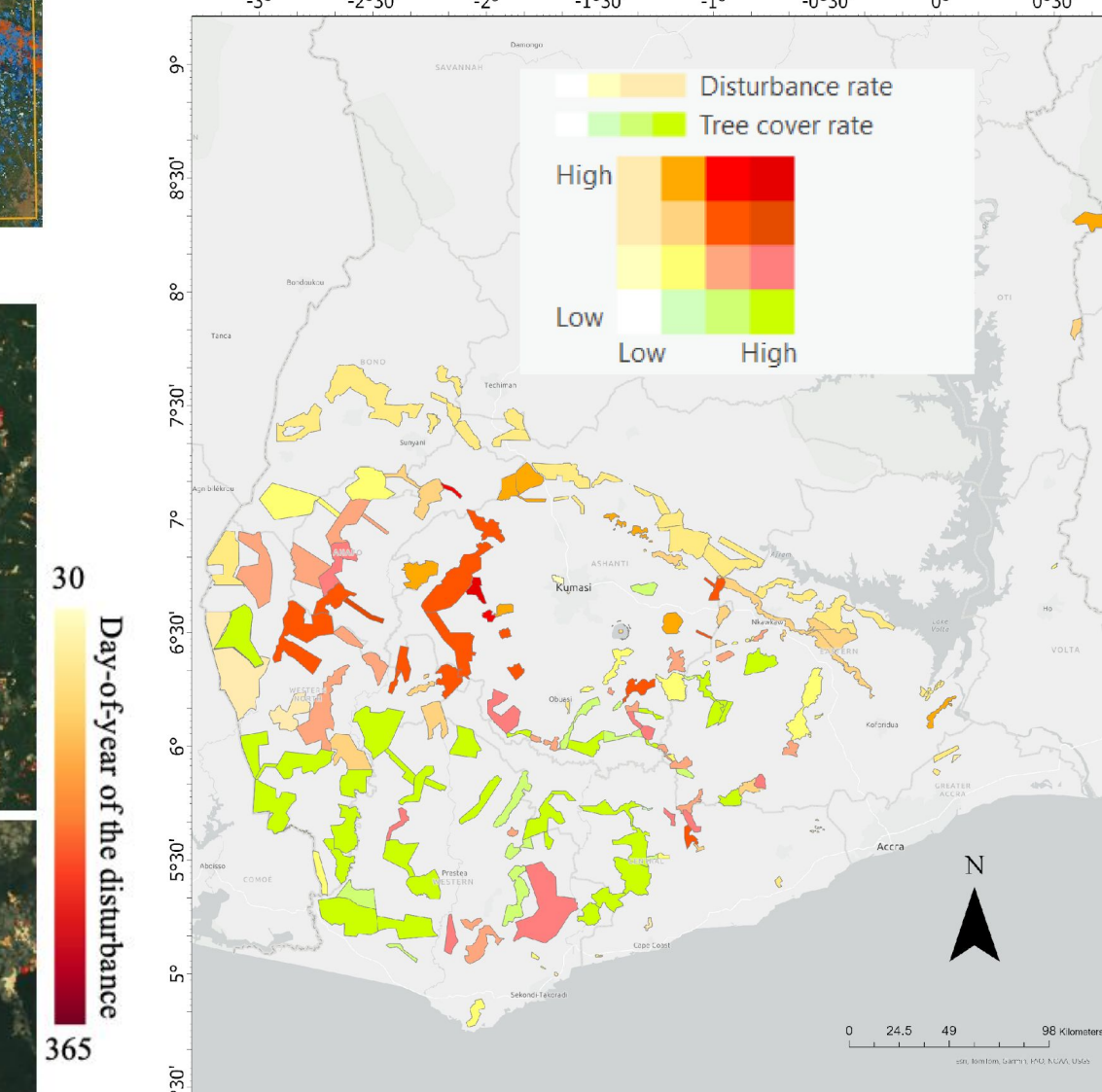


Fig. 4: The total forest reserve area within the study region is 17,241.7 Km², 12,265 Km² of which were forested in 2000. From 2000 to 2022, 3300 km² of forests were disturbed, which accounts for 27% of the forest cover in reserves.



Fig. 6: Field data collection and conversation with local farmers during field visits to Southern Ghana in April 2024

Outcomes & Impacts:

- Participated in a virtual training hosted by AFRIGIST in July on optical and SAR data fusion for monitoring dryland.
- Pan-tropical near real-time map of forest disturbance released as an App on GEE: <https://fusionnrt.projects.earthengine.app/view/fnrt-2024>



- Training activities are planned for Sep. and Oct. to transfer the near real-time monitoring system to CERSGIS and stakeholders

Next Steps:

1. Comprehensive accuracy assessment and validation of the results.
2. Development of documentation and training materials.
3. Delivery of the near real-time system to CERSGIS, including code/script/data, via virtual and in-person training.



Presenter: Xiaojing Tang

