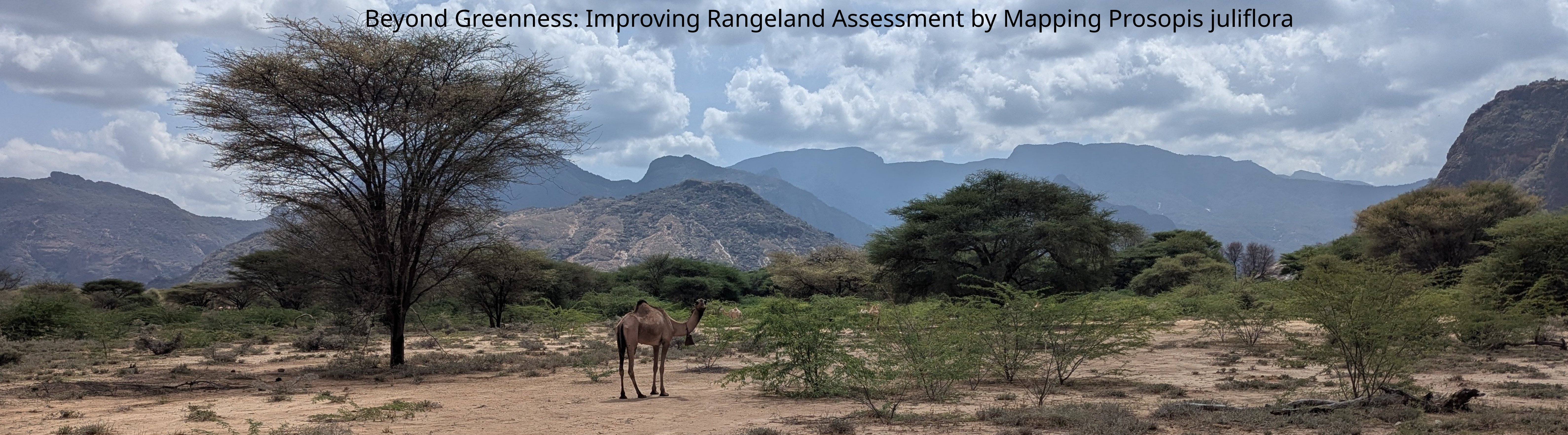


# AI-Based Enhancement for Mapping invasive *Prosopis juliflora*

Beyond Greenness: Improving Rangeland Assessment by Mapping *Prosopis juliflora*



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## Introduction

- The grazing lands of sub-Saharan Africa provide a livelihood for more than 60 million people through extensive livestock farming, but face challenges due to erratic rainfall and invasive species that threaten the availability and management of these grazing lands.
- Timely and accurate vegetation information is difficult and costly to collect manually.
- Satellite remote sensing and AI provide a scalable approach for vegetation monitoring.
- NDVI cannot distinguish palatable forage from unpalatable *Prosopis juliflora*. The invasive species can displace native vegetation and reduce preferred livestock forage.
- Study aim: Develop an approach to identify *P. juliflora* on satellite-derived NDVI maps, improving estimates of available forage.

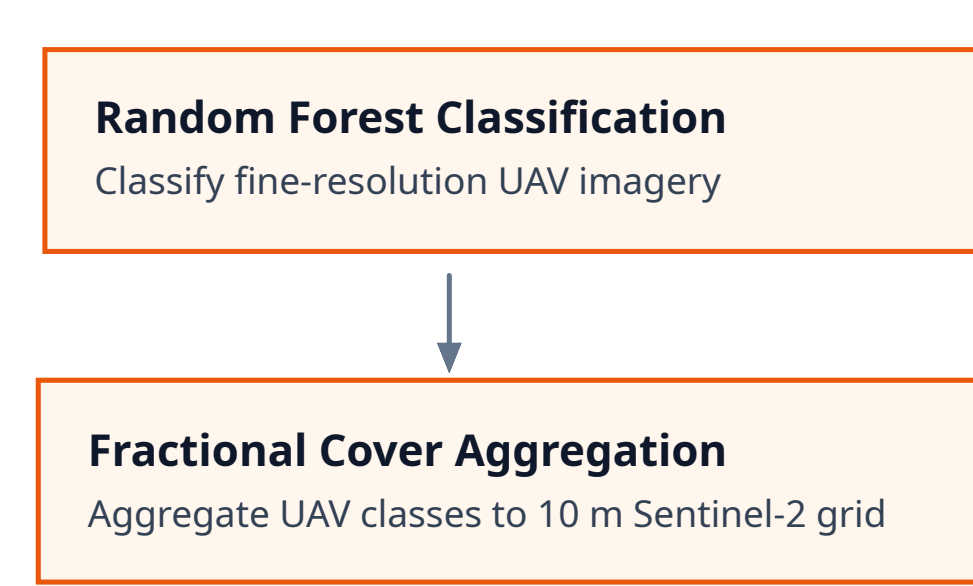
## Material and Methods

- Study Area: ~100 km<sup>2</sup> in the northern grasslands of Kenya near the village of Ngurunit.

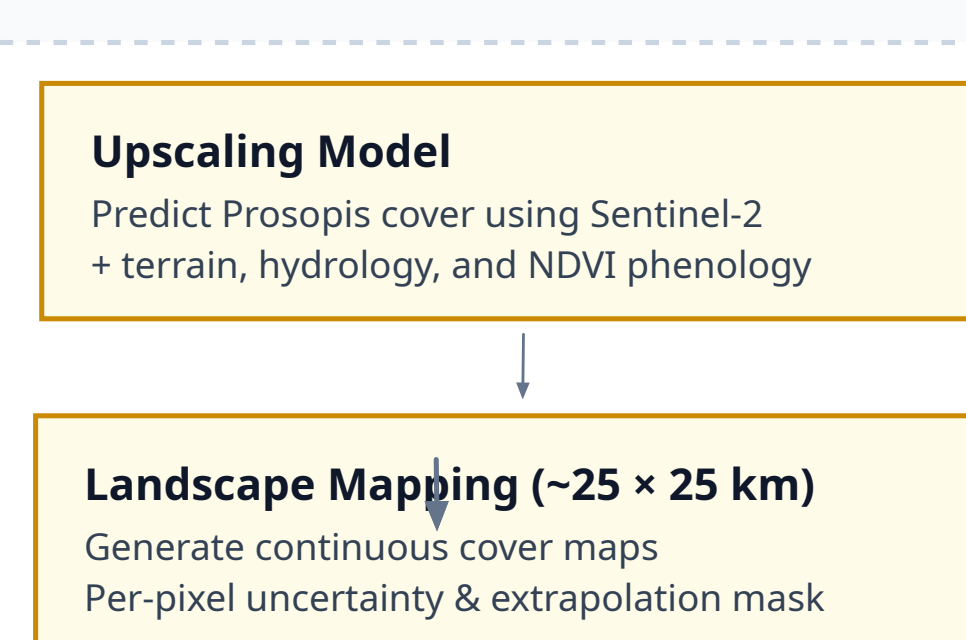
### 1. INPUT DATA SOURCES



### 2. HIGH-RESOLUTION UAV PROCESSING



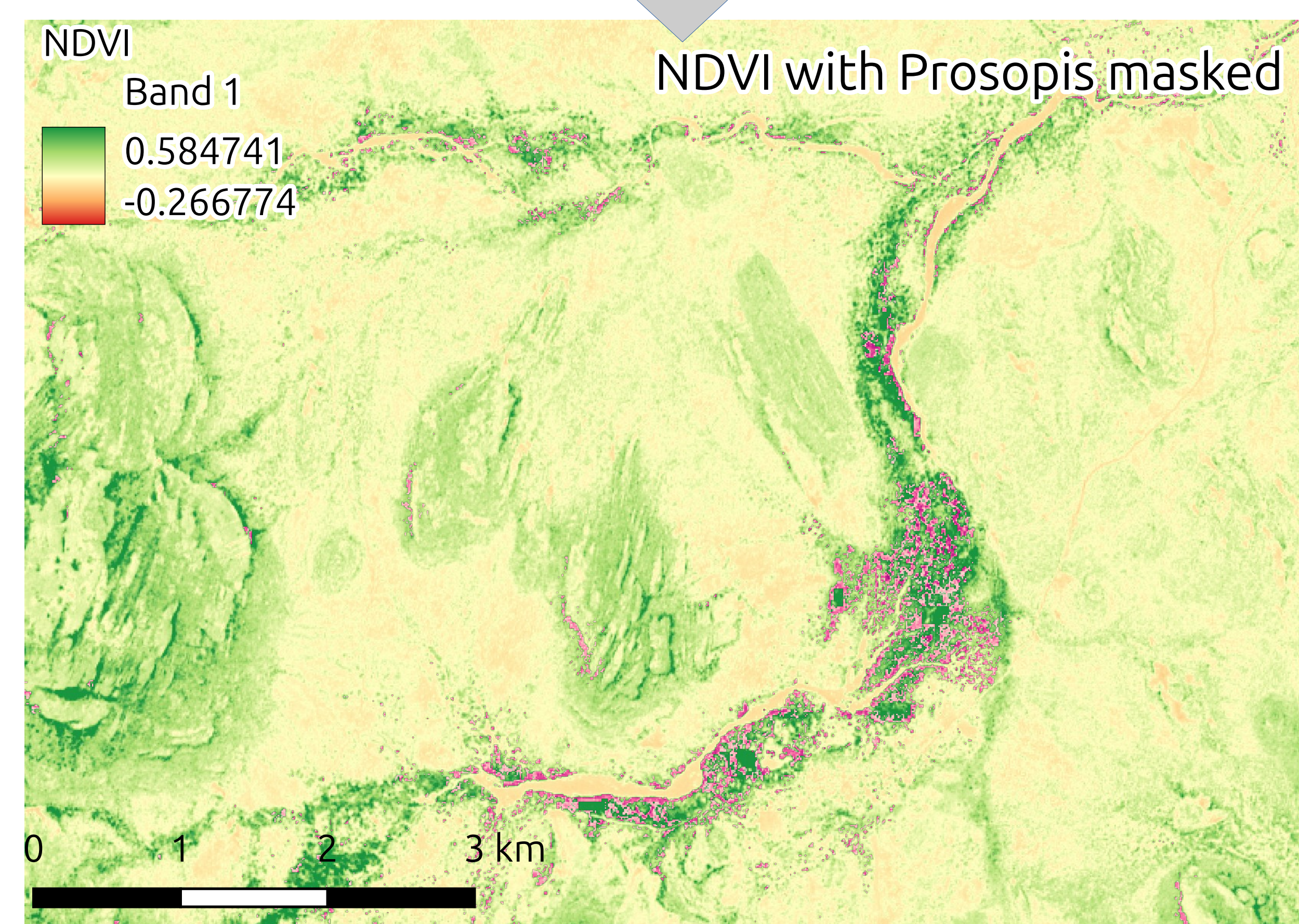
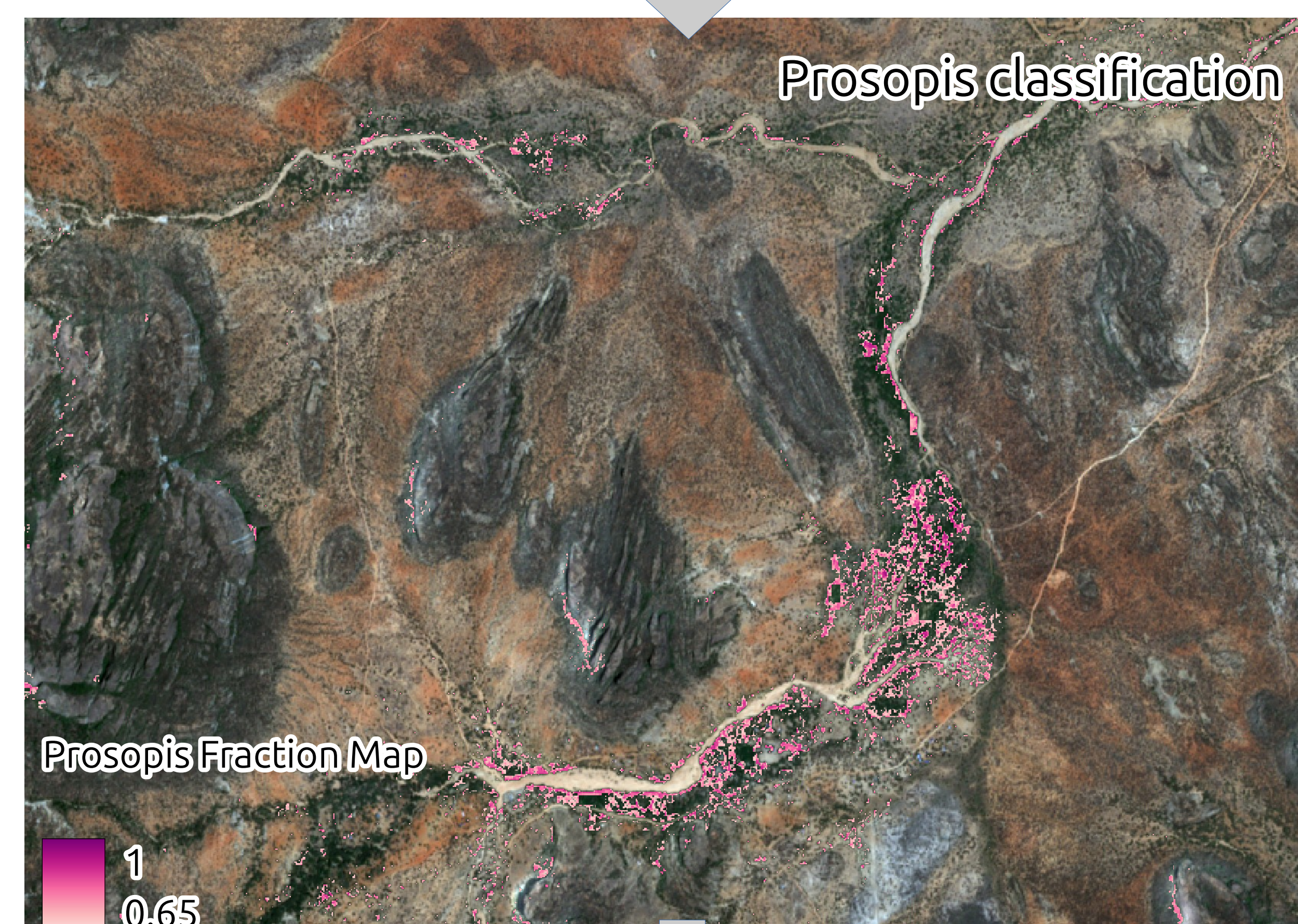
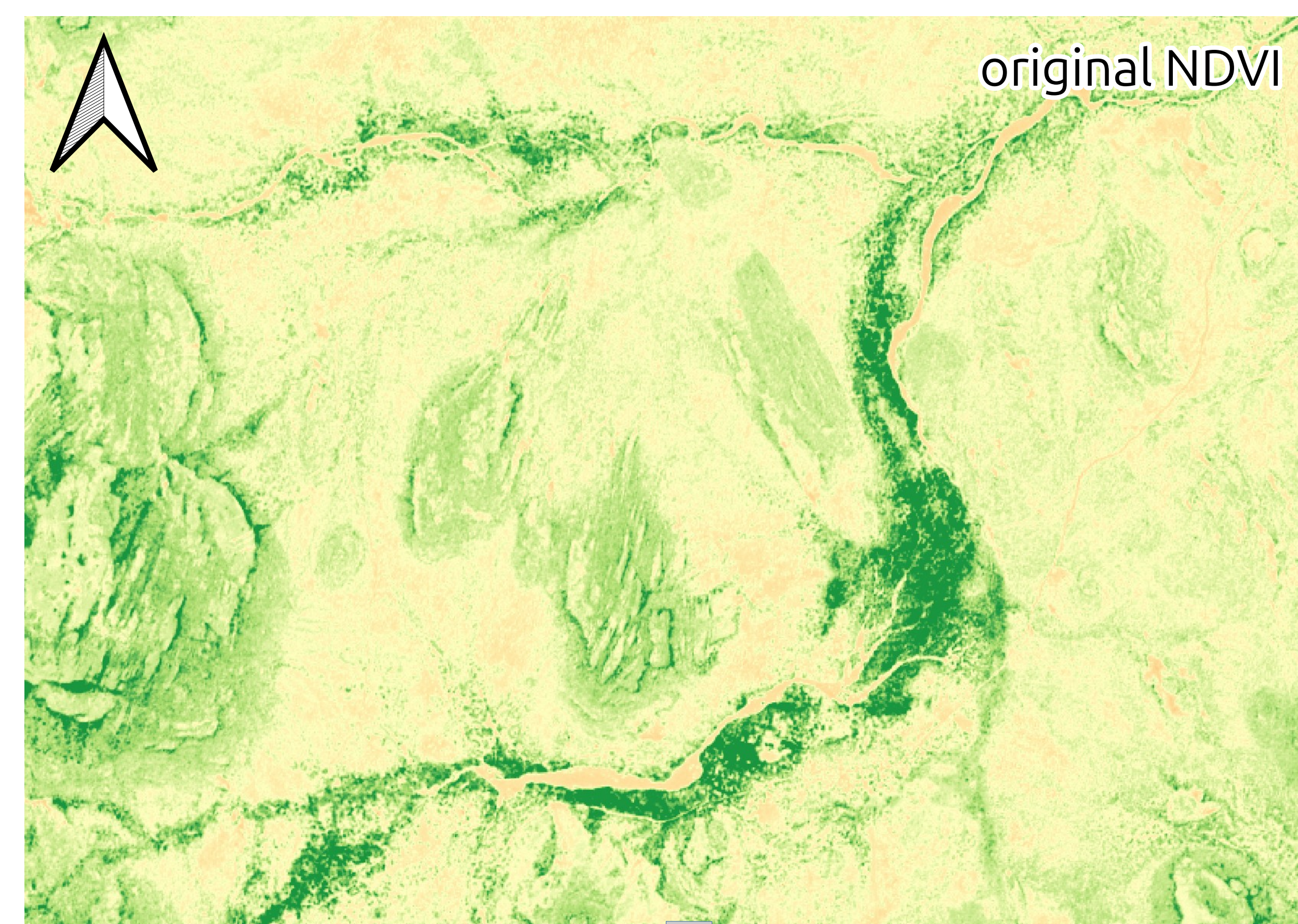
### 3. UPSCALING MODEL & LANDSCAPE MAPPING



### 4. VALIDATION & ECOLOGICAL EVALUATION

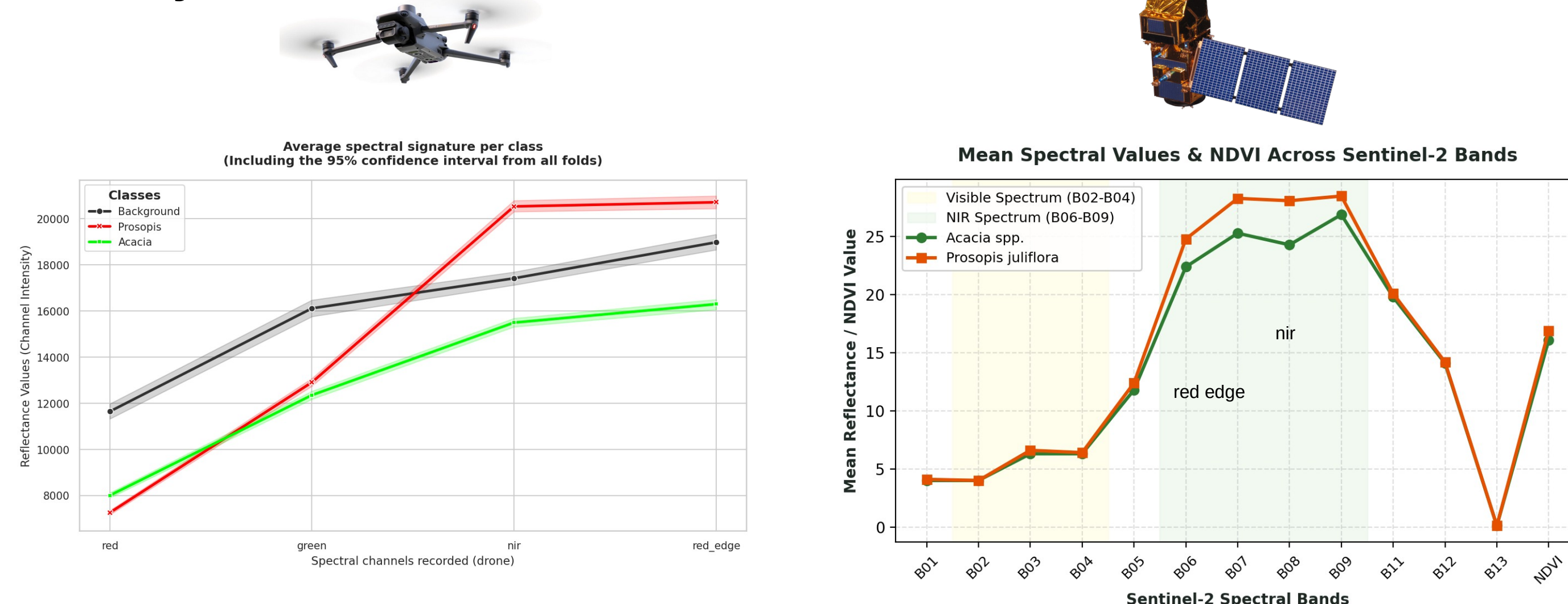


Processing pipeline for classifying S2 images using high resolution UAV input data



Comparison of the original NDVI image (top), the modelled *Prosopis juliflora* fraction map (middle) and the NDVI image masked for *P. juliflora* (bottom). The masking reduces the contribution of *P. juliflora* to the NDVI and allows for a more detailed representation of the remaining vegetation.

## Preliminary Results



Spectral signatures of *Prosopis juliflora* and *Acacia spec* recorded using a UAV and Sentinel-2. In visible light, there are hardly any differences. The species can be distinguished in the NIR and red-edge bands.

- Improved NDVI mapping successfully highlights the spatial distribution of *Prosopis juliflora*.
- Primary limitation: training data remain constrained by the availability of UAV imagery and ground-truth observations.
- Data scarcity due to the remoteness of the study area may limit model generalizability and landscape-scale application.



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