

CROPHYPE

Possibilities and Challenges of Crop-Type Classification in
Western Kenya

Background



AOI Esri Eastern Africa, Esri, Garmin, FAO, NOAA, USGS; Esri, USGS

Status of the Kenyan economy and food security

- Smallholder agriculture is an important contributor to food production and employs 54% of the population.
- Climate- and environmental changes increasingly threaten harvests (floods and droughts).
→ Risk for food security and the economy

Improvement Strategy

- Increase food security and support smallholder livelihood.
→ Timely and accurate harvest forecasting models

Crop maps

Objective

Developing methods for accurate, intraseasonal crop classification based on EnMap and Sentinel data.

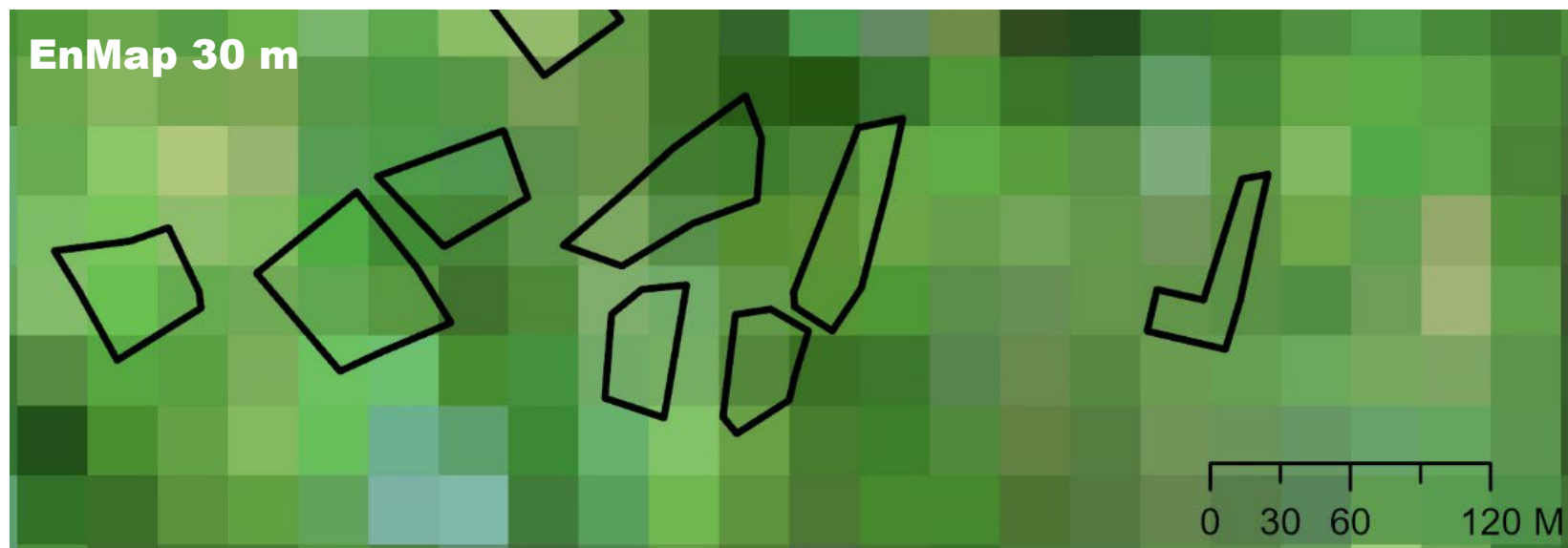
Project Partners:



- Cloud-based processing with native time series.
- Processing with modular, transparent workflows.
- AI training with existing frameworks and integration into workflows.
- Open source platform with WebGIS UI and Python API
- Field mapping campaigns in Kenya.
- One campaign per growing season (2/year).

Challenges

- Spatial resolution
- Small field sizes
(\bar{x} 0.4 acres, 1600 m²
or 1.8 EnMap pixels)
- Irregular geometries



Challenges

- Spatial resolution
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- Irregular geometries
- **Intercropping**
- Class overlap
(Maize-Cassava, Cassava-Maize)



Mixed Pixels



Agribora GmbH

Current Work



Establishing a baseline model:

Goal: Classifying **main crops** on a single EnMap acquisition.

- Building feature spaces via spectrum transformations
- Applying feature selection

Model Info:

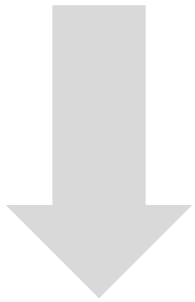
- EnMap scene from 06.12.2023
- Season peak greenness
- Pixel coverage fraction ≥ 0.75
- ~1800 pixels in training
- Four crop-type classes

Current Work

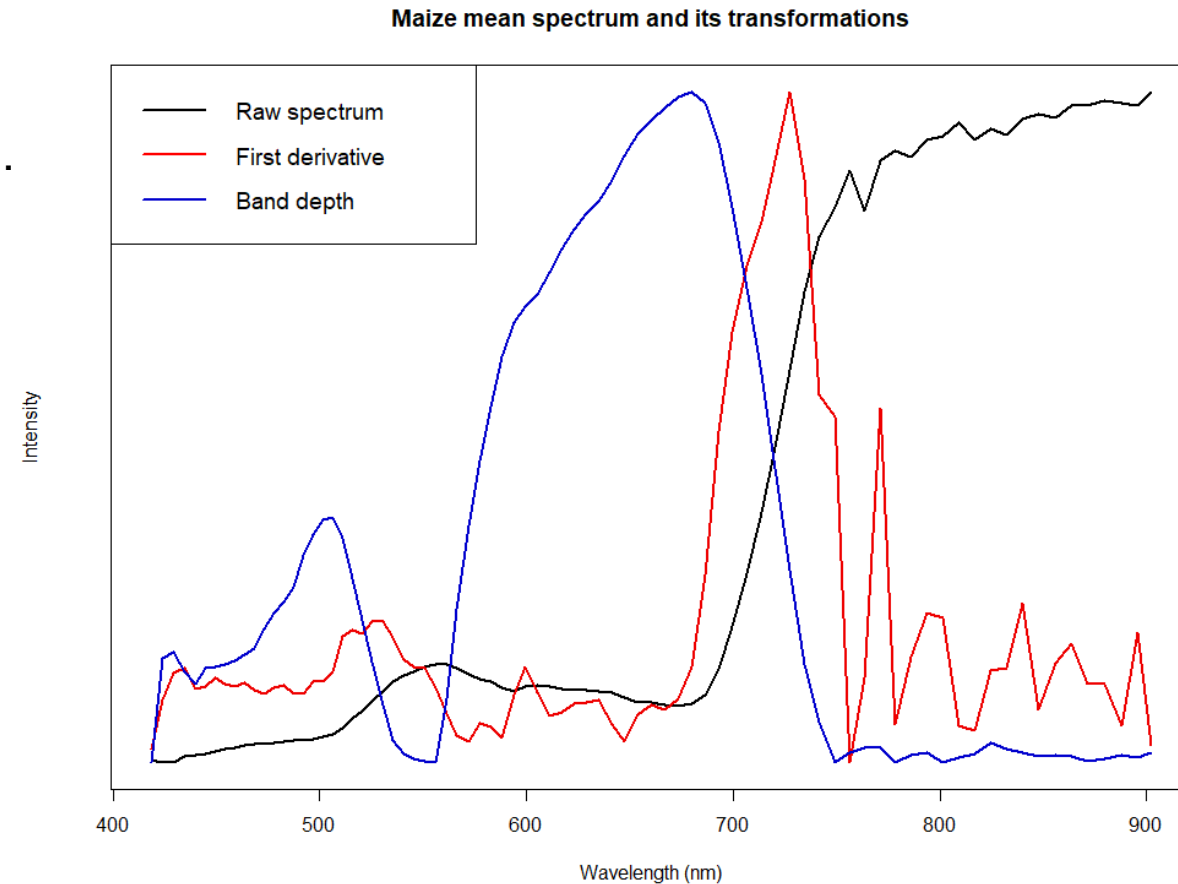
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Spectrum transformations improve model robustness (+6% F1-Score).



Current Work and Next Steps

However: Single acquisition classification cannot surpass a F1-Score of 0.71.

Suspected reasons:

- Mixed pixels and class-overlaps.
- Fields are insufficiently represented by large pixels.
- Strong confusion of phylogenetically **closely related crops**.

Envisioned solutions:

- Including secondary crops in the model
- EnMap Sentinel-2 superresolution
- Detailed feature analysis
- Incorporating the temporal domain

Acknowledgements





Thank you for your attention.

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