1st EnMAP User Workshop

10/11 October 2023

Landscape Element Detection using Deep Learning and EnMAP Data

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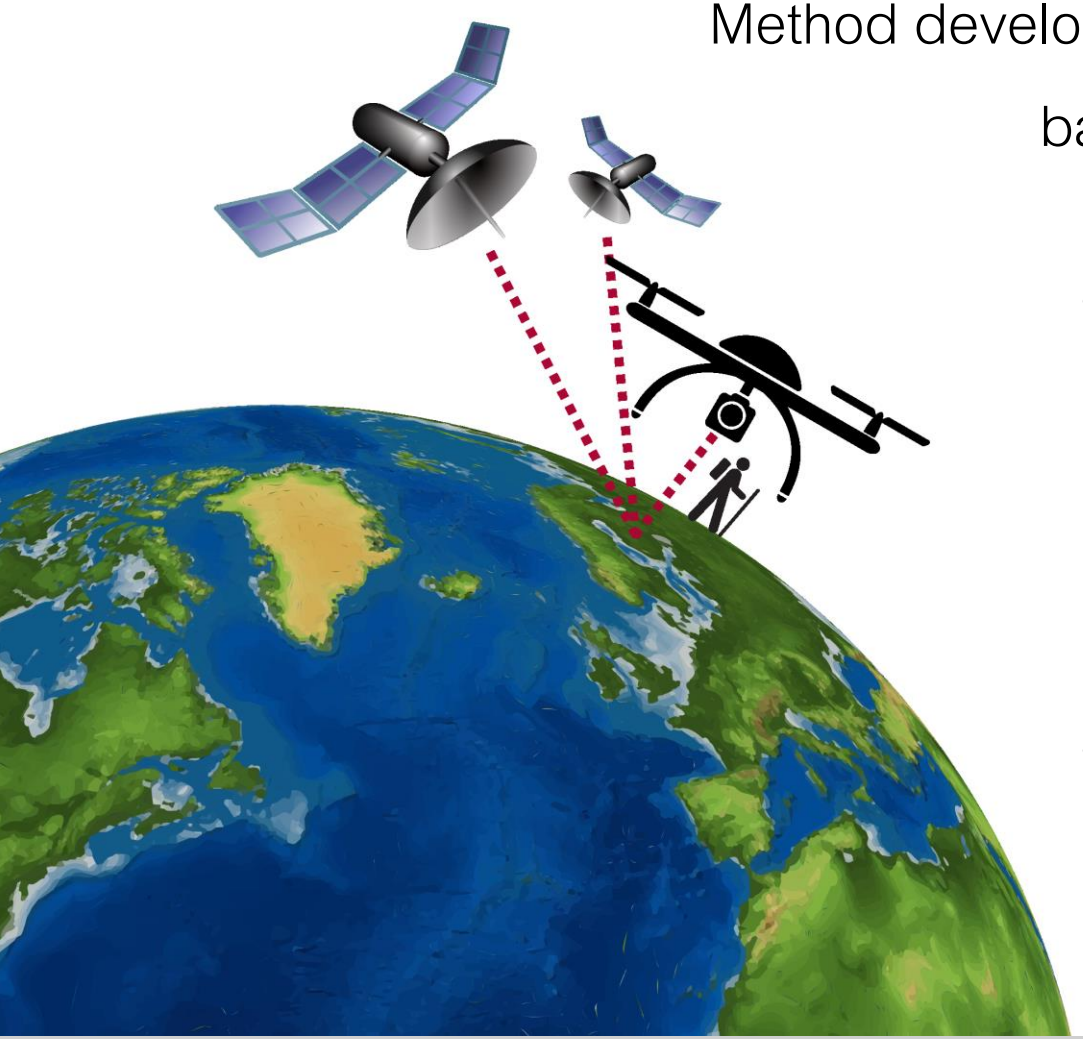

Method development for monitoring biodiversity in agroecosystems based on EnMAP and multisensory data.

- Large-scale monitoring of the condition of agricultural landscapes by integrating:
  - In-situ field data
  - Hyperspectral UAV data
  - EnMAP data
  - Sentinel data
- Using the *European Monitoring of Biodiversity in Agricultural Landscapes* (EMBAL) as a framework

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aufgrund eines Beschlusses des Deutschen Bundestages
FKZ 50EE2302

Overview

- Landscape Elements as defined by EMBAL:
  - Tree rows
  - Hedges
  - Field copses
  - Field margins
  - Ditches

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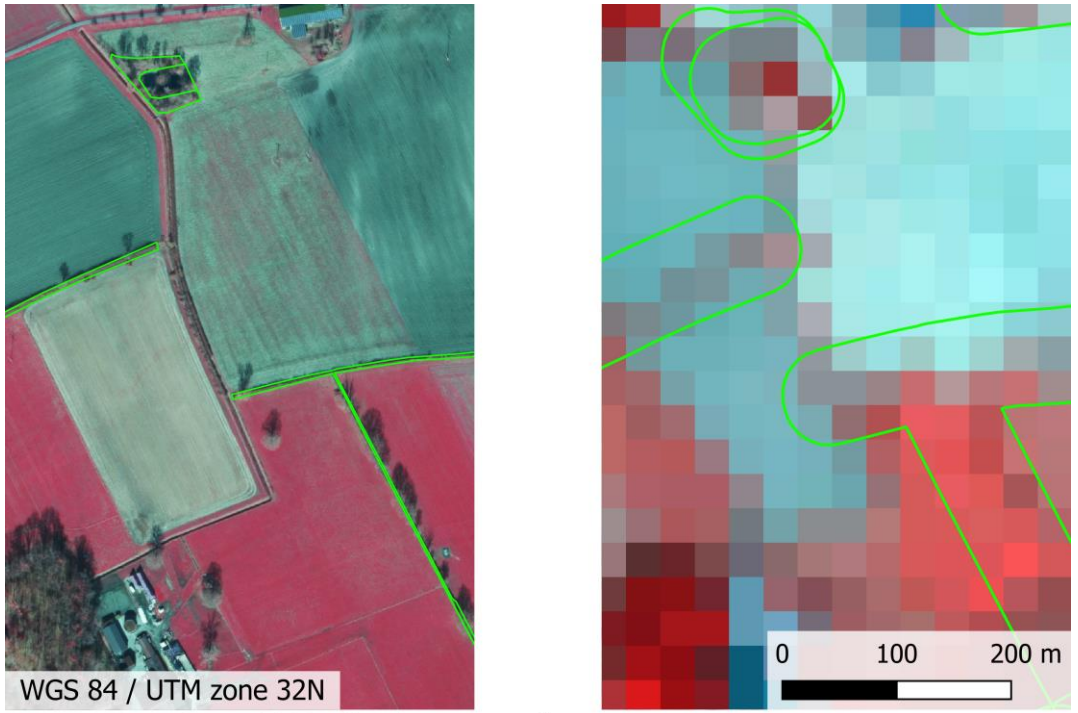
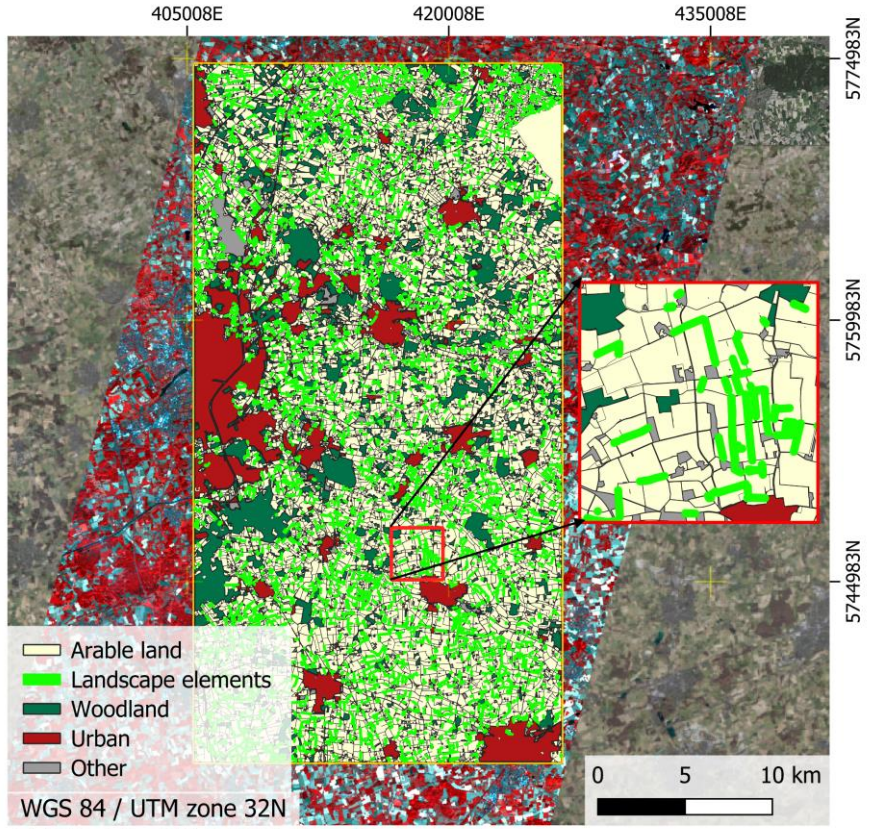
Overview

- Landscape Elements as defined by EMBAL:
  - Tree rows
  - Hedges
  - Field copses
  - Field margins
  - Ditches
- Research idea: Identifying mixed pixels containing landscape elements for follow up research (e.g., spectral unmixing)



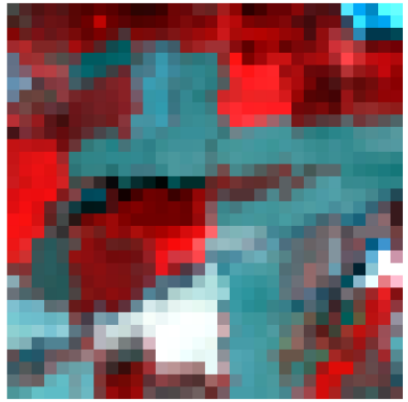
Data

- Two EnMAP scenes from July 2022
- Subset for which the following were obtained:
- InVeKoS database
  - Farmland &
  - Landscape elements for which subsidies have been applied for
- CORINE LC 2018
  - Forests, urban & “other”

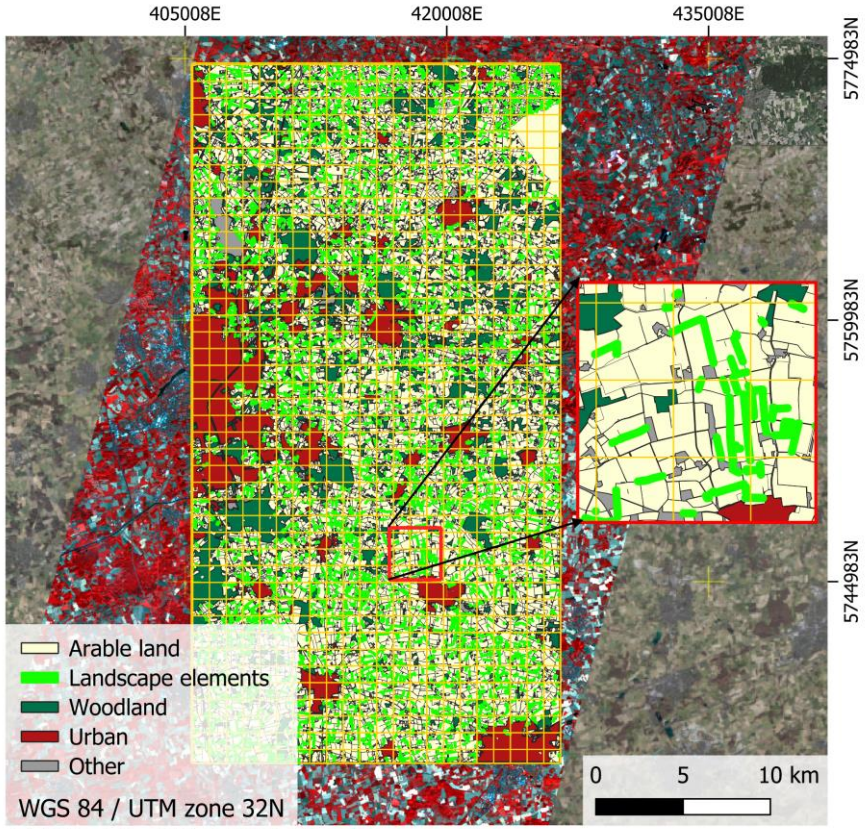


Training Data

- Rasterized and split in 32 x 32 pixel patches
- Total of 861 patches & corresponding masks

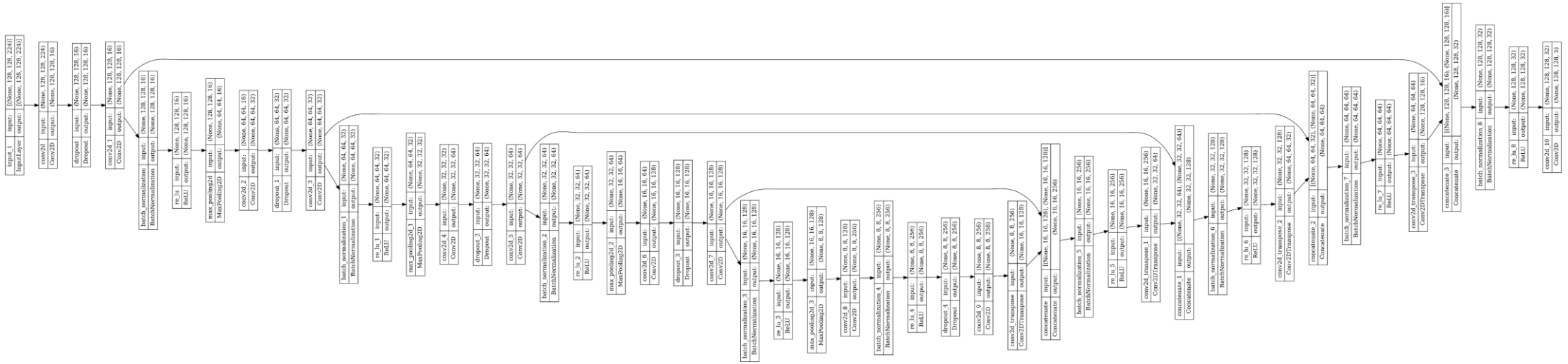


- Split in training, validation & testing data (60/20/20)

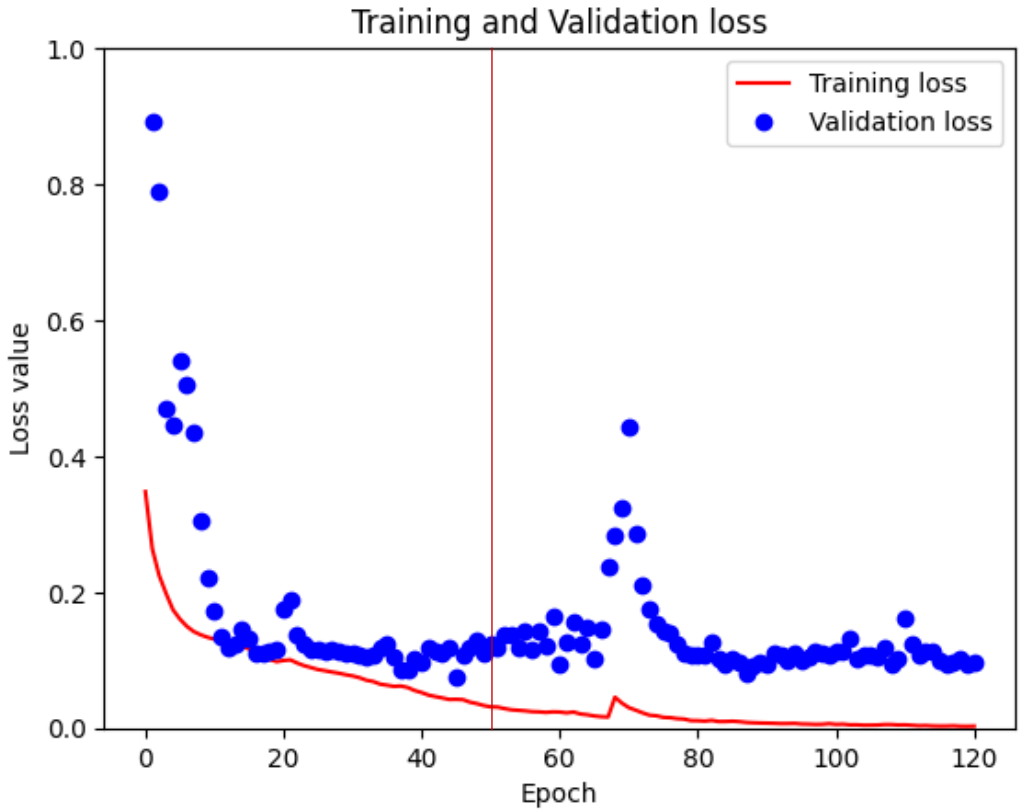


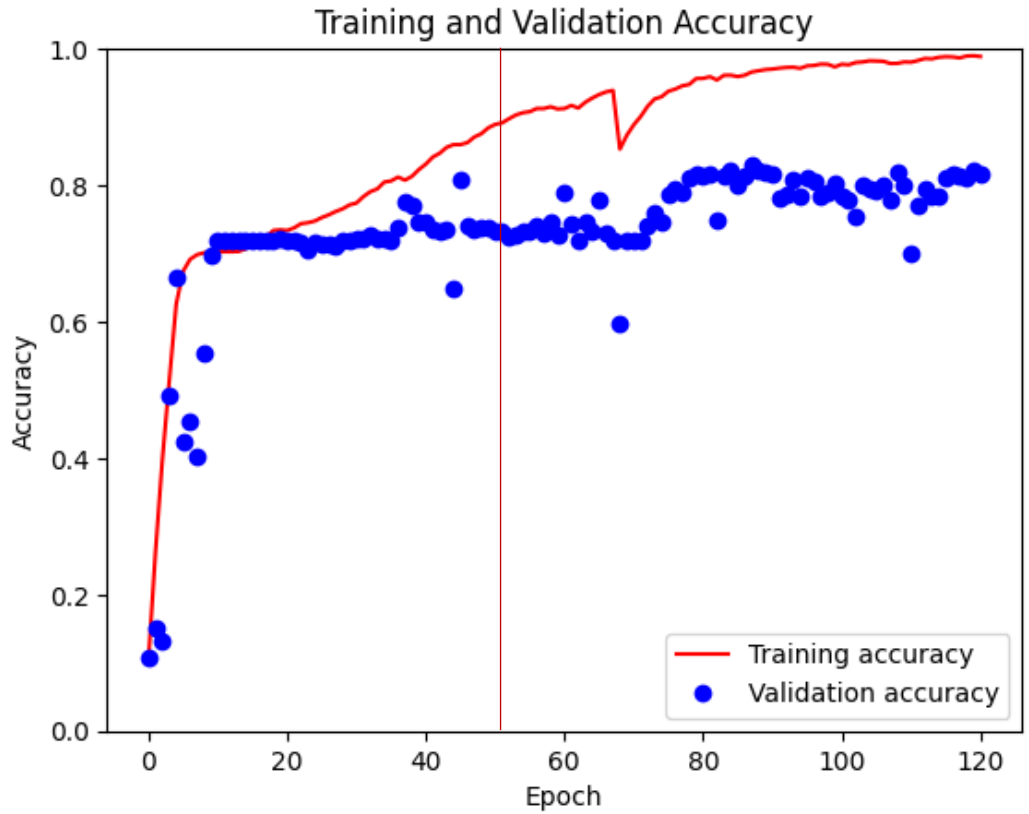
Classifier

- Tensorflow U-Net implemented in Python API
- 1.430.037 trainable parameters



Training Results

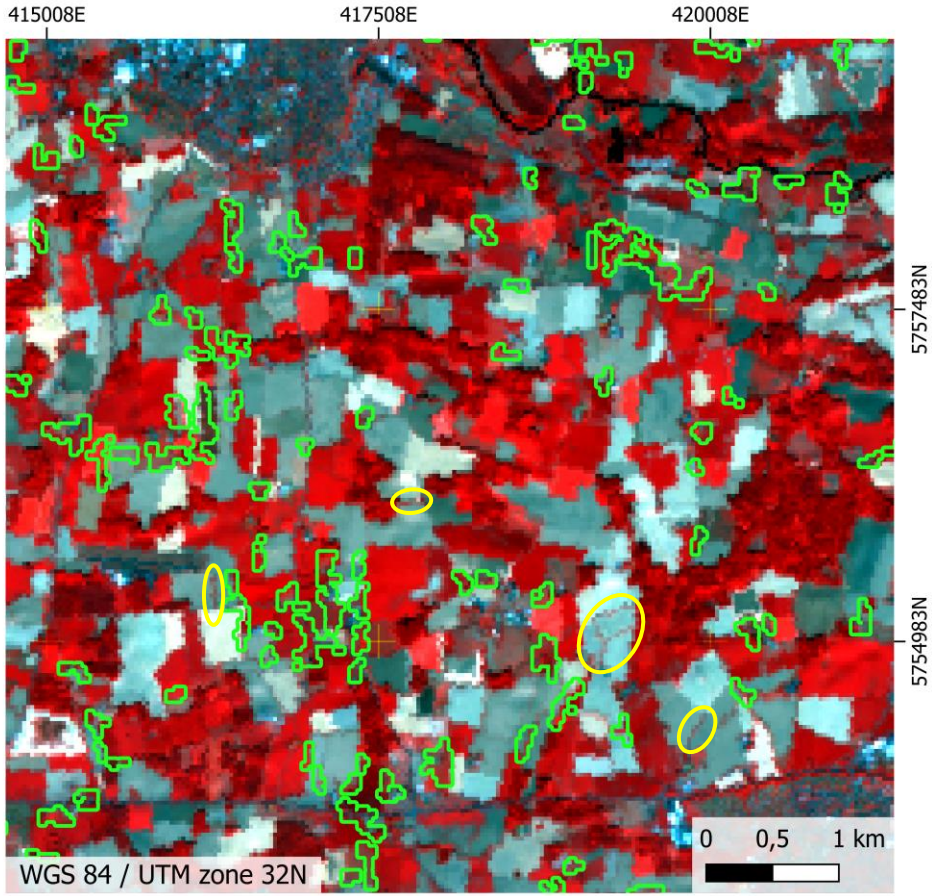




Training accuracy: 0.87, validation accuracy 0.73 (early stopping after epoch 52)

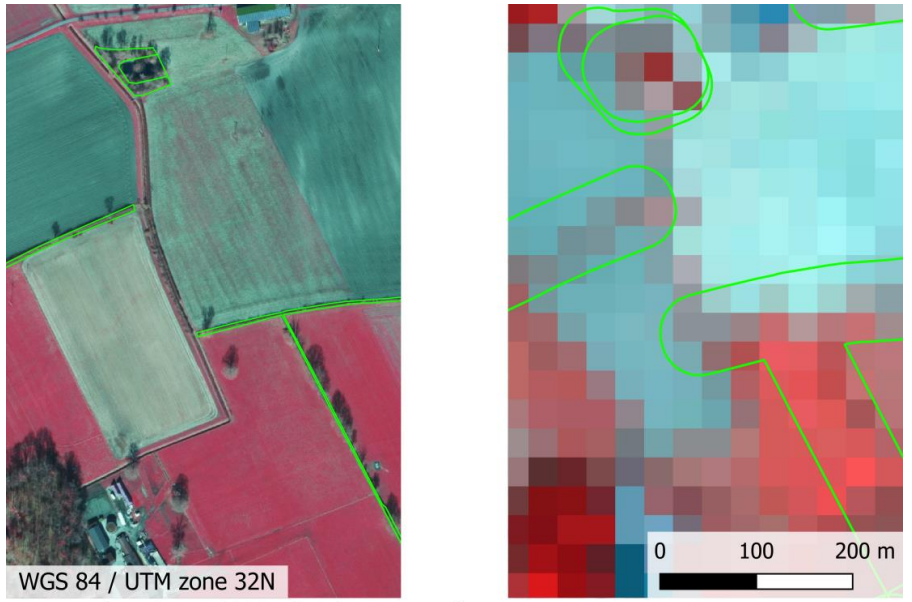
Results

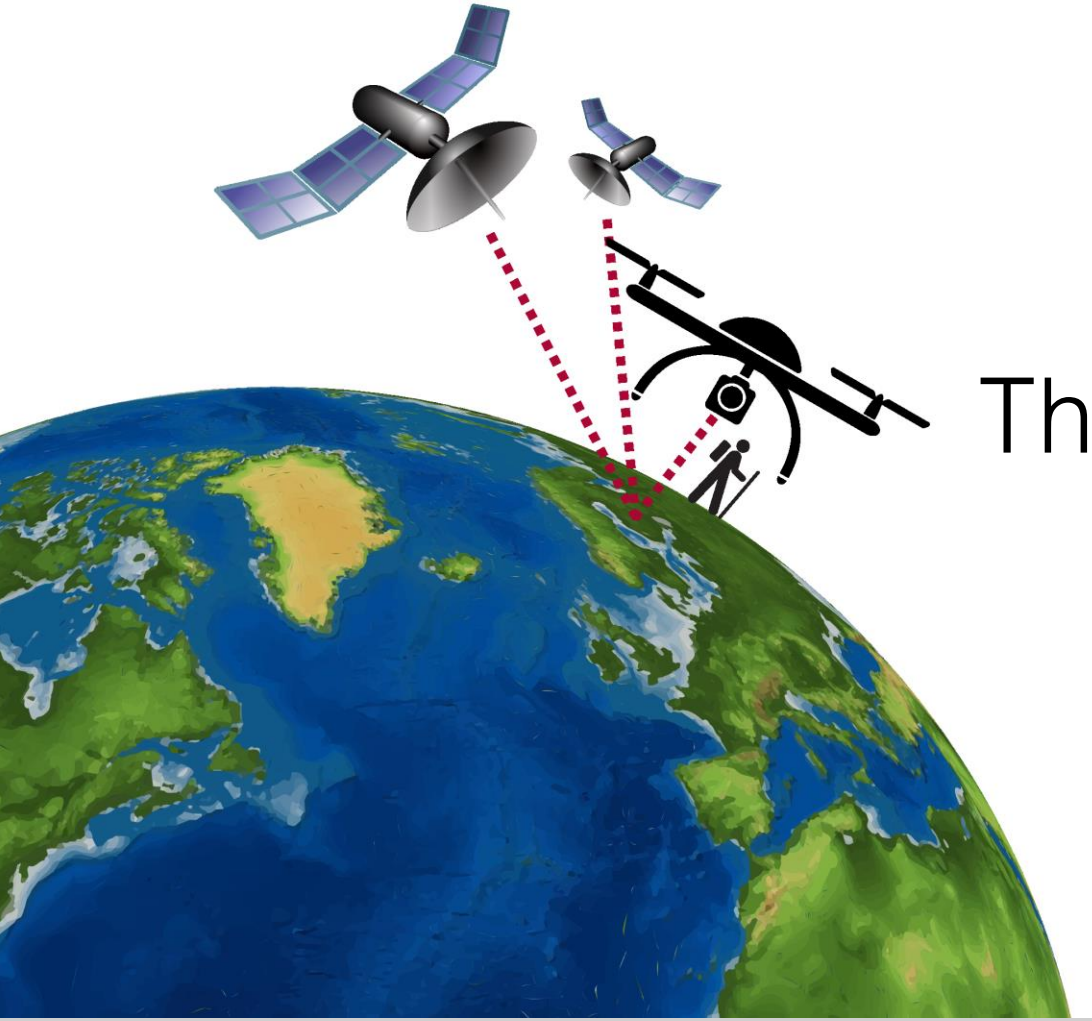
- 0.75 accuracy on independent test dataset
- Positive classifications mostly match
- Many potential landscape elements are missing



Conclusions & Outlook

- Unedited InVeKoS database insufficient as training data
  - → Not all landscape elements applied for
  - → Next step: Revision and extension of the training data
- So far only tested with standard U-Net
  - → Exploring with extensions and (hyper)parameter fine tuning
- Consideration of inclusion of Sentinel-2 Data to add temporal dimension





Thank you for your attention!

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