

# Wide-area Monitoring of Soil Moisture in Peatlands Using Sentinel-1 Images

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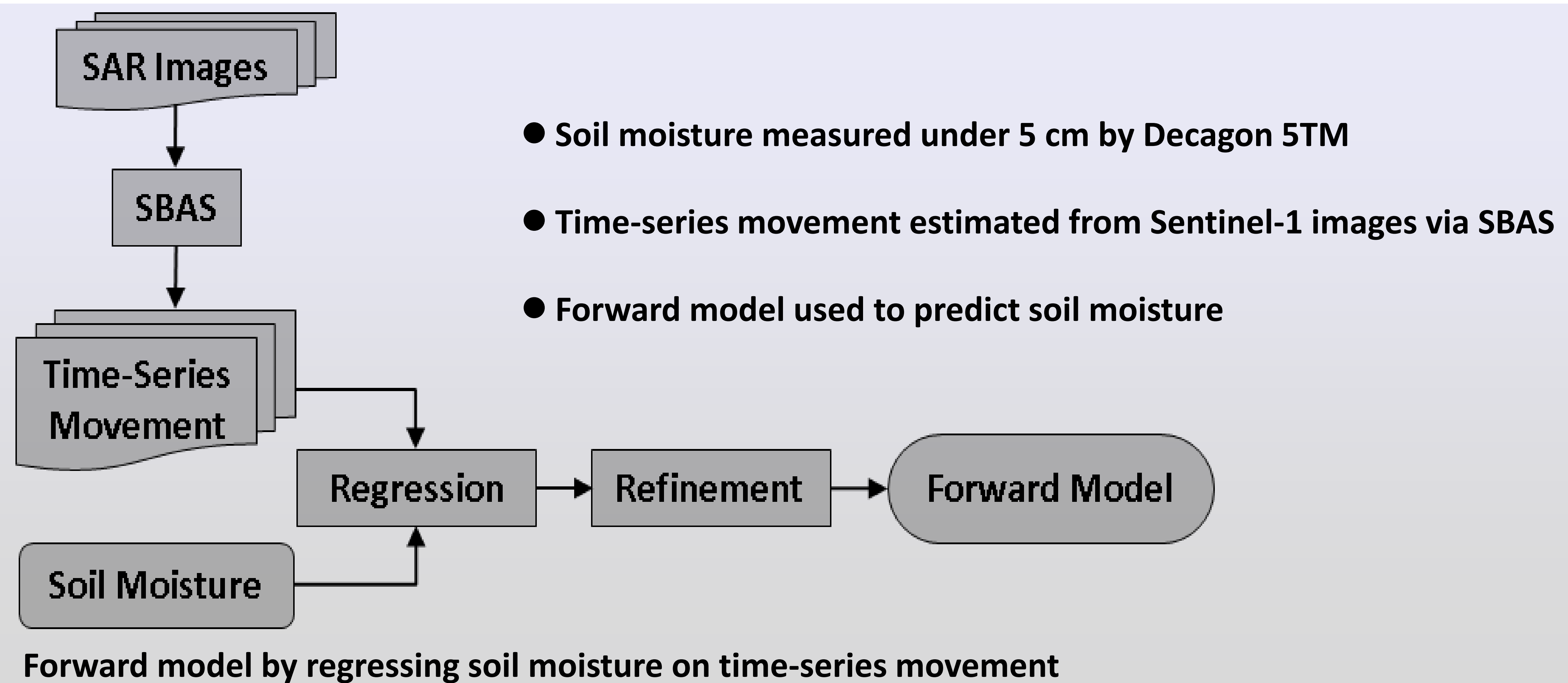
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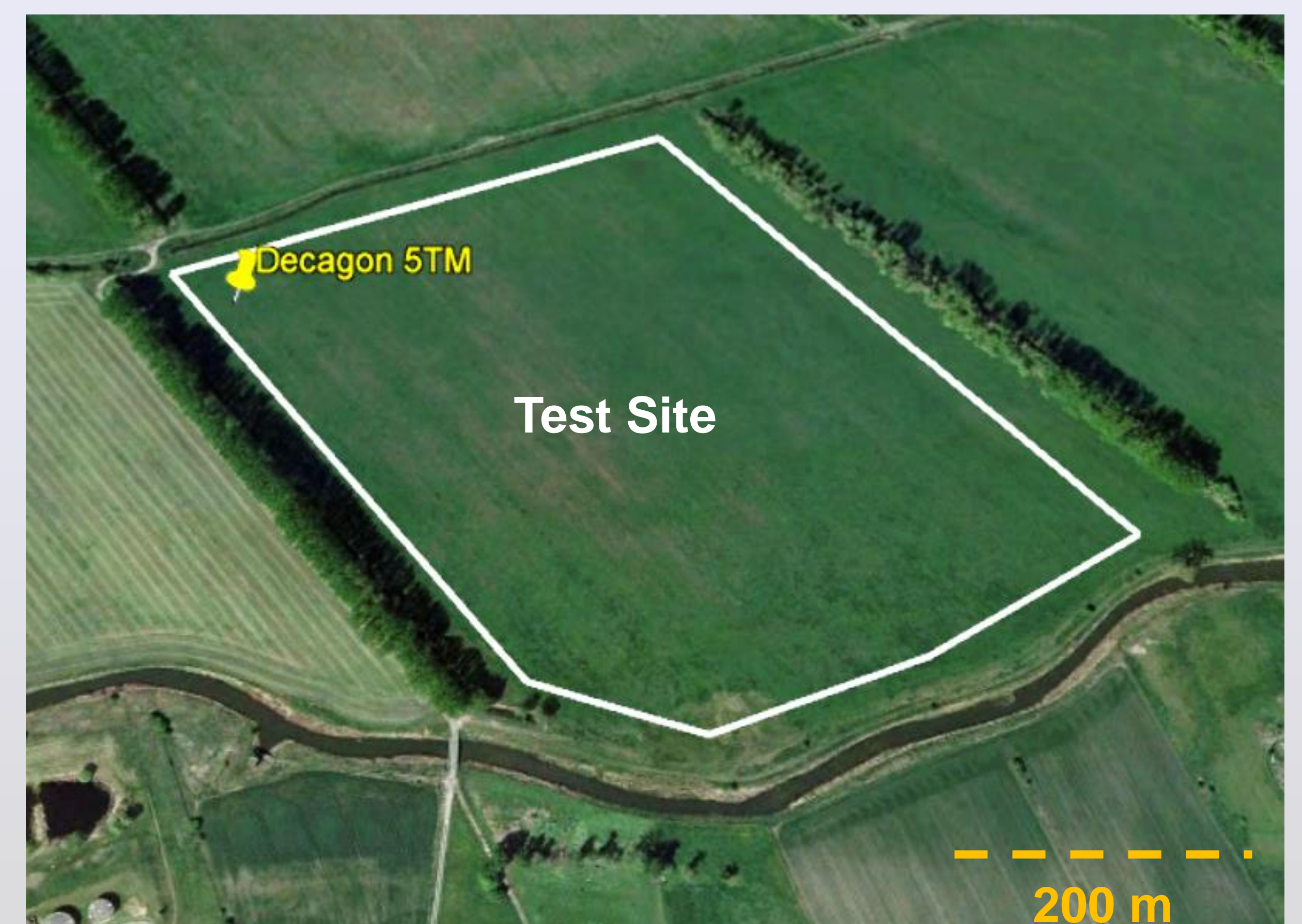
## Abstract

- Soil moisture, an important role in hydrological cycle
- A novel approach using multi-temporal Sentinel-1 images to model and evaluate soil moisture
- Test result compared with ground truth
  - Pearson correlation coefficient: 0.91
  - Absolute mean error (volumetric water content): 3.15%

## 1. Methodology

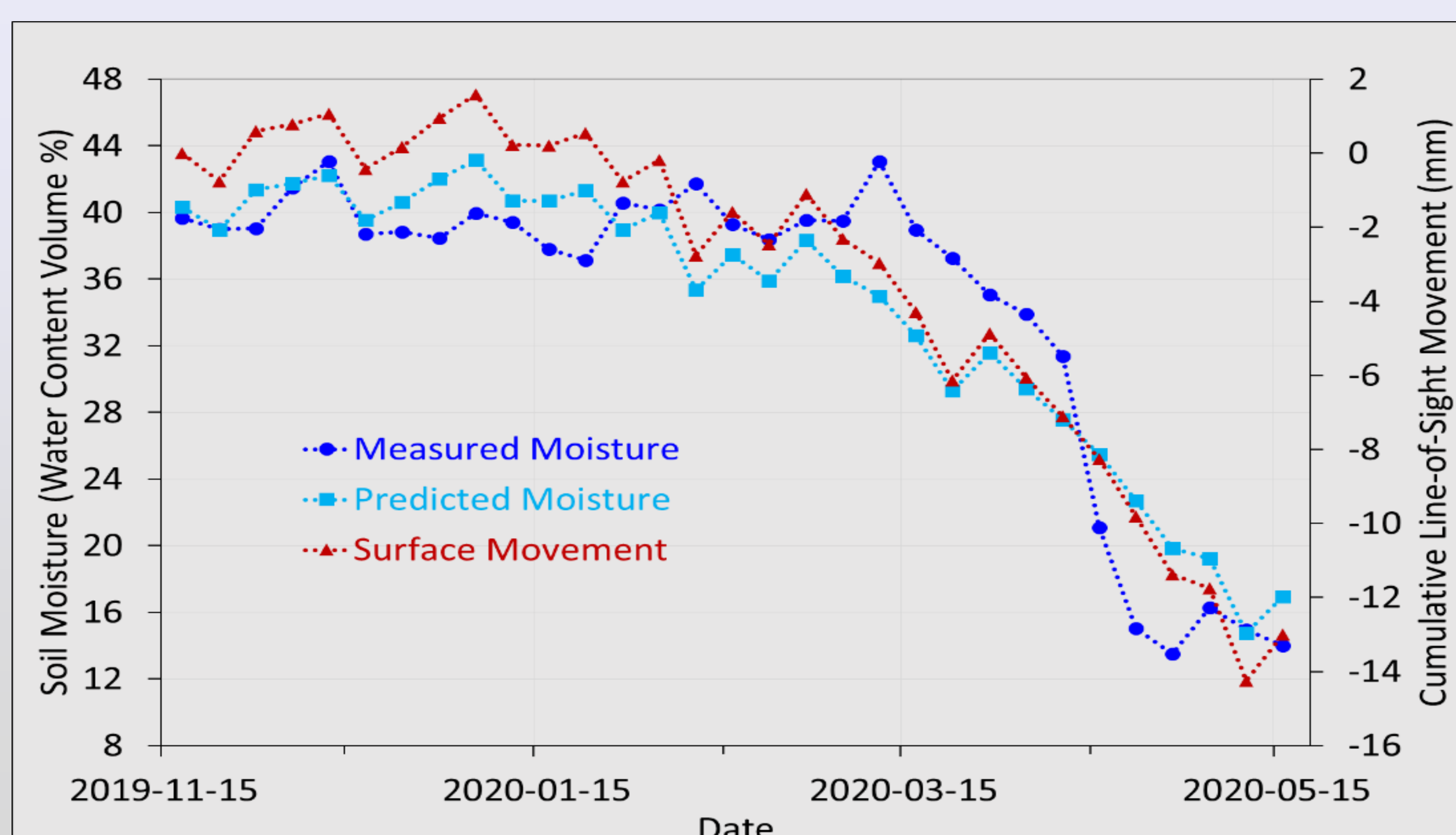


## 2. Test Data



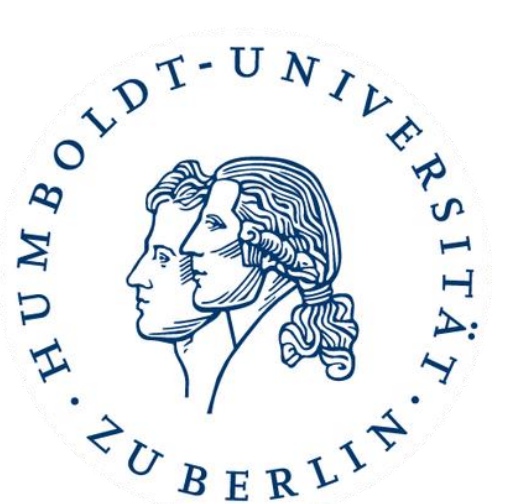
- Test site: Grassland of organic soil in Rhinluch around 50 km northwest Berlin
- 31 x VV-polarized Sentinel-1 images along ascending orbit acquired from November 2019 to May 2020
- Decagon 5TM measures soil moisture under 5 cm.

## 3. Test Result



Compared between predicted and measured soil moistures

- Pearson correlation coefficient: 0.91
- Absolute mean error (volumetric water content): 3.15%



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# European Monitoring of Biodiversity in Agricultural Landscapes (EMBAL)

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## Abstract

- Initiative launched by the European Commission (DG Environment)
- EMBAL represents a further development of the [LISA](#) approach
- EMBAL provides a harmonized pan-European overview of the state and changes of biodiversity in agricultural landscapes
- It contributes to a number of EU environmental policies (e.g. EU Biodiversity Strategy for 2030, EU Common Agricultural Policy, EU Pollinators Initiative)
- Pilot survey on 250 plots in 4 EU member states in 2020-21
- Based on the experience with the pilot, we can provide recommendations for an intended EU-27 rollout in 2022

## 1. Methodology - EMBAL consists of three spatial levels of mapping units

### (1) Plots (500 x 500 m)

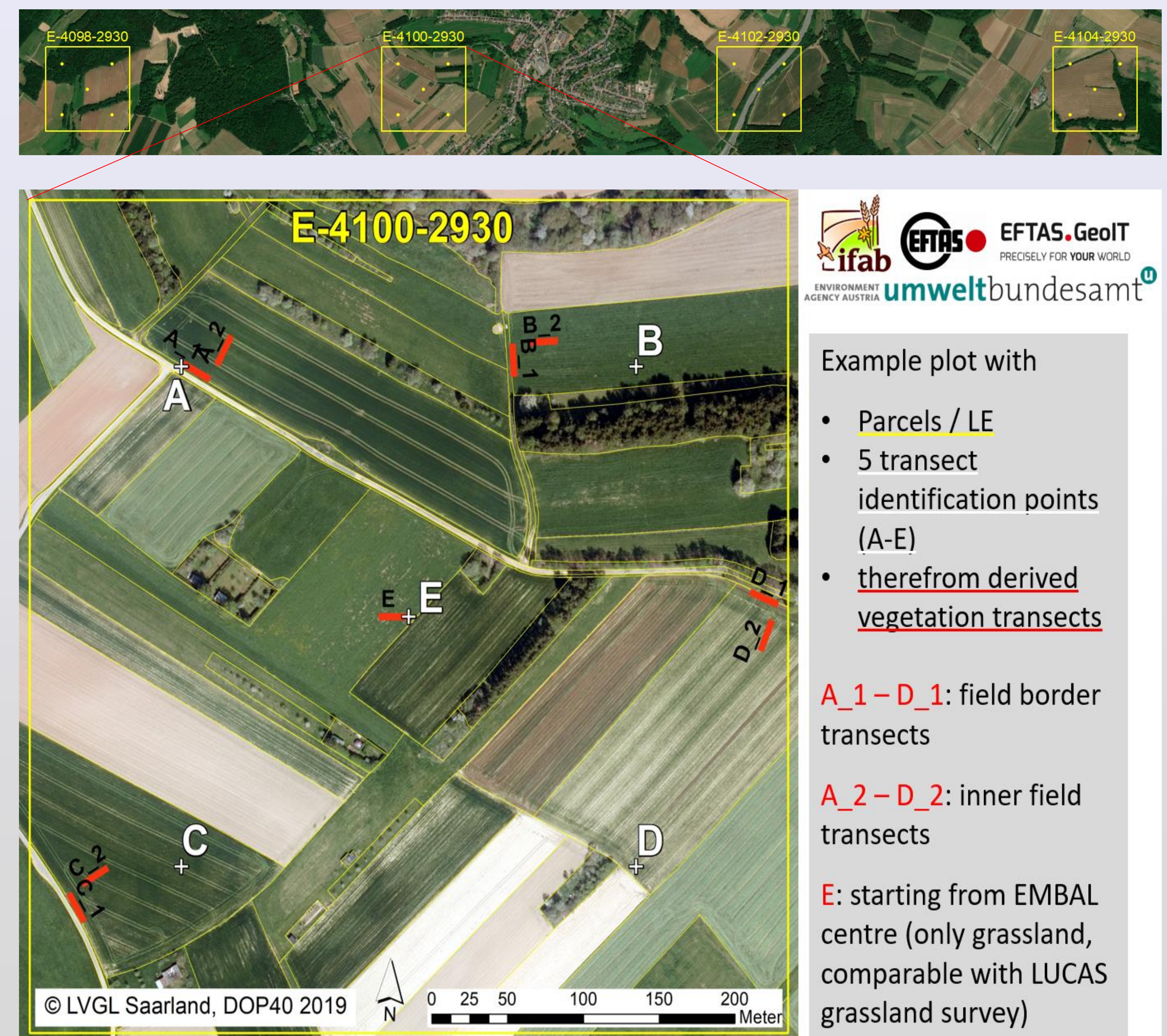
- recording unit with 500 x 500 m edge length (25 ha)
- Master sample arranged in a regular grid of 2 x 2 km across EU-27
- Grid based on the LUCAS master sample
- Minimum agricultural use for survey: 10% coverage per plot

### (2) Parcels and Landscape Elements (LE) – recorded in each plot

- Full delineation and description by recording a basic set of parameters
- Parcels = i.e. management unit of the same land cover and land use
  - ⇒ Main parameters: land cover and land use, number and colours of flowering forbs, coverage of crop and wild plants on arable land or vigour and graminoid-forb ratio on grassland, nature value
- Landscape Elements = hedges, ditches, dirt tracks, grass/flower strips, etc.
  - ⇒ Main parameters: land cover, size, length/width, nature value

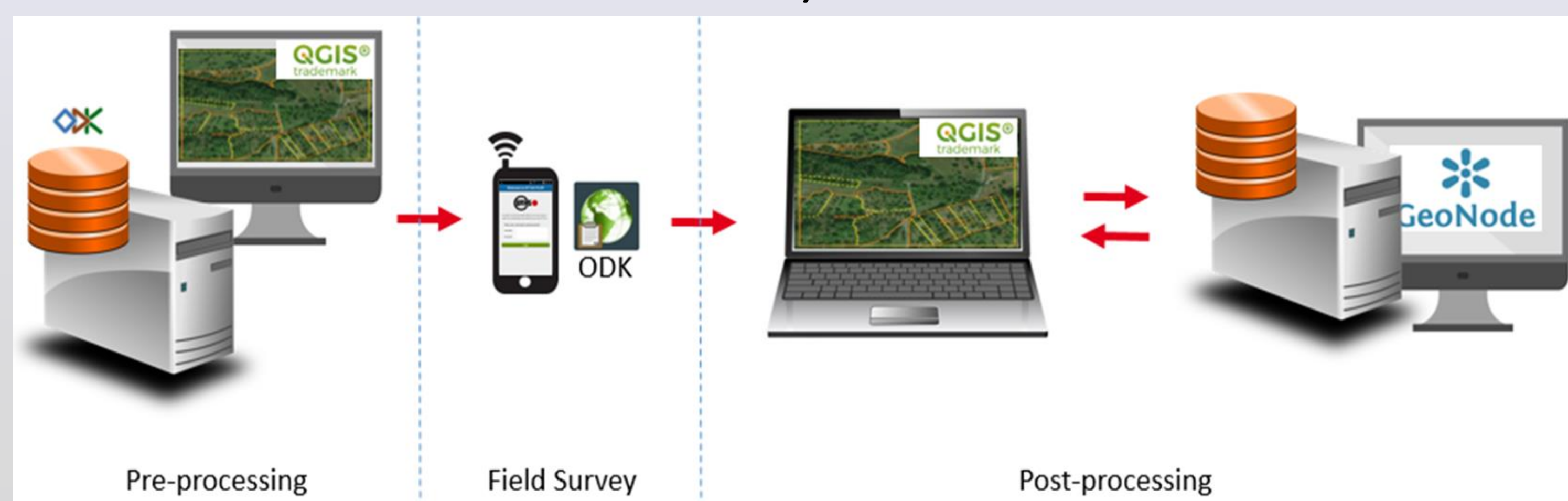
### (3) Vegetation transects – only observed in grassland or cropland

- Up to 9 transects regular positioned within the plots
- 20 m in length and 2.5 m wide
- Surveyed in pairs – one at the field margin, and one in the field interior
- Photo documentation of transects



## 2. Digital workflow

- Digital pre-processing of the mapping units
- Field survey
- Digital post-processing of recorded data
- Data exchange
- Quality control



## 3. Proposed rollout scenarios for 2022 (EU-27)

	Scenario I	Scenario II	Scenario III
Geographical level	EU-Member States (MS)	EU	EU / EU-MS
Number of plots	20,000	5,000	a) 2x 3,000 / b) 2x 20,000
Cycles	one	one	two
Pro	MS-baseline	EU-baseline	EU-Monitoring
Contra	Financing	EU-approach	a) Basic small EU approach
Financing	National co-financing	EU-financing	a) EU-financing / b) National co-financing

## 4. Results and Conclusions

- The preliminary results indicate that EMBAL will be a **unique and powerful tool to monitor biodiversity** in European agricultural landscapes.
- EMBAL will particularly **evaluate how far and if European legislation and measures are effective** to preserve and regenerate the natural resources and natural capital.
- With the recorded species groups, additional environmental and structural parameters, and different spatial components of EMBAL, it becomes possible to generate **objective information for nature value and biodiversity to evaluate the impact of agri-environmental policies**, since there are no comparable data for this at EU level to date.