International Institute for Applied Systems Analysis

Remote sensing detection of climate-smart practices: Enhancing farm resilience in Austria

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sentinelhub

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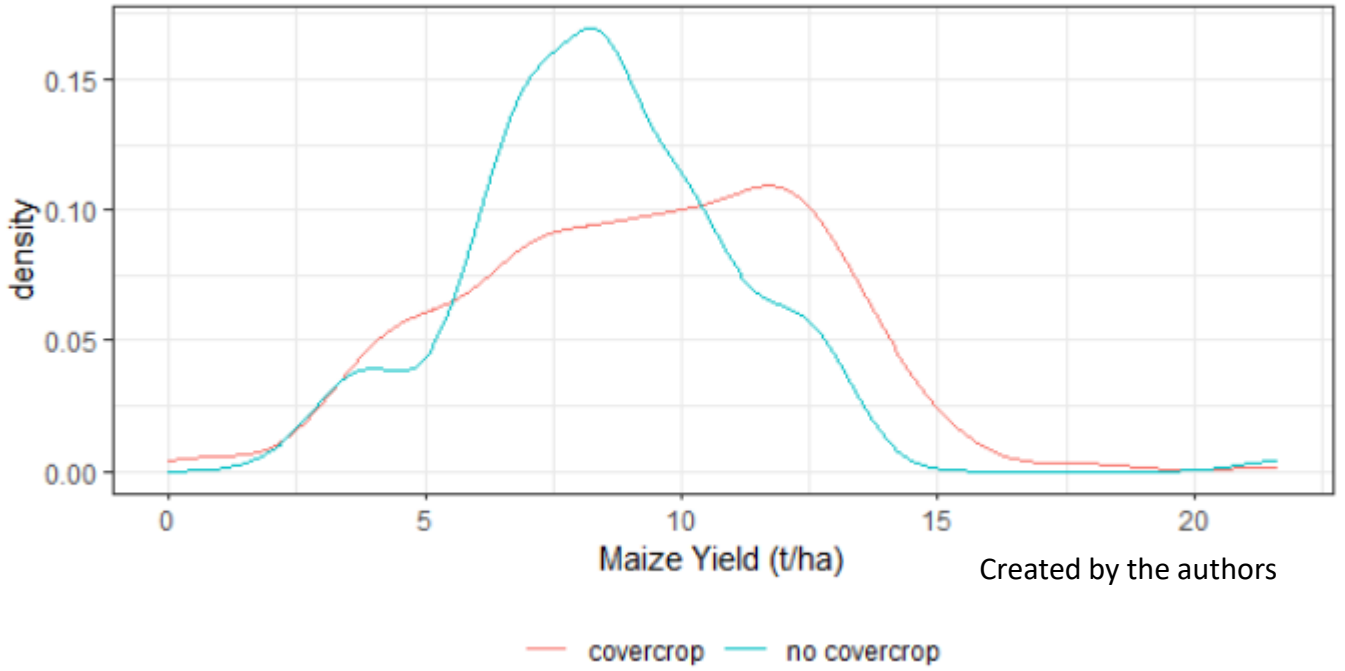
Climate Change Adaption in Agriculture

Climate Smart Agricultural Practices

- Resilient yields in hazardous years
  - Cover Crops
    - Soil erosion and soil quality
  - **Seeding Dates**
    - Yield
  - Reduced or no tillage
    - Soil erosion and soil quality
  - Crop-rotation
    - Climate Resilience

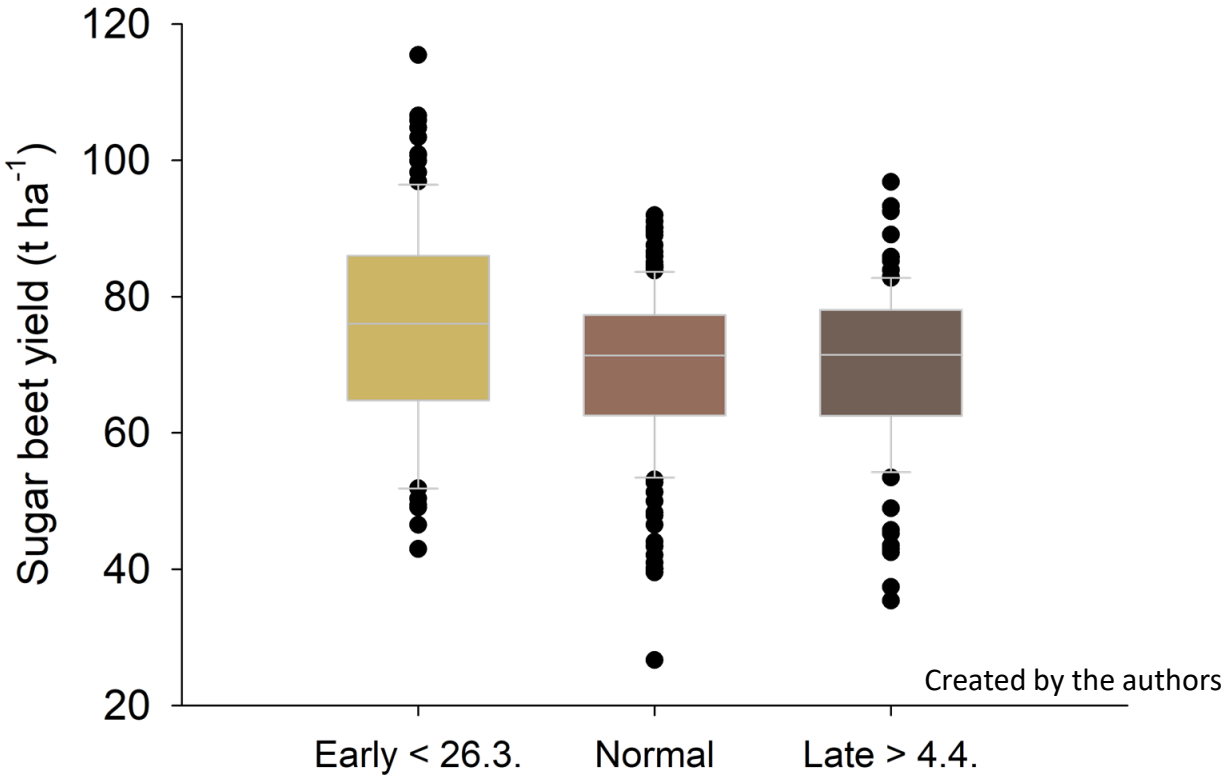


Created by the authors

Distribution of maize yields for the years 2002 to 2020 in Lower Austria, for fields with [N = 292] and without [N = 138] a winter cover crop.

Sensing Seeding Dates Remotely

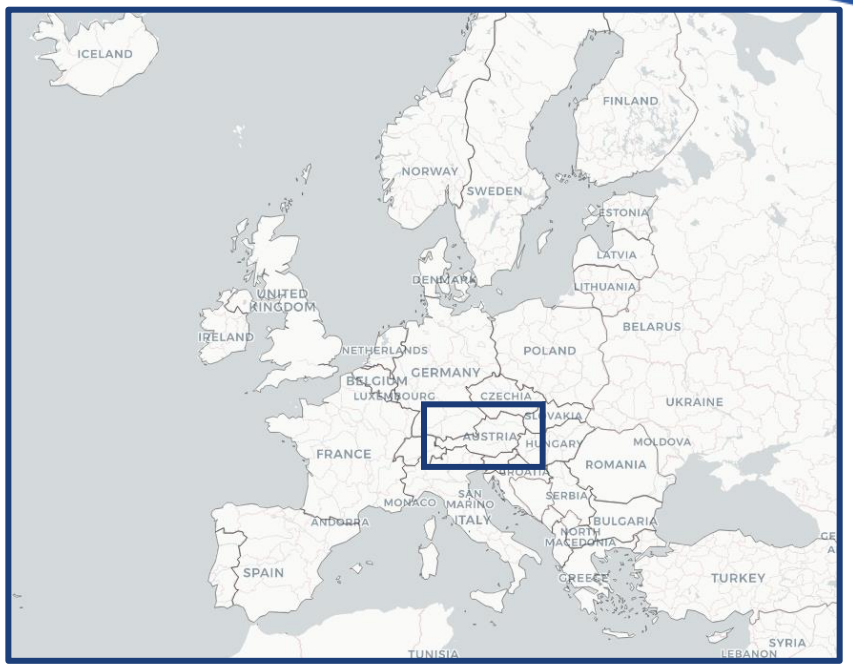
- Publicly available Satellite data
  - Sentinel 1
- Estimates for:
  - Farmers
  - Policymakers
  - Scientists



Distribution of sugar beet yields in Lower Austria, for fields with early [N = 103] normal [N = 214] and late seeding [N = 108] dates.

In-Situ Data

- Austrian Chamber of Agriculture
  - Unbalanced Panel with polygons
    - Approx.. 1000 observations
    - 2017 – 2020
  - Self Reported
- Crops common in Austria
  - Maize, Soy, (Winter-)wheat, (Winter-)barley, Sugar beets, Sunflower

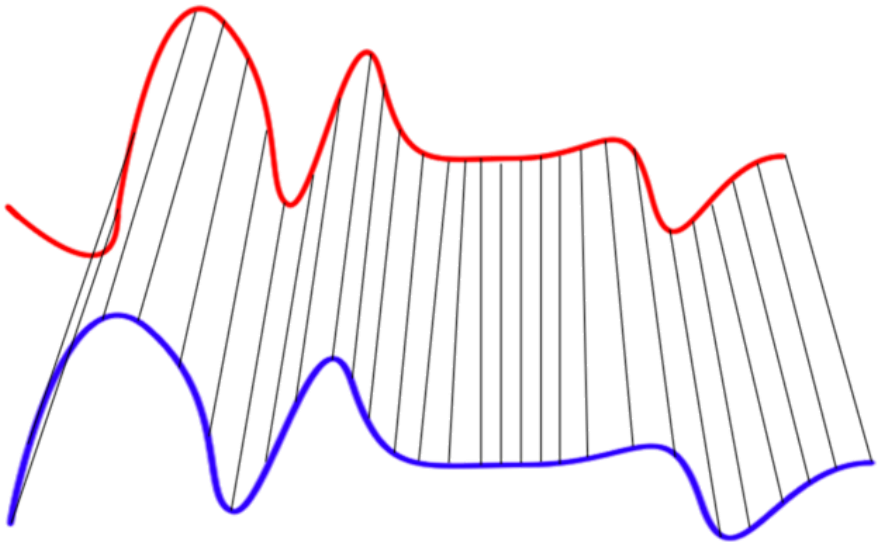


Ground Truth - Plot Locations

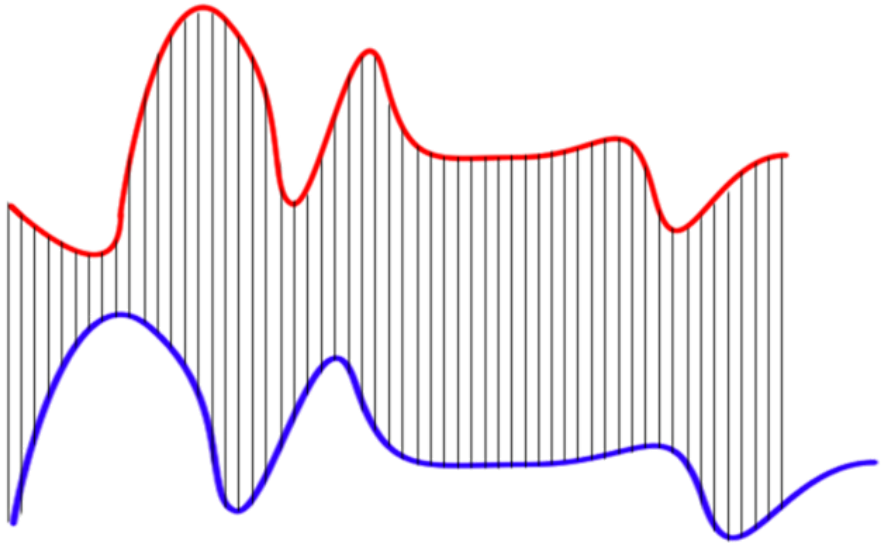
Created by the authors – using the R package mapview

Dynamic Time Warping

- Measure of dissimilarity between time series
  - Classification
  - Clustering
- Different speeds

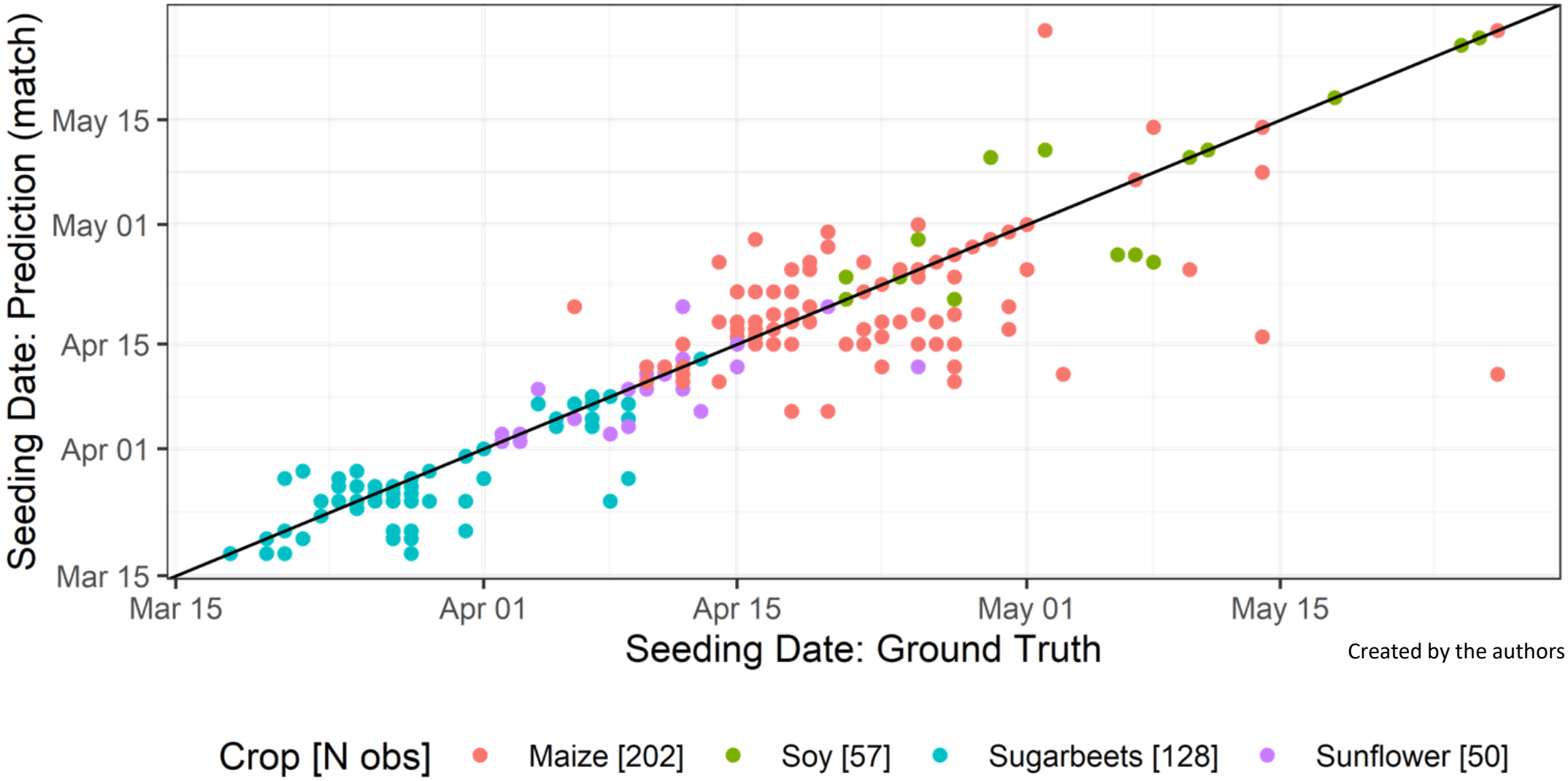


Dynamic Time Warping Matching



Euclidean Matching

Source: https://commons.wikimedia.org/wiki/File:Euclidean_vs_DTW.jpg

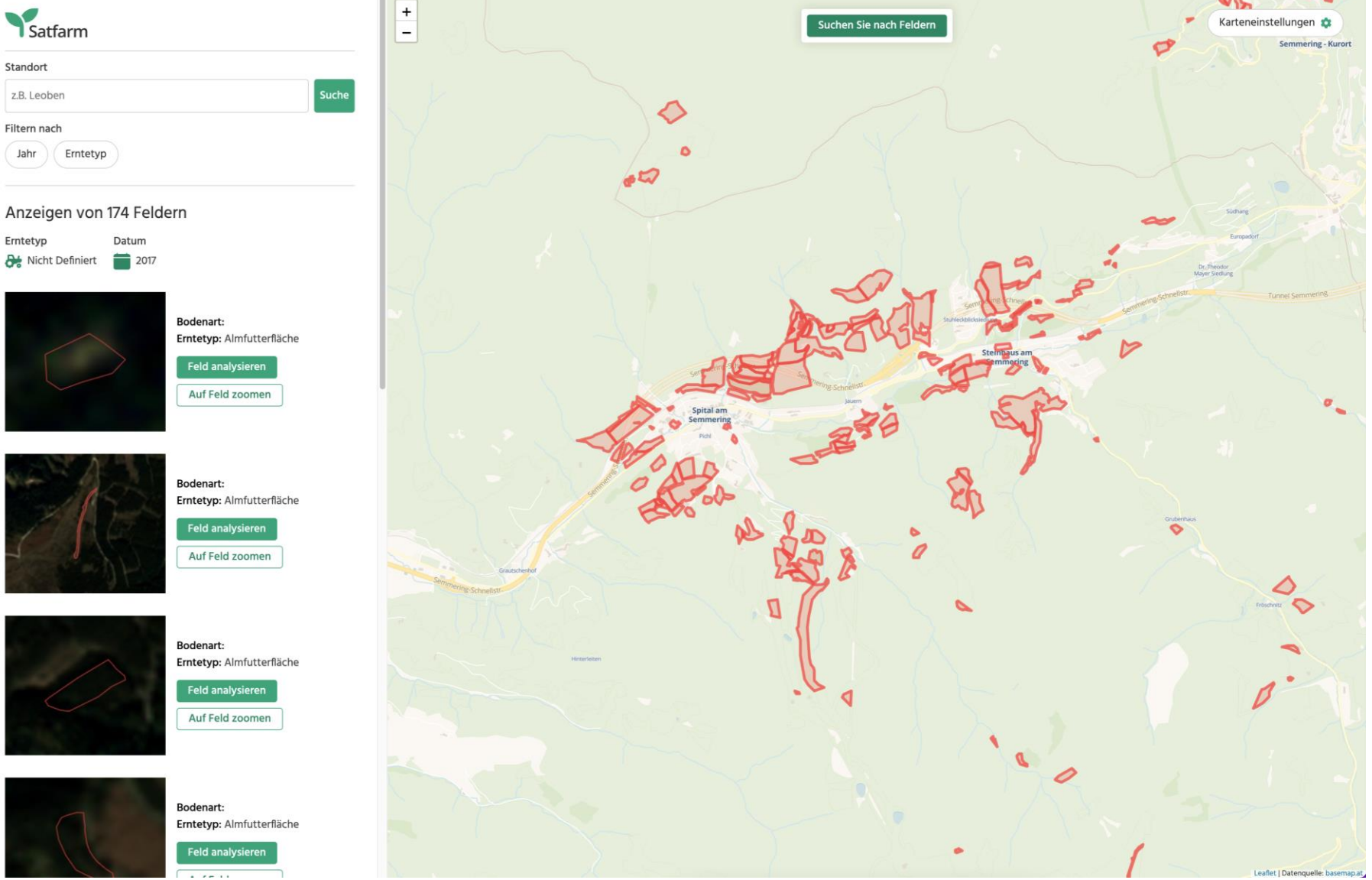


Created by the authors

Prediction – ground truth plot for various crops;
root mean squared error: 5.12 days

SATFARM – Services platform

- Online Tool
  - Farmers
  - Policymakers
- Working Prototype
  - Lower Austria
- Common Remote Sensing Indices



Screenshot of the Satfarm Services platform prototype

SATFARM – Services platform

- Browse and compare fields
  - Crop type
  - Soil type
  - Cover crop
  - Seeding Date
- Planned:
  - Tillage
  - Crop rotation

Screenshot of the Satfarm Services platform prototype

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Thank you, EGU!

I am happy to answer any questions.

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