



**NLS**  
FINNISH GEOSPATIAL  
RESEARCH INSTITUTE  
FGI

# Exploring and processing big earth observation data with EODIE

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# What is EODIE?

- **E**arth **O**bservation **D**ata **I**nformation **E**xtractor
  - <https://eodie.readthedocs.io/>
- A stand-alone Python software for processing geospatial raster and vector data
- Natively supported raster formats:
  - Sentinel-2
  - Landsat 8
  - Generic GeoTIFF
- Dependencies on commonly used geospatial libraries
  - rasterio, geopandas, rasterstats...

# Documentation


 **EODIE**  
latest

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## EODIE 2.0.0 Documentation

### Purpose

EODIE is a toolkit to extract object based timeseries information from Earth Observation data.

The EODIE code can be found [on Gitlab](#) .

The goal of EODIE is to ease the extraction of time series information at object level. Today, vast amounts of Earth Observation data are available to the users via, for example, [Earth Explorer](#) or [SciHub](#). Often, not the whole images are needed for exploitation, but only the timeseries of a certain feature on object level. Objects may be polygons depicting agricultural field parcels, forest plots, or areas of a certain land cover type, for instance.

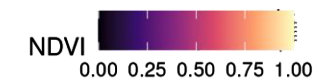
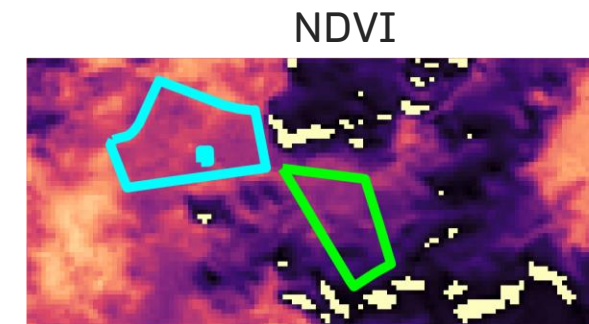
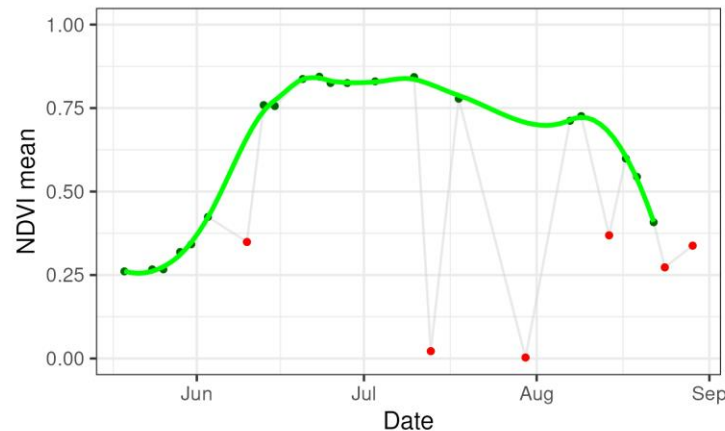
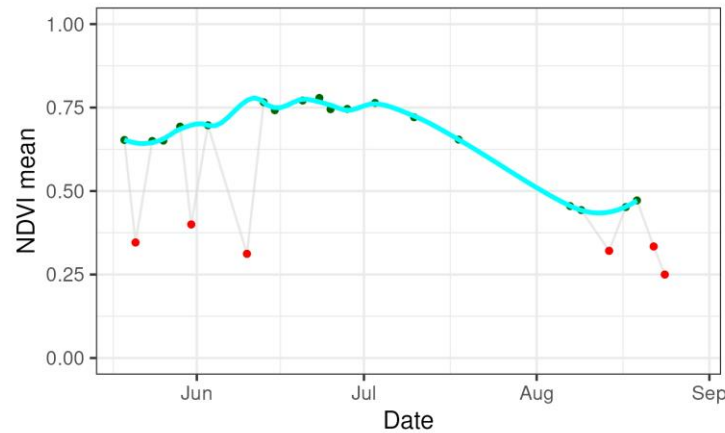
EODIE takes the objects in as polygons in a vector file as well as the timeframe of interest and the features (eg. vegetation indices) to be extracted. The output is a per polygon timeseries of the selected features over the timeframe of interest.

# What does it do?

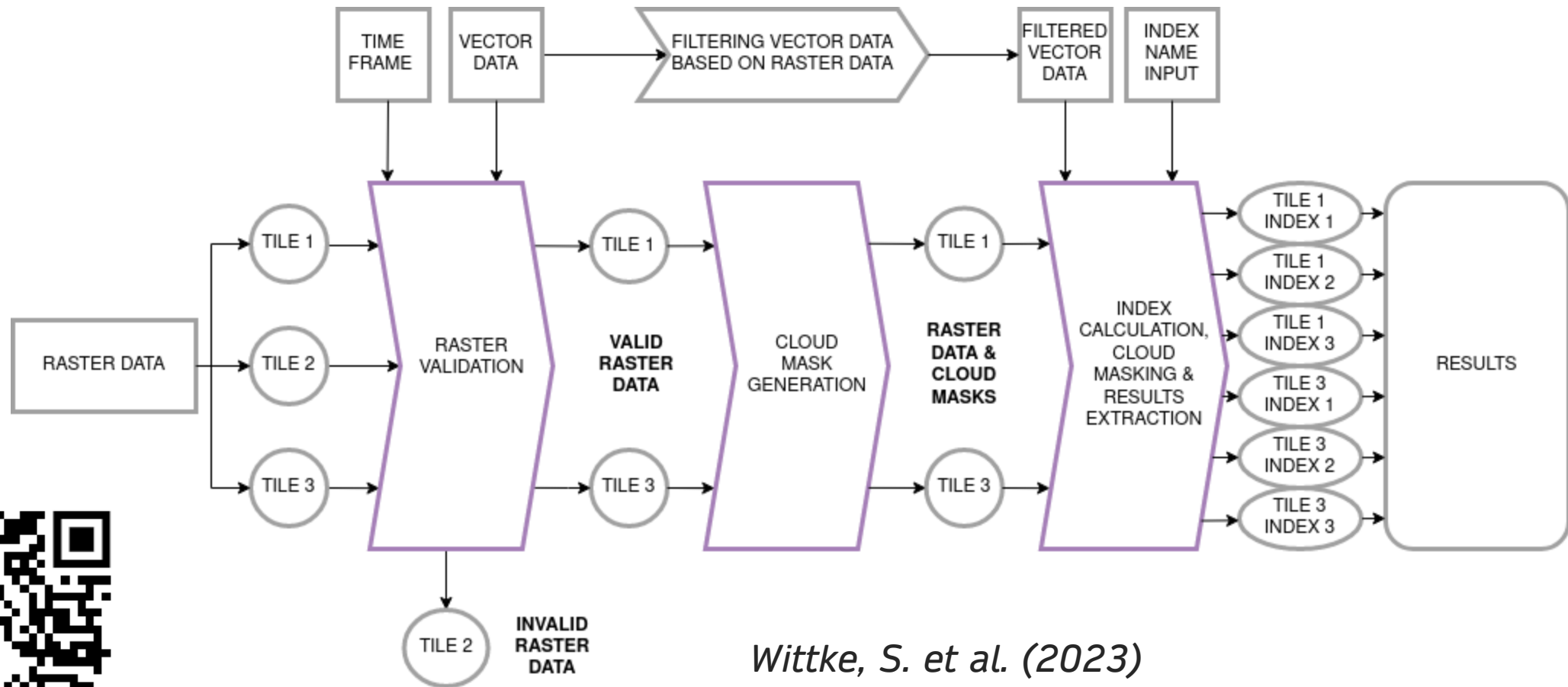
- Find relevant raster data based on vector data
  - Filtering by timeframe, location, cloud cover
- Calculate several remote sensing indices (NDVI, NBR, Tasseled-Cap, etc.)
- Extract index/raster values per vector feature (polygon/point)
- Output options:
  - Statistics as csv-files or SQLite3 database
  - Raster values as GeoTIFFs or NumPy arrays
- Works on Linux and Windows
- Open source: can be adapted to users' needs

# Example on agricultural growth parcels

- Sentinel-2 data
- SCL-based cloud-masking

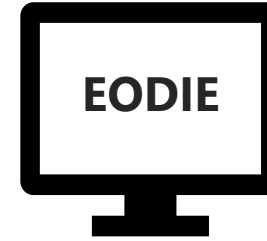


# How does it do it? Sentinel-2 example



Wittke, S. et al. (2023)  
<https://doi.org/10.1016/j.softx.2023.101421>

# Why EODIE?



VS.



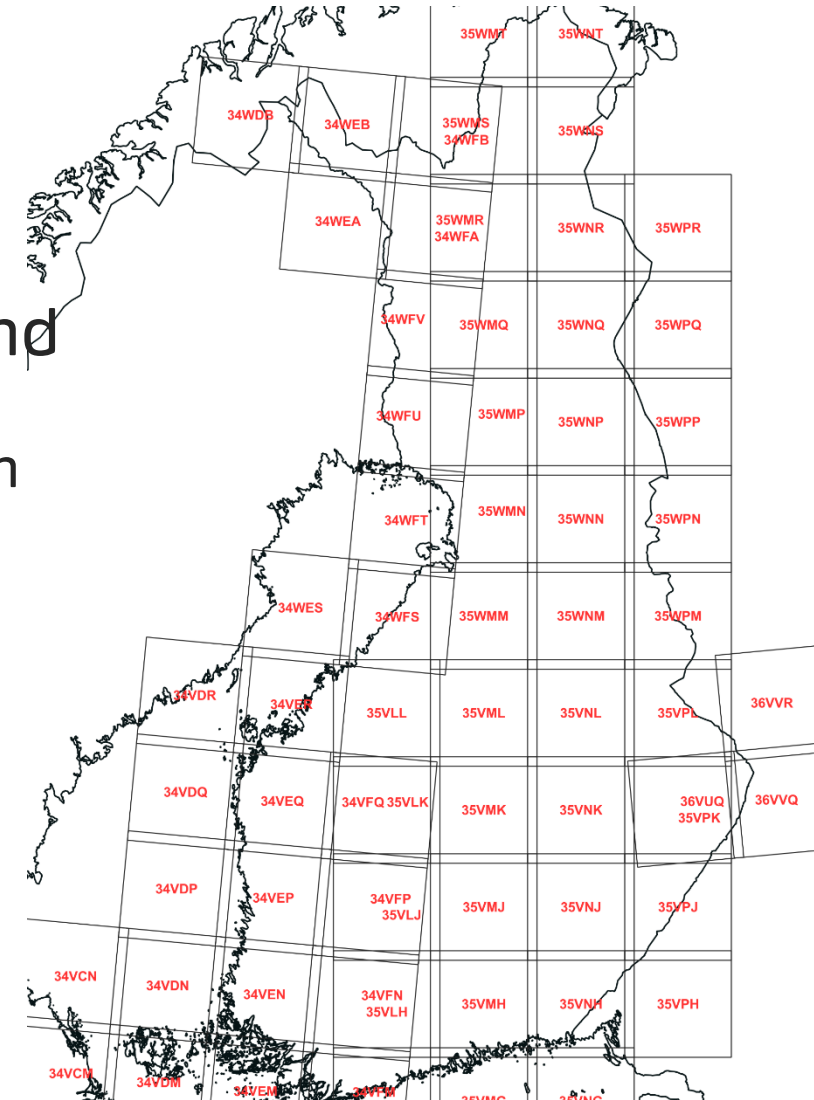
- Data sensitivity or privacy
  - Data cannot be uploaded to cloud platforms for computations (GDPR)
- Offline use possible after installation
- Straightforward workflow
  - Easy to utilize for people not familiar with remote sensing data
  - No need to build own workflows in other platforms
- Stand-alone, open source software
  - Scalability without licensing issues
  - Doesn't require other software to function
- Downloading Earth Observation data is still popular



# Case 1: Field parcel growth monitoring

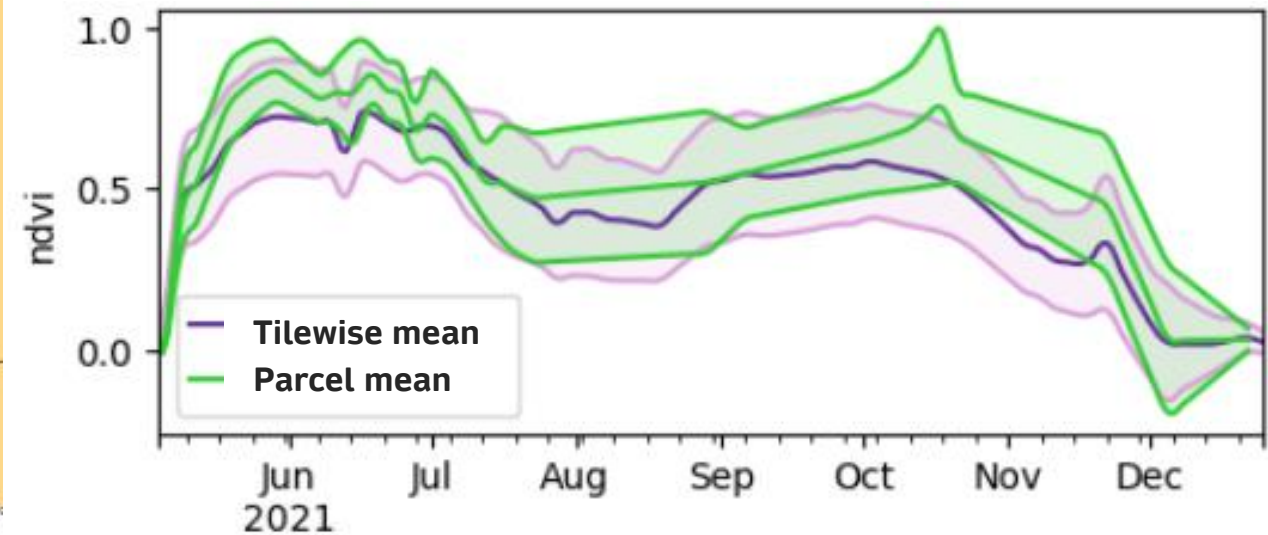
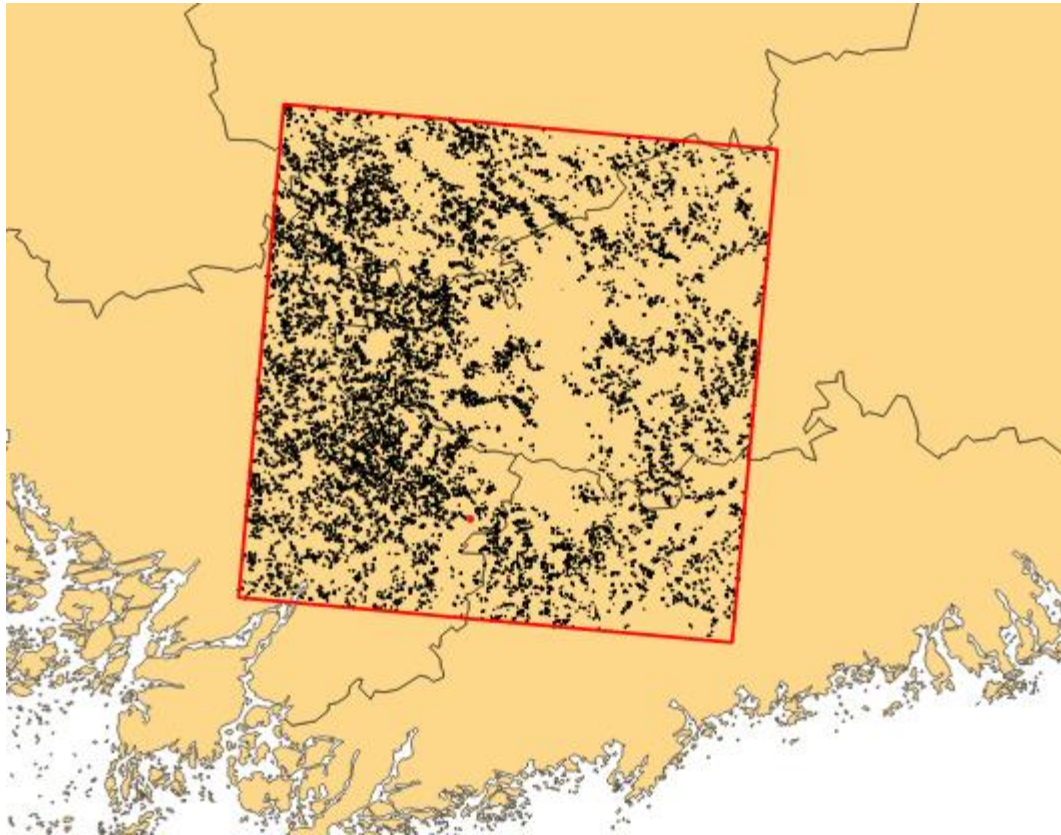
Finnish growth season (May – September)  
time series from agricultural field parcels of Finland

- Platform: CSC supercomputer *Puhti*
- Scalable – computationally effective information extraction
- Simultaneous processing of several (vegetation) indices
- Big data:
  - Over one million field parcels
  - Up to 20 requested indices/bands by default
- Estimated processing time:
  - Less than one week per growth season



# Case 1: Field parcel growth monitoring

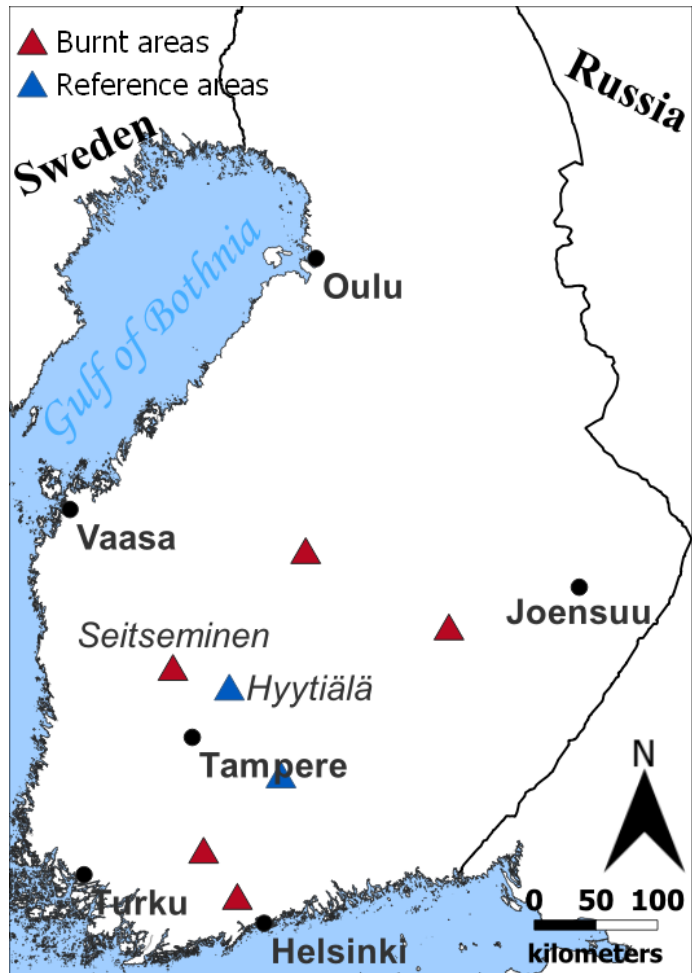
NDVI mean of parcels in a single Sentinel-2 tile



Figures by Maiju Karhu

# Case 2:

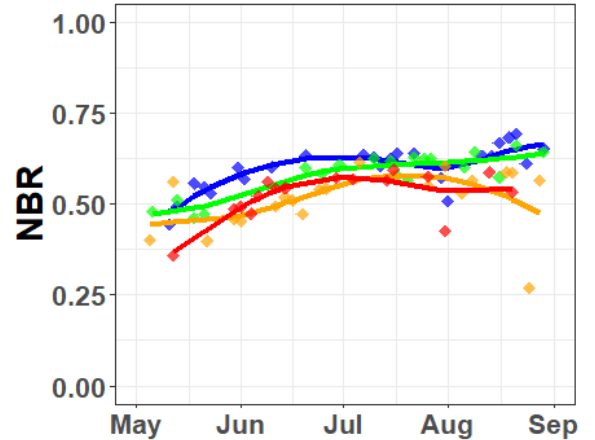
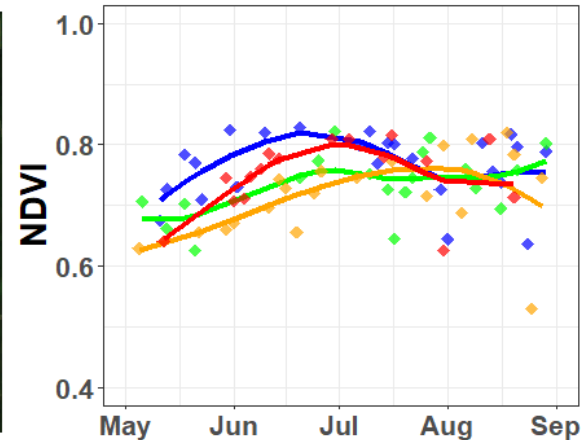
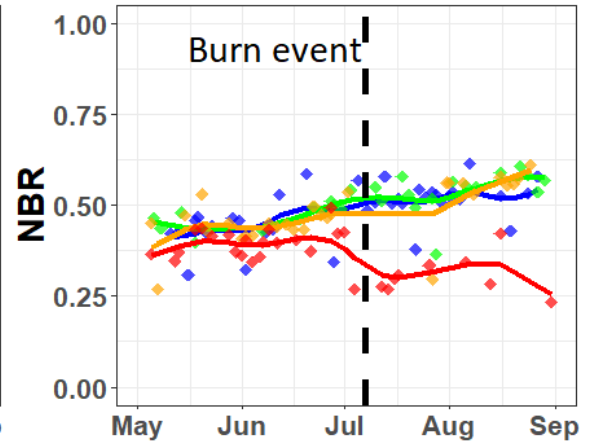
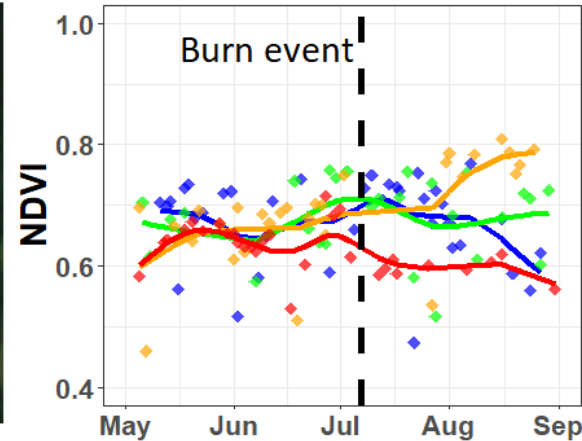
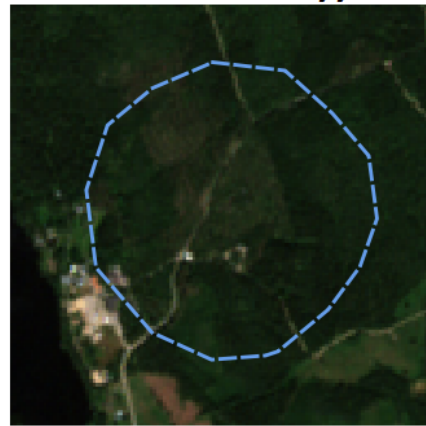
## Forest fire severity & recovery monitoring



Burnt area - Seitseminen



Reference area - Hyytiälä



Year  
2018  
2019  
2020  
2021

# Projects and acknowledgments

- Hiilestä kiinni –subprojects funded by Ministry of Agriculture and Forestry
  - IKIVIHREÄ
  - NC-GRASS
- Other agricultural research projects
  - DIGITALIS
  - PELTOPISTE
- Research projects funded by Academy of Finland
  - LS-HYDRO
- And yours...?



Maa- ja metsätalousministeriö

# Advancing together

