

# T4.4 – Change detection and mapping in forest MLs



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## Objective of Task 4.4

Development of a method for change detection and mapping in forest MLs:

- Afforestation / reforestation
- Deforestation

# Secondees and workflow

- Sebastian Aleksandrowicz, CBK PAN
- Ewa Gromny, CBK PAN
- Marta Milczarek, CBK PAN
- Georgios Spanos, AUTH

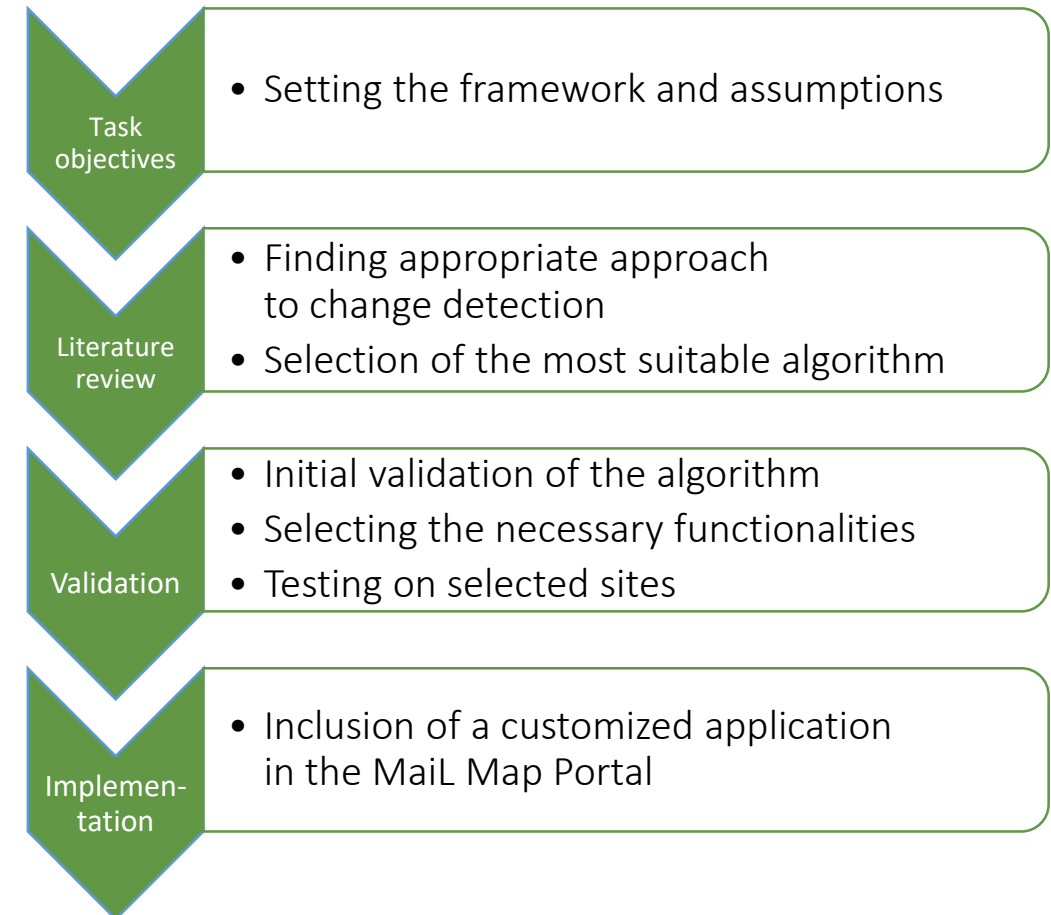
IABG

Task Leader:

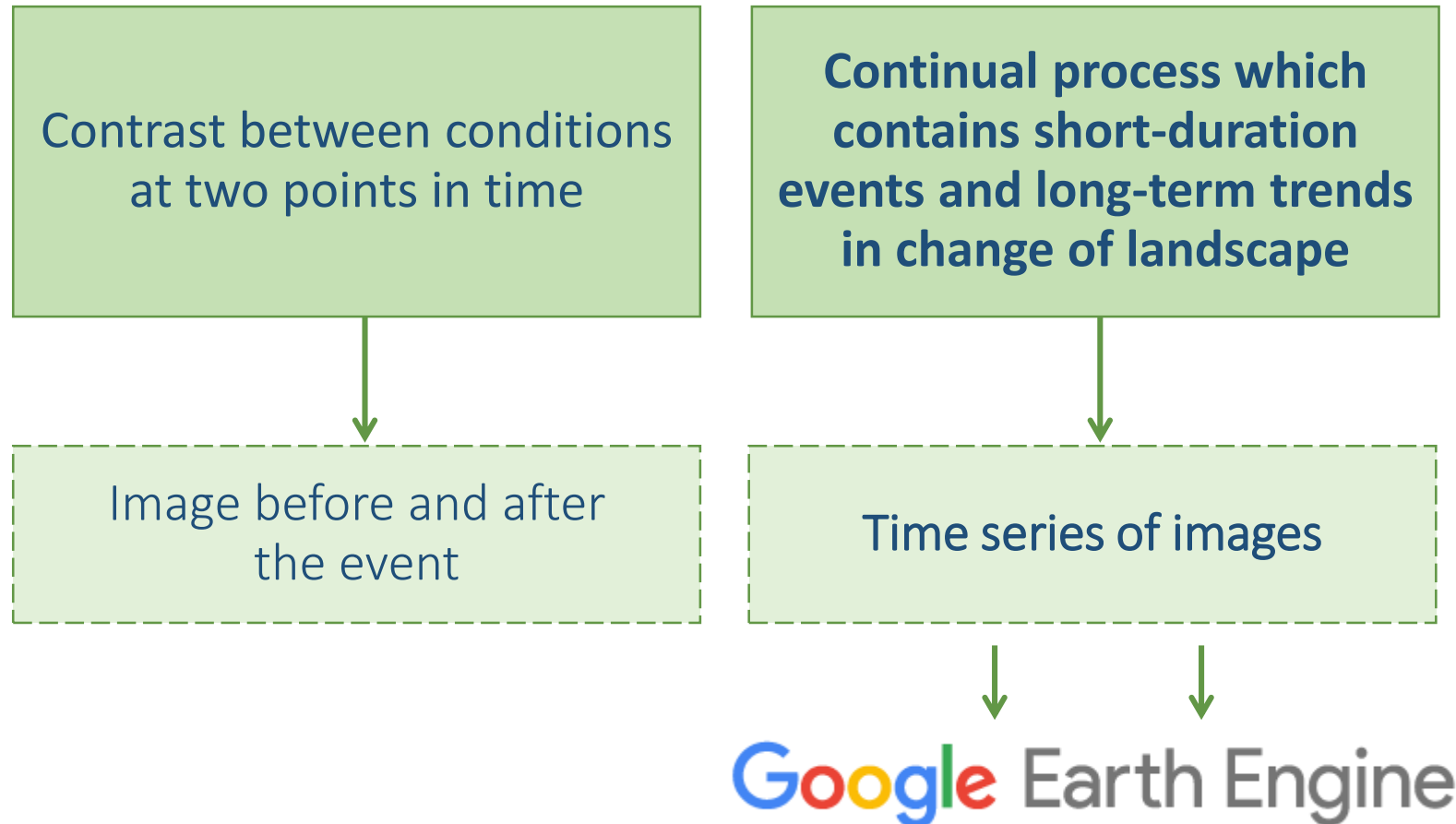
Michał Krupiński, CBK PAN

IT implementation:

Marek Ruciński, Fernando Bezares



# Land cover change detection



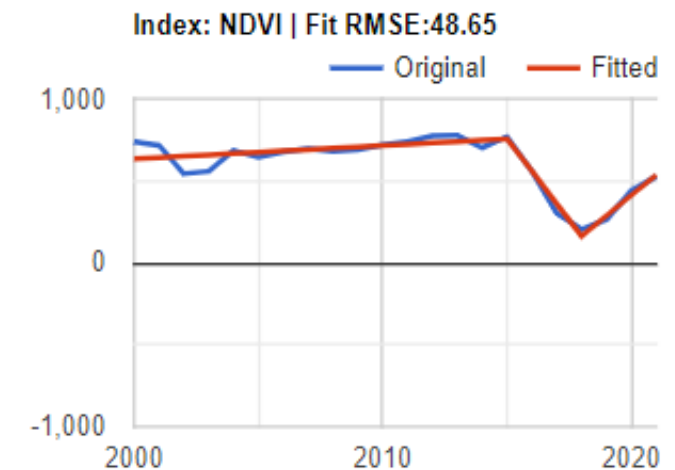
# LandTrendr algorithm

Landsat-based detection of Trends in Disturbance and Recovery

- Algorithm developed to run on Google Earth Engine
- Dataset: Landsat collection (L5, L7, L8) → 1984 - now
- Annual image composite generated by medoid approach

*A method to extract spectral trajectories of land surface change from yearly Landsat time-series stacks.*

## ➤ LandTrendr Change Mapper Application



Kennedy R.E. et al. 2010, Detecting trends in forest disturbance and recovery using yearly Landsat time series: 1. LandTrendr – Temporal segmentation algorithms, Remote Sensing of Environment 114, 2897-2910.

Kennedy R.E. et al., 2018, Implementation of the LandTrendr algorithm on Google Earth Engine, Remote Sensing 10, 691.



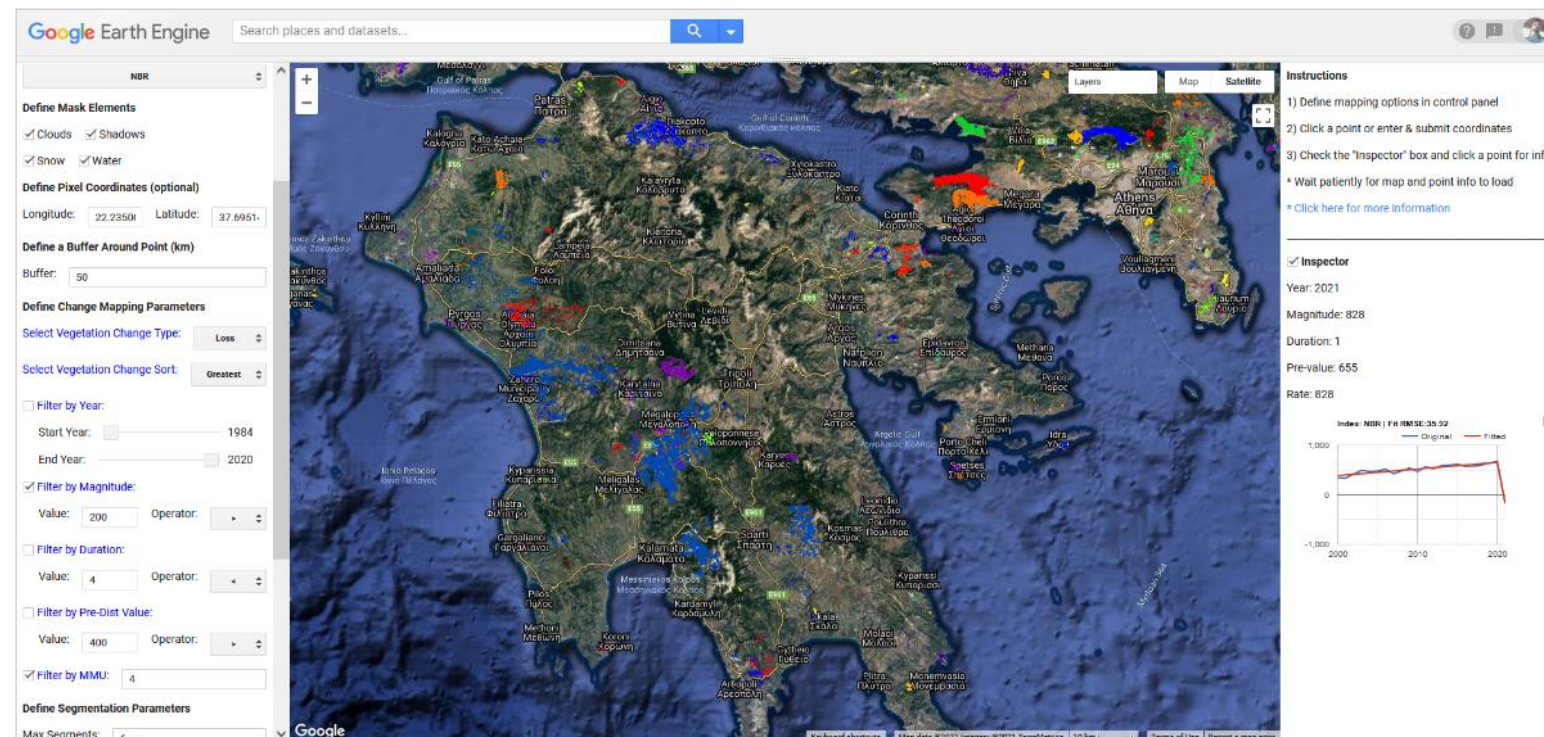
# LandTrendr Change Mapper Application

- Narrowing down the possibility of setting variables and filters:

- Selection of spectral indexes
- Year range
- Vegetation change type and sort

- Layers:

- ✓ Year of detection
- ✓ Magnitude





# LandTrendr Change Mapper Application

3 scenarios of use:

- deforestation detection (year of occurrence)
- forest areas monitoring
- afforestation/reforestation projects monitoring





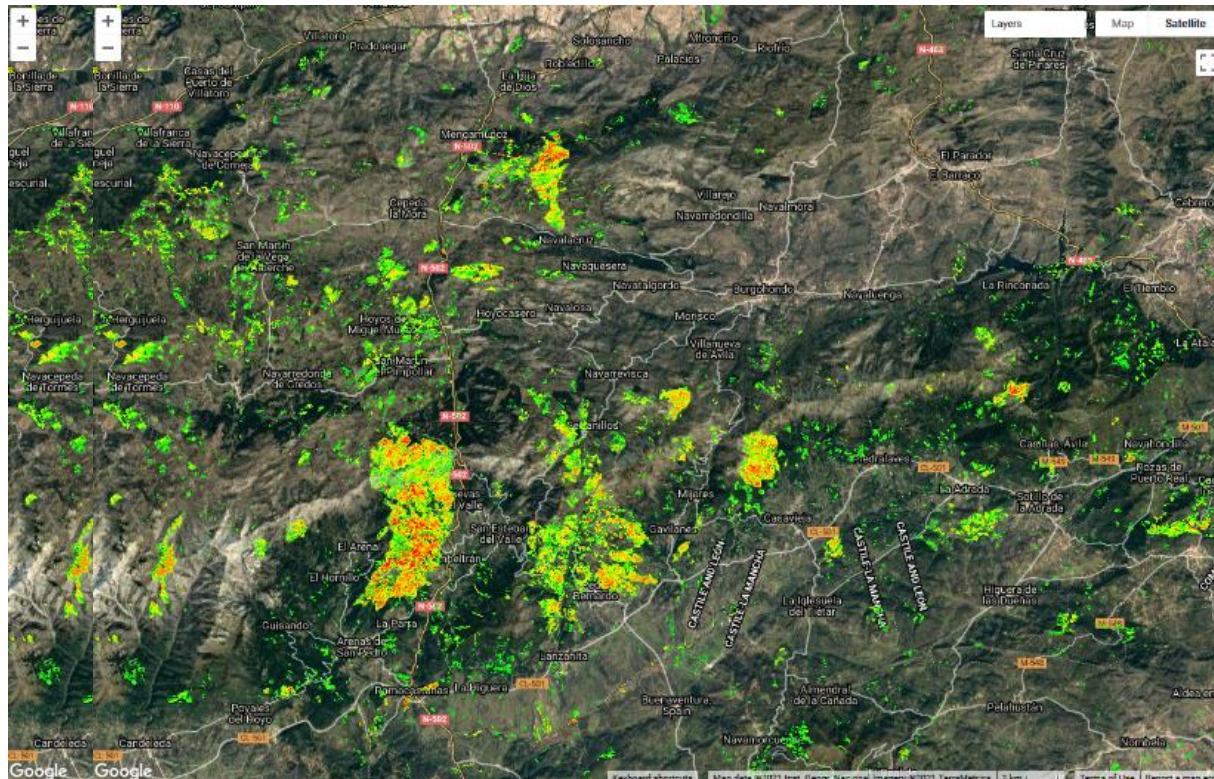
# Scenario 1 – deforestation detection

- where is the forest area that was lost
- when the decrease in forest biomass happened (year)
- what is the magnitude of change

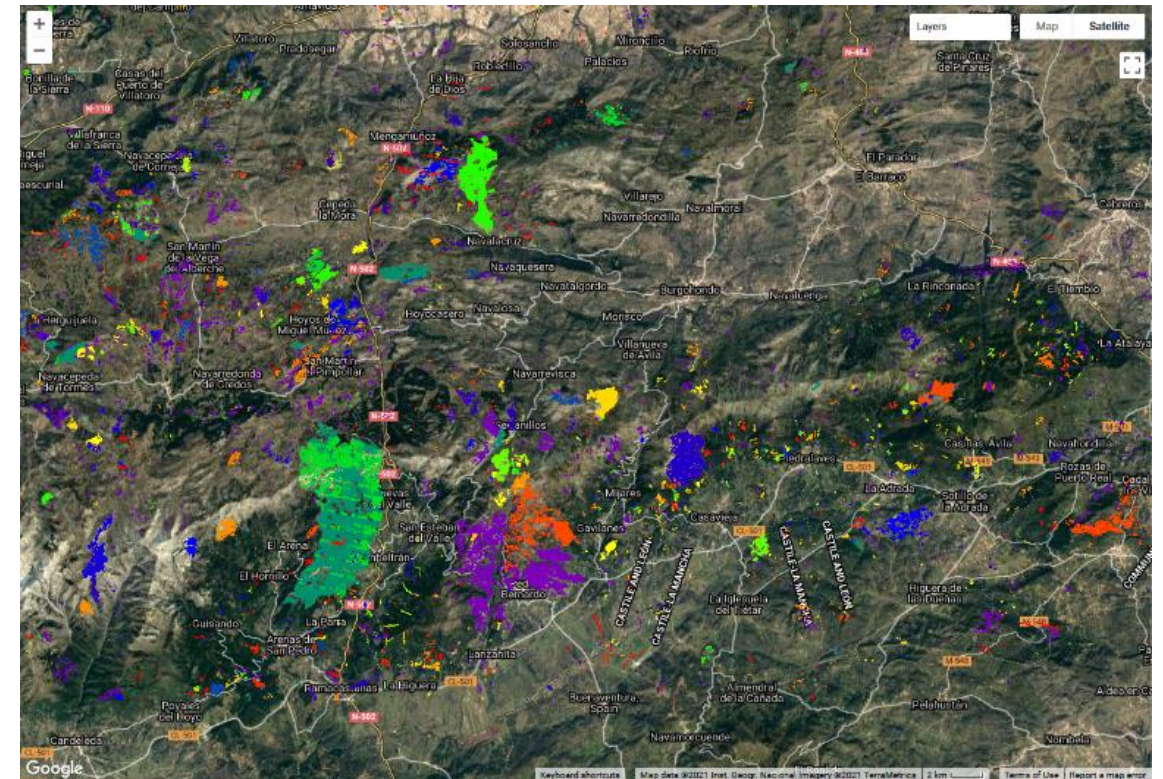


# Scenario 1 – deforestation detection

Burned forest, Spain



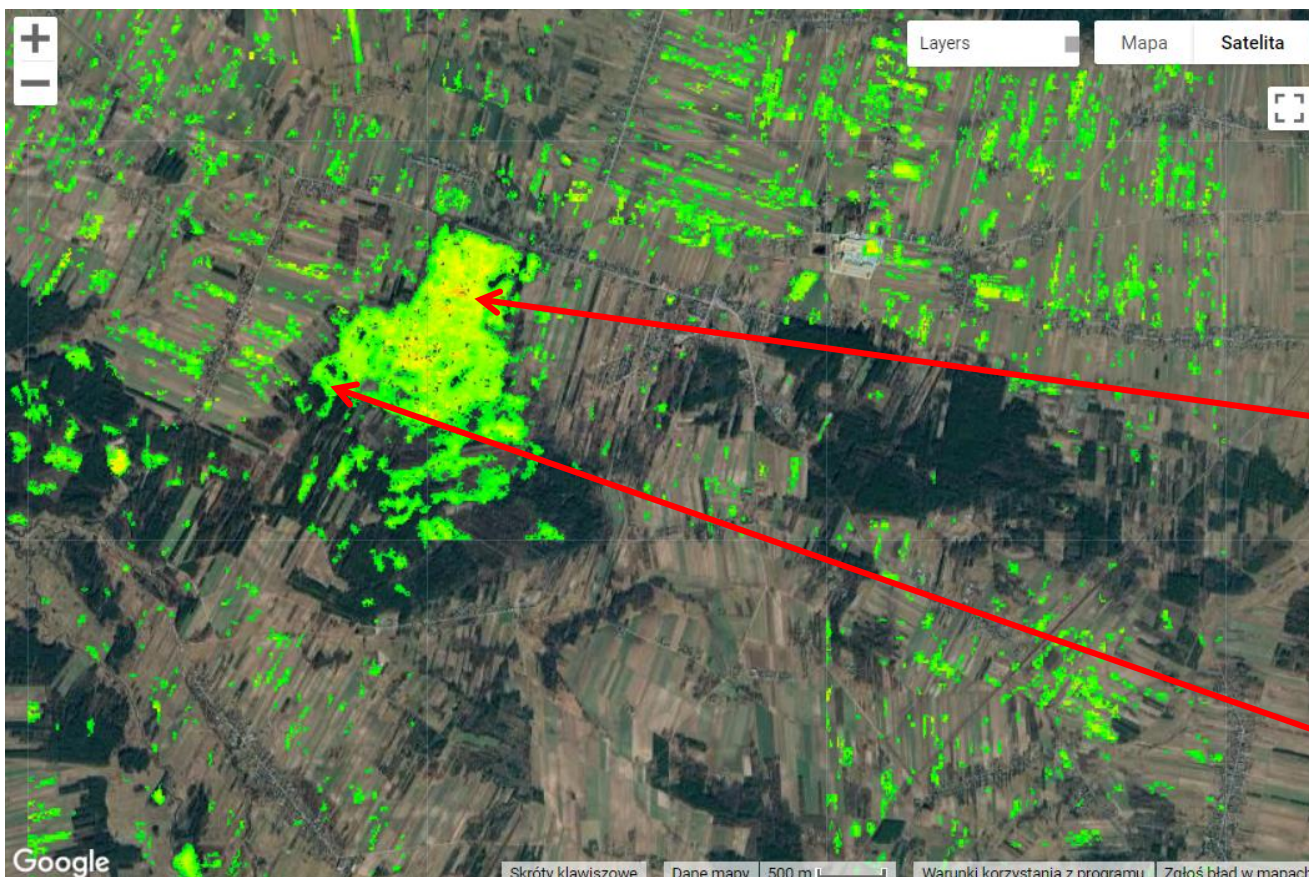
Magnitude of change



Year of change detection

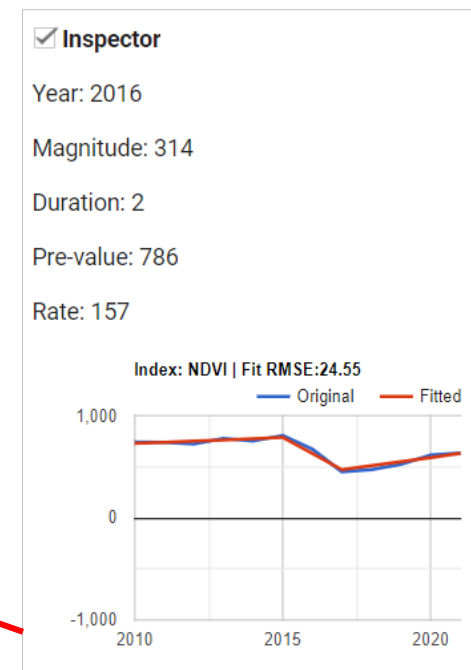
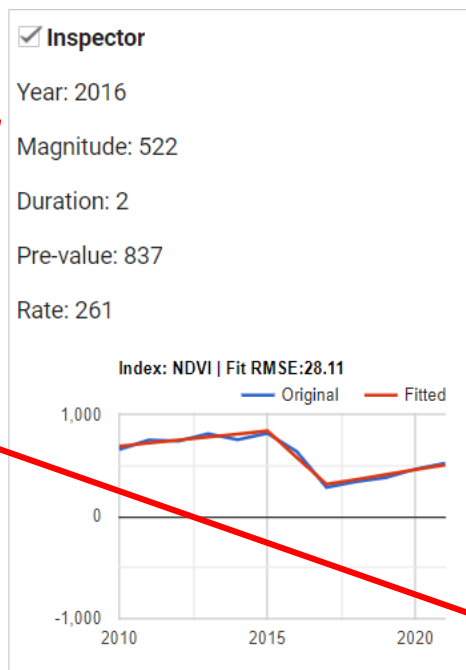


# Scenario 1 – deforestation detection



Forest destroyed by strong wind, central Poland

- Magnitude of change



# Scenario 1 – deforestation detection



Open pit mine in Saxony, Germany

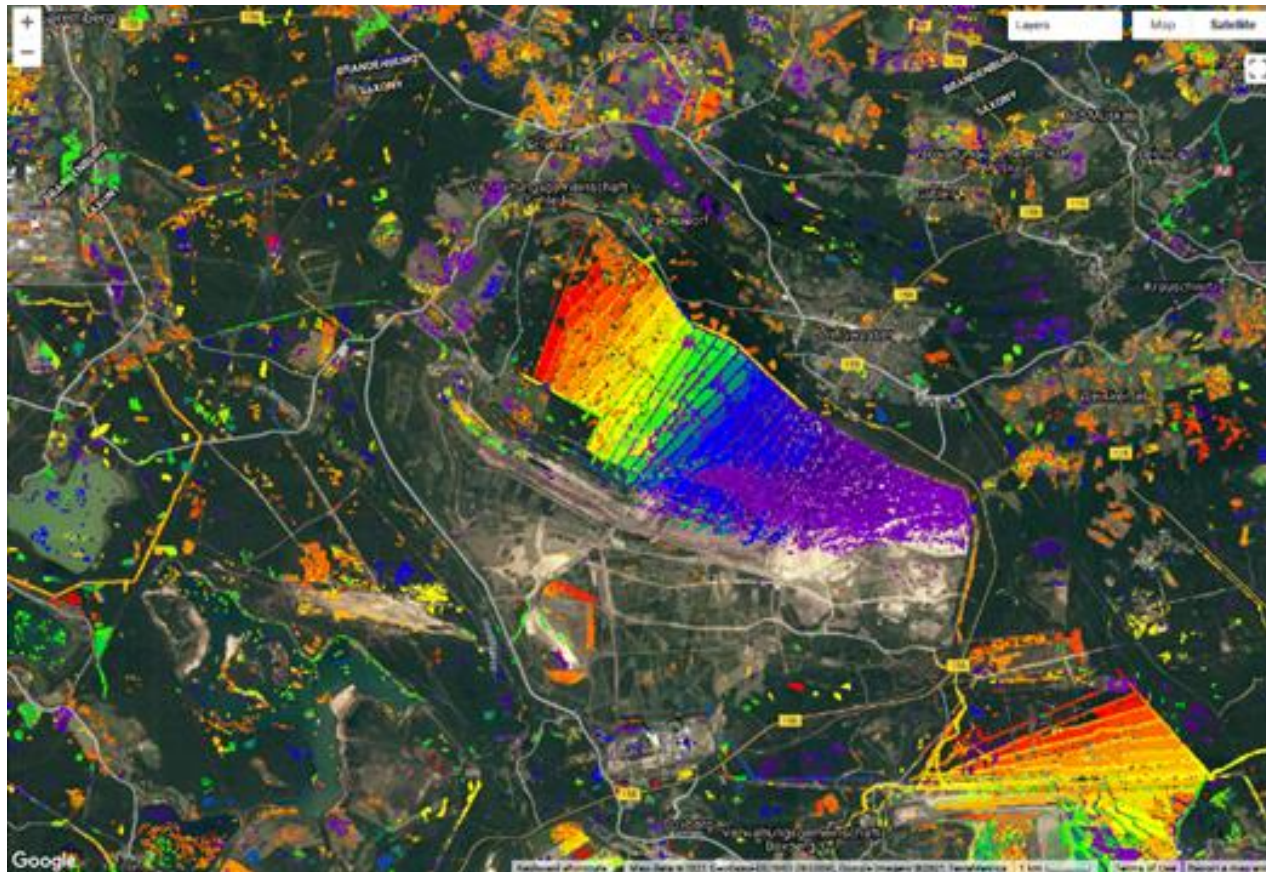
- Year of change detection



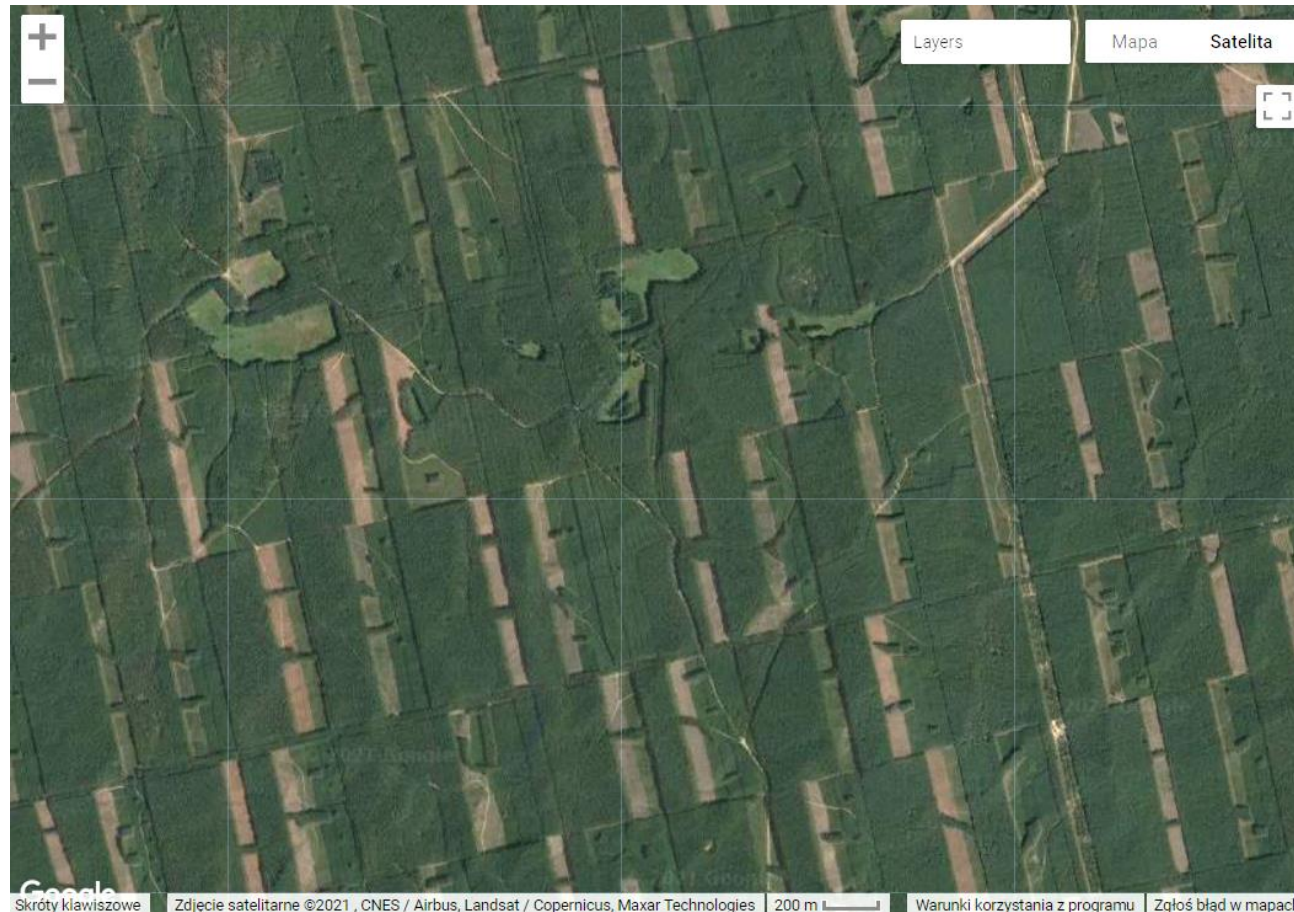
# Scenario 1 – deforestation detection

Open pit mine in Saxony, Germany

- Year of change detection



## Scenario 2 – forest areas monitoring

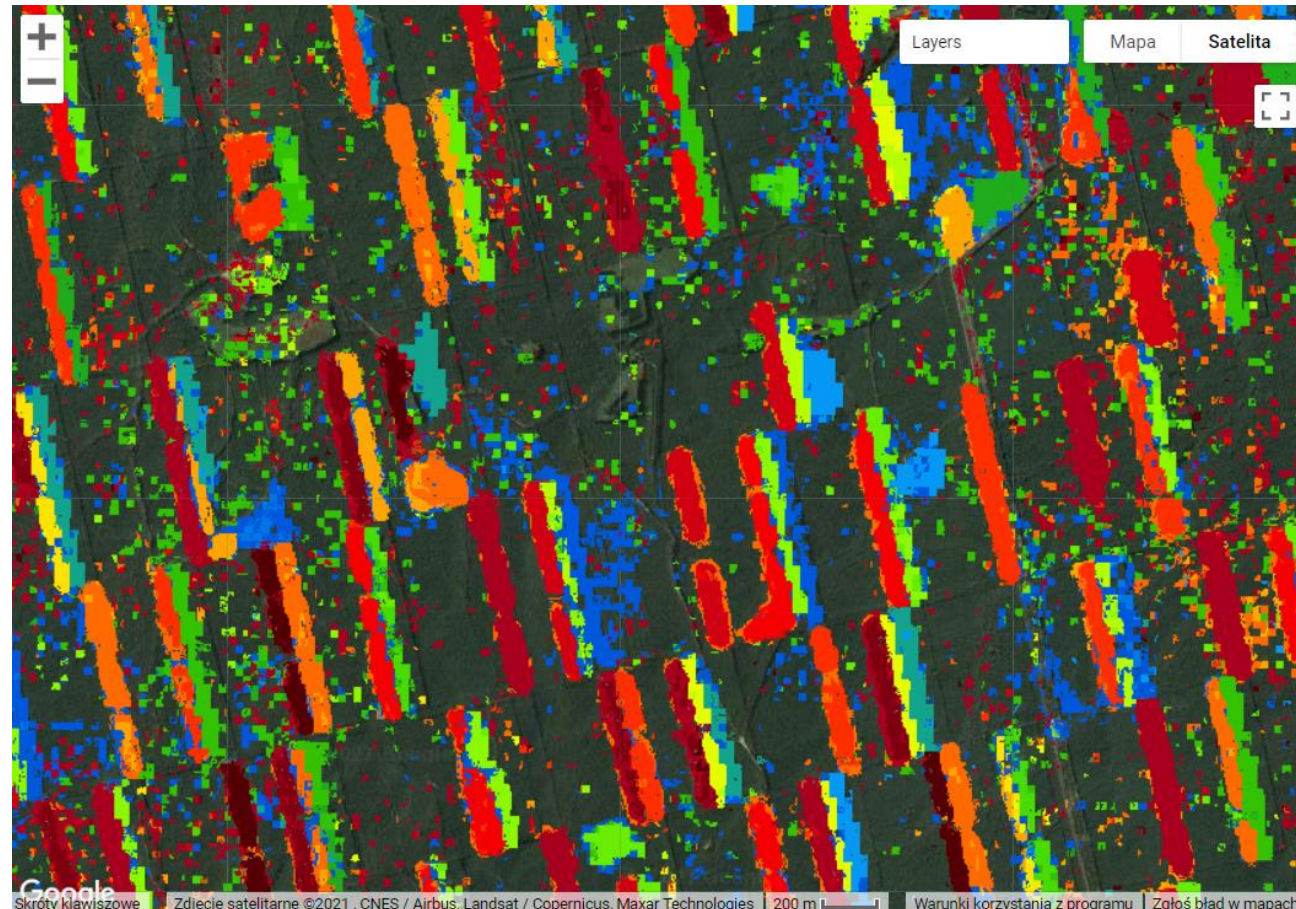


Forest complex, NW Poland

- Pine forest on dune area
- Many clear cuts



## Scenario 2 – forest areas monitoring



Forest complex, NW Poland

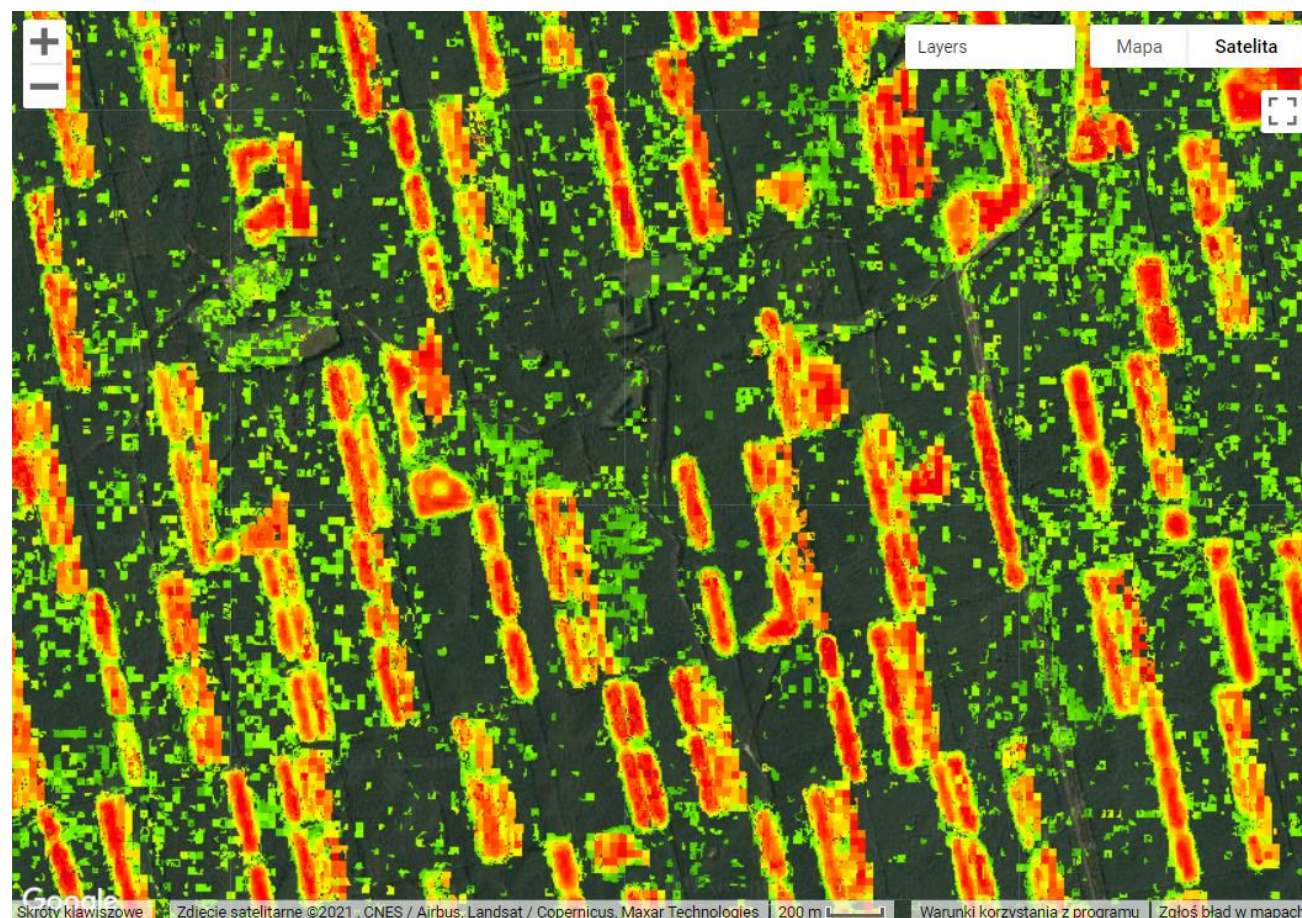
- Pine forest on dune area
- Many clear cuts
- Greatest loss

Year of detection





## Scenario 2 – forest areas monitoring



Forest complex, NW Poland

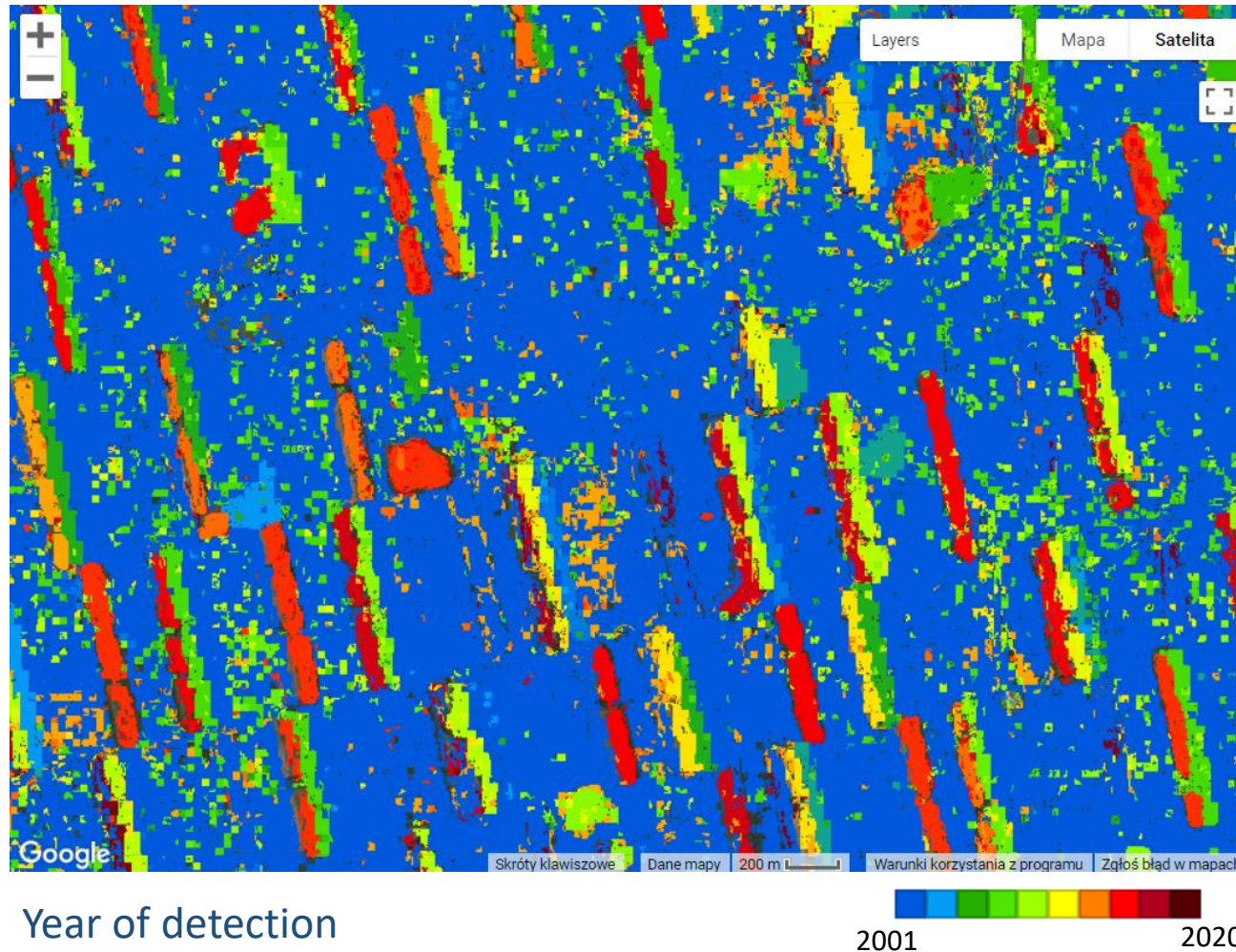
- Pine forest on dune area
- Many clear cuts
- Greatest loss



Magnitude of change



## Scenario 2 – forest areas monitoring

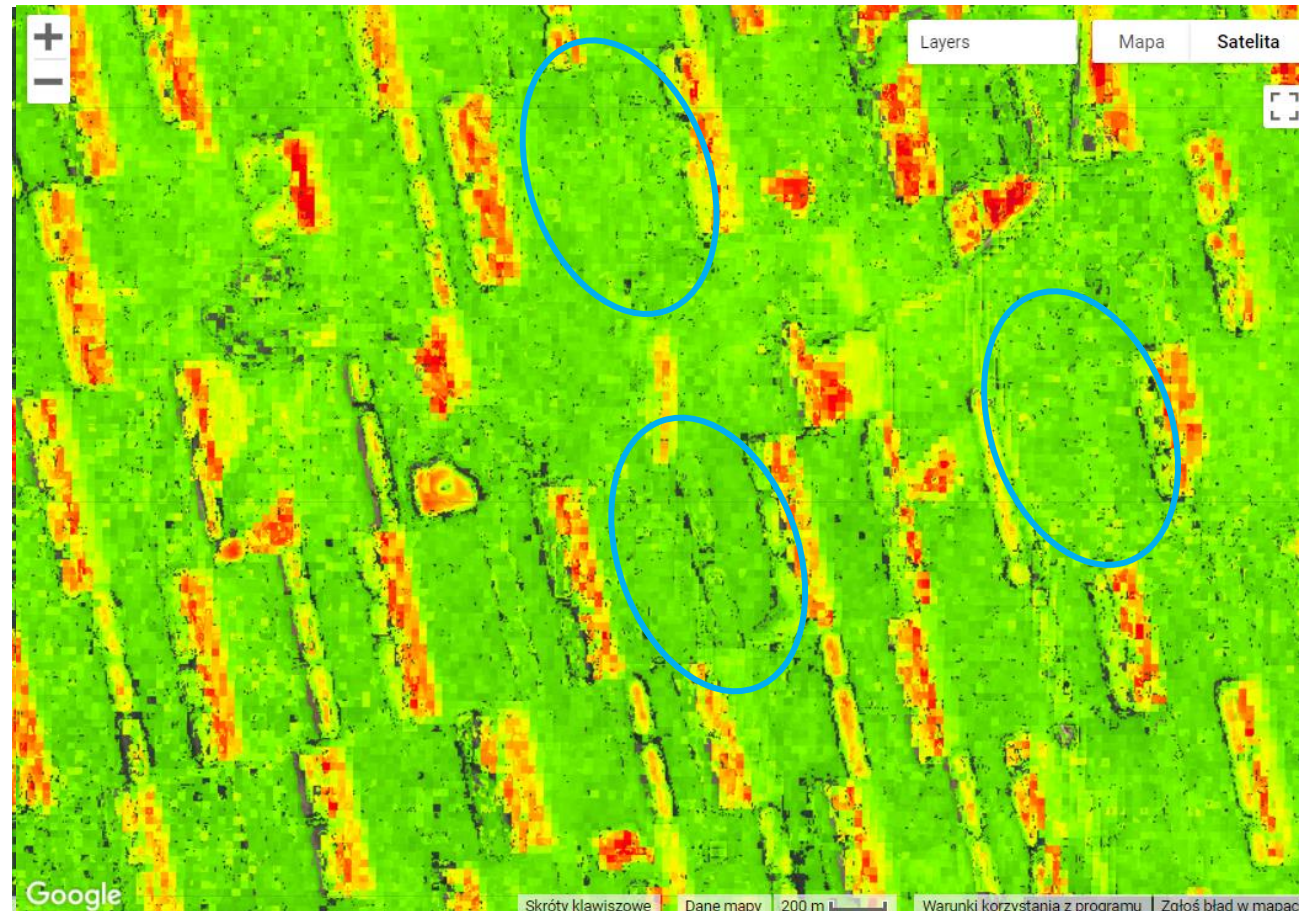


Forest complex, NW Poland

- Pine forest on dune area
- Many clear cuts
- Greatest gain



## Scenario 2 – forest areas monitoring



Forest complex, NW Poland

- Pine forest in dune area
- Many clear cuts
- Greatest loss vs. greatest gain

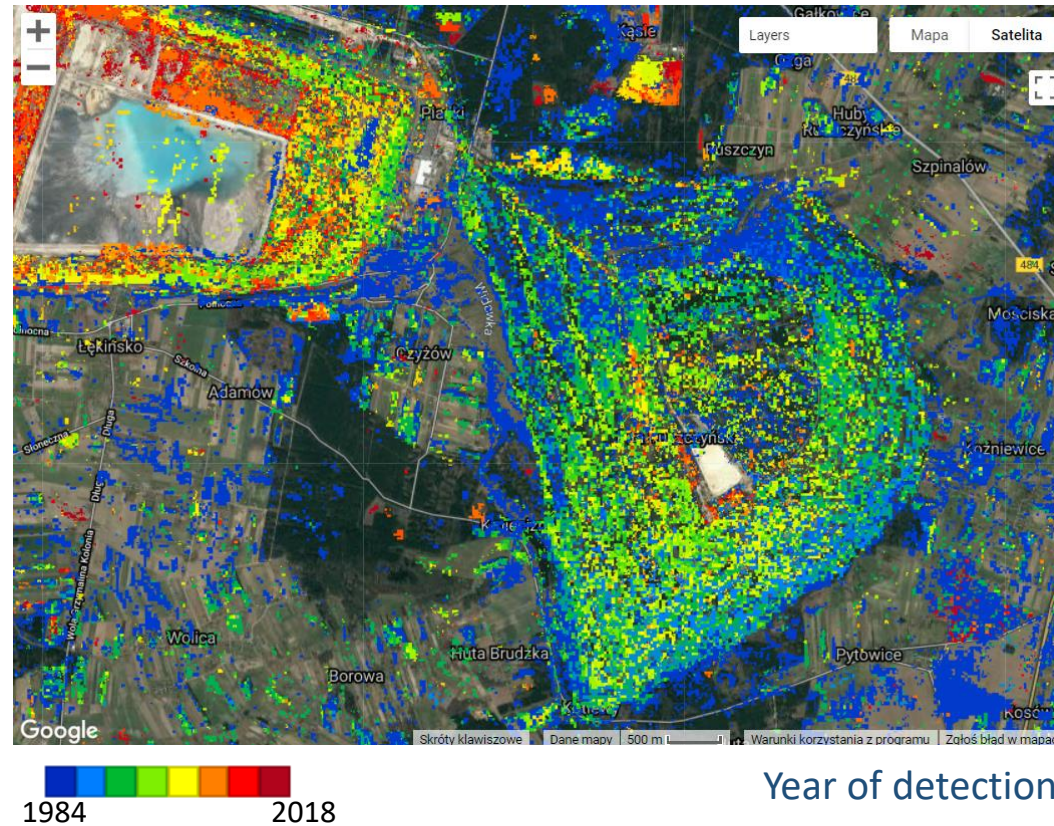
Magnitude of change



# Scenario 3 – afforestation/reforestation projects monitoring



Post-mining heap on Landsat 5 images, Mount Kamiensk, Poland



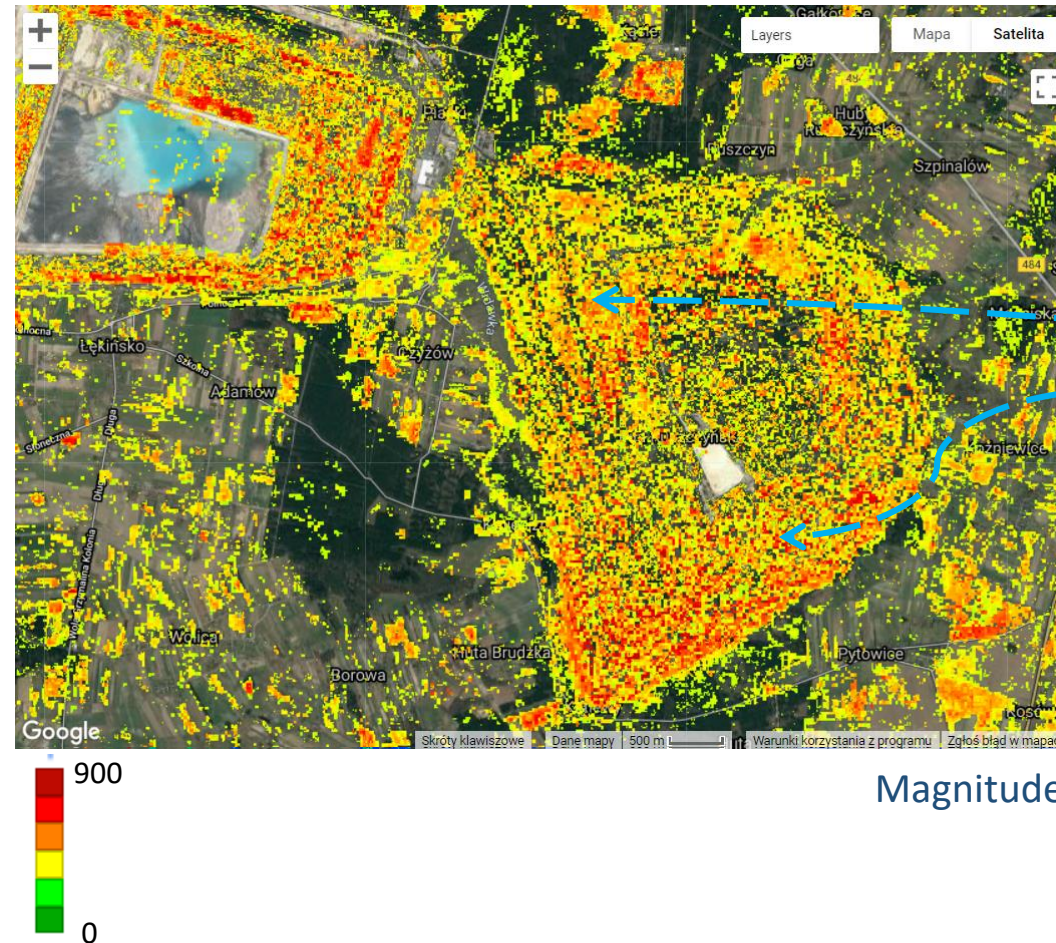
Credit: PGE



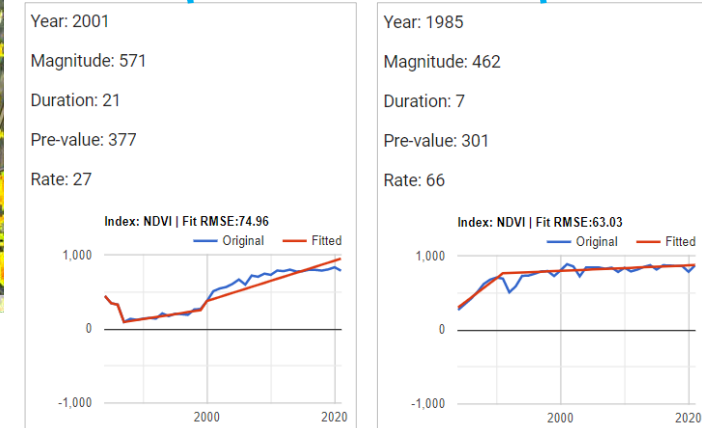
# Scenario 3 – afforestation/reforestation projects monitoring



Post-mining heap on Landsat 5 images, Mount Kamiensk, Poland



Credit: PGE





# LandTrendr Change Mapper Application

Implementation into the Mail Map Portal:

- additional tool to monitor forest areas,
- gives an extra information to the user.



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# Thank you for your attention!



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Carbon sequestration potential of Marginal Lands in Europe, Mail Conference 13.12.2021, Online