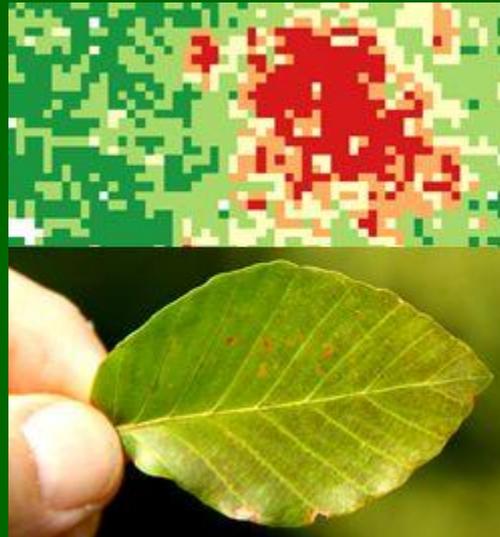


FOREST HEALTH MONITORING SYSTEM IN HUNGARY BASED ON MODIS PRODUCTS



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Debrecen, 24 May 2018



Nemzeti Agrárkutatási és Innovációs Központ • National Agricultural Research and Innovation Centre
Erdészeti Tudományos Intézet • Forest Research Institute

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CLIMATE CHANGE: A SERIOUS ISSUE



+1.5°

+2.5°









Fotó: Koltay A.



Fotó: Koltay A.



Fotó: Koltay A.

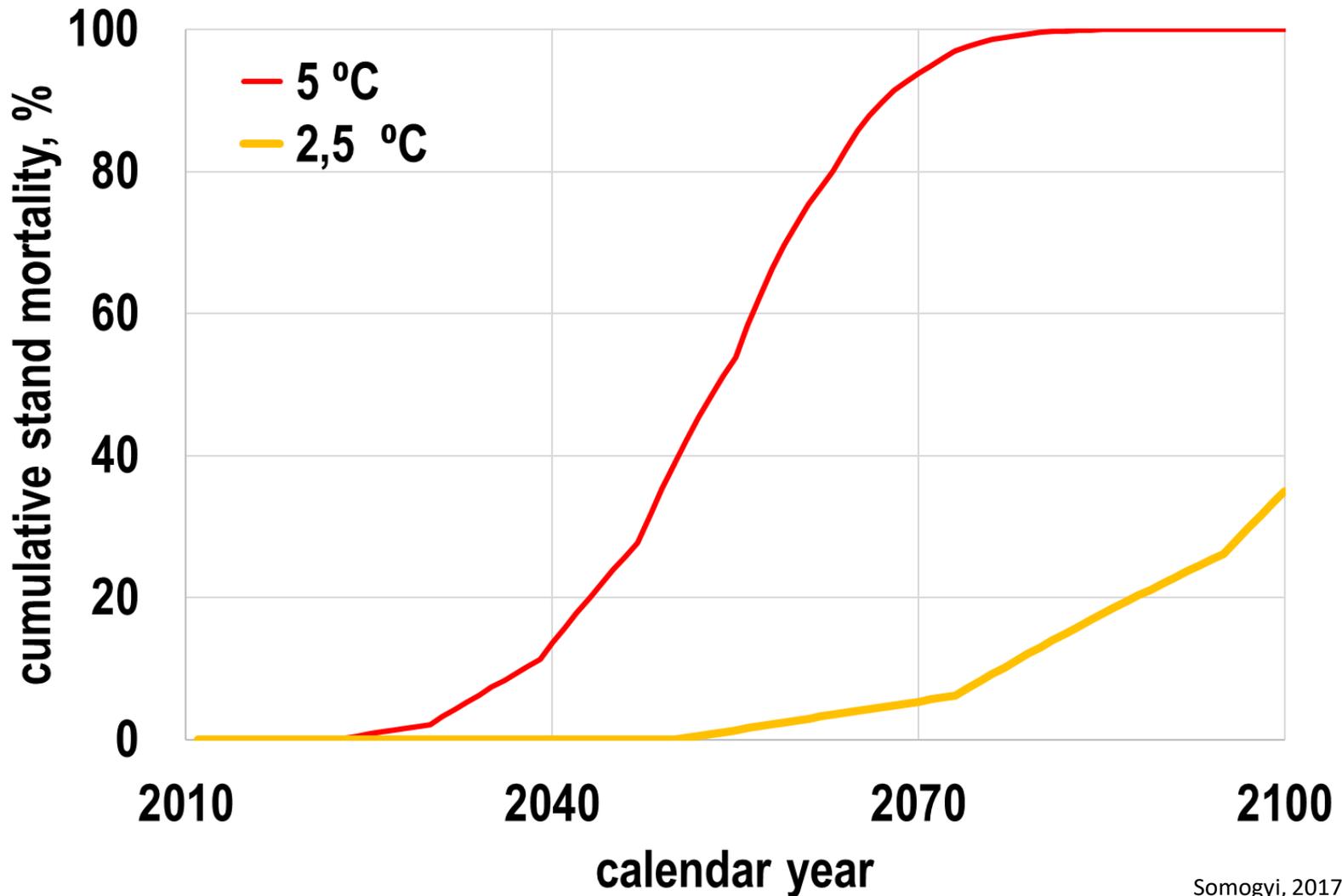


Fotó: Koltay A.



Fotó: Koltay A.

CLIMATE CHANGE MIGHT DESTROY MOST FORESTS





20th June

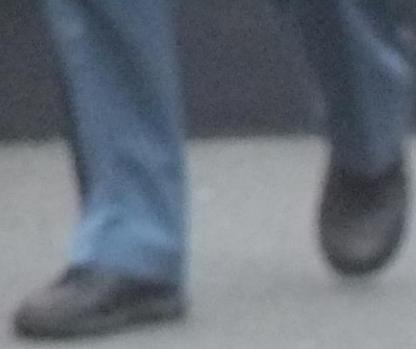
Fotó: Csóka Gy.



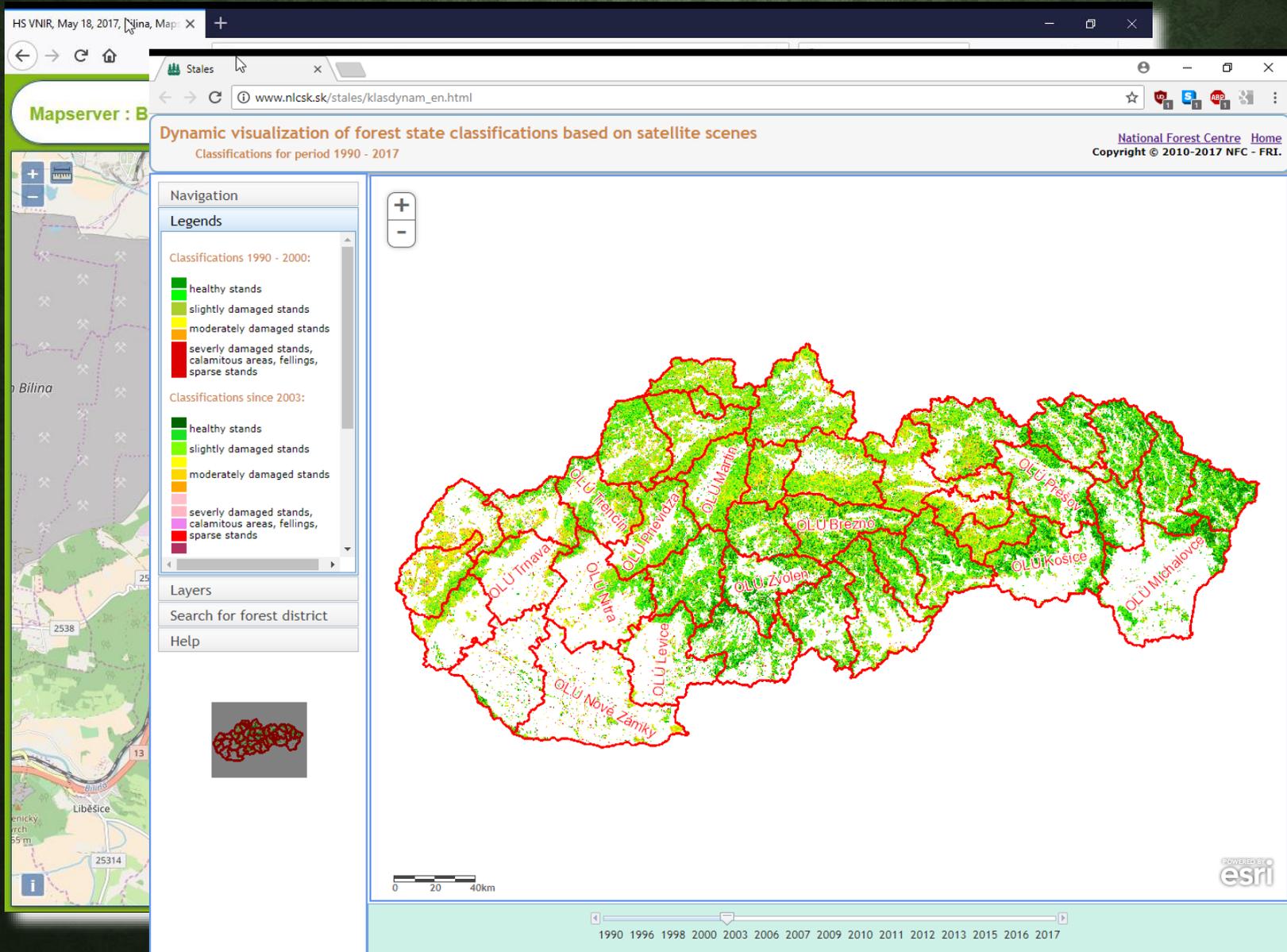
Fotó: Csóka Gy.

20th July

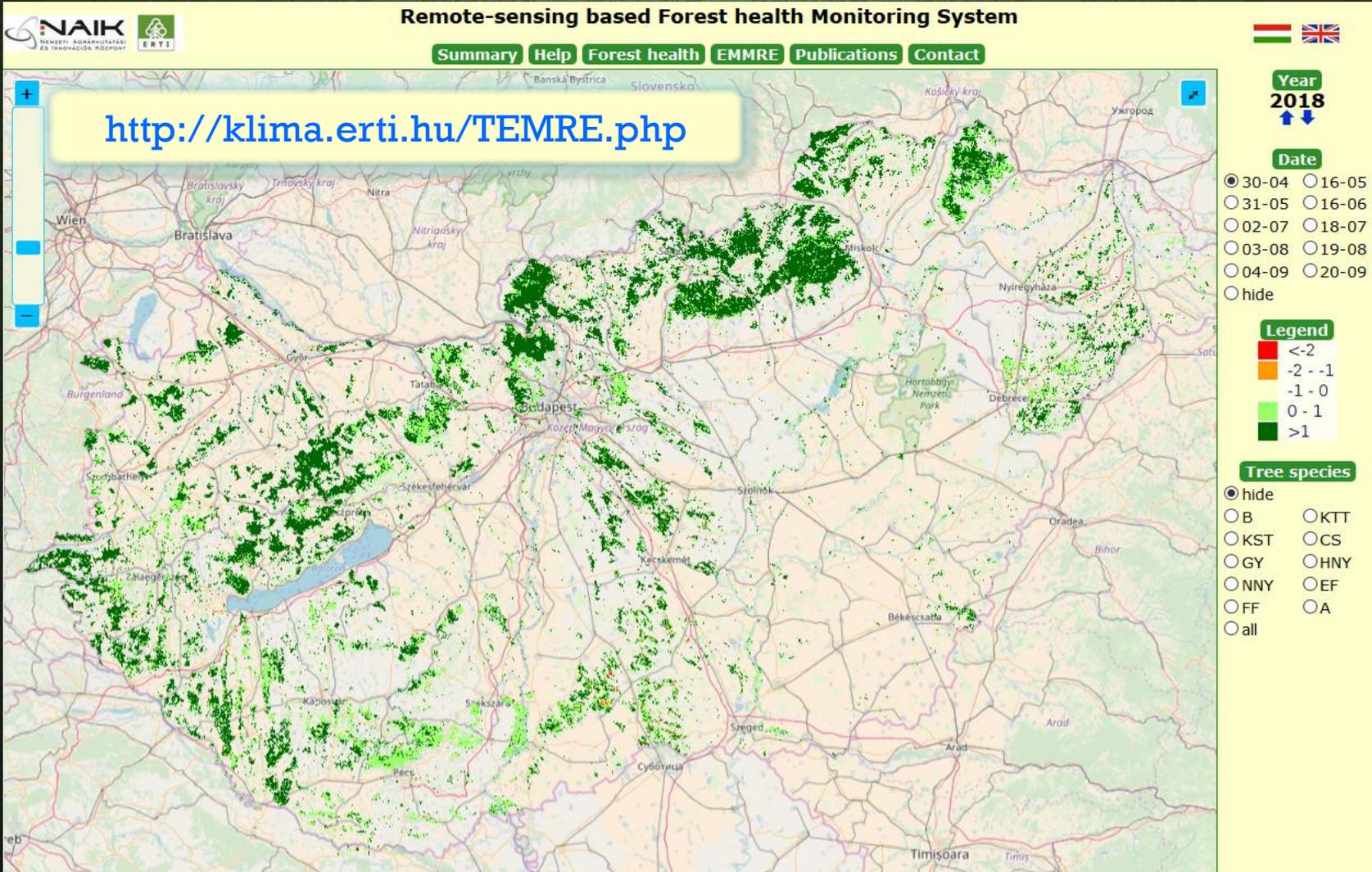
**SYSTEM
CHANGE
NOT
CLIMATE
CHANGE!**



REMOTE-SENSING BASED SYSTEMS IN NEIGHBOURING COUNTRIES

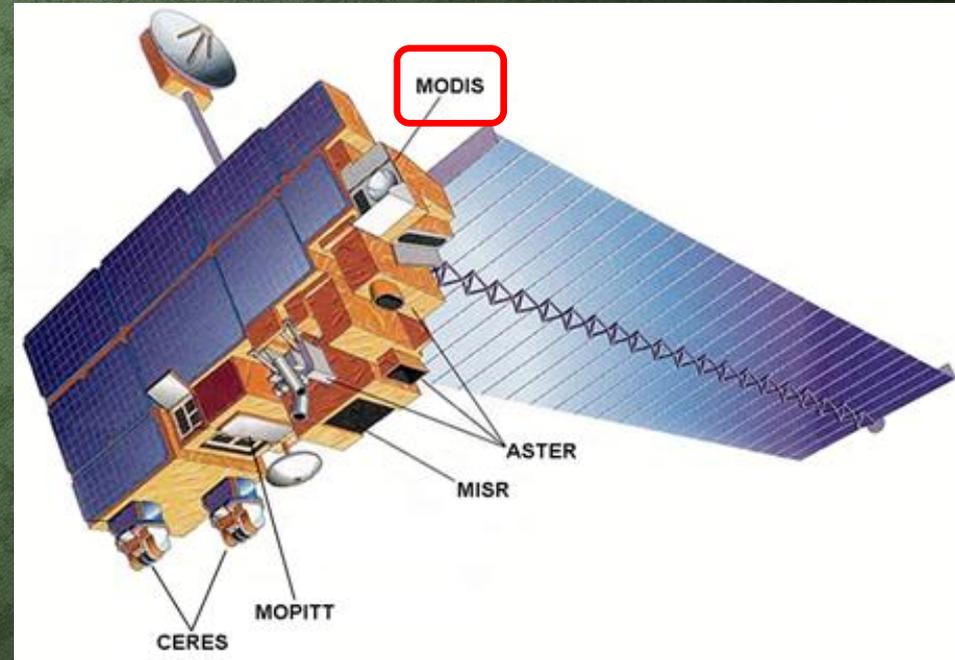


TEMRE: HUNGARIAN REMOTE SENSING-BASED FOREST HEALTH MONITORING SYSTEM



RS & PROGRAMMING COMPONENT

- free data from TERRA's MODIS sensor
- for forest mask of the country (241,830 pixels, 6.25 ha each)
- proprietary programs
 - download, filter for errors & process: in R
 - visualize: in php using Geoserver

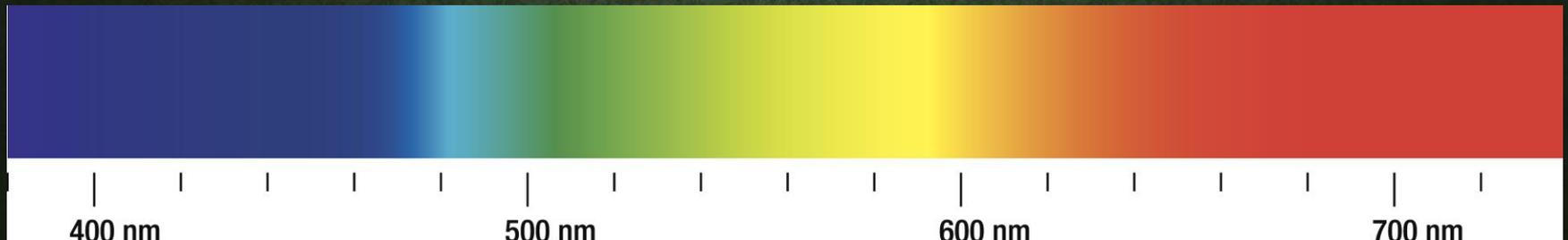


**FOR EVERY PIXEL, YEAR & (FIXED)
16-DAY PERIOD DURING THE
VEGETATION SEASON:**

$$\text{NDVI} = \frac{\text{NIR} - \text{RED}}{\text{NIR} + \text{RED}}$$

RED

NIR



STANDARDIZED NDVI

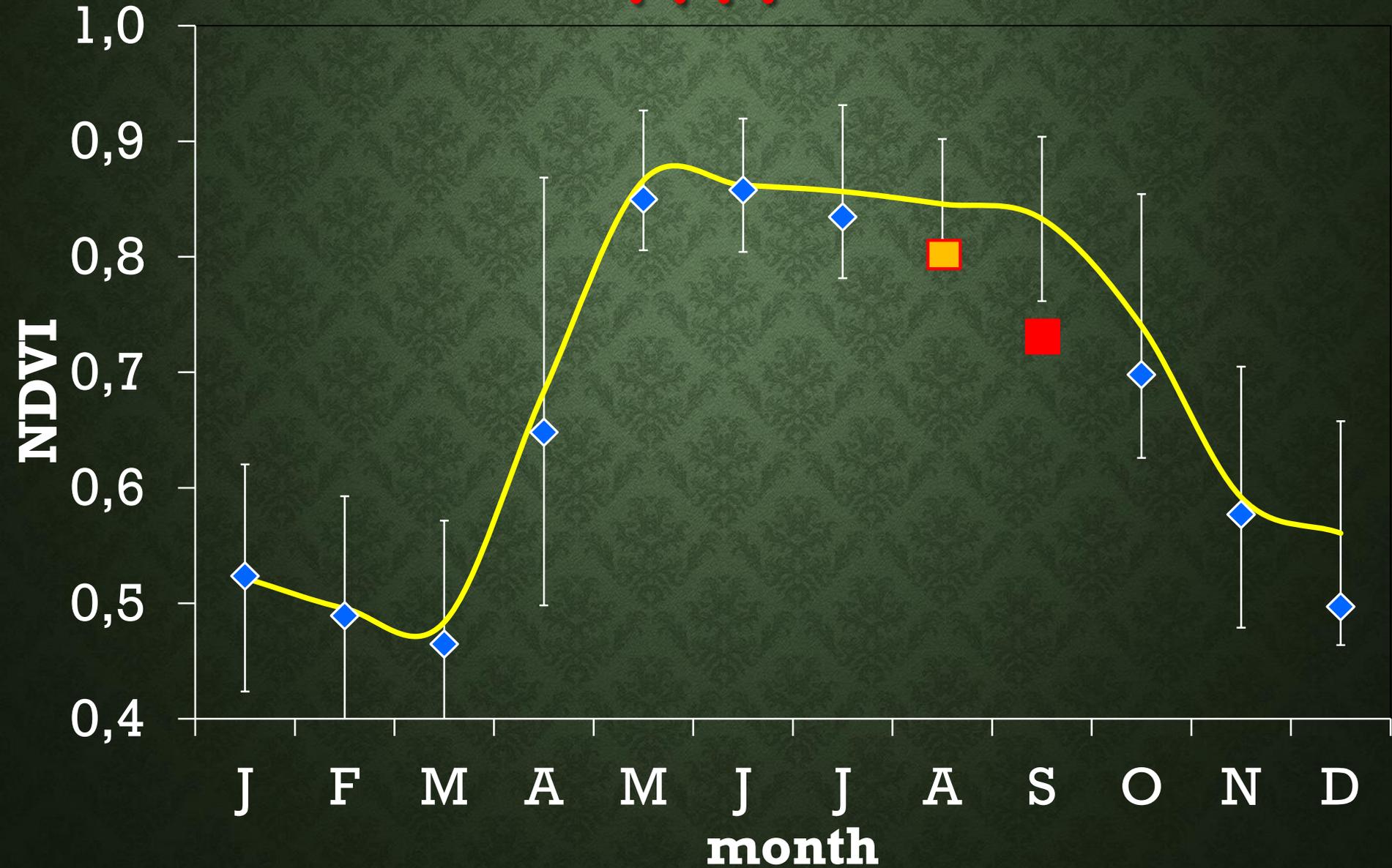
$$Z = \frac{NDVI - \overline{NDVI}}{\sigma}$$

\overline{NDVI} = average of *NDVIs* of previous years

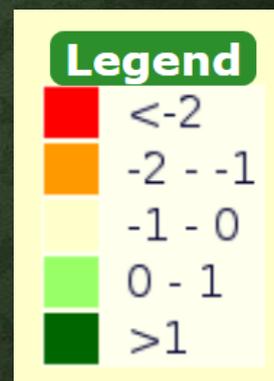
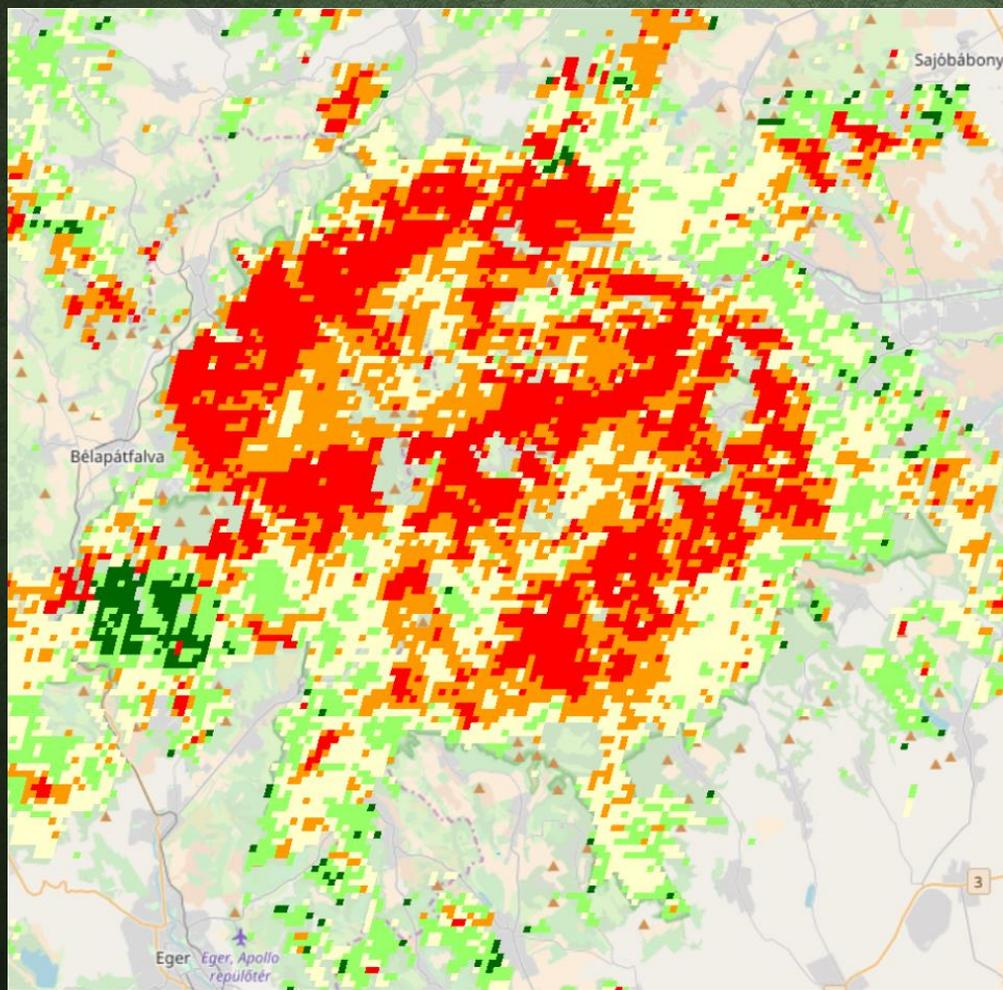
σ = STD of *NDVIs* of previous years

AVERAGE / ACTUAL NDVI \pm 2*STD

????



INTERPRETATION COMPONENT: WHAT DO & COLOURS MEAN?



INTERPRETATION COMPONENT: WHAT DO & COLOURS MEAN?

- current deviation from long-term mean
- due to
 - errors
 - (temporary) decline of physiological activity due to abiotic or biotic causes
 - (temporary) loss of leaf area (e.g. due to harvests)
 - other factors

ATTRIBUTION COMPONENT: „PROBLEMS”

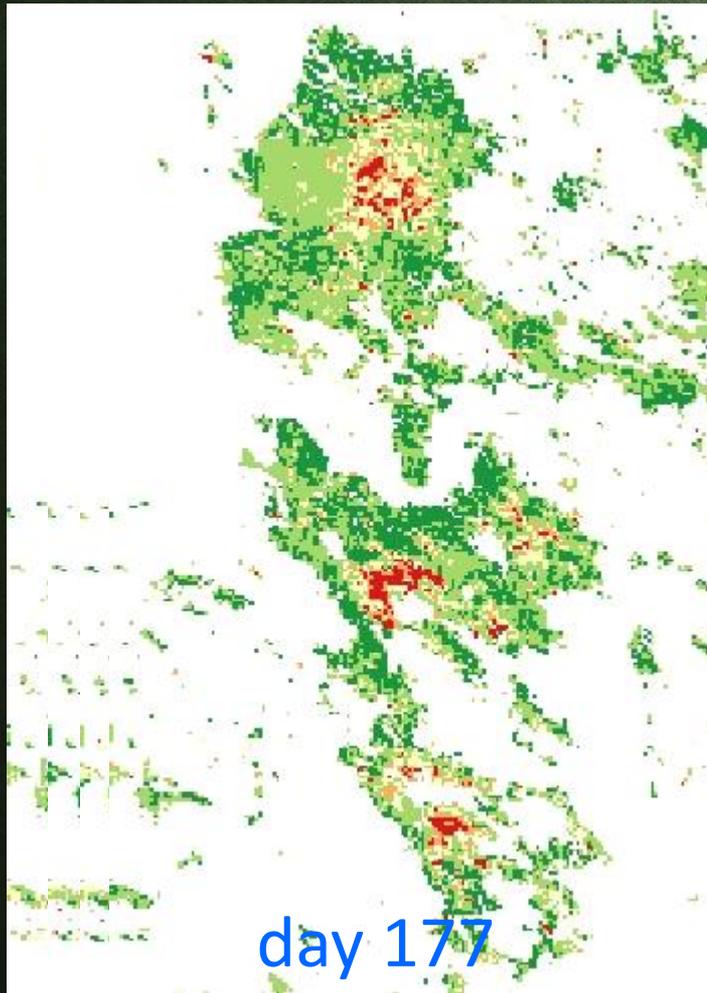
- might be indicated by discolouration
(even before visible symptoms in the field)
 - on *large* (>1000 ha) contiguous areas
 - *sustained* over time
 - *or both*
- should be confirmed by field observations
(and/or laboratory tests)

DEC 2014 ICE BREAK IN PILIS AND BÖRZSÖNY MOUNTAINS

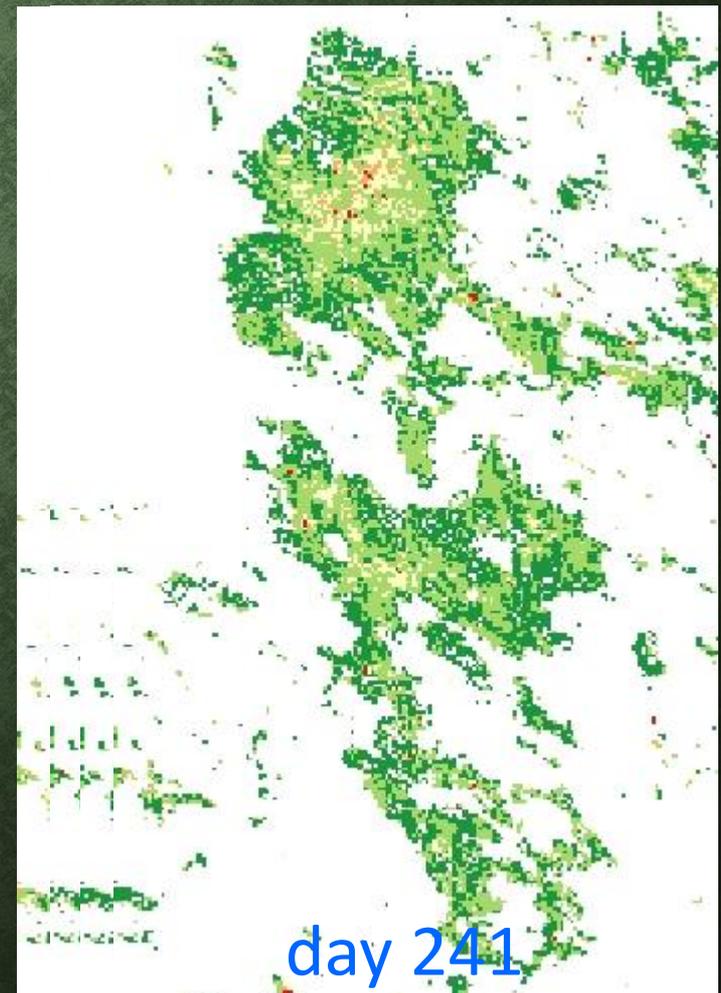


DEC 2014 ICE BREAK IN PILIS AND BÖRZSÖNY MOUNTAINS

2015

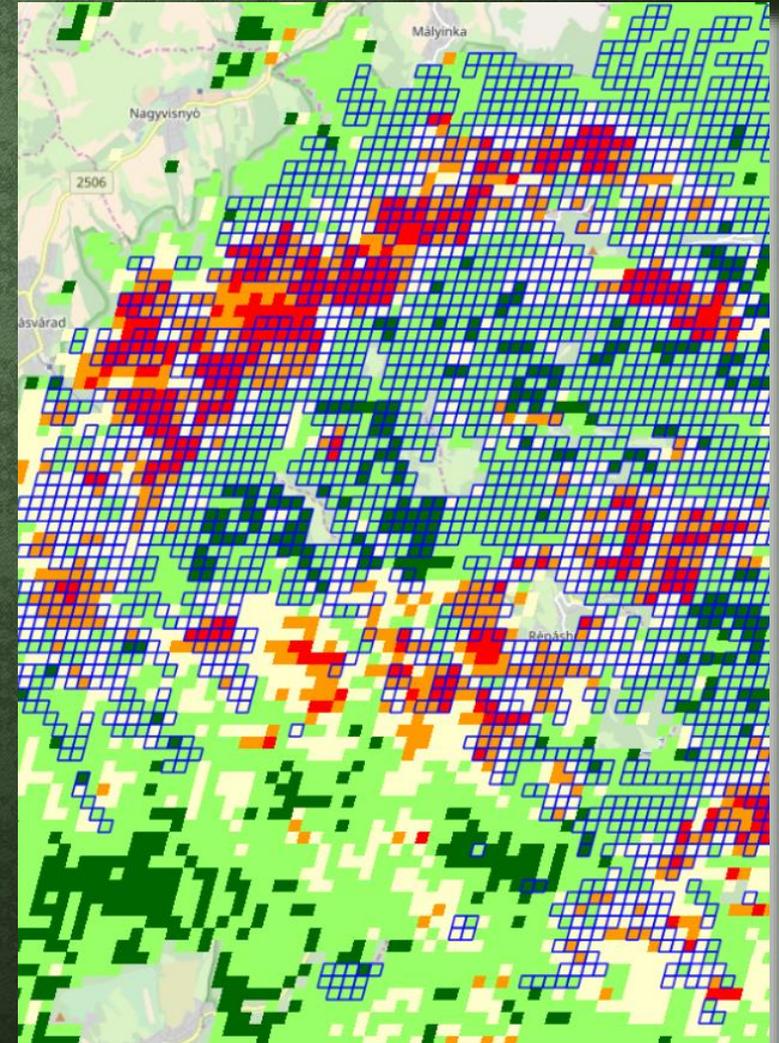


2016



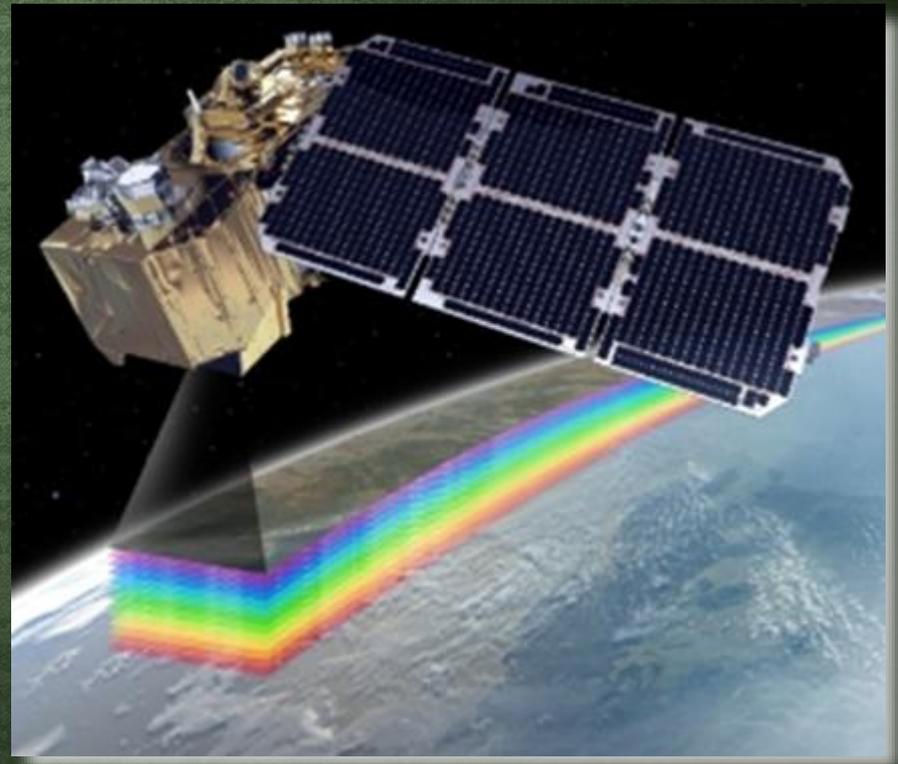
ATTRIBUTION IS AIDED BY USING ADDITIONAL LAYERS

- currently: (10) tree species
- in the pipeline: Digital Elevation Model, slope, aspect, genetic soil type, physical soil type, rooting depth, hidrological site type, groundwater level, past and recent climate



OTHER PLANNED ACTIVITIES

- analyses of time series of known calamities
- analyses of effects of climate change
- trying other indices
- using Sentinel data
- improving the forest mask



CLIMATE CHANGE: A SERIOUS ISSUE

