Growing EO in the Estonian public sector

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23.05.2022

living planet symposium

UNIVERSITY OF TARTU

During the last years, the Estonian public sector has strongly supported the greater use of EO derived information. The most significant Remote Sensing project KAUGSEIRE RITA was initiated by:

- The Ministry of the Environment,
- The Ministry of Rural Affairs,
- The Ministry of Economic Affairs and Communications,
- The Ministry of the Interior.

- The Estonian Research Council

University of Tartu: Tartu observatory, Institute of Ecology and Earth Sciences, Estonian Marine Institute, Institute of Physics

Estonian University of Life Sciences: Institute of Agricultural and Environmental Sciences, Institute of Forestry and Rural Engineering

Tallinn University of Technology: Department of Marine Systems, Departmnet of Civil Engineering and Architecture

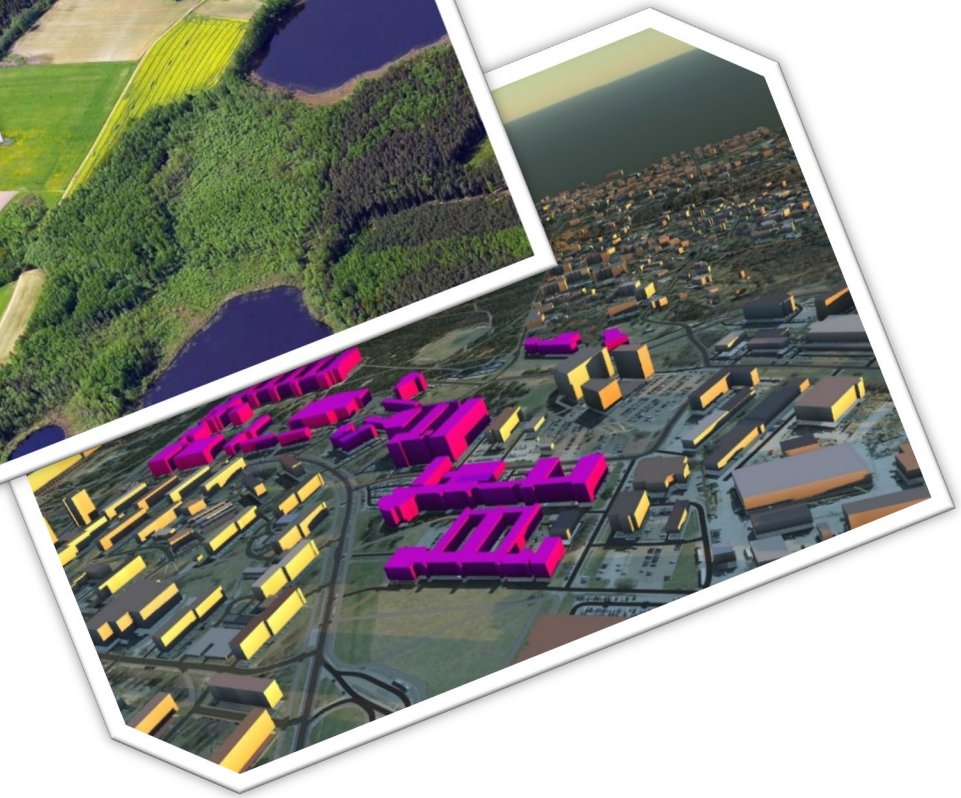
Kappazeta Ltd.

Prevention and eradication of landscape fires

Monitoring of floods and water levels

Monitoring of the use of agricultural land

Planning and monitoring of construction activities



Fire risk assessment and forecasting

Additional data

Better meteorological data (Precipitation data come from the weather radar in Sürgavere)

ca 1x1 km

Temperature, wind field and radiation data come from meteorological models.

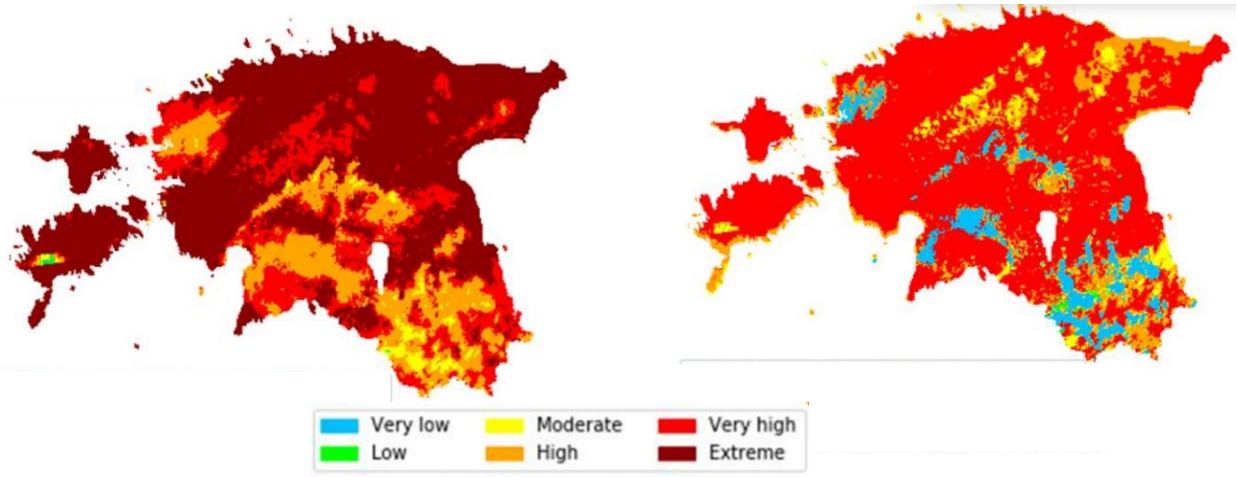
The Canadian model is after a single rainfall less sensitive to a sharp reduction in fire risk

Methodology

Canadian model index FWI (Fire Weather Index). FWI provides a more detailed picture than the index used so far, and the computing of moisture reserves is more accurate.

Output

More precise fire hazard map



Canadian model

Nesterov methodology

Fire propagation algorithm

Input

The developed fire hazard map prototype

Due to its flexibility, it allows taking into account seasonal changes; a free resource operating in R environment code

Methodology

Fire hazard map + recommended methods for detection of fire, initial analysis and hazard modelling

FBP (Forest Fire Behavior Prediction System) Index (Canadian)

Output

Fire propagation algorithm and data flows.
The spread of fire modelling is partly a preventive, pre-fire activity that allows for better preparedness to respond to a possible fire and partially parallel to the fire – a possible spread of fire forecasting in a real fire site and conditions.

Monitoring of coastal and inland waters

Input

Sentinel-1 and Sentinel-2 data

Data from water and buoy stations

GNSS measurements onboard

Methodology

Validation of satellite altimetric data by local measurements (water and buoy stations and GNSS measurements onboard)

Output

More accurate water level forecasting service in the Baltic Sea (incl. Estonian coastal sea)

The height of the water level is possible to determine for offshore (95% probability) of 0.05 ± 0.16 m and for inland waters, 0.17 ± 0.56 m.

Moisture regime of wetland

Input

Radar remote sensing (Sentinel-1 satellite)

Methodology

The assessment of the change is based on the similarity, i.e. coherence, of the images between the two overflights over the mining allotment.

A median coherence of less than 0.2 indicates mining operations (Tampuu et al., 2020)

Output

Methodology for monitoring peat deposit

Helps to verify the correctness of the receipt of resource fees

Scientists discovered that we can get information about mining operations by assessing the changes of moister regime of wetland.

Crop identification using satellite information

Input

Sentinel-1 and Sentinel-2 data

Additional terrestrial spatial (field locations and soil information) and weather data (precipitation and temperature)

Methodology

Crop identification model methodology with precision estimates
Classification of Estonian plant groups

Output

full-featured software crop detection model based on time series data from Estonian fields

Detailed information about the crop growing in each field

Kaupo Voormansik: Friday, 02:15 pm oral presentation

Remote sensing applications in the construction sector

Input

Elevation data (from Land Board)

Data collected by a drone

Methodology

Terrestrial laser scanning

Exemplary procedures for both buildings and road construction

important in error analysis

Output

prototype based on aerial laser scanning and drone monitoring

These can be used to map construction activities and monitor the construction process.

Plan for sustainable implementation of RS for the Estonian public sector

The plan was developed for the Estonian public sector. It is like a **databank for ideas** on implementing EO in different fields (more than 40 concrete ideas).

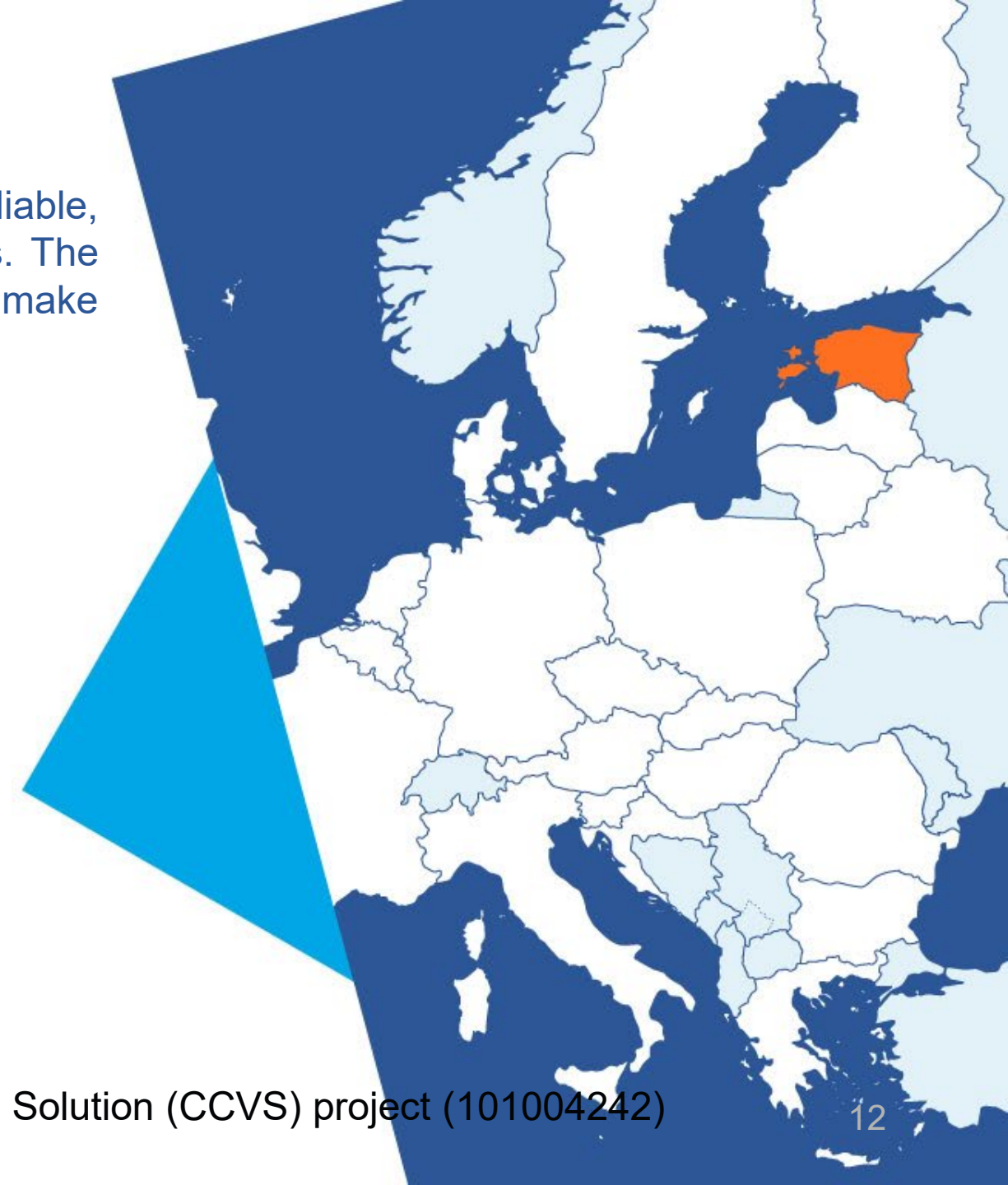
Kaugseire RITA

Some ideas from the plan (where RS can be engaged):

- Improving coastal meadow management
- Monitoring vegetation stress
- Controlling pests and diseases
- Monitoring of potentially toxic algae blooms
- Monitoring of plastics and other litter in water and beaches
- Assessing the potential solar and wind energy
- Determining extreme weather conditions
- Measuring anthropogenic carbon dioxide emissions

Our project demonstrated that the available data are reliable, which allows us to use them for different public services. The public community has become more aware and can make better decisions.

Thank you for your time!



This project is funded by the European Union

H2020 Copernicus Cal/Val Solution (CCVS) project (101004242)