SATELLITES MONITOR FOREST CHANGES IN FINLAND

The space data based cloud service monitors Finnish forests and provides up-to-date information about the changes for Finnish forest authorities.

The challenge

Satellio has developed a forest monitoring service based on Sentinel-2-data in the Finnish Government led project. The forest authorities had need for new methods to collect up-to-date information about forest inventories and loggings.

The efficient monitoring and controlling large forest areas has been challenging and resource consuming. Previously the forest authorities have mainly relied on field sampling based on required forest user notifications.

The project aimed to develop a tool for forest law enforcement. The operational use of Earth Observation and GNSS data is crucial to ensure updatable and scalable information for large territorial areas.

The space based solution

The developed solution has approval from the Finnish Ministry of Agriculture and Forestry. It is space based and utilises earth observation and satellite navigation which are used for monitoring and accurate positioning. The solution consists of three parts: data acquisition, processing and analysis.

First step is to go through all data from Sentinel-2-satellites using automated machine learning methods and artificial intelligence. As a result, the process produces a coherent time series of the desired geographic areas. Sentinel-2-satellite constellation has a good revisit time providing several images from area of interest.

Next the automatic process analyses image series, detects and classifies forest biomass changes between clear cuts and thinnings. The service interprets types of change, time frame and geometry. Generated information is enriched with forest inventory data to estimate biomass volume change.

The results can be viewed and integrated to existing geographic information systems (GIS) using Satellio's web cloud service. The technology can be scaled anywhere and anytime in the world.

Benefits to Citizens

The space-based solution is an efficient tool to monitor and detect changes in forest areas. The technology is suitable from small to large forest areas and they can be located anywhere from nearby to remote areas as Sentinel-2-images are available anywhere on Earth.

The automatic processing chain ensures up-to-date and accurate information about environmental changes. This helps to react faster and make relevant decisions concerning the changed forest area.

Automatic process classifies forest biomass changes between clear cuts (red) and thinnings (yellow).

The technique has a significant positive operational, ecological and financial benefits.

Law enforcement is improved as the changes are recognised efficiently and more accurate analysis can be made to predict direct and indirect impacts of forest use.

The solution enables monitoring to ensure forest management duties are conducted on the correct areas and in the time period as

Thematic Area: AGRICULTURE, FOOD, FORESTRY AND FISHERIES

Region of Application: FINLAND

Sentinel mission used: S2

Copernicus Service used: –

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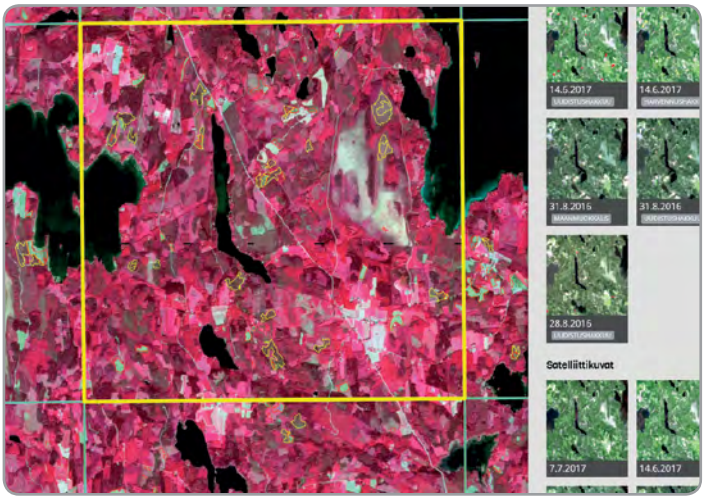
informed. Furthermore, the control of conservation areas is easier as the automatic detection can reveal unexpected or illegal actions in the areas.

Financial benefits are achieved thanks to improved and optimised forest inspections. The field work can be targeted and performed on areas needing attention more efficiently.

Outlook to the future

The service has been developed in a three-year project which ends in 2019. The last year of the project is for operational piloting. The initial service has approval from the Finnish Ministry of Agriculture and Forestry. The forest authorities intend to put the technology into full operational use throughout Finland.

In the future, satellite technology can provide new applications for defining forest management needs and monitoring overall forest condition.



Web service user interface.

> "Effective law enforcement is beneficial to the entire forest industry."

Aki Hostikka,
Head of Financing and Inspections Finnish Forest Centre

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