# Forestry TEP

ESA RepreSent user workshop
4 May 2023

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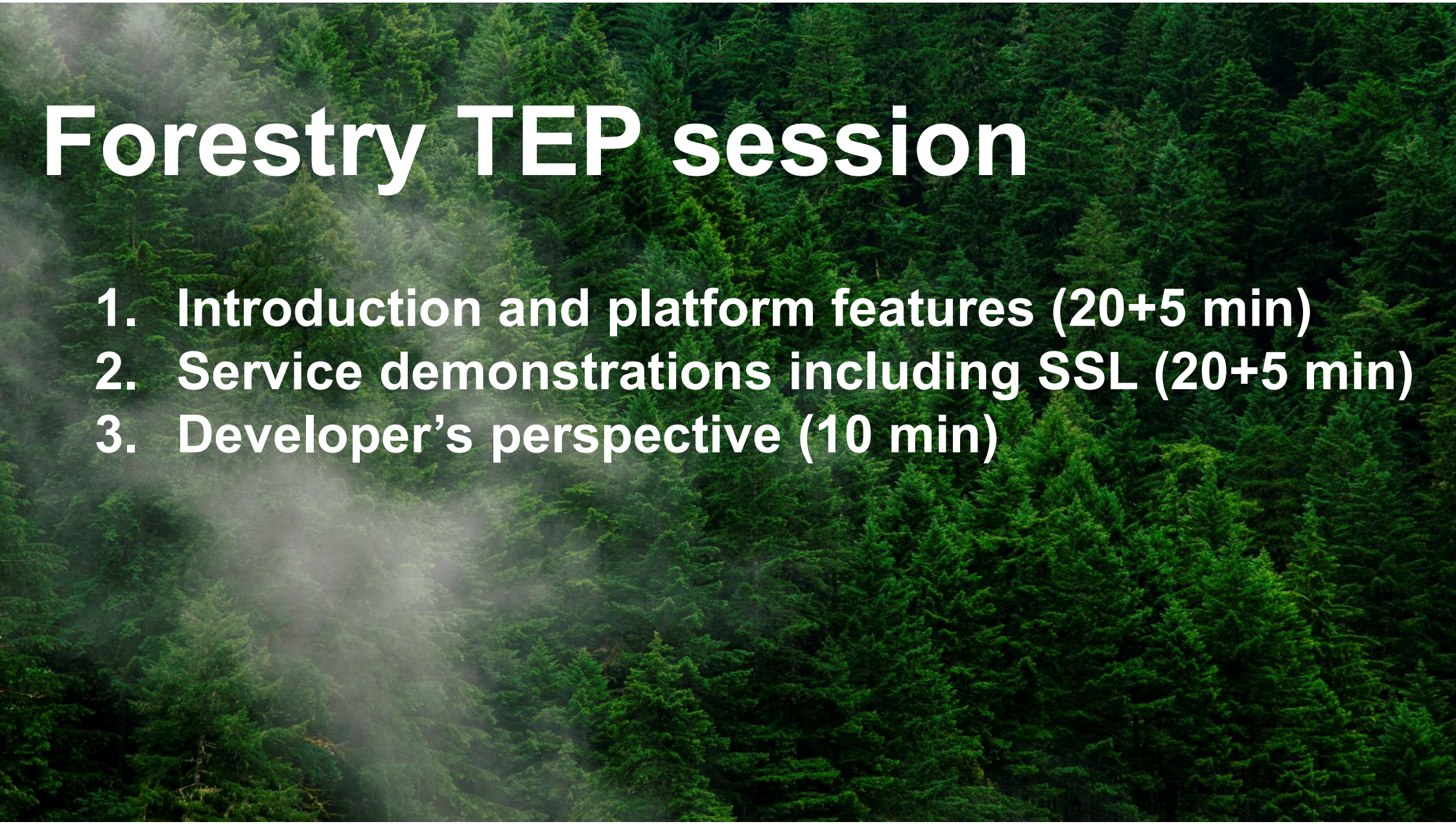
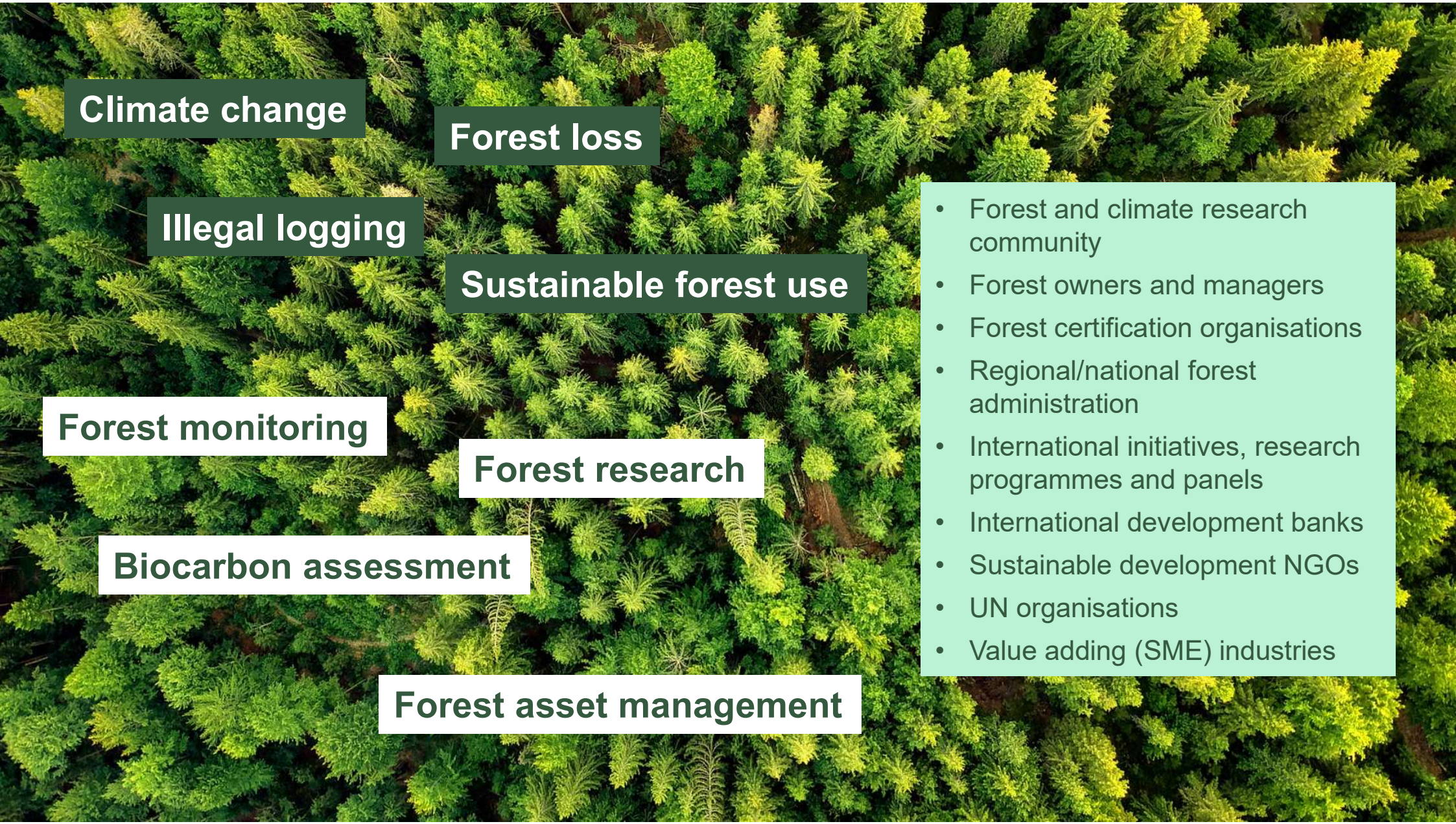


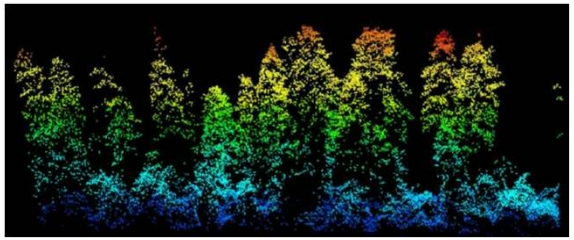
# Forestry TEP session

1. Introduction and platform features (20+5 min)
2. Service demonstrations including SSL (20+5 min)
3. Developer’s perspective (10 min)


Forestry TEP
Overview


Climate change
Forest loss
Illegal logging
Sustainable forest use
Forest monitoring
Forest research
Biocarbon assessment
Forest asset management
• Forest and climate research community
• Forest owners and managers
• Forest certification organisations
• Regional/national forest administration
• International initiatives, research programmes and panels
• International development banks
• Sustainable development NGOs
• UN organisations
• Value adding (SME) industries

# Big Data Revolution



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Openly available GIS layers

Airborne sensing

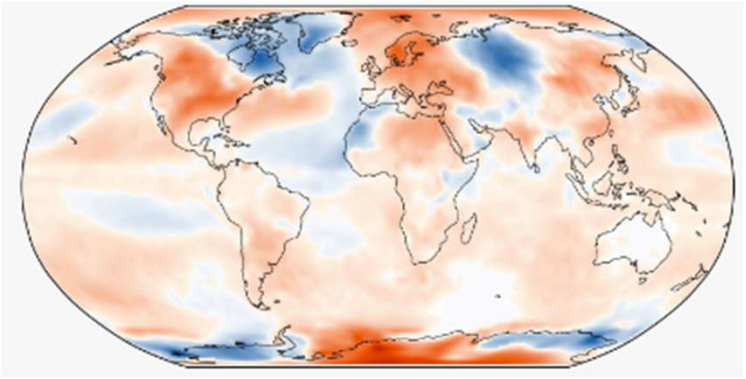
Satellite images

Overflow of data sources

Field measurements

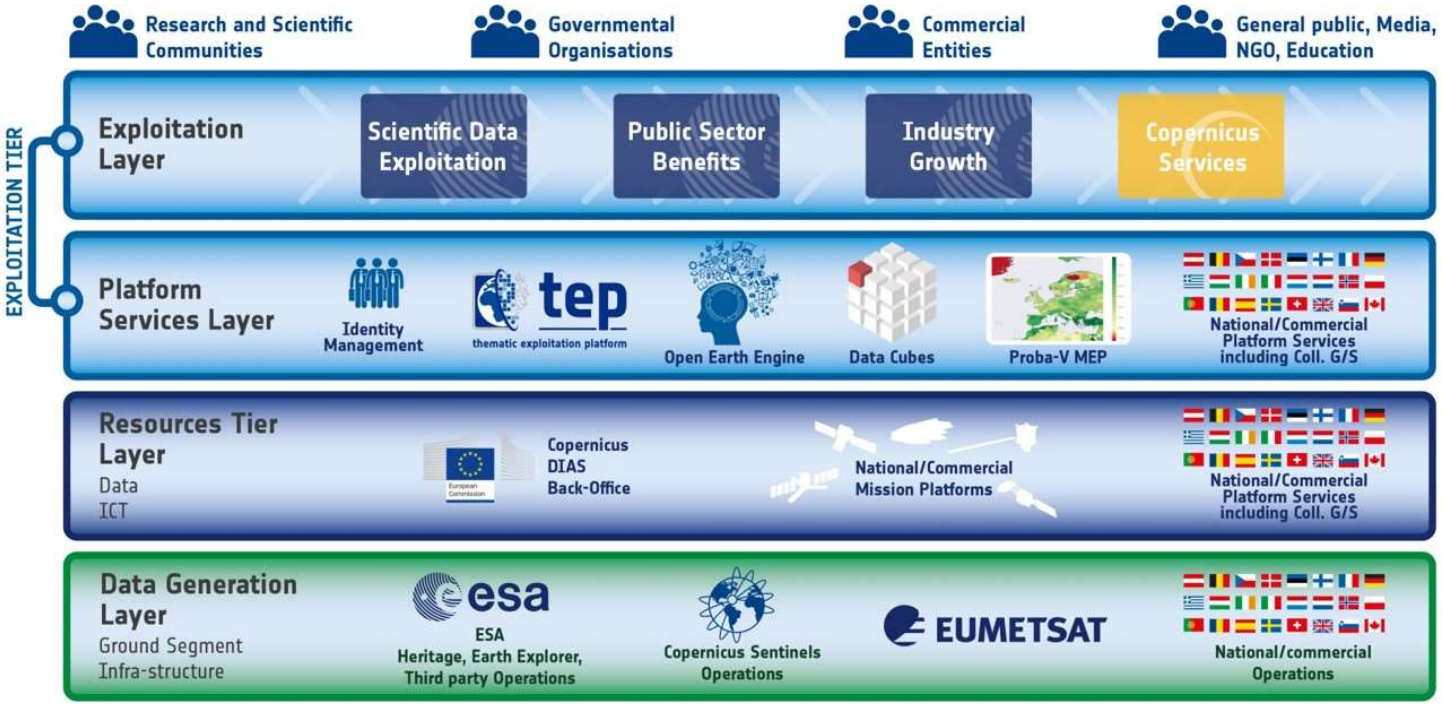
Weather/ climate data

Crowd-sourced

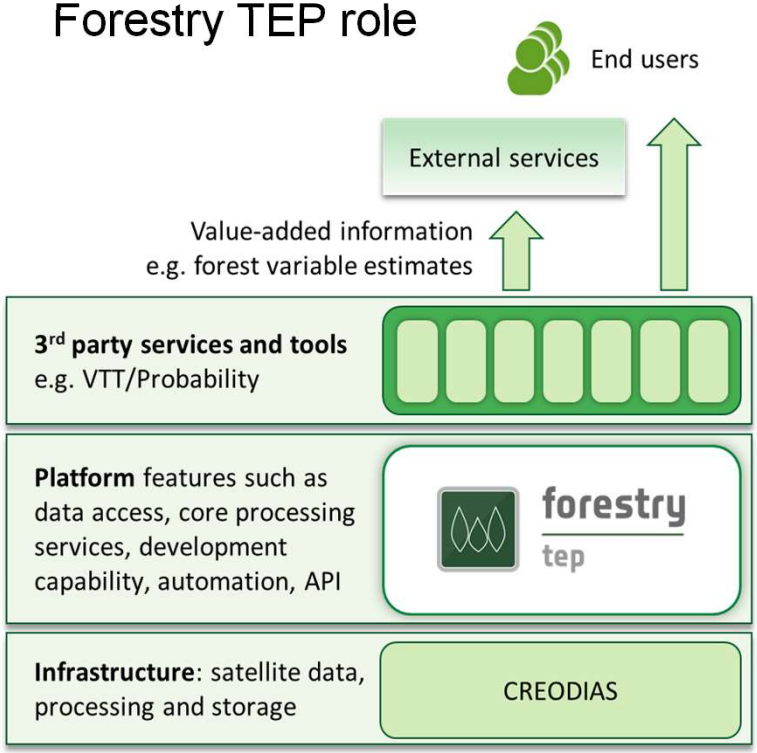



# Forestry TEP, part of a big puzzle

ESA vision on data and processing platforms




Forestry TEP role




Forestry TEP
Offering

# How to benefit from Forestry TEP?

## Ways to use the platform

- Use available applications that combine EO data and your own input datasets
- Develop your own processing scripts
- Share or license applications
- Access or share output products

## Two modes of usage

- Online web user interface
- REST API for interconnecting between systems

## Guidance at f-tep.com > Registration and support:

**Registration and login**: how to access the platform
**Learning:** introductory videos, 2-4 min each
**User manual:** User Manual document (pdf) and REST API tutorial
**Creating services:** Service Developer Guide (pdf) & supporting information

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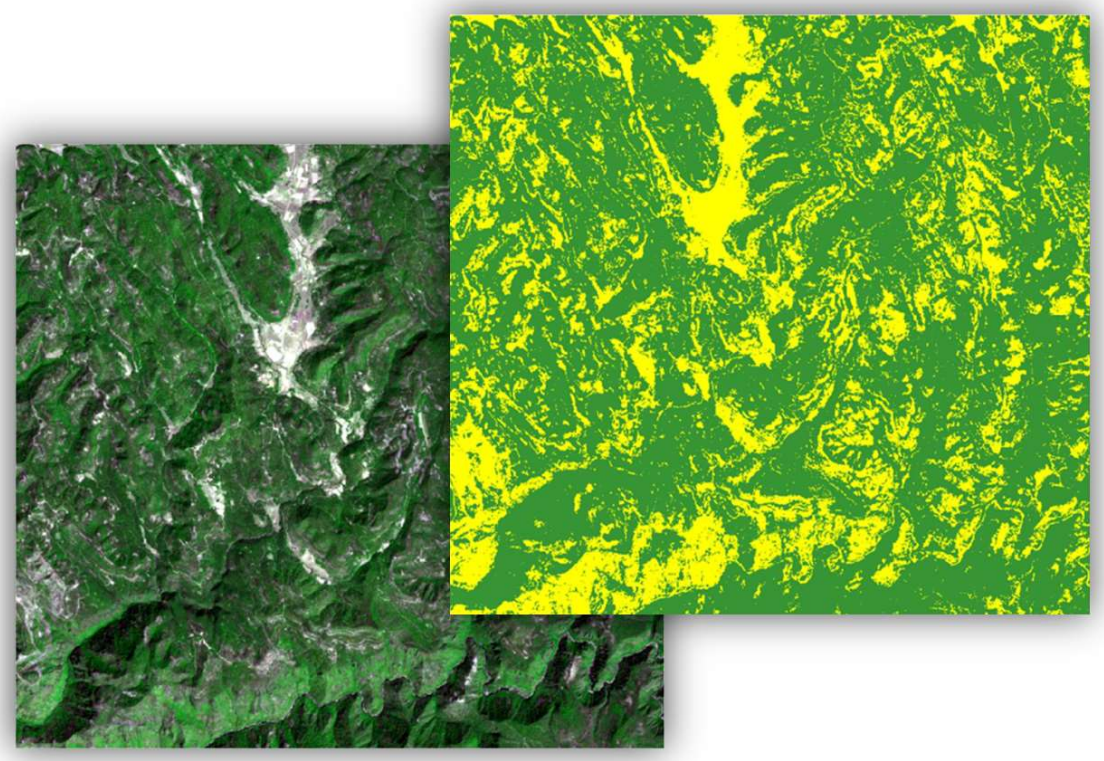
# Processing Services and Tools

- **Thematic processing services**
  *e.g. vegetation indices, land cover mapping, forest change mapping*
- **Supporting processing services**
  *e.g. S-1 stacking, masking, mosaicking, radiometric correction*
- **Interactive applications**
  *e.g. QGIS, SNAP*

- Full listing at https://f-tep.com/
  *Additional services* by agreement, e.g. VTT AutoChange and Probability



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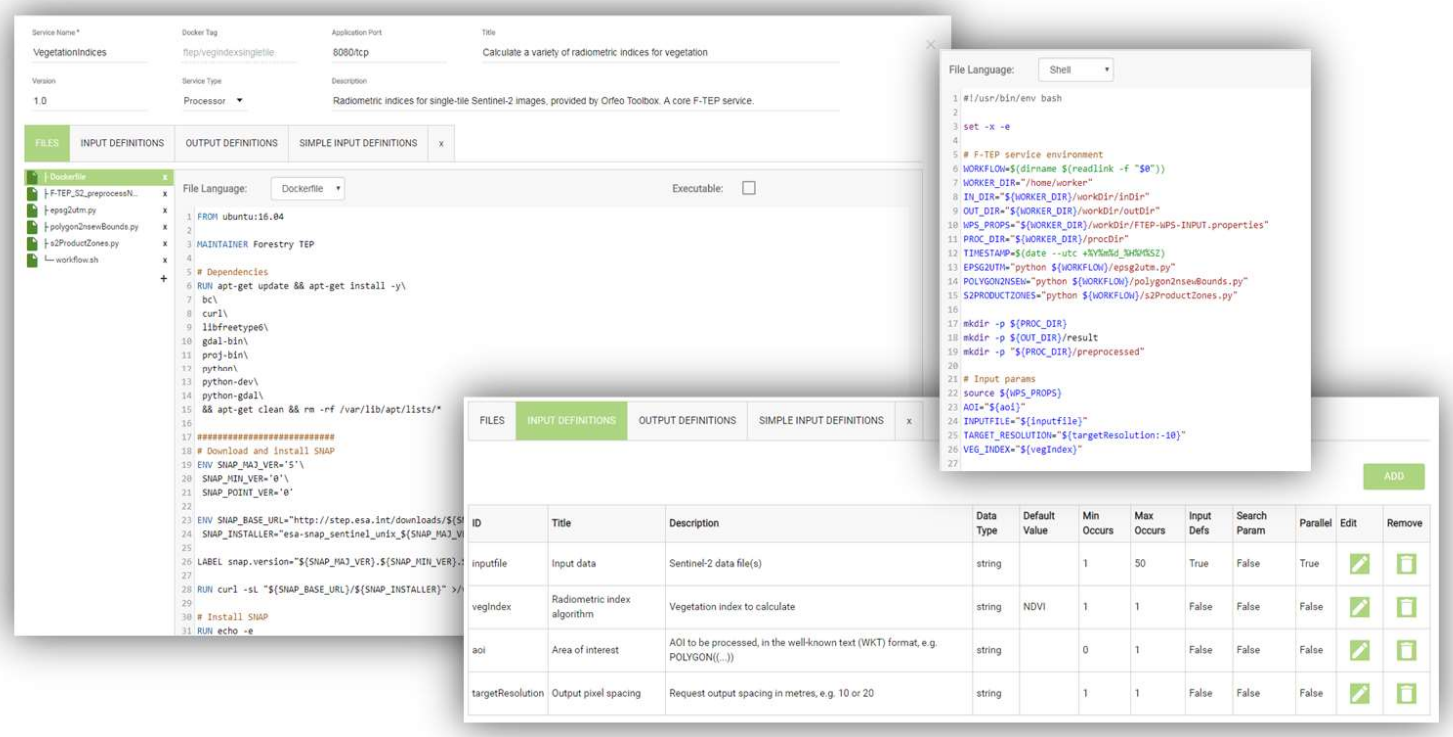
# Service development

- **Online development environment**
  - Based on Docker and Linux
  - Developer defines the processing logic and input parameters
  - Implementation in any programming language
  - Libraries such as SNAP, Orfeo Toolbox, GDAL etc. can be used
  - Templates are provided
  - No software needed locally

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# REST API

- **The F-TEP REST API enables inter-platform collaboration – utilizing the platform features from external systems**
  - Authenticated access to resources (services, data, processing)
  - Technically based on Spring Data REST, with JSON contents
- **The API allows to (e.g.):**
  - Query the data catalogue
  - Query the available processing services and their interfaces
  - Create and launch processing jobs
  - Retrieve outputs of completed jobs
- **Python library** also available for easy REST API access in external scripts

# Get involved!

- **Utilize in projects – by yourself or together with us**
  - VTT Remote Sensing team has long experience in coordinating and participating in cooperative projects
  - Expertise in remote sensing based forest monitoring and platform processing
- **Bring in your business!**
  - We will support you to onboard your business ideas on the platform

Contact us at: f-tep.com/

# ESA funding for platform use

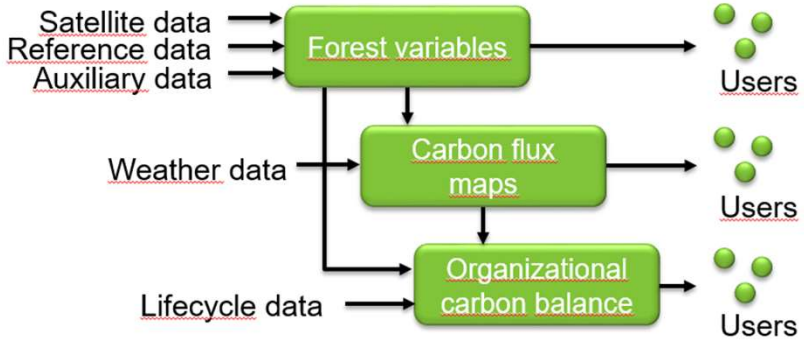
- The European Space Agency (ESA) has set up the **Network of Resources** (NoR) to stimulate the uptake of platform services.
- Forestry TEP is an eligible service provider in the NoR.
- **For research and pre-commercial uses, our users can apply for NoR sponsorship to cover for the costs of the platform use.**
- To apply for our Platform Package:
  - Head to the NoR Discovery Portal and search for VTT.
  - Check the Details, select *Pricing Wizard* and proceed as instructed to submit a sponsoring request to ESA.
  - We also provide User Trainings and other support services via the NoR.


Forestry TEP
Ongoing activities

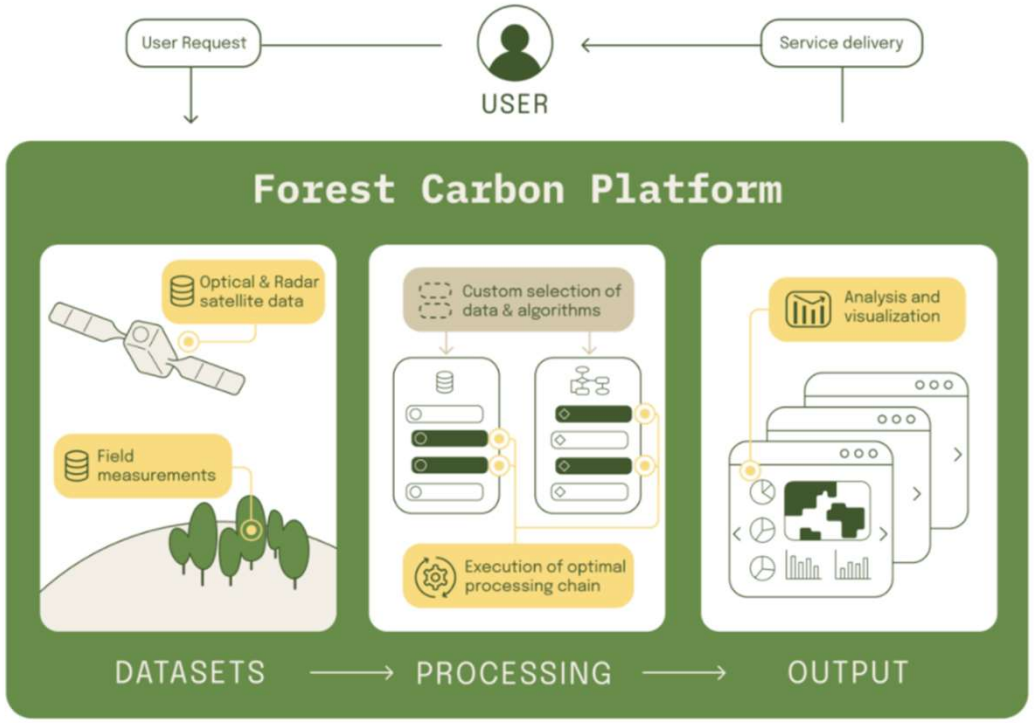
# Forestry TEP – Ongoing activities

Heavy platform use in multiple projects:

- Forest Flux (EU)
- Forest Digital twin precursor (ESA)
- Forest Carbon Monitoring (ESA)
- See https://f-tep.com/news-and-outreach/




https://www.forestflux.eu/




https://www.forestcarbonplatform.org/

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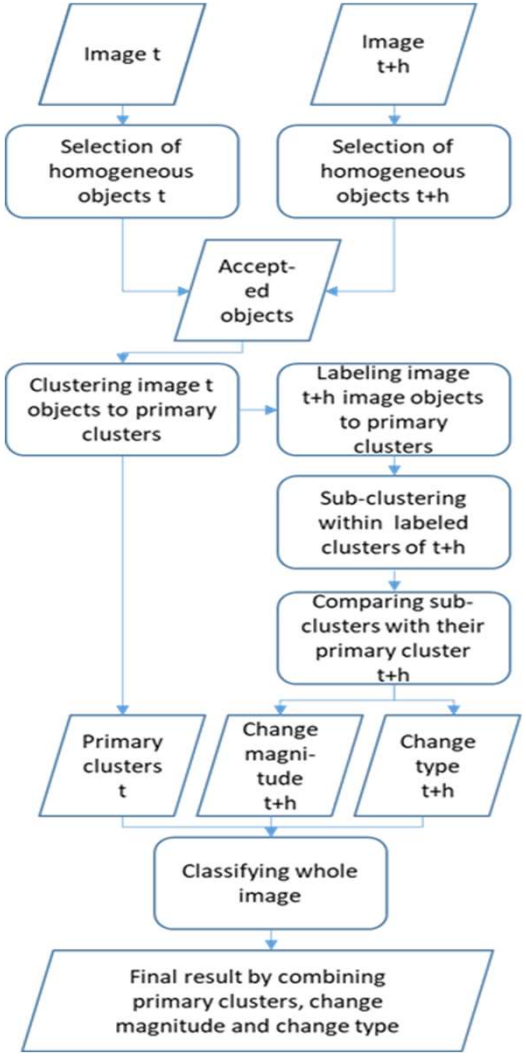
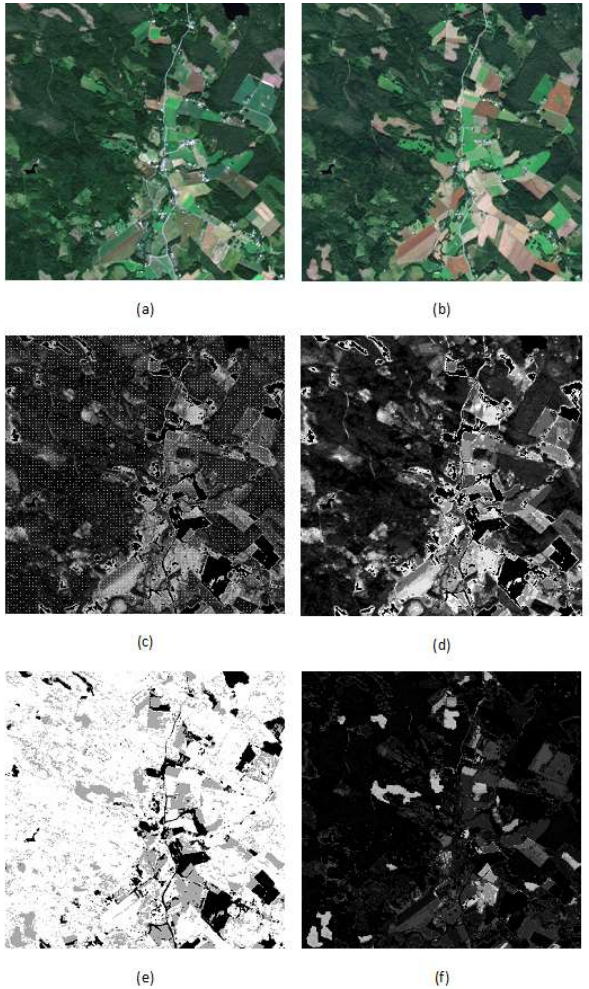
# AutoChange



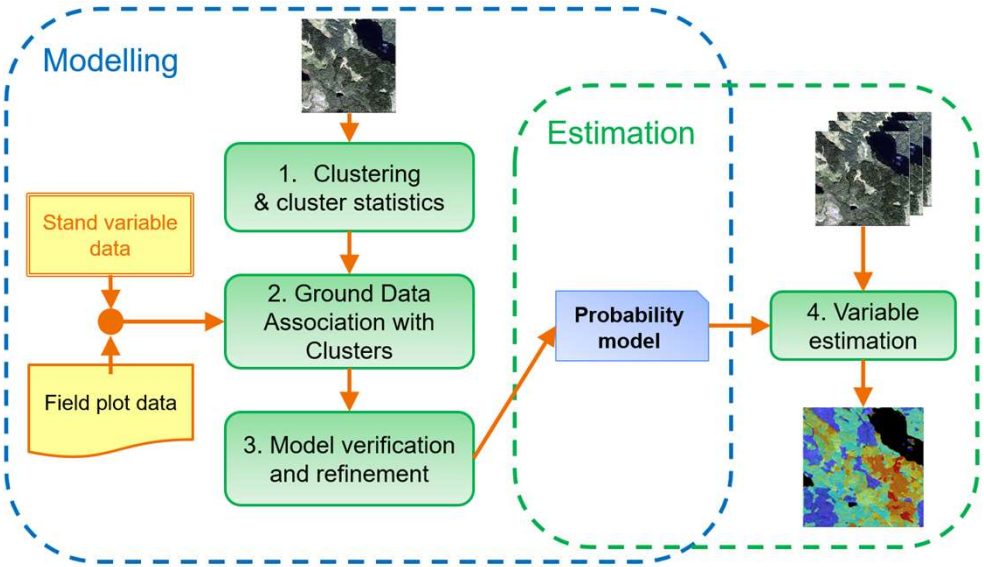

Output of S2-S2 Autochange classification.

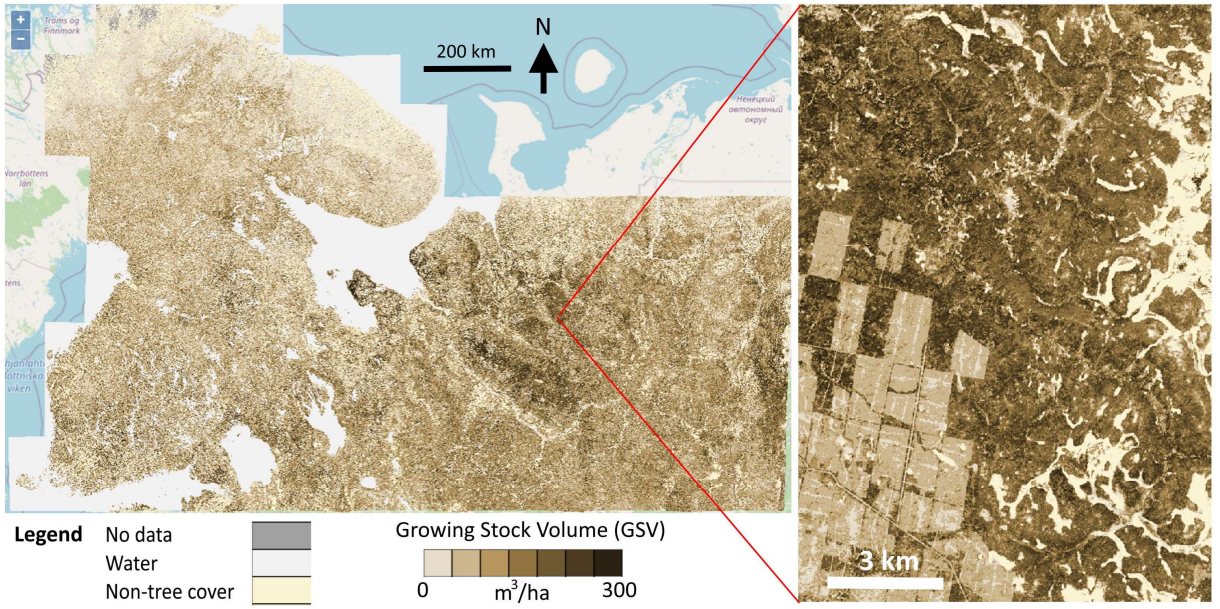
Detail of 3.6 x 3.6 km2: (a) Sentinel-2A 2015, (b) Sentinel-2A 2016, (c) observations selected for clustering as white dots, (d) primary clusters from pre-change image sorted by increasing red band reflectance, (e) change type, (f) change magnitude.




Häme et al. *Remote Sens.* 2020, *12*, 1751 https://www.mdpi.com/2072-4292/12/11/1751

# *Probability* forest variable estimation approach



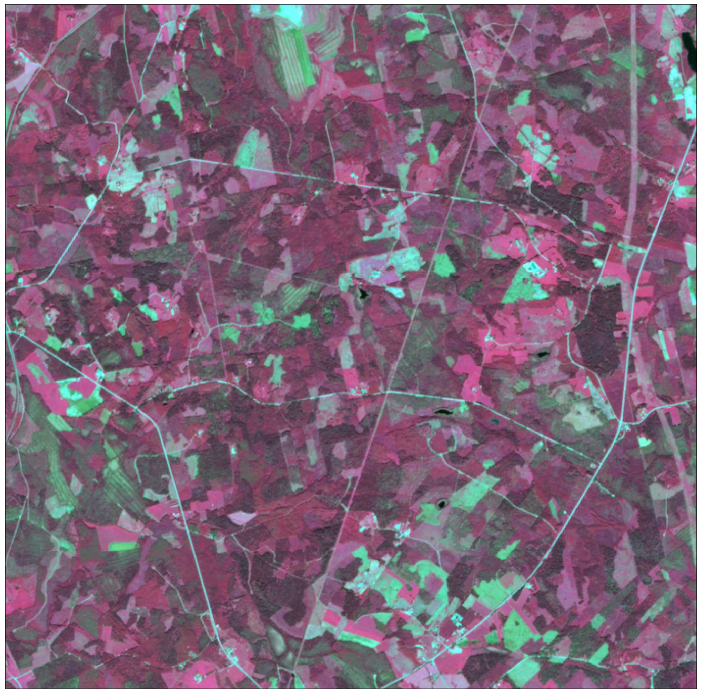


Häme et al. (2001) AVHRR-based forest proportion map of the Pan-European area. Remote Sensing of Environment, 77(1), 76-91.

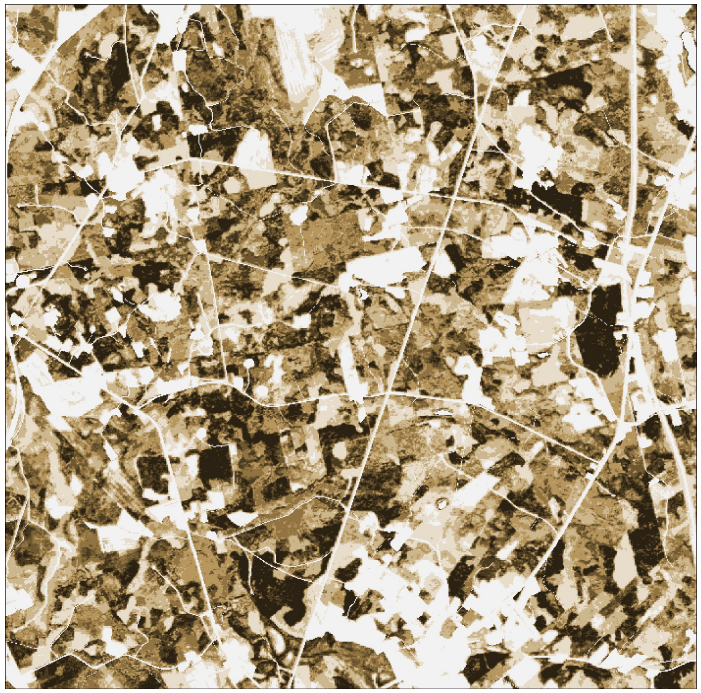
Miettinen et al. (2021) Demonstration of large area forest volume and primary production estimation approach based on Sentinel-2 imagery and process based ecosystem modelling. International Journal of Remote Sensing 42: 9492-9514. doi: 10.1080/01431161.2021.1998715

# *Probability* + PREBAS ecosystem modelling

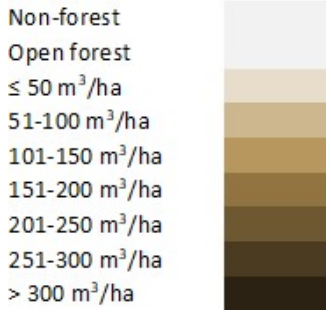
**Results from Forest Flux: https://www.forestflux.eu/**

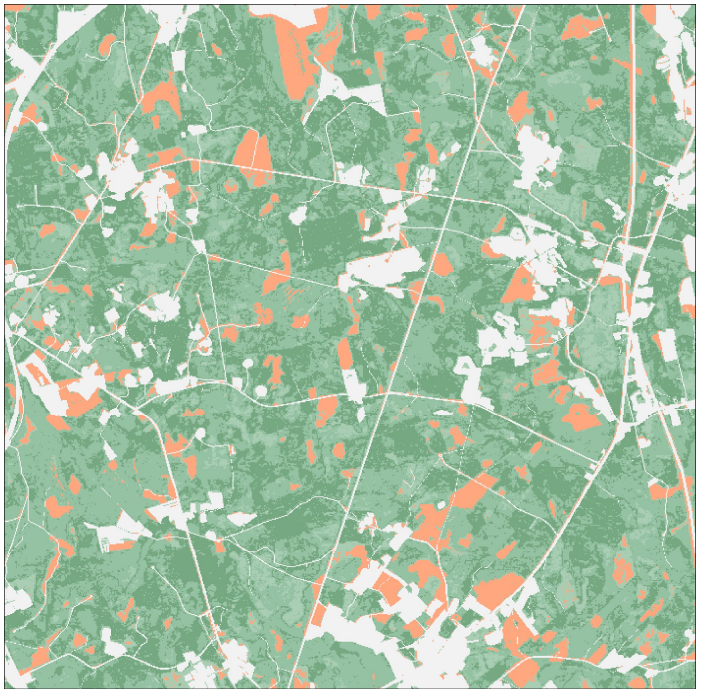


False color composite of Sentinel-2 satellite data from June 2019 in Forest Flux pilot site in Eastern Finland. Size of the image area is 7 km by 7 km.

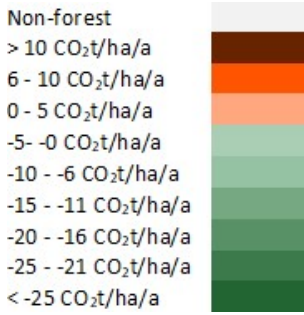


Growing stock volume estimated for the area of the image on the left using Sentinel-2 satellite data and sample plots from Finnish Forest Centre.



Net ecosystem exchange 2019 computed using carbon flux models, satellite based forest variable estimates and weather data. Negative values (green) mean carbon assimilation and positive (red) carbon emission

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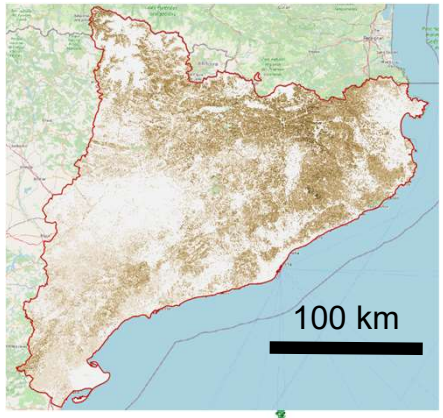
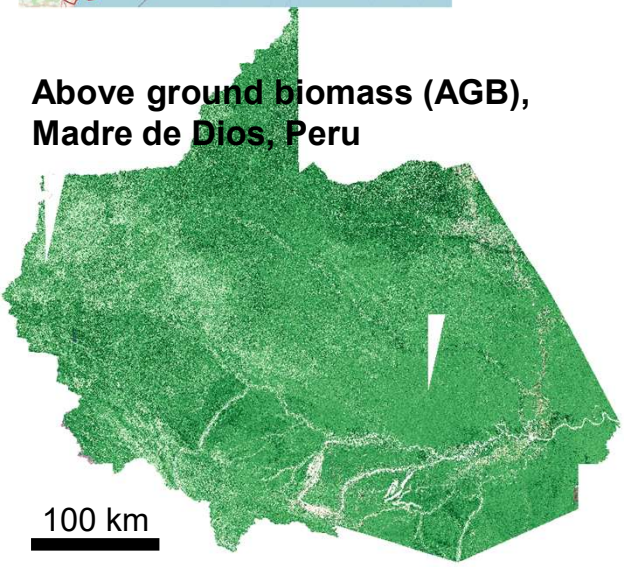
# Large scale demonstrations

Results from Forest Carbon Monitoring:
https://www.forestcarbonplatform.org/

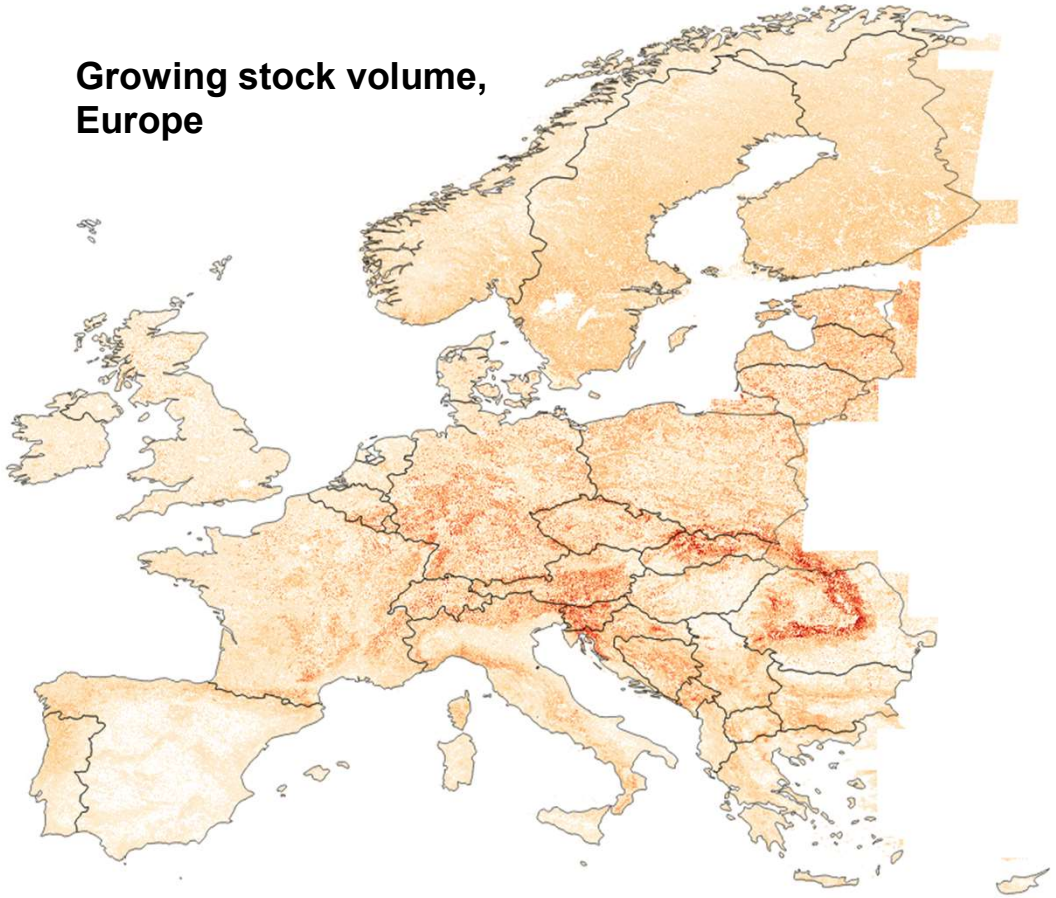
**Growing stock volume (GSV), Catalonia, Spain**



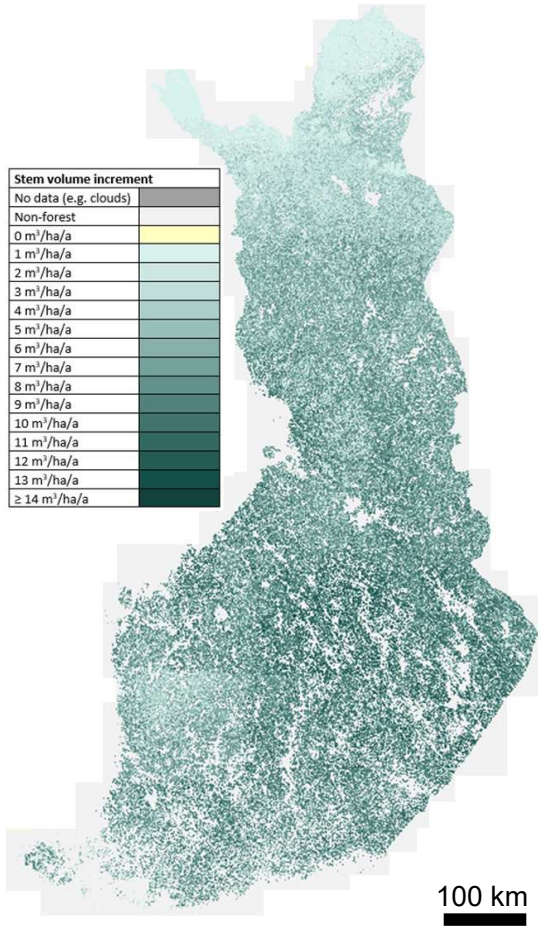

**Above ground biomass (AGB), Madre de Dios, Peru**

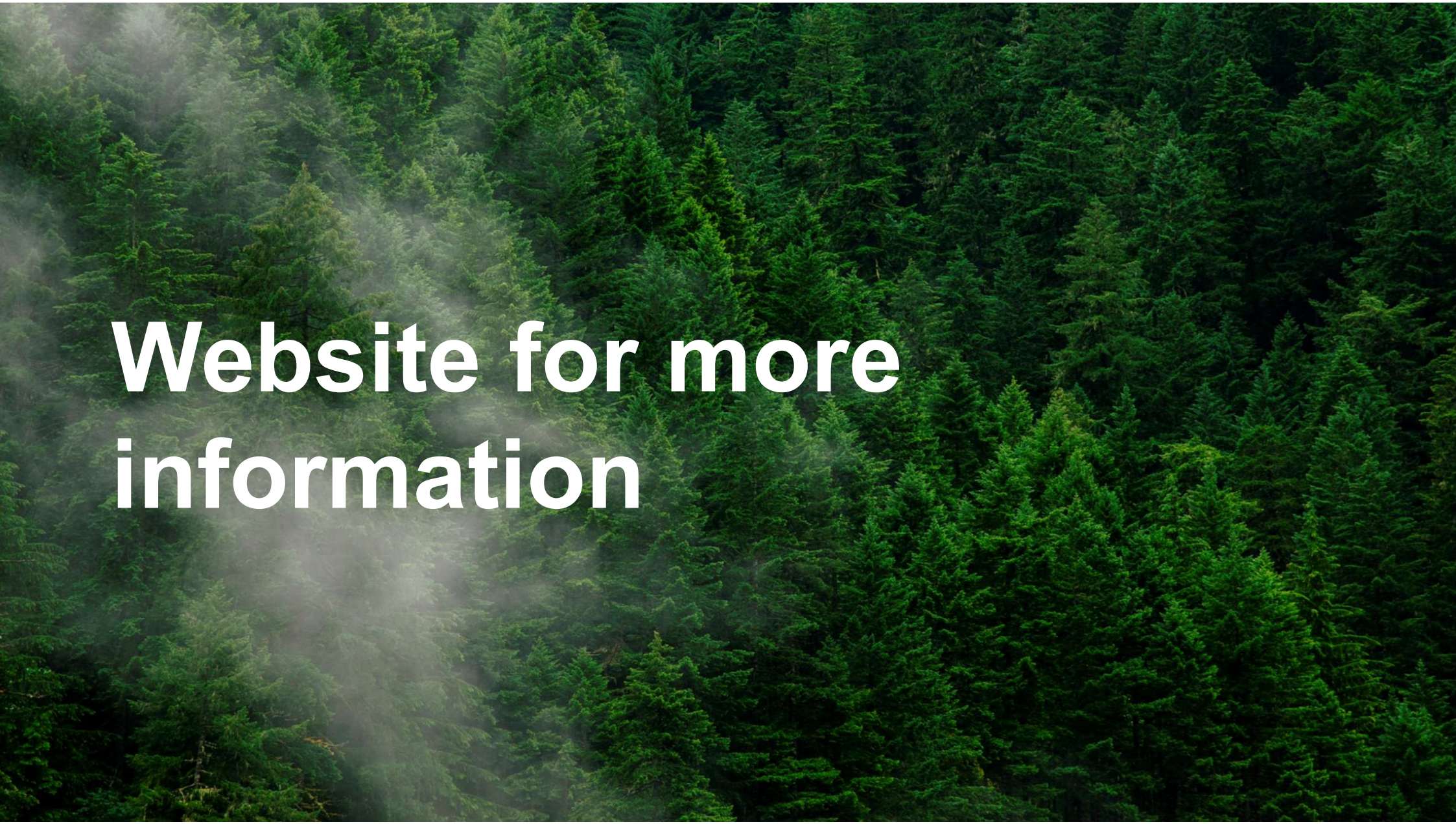



**Growing stock volume, Europe**

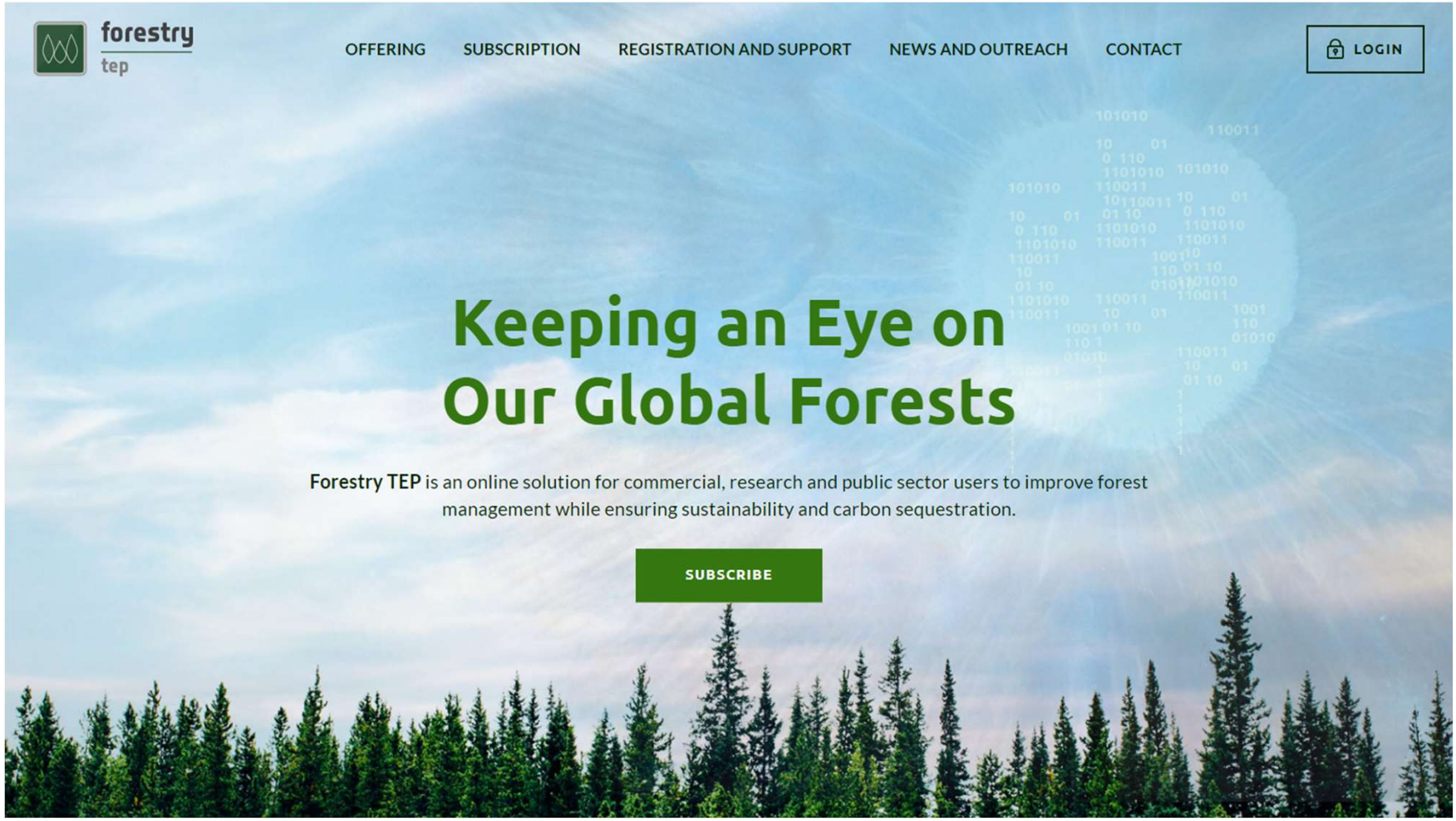


**Stem volume increment, Finland**




Website for more
information

https://f-tep.com/

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Thank you!