Thierry RANCHIN

MINES ParisTech – PSL University – ARMINES

e-shape

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

e-shape: strengthens benefits for Europe of GEOSS and vice-versa – supports the EuroGEOSS Regional GEO

What is e-shape?

e-shape allows Europe to position itself as global force in Earth observation through leveraging Copernicus, making use of existing European capacities and improving user uptake of data from European assets in the GEO context.

e-shape vision: To develop operational services with and for the users and to create a conducive environment whereby the strengths of Europe are exploited towards addressing societal challenges, fostering entrepreneurships and supporting sustainable development

e-shape: strengthens benefits for Europe of GEOSS and vice-versa – supports the EuroGEOSS Regional GEO

What is e-shape?

It **builds on existing EU GEO actions, GEO initiatives and flagships and Copernicus-related activities** by bringing together the key partners engaged therein.

Amongst the most prominent programmes that shall be linked to the proposal are Copernicus, INSPIRE, the ERA-Net on EO, the GEO relevant H2020 projects (ECOPOTENTIAL, EDGE, NextGEOSS, GEO-CRADLE, SWOS, ERA-PLANET, GROUND TRUTH 2.0, etc.), and many National EO initiatives, infrastructures and programmes.

e-shape

Contribution to GEO Priorities

Sustainable Development Goals (SDGs)

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate, environmental degradation, prosperity, and peace and justice.

e-shape

Contribution to GEO Priorities

Paris Agreement

The Paris Agreement builds upon the Convention and for the first time brings all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so.

Sendai Framework

The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action.

e-shape
Objectives

O1: Develop operational EO services with and for users active in key societal sectors

O2: Demonstrate the benefits of the EO pilots through the coordinated downstream exploitation of EO data and the utilization of existing EO resources

O3: Promote the uptake of pilots at national and international scale, across vertical markets (private and public) and amongst key user communities

O4: Enable the long-term sustainability of the numerous pilots, their penetration in public and private markets and support their upscaling

O5: Increase uptake by raising awareness on the solutions developed through tailored and well-targeted communication, dissemination and outreach activities

e-shape

Fast Facts for You

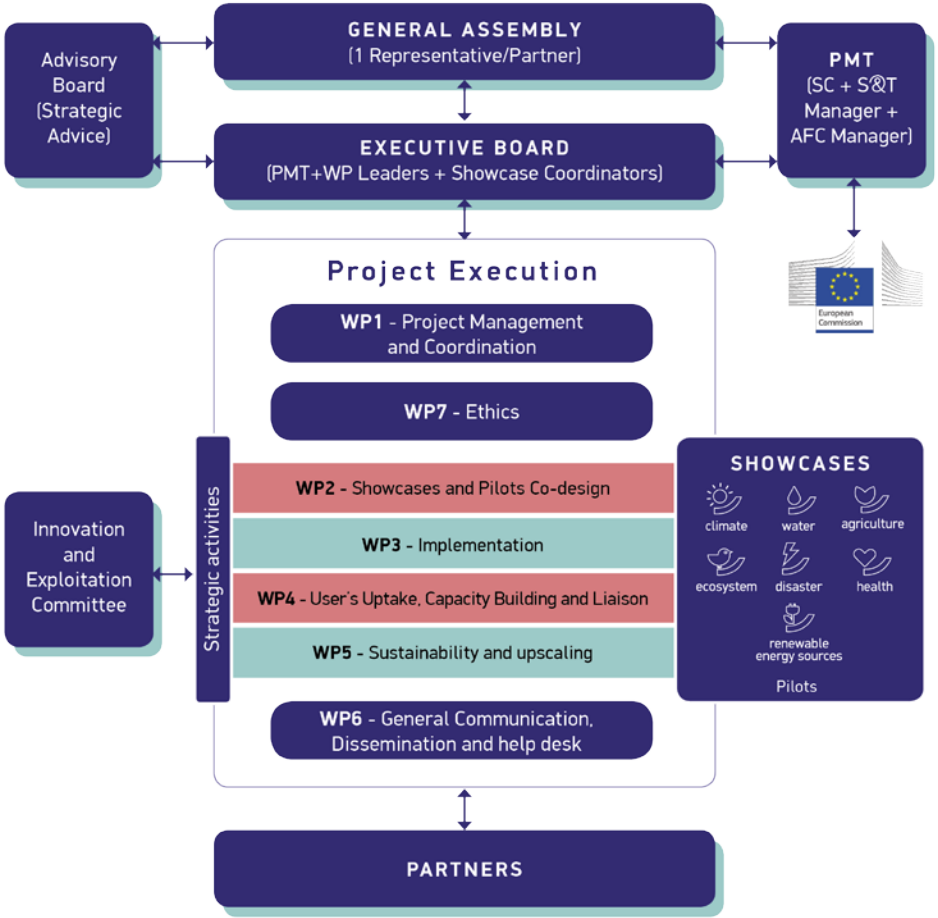
54 partners

7 showcases
27 pilots

4 years grant

e-shape
Structure of the project

e-shape



e-shape brings value to the pilots

Where you are now…

Where you want to be…

Where you can be…

Co-design

User uptake

Infrastructure

Synergies

Standards

Go-to-market

Sustainability

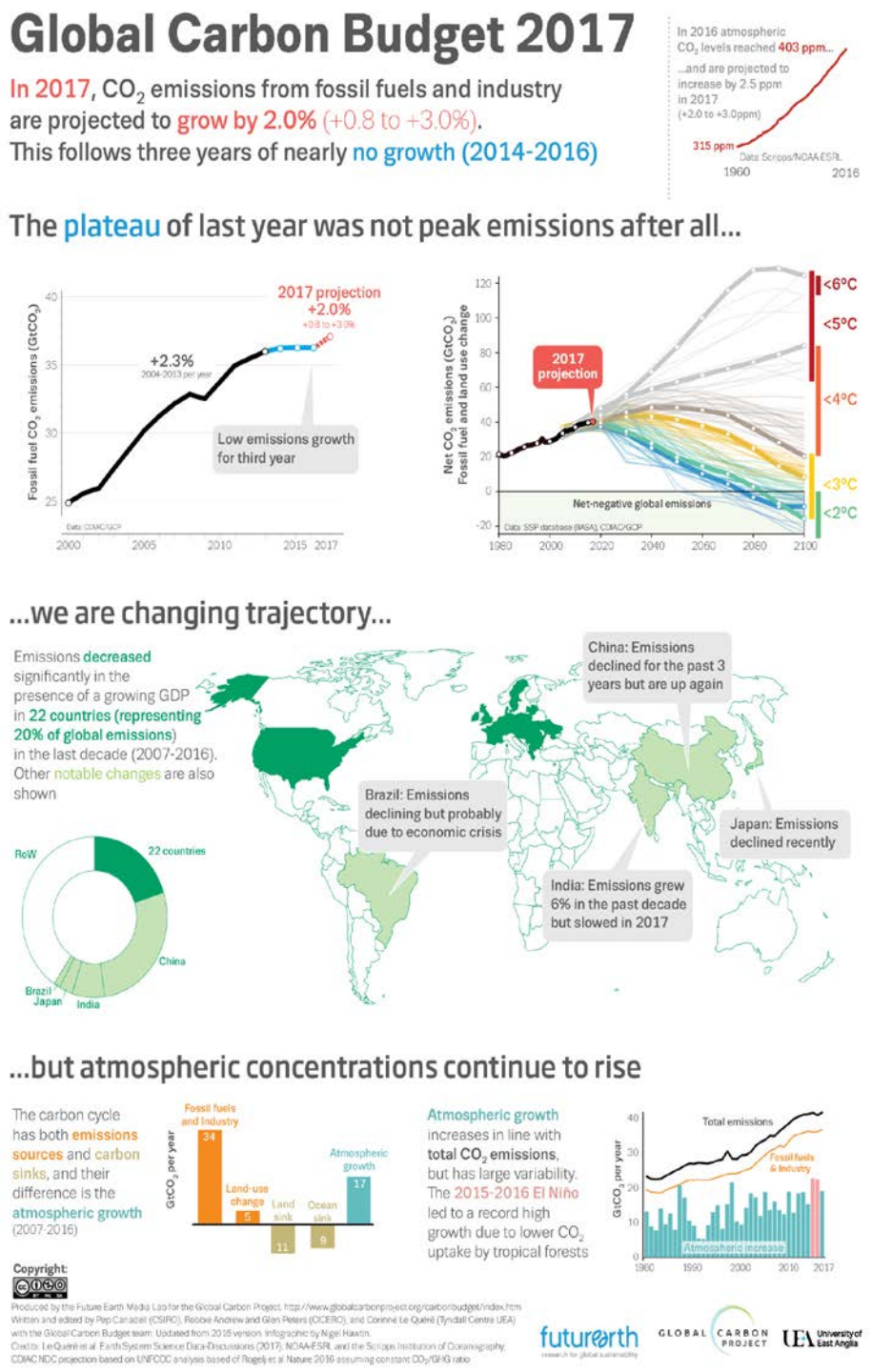
Communication

Help Desk

climate

Climate showcases

- Main idea is to expand current weather or climate services with seasonal forecast information produced by the Copernicus C3S service at ECMWF
  - SBA areas Climate, Energy, Forestry, Urban resilience, Transport, Tourism
- Big priority is improving global carbon information in support to UNFCCC, IPCC and GCOS
- Preparedness to disasters in urban areas
- As seasonal forecasts are 51 member ensembles with many variables, services will be developed on the WekEO DIAS and its ECMWF node/C3S CDS: https://cds.climate.copernicus.eu/
- E-Shape will operationalize and fine-tune user interface for technology demos



e-shape supports EuroGEO

- **co-designs and co-creates with end-users** of EO based services.
- leverages **existing distributed assets** (DIAS, GEOSS Platform, NextGEOSS platform, EOSC, …) for developing the pilots AND respects the Data Management Principles of GEOSS and GEO Standards & Interoperability Forum (SIF) recommendations on **interoperability** and being in compliance with the INSPIRE Directive.
- promote services in European and global markets through eoMall acting as a "**window to the market**" for providers
- delivers a boost to the European EO sector acting as a **sustainability booster** for **market penetration support**.
- On-boards **new pilots** and offers them the support of our strategic activities

EuroGEOSS Showcases: Applications Powered by Europe

The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 820852

7.1 Global Carbon and GHG Emissions Pilot

climate

Existing datasets	Type of improvement	Improved datasets	Data storage, distribution	Data flow integration	Service co-design	Service specifications	End-user descriptions

ICOS Ocean, ECMWF, ERA5, OCO-2, Sentinel 3, ENVISAT SST, ERS2 wave/wind, SMOS Salinity

EOV Inorganic Carbon, EMODnet Chemistry, Meteorology

SOCAT fluxes → Improved SOCAT

SOCAT community
ICOS-RI as developer

Quality indices

ICOS ECO/ATM, MODIS LST/NDVI/LAI/FPAR, OCO-2, Sentinel 3, ECMWF, ERA5

Terrestrial fluxes → Improved fluxes

FLUXCOM
UHEL & FMI
as developers

Existing data systems (ICOS Carbon Portal, DIAS, IOC UNESCO IODE)

UNESCO
ICOS CP
→ IOC UNESCO → Improved Services

GCP
ICOS CP
→ Global Carbon Project → Improved Global Carbon Budget

Copernicus
ICOS CP
→ Copernicus → Improved Services

All flux data at spatial resolution of 1x1 degree or better. Temporal resolution for terrestrial fluxes 1 day or better, for ocean fluxes monthly or better. Data format: netcdf. All products served FAIR through Carbon Portal, making use of **EOSC services**.

ICOS INTEGRATED CARBON OBSERVATION SYSTEM

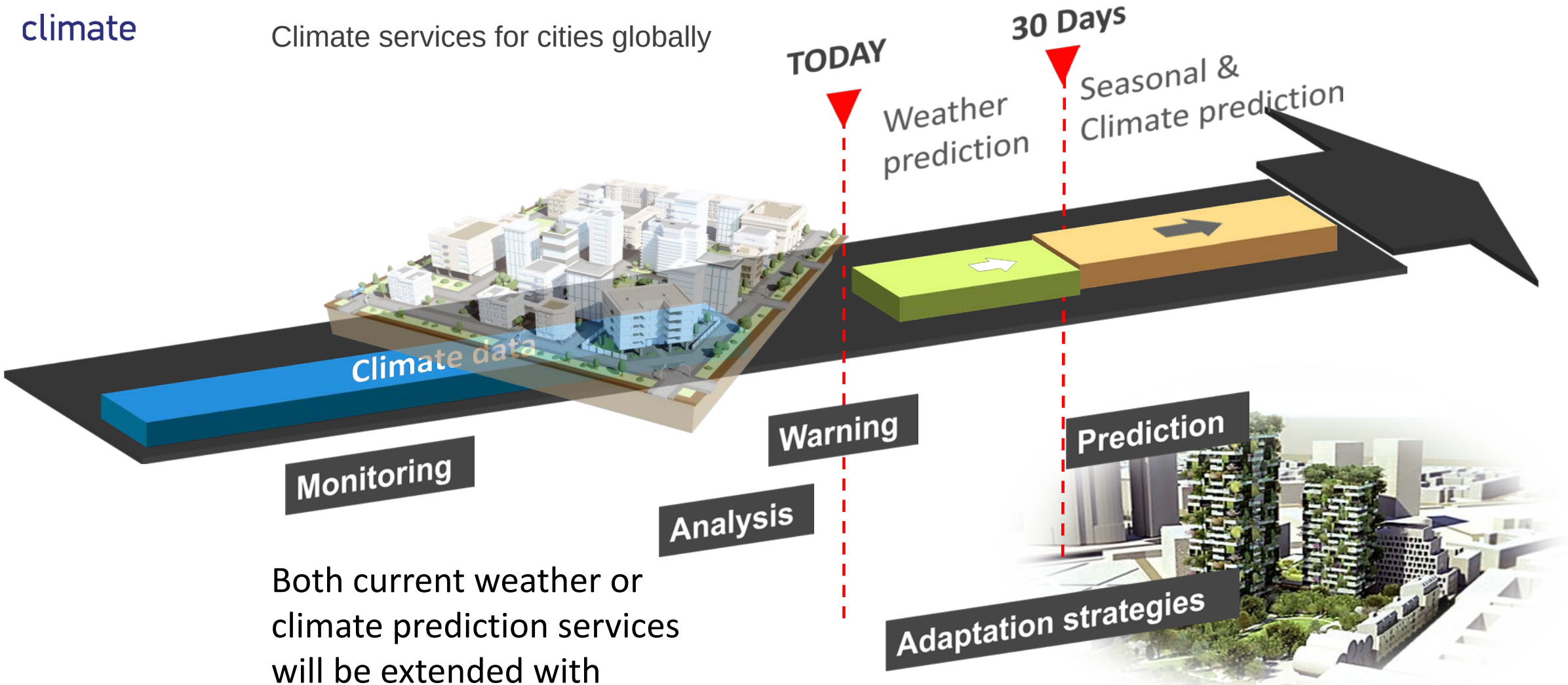
(UBergen), CMCC (MPI), UHEL, FMI

Technical descriptions
Operational activities
Products
Operators

7.2 Urban resilience to Extreme Weather

Partners: DWD, FMI, ZAMG **Co-design**: Helsinki, Aschaffenburg and WeatherPark GmbH (AU)

Climate services for cities globally

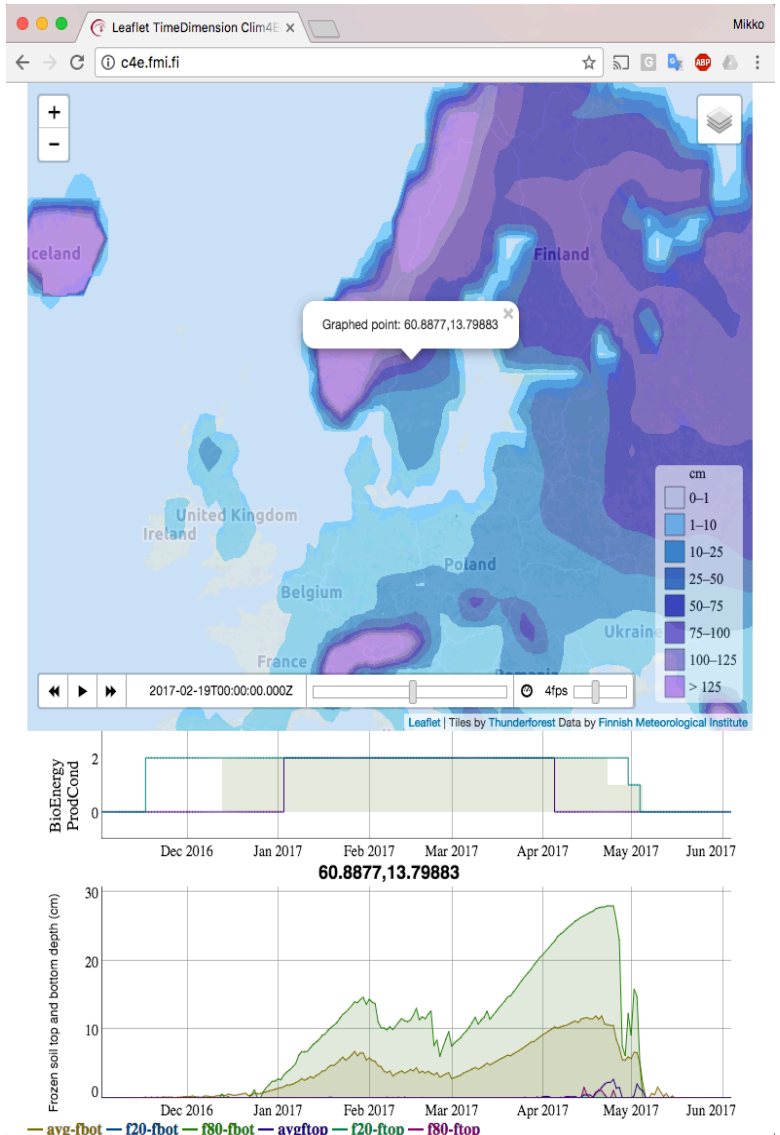


Both current weather or climate prediction services will be extended with seasonal forecasts

Urban Heat Index, drought and extreme precipitation events as target parameters

7.3 Forestry conditions

FMI and UHel, co-designer Metsäteho Oy for Harvesting SMEs (500 in Finland)



Clim4Energy seasonal forecast demonstration **-> operational service**

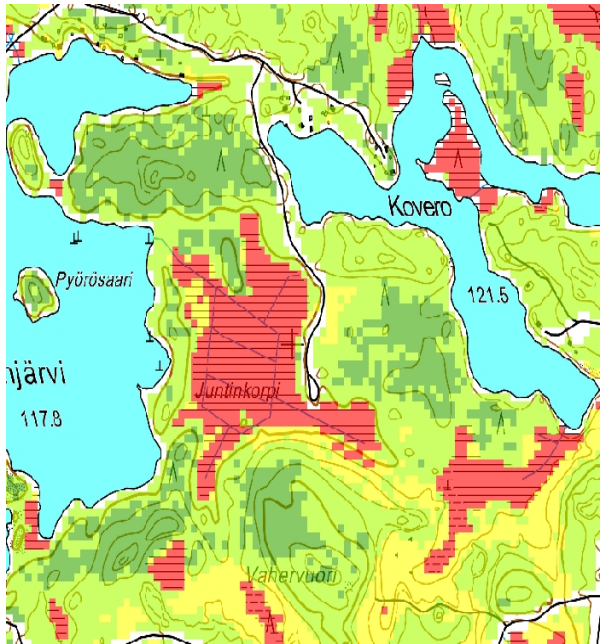
- Frozen soil depth (and thawed top depth)
- Snow depth
- Soil moisture

Forecast ensemble average and fractiles 20% and 80% can be visualized and animated on a map or as a 7 month time series of any point with data on the map.

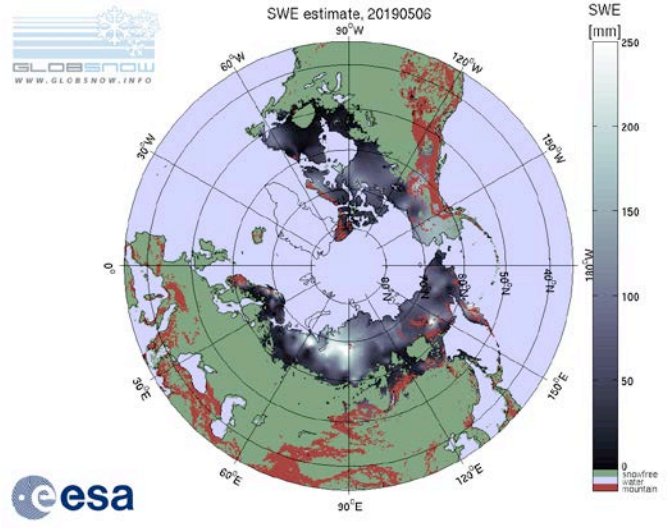
Using HOPS hydrological model ~10km

- C3S seasonal forecasts input
- Delivers more reliable variables
- Run for the different forestry condition classes analyzed from laser data by Arbonaut Oy
- -> Downscaling data to 10m resolution

UHEL adds a component to estimate GHG emissions for different harvesting options in the classes

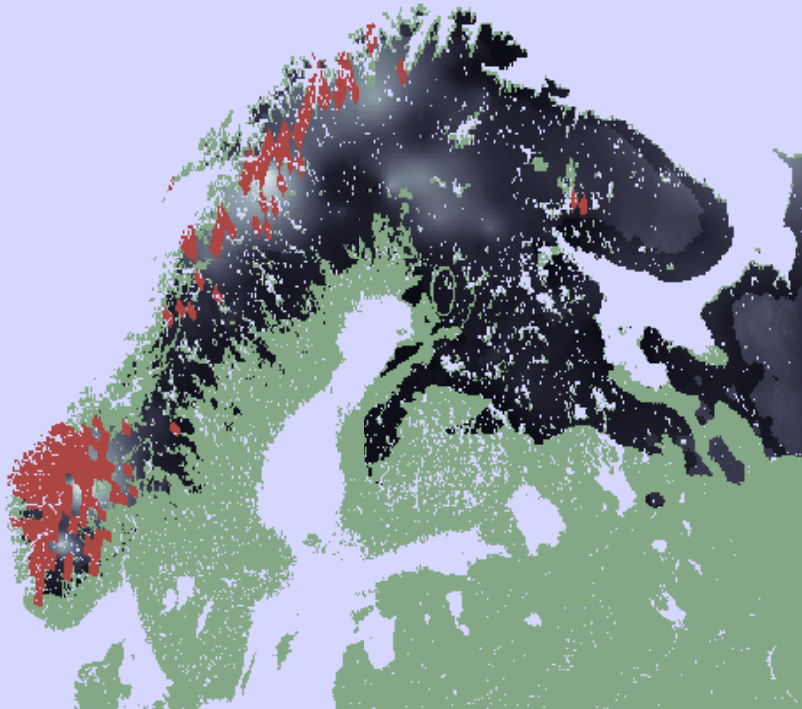


7.4 Hydropower in snow reservoirs



- Hydropower potential forecasts by FMI
  - Co-designer **Kemijoki Oy**
  - Improve reliability of forecast
  - options to adjust model inputs and parameters
  - Nordic countries alone have 2 600 hydropower sites
- GlobSnow SWE uncertain in steep terrain -> Super SWE
- Install webcams for improved snow extent/depth
  - Webcam snow monitoring
    - Developed in MoniMet+ project
    - Extent and depth
  - Improve catchment SWE accuracy
- HOPS model driven by C3S seasonal forecast
  - Kemijoki can edit reservoir info
  - Add forecast component
  - Verification with multiple obs
  - Deployed on WeKEO DIAS

Super SWE 6.5.2019



7.5 Seasonal preparedness

Partners: FMI, Academy of Athens Co-designers: VIANOR Oy, SETE institute; Potential users: Mediterranean hotels Winter tire obligation regions

- **Motivation**: information on the onset and offset of season helps tire and tourism companies in planning their business activities
- → starting time of winter tire exchanges (on/off) is essential for safety and tire sales logistics
- → starting/ending time of tourist season for Greek hotels

Cars queuing for winter tyre change in Espoo, 1.11.2016

Objective: co-design and develop extended and long-range forecasted climate outlooks on onset and offset of seasons including uncertainty information for the selected regions

Data:

- Seasonal forecast data from Copernicus services, In-situ data for climatological base
- Auxiliary data from users
  - Past statistics of sales and hotel booking data

Infrastructure used:

- already existing infrastructure (CLIPS infrastructure, including Ilmanet/Ilmatie platform in FMI) will be used for product communication/delivery
- GUI to be improved according to co-design
- WekEO DIAS platform for production (on ECMWF part) for WMS production

CLIPS 6 week outlook on slippery conditions