



Climate forecasts enabled knowledge services

I servizi climatici sviluppati dal progetto H2020 CLARA

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Ferrara, 20 settembre 2019

Conferenza nazionale sulla mitigazione, adattamento e resilienza ai
cambiamenti climatici. Tecnologie, climate services, ambiente e salute



REMTECH EXPO



CLARA Project in brief - 1

Project coordinator: CMCC, Venezia, *Jaroslav Mysiak@cmcc.it*

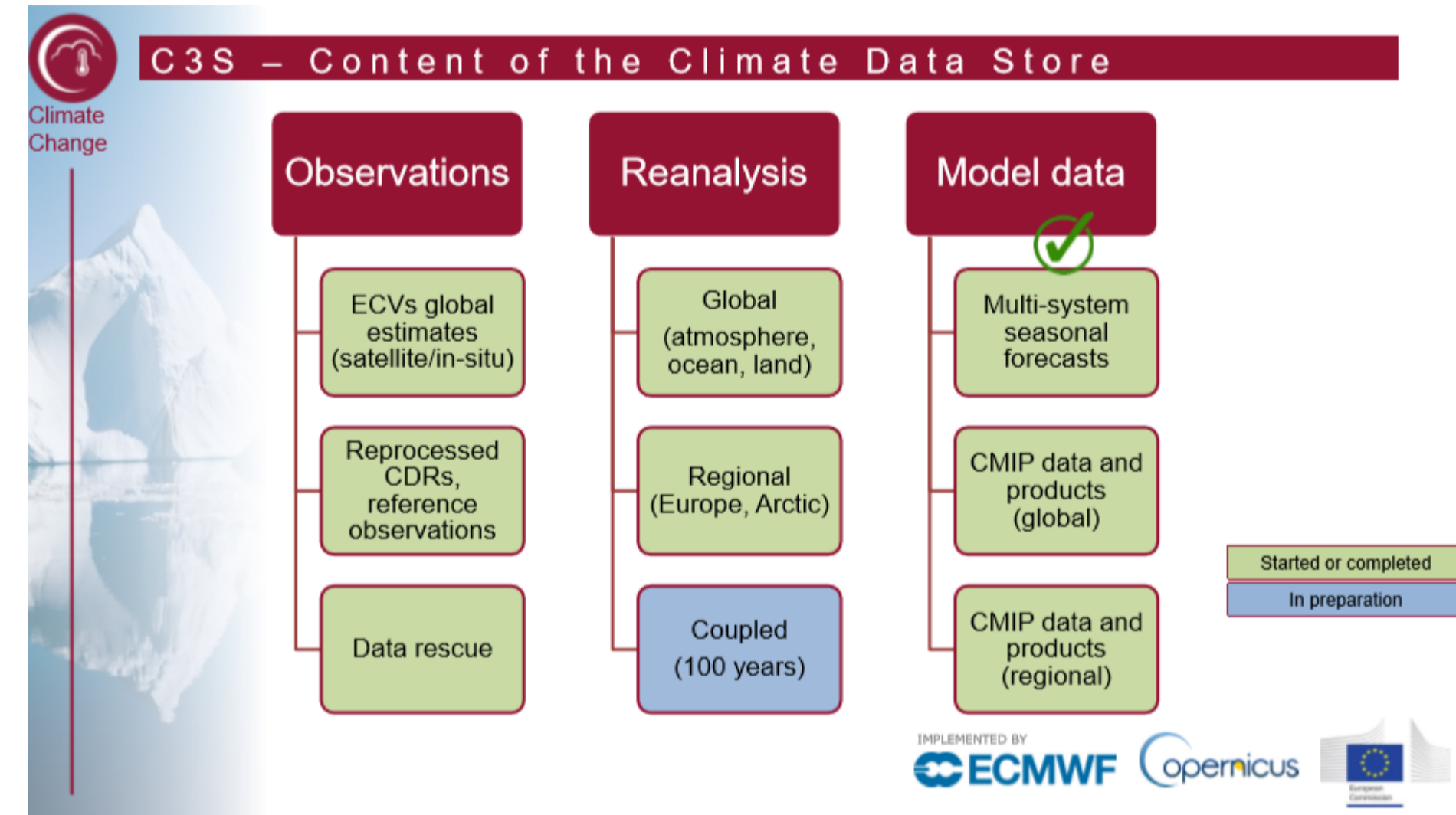
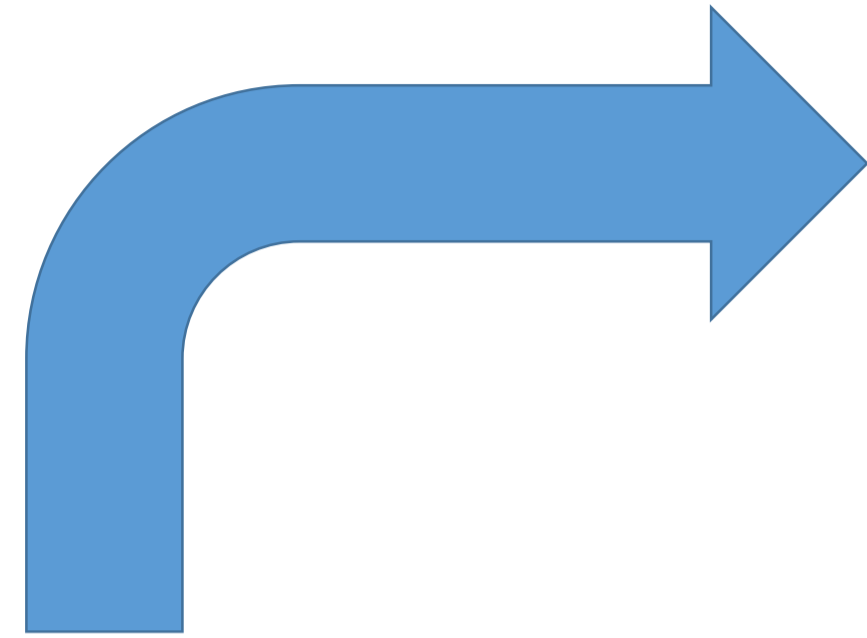
Main objective

» to develop a set of climate services building upon the Copernicus C3S seasonal forecasts and sectorial information systems, demonstrate their value and ensure their viability.

» H2020 innovation action (IA), 06/2017 – 05/2020

» 14 climate services being developed

» 11 partners from academy, business and public administration



Taken from Anca Brookshaw, ECMWF

CLARA Project in brief - 2

Develop new and enhance existing **climate services**

Analyse and demonstrate the **economic and social value** unleashed by climate forecast enabled climate services and corroborate their direct and indirect benefits

Engage service developers, purveyors and end-users in **mutually beneficial collaboration and partnerships**

Contribute to advancing the European **innovation, competitiveness and market performance** for climate services





Climate services

- DISASTER RISK
- Flood damage and loss service

- WATER
- Water resource management model
- Water supply forecast
- Multi-objective reservoir assessment tool

- IRRIGATION
- Water requirements for irrigation
- Soil budget usable predictor

- HEALTH
- Air Quality

- ENERGY
- Small hydropower atlas
- Small hydropower tool
- TWh Predictor
- Solar energy assessment

Horizontal services

All priority areas of the Global Framework for Climate Services (gfcs.wmo.int)

CLARA SERVICES

Disaster Risk Reduction

FLOOD-MAGE (CMCC)

Water Resources

Management

PWA (ARPAE)

AQUA (SMHI)

ROAT (UCO)

Agriculture

WRI (ARPAE)

IRRICLIME (GECOSistema)

Air Quality

AIRCLOUD (SMHI)

AQCLI (ARPAE)

Renewable Energy

Production

SCHT (GECOSistema)

SHYMAT (UCO)

GWh (SMHI)

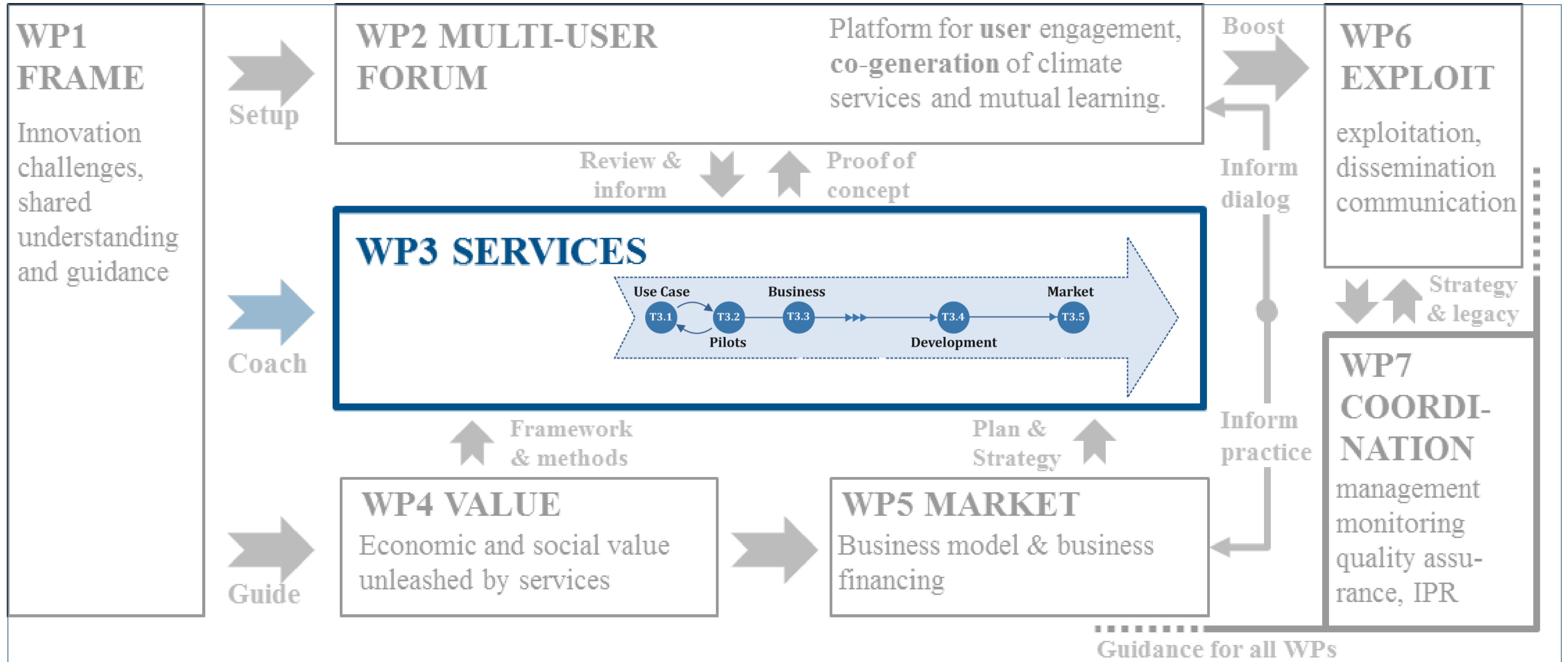
SEAP (UCO)

Horizontal Services

PPDP (TCDF)

CLIME (CMCC)

Workflow



Water resources for irrigation - WRI

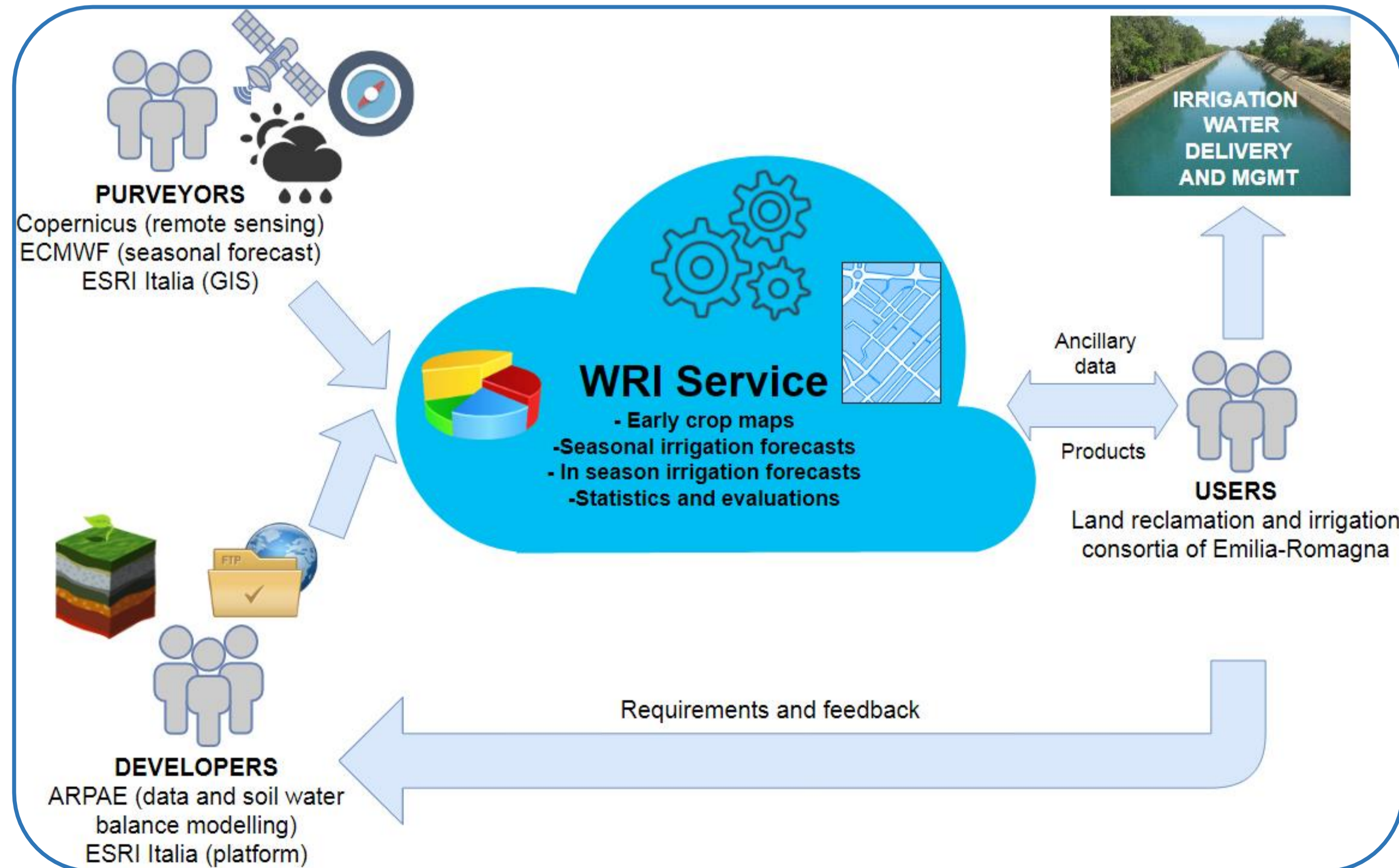
Aim

WRI is developed by Arpae and addresses water management in agriculture providing **mid-term and seasonal forecasts of irrigation needs** for crops, distributed through a GIS platform. It takes advantage from results of the previous MOSES H2020 project

Stakeholders

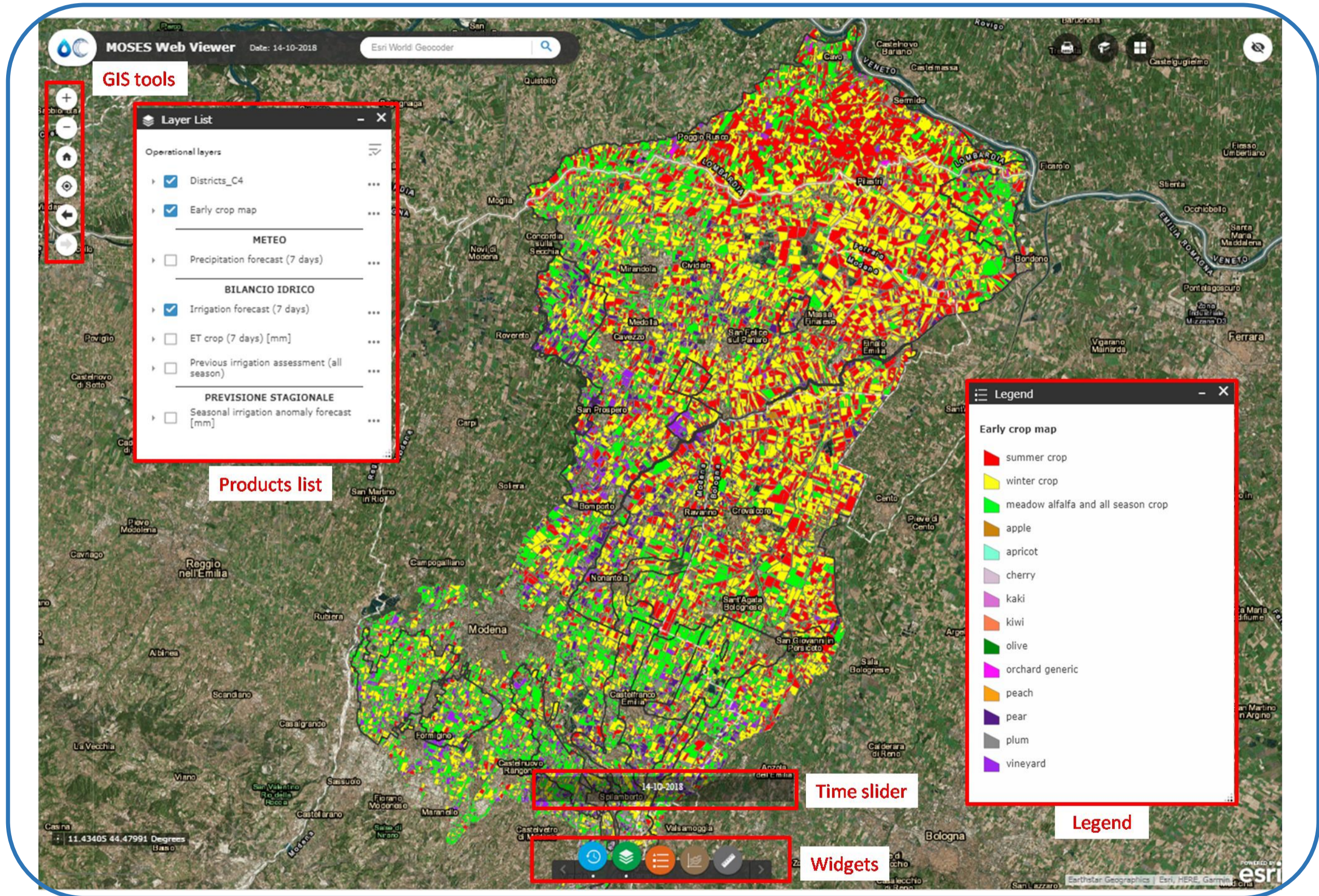
WRI is targeted to **irrigation water management authorities** (e.g. water procurement and allocation agencies).

Conceptual scheme



WRI – Outputs

WRI GIS platform



WRI products

- **Early crop maps:** objective support for evaluating potential irrigation water demand early in the season.
- **Mid-term irrigation forecasts:** 7-day forecast of crop water requirements and evapotranspiration.
- **Seasonal irrigation forecasts:** projection of expected demand to procure the resource and manage its seasonal term demand.
- **Monthly repeated seasonal forecasts and daily repeated weather numerical forecasts:** fine tuning water procurement and distribution, to better set up supply and distribution of water to irrigation districts.
- **End of season final statistics:** evaluation and further analysis (i.e. fine tuning water cost charging between farmers).



WRI INNOVATION FOR 2019

- Summer crop class modified from maize to a **synthetic crop** with a longer irrigation season to accommodate the actual spectra of **summer irrigated crops**, based on **co-evaluation** with CLARA users of available observations collected in 2018.
- Additional **GIS tools** for spatial analysis of outputs.

NEXT STEPS

2019

- **Comparison** with observed data of irrigation amounts at the end of the season (on one irrigation district of C7 (Romagna) equipped with **new devices** measuring water volumes)
- **Calibration of the synthetic crop** to better simulate the irrigation water needs of permanent crops (e.g.: *alfalfa, grassland, permanent meadows*)
- **Challenges:** user involvement in the **practical and economic evaluation of the prototype**

2020

- Setup of a working prototype active in **all (eight) irrigation districts** of Emilia-Romagna accessible via the Arpae web site and based on geographical webgis interface

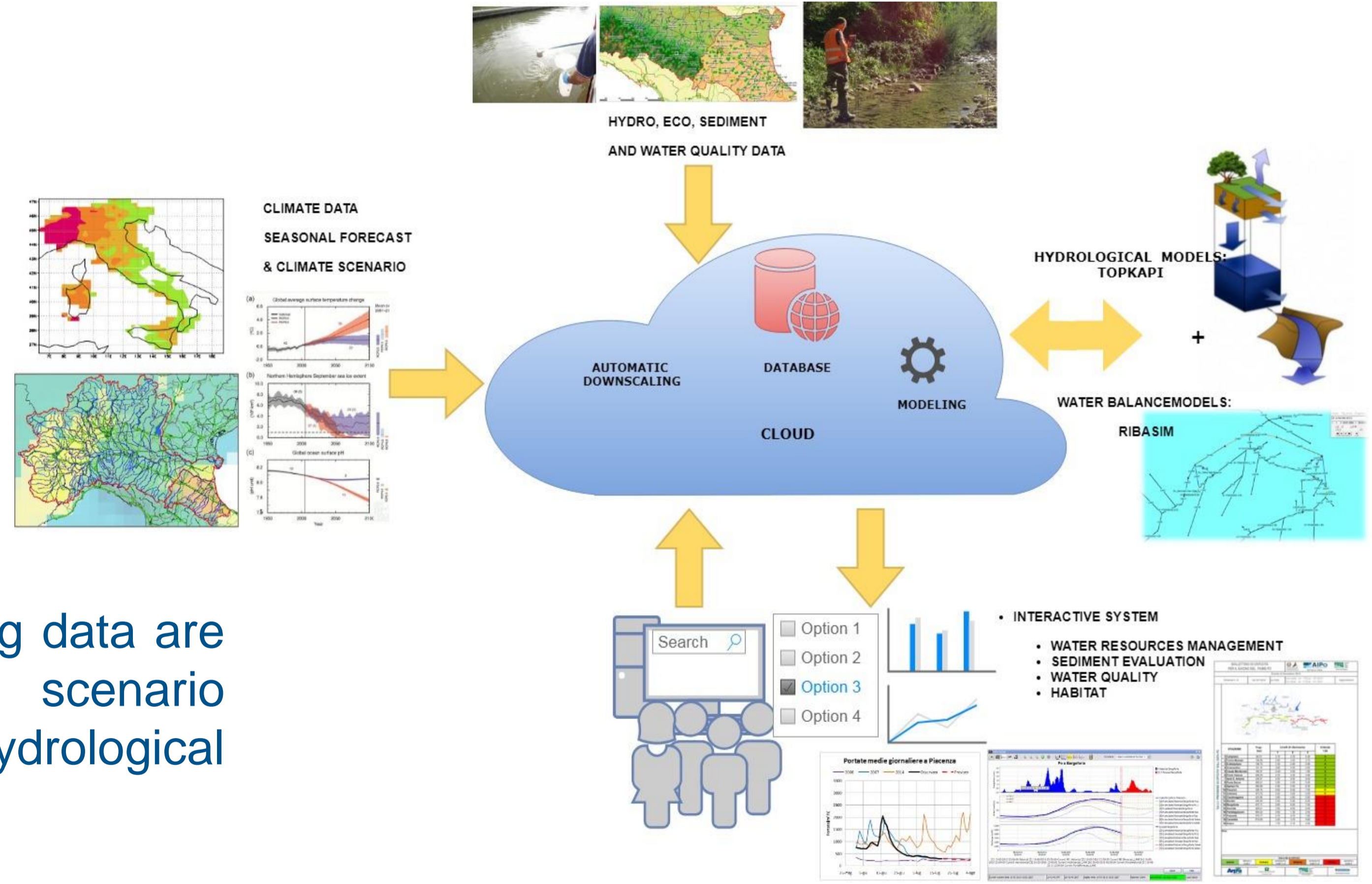
Parma river Water Assessment - PWA

PWA service aims to include climate change in planning and emergency actions in the selected area of the Parma river basin.

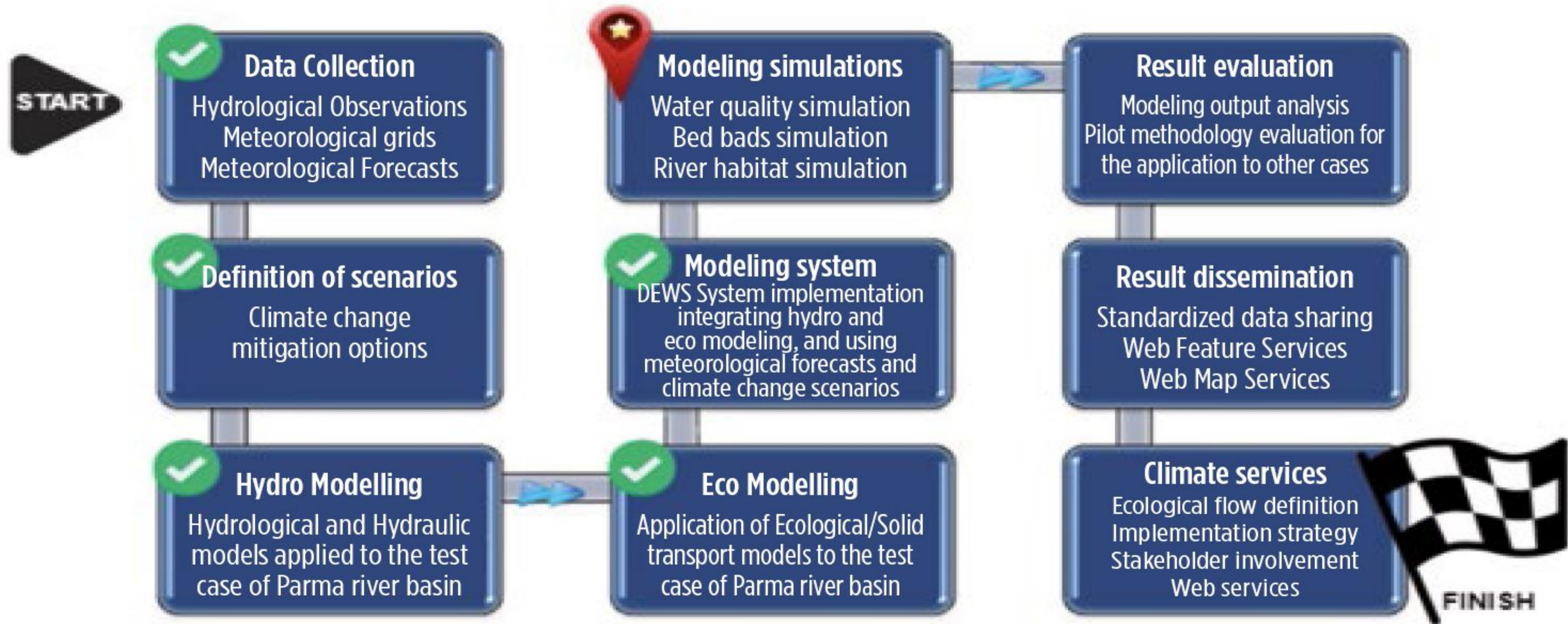
PWA has a special focus in:

- water quality
- habitat evaluation
- sediment transport
- water allocation

To carry out the service, the following data are used: hydrological observations, scenario simulated data, meteorological, hydrological and climatological predictions.



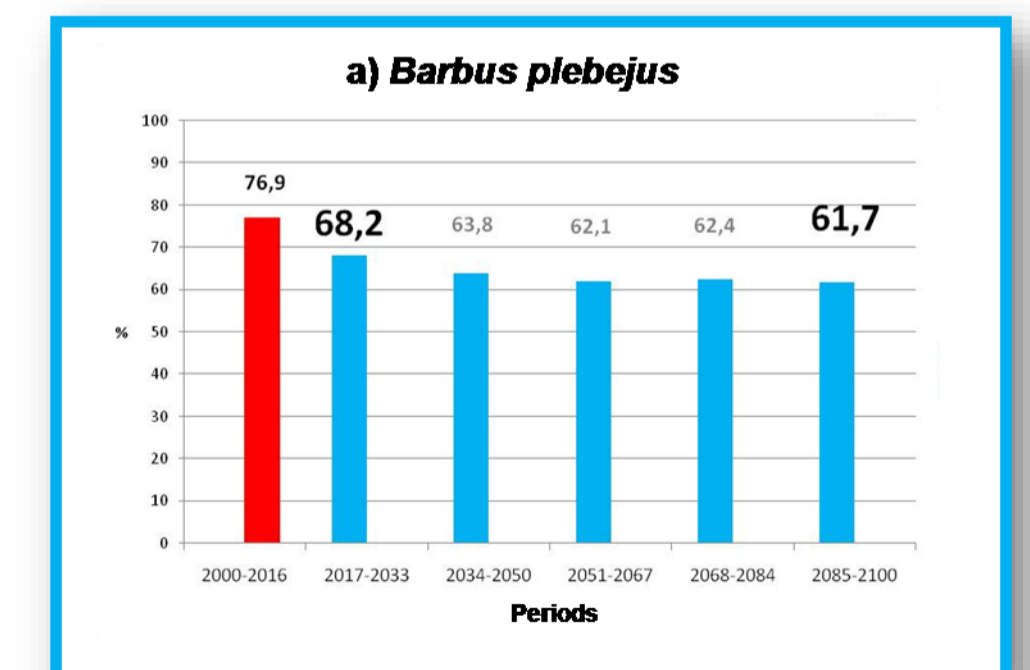
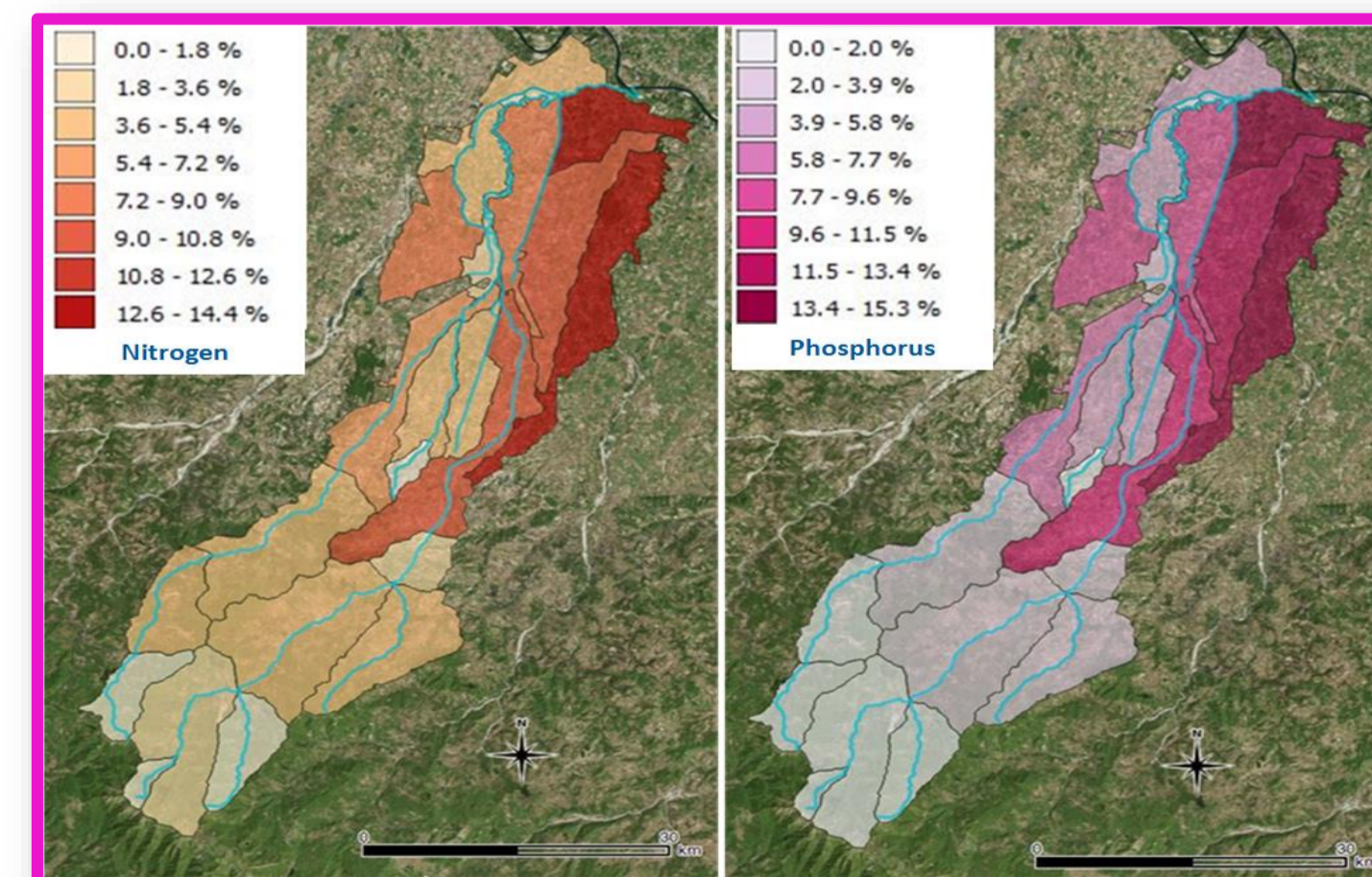
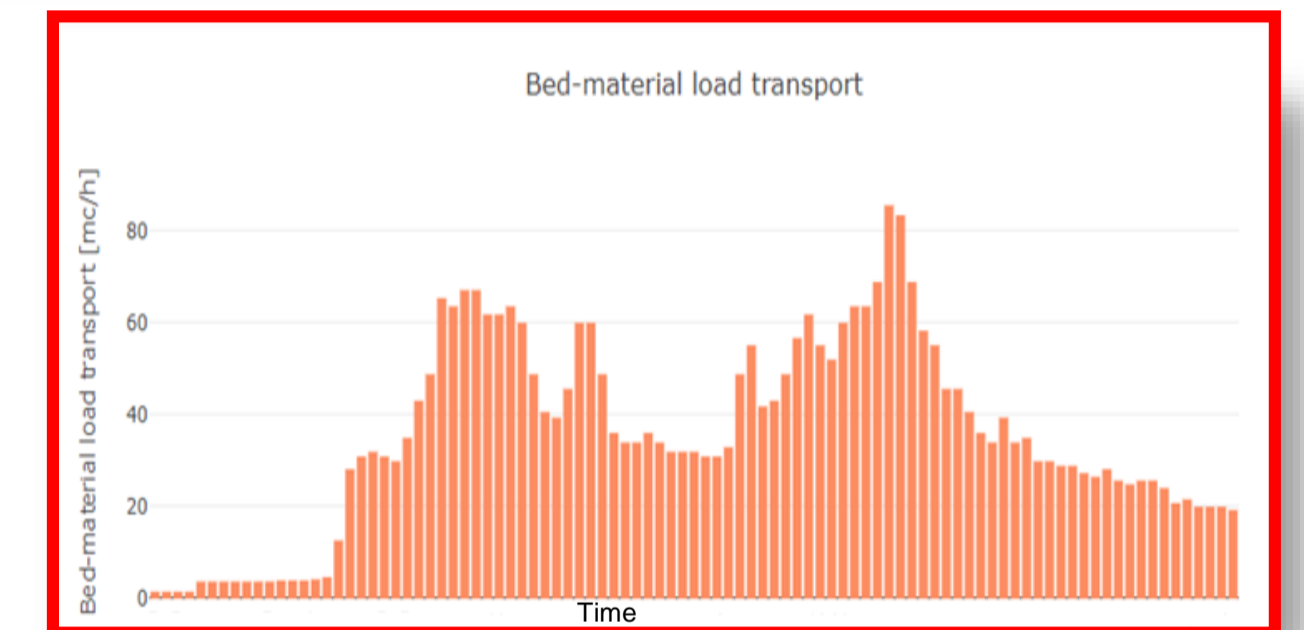
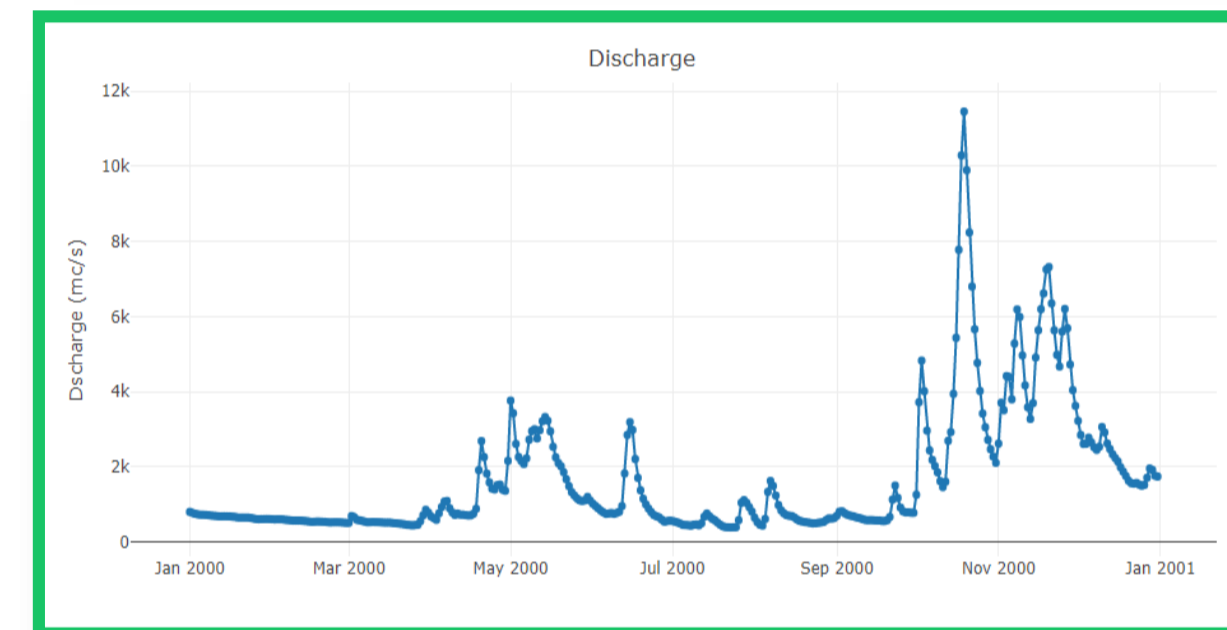
PWA Workflow



Future challenges

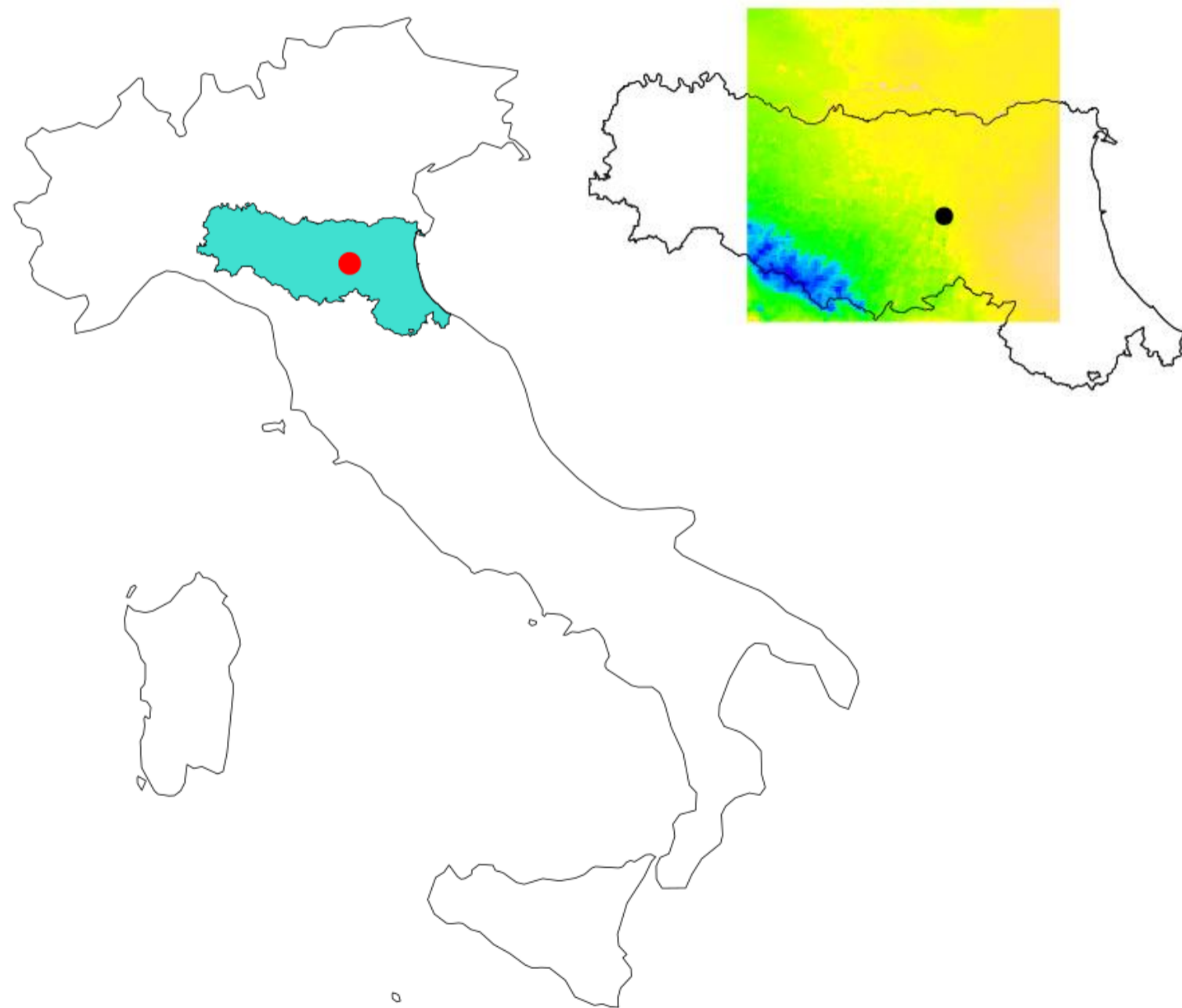
PWA will work throughout an interactive system / web page in which metadata, data, indicators and modeling results will be supplied according to international standards WMO/OGC (open geospatial consortium) compliant, including semantic and ontology facilities, using **web services** (*Web Map Service, Web Feature Service, etc*)

The service will support Administrations and Authorities involved in water management and planning activities .

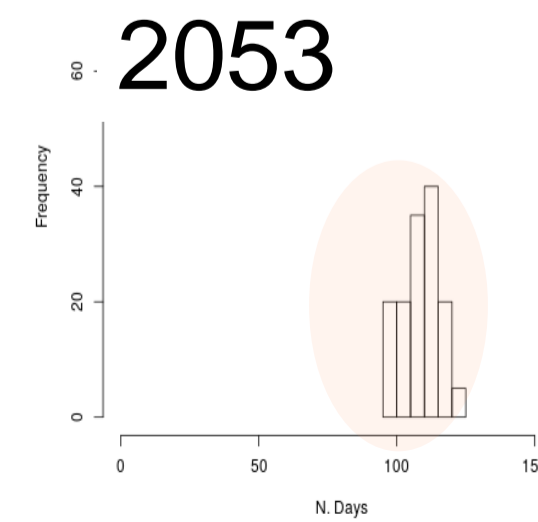
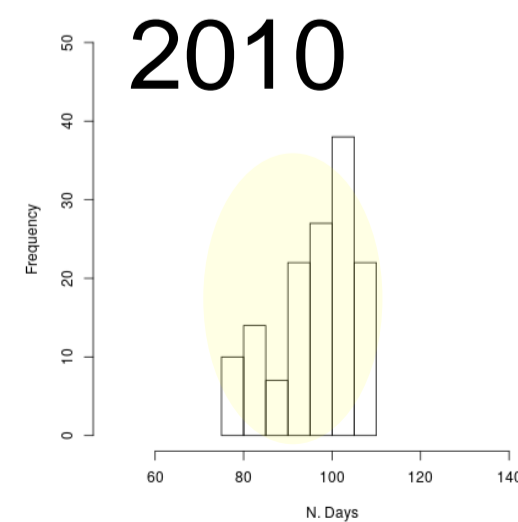
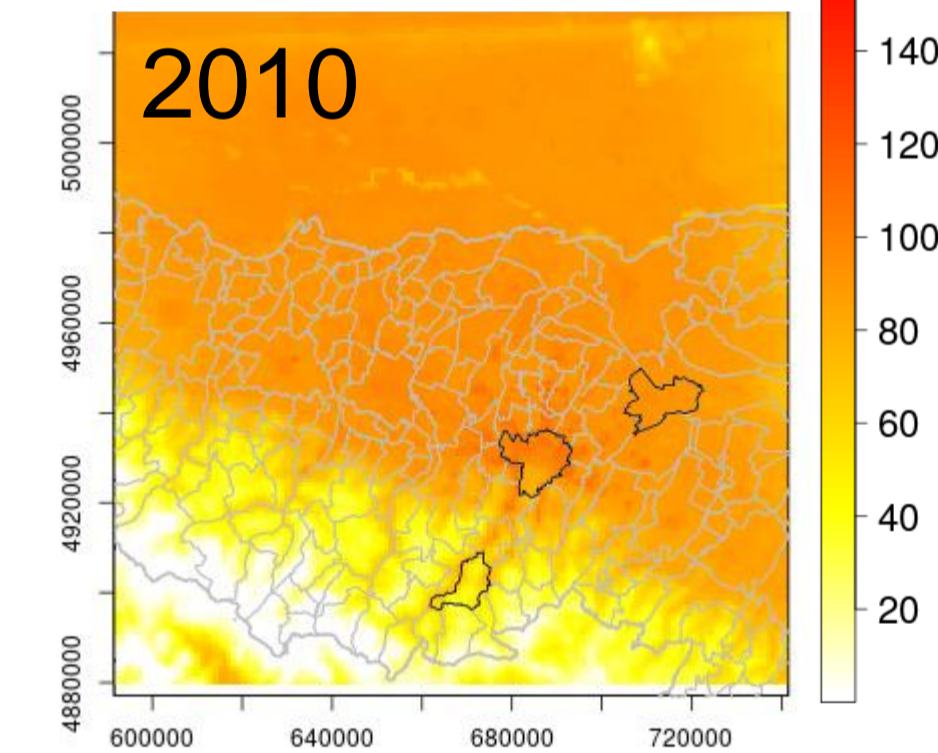


Air Quality in future CLimate - AQCLI

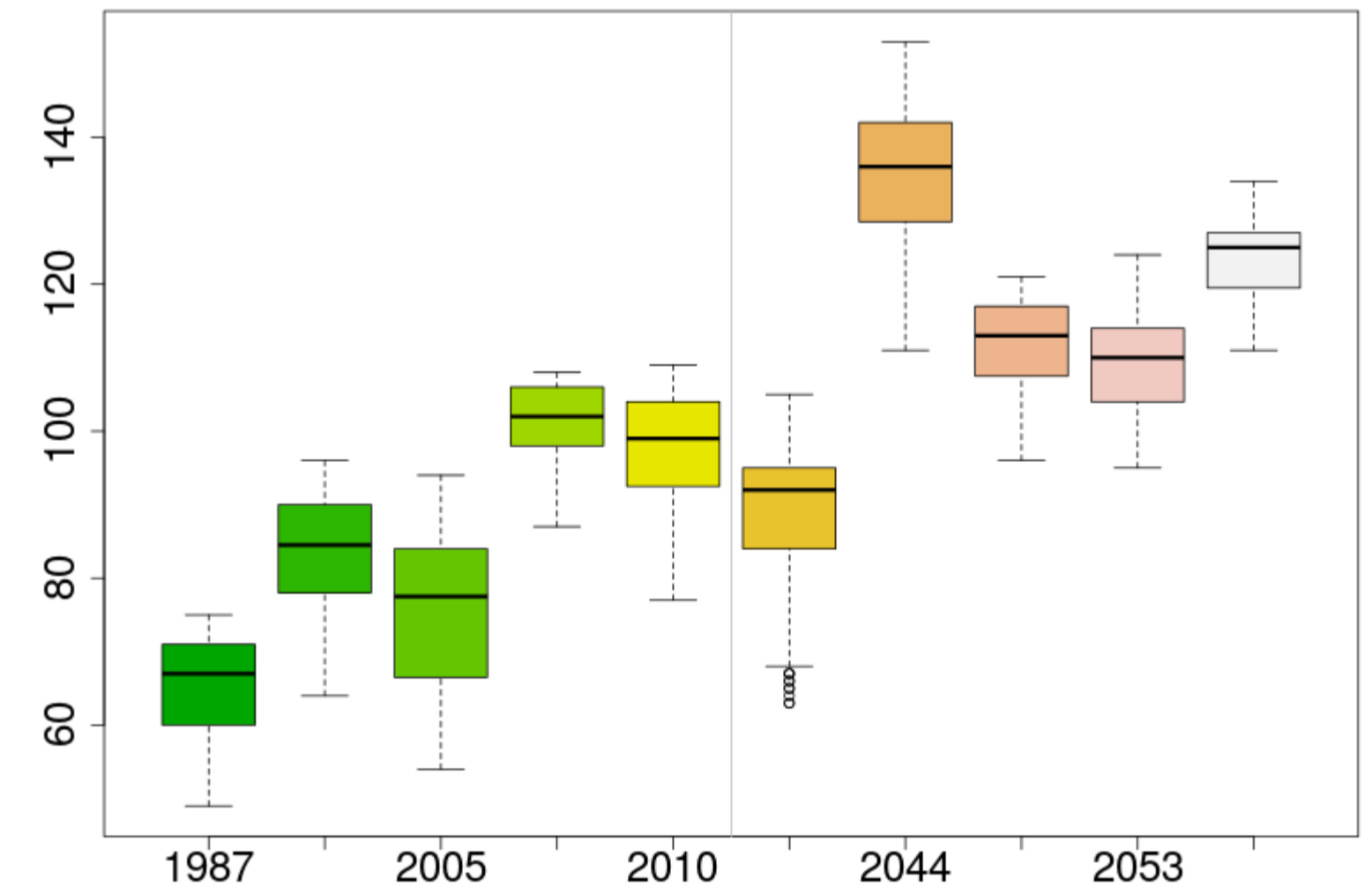
- The AQCLI service will provide an assessment of how climate change will affect the air quality, especially for **PM10** and **O3**.
- The assessment will be representative of background concentration in the area around **Bologna** urban agglomeration.
- The service is a **pilot** and will provide maps and statistical analysis over municipalities. It will to possible extensions to Po Valley.



days favor. O3



Bologna - Distribution of days favourable to O3 along time



AQCLI - DONE

The estimate of impact of future climate scenarios on air quality has been accomplished for the area around the agglomeration of Bologna for **O3**

The input dataset **interface** to the statistical processor has been done for the **PM10** estimates

AQCLI - IN PROGRESS

Production of the dataset of days favourable to **PM10** accumulation for present and future **meteorological conditions**

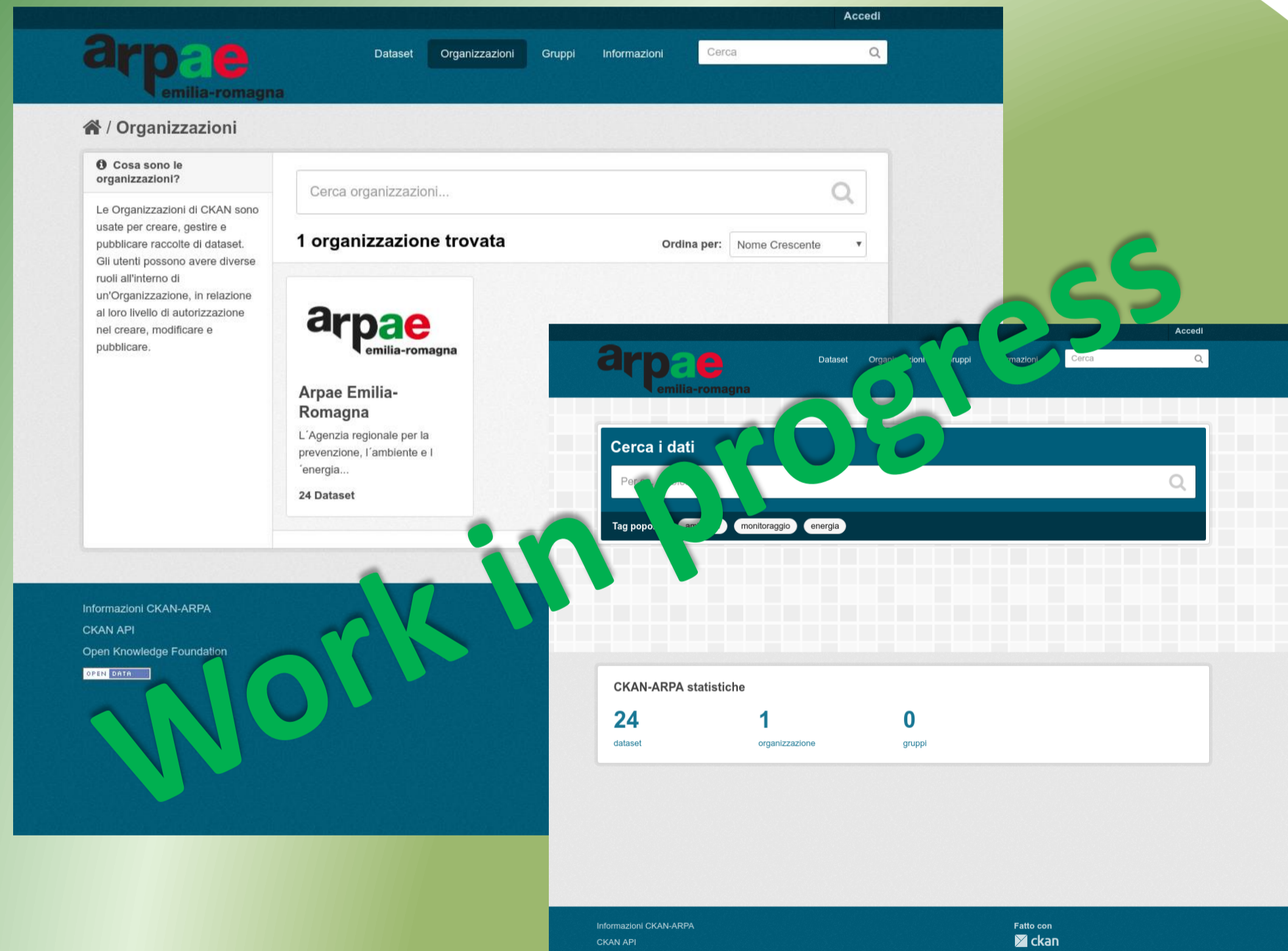
Storage of the output dataset in a repository and/or private cloud datacenter widely accessible



- The output dataset will be made accessible from the **Arpae Open Data website**
- The data and associated metadata are organized by means of the **Ckan tool**.

A dataset for AQCLI results is going to be created

- Quantitative yearly maps of Days Favourable to Ozone accumulation (ncdf, png)
- Quantitative yearly maps of Days Favourable to PM10 accumulation (ncdf, png)
- Statistical analysis on irregular grid (shp, geojson)
- Tabular statistical analysis (txt, csv)



<https://dati.arpae.it/>

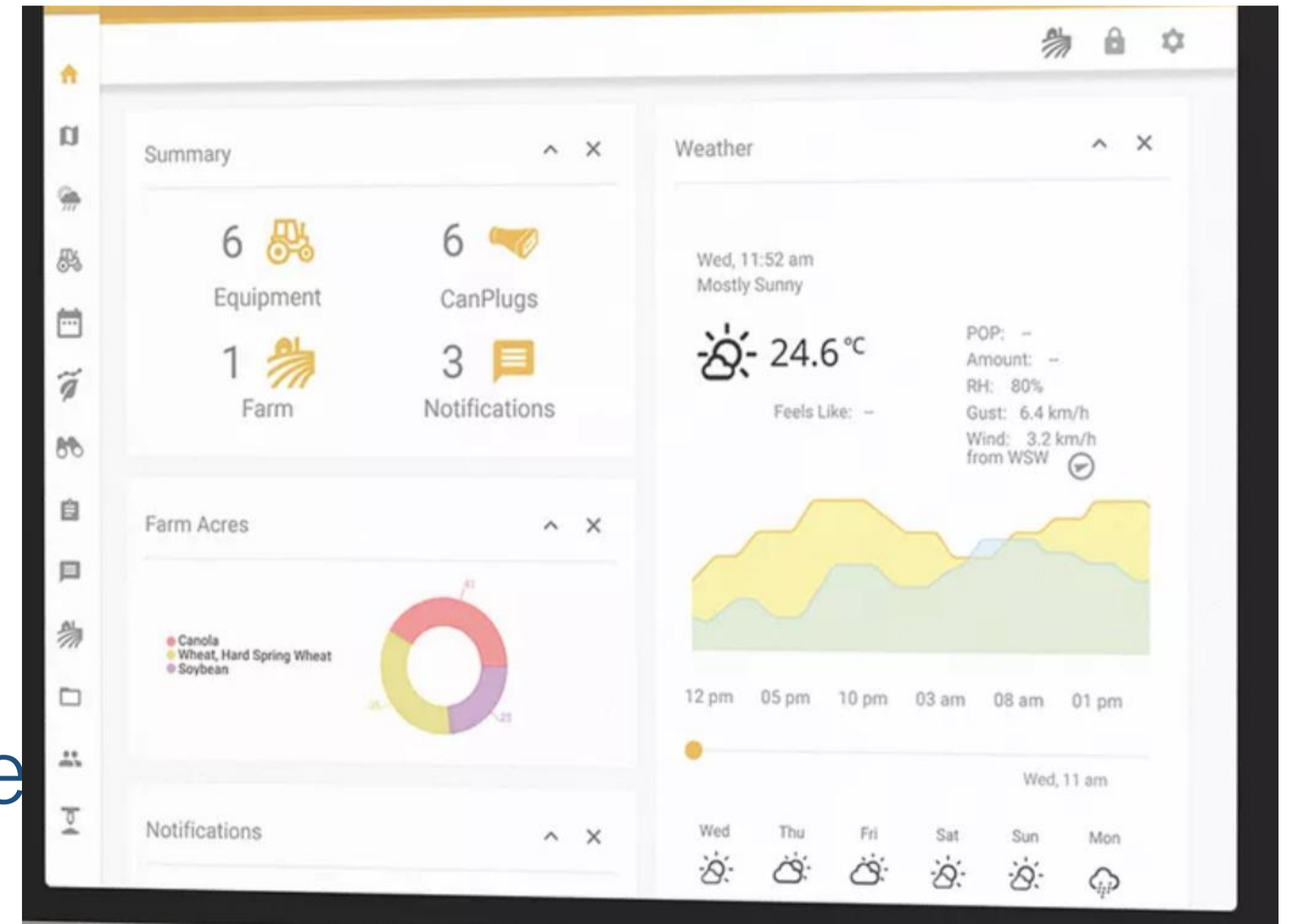
IRRICLIME - Intro

- cloud-web platform for Agriculture 4.0
 - End-Users
 - Irrigation Managers – Water Authorities
 - Farmers
 - Climate Change Projections (SWICCA)
 - ARE YOU CLIMATE READY?
 - Irrigation network
 - DSS for mitigation/adaptation
 - Improve irrigation
 - New Crops Scheme
 - Seasonal Forecast (CLARA)
 - Assessing climate seasonal risks for crops
 - Short term water irrigation management



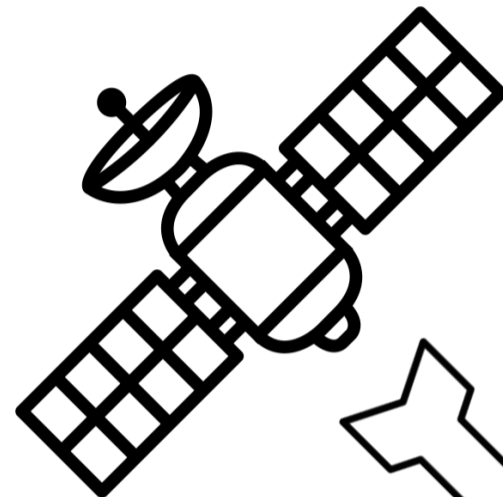
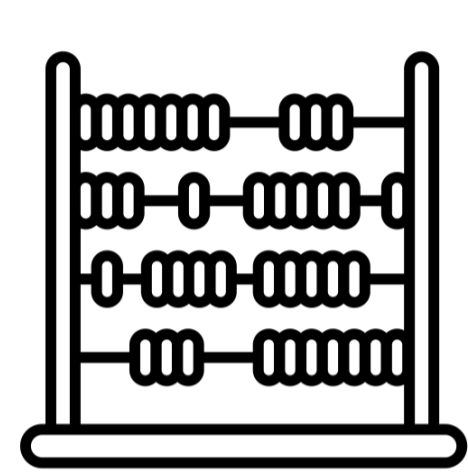
IRRICLIME – Outputs

- Seasonal Climatic Web Bulletin
 - Forecasting Crop-Soil Water Balance
 - Warning on climatic risks
 - Irrigation tips to Farmers
 - Short-term management of water resource
 - Assessing climatic damages

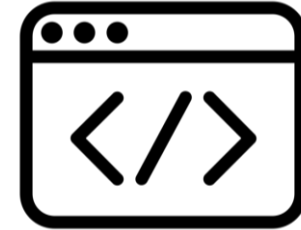


IRRICLIME - Framework

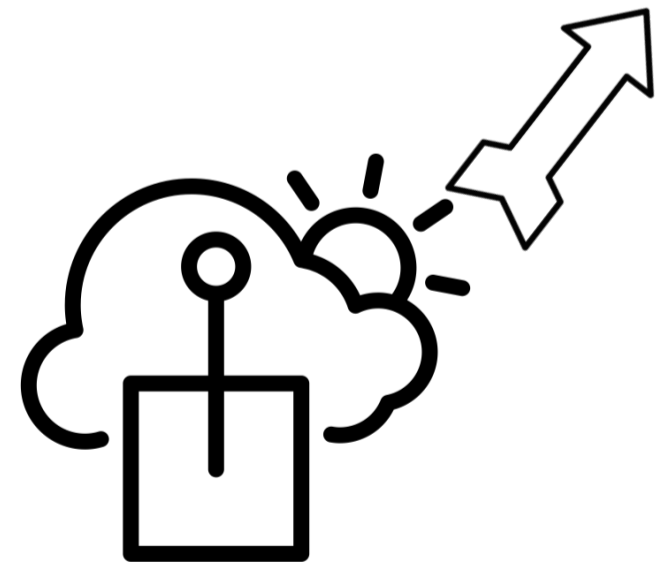
Copernicus CDS Multi Model
Seasonal Forecast



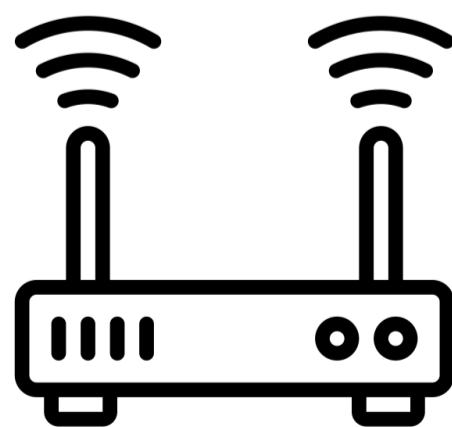
CDS API



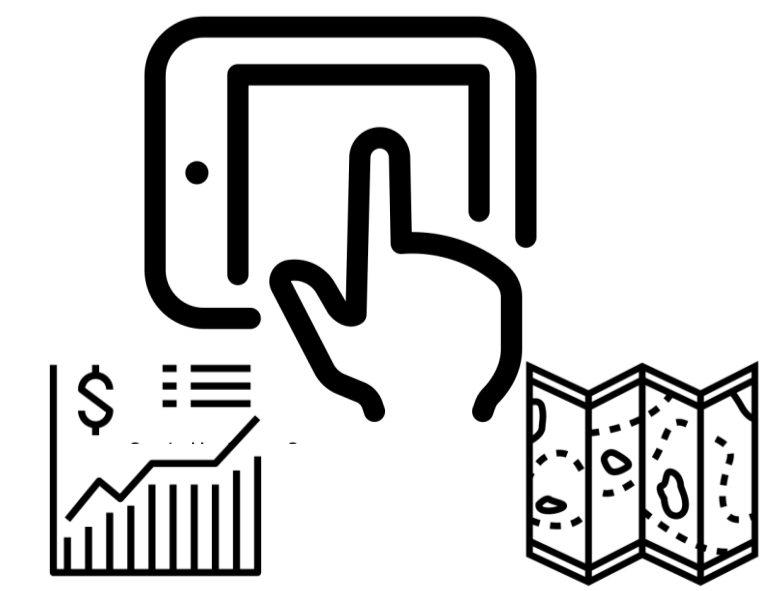
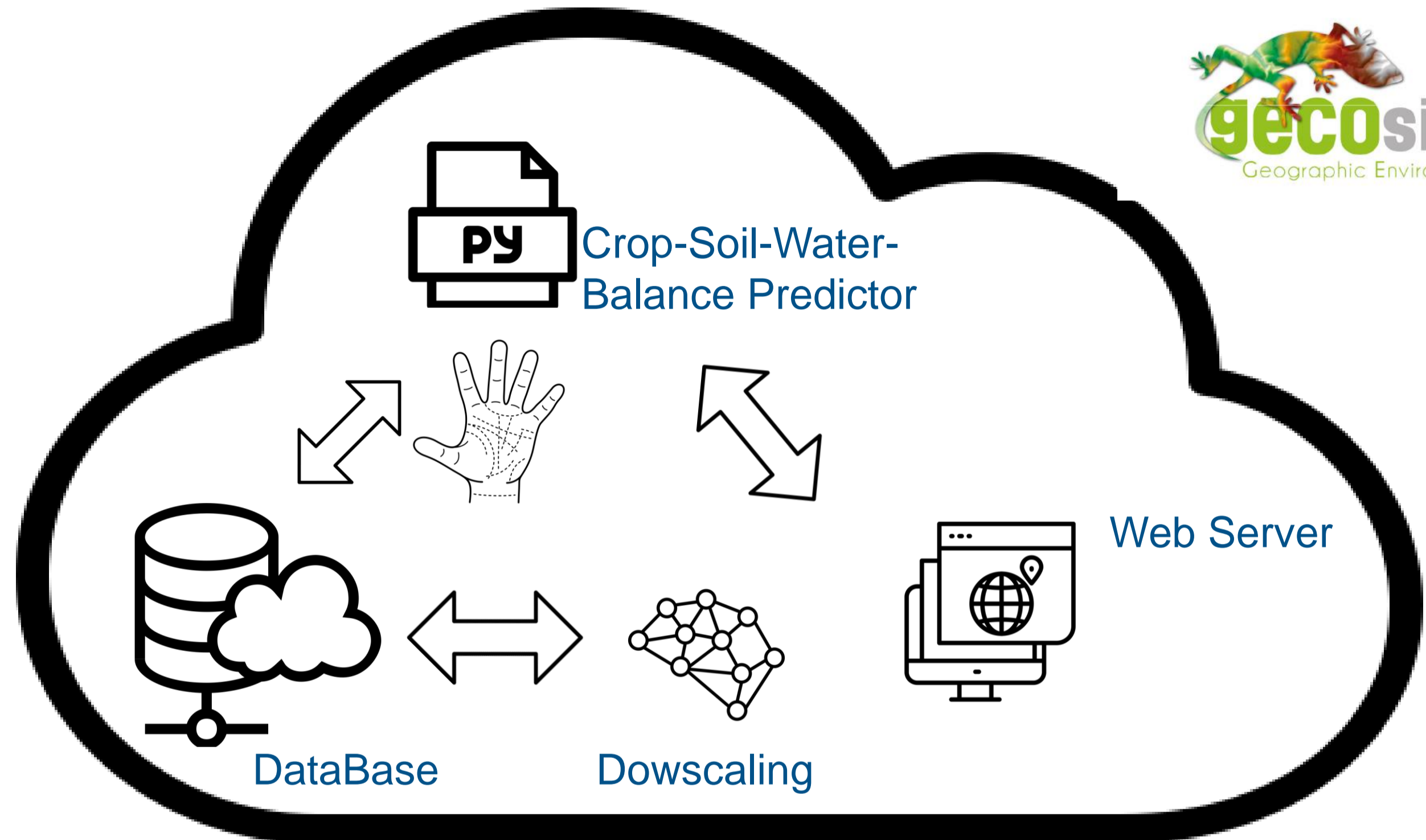
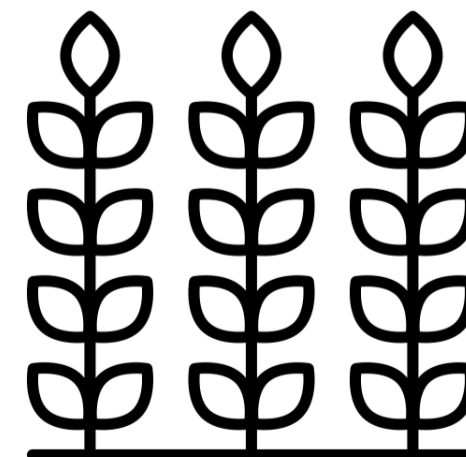
On-Site Meteo data



IoT

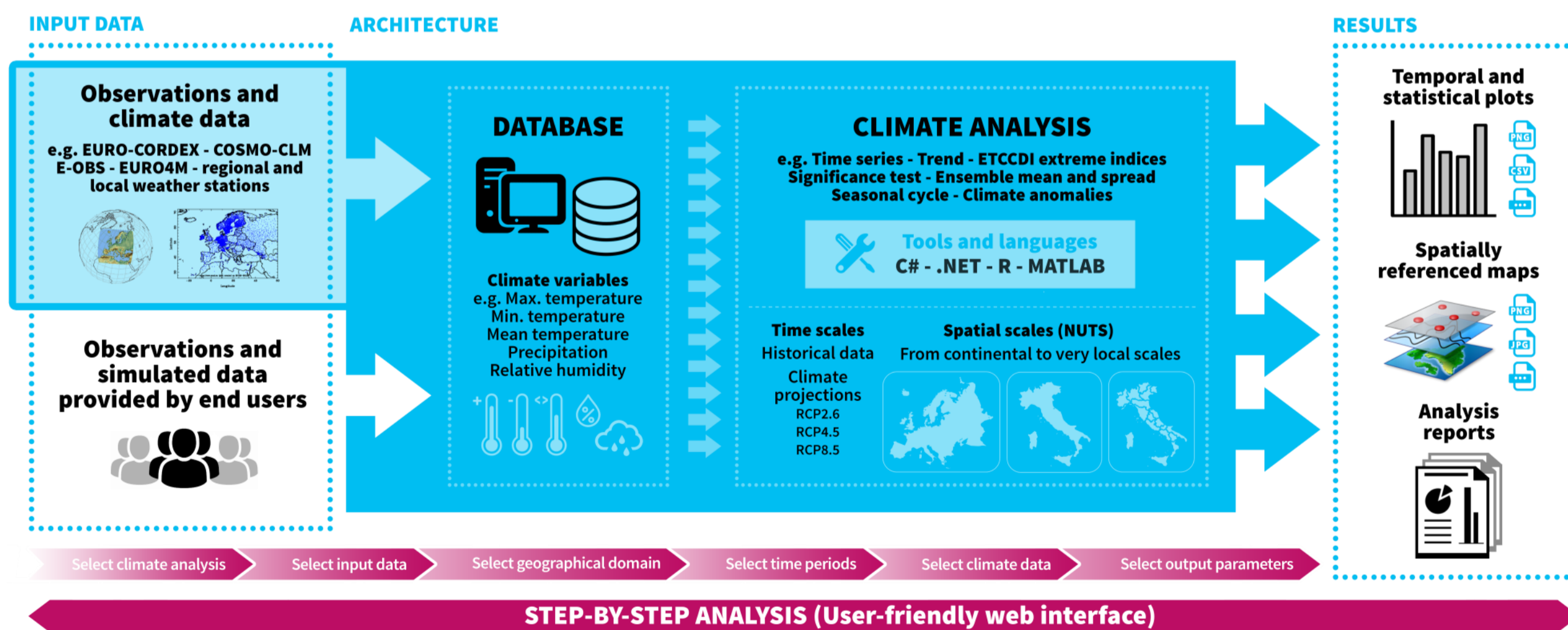


Crop Data



CLIME - Intro

- ✓ Facile accesso a diverse tipologie di dati climatici/soluzioni
- ✓ Analisi climatiche personalizzate su diverse scale temporali e spaziali
- ✓ Diverse analisi statistiche: serie temporali, trend, indicatori, anomalie climatiche
- ✓ Visualizzazione chiara ed efficiente dei dati attraverso grafici e mappe georeferenziate
- ✓ Risultati delle analisi climatiche disponibili in formati diversi



Variabili climatiche a
diversa risoluzione
temporale

Simulazioni climatiche per
diversi orizzonti temporali

CLIME – Outputs

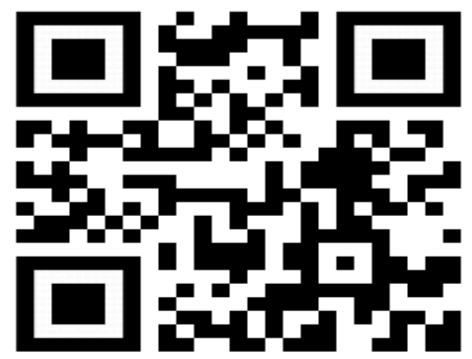


Access your dedicated user area through the web platform dataclime.com by clicking here



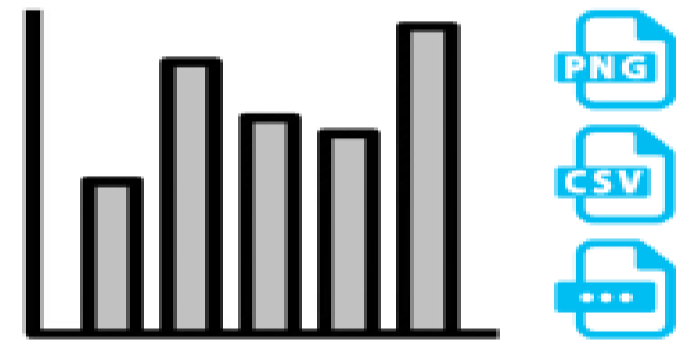
GET YOUR CLIMATE DATA

dataclime.com

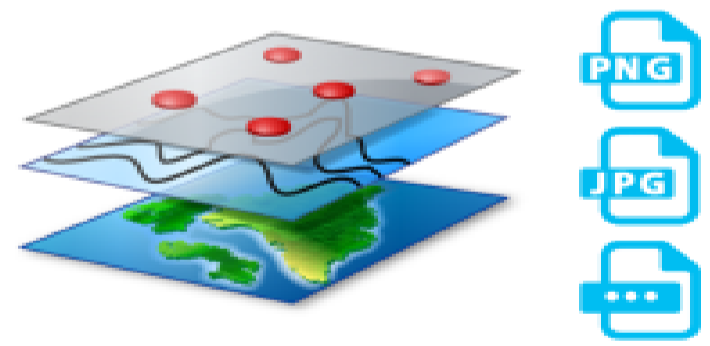


RESULTS

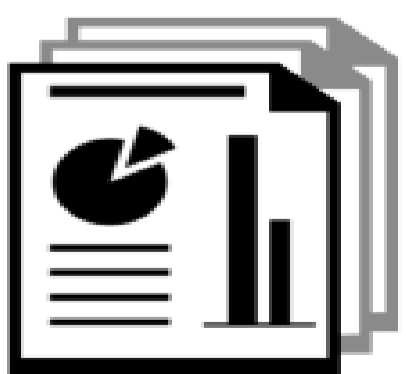
Temporal and statistical plots



Spatially referenced maps



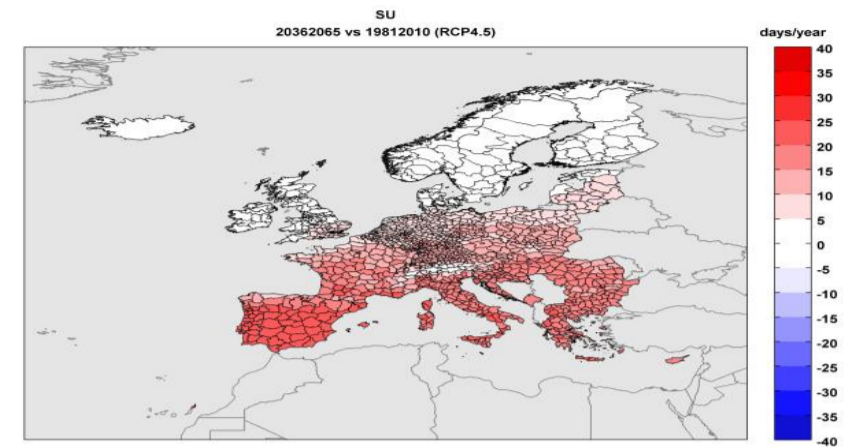
Analysis reports



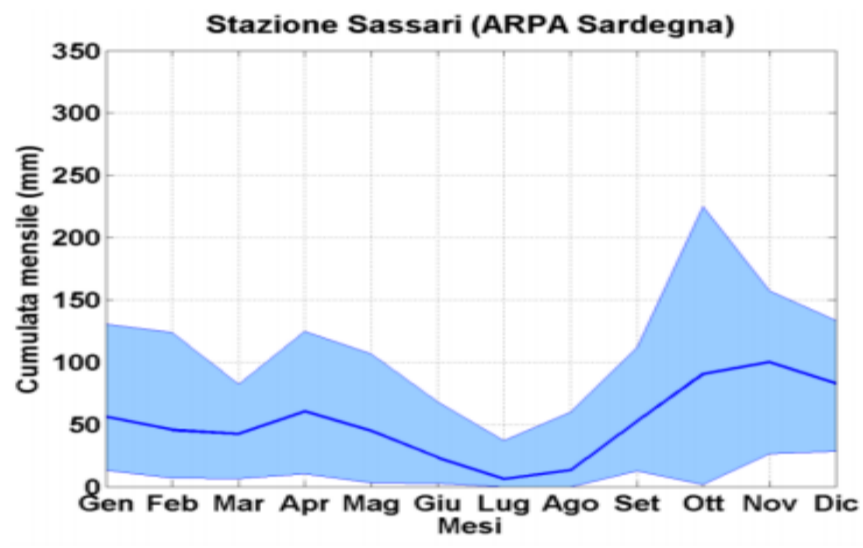
Download climate analysis available in different format



MAPS



PLOTS



REPORT



TEXT FILES

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.;43.9;12.10007;10/01/2006 00:00
```





**Climate forecasts
enabled knowledge
services**

Please visit CLARA web
site for further info and
contacts, thank you!

www.clara-project.eu

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