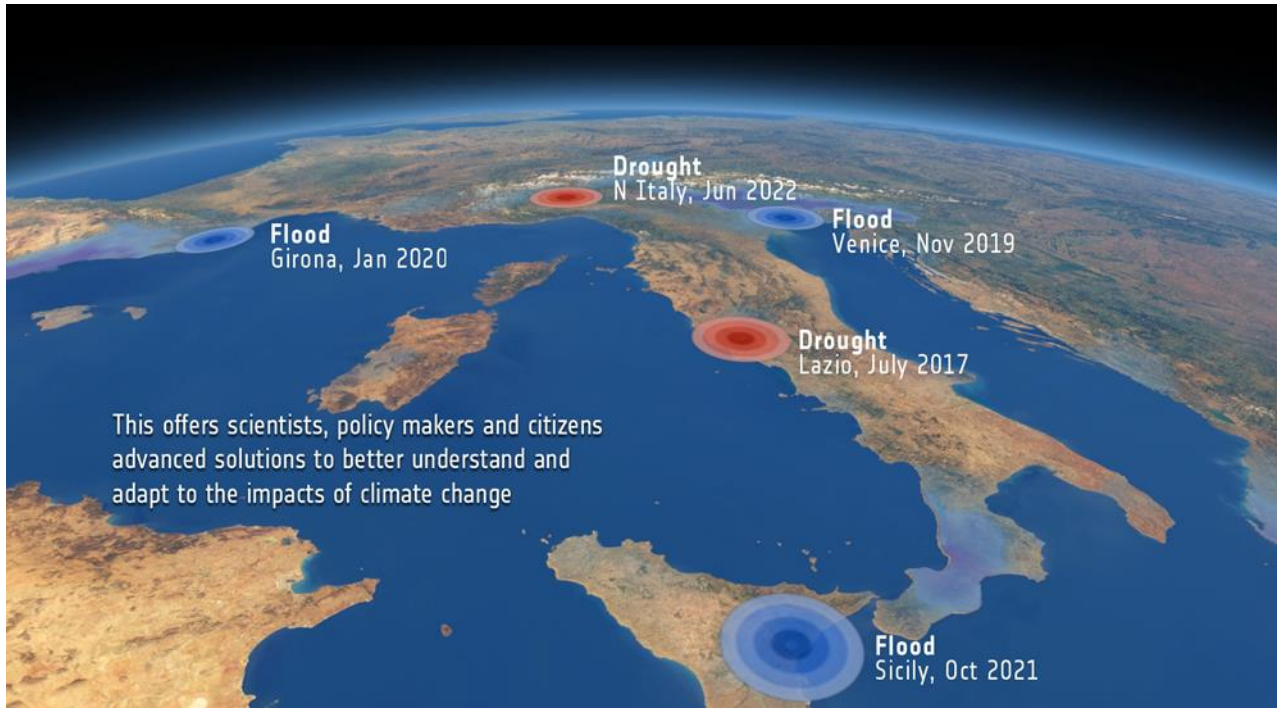
DTE HYDROLOGY EVOLUTION

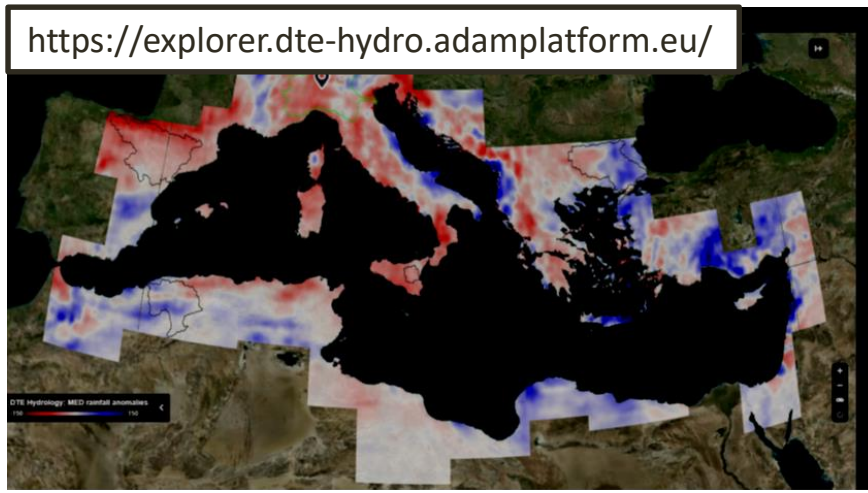
4D reconstruction of the water cycle at the decision making scale (1 km, 1 hour)

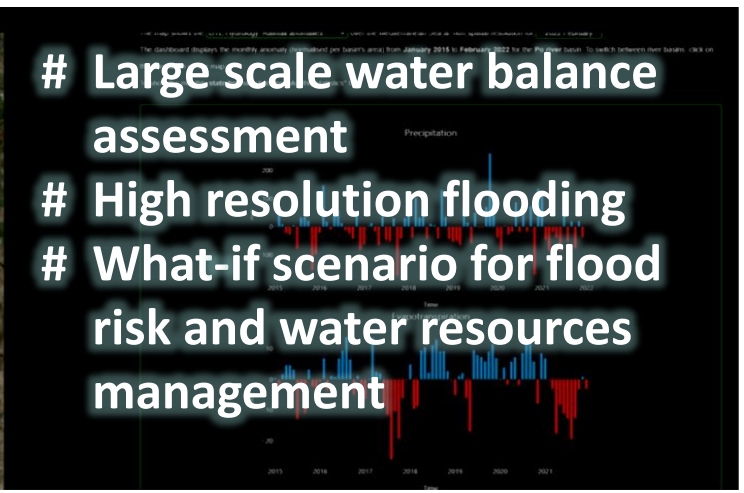
To develop and demonstrate a **prototype of Digital Twin Earth with focus on water cycle** and hydrological processes by highlighting the huge potential of high-resolution Earth Observation products for predicting **hydrological extremes** (floods, landslides and drought) and for **water resources management**



Demo @ESA Science Hub to ACEO

https://explorer.dte-hydro.adamplatform.eu/



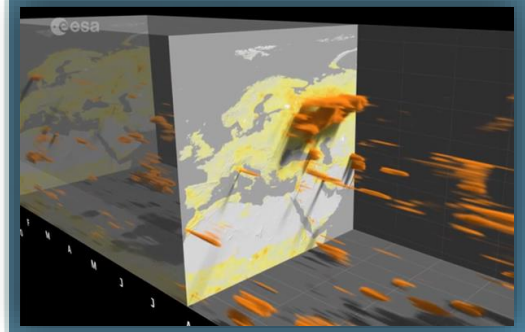


DTE HYDROLOGY EVOLUTION OVERVIEW

4D reconstruction of the water cycle at the decision making scale (1 km,1 hour)

DTE Hydrology Datacube

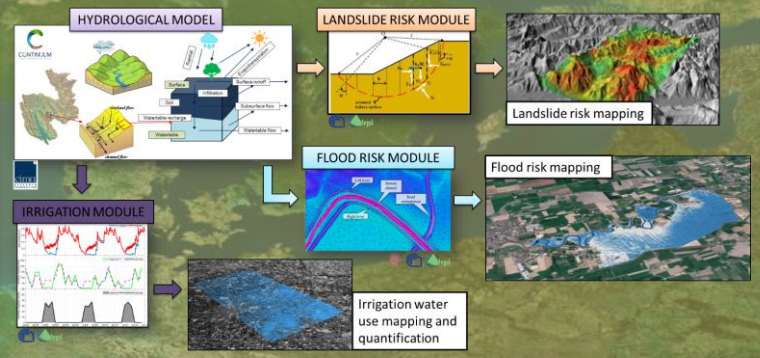
EO-based and in situ dataset



High resolution datacube (1km, 1hour\1day)

DTE Hydrology Modelling System

Physical modelling and Artificial Intelligence



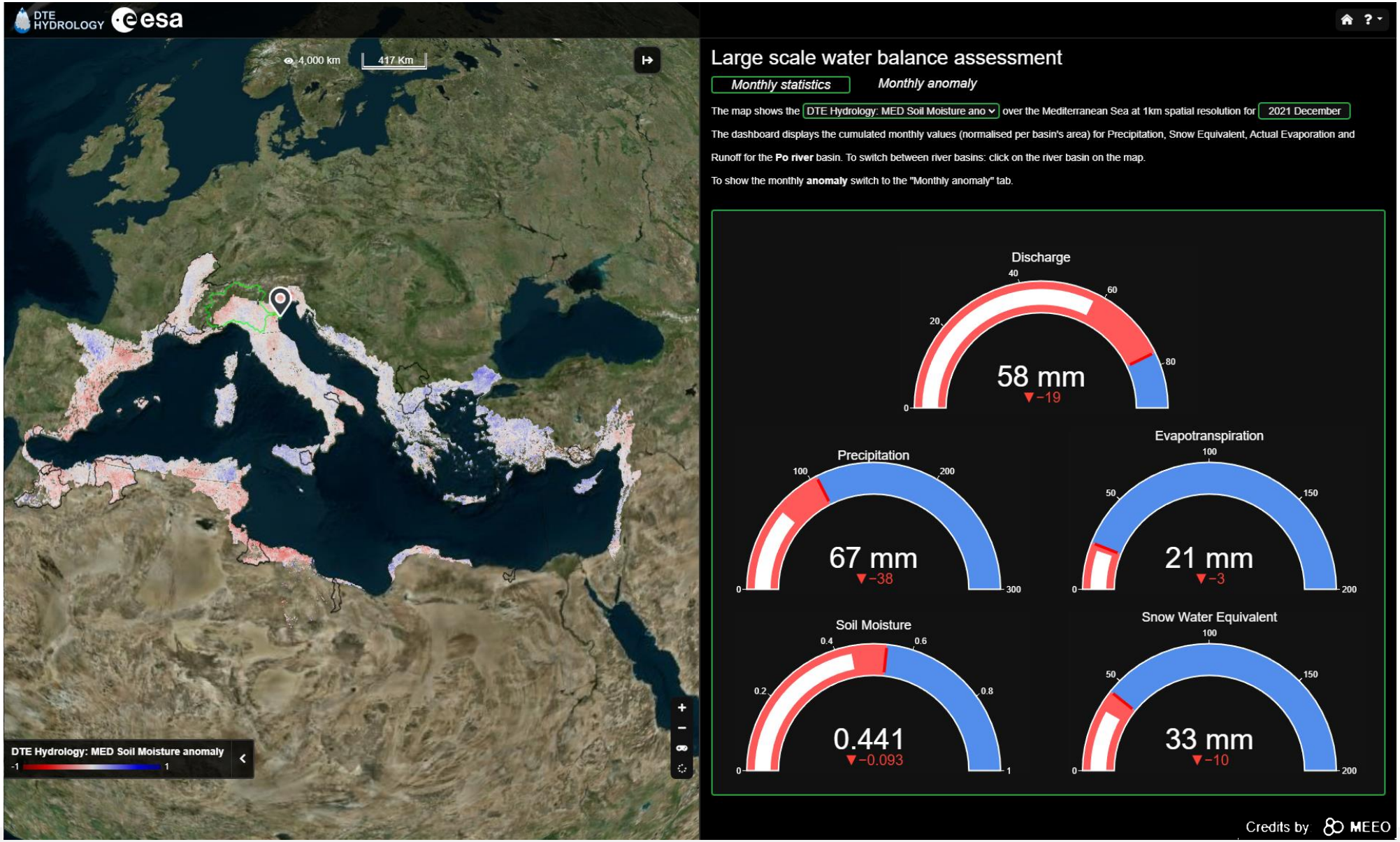
DTE Hydrology Platform

An integrated platform including observations and modelling results as a community tool to foster science and applications.

Cloud-HPC infrastructure

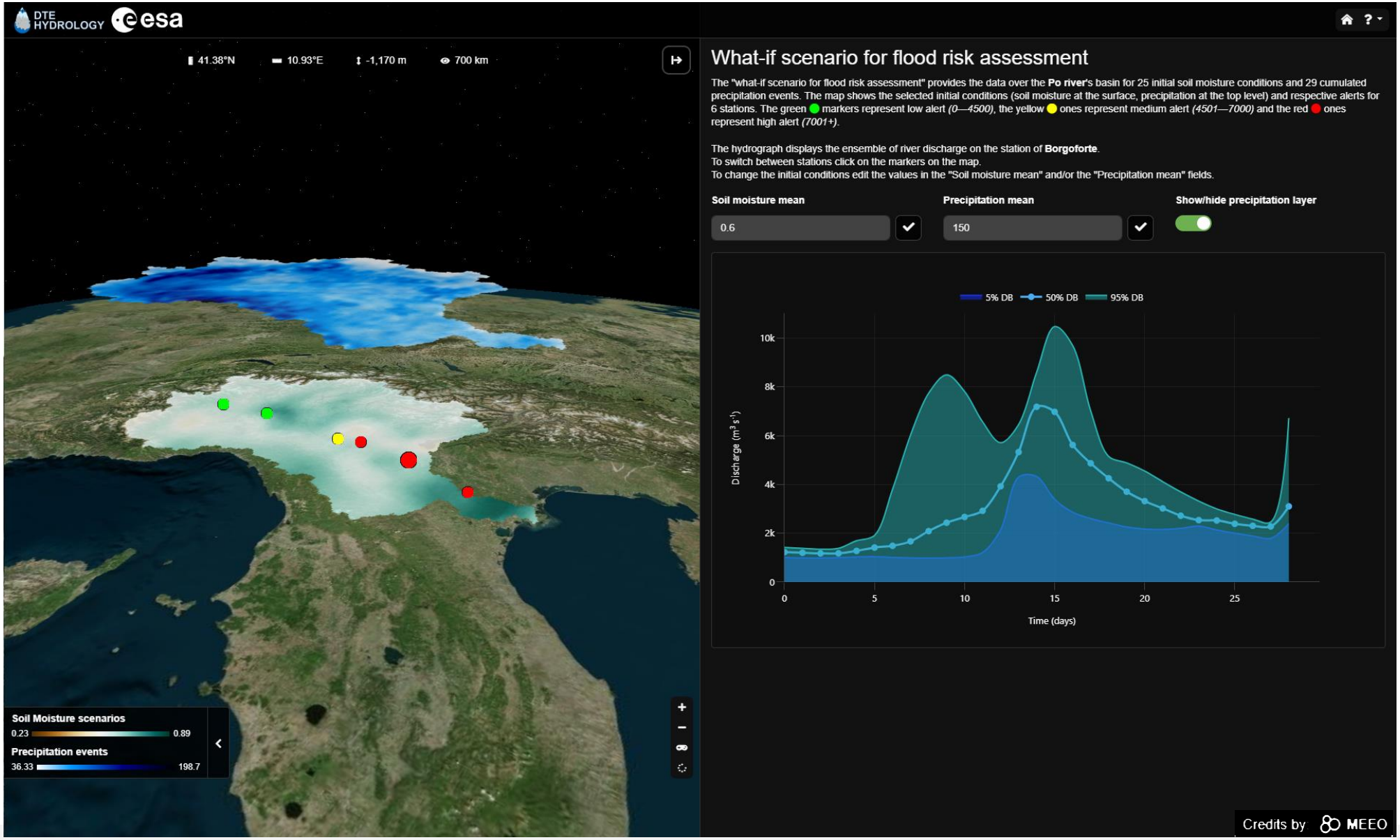
DTE Hydrology Community

DTE HYDROLOGY PLATFORM: DROUGHT

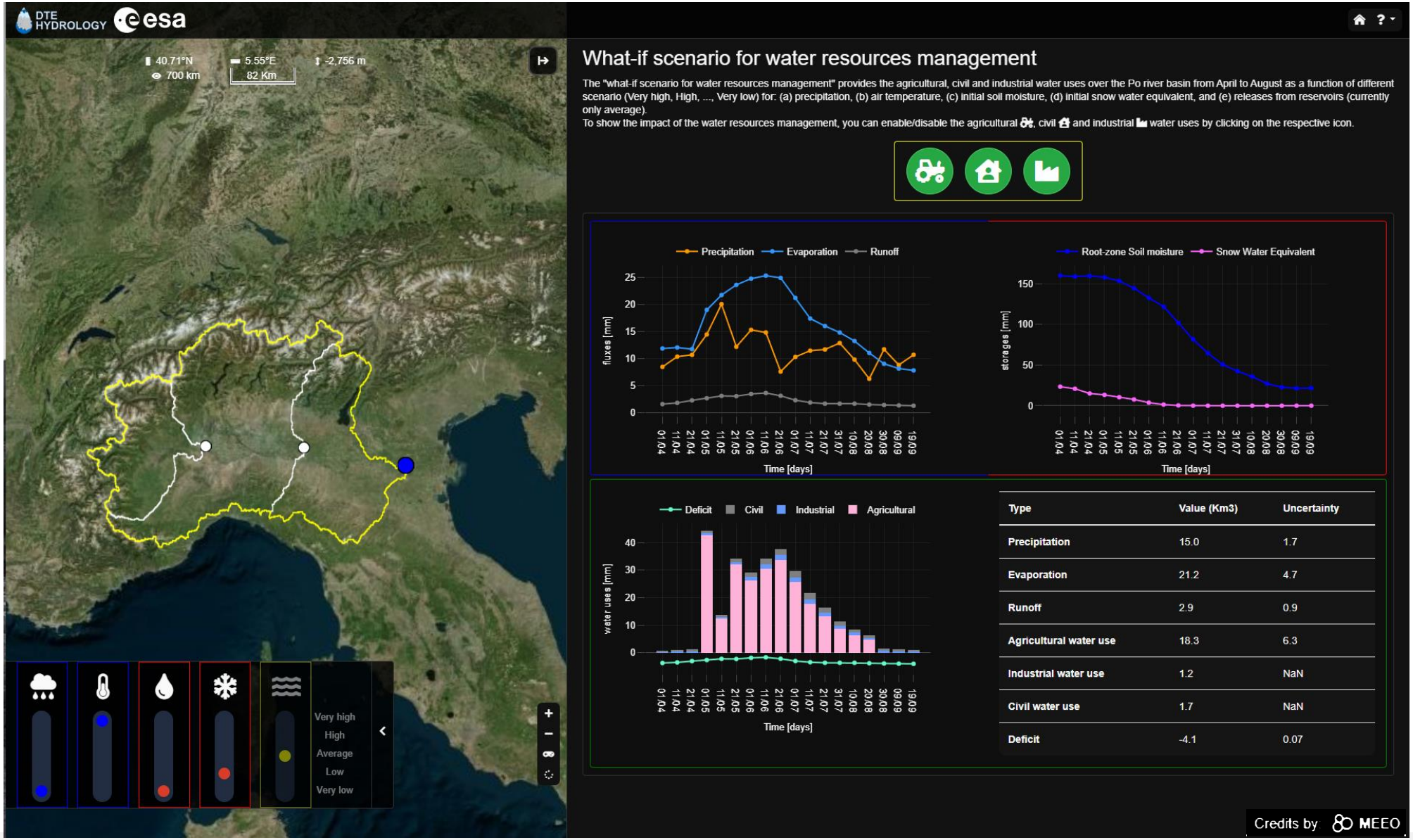


DTE HYDROLOGY PLATFORM: FLOODING

DTE HYDROLOGY PLATFORM: WHAT-IF FLOOD RISK



DTE HYDROLOGY PLATFORM: WHAT-IF WATER RESOURCES



Type	Value (Km3)	Uncertainty
Precipitation	15.0	1.7
Evaporation	21.2	4.7
Runoff	2.9	0.9
Agricultural water use	18.3	6.3
Industrial water use	1.2	NaN
Civil water use	1.7	NaN
Deficit	-4.1	0.07

DTE HYDROLOGY PLATFORM: NOR CONTRIBUTION

- Cloud resources for frontend services
  - Use cases (drought, flooding, what-if flood risk and what-if water resources)
  - Generic data exploration service
- Cloud resources for backend services
  - OGC services (OpenSearch, Web Map Service, Web Coverage Service)
  - Ad-hoc tools for climatology and anomaly computation

- Cloud storage for DTE Hydrology Datacube

- Operation and maintenance
  - Security update
  - Bug fixing

DTE HYDROLOGY PLATFORM: SCIENTIFIC QUESTIONS

- In which area **drought** is more severe?
- How severe is current **drought** condition with respect to the past?
- How much water is needed to recover from **drought** conditions in different compartments (river, soil, snowpack, reservoirs, …)
- Do evaporation increase or decrease during **drought**?

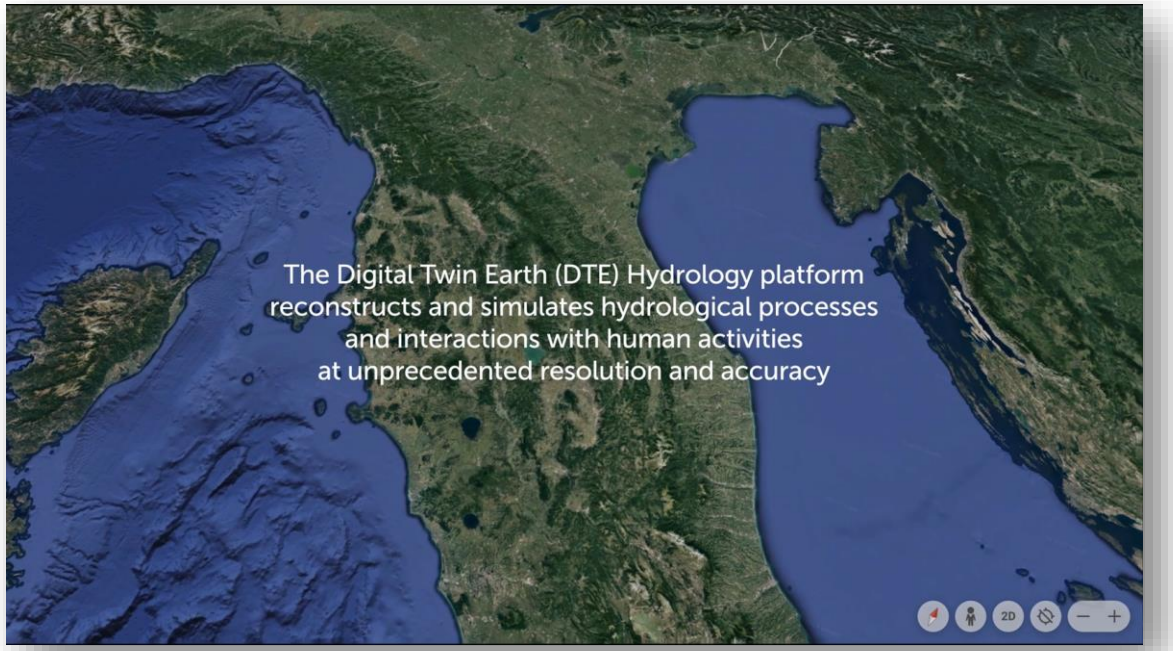
- How much rainfall is needed before river **flooding**?
- What is the impact on **flood** peak of 20% increase in initial **soil moisture**?
- Where **flooding** will occur?
- What do we need to know to predict **flood**?

- What is the impact on **water uses** of reducing 20% reservoir outflow? Or reducing irrigation 20%?
- What will be the impact on **water uses** of missing precipitation in the next months?

DTE HYDROLOGY PLATFORM: OUTREACH

VIDEO PRESENTING THE DTE HYDROLOGY (EVOLUTION) PROJECT

DEMO VIDEO FOR THE USE OF DTE HYDROLOGY PLATFORM



DTE HYDROLOGY PLATFORM: CURRENT USAGE

- Showcasing the results of DTE Hydrology Evolution project to:
  - General Public
  - Policy makers
  - Stakeholders involved in hydrological applications (flood risk, drought, water resources management)
  - Scientists

- Training Course
  - ESA courses
  - Civil Protection Centres
  - EUMETSAT courses
  - University: students and PhDs