Emergency Management

SEE-MHEWS-A project

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WMO OMM

WORLD BANK GROUP

GFDRR
Global Facility for Disaster Reduction and Recovery

ECMWF

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SEE-MHEWS-A project overview

South-East European Multi-Hazard Early Warning Advisory System

Why South-East Europe?

- South-East Europe has experienced a significant number of severe meteorological and hydrological hazardous events such as floods, extreme temperatures, severe storms, droughts, wildfires, and landslides. Over the last 20 years, more than 6 000 people lost their lives and over 12 million people were negatively affected by weather, climate, and hydrology related disasters in this region. Furthermore, the total estimated losses and damage from these disasters during this period amounted to over US$ 20 billion.
- NMHSs are facing challenges with securing adequate financial and human resources in fulfilling their core function - to provide timely and accurate warnings.
- Complementary to the national activities, through international cooperation these countries can achieve better quality of weather and water related information, forecasts, warnings and advisories supported by the jointly developed multi-hazard early warning system.

1. First phase 2016 -2017 – Implementation plan was prepared with support by the USAID
2. Second phase 2018-2022 - Pilot phase supporting an implementation of a prototype, supported by the World Bank and European Union
3. Third phase (2022-2026, subject to the availability of funds) – Implementation of the operational system

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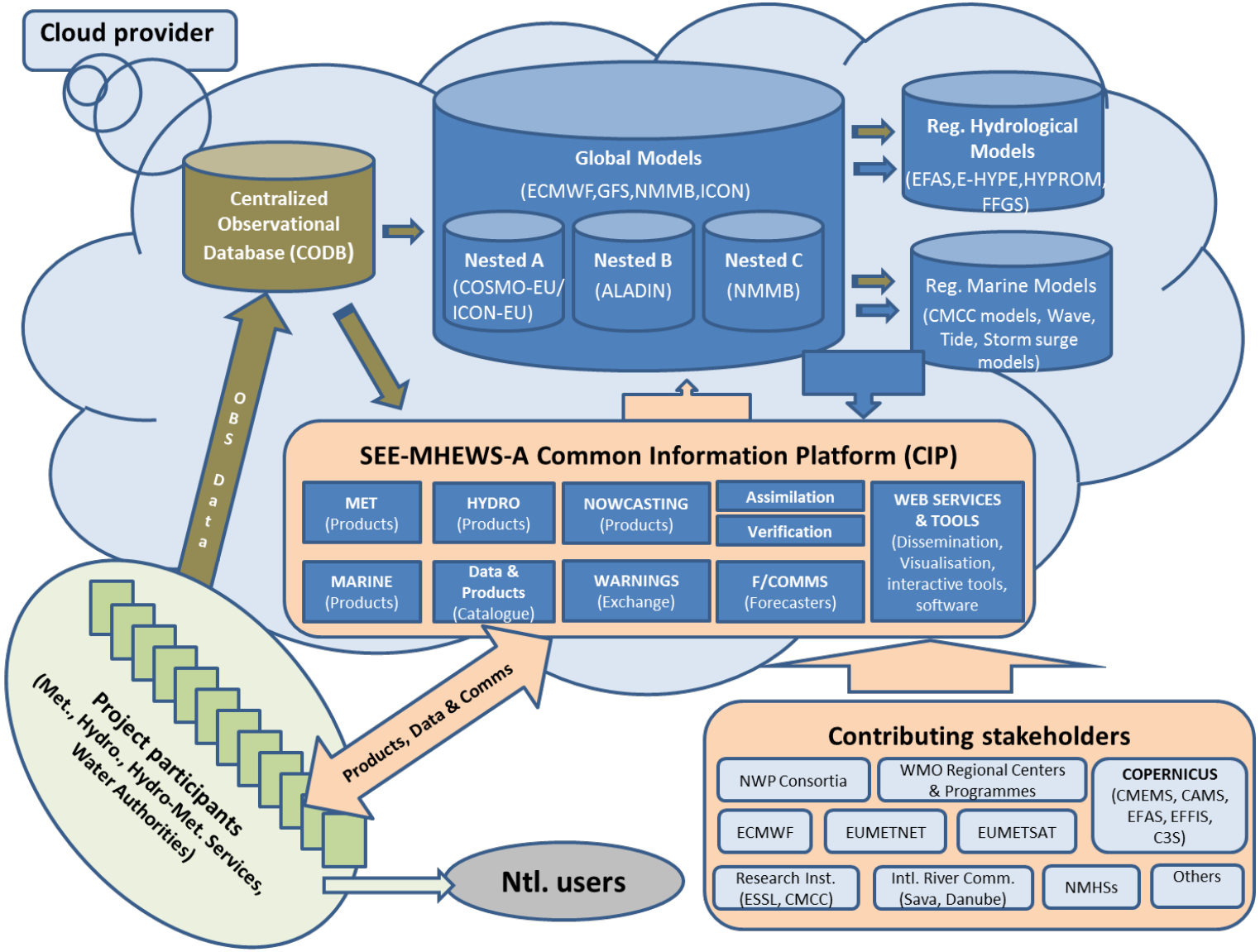
SEE-MHEWS-A project overview



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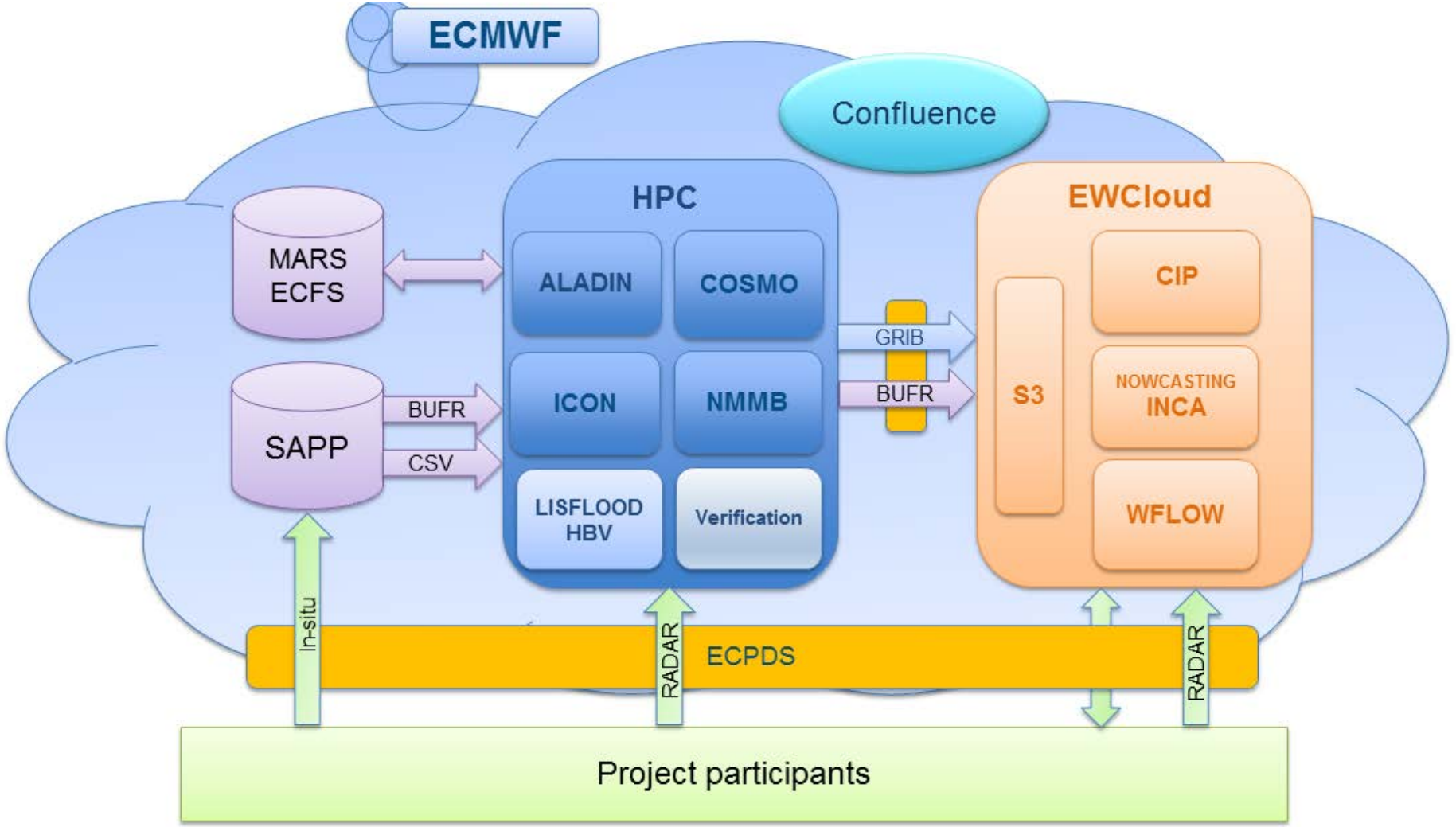
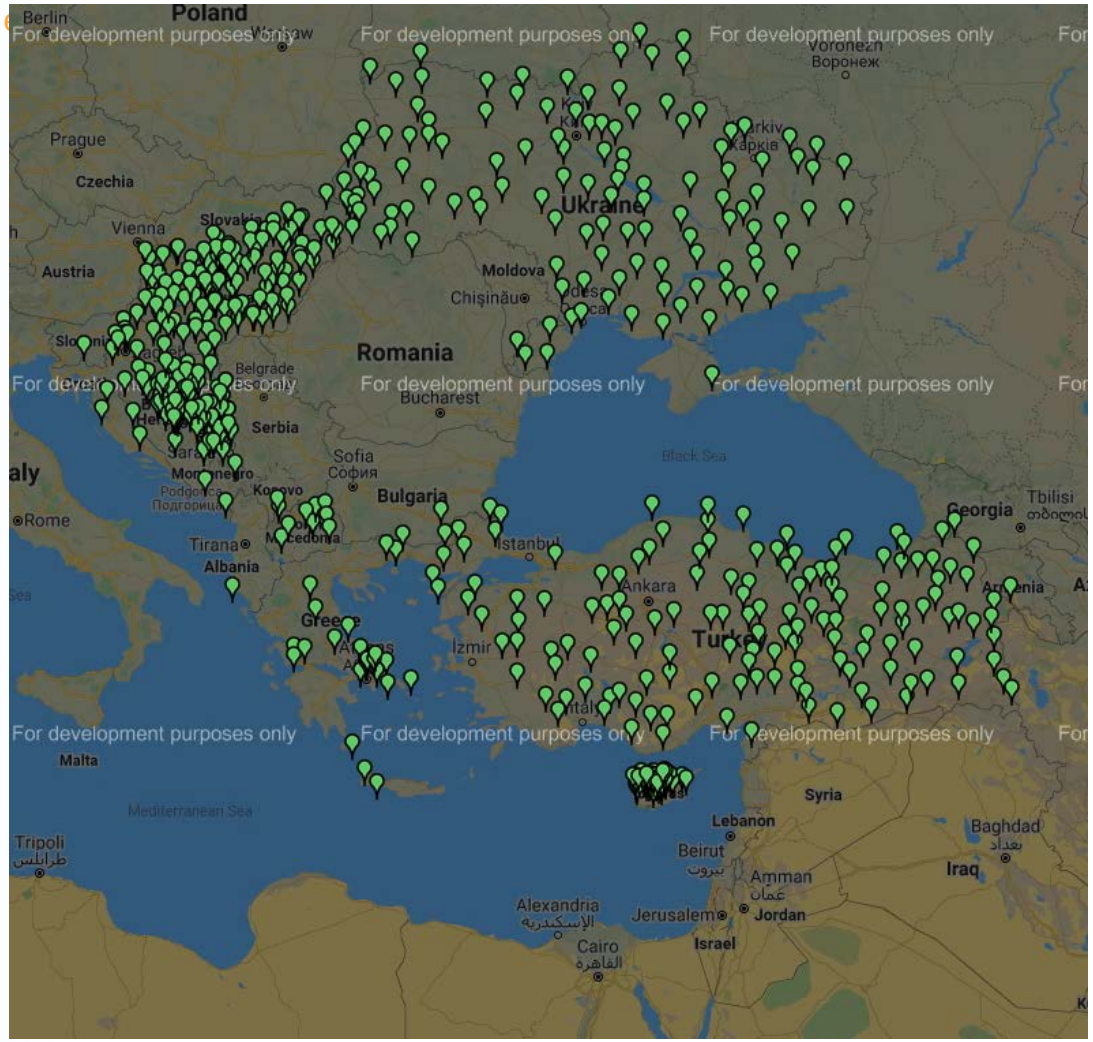
SEE-MHEWS implementation at ECMWF



SYNOP Observations – NRT additionally received



Map shows both non-GTS and more frequent GTS available stations.

Country	Number of stations - GTS	Number of additional stations through SEE MHEWS-A	Total # of reports/day – GTS	Total # of additional reports/day through SEE-MHEWS-A
Bosnia and Herzegovina	14	63 (28 RS, 35 FBIH)	222	9072
Republic of Croatia	40	4	683	576
Cyprus	4	37	43	5328
Greece	44	11	282	82
Hungary	30	90	496	2160
Montenegro	6	4	120	80
Republic of North Macedonia	17	11	113	1584
Republic of Turkey	122	144	1640	3456
Ukraine	36	127	288	1016
Total Number	**312**	**491**	**3887**	**26354**

Table summarizes GTS vs. non-GTS (SEE-MHEWS-A only) stations.

NWP with limited area modelling

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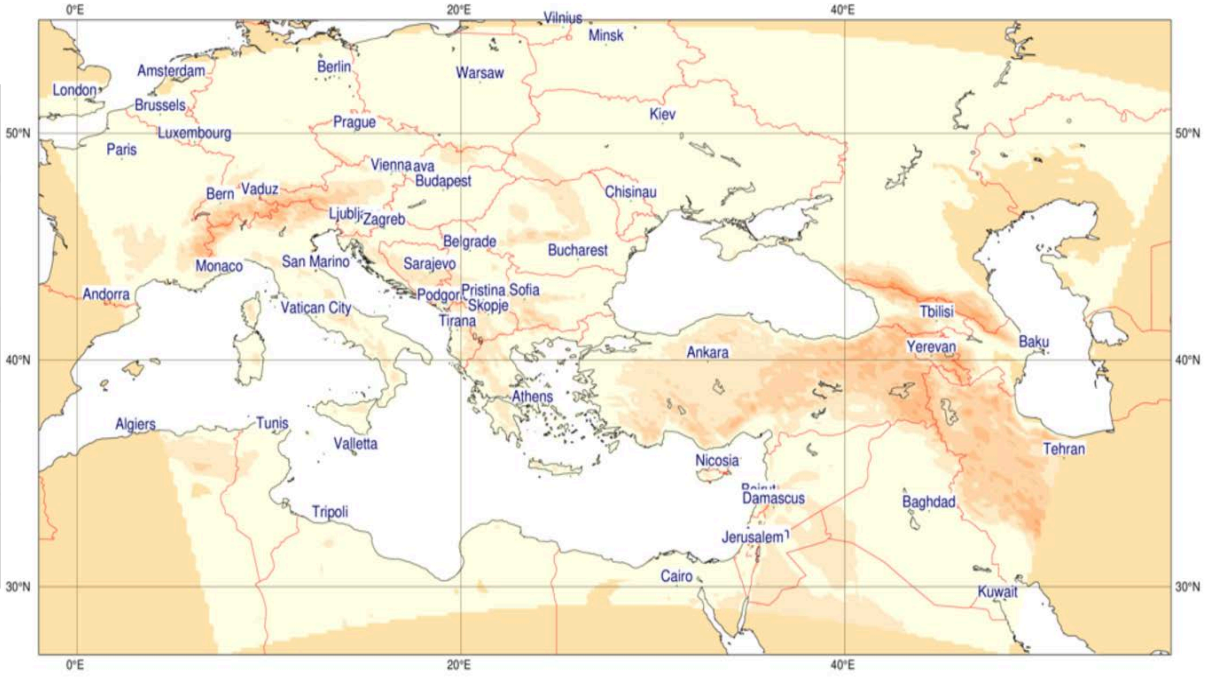
NWP models in the project:

Model	Institute	Country
ALADIN-ALARO	ARSO	Slovenia
COSMO	HNMS	Greece
ICON	IMS	Israel
NMM-B	Uni Belgrade	Serbia

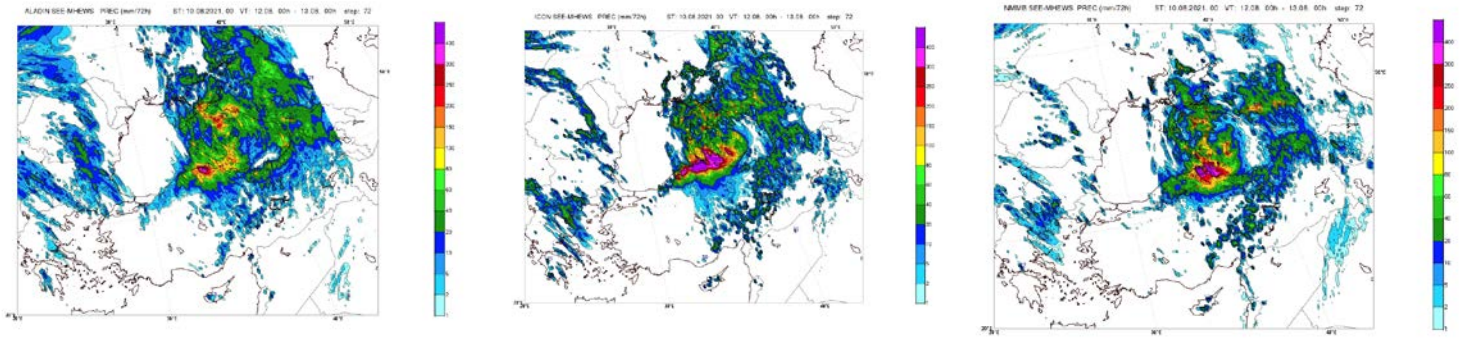
The common NWP domain for SEE-MHEWS-A



All NWP models running on ECMWF's HPC

- COSMO and ICON run as time-critical
- ALADIN-ALARO and NMM-B run in NRT

Severe rainfall in Turkey in August 2021:



Hydrological modelling

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Observations used for initial conditions, NWP output for the forecasts.

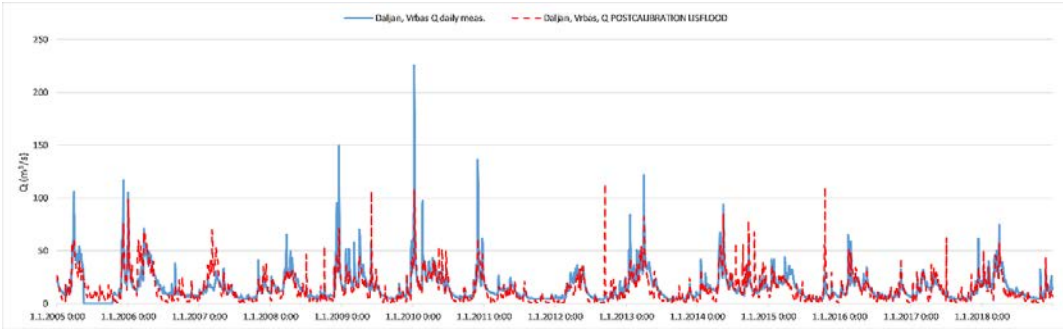
Models set up over **two** catchments:

Vrbas river in Bosnia and Hercegovina (run on HPC)

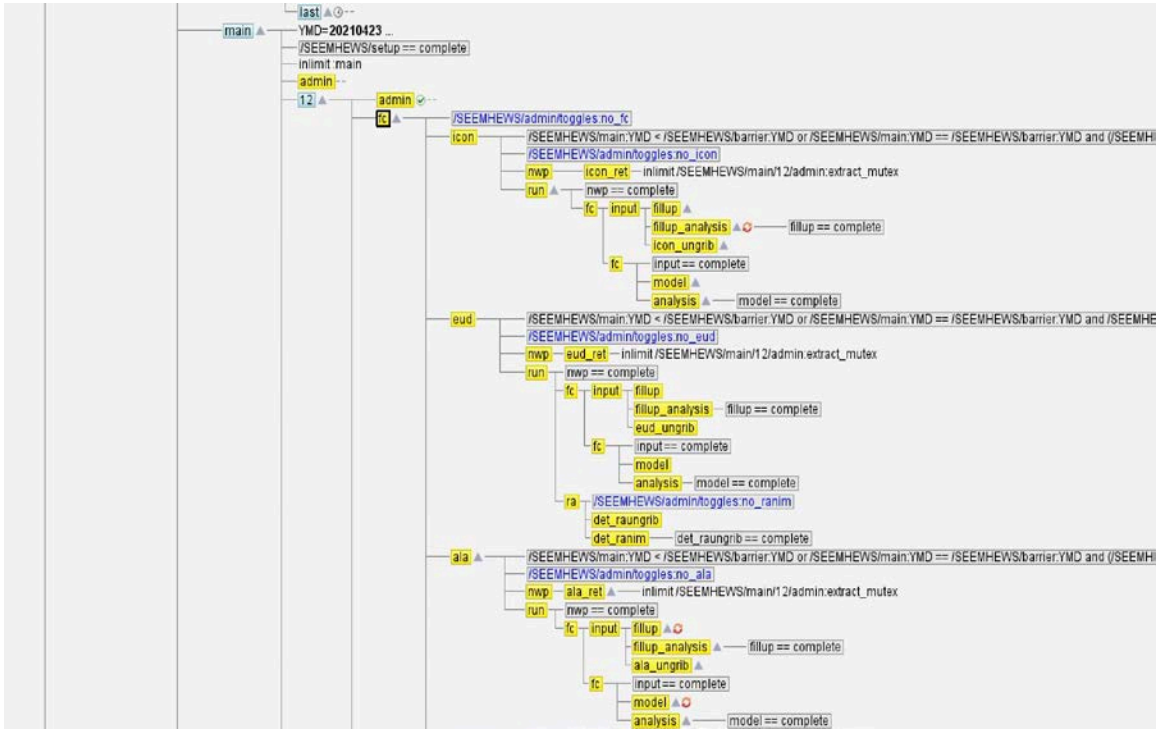
- **LISFLOOD** hydrological model (CEMS-Flood)
- 5km gridded model (similar as operational)
- **HBV** model implemented by WMO contractor
- Catchment-based

Vardar river in North Macedonia

- **WFLOW** model being implemented at EWC
- Uses S3 on for access to observations and NWP forcing



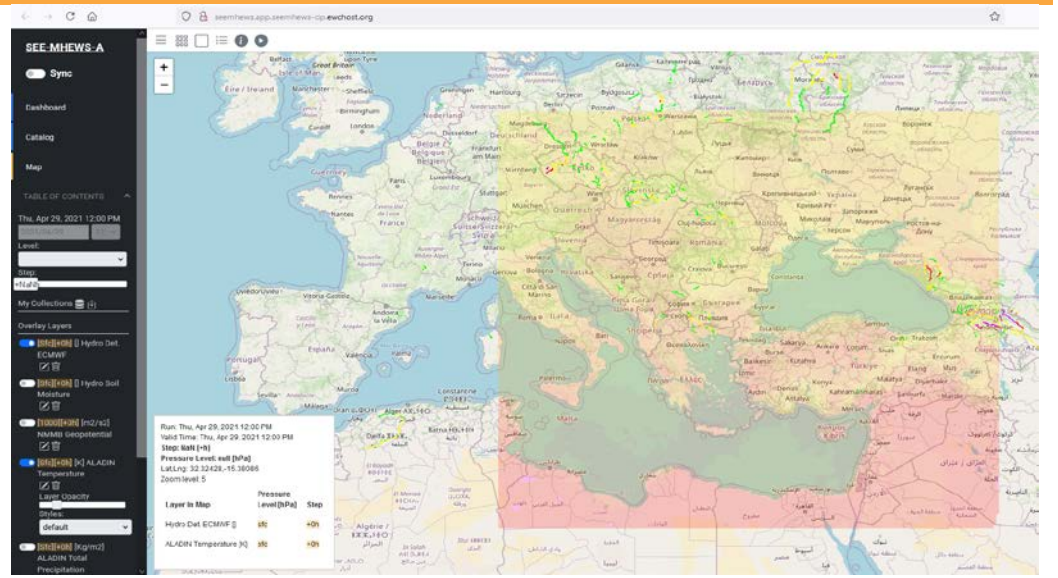
Observed (blue) vs. calibrated discharge (red) at station in Vrbas river

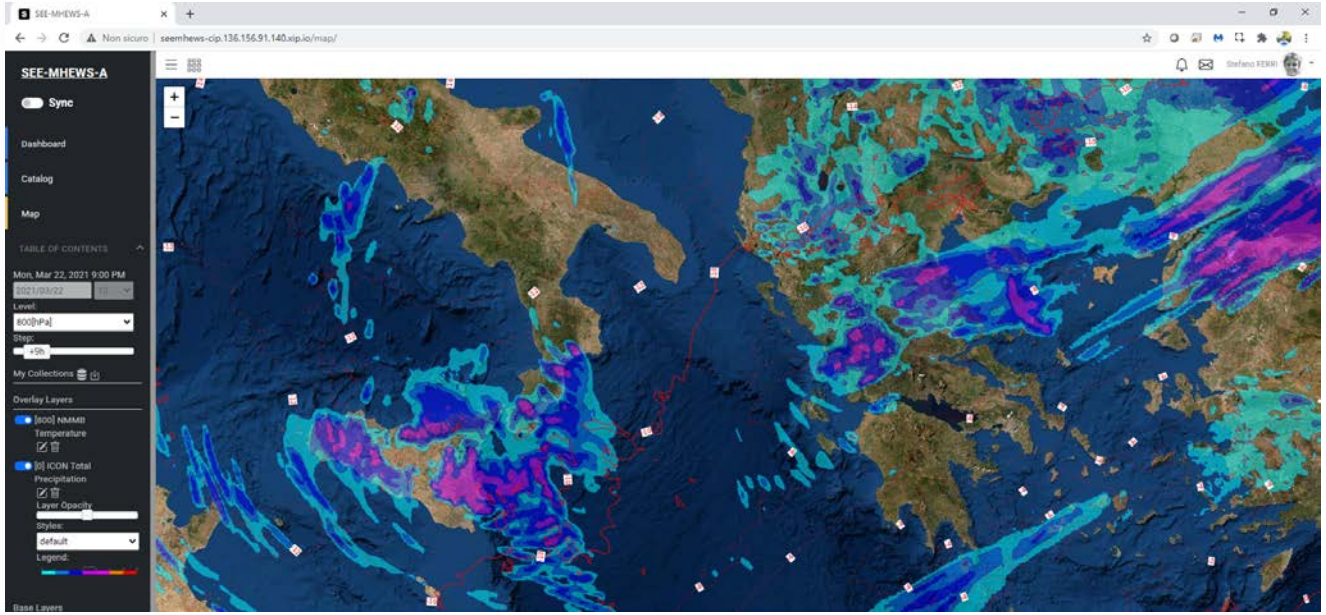


Screenshot of the SEE-MHEWS-A hydrometeorological modelling chain

Common information platform (CIP)

- Setup on the European Weather Cloud
- Website with front-end and back using REST API
- Testbed for new ways of disseminating the output
- Responsive and lightweight
- Co-design with user forums





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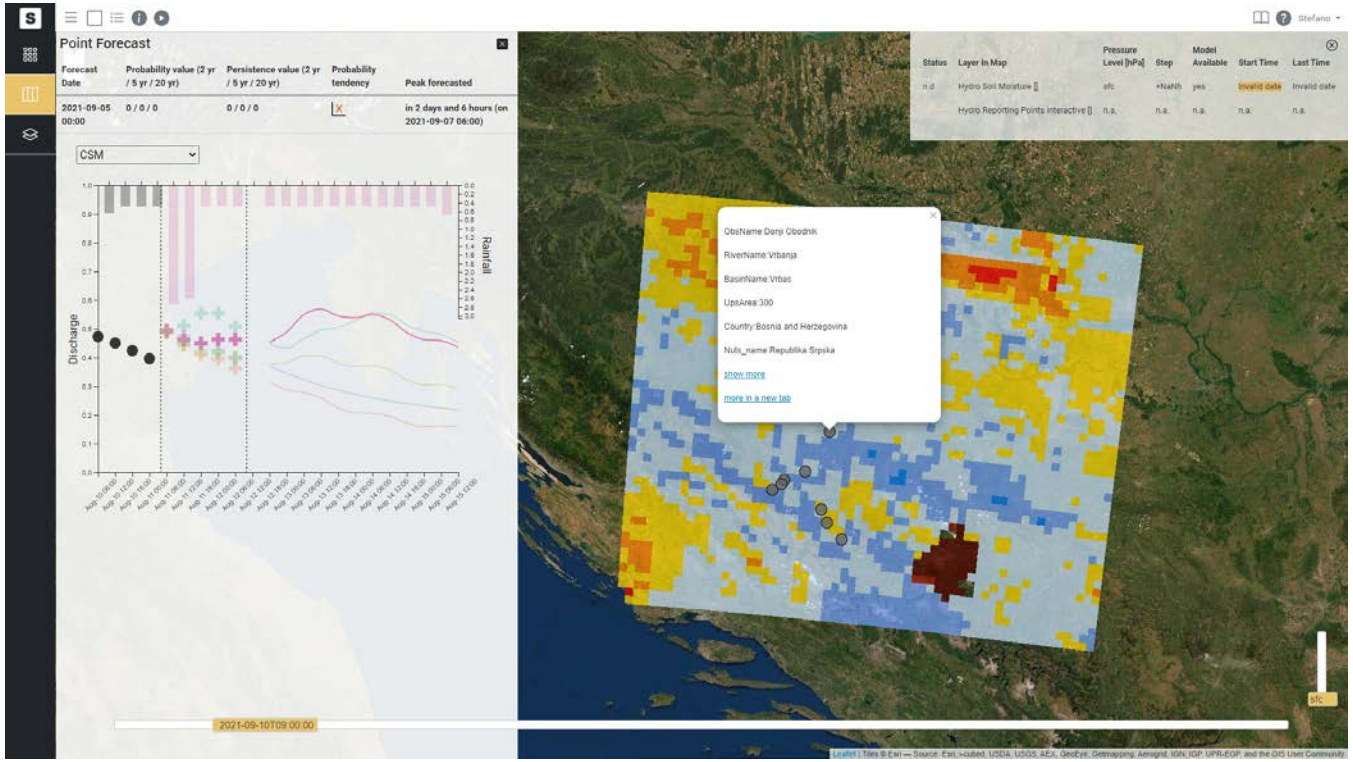
Hydrological output

Product types

- Maps over the region (soil moisture, snow)
- Vector data (river network)
- Point data from stations (discharge and meteorological variables)

Output features

- Time animation of maps and vector data
- Detailed information at stations
  - Time series of variables
  - Summary plots
- Interactive



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Workshops with users

Product development with users (co-design)

Regular meeting with core group of user to give feedback on the design

Workshop for meteorological users 26 October

Workshop planned for hydrological users to be held in November

How to get engaged?

- Join the group of forecasters that test and co-design the output

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