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Ilias Pechlivanidis

SMHI

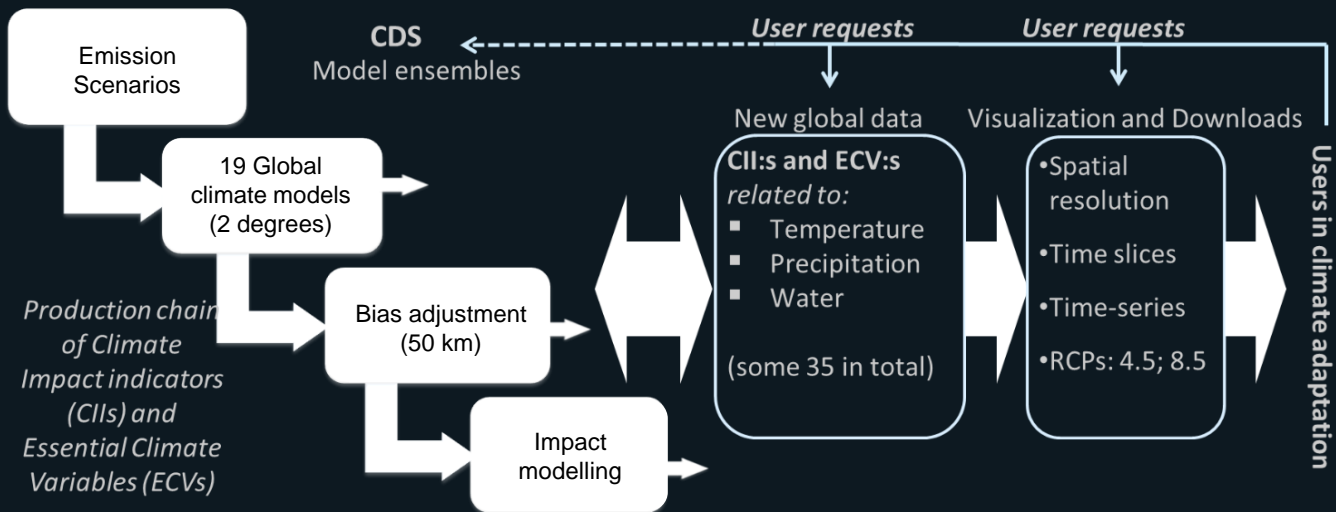
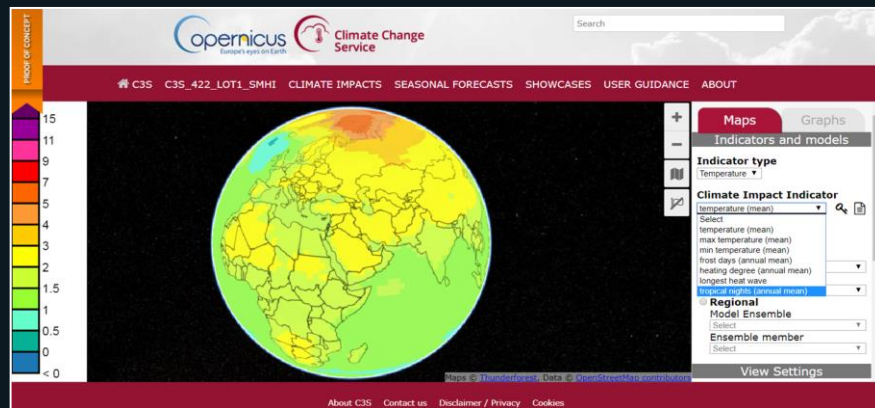


***Are we done with co-creating climate services?
Time to co-evolve knowledge for successful service uptake***

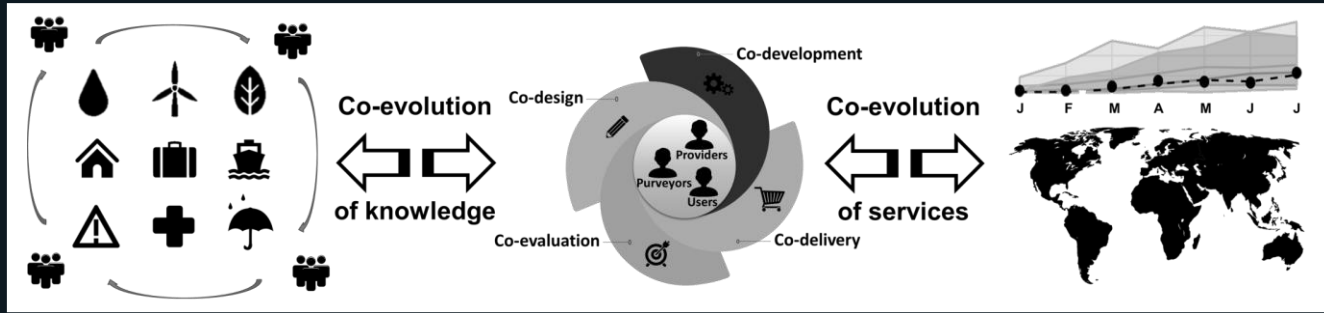
Global hydroclimatic datasets (projections)

A bias-adjusted ensemble of **19 models** from **CMIP5** was used to force the **WW-HYPE hydrological model** over the entire globe.

A total of 35 CII and ECVs are provided in this dataset at **catchment scale** (1981 – 2100).



Co-generation's role for co-evolution

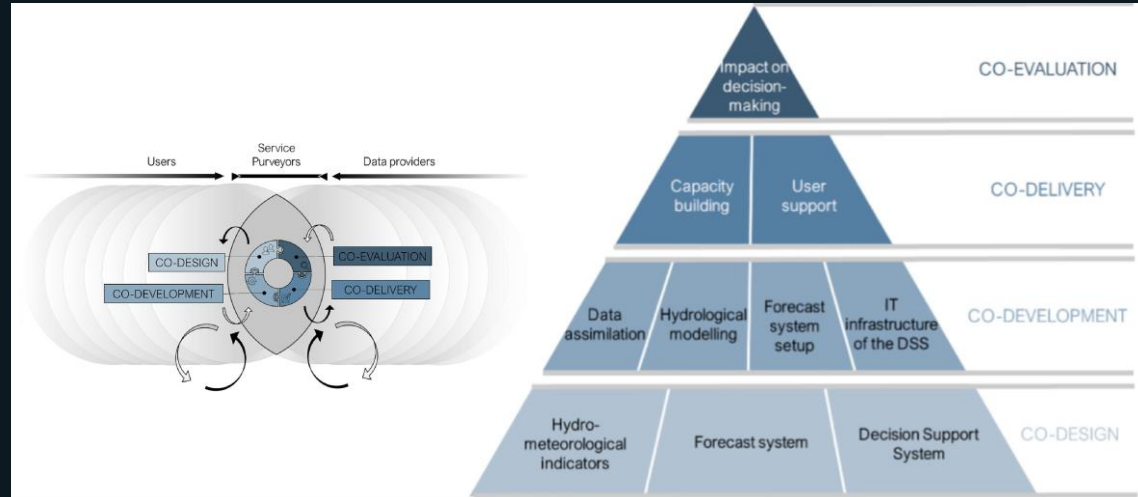
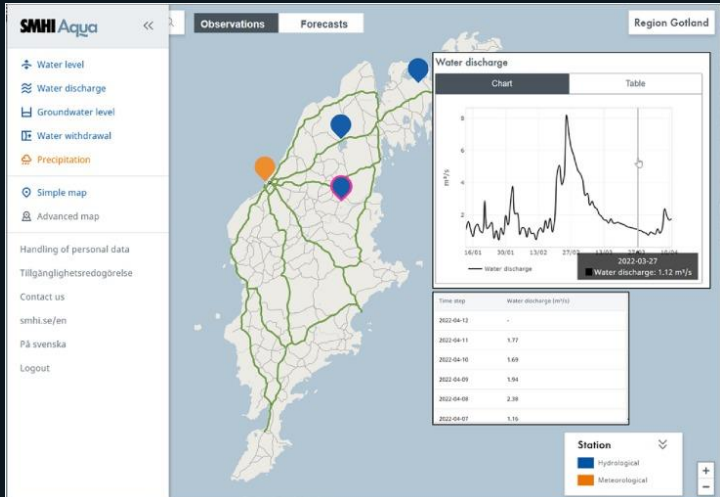


Climate Services
Volume 31, August 2023, 100399

ELSEVIER

A co-generation success story: Improving drinking water management through hydro-climate services

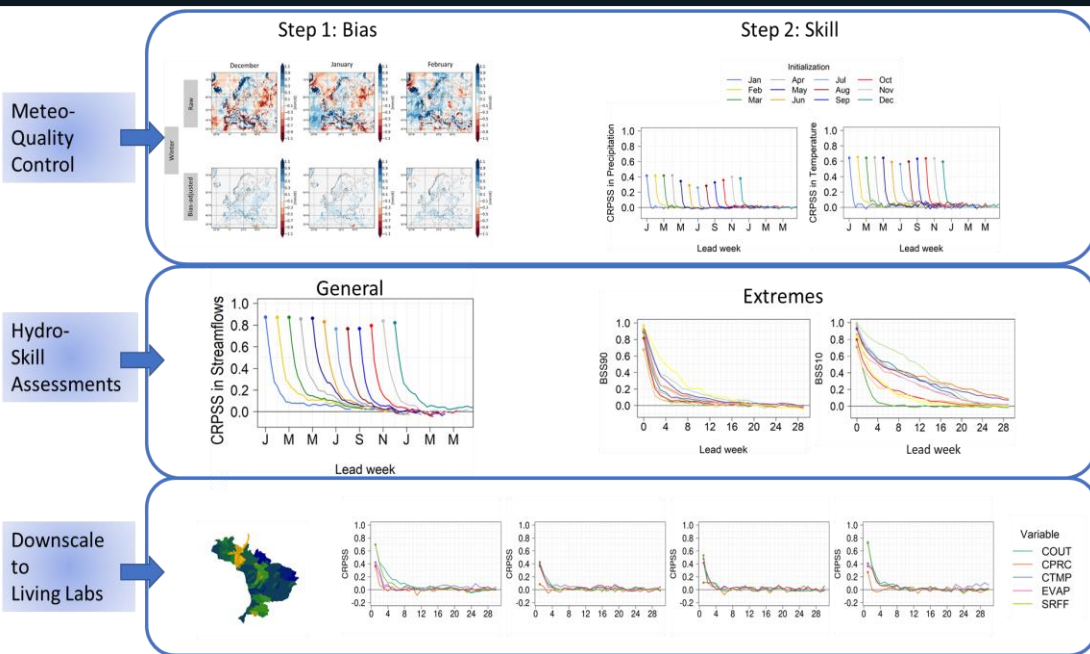
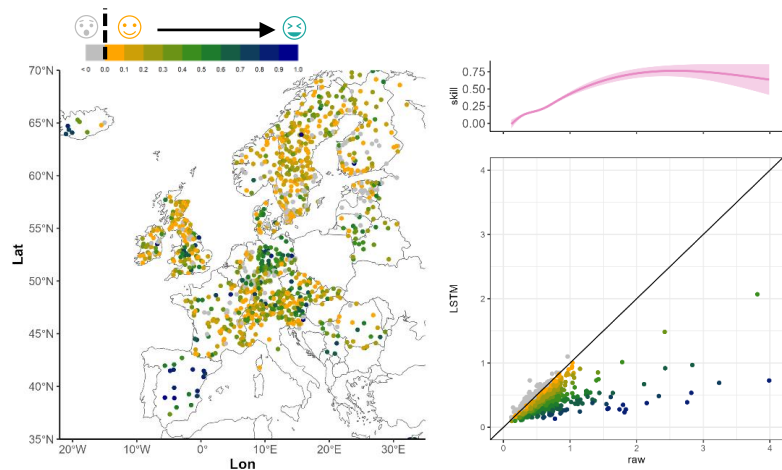
Carolina Cantone^a, Helen Ivars Grøns^a, Shadi El Habash^b, Ilias G. Pechlivanidis^a



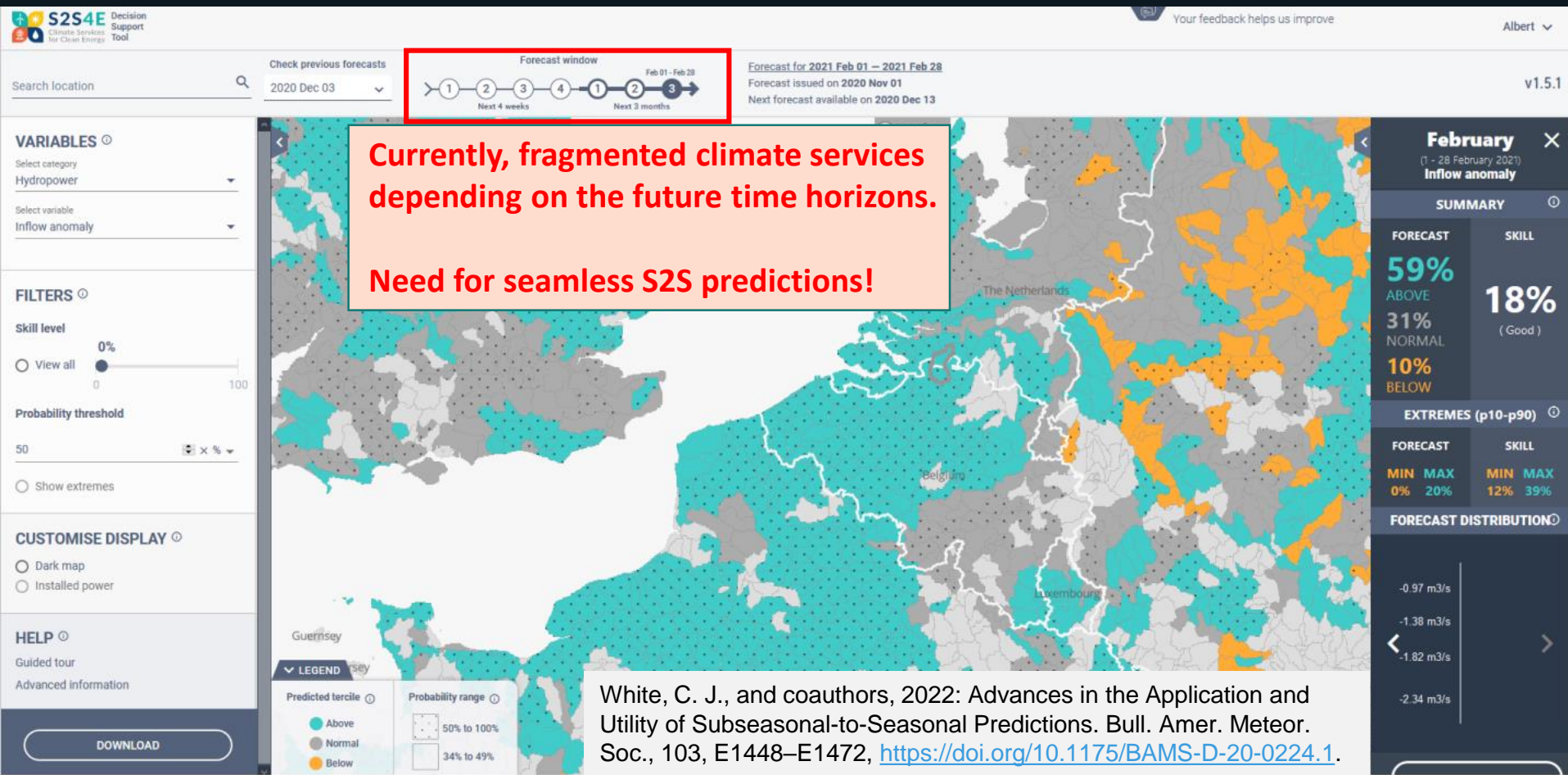
Data integration to meet the needs of local stakeholders

Narrowed the **scaling and predictability gap**:

- **Post-processing meteorological forecasts based on local observations** →
- **AI post-processing (LSTM) using local data to increase S2S streamflow accuracy and reliability** ↓

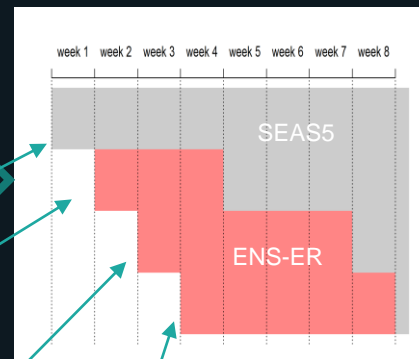
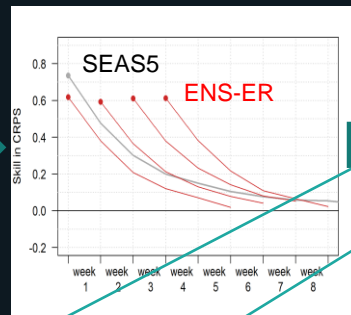
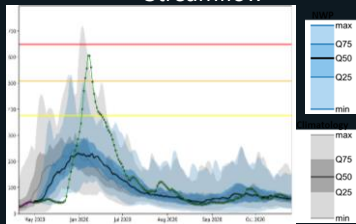


Du et al., 2023, Hydrological regimes explain the seasonal predictability of streamflow extremes, ERL, 18, DOI 10.1088/1748-9326/acf678



What is the optimal S2S combination time and how this vary in space?

Streamflow

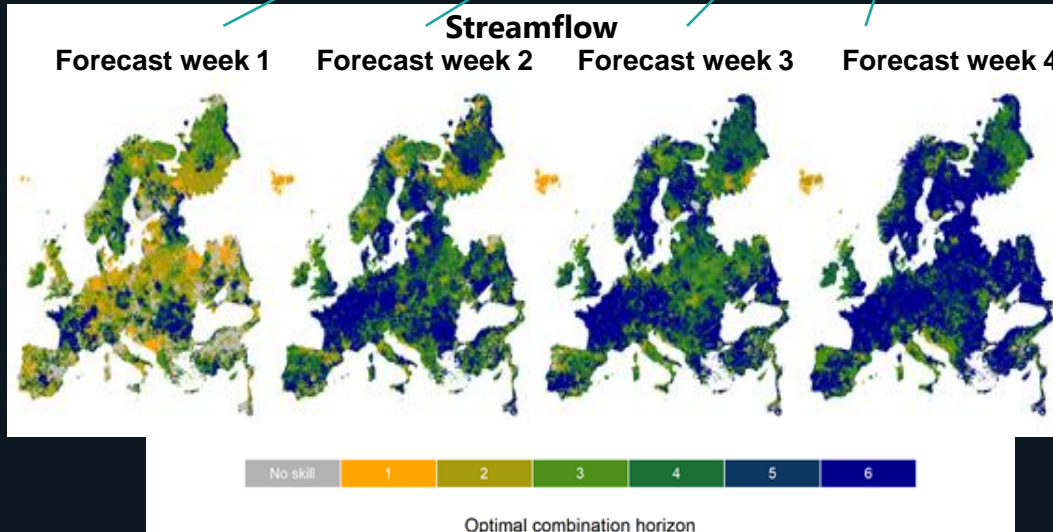


Sub-seasonal forecasts

- ECMWF Extended Range (ENS-ER)
- Twice a week initialization
- Up to 46 days ahead

Seasonal forecasts

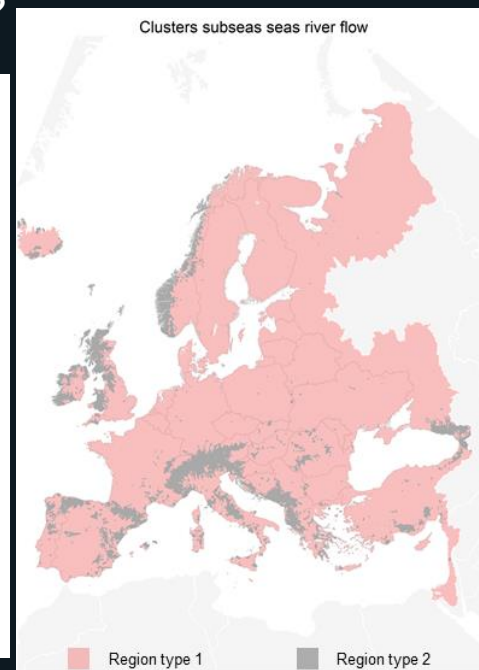
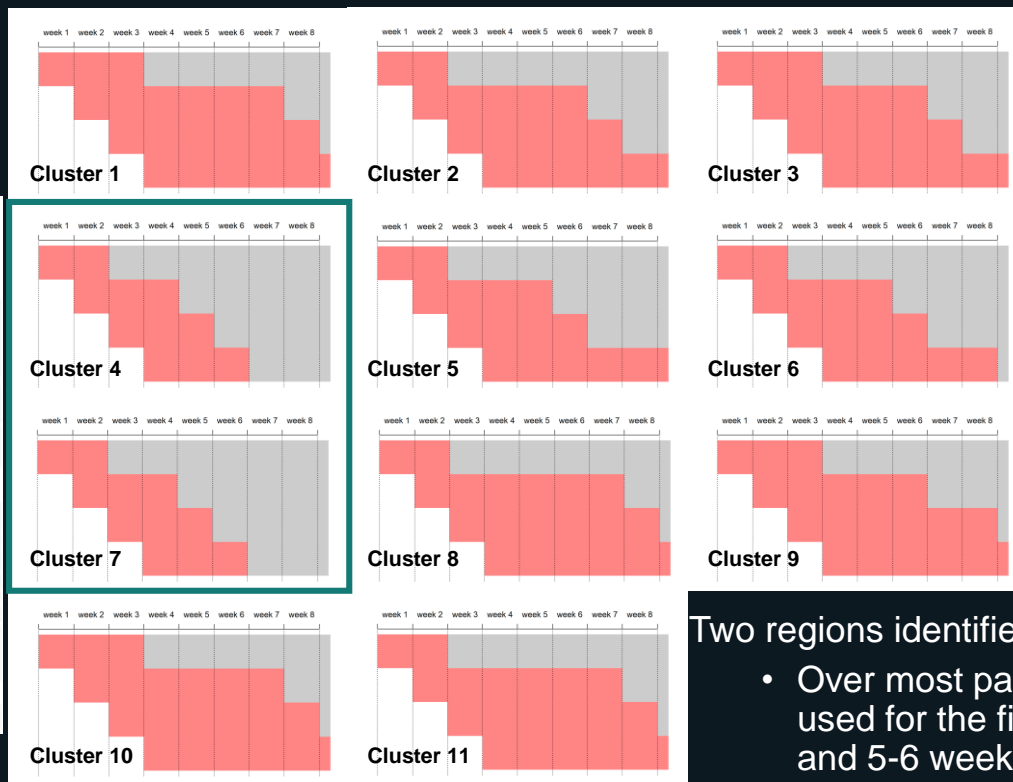
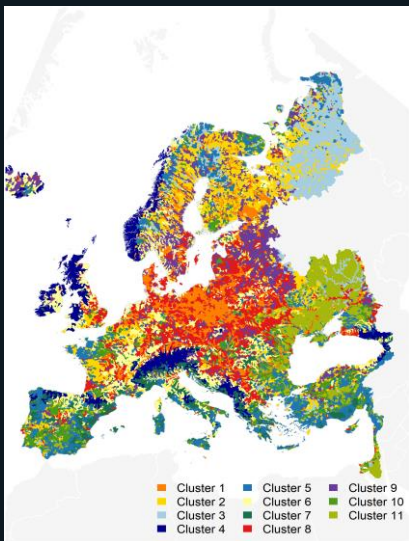
- ECMWF SEAS5
- Once a month initialization
- Up to 7 months ahead



Insights

- ENS-ER benefits from updated initial conditions
- ENS-ER skill decays faster

How does the optimal combination time vary spatially (and why)?



Two regions identified:

- Over most parts of Europe, ENS-ER can be used for the first 3-4 weeks for week issue 1 and 5-6 weeks otherwise (type 1).
- In rain-driven and mountainous regions, the skill of ER is limited to 2 weeks for week issue 1, and 3 weeks otherwise (type 2).

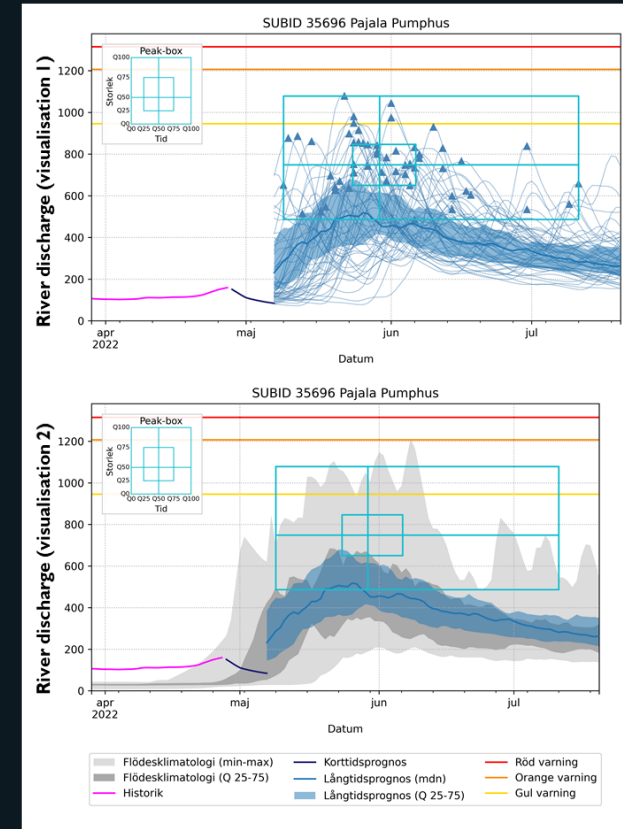
From research to climate services to decision-making

Challenge

- Science and services are developing fast and often users find difficulties to adapt to the use of new emerging methods or types of simulations.

Moving forward

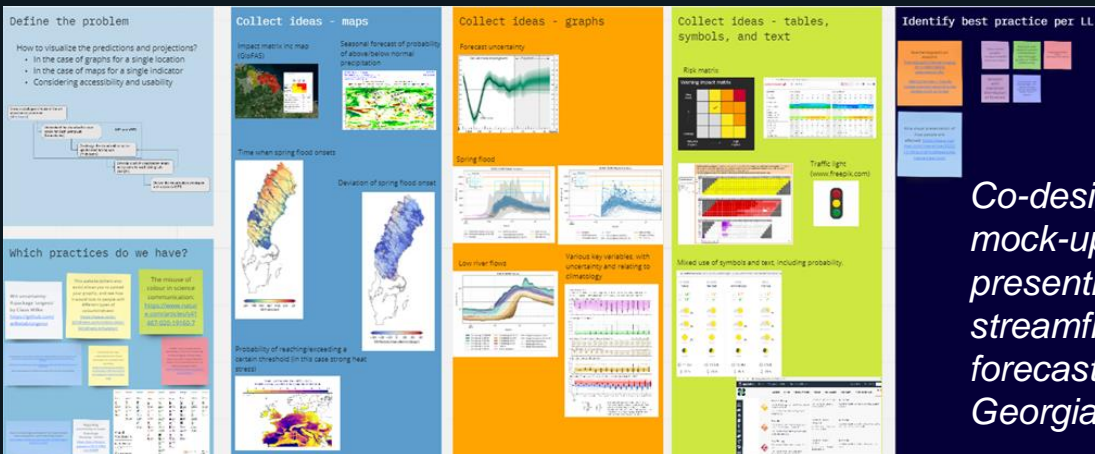
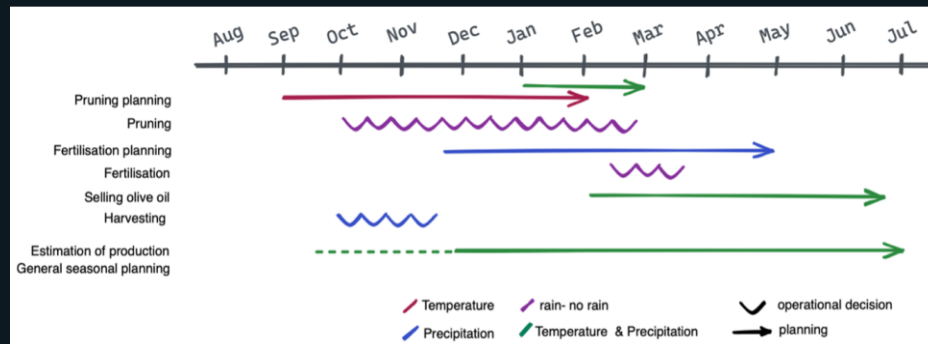
- Knowledge transfer - Identify visualization methods that allow improved communication of information tailored to specific user needs



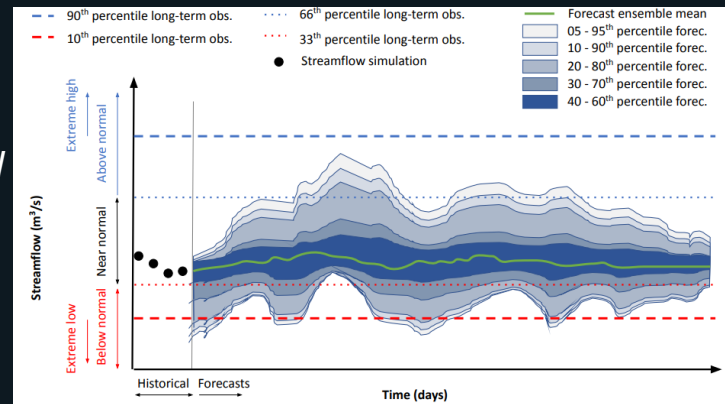
User-driven evaluation and visualization practices

- Establish the decision-making process throughout the year by different local stakeholders.
- Set a database of visualization practices for communicating complex and uncertain predictions. Moving towards tailored visualizations for each regional service.

Decisions taken and at what times during a year and which CS variables are of interest for the stakeholders.



Co-designed mock-up for presenting streamflow forecasts in Georgia





Thank you for your attention!

With acknowledgements to all projects that funded our research!

