Ilias Pechlivanidis, L. Crochemore, F. Gyllensvärd, T. Bosshard, P. Berg, B. Arheimer

An operational pan-European seasonal hydro-climatic forecasting service

Climate Change Service

How to better communicate improved forecasts with users?

What are the limits of predictability for forecasting systems?

How would the users respond to forecasting signals of different quality; narrow the gap between results and

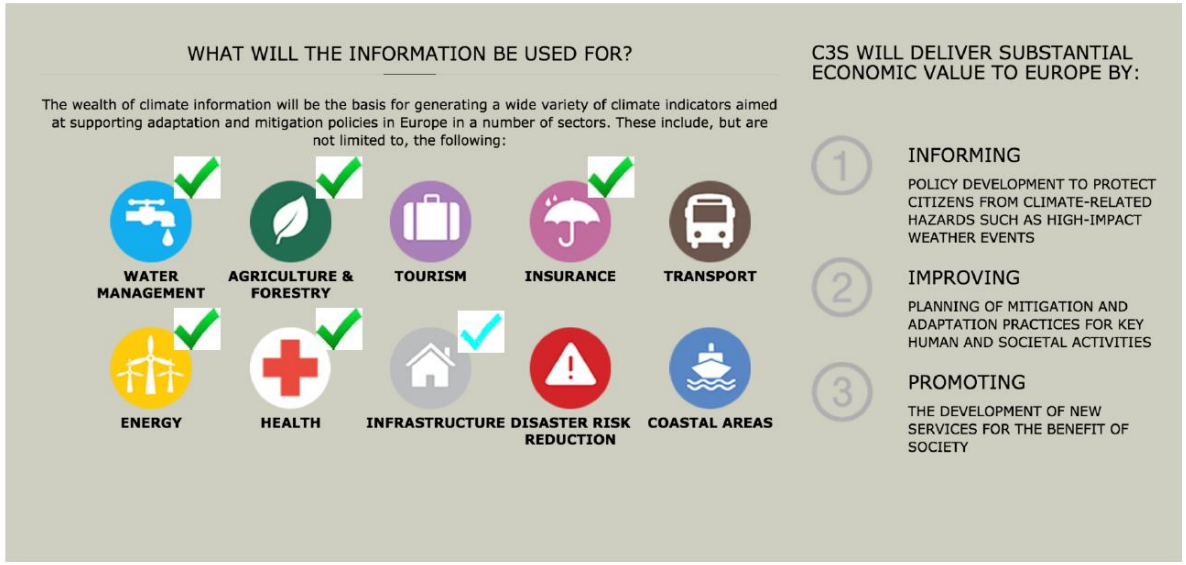
Ilias Pechli… …ochemore, F. Gyllensvärd, T. Bosshard, P. Berg, B. Arheimer

A… …rational pan-European seasonal hydr… …atic forecasting service

Climate Change Service

Climate Change

Sectorial Information System: PoC WATER



- 'Proof-of-Concept' in C3S for Sectorial Information System
- Nov. 2015 – Feb. 2018:
  - Co-design a web service with users (Knowledge Purveyors)
  - Define & Provide Climate Change Indicators and Seasonal Indicators (CII and SI)
  - Evaluate user uptake
- http://swicca.climate.copernicus.eu/

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European Commission

Climate Change

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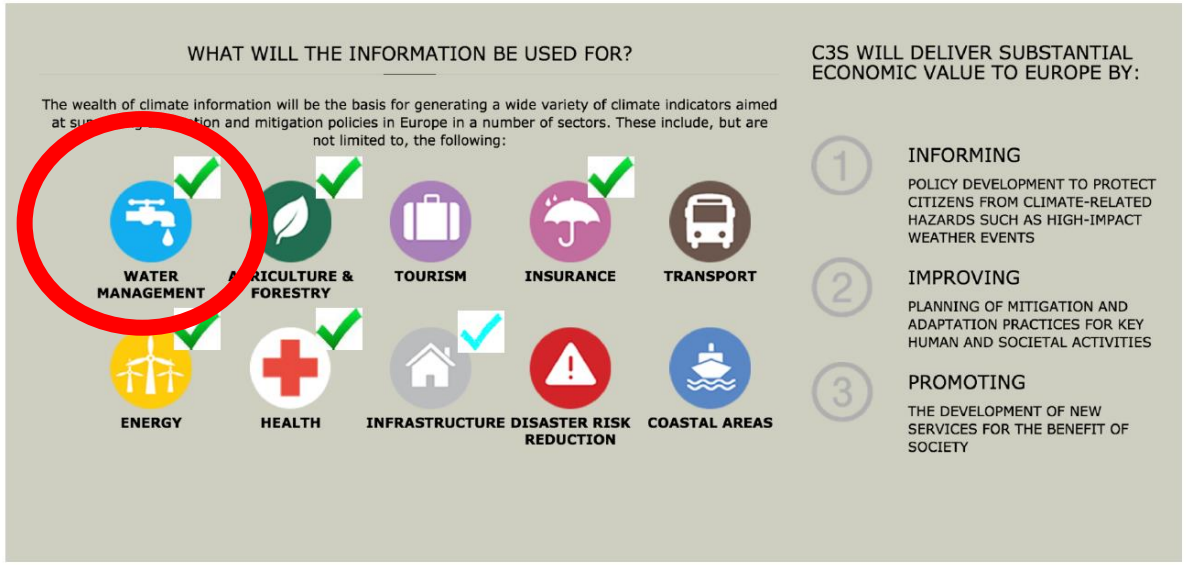

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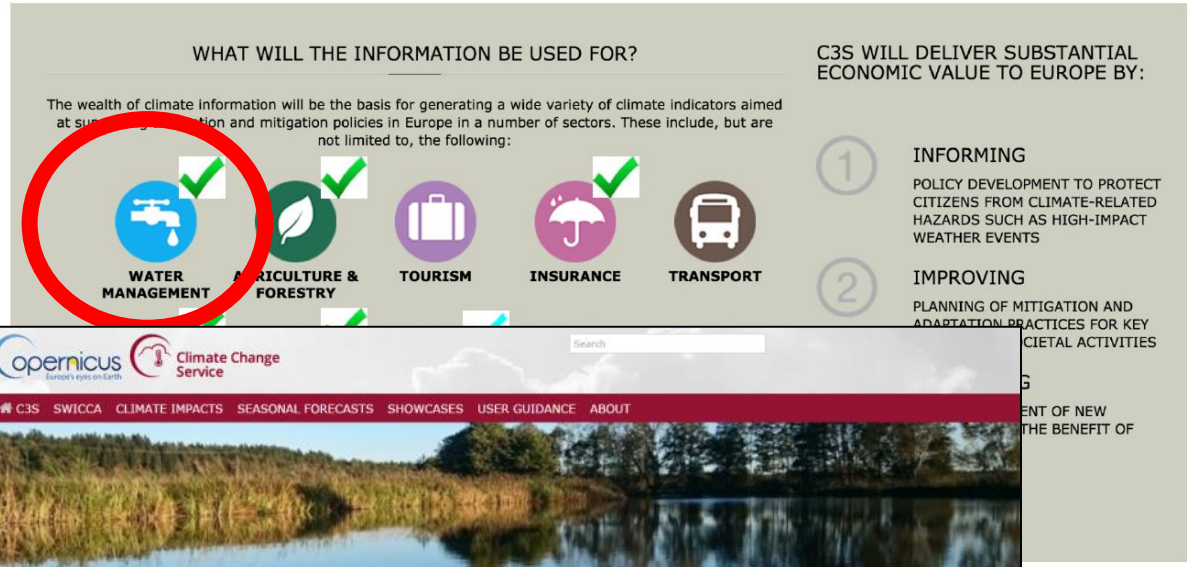

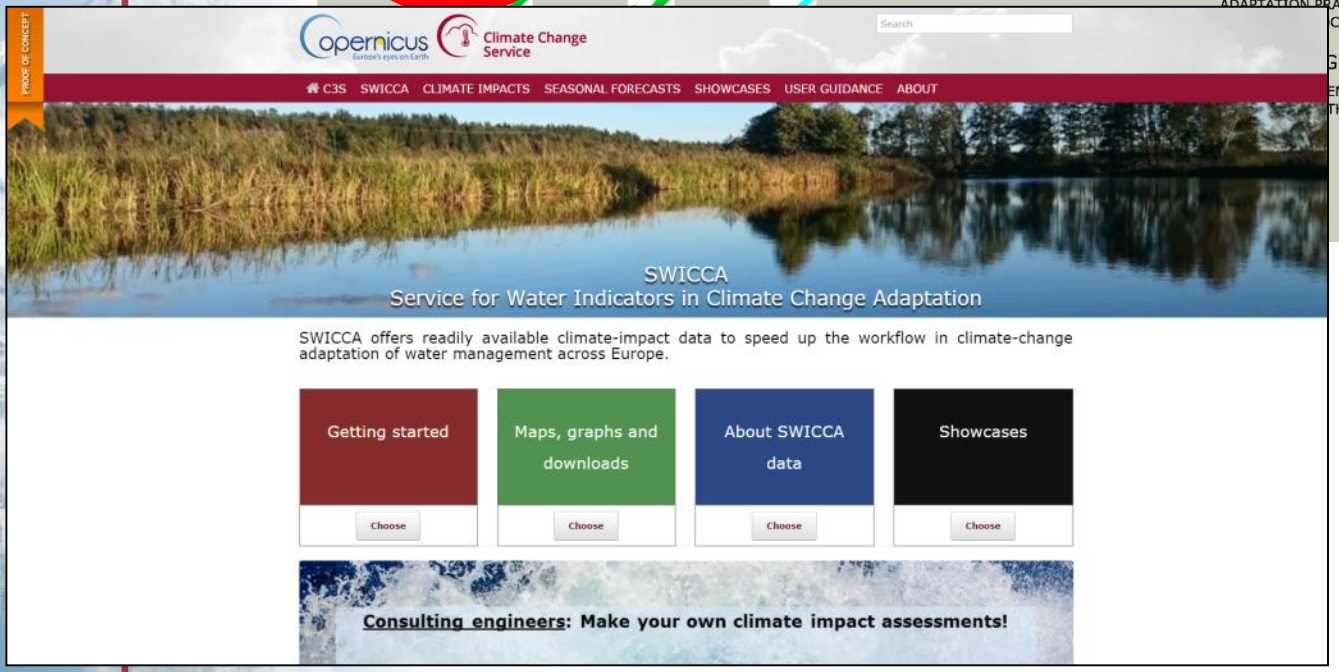

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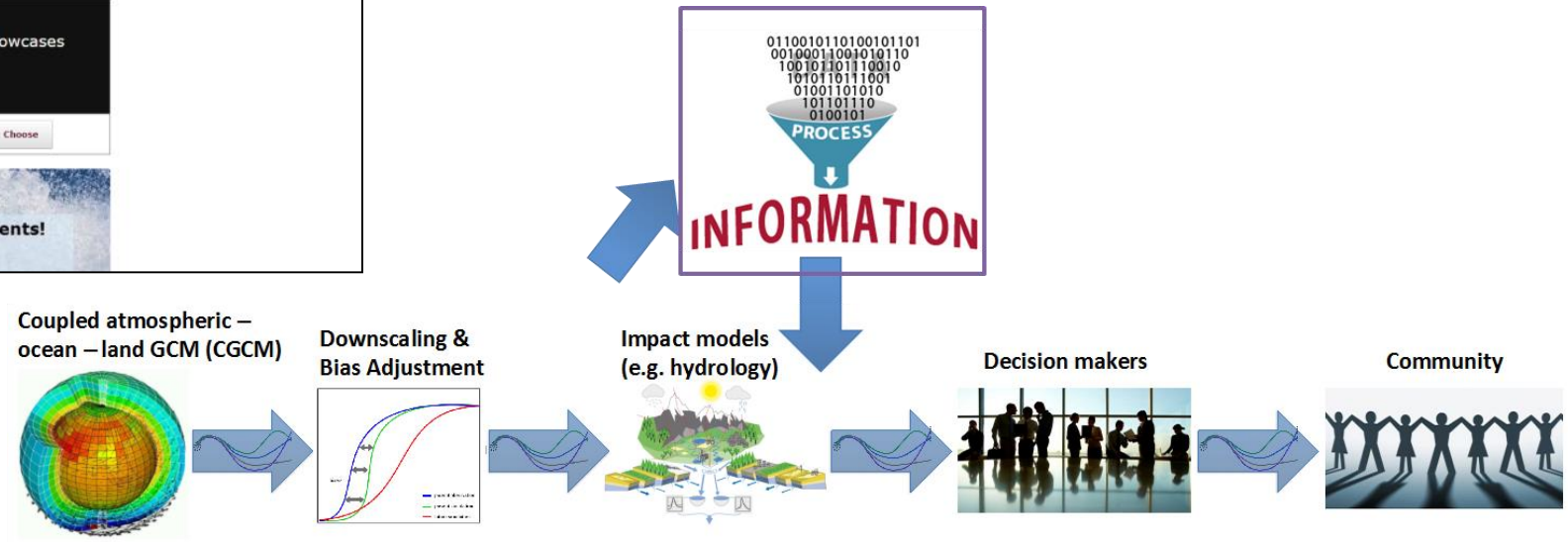
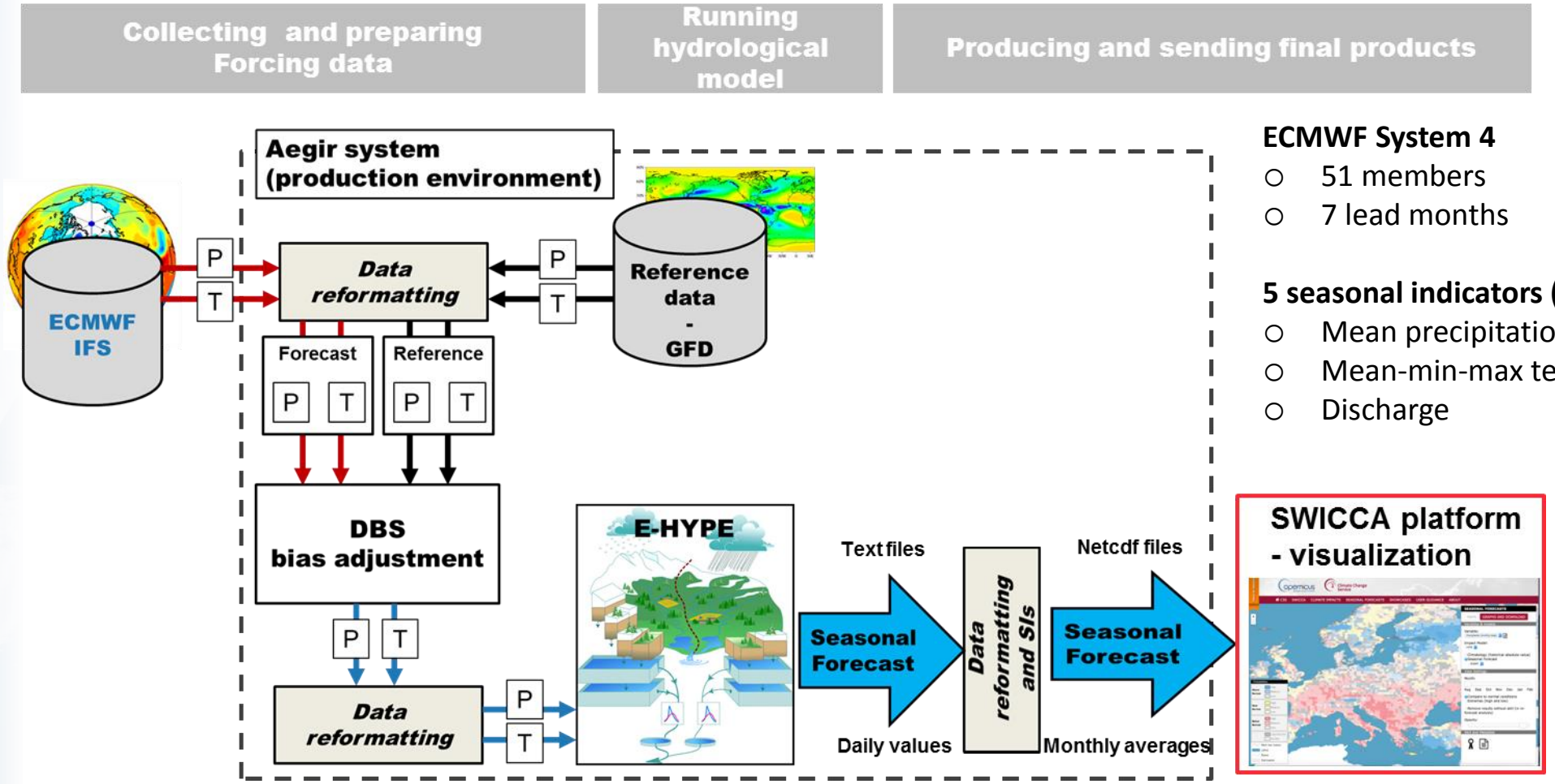


Climate Change

Seasonal forecasting service



ECMWF System 4

- 51 members
- 7 lead months

5 seasonal indicators (SIs)

- Mean precipitation
- Mean-min-max temperature
- Discharge

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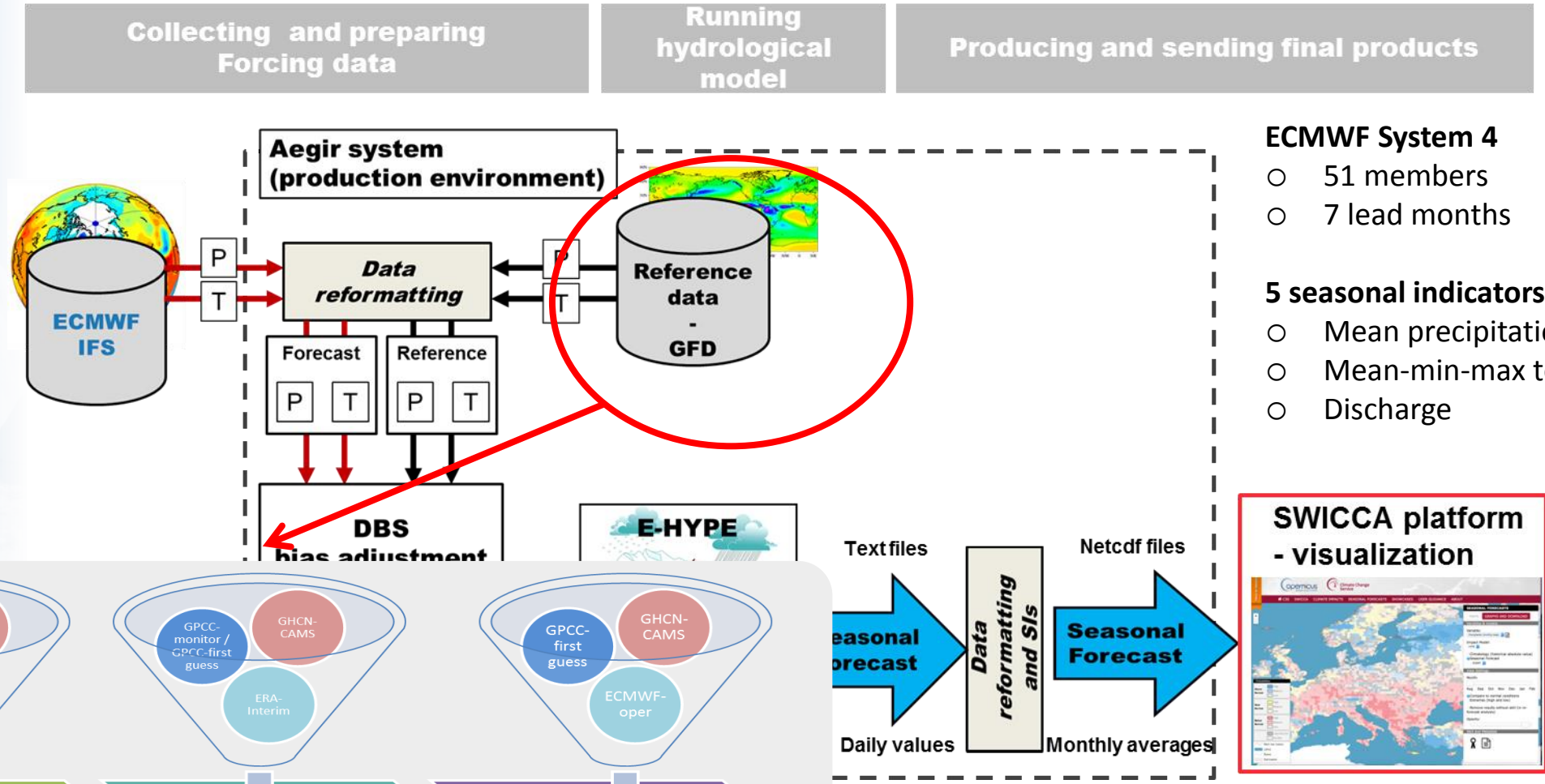
Seasonal forecasting service

Climate Change



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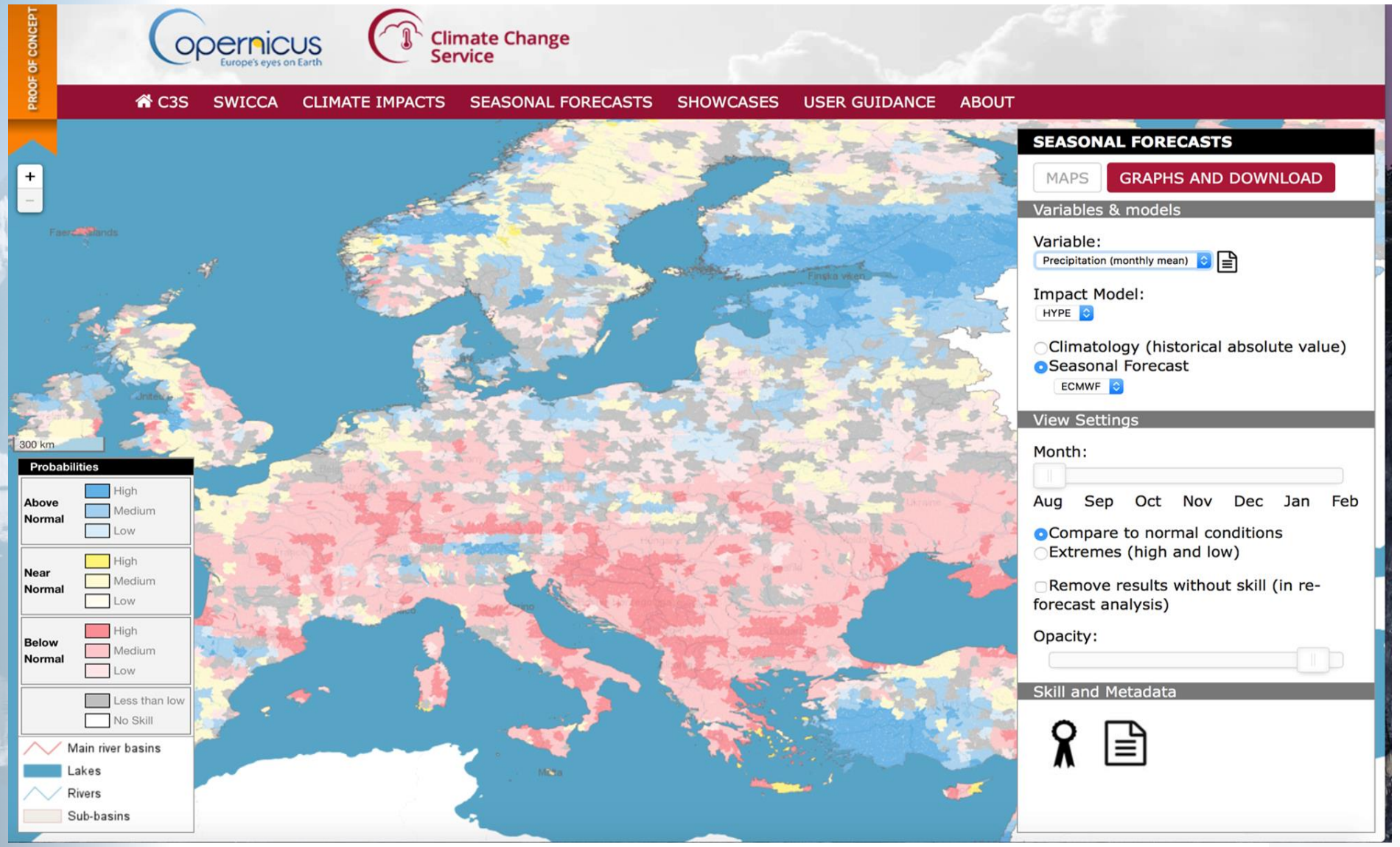
C3S for Water content: Maps

Climate Change



Probability

Low	35-50%
Medium	50-75%
High	75-100%

Otherwise unreliable

Monthly (month compared to normal month)

Above Normal >66%

Near Normal >33% and < 66%

Below Normal < 33%

Extremes (month compared to extreme month)

High Extreme > 90%

Low Extreme < 10 %

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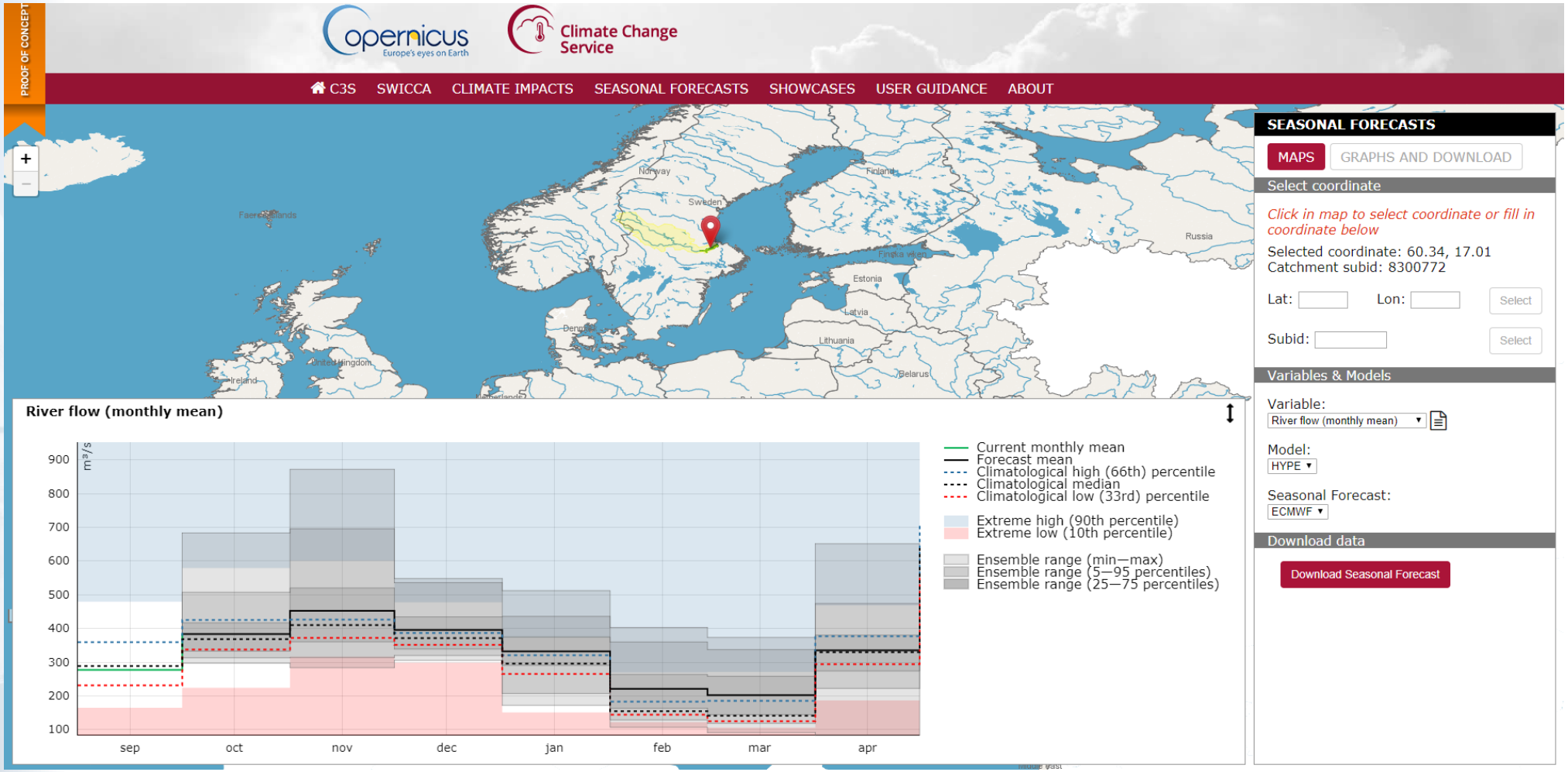
Climate Change

C3S for Water content: Graphs & Downloads



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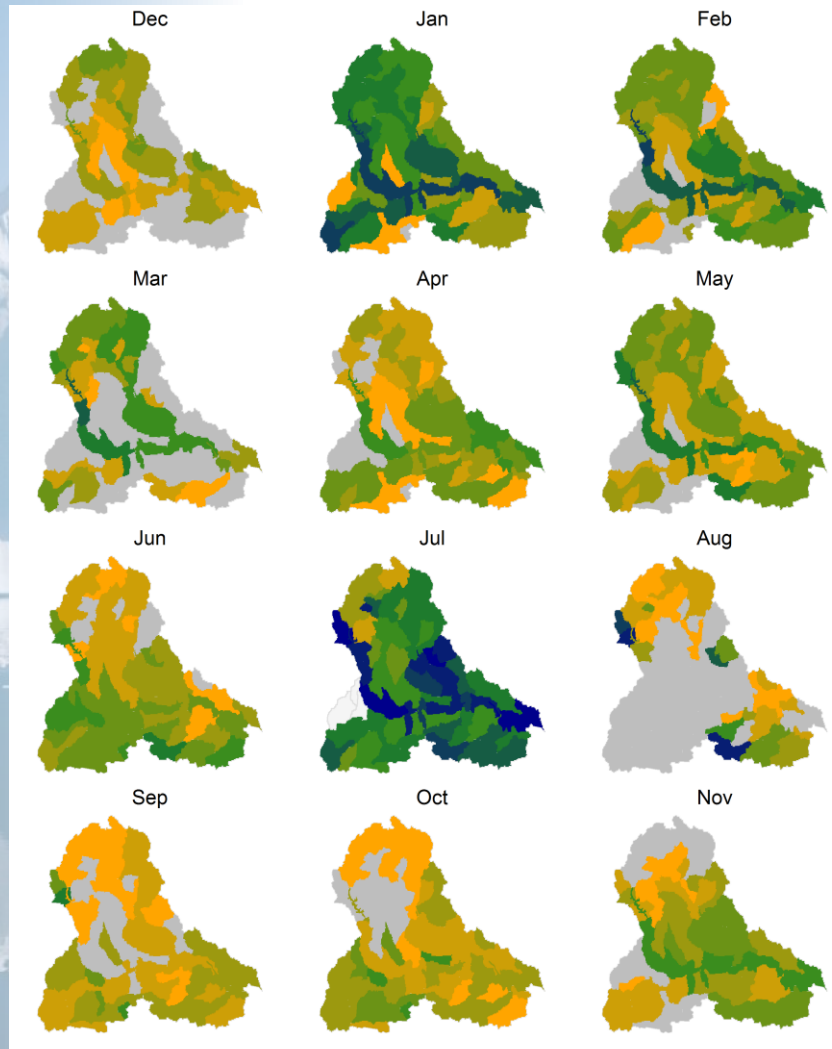
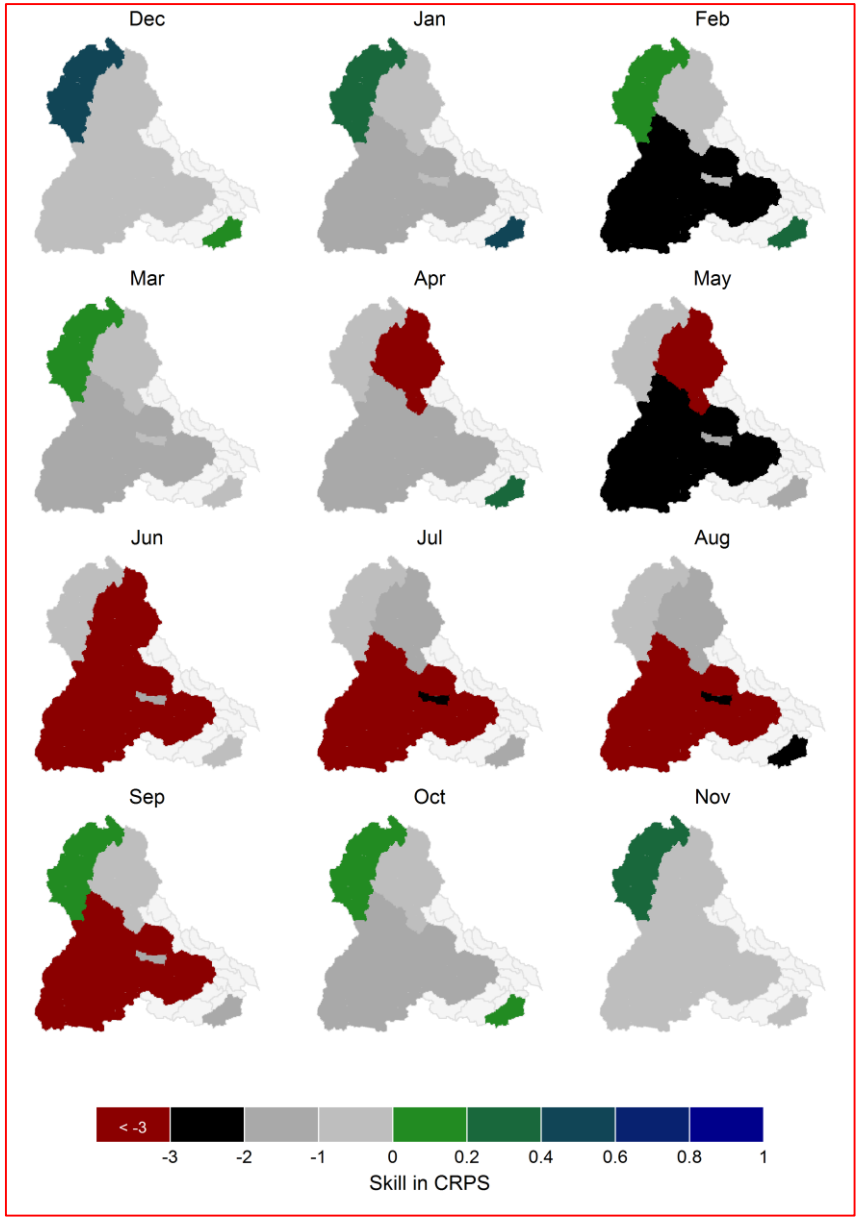
Climate Change

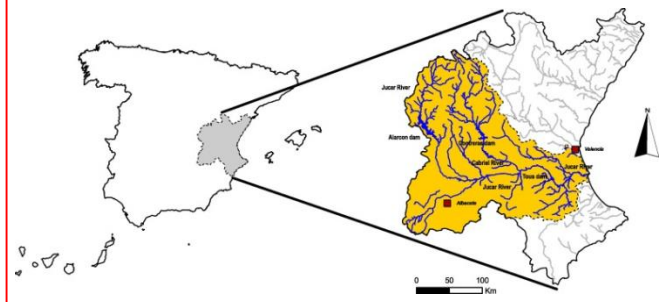
Limitations of services: the Jucar river

Pseudo-reality



Reality





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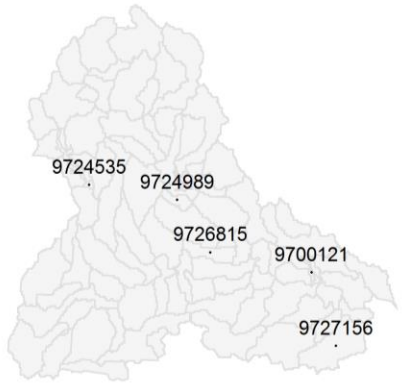
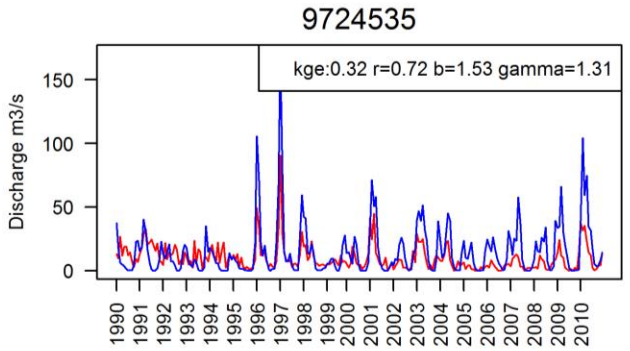
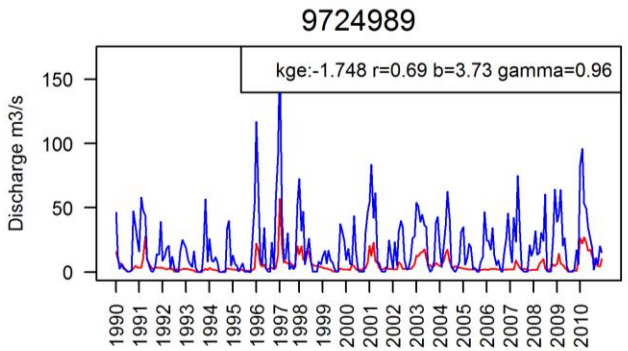
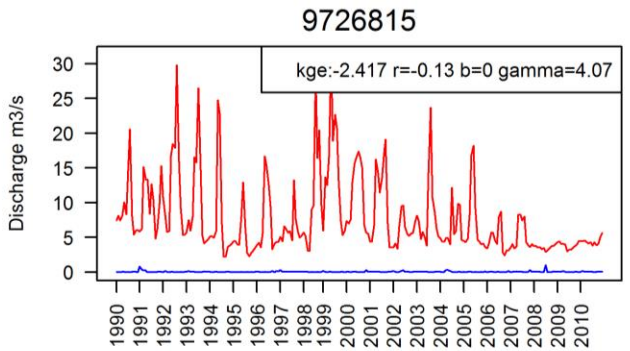
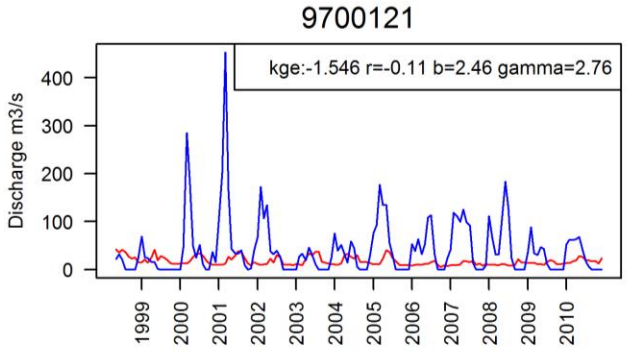
Limitations of services: the Jucar river

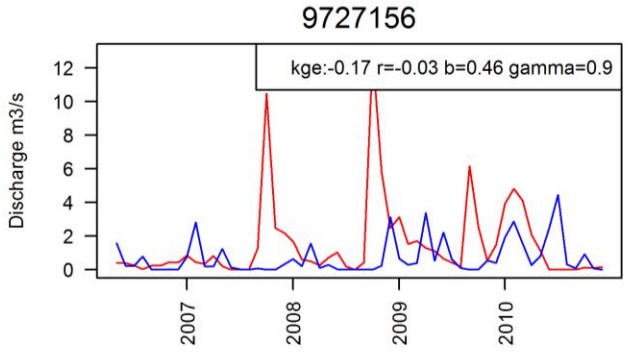












Jucar river is a complex system due to management and groundwater interaction.

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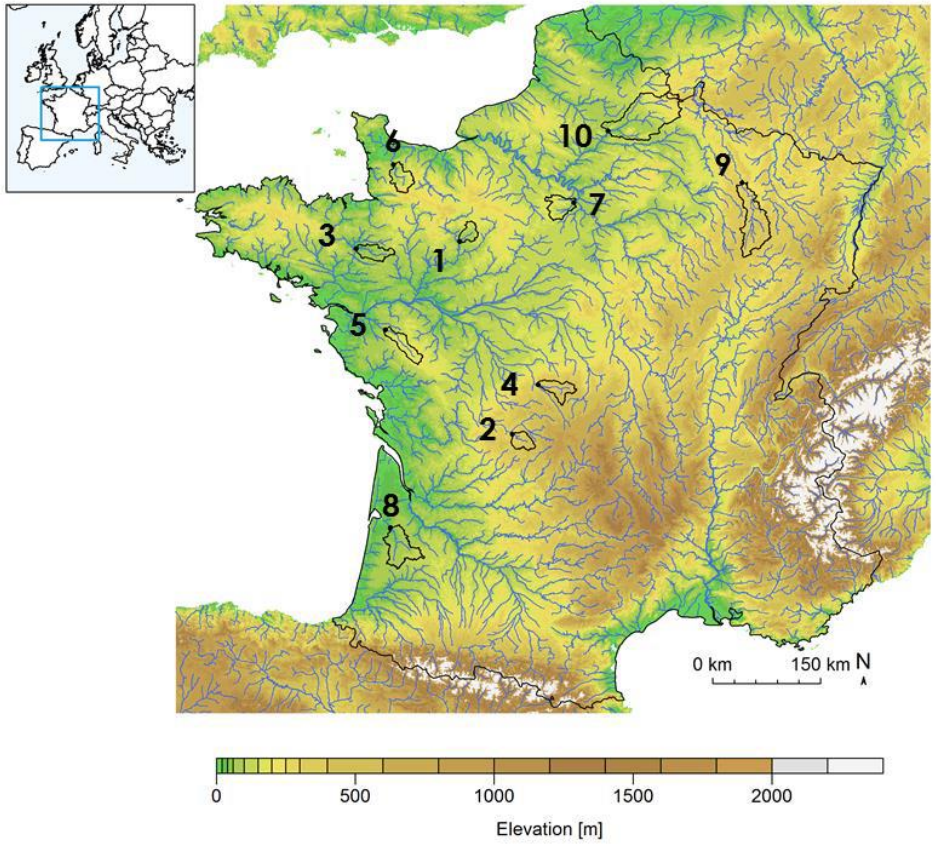
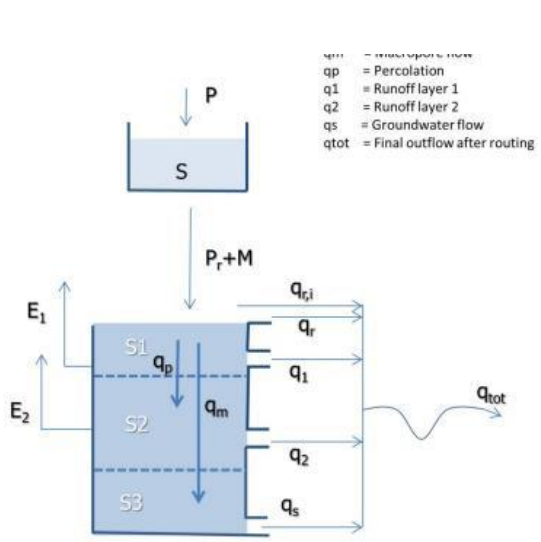
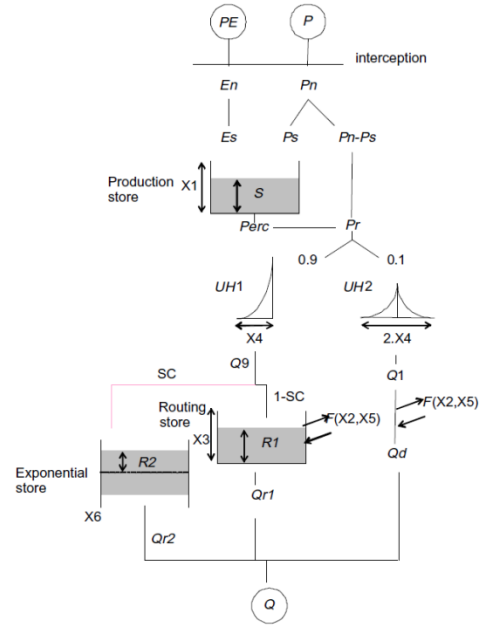
Climate Change

Methods for information extraction?

Continentally calibrated vs regionally calibrated hydrological assessments: Analysis over 10 French basins







	EHYPE	GR6J
Model characteristics		
Type of model	Process-based	Conceptual
Number of parameters	100 +	6
Calibrating framework		
Scale	Calibrated continentally	Calibrated regionally
Strategy	Period split	Leave-one-out
P/T time series	GFD	Météo-France
Q time series	Selected catchments in Europe	Banque Hydro database

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Climate Change

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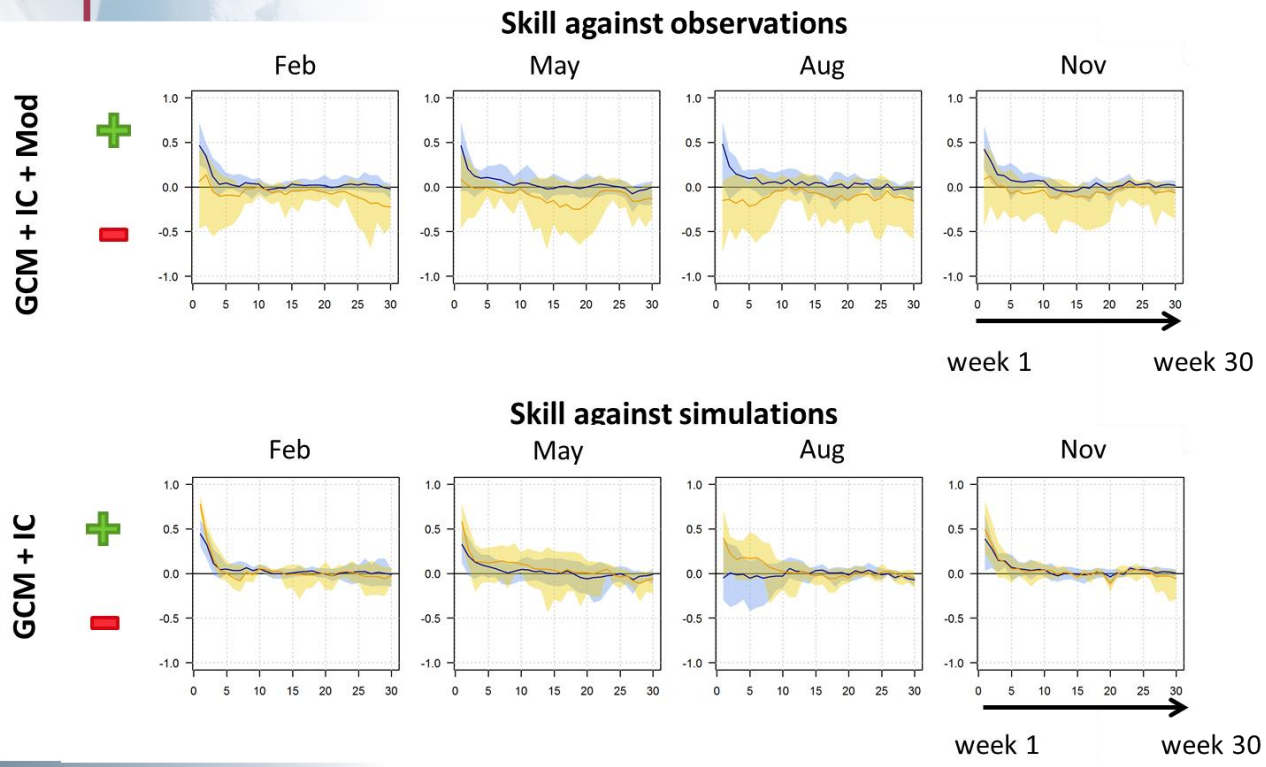
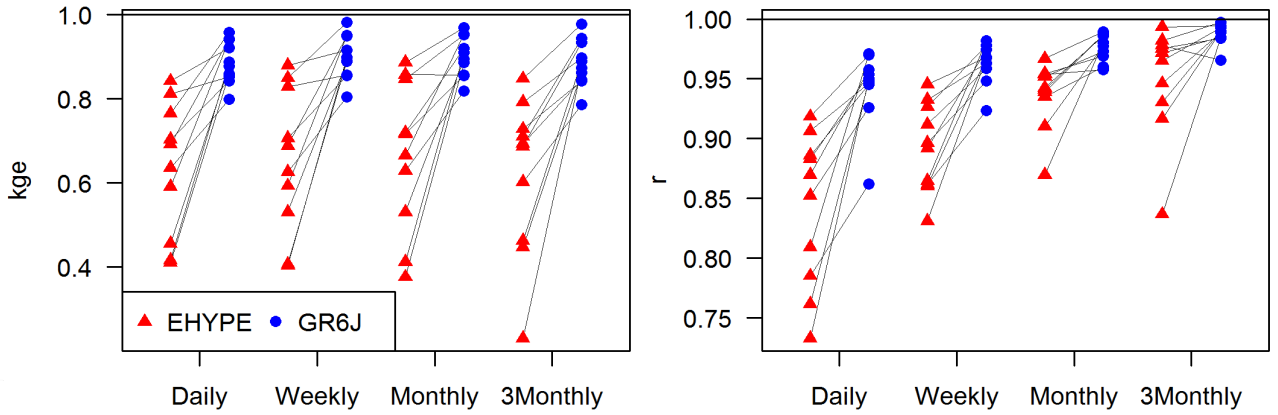
EHYPE



KGE and r model performance



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Climate Change

Co-design with Knowledge Purveyors

- Local SMEs/Agencies interacting with Clients in 15 case-studies

Resource allocation (multiple use)

- Climate-proof Irrigation Strategies, IT
- Snow Effects on Water Availability, SP
- Extensive Drought Operations, SP

Risk management

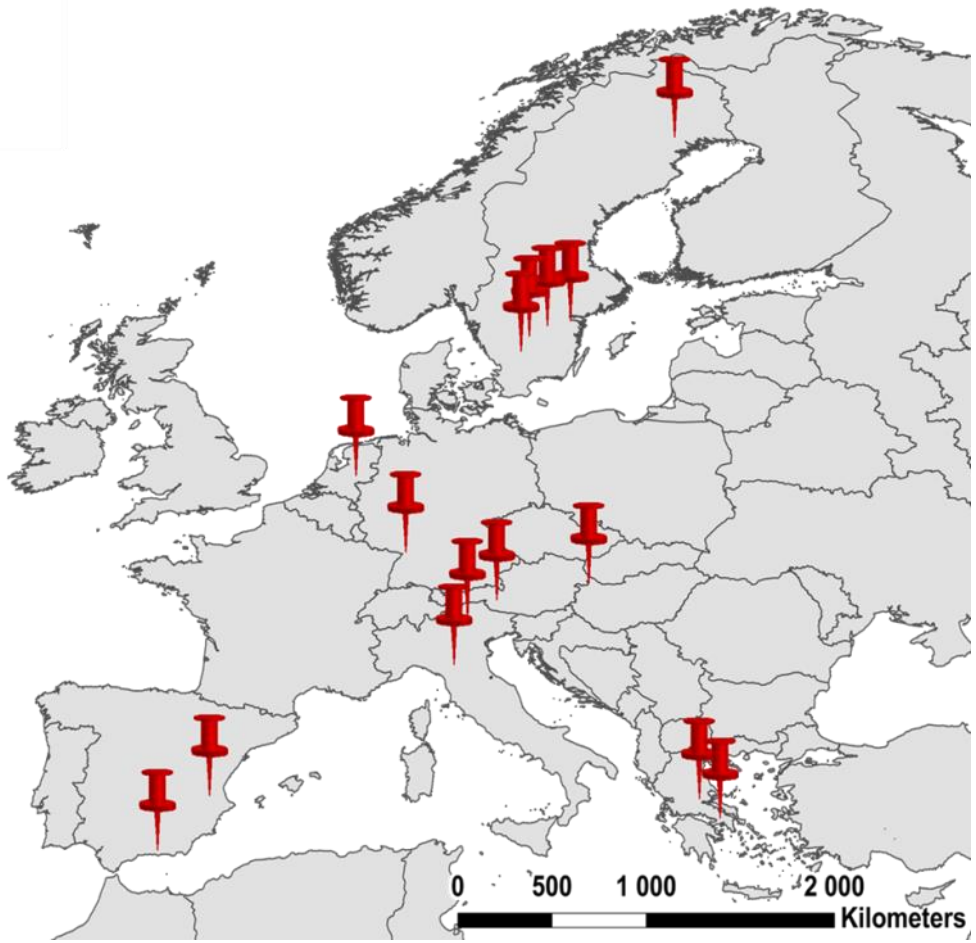
- Climate Change and Flash-Floods, AT
- Warnings for Extreme River Floods, SL
- Risk for River Flooding in Lake-rich Regions, SE

Ecological status

- Environmental flows and point source emissions, GR
- Climate-proof River Water Balance, IT
- Predicting Change in Lake Ecosystems, SE
- Climate Change Effects on Water Quality, SE

Water related industry

- Drinking water in a future climate, SE
- Inland Navigation (Rhine River), DE
- Future proof region and brewery chain, NL
- Water demand and supply of metallurgy sector, GR
- Hydro Power production in a future climate, SE



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Climate Change

You can give your FEEDBACK!!!

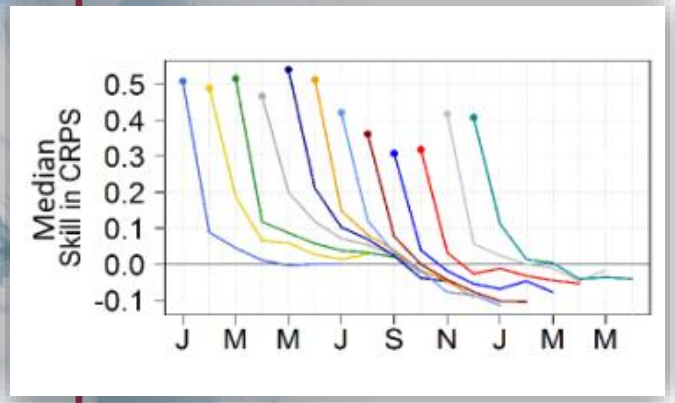
What do you prioritise most in a seasonal forecasting service:

- Guidance?
- Data quality?
- User friendliness of web interface?
- Technical tools?
- Key messages?
- Maps and graphs?
- Data downloads?
- Predictability at the local scale?
- Support service?
- Showcases?
- Hands-on training?
- *Anything else? (suggestions are Welcome!)*

Lessons learnt from user engagement

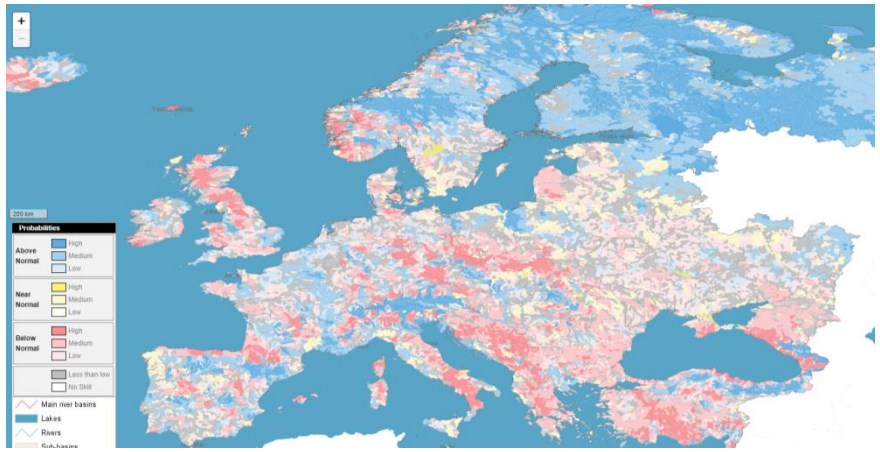
Climate Change

1. Communication… communication… communication!!!

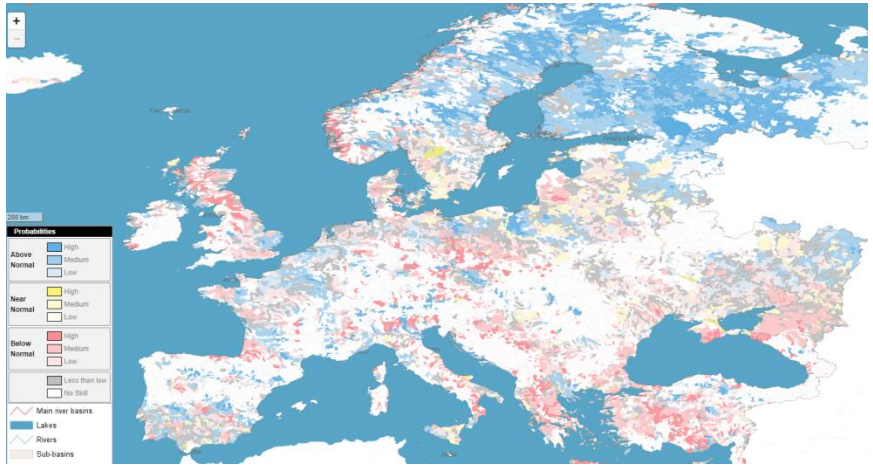


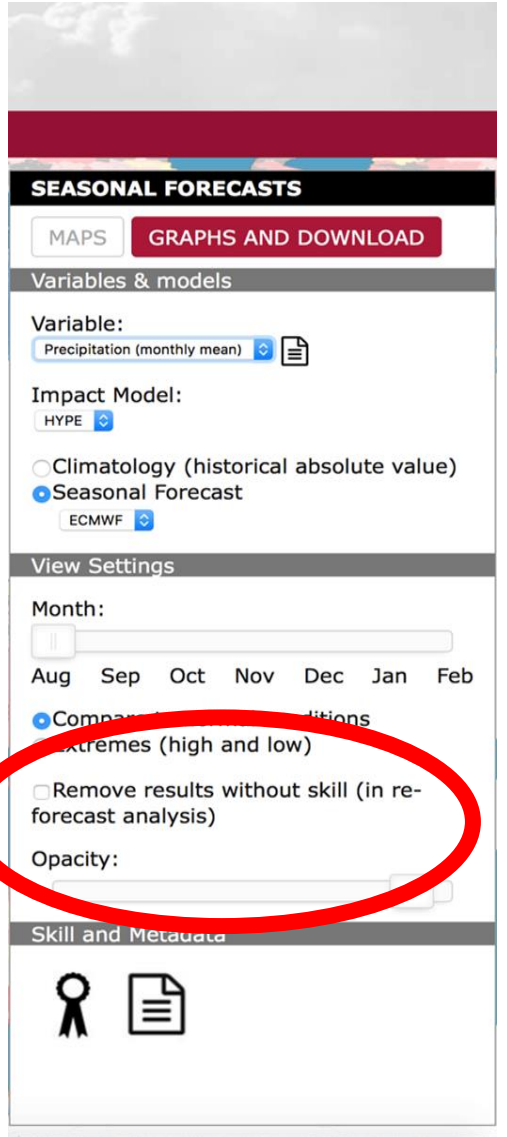
Forecasting performance: season, lead time, location, regime…

All catchments



ONLY catchments with skill





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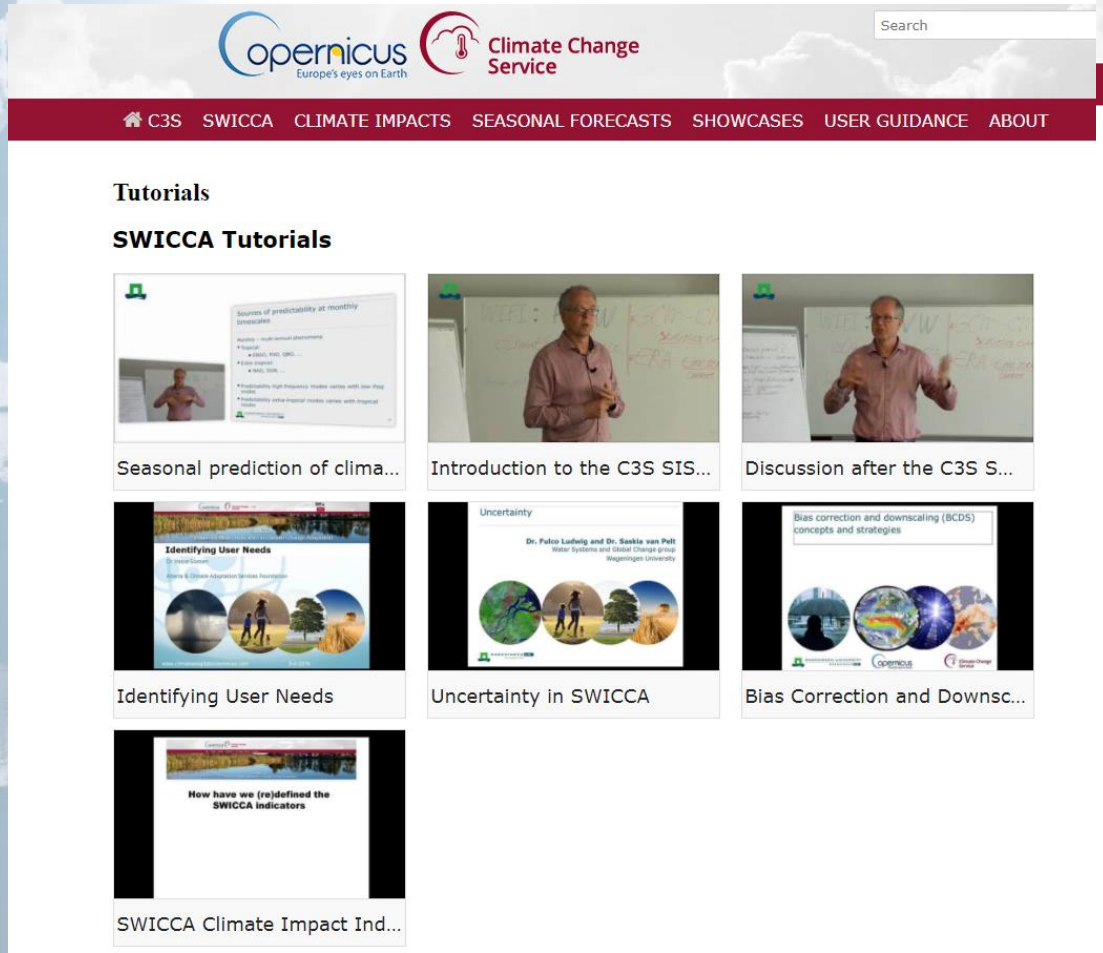
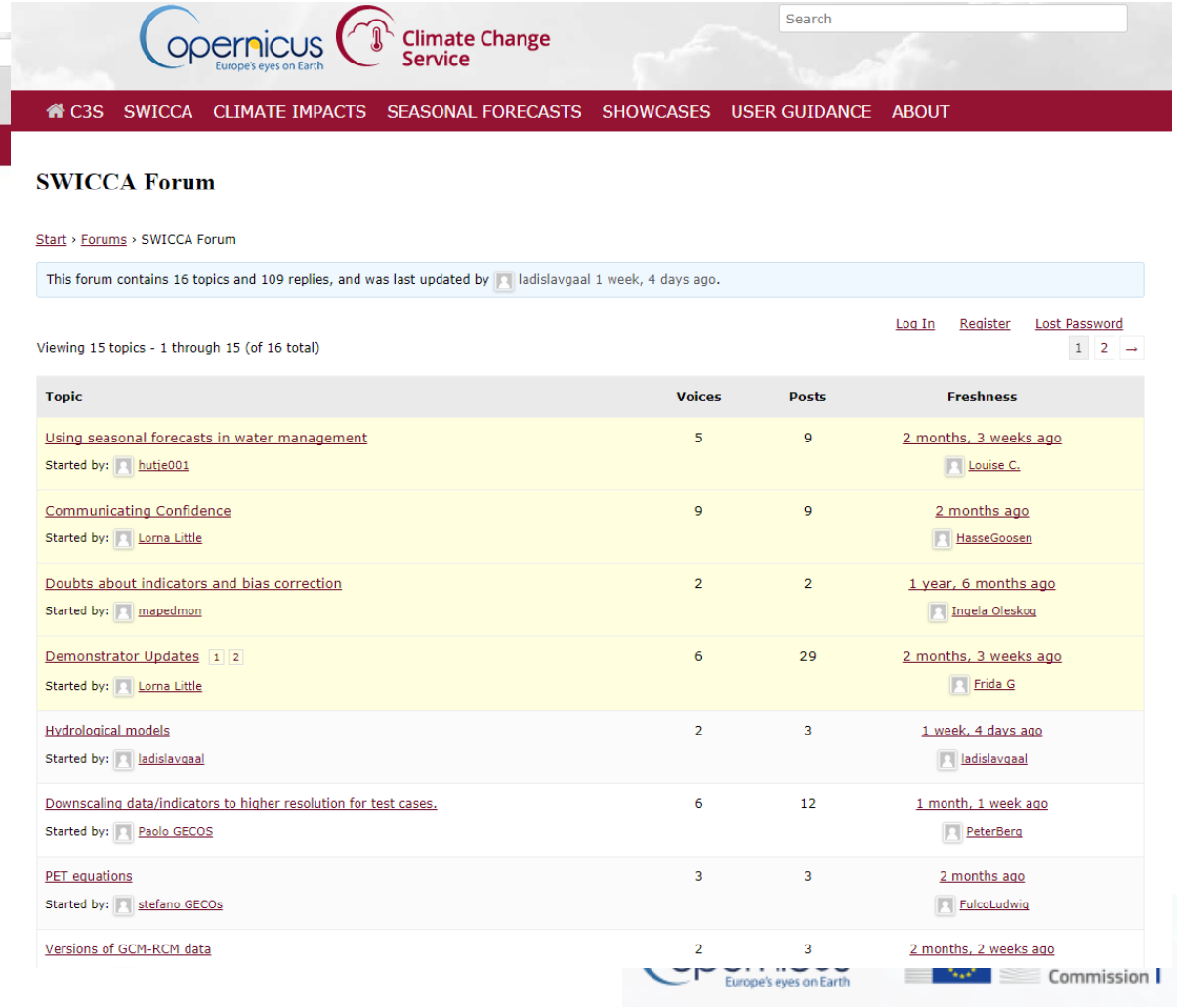
Climate Change

Lessons learnt from user engagement

2. The users want Guidance rather than technical tools for local use.
   - *Climate science is difficult and the climate signal is not clear….*





Lessons learnt from user engagement

Climate Change

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PROOF OF CONCEPT

Copernicus Europe's eyes on Earth | Climate Change Service

Search

C3S SWICCA CLIMATE IMPACTS SEASONAL FORECASTS SHOWCASES USER GUIDANC

FAQ

How to use this SWICCA Demonstrator?

How to estimate climate change impact?

What is a climate impact indicator?

What is a seasonal forecast variable?

Why and how to use an ensemble?

Why the spread of values in the ensembles?

How to use different RCPs?

How to explore confidence in SWICCA results?

How does SWICCA Soil Moisture compare to Earth Observations?

How does SWICCA Water Temperature compare to Earth Observations?

What are the future trends for water resources across Europe?

What are the future trends for population across Europe?

What are the future trends for land use across Europe?

What is the SWICCA Forum?

What is the SWICCA project?

Definitions of terms used can be found at the following links:

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Search

C3S SWICCA CLIMATE IMPACTS SEASONAL FORECASTS SHOWCASES USER GUIDANCE ABOUT

SWICCA Forum

Start › Forums › SWICCA Forum

This forum contains 16 topics and 109 replies, and was last updated by ladislavgaal 1 week, 4 days ago.

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Viewing 15 topics - 1 through 15 (of 16 total) 1 2 →

Topic	Voices	Posts	Freshness
Using seasonal forecasts in water management Started by: hutje001	5	9	2 months, 3 weeks ago Louise C.
Communicating Confidence Started by: Lorna Little	9	9	2 months ago HasseGoosen
Doubts about indicators and bias correction Started by: mapedmon	2	2	1 year, 6 months ago Ingela Oleskog
Demonstrator Updates 1 2 Started by: Lorna Little	6	29	2 months, 3 weeks ago Frida G
Hydrological models Started by: ladislavgaal	2	3	1 week, 4 days ago ladislavgaal
Downscaling data/indicators to higher resolution for test cases. Started by: Paolo GECOS	6	12	1 month, 1 week ago PeterBerg
PET equations Started by: stefano GECOs	3	3	2 months ago FulcoLudwig
Versions of GCM-RCM data	2	3	2 months, 2 weeks ago

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Lessons learnt from user engagement

Climate Change

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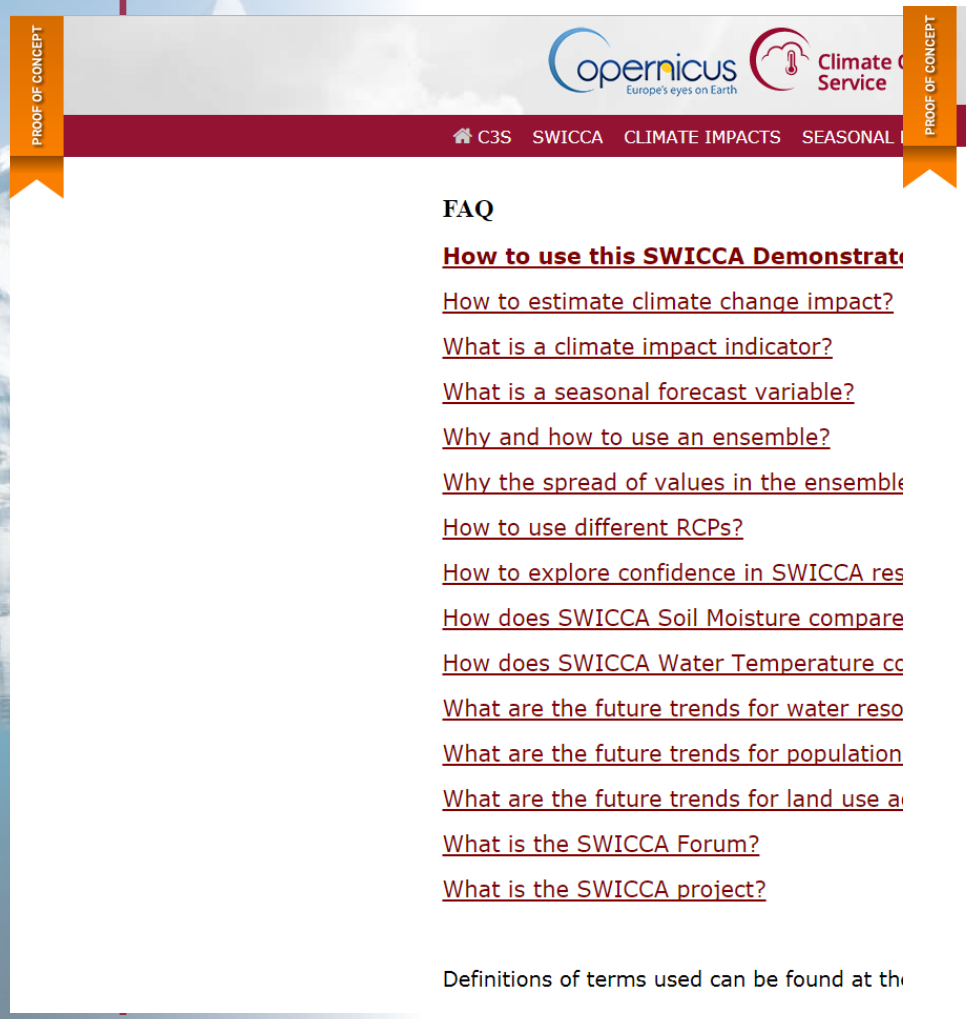

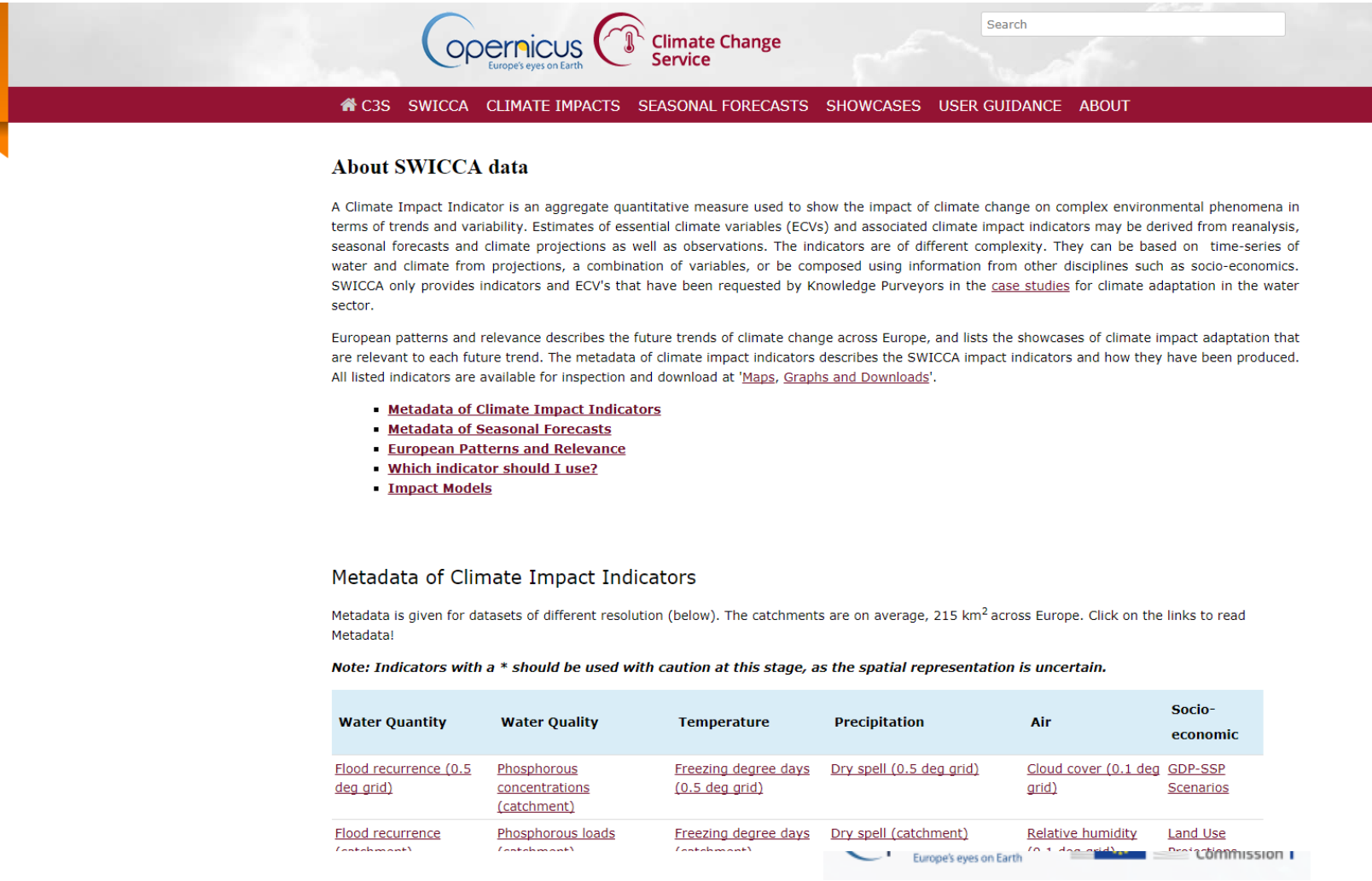

Climate Change

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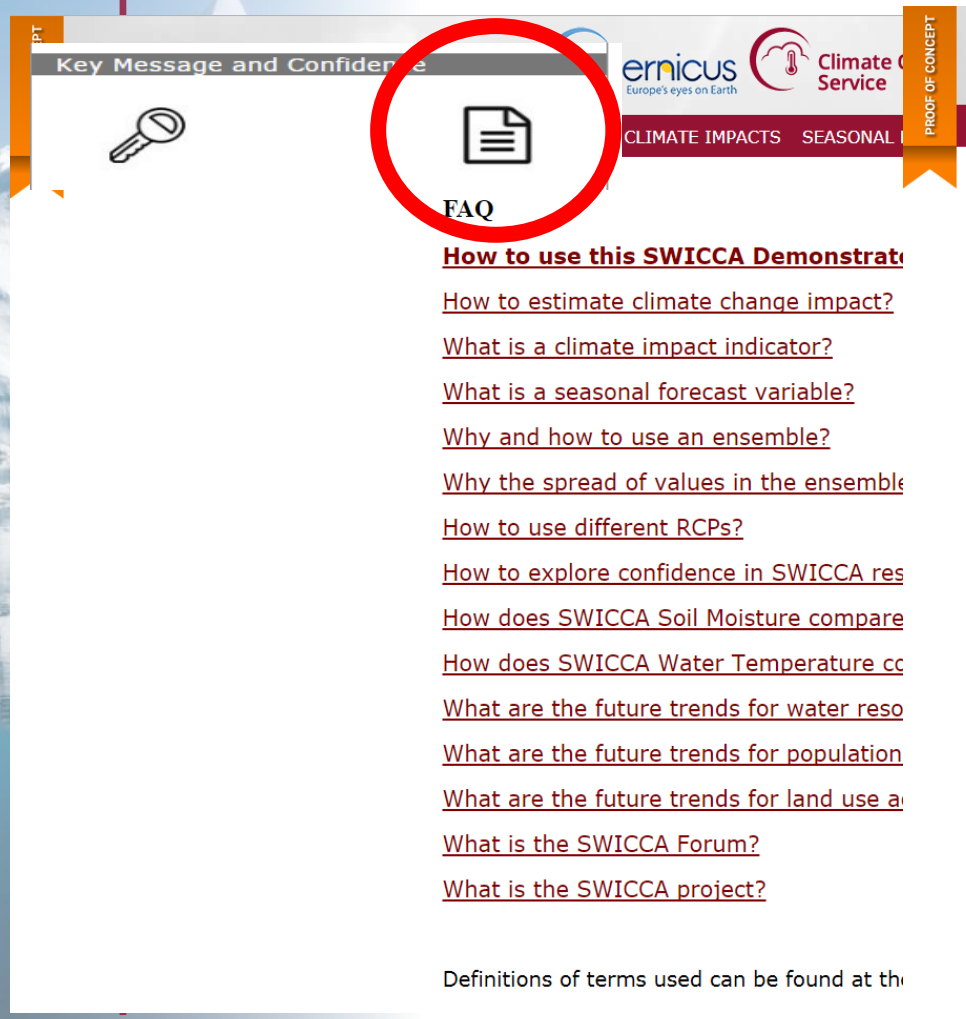

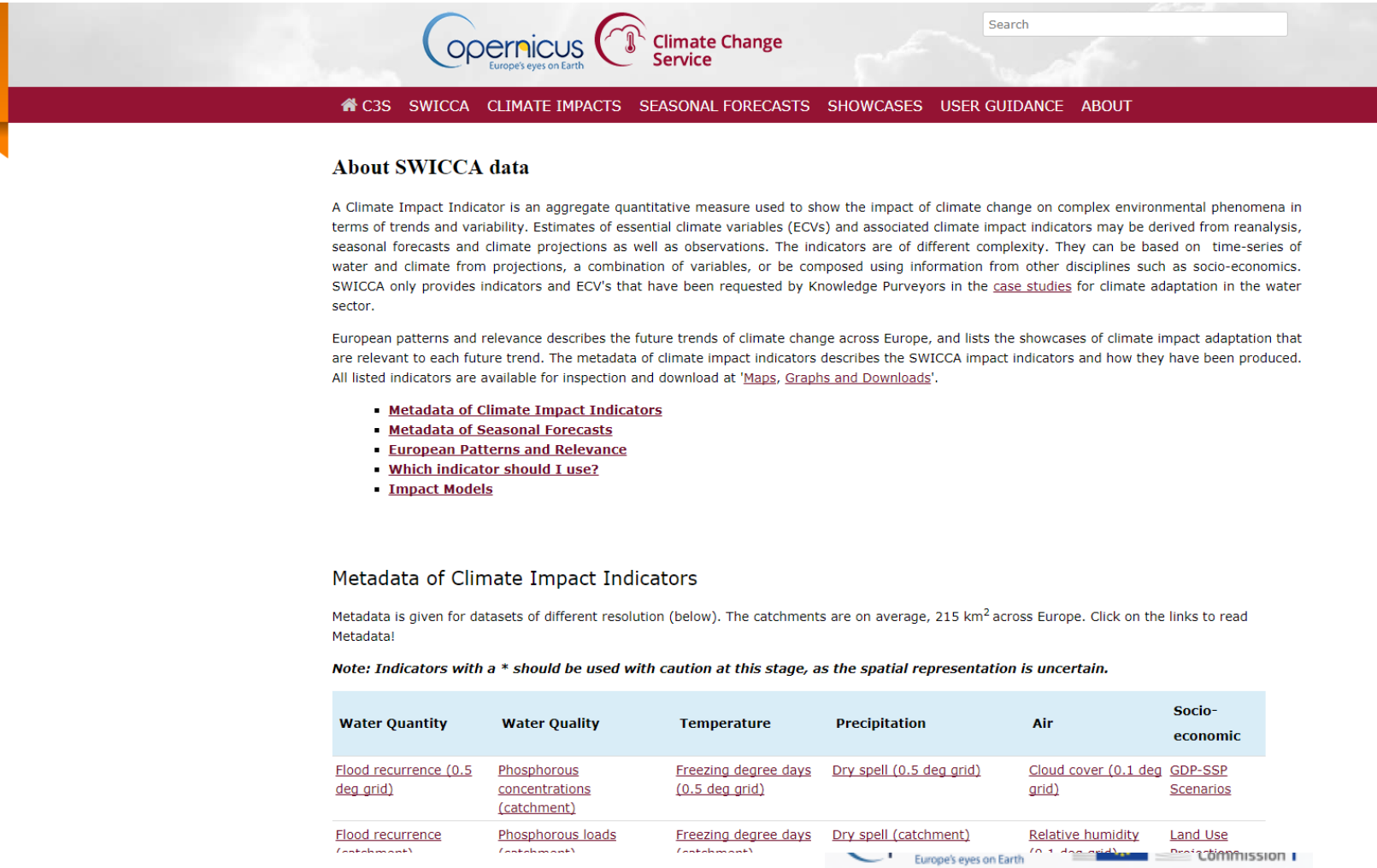

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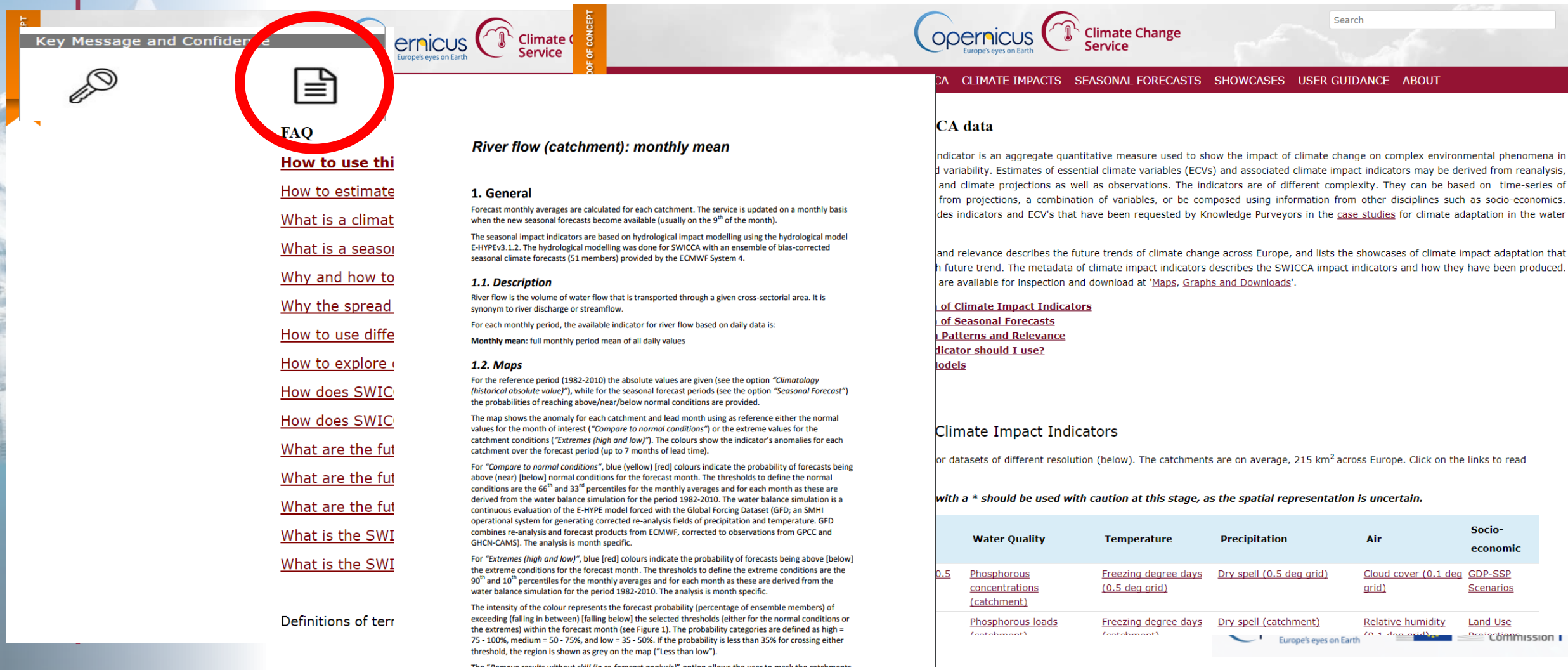
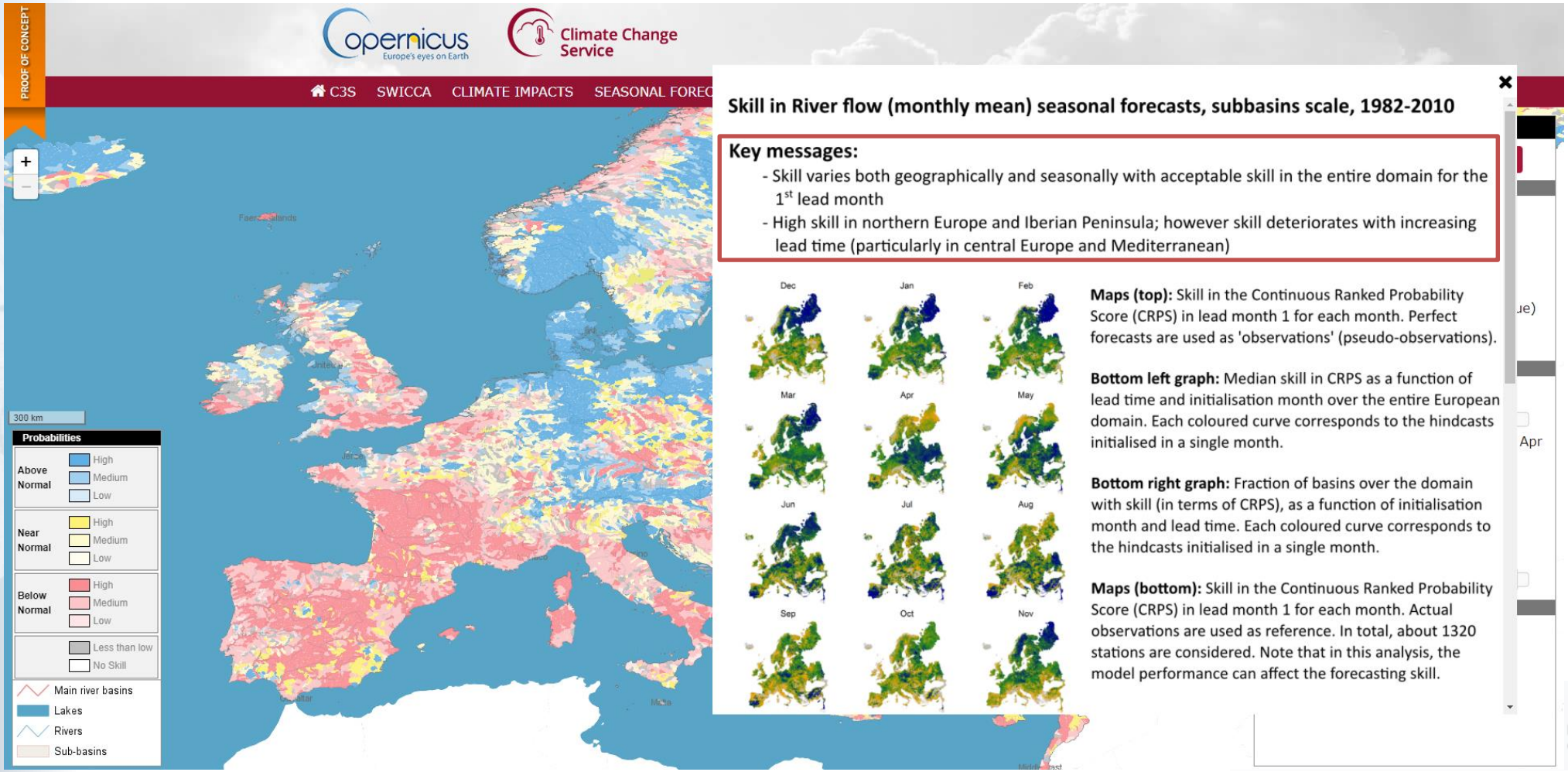


Climate Change

Lessons learnt from user engagement

3. Key messages must follow with the data for user uptake.

– *Climate science is difficult and the climate signal is not clear….*

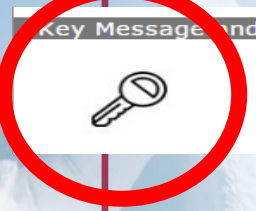


European Commission

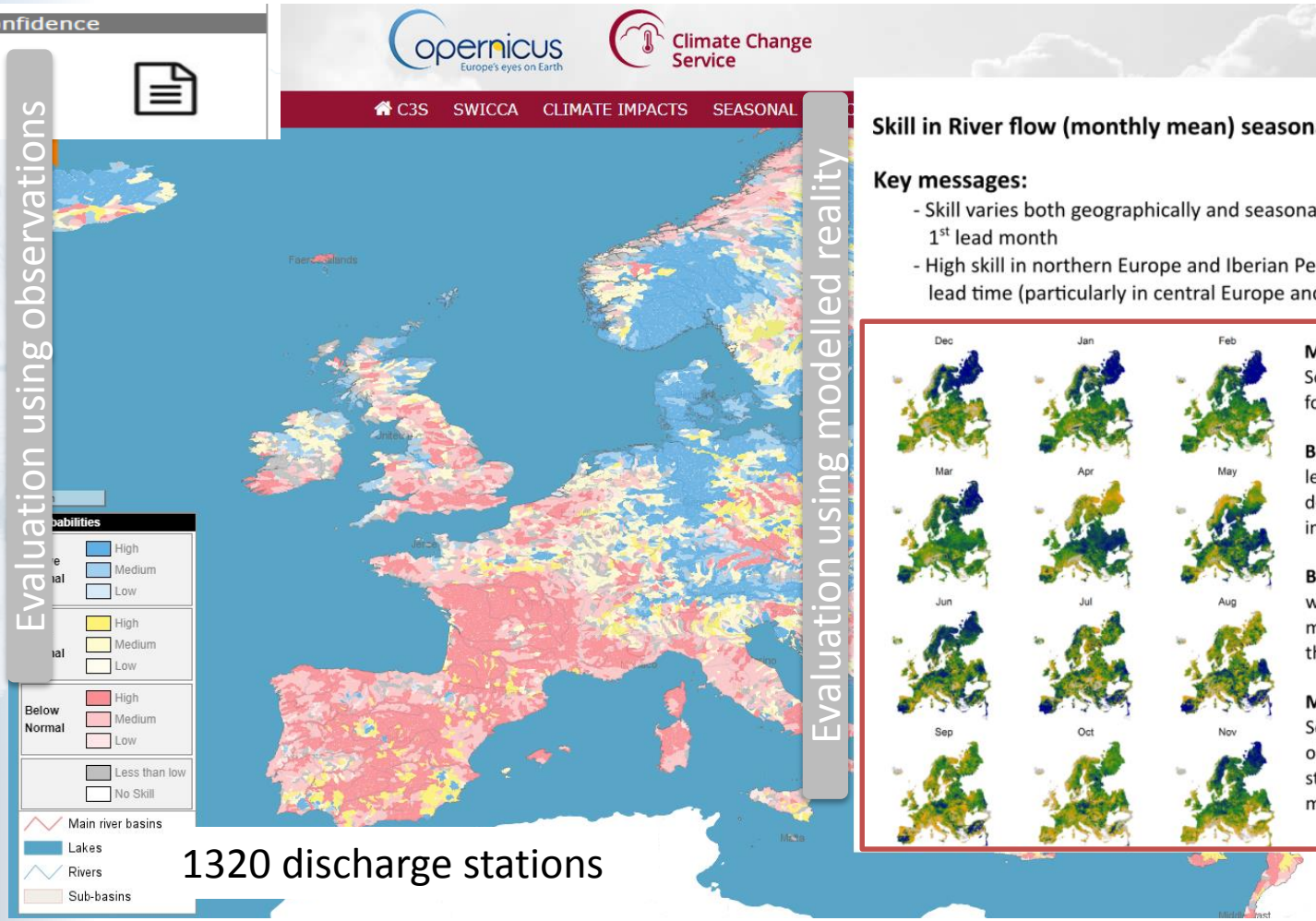
Climate Change

Lessons learnt from user engagement

4. Skill and reliability of forecasts are important to communicate.
   – *Climate science is difficult and the climate signal is not clear….*



Evaluation using observations



1320 discharge stations

Evaluation using modelled reality

Lessons learnt from user engagement

Climate Change

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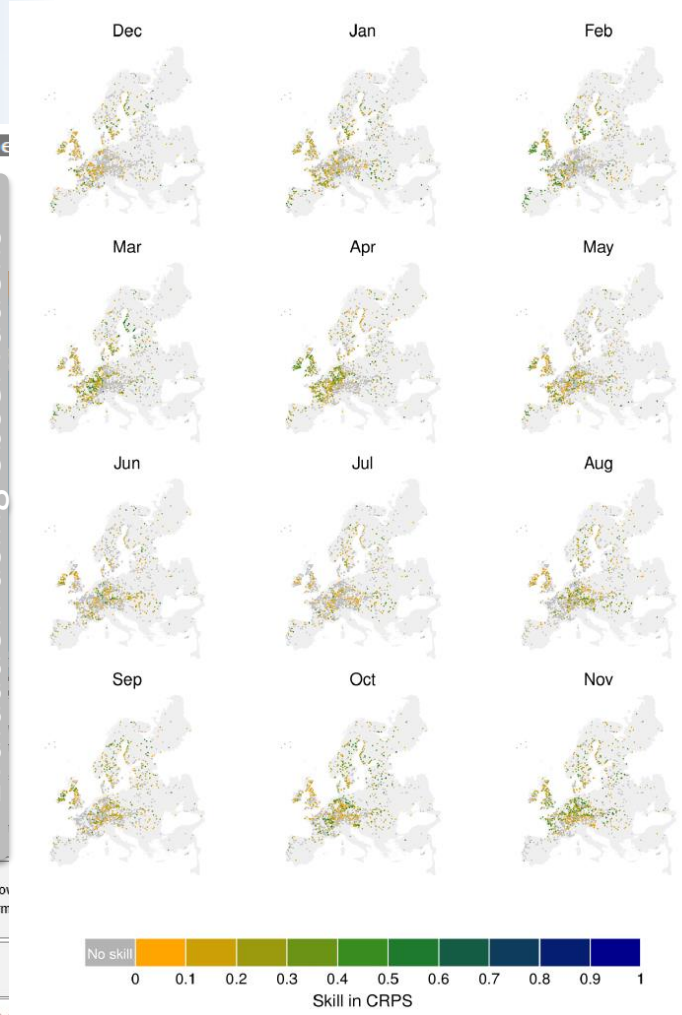
Evaluation using observations



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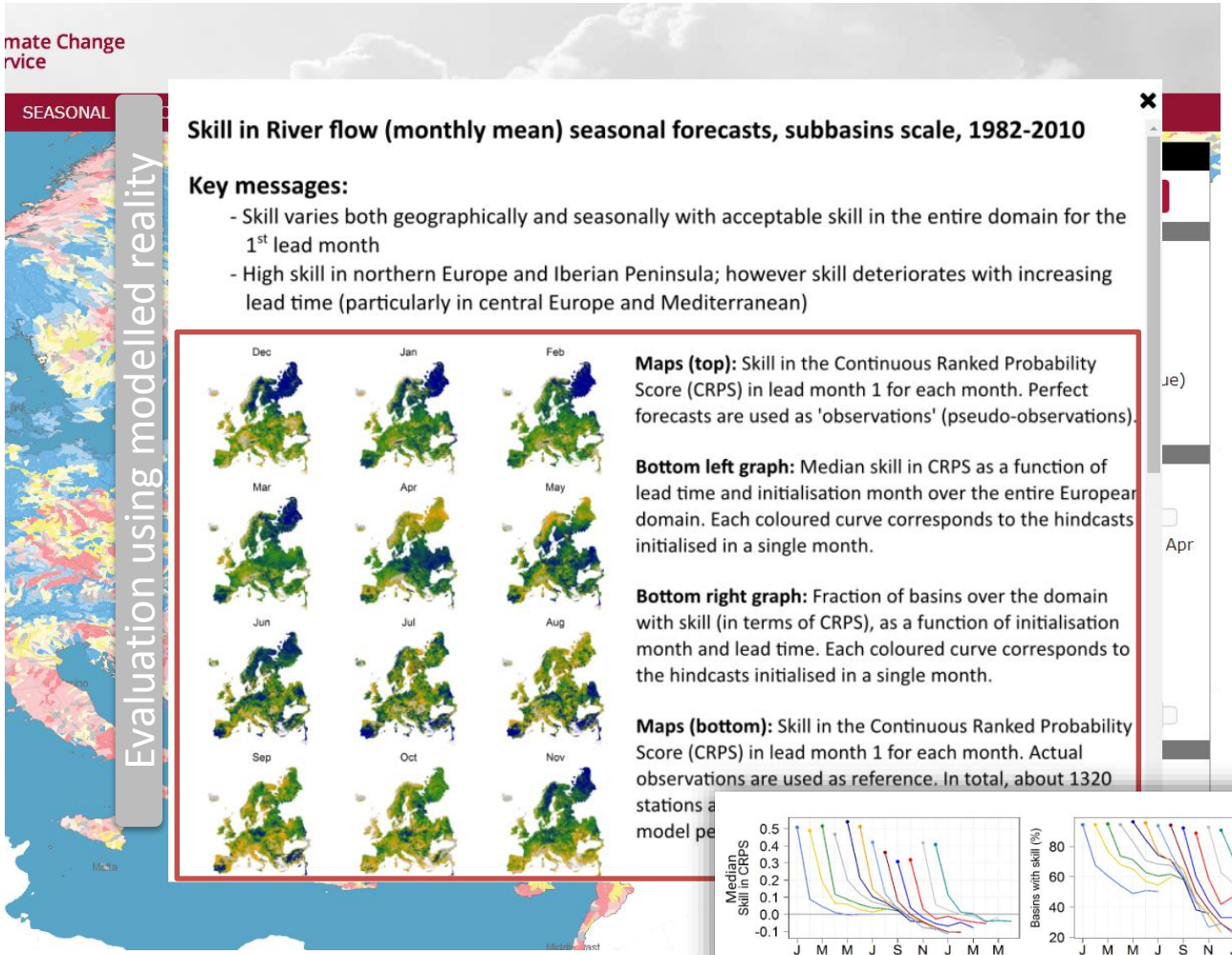
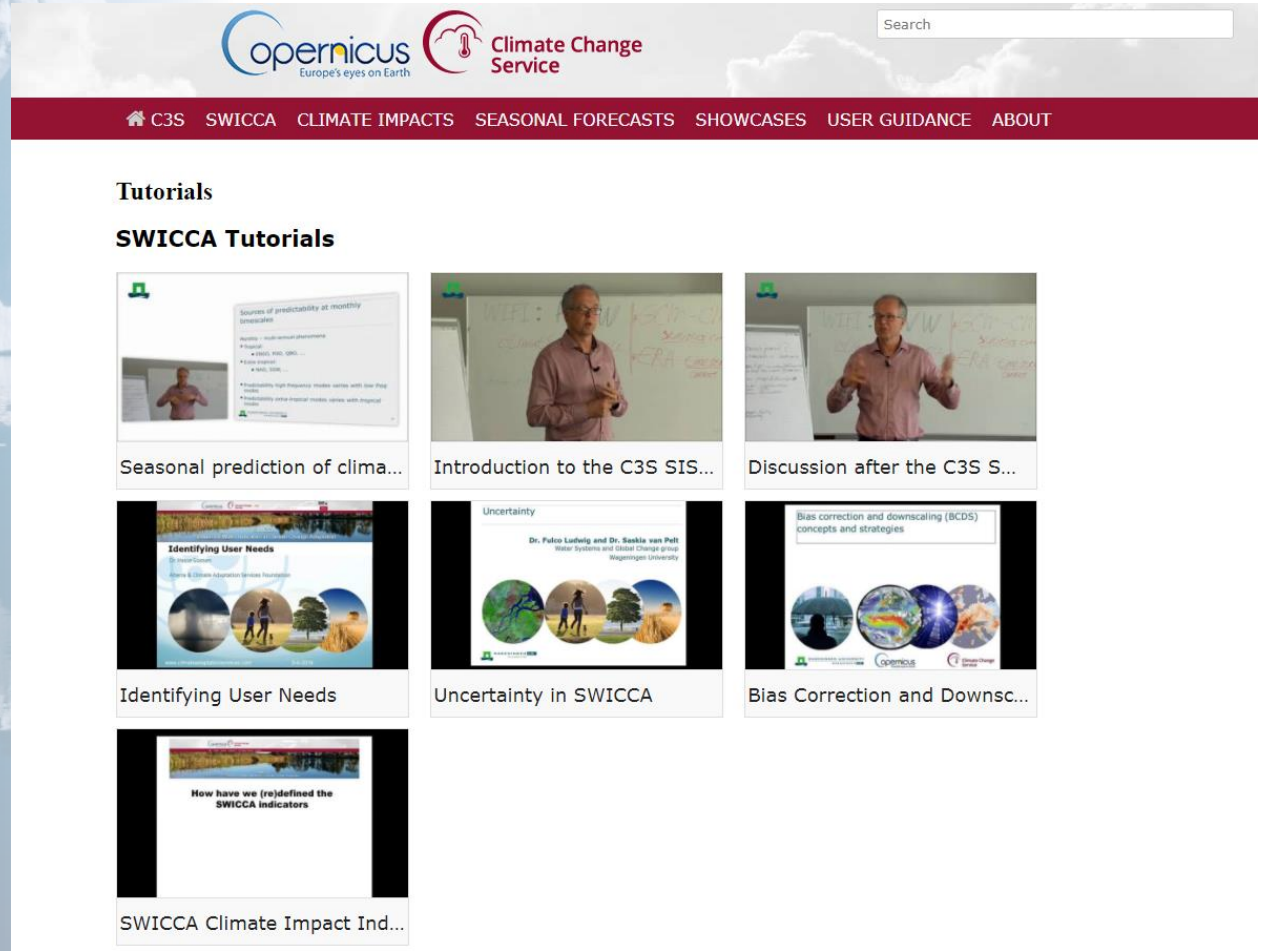


Lessons learnt from user engagement

Climate Change

5. ‘Teach the teachers’

– *Purveyors need to understand to be able to communicate results with clients*



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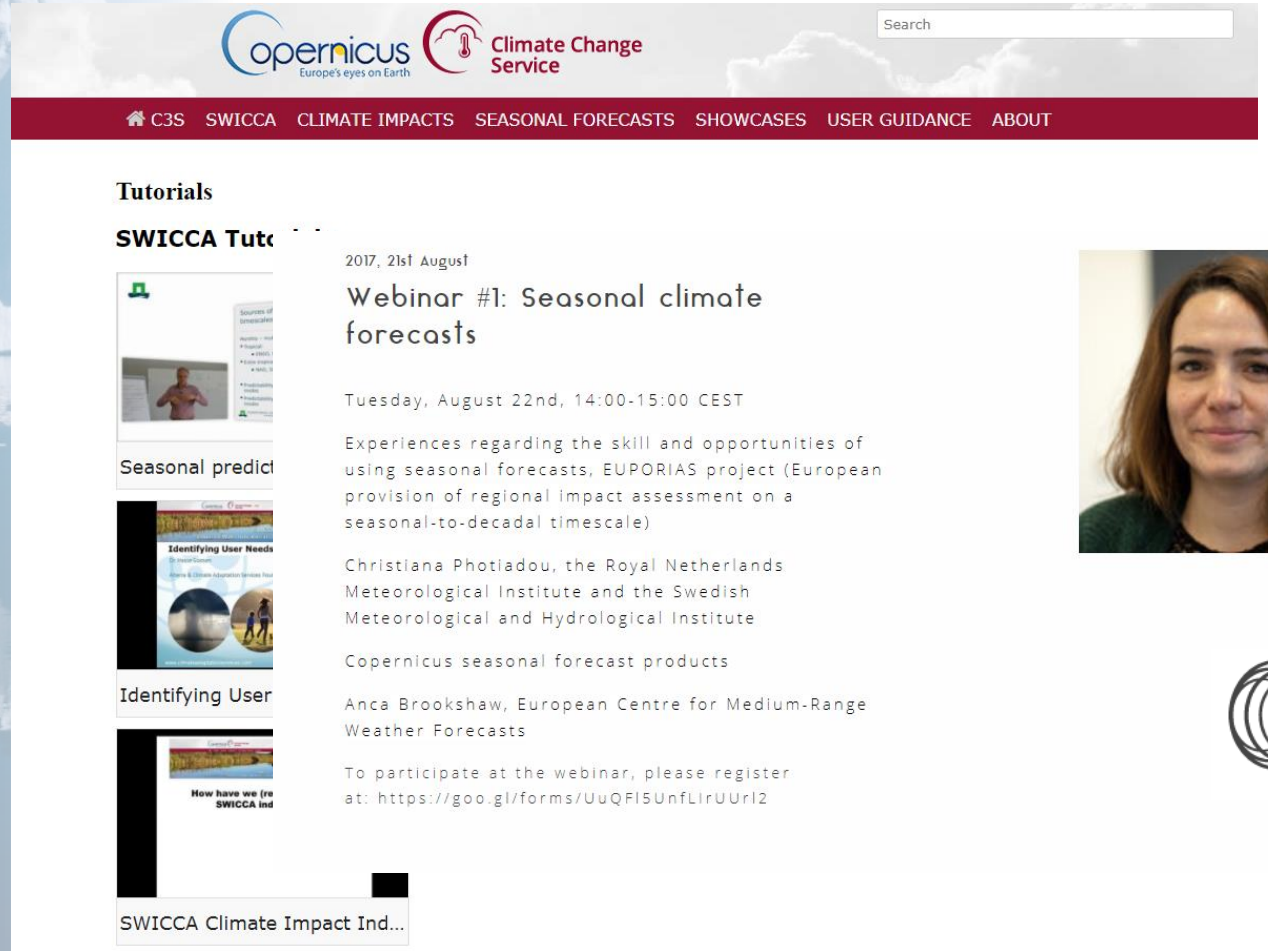
Lessons learnt from user engagement

Climate Change

5. ‘Teach the teachers’

– *Purveyors need to understand to be able to communicate results with clients*



CLARA

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My 3 key messages

- European climate services can provide useful seasonal information for a number of sectors, (i.e. energy, water, agriculture etc). Skill and reliability is region, season and lead time dependent.

- There is a strong need to engage with users and co-design user-tailored services together with knowledge purveyors.

- Reliable forecasts, communication, guidance, and metadata are the key characteristics of a user-oriented seasonal forecasting service.

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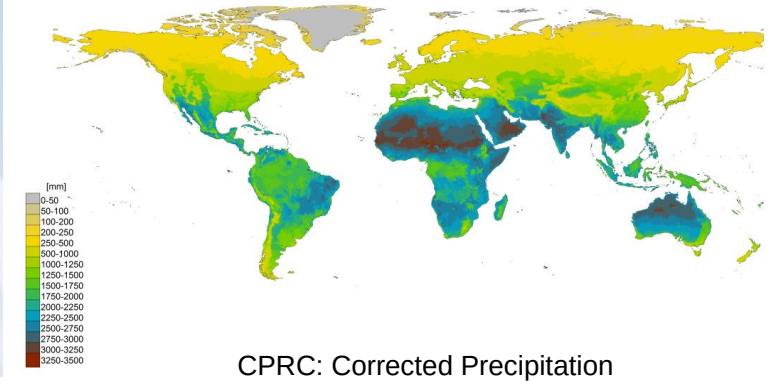
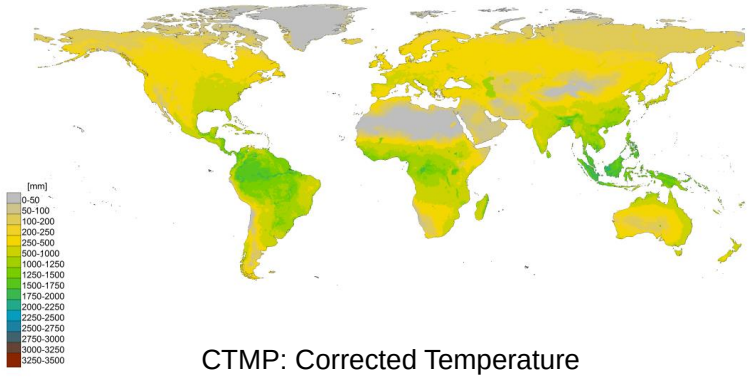
Exciting developments at SMHI !!!

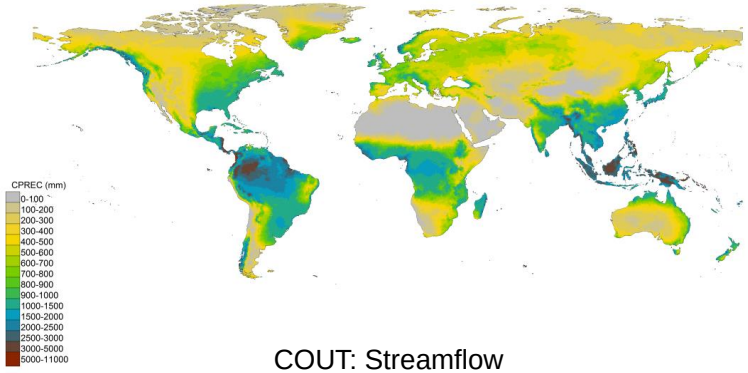
EPOT: Potential Evapotranspiration



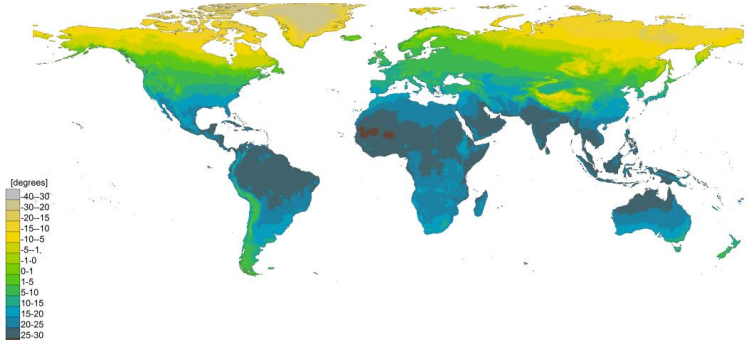
EVAP: Actual Evapotranspiration



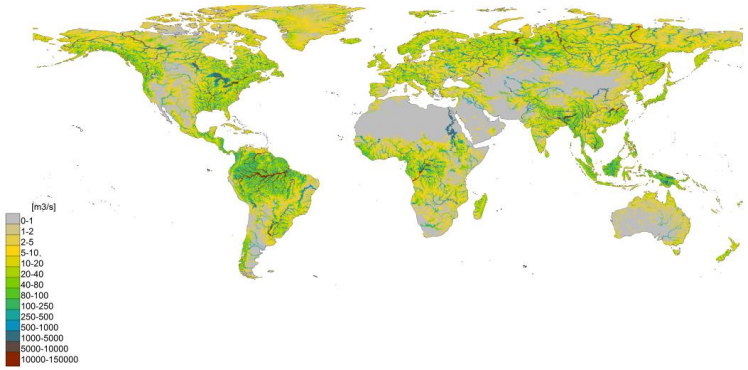
CPRC: Corrected Precipitation



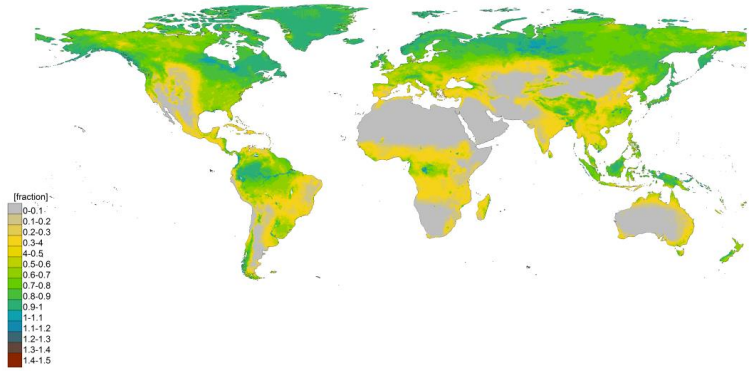
CTMP: Corrected Temperature



COUT: Streamflow



SRFF: Soil moisture fraction of field capacity volume



WW-HYPE

Area: 135 million km2

131,000 subbasins

11,400 discharge stations

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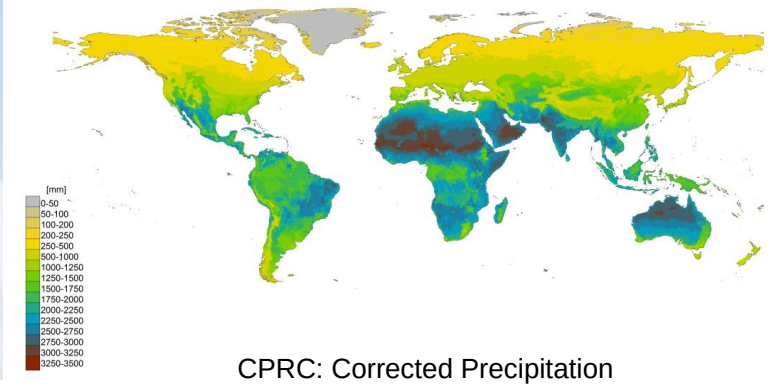
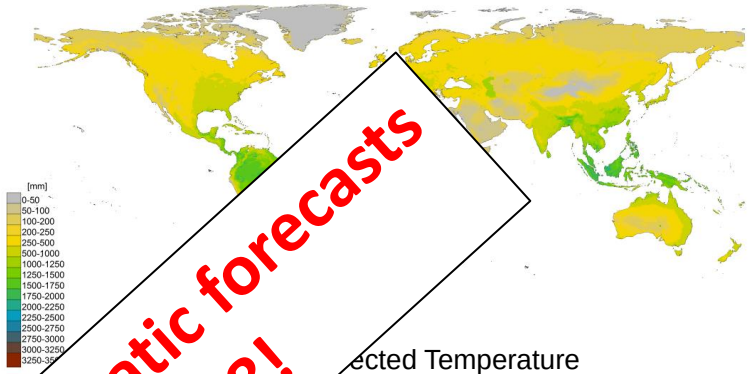
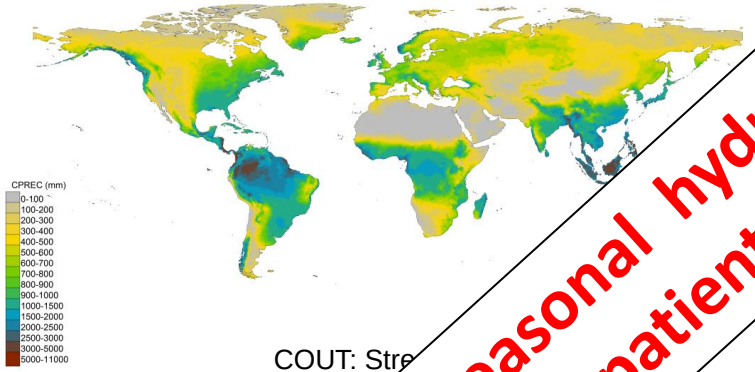
EPOT: Potential Evapotranspiration



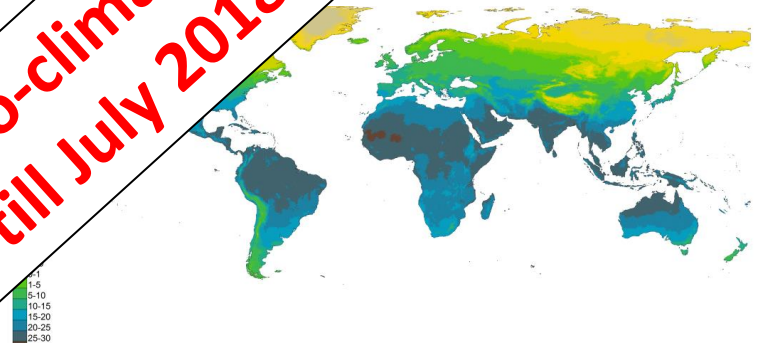
EVAP: Actual Evapotranspiration



CPRC: Corrected Precipitation

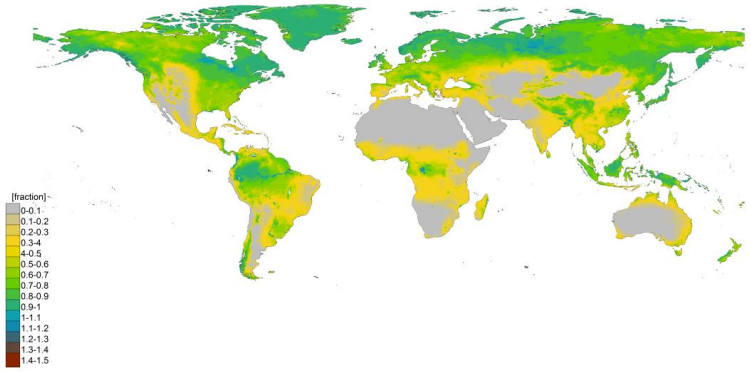


ected Temperature



COUT: Stre

SRFF: Soil moisture fraction of field capacity volume



Global seasonal hydro-climatic forecasts
Be patient till July 2018!

WW-HYPE

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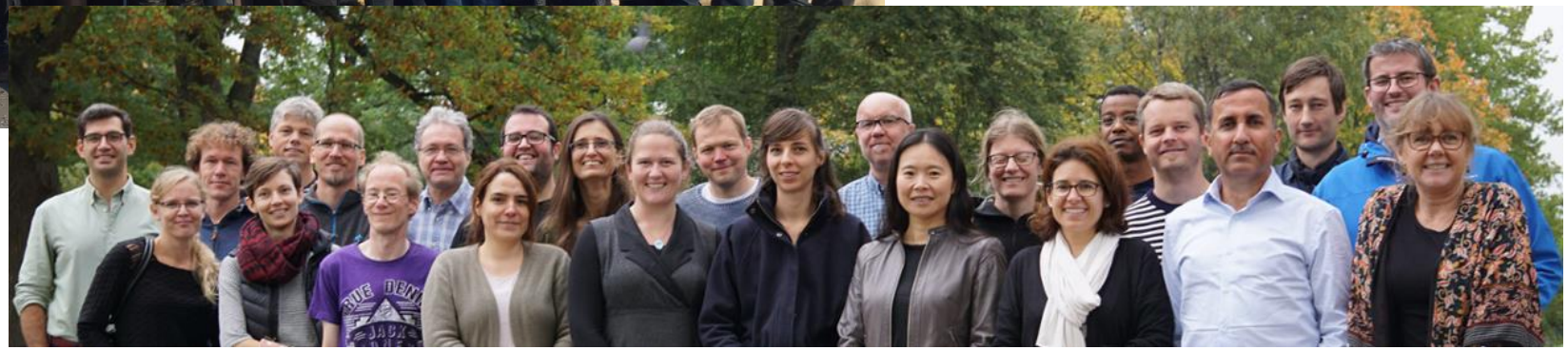
Thank you from the team!



Feel free to try a real demo!!

http://swicca.climate.copernicus.eu/indicator-interface/seasonal-forecasts-maps/

http://swicca.eu

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