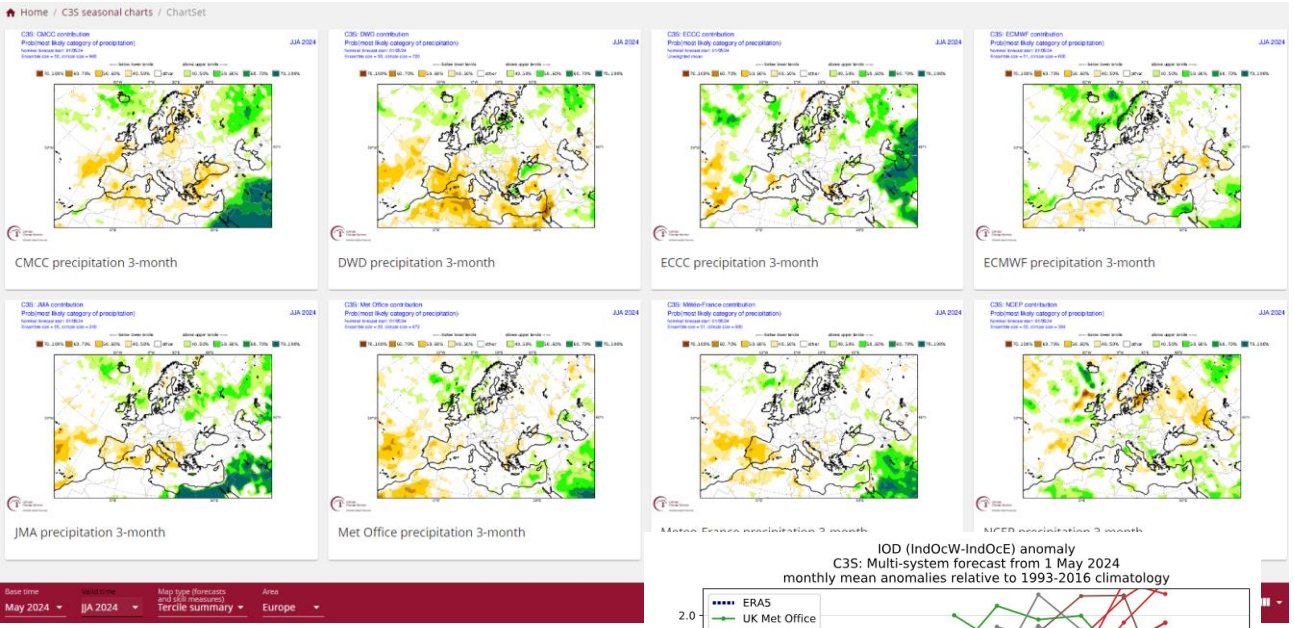
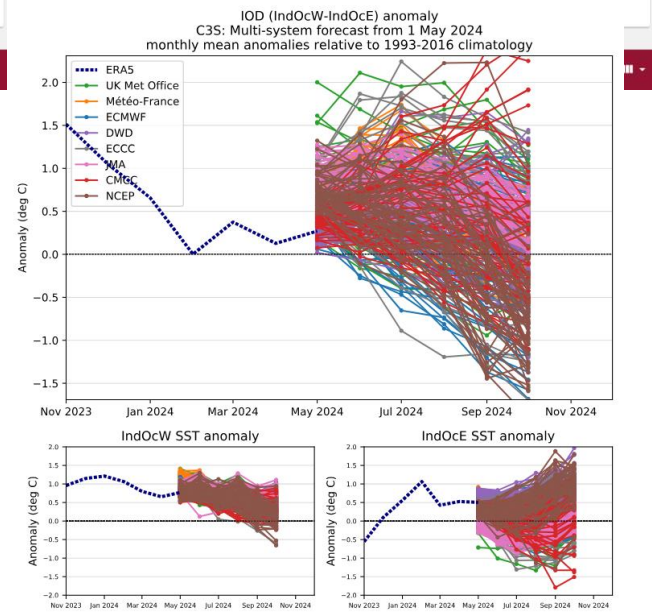
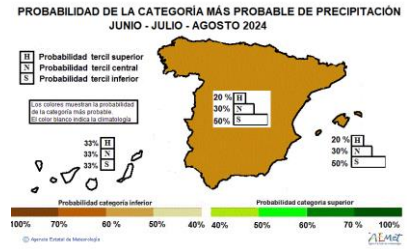
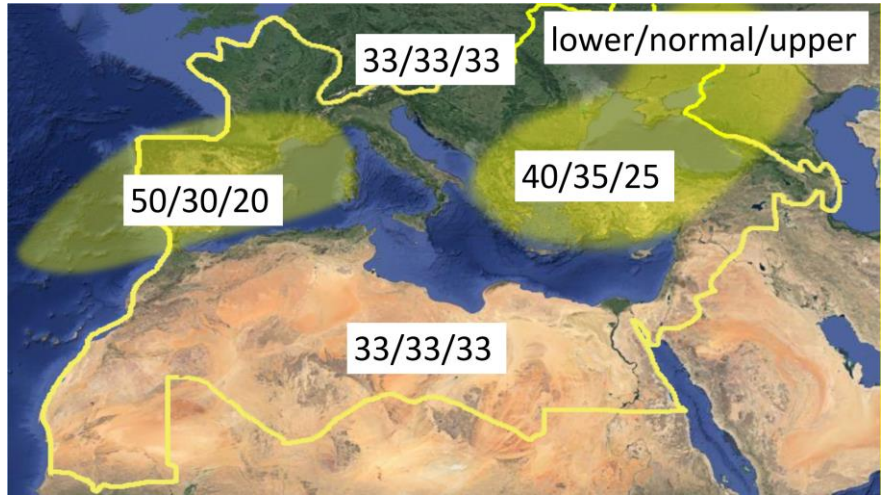
MedCOF workshop on Objective Seasonal Forecast







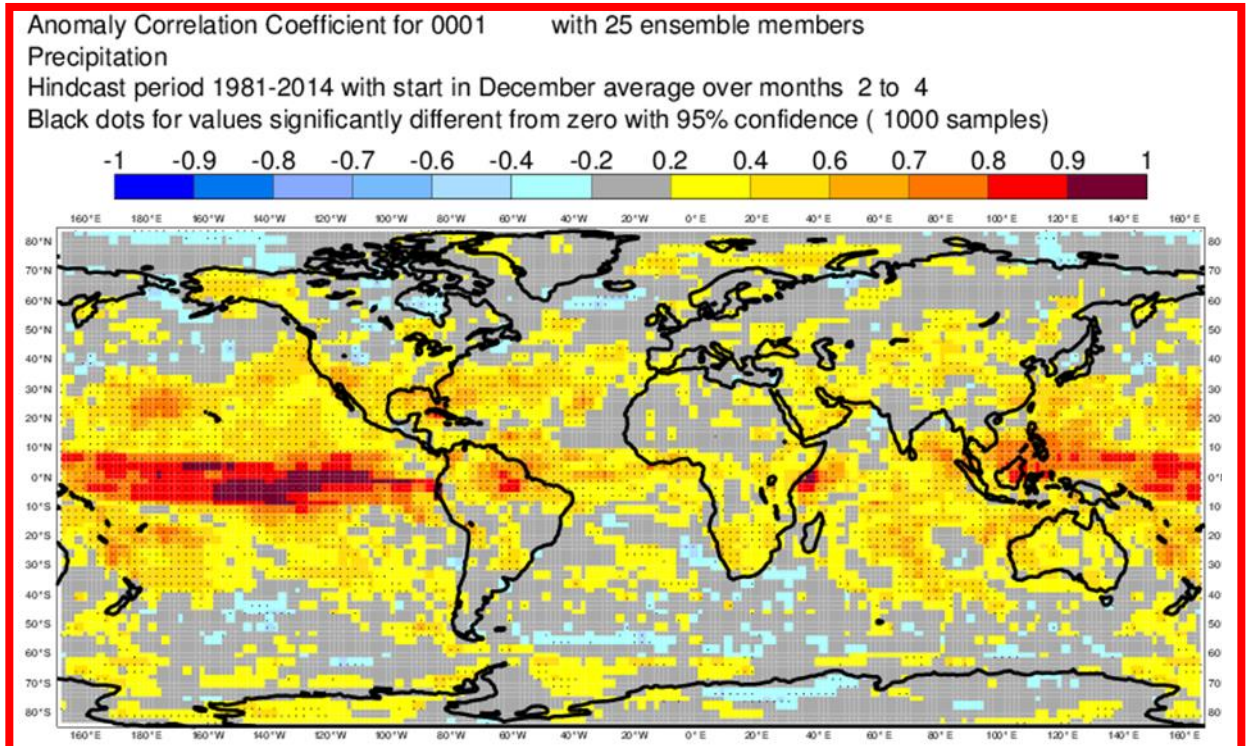


Esteban Rodríguez Guisado
AEMET (Spain) and MedCOF coordinator

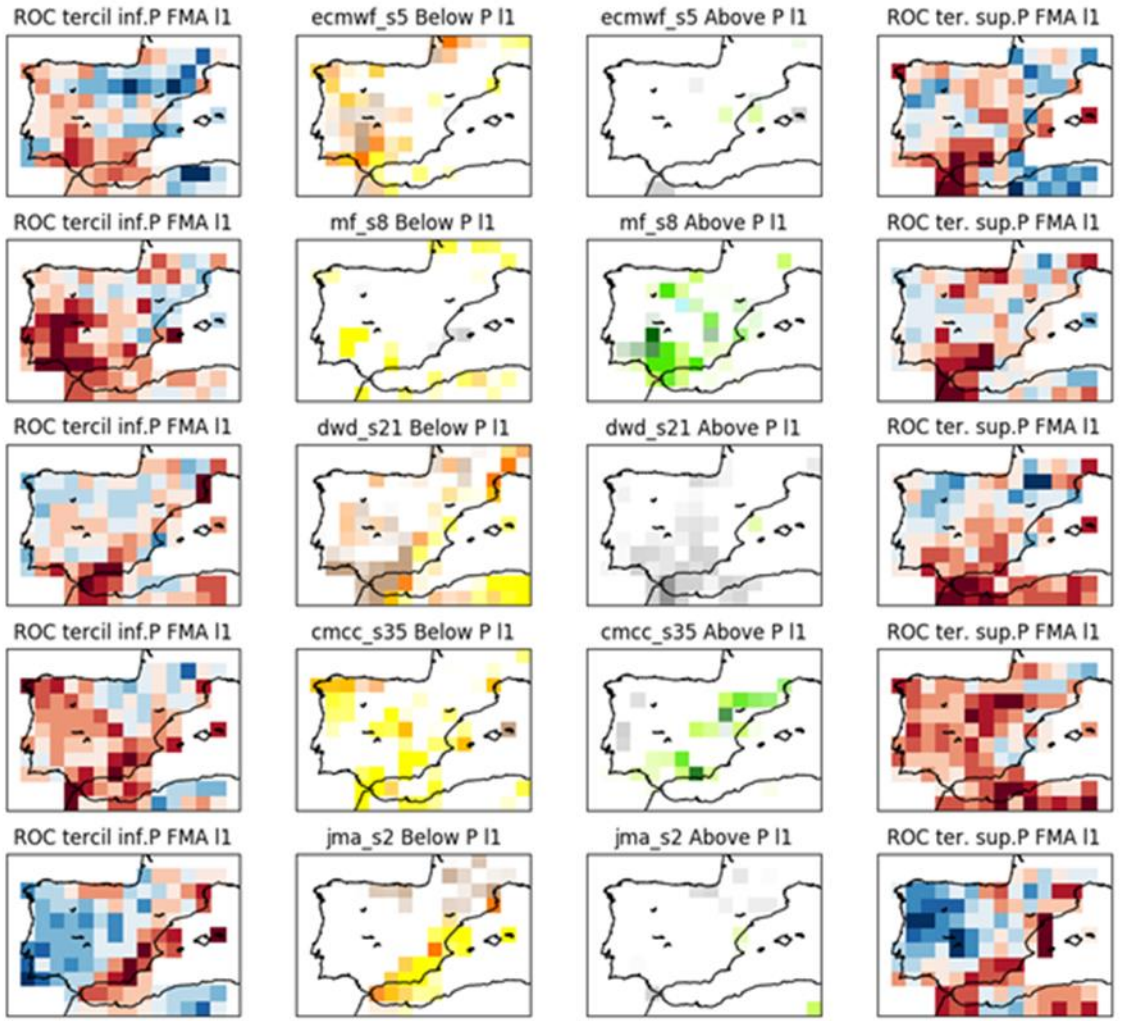
Demand on climate predictions is growing. A changing climate is causing climate distribution to drift away from historical reference, and frequency of extreme events is increasing. Any ability we may have on advancing climate's behaviour on the short term help adaptation efforts and reduces vulnerability or related loses.

But, due to internal variability, signal to noise ratio is low, and so is skill, particularly in midlatitudes. Signal tend to differ among models, so it is recommended to analize and take into account information from several ones to built a multimodel.

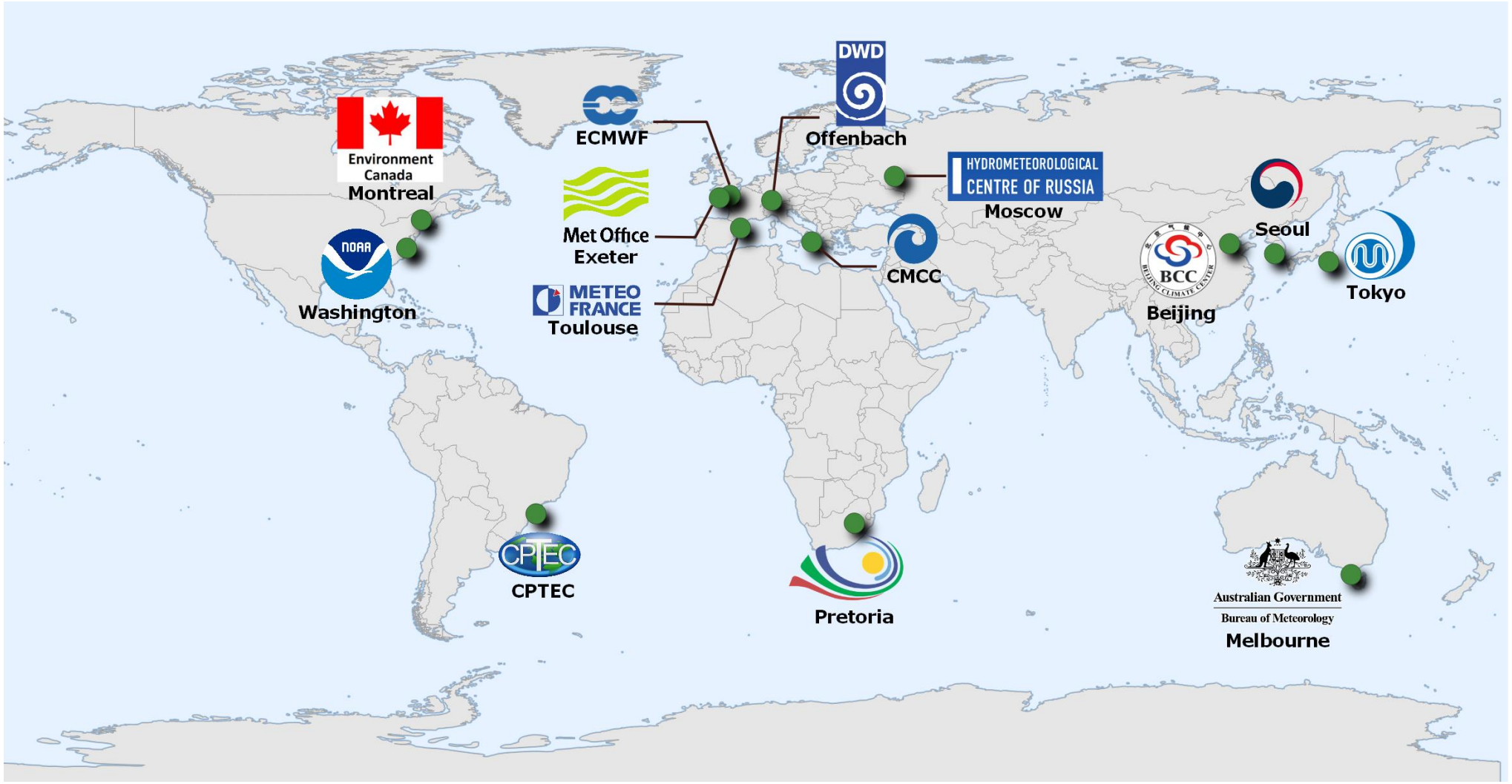
Additionally, climate models present bias, so it is needed to run a hindcast to provide the reference climatology



Anomaly correlation between observed and forecasted precipitation

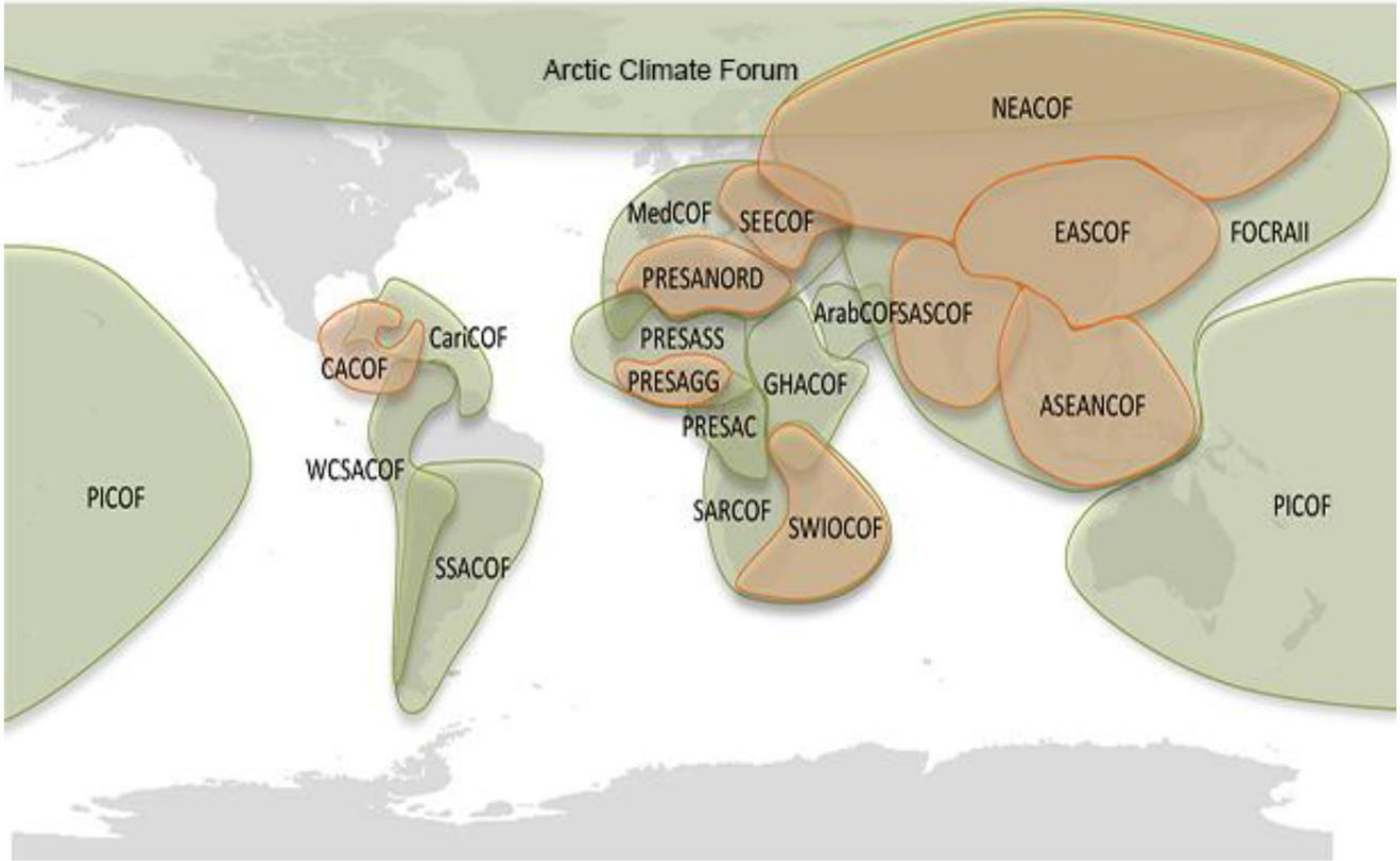


Global producing centers: need to fulfil a series of requirements, allowing to have common Schedule to produce a MM



Regional Climate Centers for LRF: adding analysis and products relevant for the region

Bringing together NHMs experts from different RA regions and bridging the gap with users



AEMet

WMO Northern Africa RCC Network

WMO RA VI RCC Network

WMO OMM

MedCOF Mediterranean Climate Outlook Forum

Harmonization of climate predictions

Capacity building

Interaction with users

Supported by WMO infrastructure (GPCs, RCCs, LC LRFMME, ...), C3S, etc.

Co-operation between WMO RA I and RAVI

Typical MedCOF session
- PreCOF (CB)
- Verification
- Monitoring
- Consensus forecast
- Interaction with users

Help to bridge gap btw CSs research and users

ERA4CS MEDSCOPE: scientific arm of MedCOF

Current MedCOF procedure

Step 1 : oceanic analysis

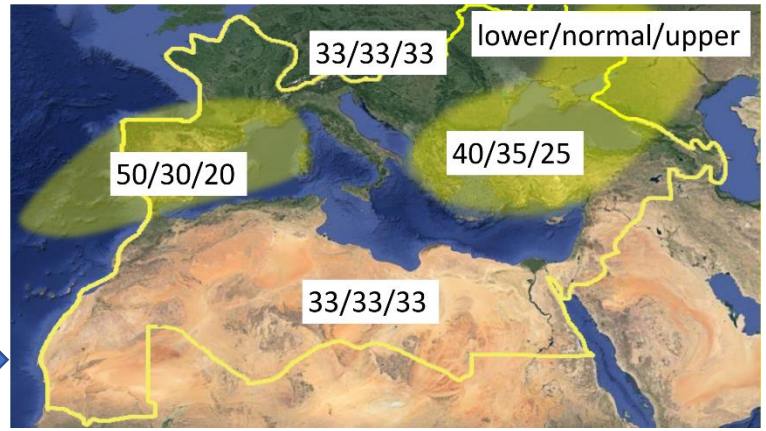
Step 2 : oceanic forecast

Step 3 : drivers

Step 4 : atmospheric circulation forecasts

Step 5 : forecast of climatic parameters

Step 6 : summary and synthesis maps



METEO FRANCE

Current MedCOF procedure

Step 1 : oceanic analysis

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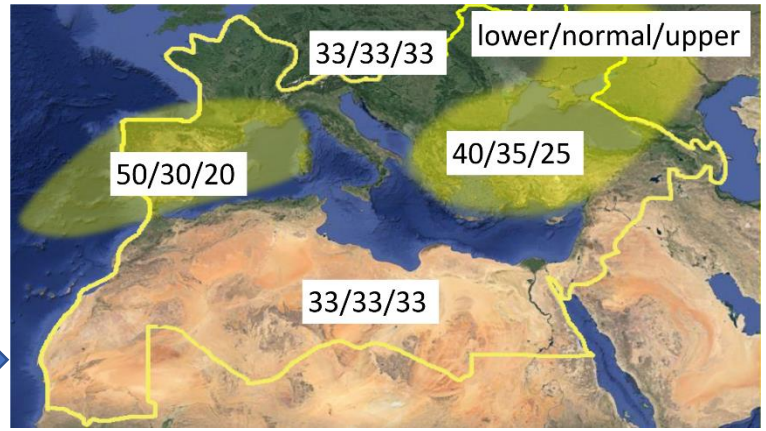
Problems

-Not easily traceable

-Not suitable for objective verification

-No grided data: not suitable for applications



METEO FRANCE

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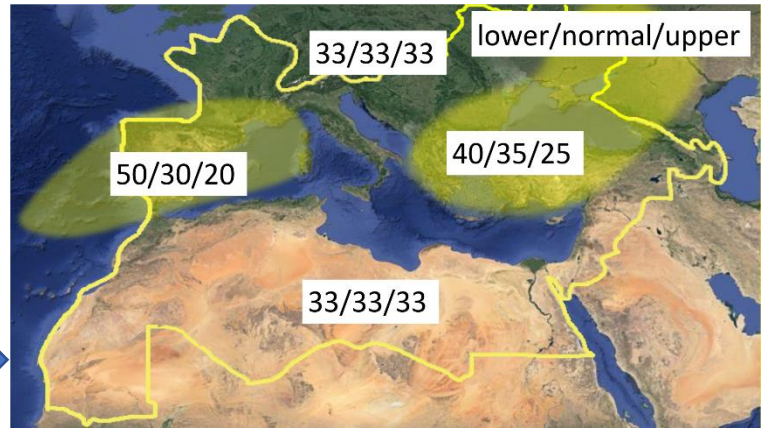
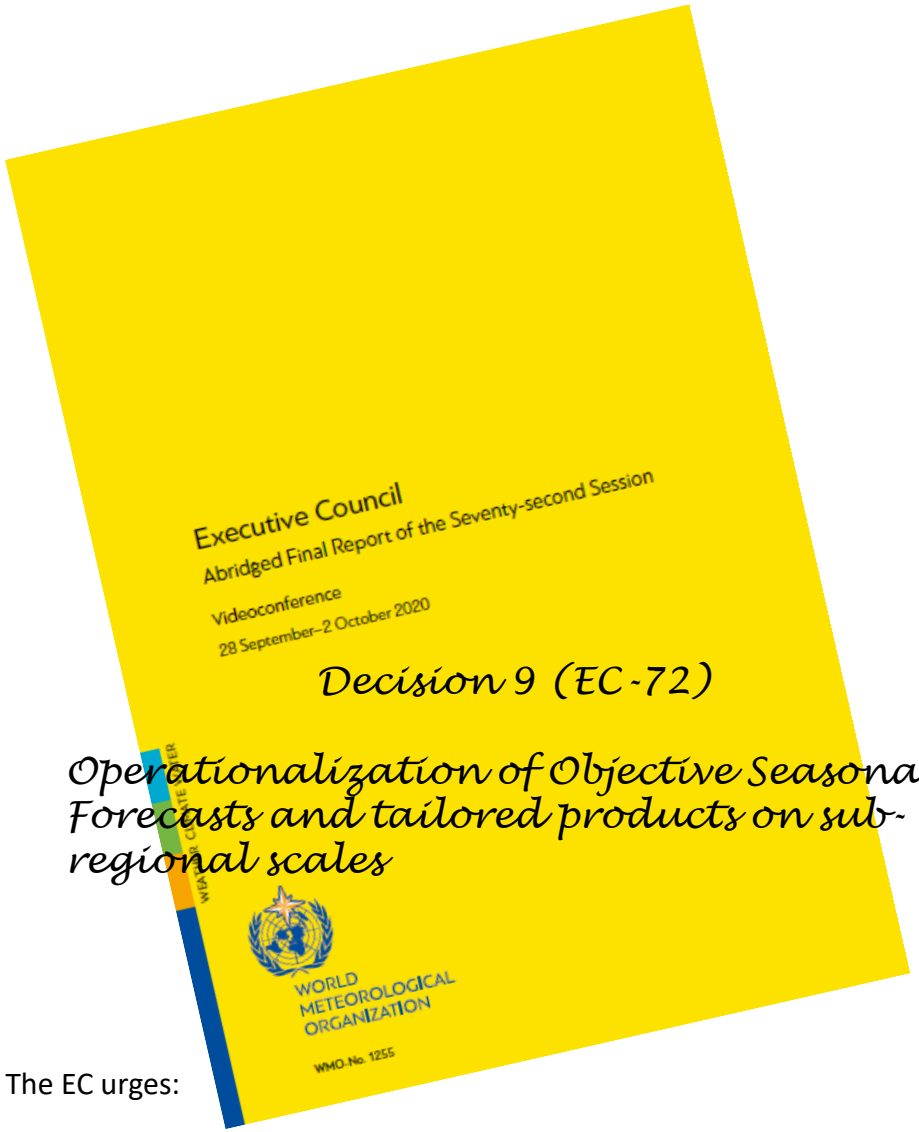


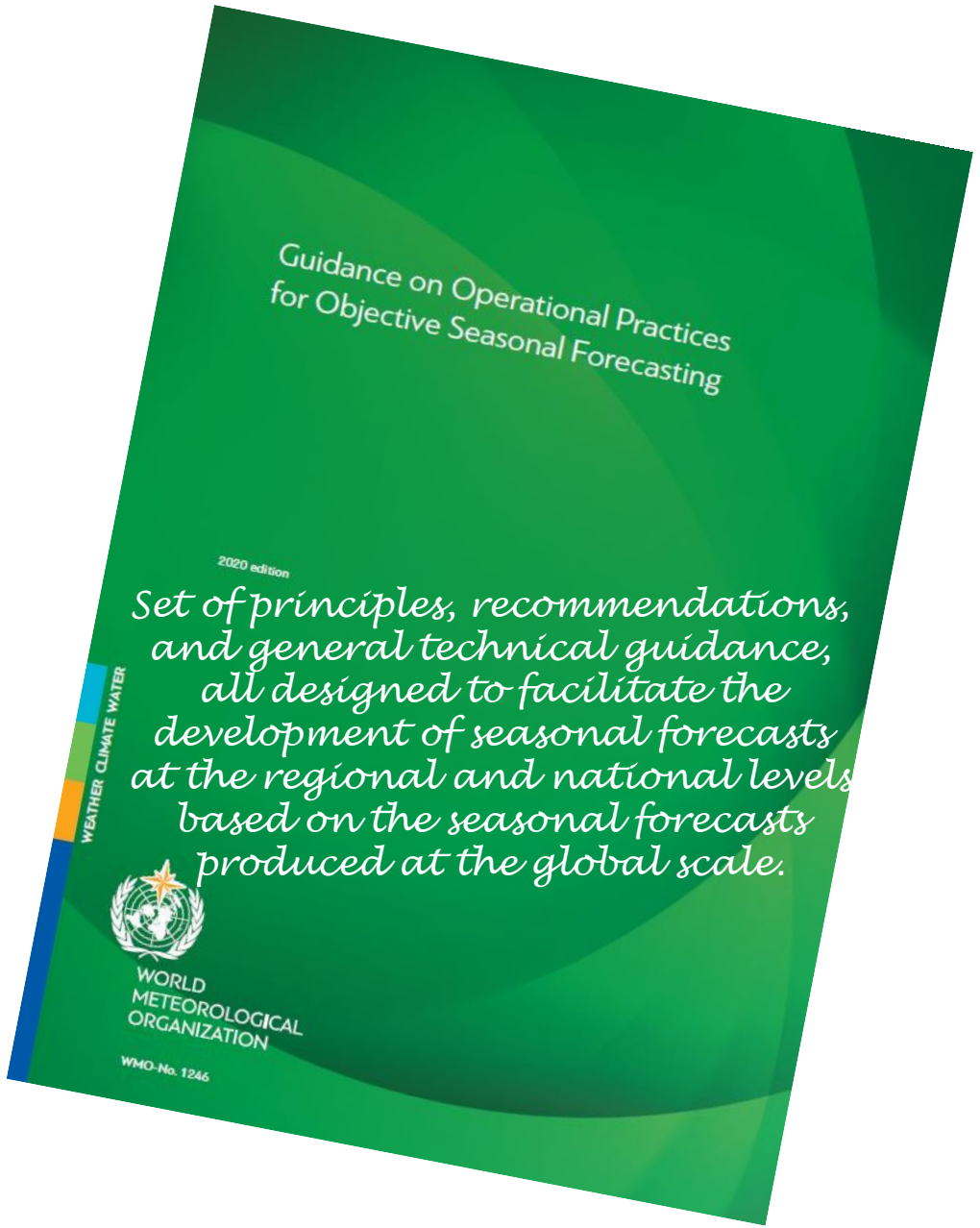
METEO FRANCE

And the impact and usability of climate predictions is linked to our ability of translating into climate services, providing actionable information that ease the decisión making process



Decision 9 (EC-72)

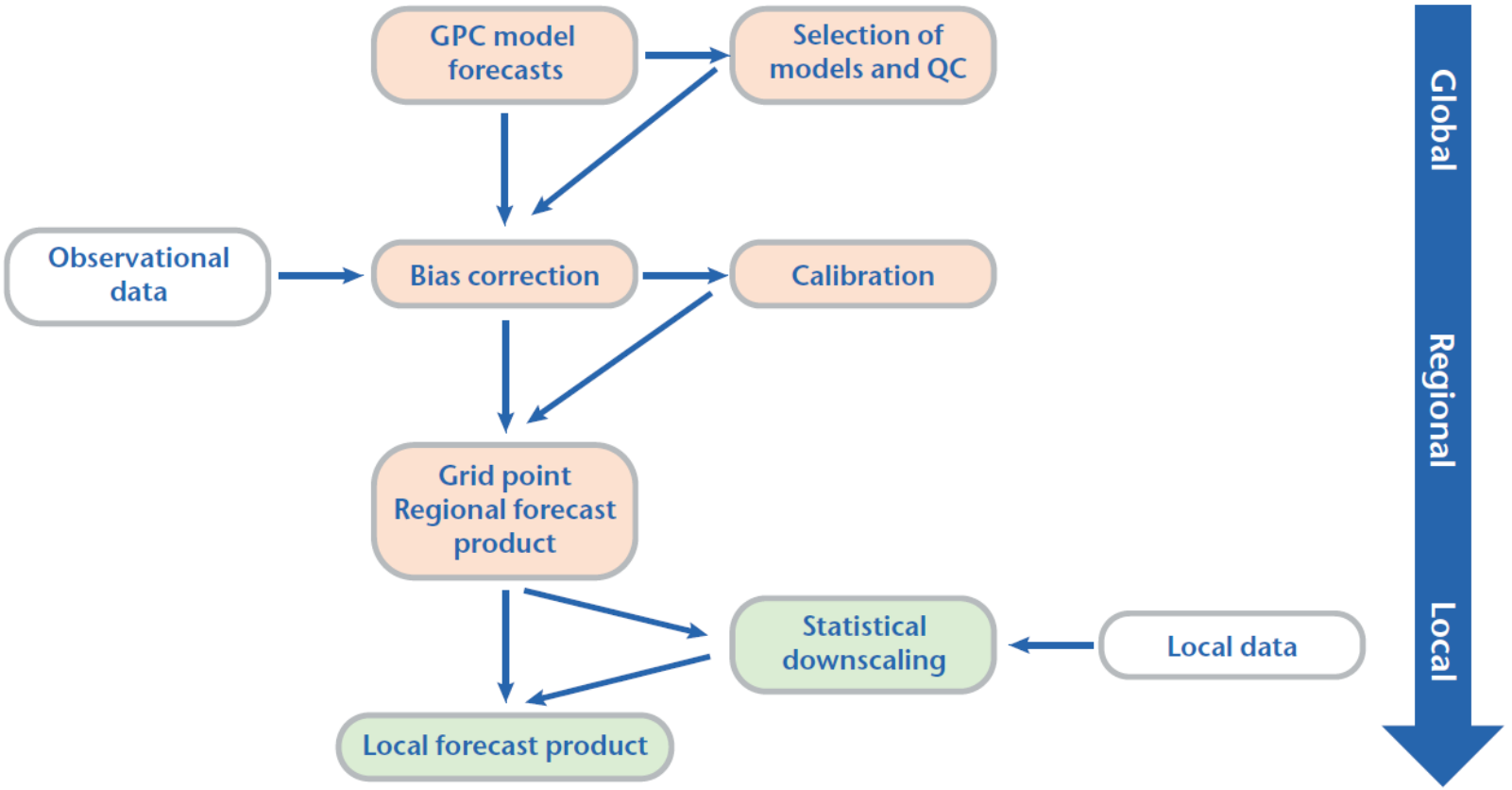
Operationalization of Objective Seasonal Forecasts and tailored products on sub-regional scales



The EC urges:

(a) RCCs, RCC networks and other relevant organizations cooperating on RCFs worldwide to actively contribute to the implementation of the proposal in the respective regions;
(b) WMO GPCs for LRF and the LC for MME LRF to facilitate access to required data sets and ensure timely and regular provision of objective sub-seasonal and seasonal forecast products, in suitable formats to RCCs, RCFs, and NMHSs

Recommended procedure for developing SFs at the regional and national levels (WMO 2020)



An outline of the recommended procedure for developing seasonal forecasts at the regional and national levels starting from the forecasts from GPCs-LRF (WMO 2020)

Further regional documents (I)

- Guidance for Mediterranean Climate Outlook Forum (MedCOF) sub-region to enable operational production of objective seasonal forecasts (8th July 2021)

Outline

1. Introduction
2. Current MedCOF operations
3. Identify needs and gaps
4. Guidance objective seasonal operational forecast
5. Summary of recommendations

ERA4CS MEDSCOPE: designed as the scientific arm of MedCOF

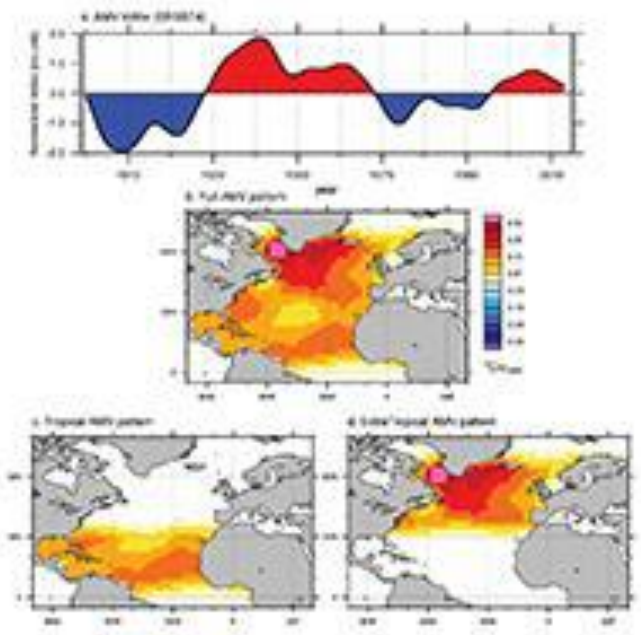
Research community and seasonal forecast producers (e.g. Copernicus)

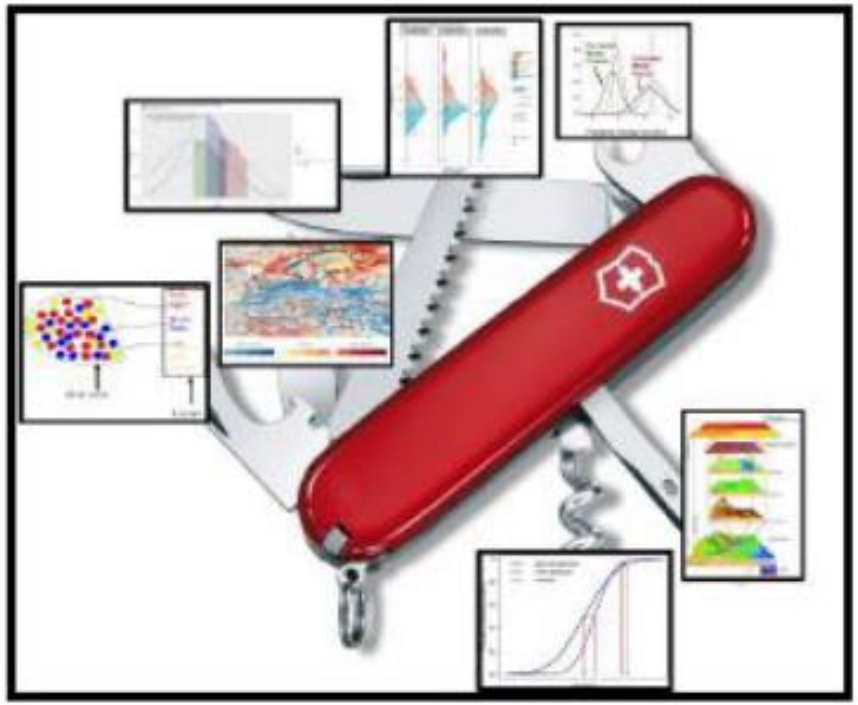
MEDSCOPE

(Thanks to S. Gualdi, CMCC)

ERA4CS MEDSCOPE Project:

main objectives

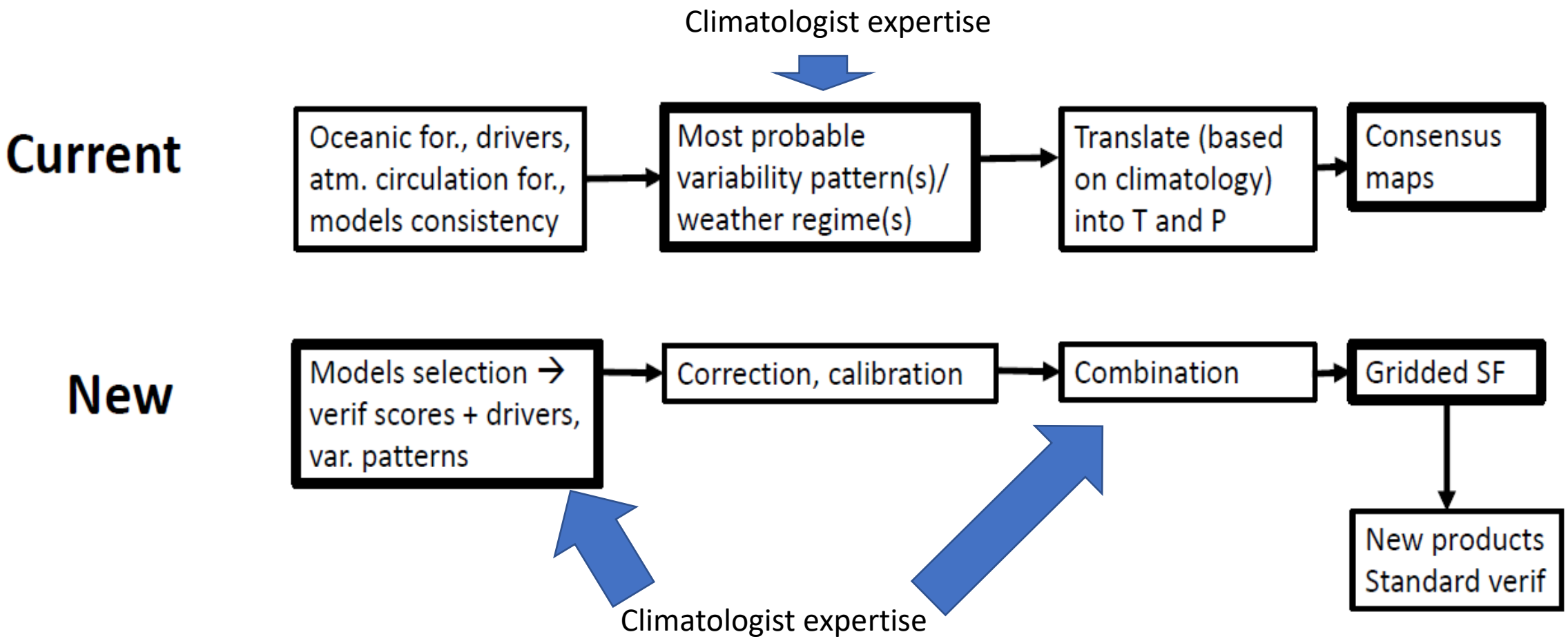




There has been a process of discussion within MedCOF community, including a training on predictability, tools and potential applications

It has been agreed to start developing a pilot that is presented together with the traditional consensus-based forecast

Current versus new approaches to SF



The ultimate goal is to generate an operational procedure that incorporates the expert knowledge into an improvement of skill or improved portfolio of products.

The ultimate goal is to generate an operational procedure that incorporates the expert knowledge into an improvement of skill and/or improved portfolio of products.

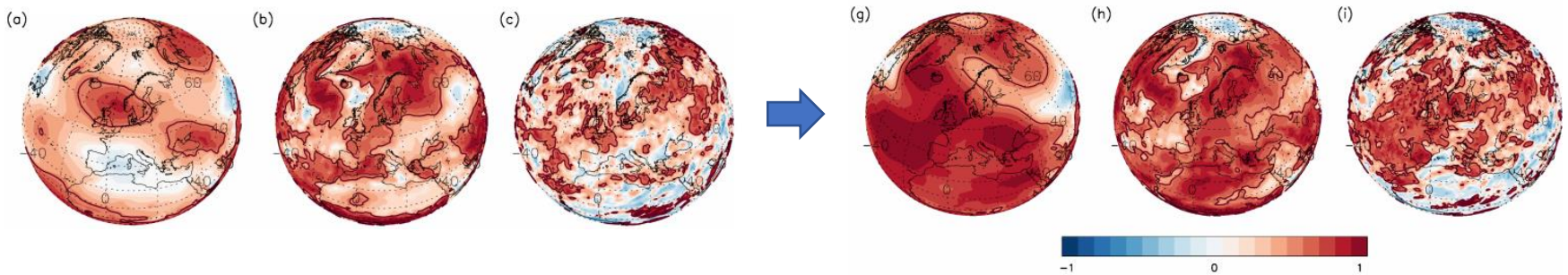
Essentially, model errors and bias can be splitted into to parts:

-The ability of the model for reproducing the relevant processes and representing the dominant circulation pattenrs and anomalies

-Given the model mimics circulation patterns, it still can have an error on the forecast of climatic paremeters due to low resolution, not being able of reproducing local features.

Several works prove the potential of calibration/downscaling/weighting of information for improving skill

Subsampling based on empirical forecast of variability mods: improvement on ACC of winter slp, temperature and precipitation



Dalelane et al., 2020 https://doi.org/10.1029/2020GL088717

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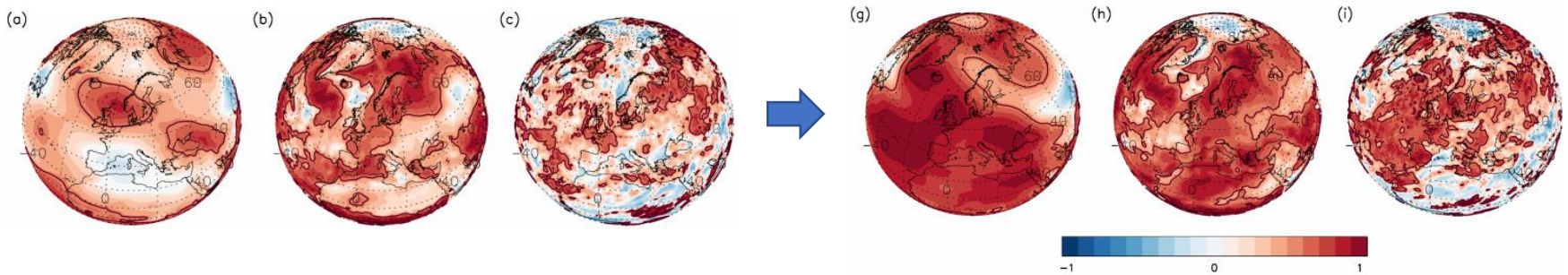

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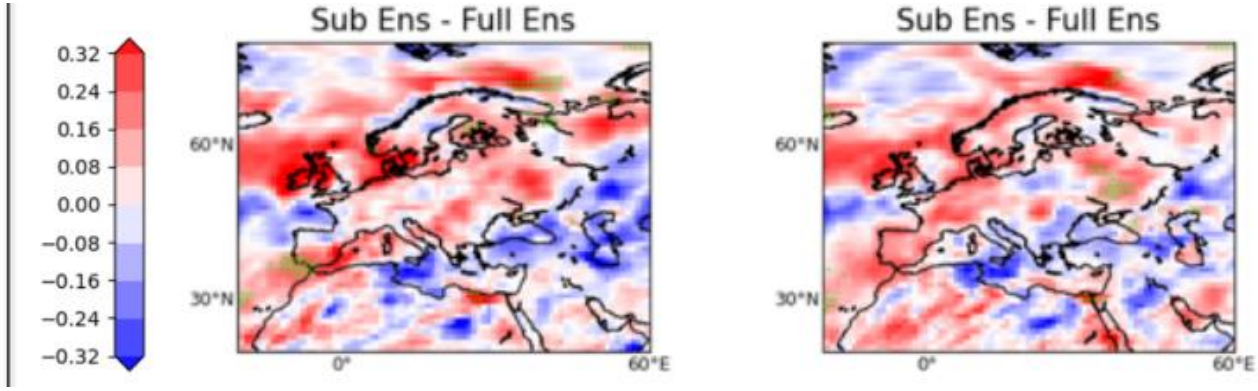
Improvement on ACC (red) for DJF and JFM precipitation subsampling based on NAO

Benassi et al, 2023

https://climate.copernicus.eu/sites/default/files/2023-11/Poster%205.pdf



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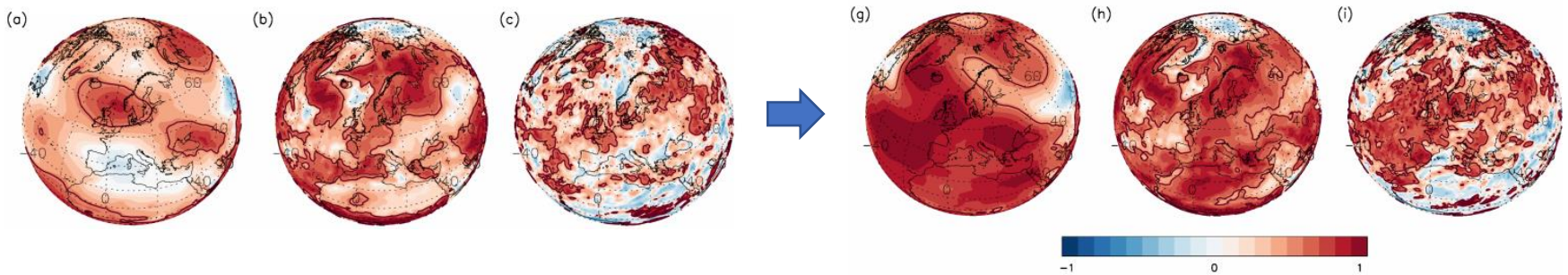

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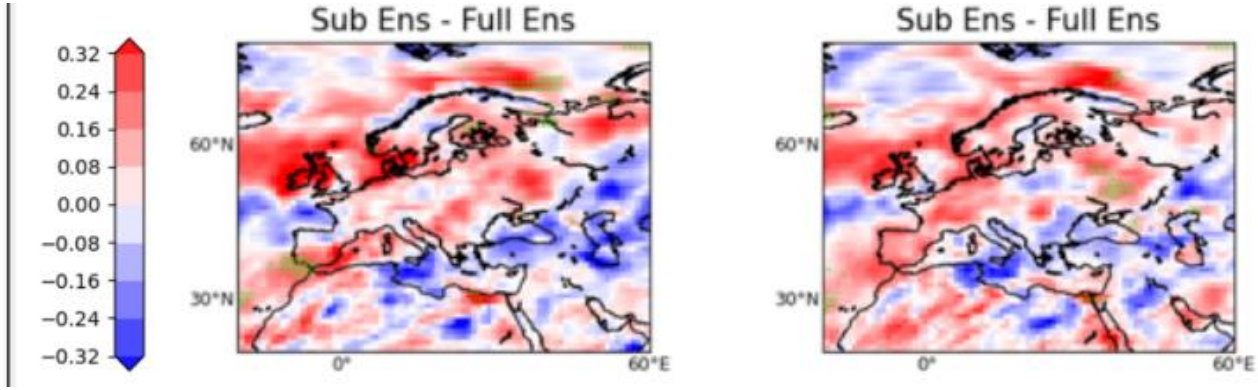
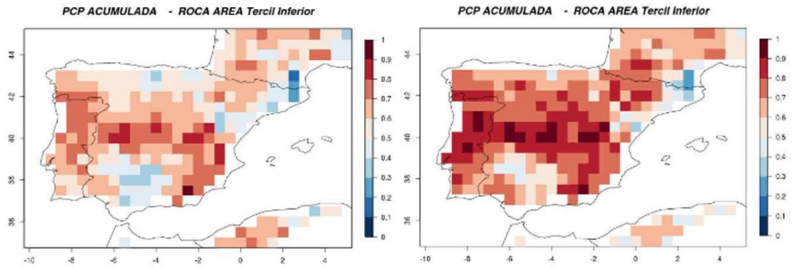


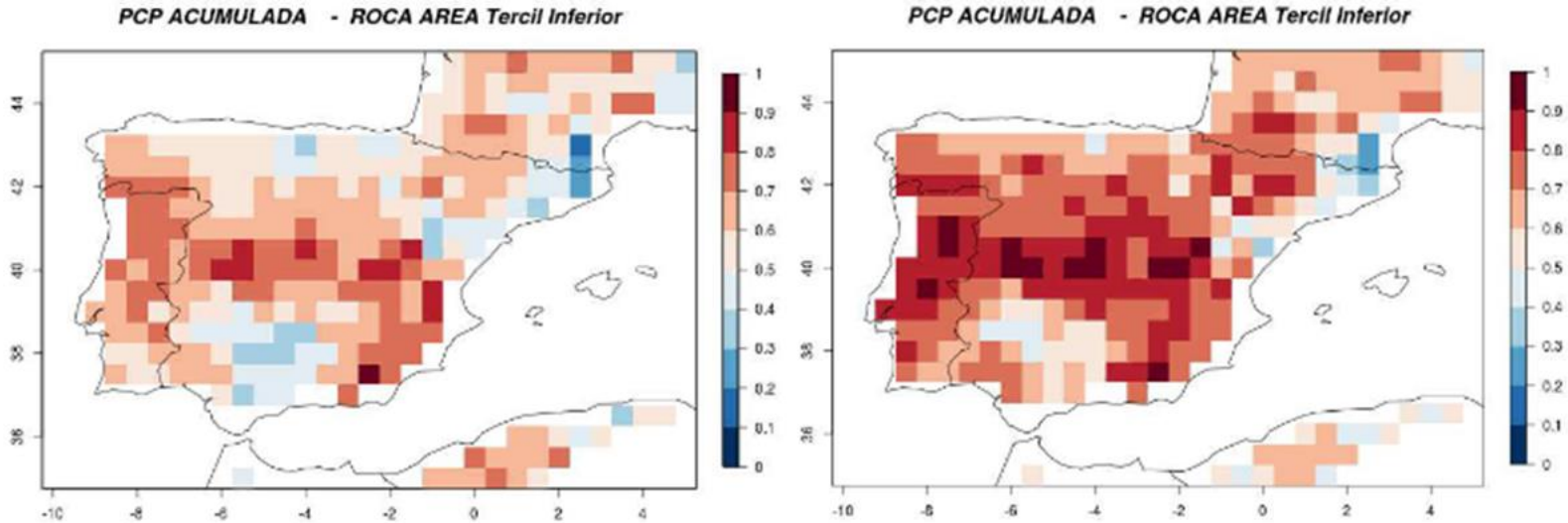
Low tercile ROC area for Nov-Mar precipitation



Sánchez García et al, 2019: Regin https://doi.org/10.5194/asr-16-165-2019

So, several works show potential for obtaining improved skill filtering/combining the information based on variability pattenrs.

Low tercile ROC area for Nov-Mar precipitation



But, additionally, we can apply a downscaling technique that, in some cases, can provide an additional improvement

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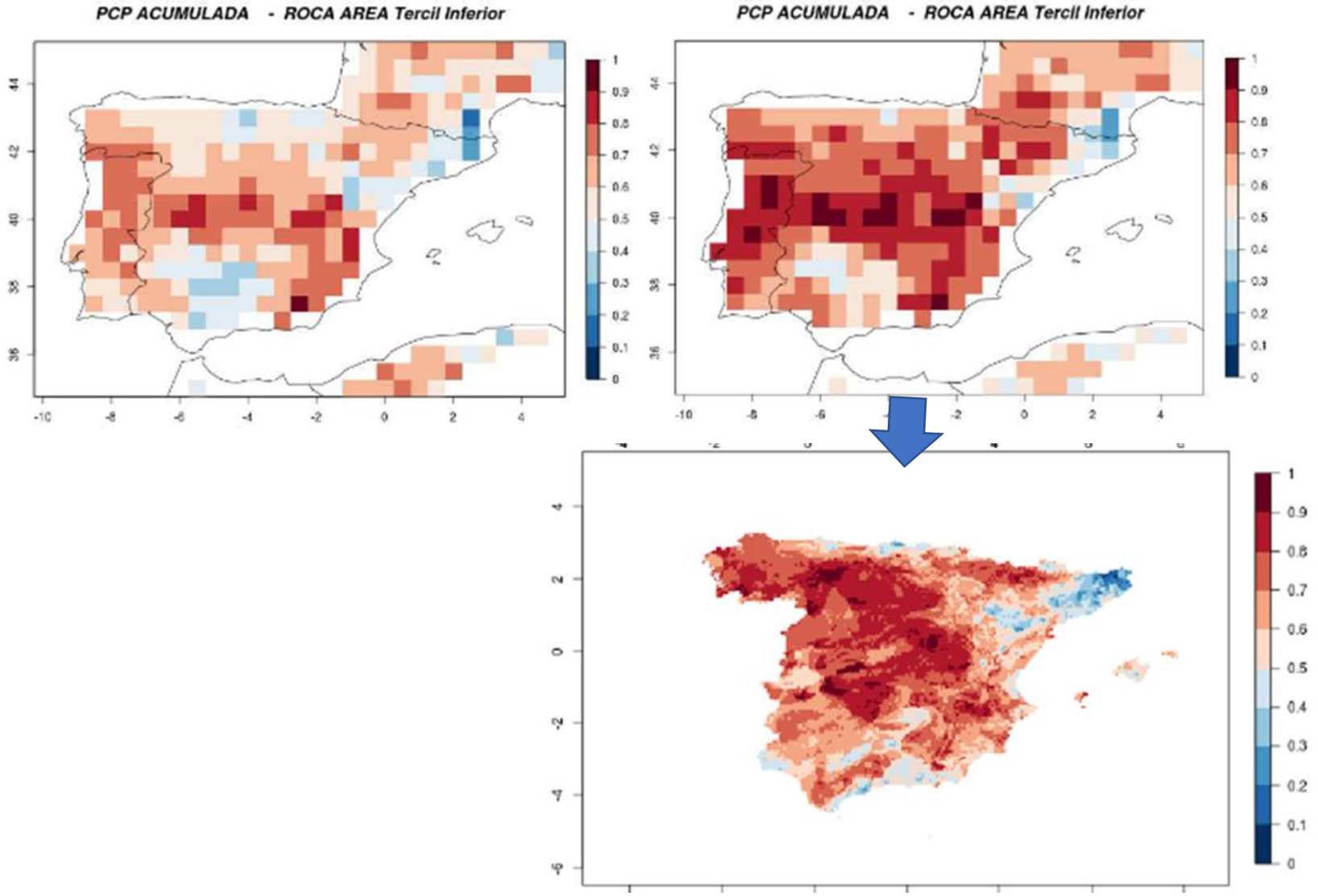
Low tercile ROC area for Nov-Mar precipitation



-How to implement this potential improvements in a manageable operational framework? Discussions among different actors (RCC, MedCOF, C3S…)

It is something that is currently being done at national level. Can we find a way of generating a product for the whole MedCOF region?

The room for improvement is linked to the presence of windows of opportunity. Most works are focused on winter. However, downscaling technique shows improvement in other seasons.

As a first step, we could set the focus on providing a more complex combined methodology for winter forecast, and explore the possibility of, at least, generating calibrated/downscaled information for the rest of the year

Other point to discuss:

Work on communication and visualization of products

Usually, (partly because of limited skill) most forecast products are focused on seasonally or at most monthly averaged basic variables

Copernicus Europe's eyes on Earth | Climate Change Service

Data | About us | What we do

Home / C3S seasonal charts

Search products...

Parameters

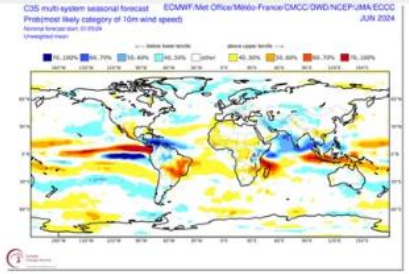
- 10m wind speed
- MSLP
- SST
- T2m
- T850
- geopotential height 500hPa
- precipitation
- zonal wind 10hPa
- sea ice concentration

Plot type

- 1-month maps
- 3-month maps
- Time series

Centres

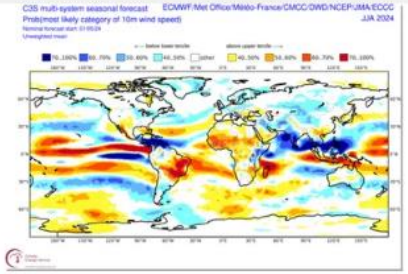
- C3S multi-system
- CMCC
- DWD



10m wind

C3S multi-system 10m wind speed 1-month

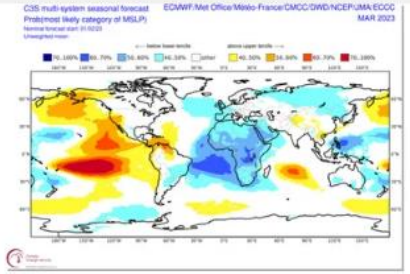
Multi-system combination spatial plots [Ensemble mean anomalies] The charts display the averages of the standardized ensemble mean anomalies. For each component model, ensemble mean anomalies are...



10m wind

C3S multi-system 10m wind speed 3-month

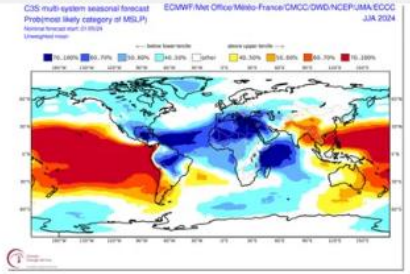
Multi-system combination spatial plots [Ensemble mean anomalies] The charts display the averages of the standardized ensemble mean anomalies. For each component model, ensemble mean anomalies are...



MSLP

C3S multi-system MSLP 1-month

Multi-system combination spatial plots [Ensemble mean anomalies] The charts display the averages of the standardized ensemble mean anomalies. For each component model, ensemble mean anomalies are...



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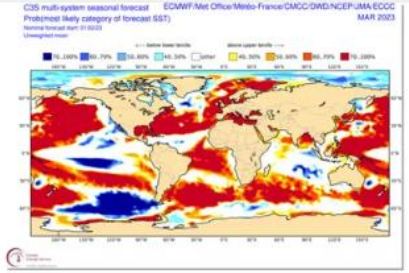
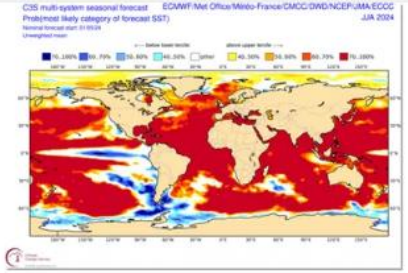


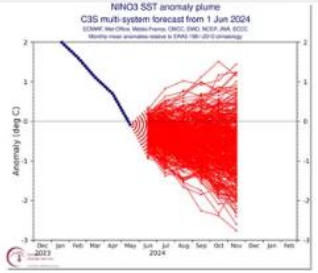
SST

C3S multi-system SST 1-month



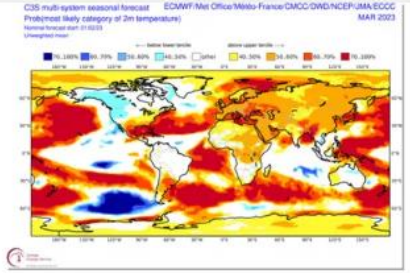
SST

C3S multi-system SST 3-month



SST indices

C3S multi-system SST indices

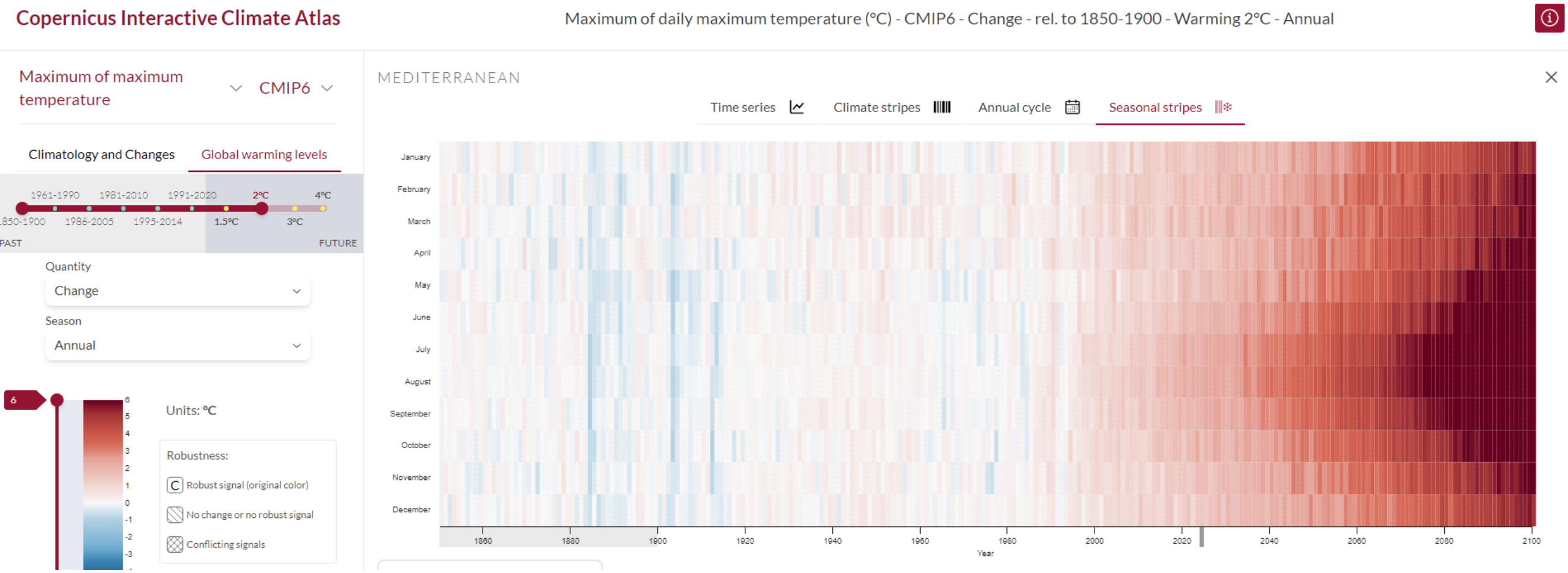


T2m

C3S multi-system T2m 1-month

It is something that have been done for the visualization of climate change scenarios (which need to manage a lot of information, too)

We can explore the evolution of the extreme maximun temperature



Or the number of days above certain threshold

Copernicus Interactive Climate Atlas

Days with bias adjusted maximum temperature above 35 °C (days) - CMIP6 - Change - rel. to 1850-1900 - Warming 2°C - Summer (JJA)

Days with bias adjusted maximum temperature above 35 °C

CMIP6

Climatology and Changes | Global warming levels

1961-1990 1981-2010 1991-2020 2°C 4°C
1850-1900 1986-2005 1995-2014 1.5°C 3°C
PAST FUTURE

Quantity: Change

Season: Summer (JJA)

40 30 20 10 0 -10 -20 -30 -40

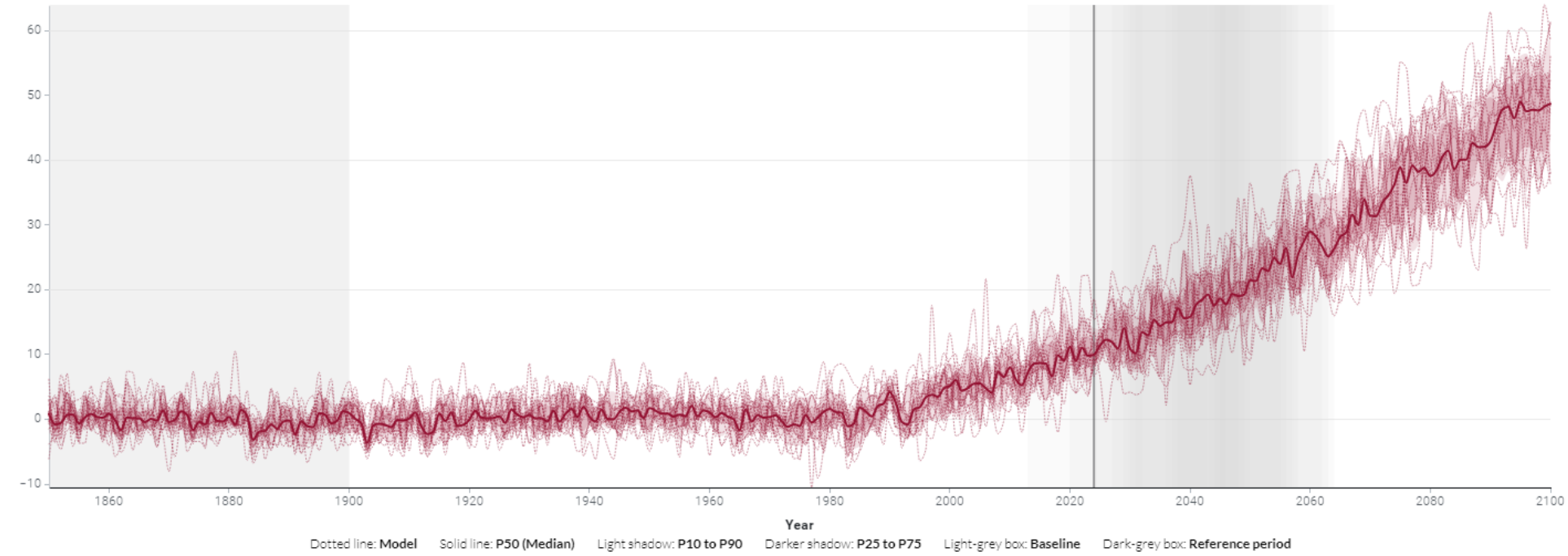
Units: **days**

Robustness:
- Robust signal (original color)
- No change or no robust signal
- Conflicting signals

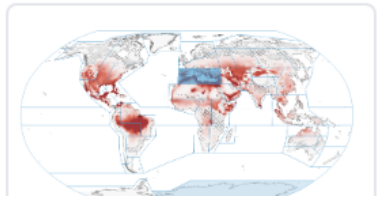
Palette | Autofit | Reset

MEDITERRANEAN

Time series | Climate stripes | Annual cycle | Seasonal stripes

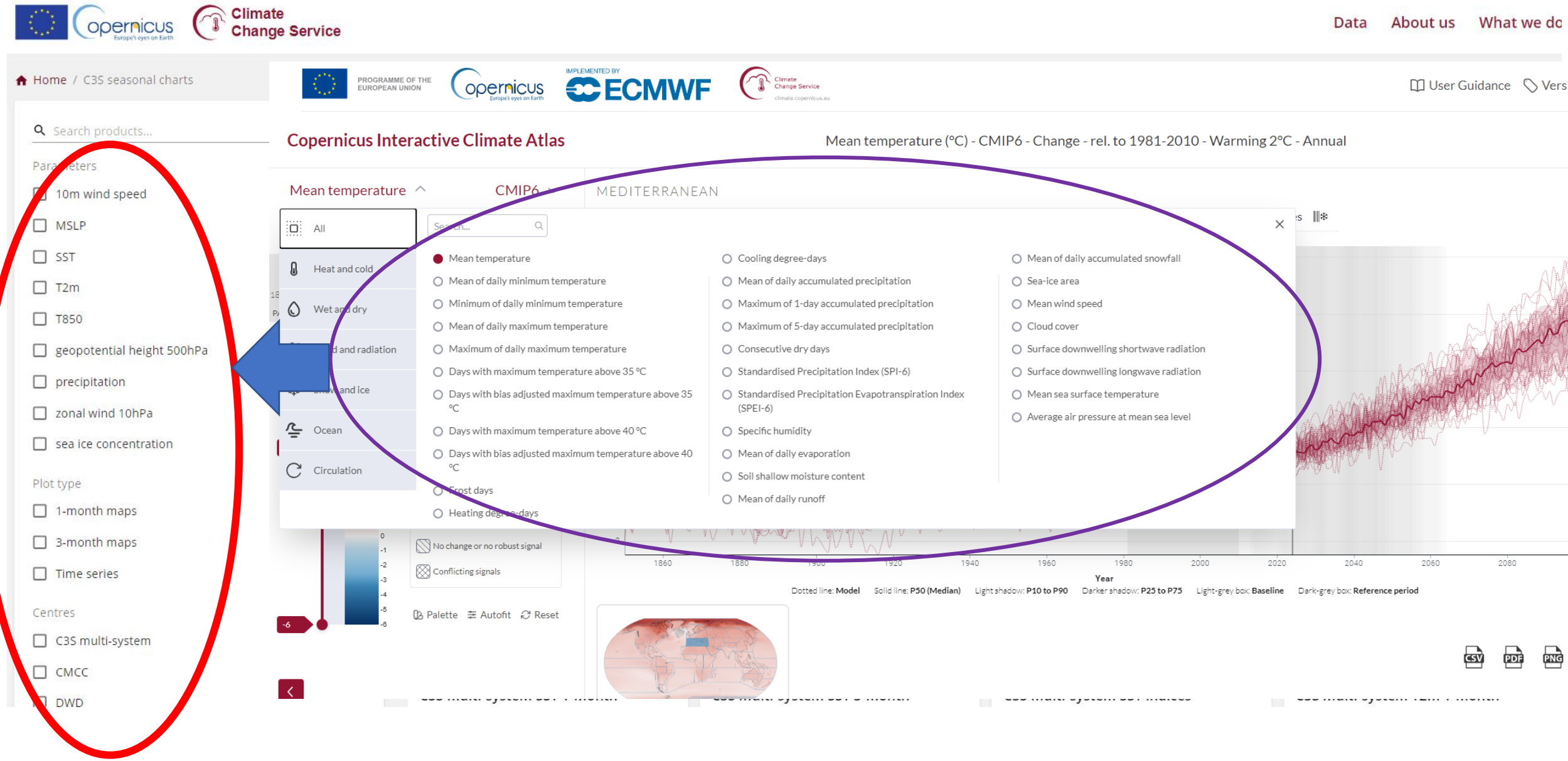


Dotted line: **Model** Solid line: **P50 (Median)** Light shadow: **P10 to P90** Darker shadow: **P25 to P75** Light-grey box: **Baseline** Dark-grey box: **Reference period**



CSV PDF PNG

Exploring the possibility of incorporating some daily indices or extremes information already calculated for interactive climate atlas to seasonal predictions

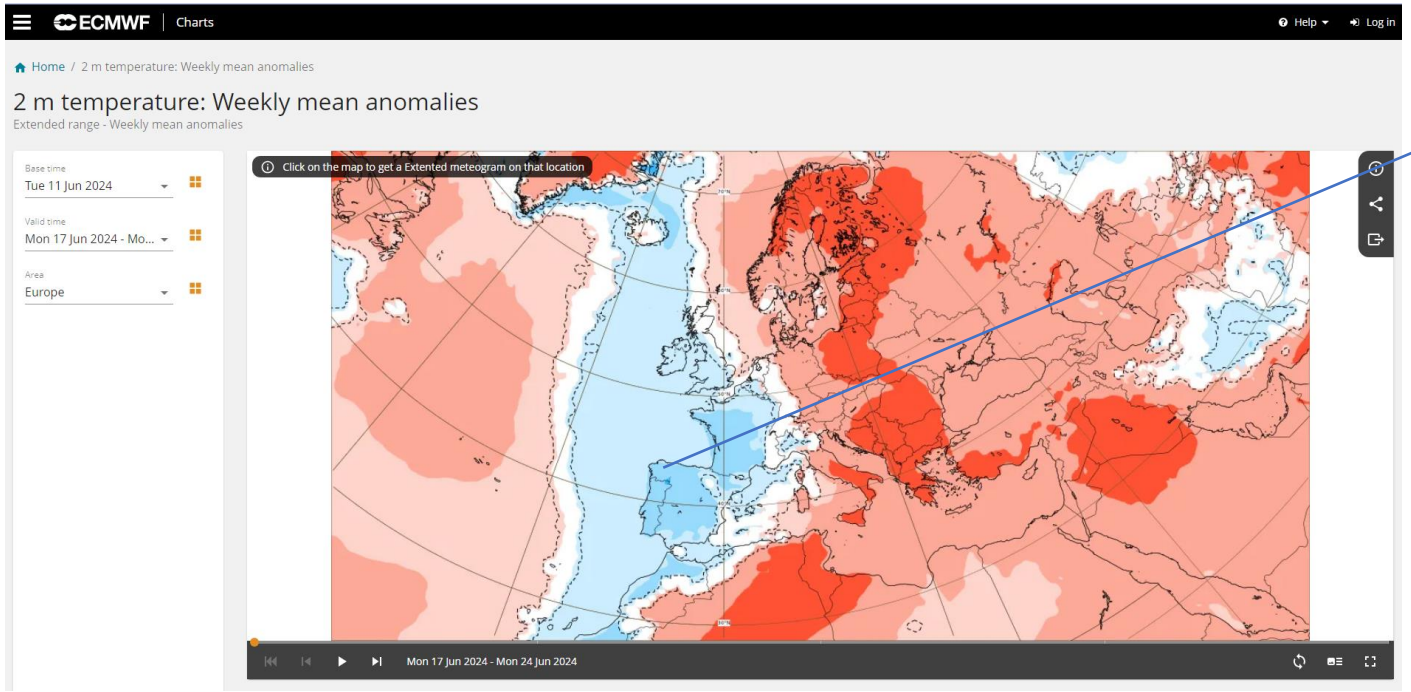


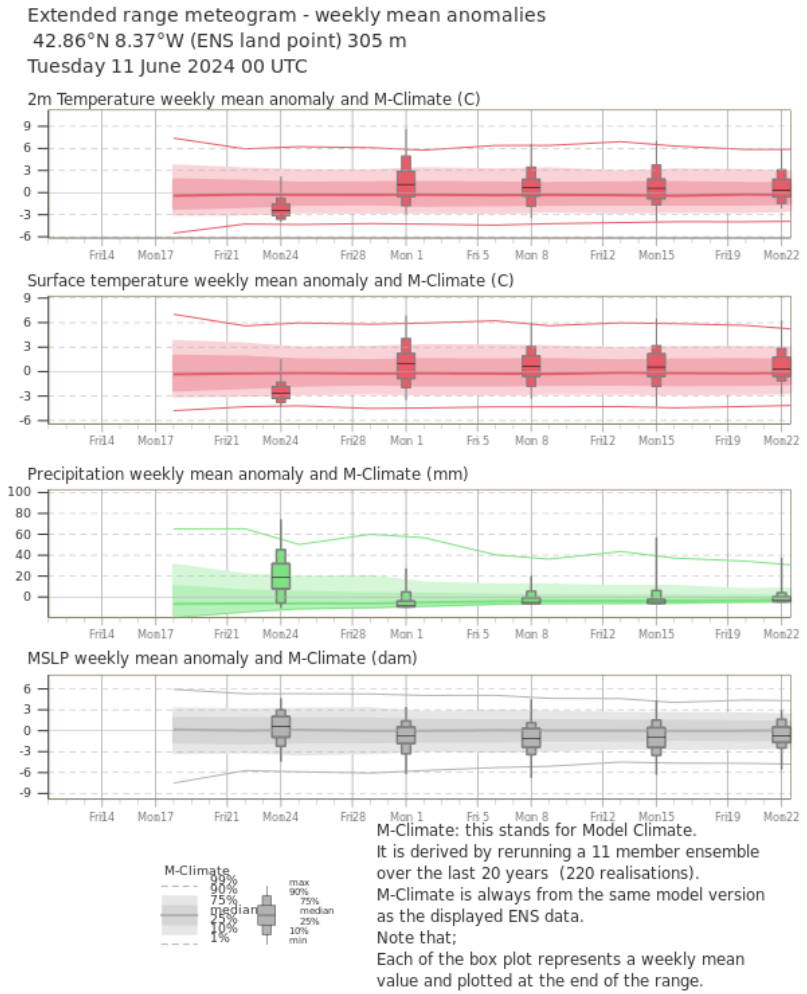
Other points to discuss:

-Inclussion of extremes and daily information

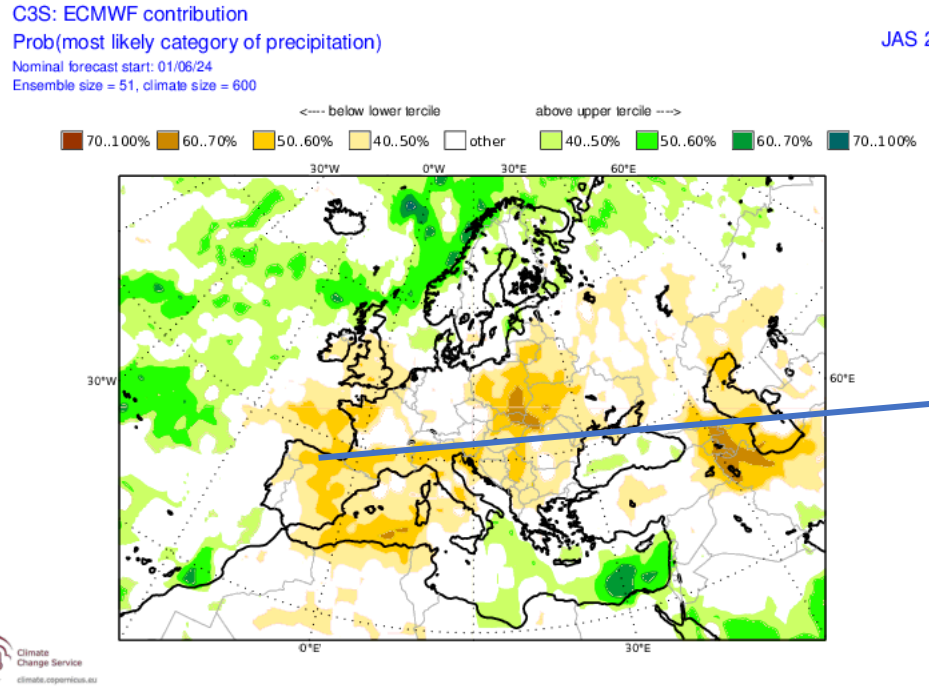
-Dynamic maps (as in climate change atlas), with point wise or regional information

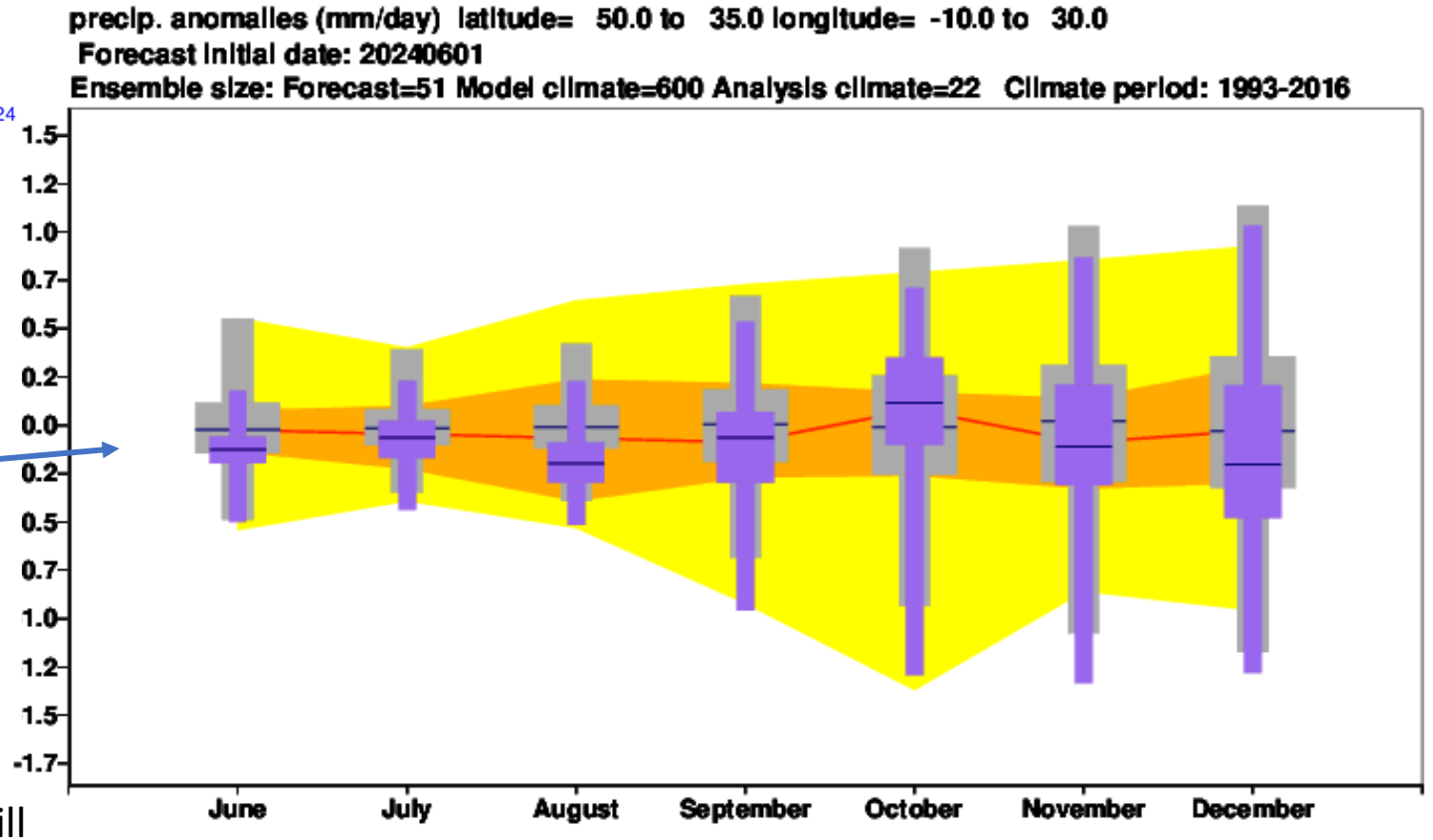
Adding a more dynamic visualization: interactive maps with point wise information, as it is available at médium ad extended range.





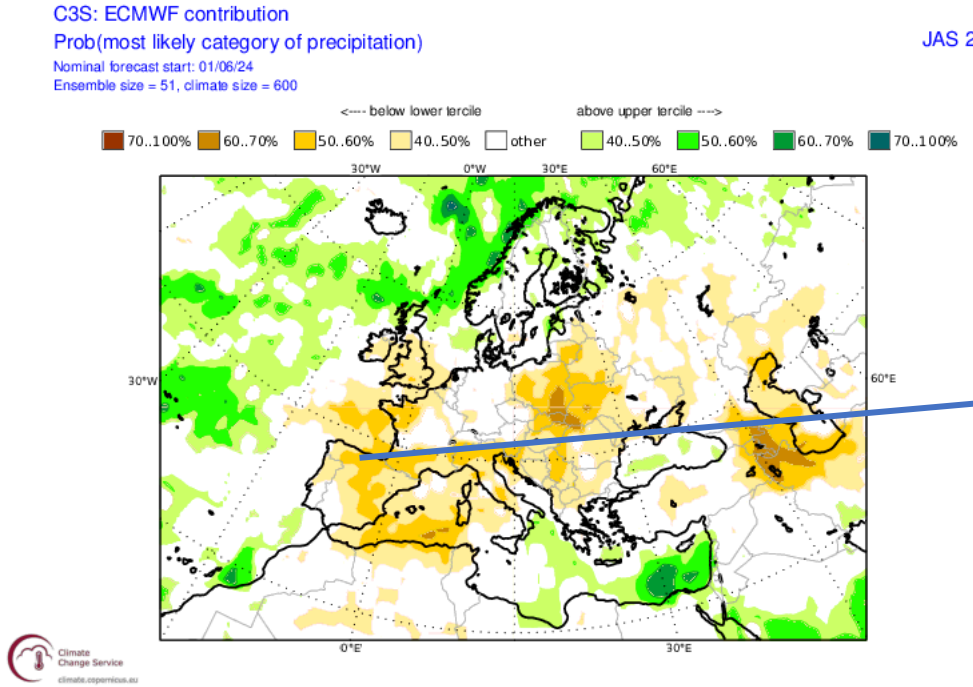
Ideally, we could select grid points or áreas interactively, opening a dialog box with point wise information from the maps, with boxplots and skillscores

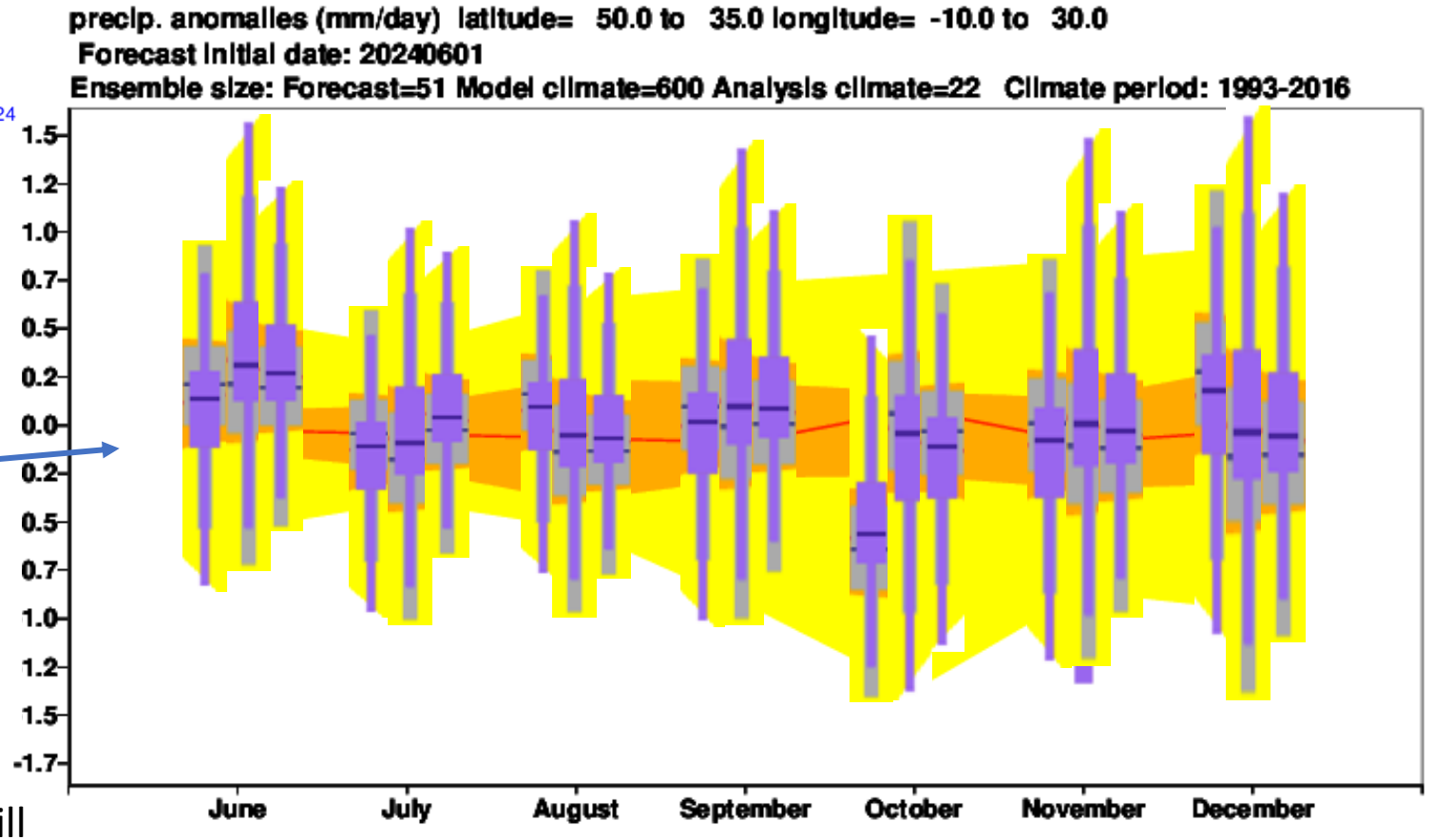




Skill	June	July	August	September	October	November	December
RPSS	0.04	-0.01	-0.03	-0.02	-0.01	-0.01	-0.01
Correlation	0.43	0.4	0.4	0.4	0.4	0.4	0.4
ROC above	0.62	0.65	0.65	0.65	0.65	0.65	0.65
ROC below	0.73	0.67	0.67	0.67	0.67	0.67	0.67

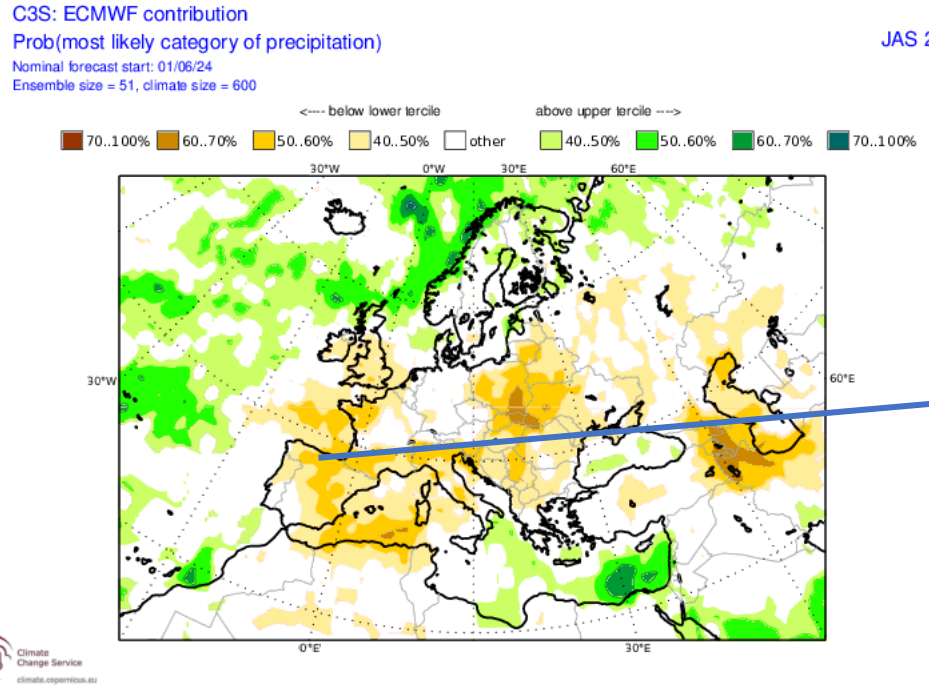
Icluding the pòssibility of combining several models for comparison

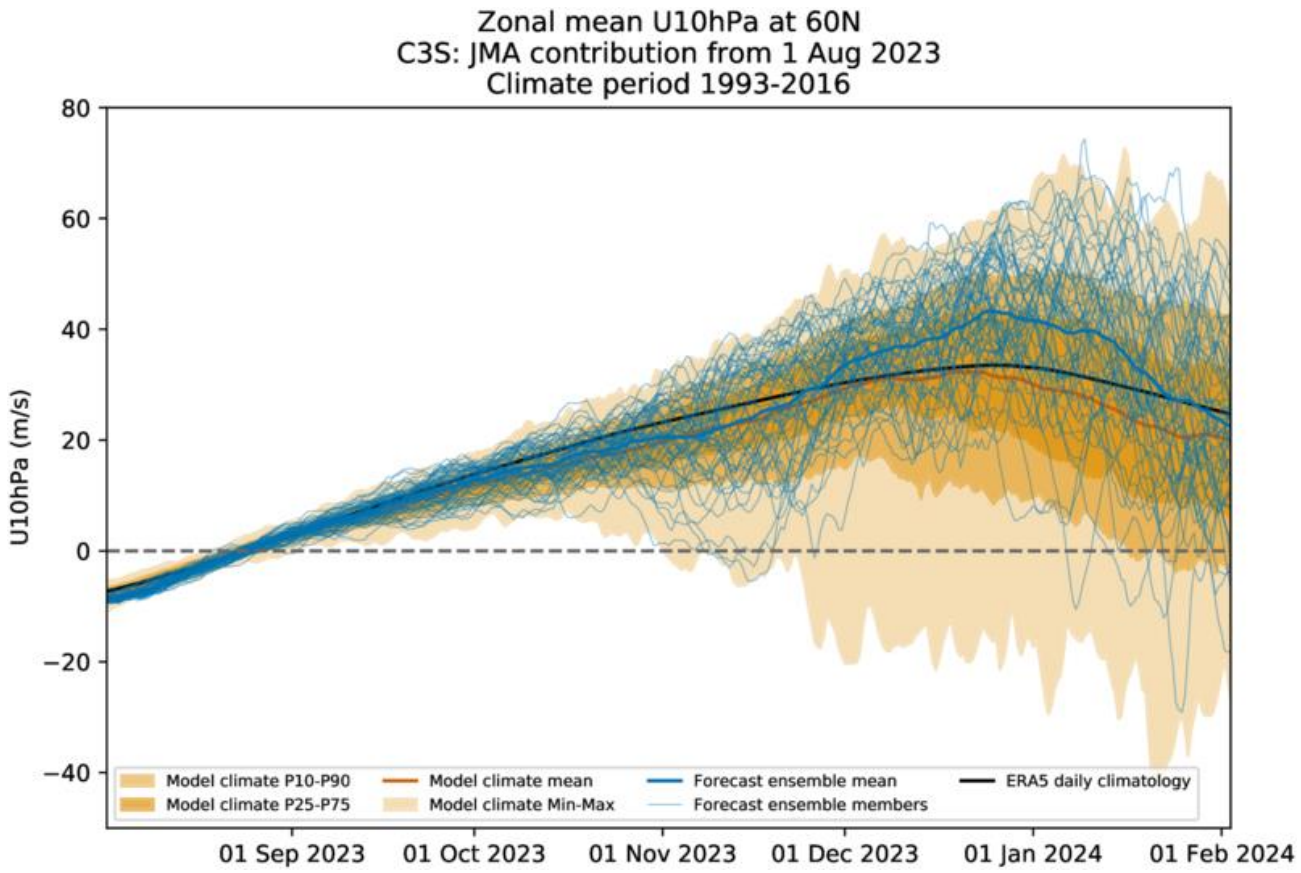




Skill	June	July	August	September	October	November	December
RPSS	0.04	-0.01	-0.03	-0.02	-0.01	-0.01	-0.01
Correlation	0.43	0.4	0.4	0.4	0.4	0.4	0.4
ROC above	0.62	0.65	0.65	0.65	0.65	0.65	0.65
ROC below	0.73	0.67	0.67	0.67	0.67	0.67	0.67

Plotting complete daily ensemble on that grid point





Skill							
RPSS	0.04	-0.01	-0.03	-0.02	-0.01	-0.01	-0.01
Correlation	0.43	0.4	0.4	0.4	0.4	0.4	0.4
ROC above	0.62	0.65	0.65	0.65	0.65	0.65	0.65
ROC below	0.73	0.67	0.67	0.67	0.67	0.67	0.67

The workshop will focus on how translating the potential showed in combining/weighting/calibrating information into an operational framework, and the need steps to implement it

Focus will be aswell on how we convey the message: developement of a specific visualization and the possibility of extreme based products/daily based information will improve visibility of the forecasts.

The idea for the workshop is to have a relaxed Schedule, with enough time for open discussion among talks, and additional time by the end of the sessions and the final day.

The objective is to come up with an proposal for OSF implementation and the steps needed to achieve it.

An impotant piece of information is that COST action MEDUSSE has been granted, so we will have funding for trainings and meetings with a wider community in the next few years