European Commission

Copernicus Climate Change Service (C3S) Seasonal Forecasts

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interpreted by
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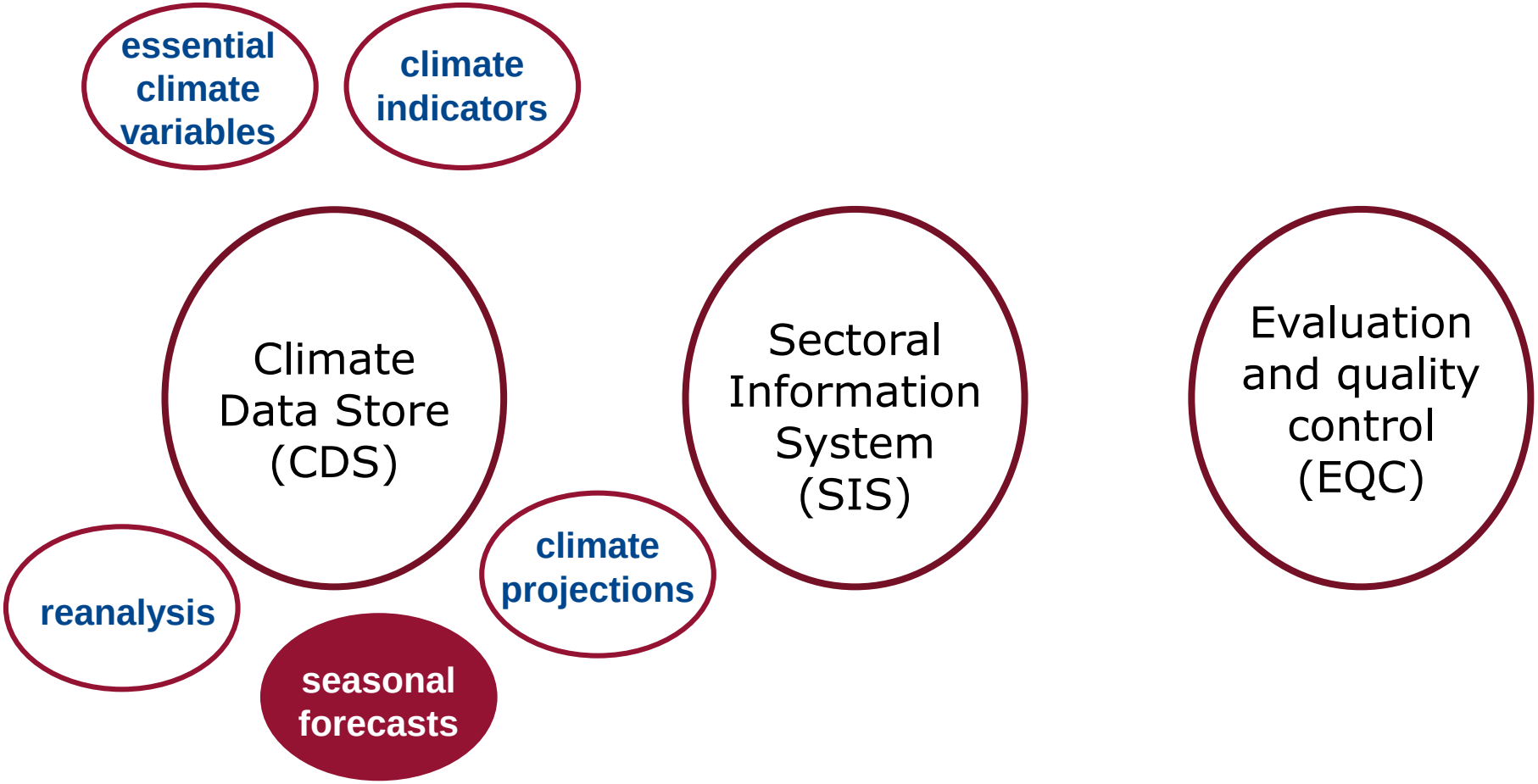
Seasonal forecasts in C3S

European Commission

Copernicus Climate Change Service



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  - two for later use, following further development (additional providers): Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC), Deutscher Wetterdienst (DWD)

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- Evaluation and quality control (EQC) function for seasonal forecasts in CDS
  - will be performed by a team independent of providers and developers
  - will be the main mechanism for interaction with users
  - will test operability, relevance, scientific quality, suitability for sectoral applications

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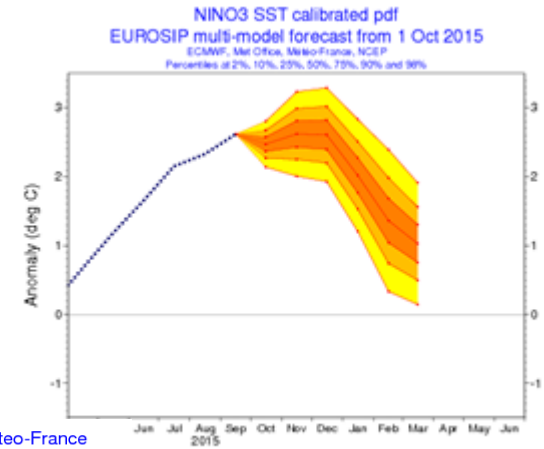

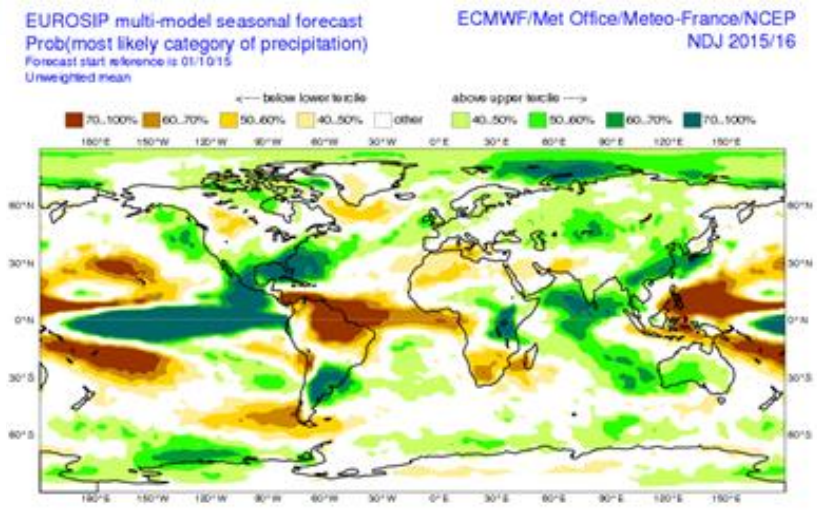

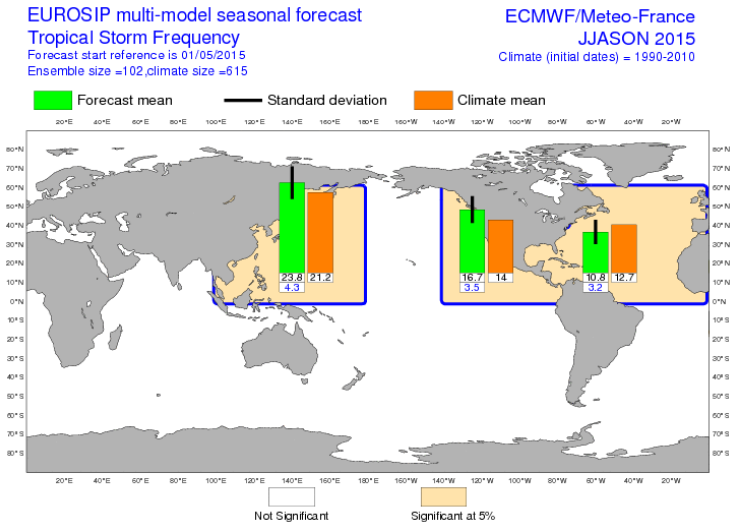

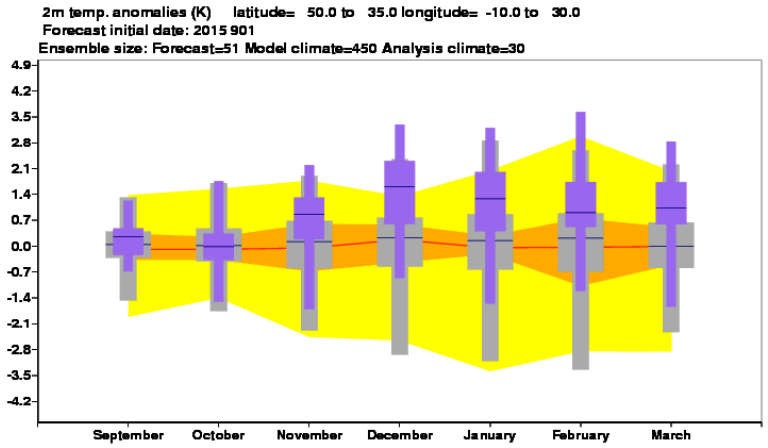

ECMWF

Copernicus Europe's eyes on Earth

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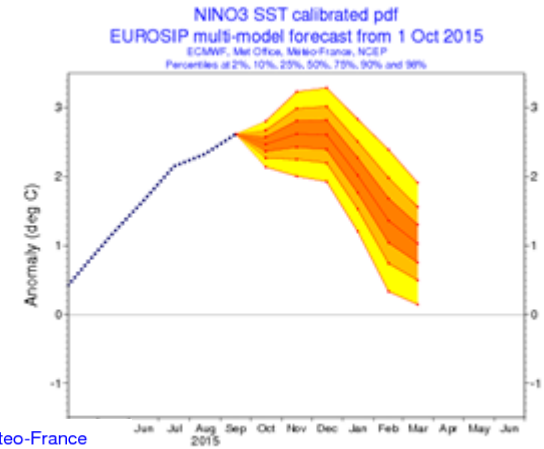

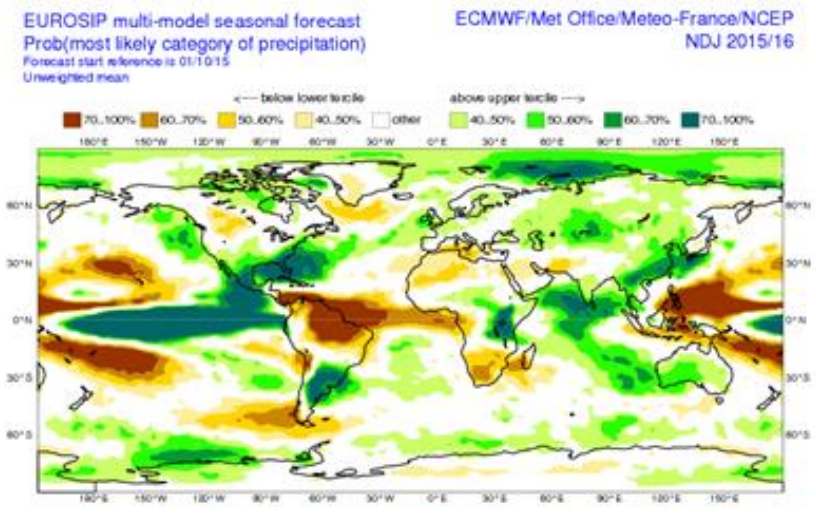

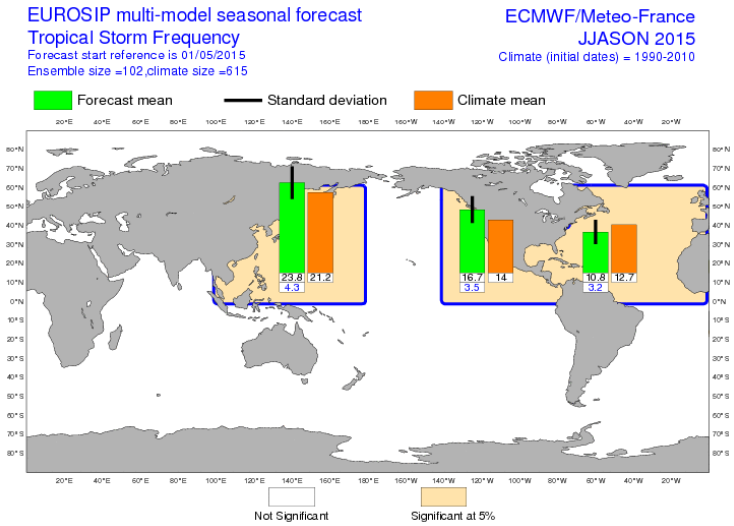

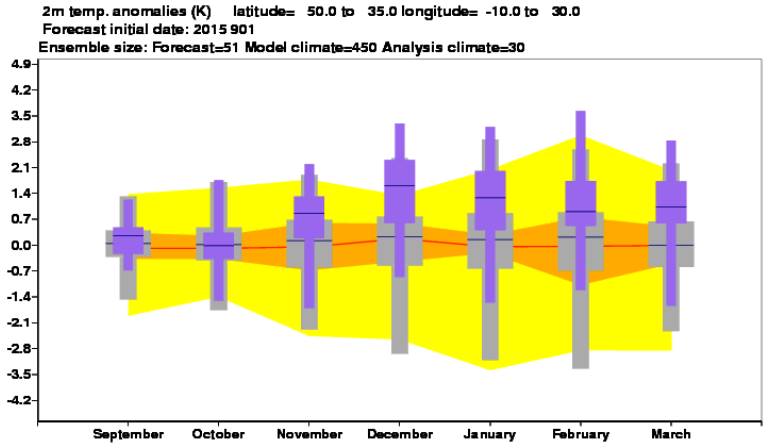

- ★ Processed data, starting with all data represented in the graphs.

ECMWF

Copernicus Europe's eyes on Earth

Why multi-system?

- **Larger samples**: each system will provide at least 50 ensemble members for the real-time forecast and at least 25 ensemble members per year for re-forecasts.

- **Diversity**
  - ECMWF (System 4): IFS atmosphere (~75 km and 91 levels), NEMO ocean (1 deg, 42 levels)
  - Met Office (GloSea 5): UM atmosphere (~60 km and 85 levels , NEMO ocean (¼ deg, 75 levels), CICE sea-ice
  - Météo France (System 5): IFS atmosphere (as ECMWF), NEMO ocean (as ECMWF), GELATO sea-ice
  - CMCC (SPS.v3): CSEM atmosphere (~100 km, 46 levels), NEMO ocean (¼ deg, 50 levels), CICE sea-ice
  - DWD (GCFS 1.0): ECHAM6 atmosphere (~200 km, 47 levels), MPIOM ocean (1.5 deg, 40 levels)

- **Complementarity of strengths**

Timeline: proof of concept (~2016) and pre-operational phase (to end of Q1 2018)

Progress so far:

- ★ All contracts for provision of forecasts have started.
- ★ Work on data acquisition, product generation and interim solutions for access to products is underway.
- ★ The next ECMWF seasonal forecast system is now being specified and tested; C3S will be responsible for its operational implementation and production of reforecasts.
- ★ Contract for EQC has been awarded and their work will start in July 2016.

Challenges

- ★ data formats: collecting (and distributing) data in netCDF format poses new challenges for archiving
- ★ developing robust methods for bias correction and product generation
- ★ archiving and disseminating products likely to be relevant to users (up to now, only graphical processed products have been available); improving visualisation
- ★ overlaps with ongoing activities (ECMWF catalogue and seasonal forecast products, EUROSIP)

How does C3S seasonal fit in?

- ECMWF will continue to develop its seasonal forecast system, and make the resulting data and products available to member countries (each month, before the similar C3S outputs become available).
- The other Global Producing Centres of long-range forecasts which contribute to the C3S seasonal service (Met Office and Météo France) will also continue to produce and issue their own forecast products and assessments, as is the Regional Climate Centre for Europe.
- EUROSIP will continue to issue its current suite of products, at least until the C3S seasonal service becomes operational. The decision on the longer-term future of EUROSIP will be taken by its steering group in due course.

Climate projections

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- **Lot 1 (39 months): Provision of support to one Earth System Grid Federation (ESGF) node in Europe -** facilitate access and manipulation of global climate projections from the CMIP5 archive.
  - technical requirements: response time, availability of a user friendly interface with the C3S's CDS and web portal, documentation standards, implementation of appropriate protocols (eg OPeNDAP) to allow computations from stored data on local servers.
  - scientific requirements: number of supported models, number of available scenarios, availability of historical (eg 20th century to current date) simulations, minimum ensemble size.
- **Lot 2 (39 months): Multi-model product generation**
  - definition of **metrics for quantifying the fidelity** of models in simulating historical climate,
  - application of these metrics to most historical model datasets served by C3S.

  These metrics will use observations and reanalyses from the CDS, and will be **translated into quality flags** to inform selection of input to specific applications.
  - a set of **interactive tools** for generic products (e.g. maps of intra-ensemble variability for different models and scenarios), and tailored products for several economic sectors (including energy and water)
- **Lot 3 (27 months): Roadmap towards a reference set of climate projections for Europe (EUCP):** studies to guide requirements for the operational phase of C3S. These studies will analyse how well CMIP6/MIPs address sectoral requirements.

Areas of interest:

- the benefit of increased **ensemble size versus resolution** for global models, linking the results to the specific needs of different economic sectors.
- the benefit of **initialised projections** for the first half of the 21st Century, and their consequences in terms of climate information to be used by sectoral applications (links to relevant FP7/H2020 projects and CMIP5/CMIP6 simulations are required).

EQC component for climate projection-based services is also being set up.