

Copernicus Climate Change Service

C3S

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Funded by
the European Union



Implemented by  **ECMWF**

Copernicus Climate Change Service: C3S Vision

To be an authoritative source of climate information for Europe

To build upon national investments and complement national climate service providers

To support the market for climate services in Europe

How is the climate changing?

- Earth observations
- Reanalyses

Will climate change continue, accelerate?

- Predictions
- Projections

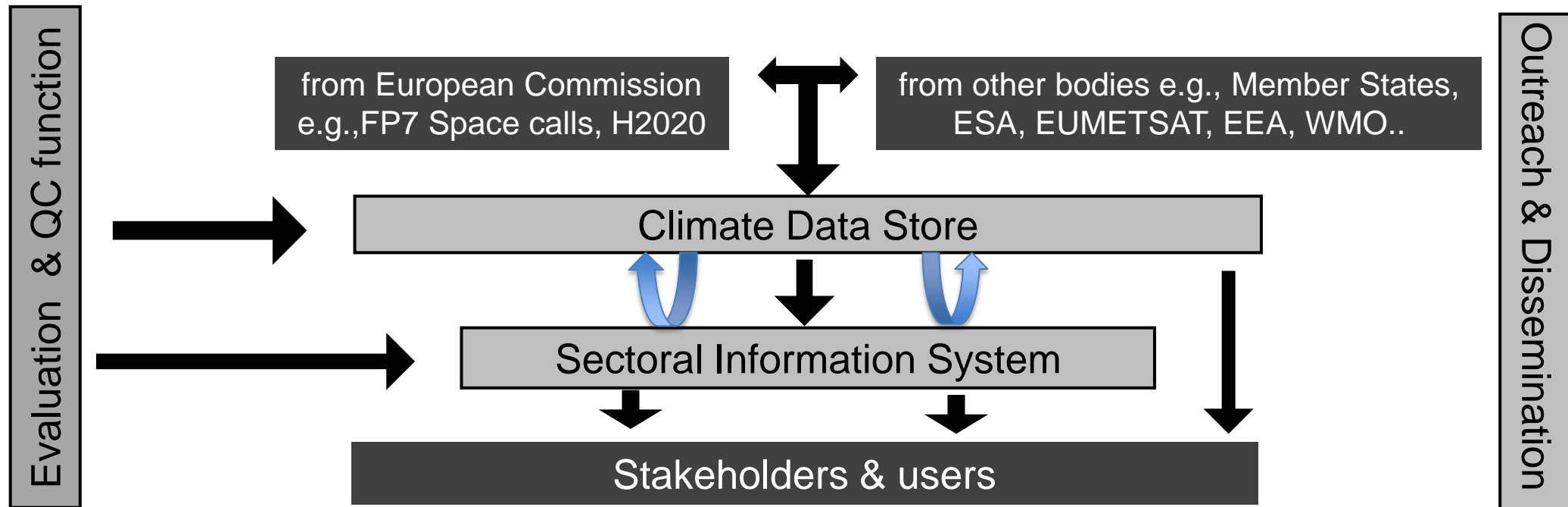
What are the societal impacts?

- Climate indicators
- Sectoral information



C3S in a nutshell

organisation

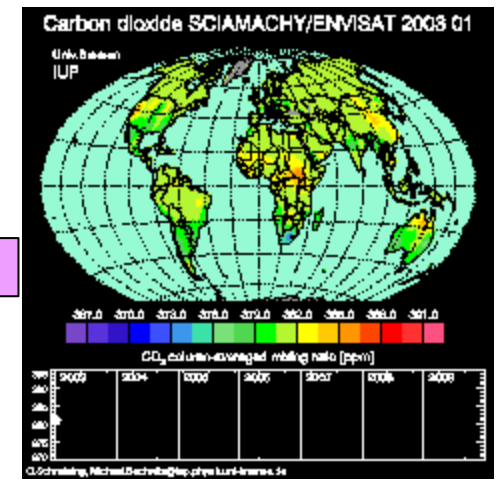


C3S Service elements: Climate Data Store

A wealth of Essential Climate Variables and Climate Indicators

- **Observed, reanalysed** and simulated
- Relevant to support adaptation/mitigation policies at European level and wider

Credit: ESA-CCI



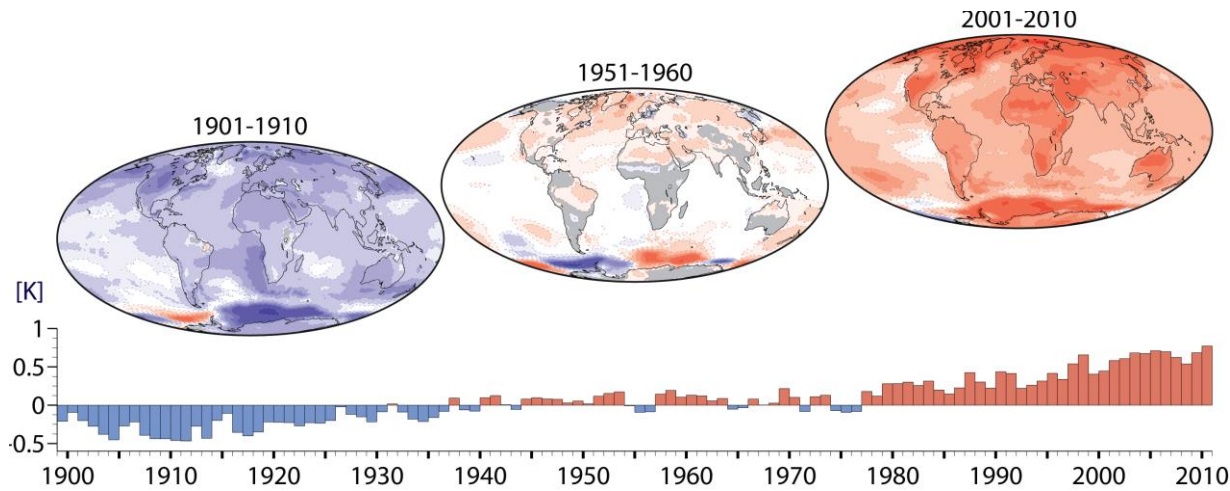
Earth Observation based
ECV datasets



Data collection and
data rescue



Data reprocessing



Reanalyses

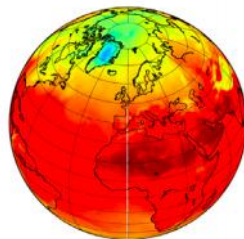


Figure 1: ERA-Interim analysis of the 2m-temperature.

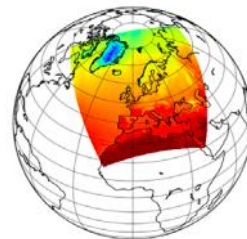
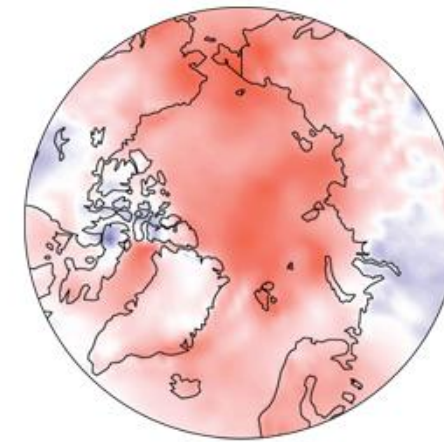
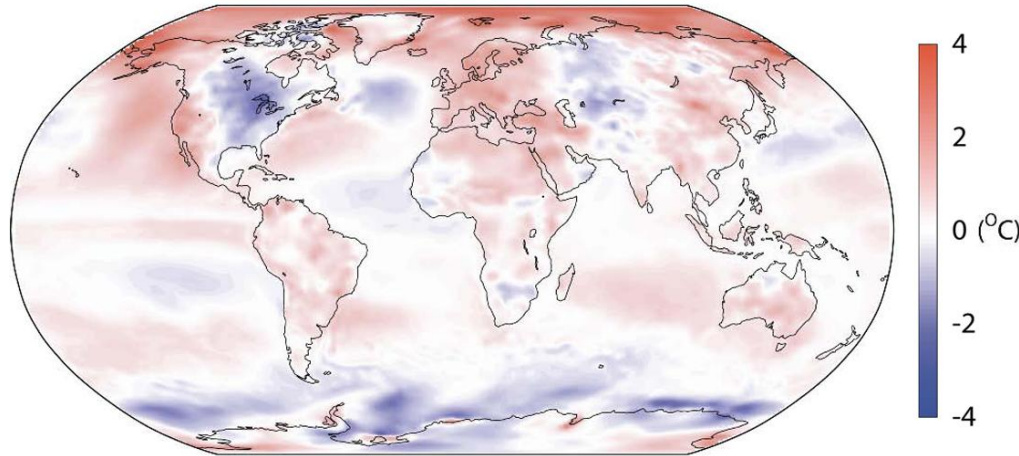


Figure 2: HIRLAM 2m-temperature using ERA-Interim analysis on the borders and as a large scale constraint.

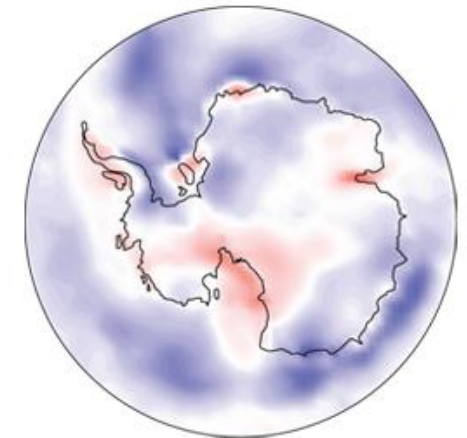
Credit: Euro4m



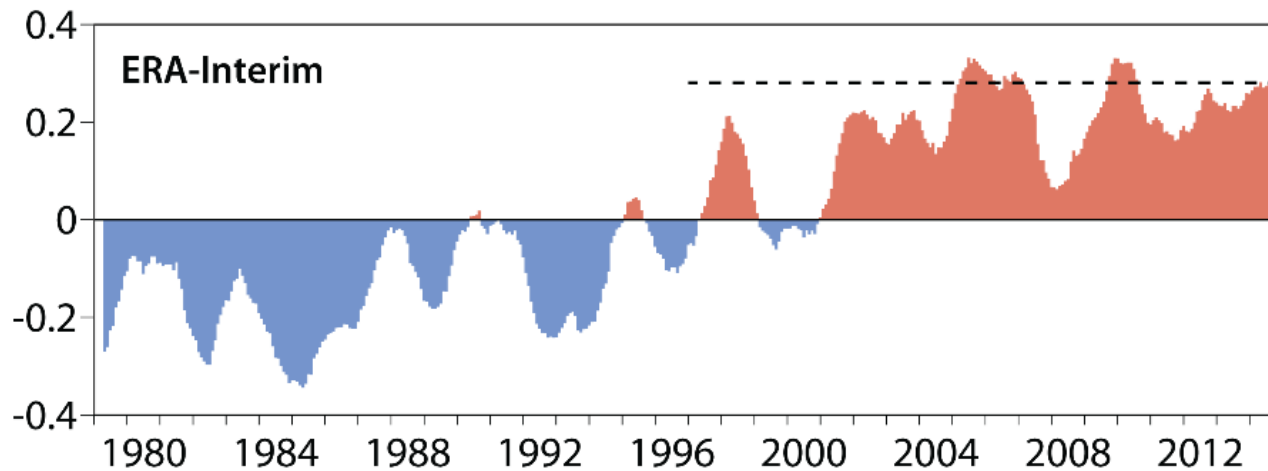
Global temperature changes from reanalysis (*ERA-Interim*)



Arctic pattern of temperature anomalies



Antarctic pattern of temperature anomalies



- ERA-Interim estimates for 2014 are slightly cooler than those from station data alone
- Mainly due to a cool Antarctic
- Consistent with independent observations of sea-ice extent

ERA-Interim

ERA5

Model version	August 2006 (IFS Cy31r2)	June 2015 (IFS Cy41r2)
Model boundary conditions	As in forecasting (inconsistent SST)	Appropriate for climate (CMIP5, HadISST.2)
Spatial resolution	79 km global 60 levels to 10 Pa	31 km global 137 levels to 1 Pa
Time period	1979 - present	1979–present (extension to ~1950?)
Dissemination	Monthly	Monthly for ERA5; daily for ERA5T
Observations	Mostly ERA-40, GTS	Various reprocessed CDRs
Radiative transfer	RTTOV7	RTTOV11
Analysis method	4D-Var 1D+4DVar rain	10-member EDA All-sky radiance assimilation
Variational bias corrections	Satellite radiances	Radiances, ozone, aircraft, surface pressure

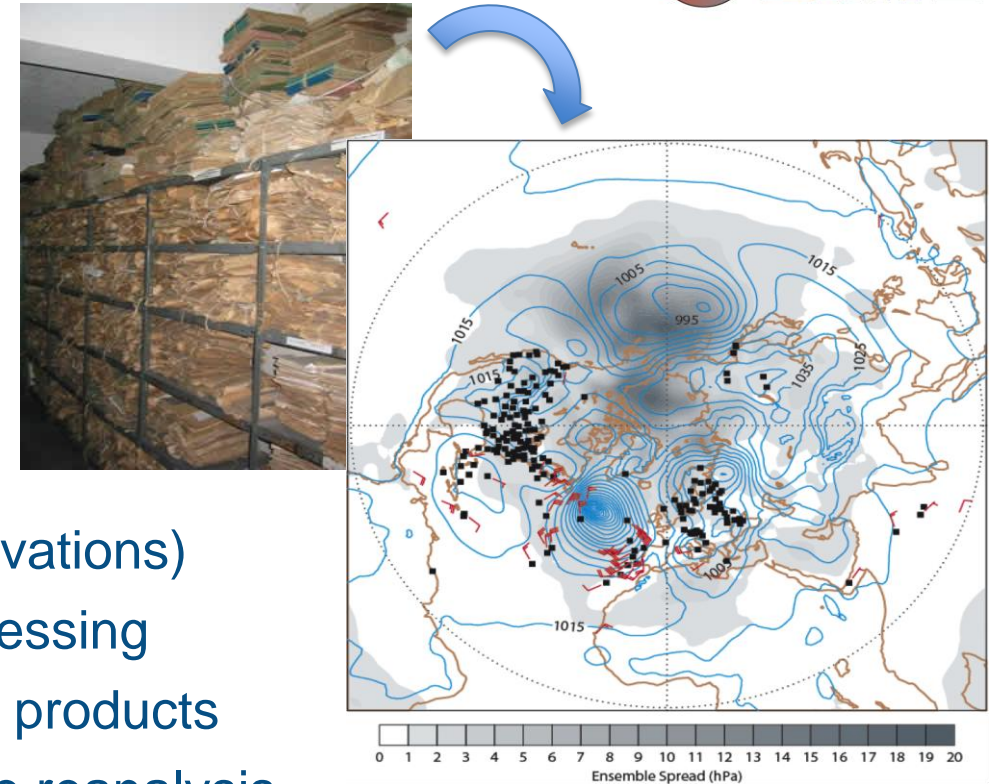
The FP7 ERA-CLIM / ERA-CLIM2 projects (2011-2016)



Goal: Preparing input observations, model data, and data assimilation systems for global reanalyses of the 20th century climate

Main elements:

- Data rescue (in-situ upper-air and satellite observations)
- Data quality control, homogenization and reprocessing
- Incremental development of new 20C reanalysis products
- Research in coupled data assimilation for climate reanalysis
- Use of reanalysis feedback to improve the historic data record
- Improving access to reanalysis data and information about uncertainties



The FP7 ERA-CLIM / ERA-CLIM2 projects (2011-2016)

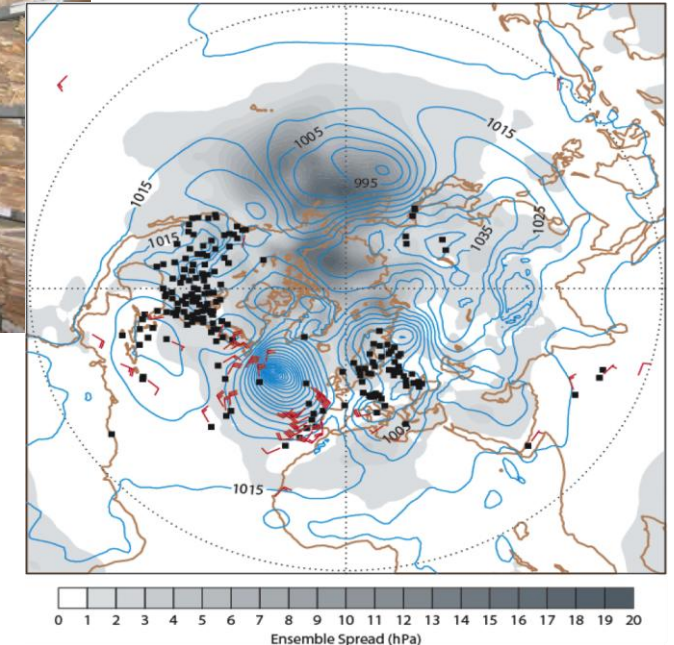


Goal: Preparing input observations, model data, and data assimilation systems for global reanalysis

Extended climate reanalysis products for 1900-2010:

Main e

- **ERA-20CM:** Atmospheric model integrations
- **ERA-20C:** Reanalysis assimilating surface pressure data and marine winds
- **ERA-20C ODB:** Access to all assimilated observations
- **CERA-20C:** Coupled ocean-atmosphere (*in production*)



the observations)

reprocessing

analysis products

climate reanalysis

the historic data record

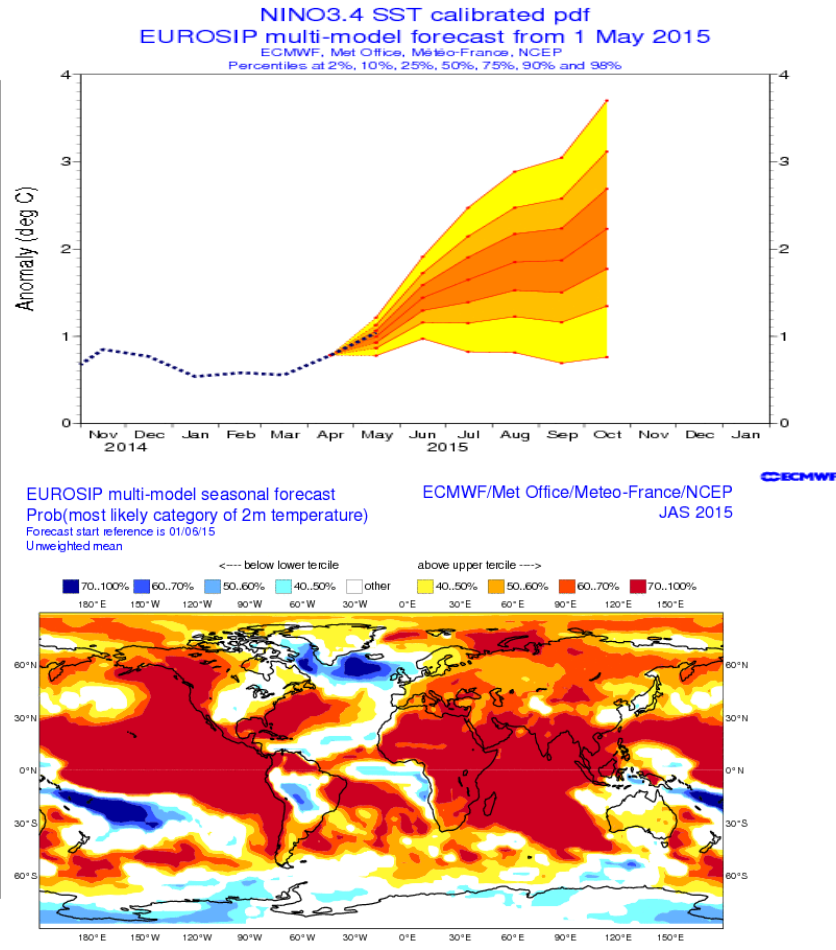
information about uncertainties

C3S Service elements: Climate Data Store

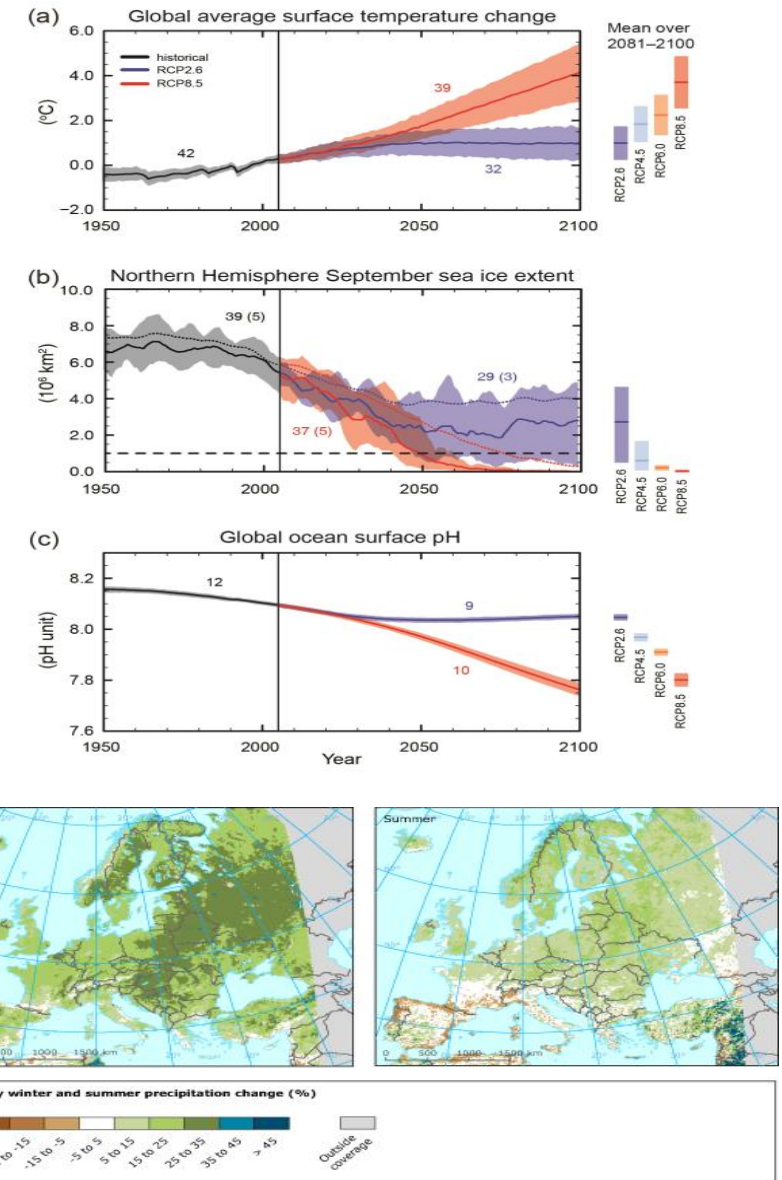
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Multi model seasonal forecast products



Climate projections



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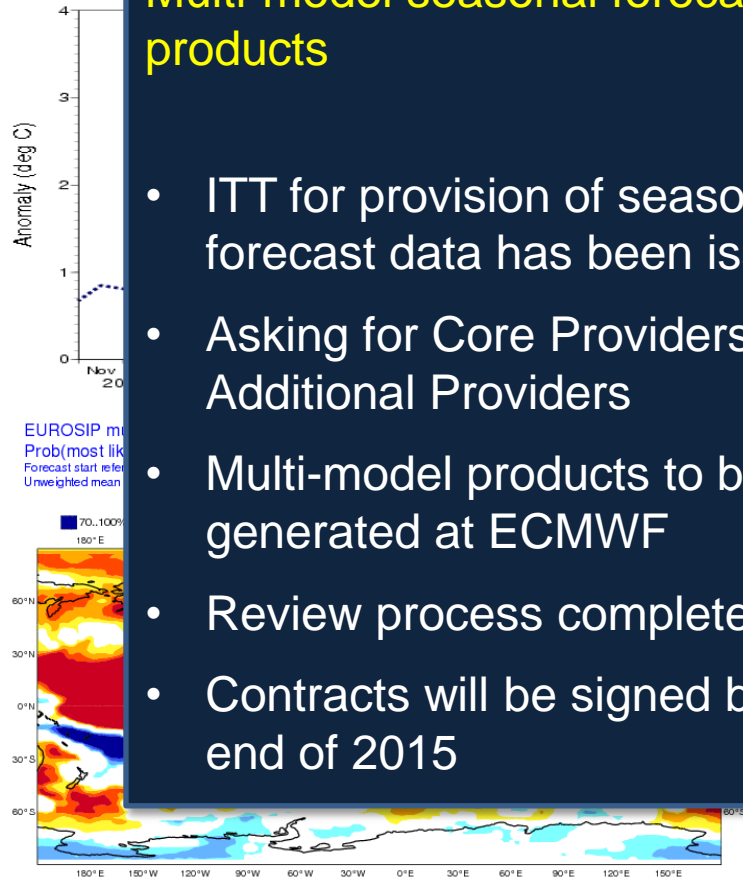
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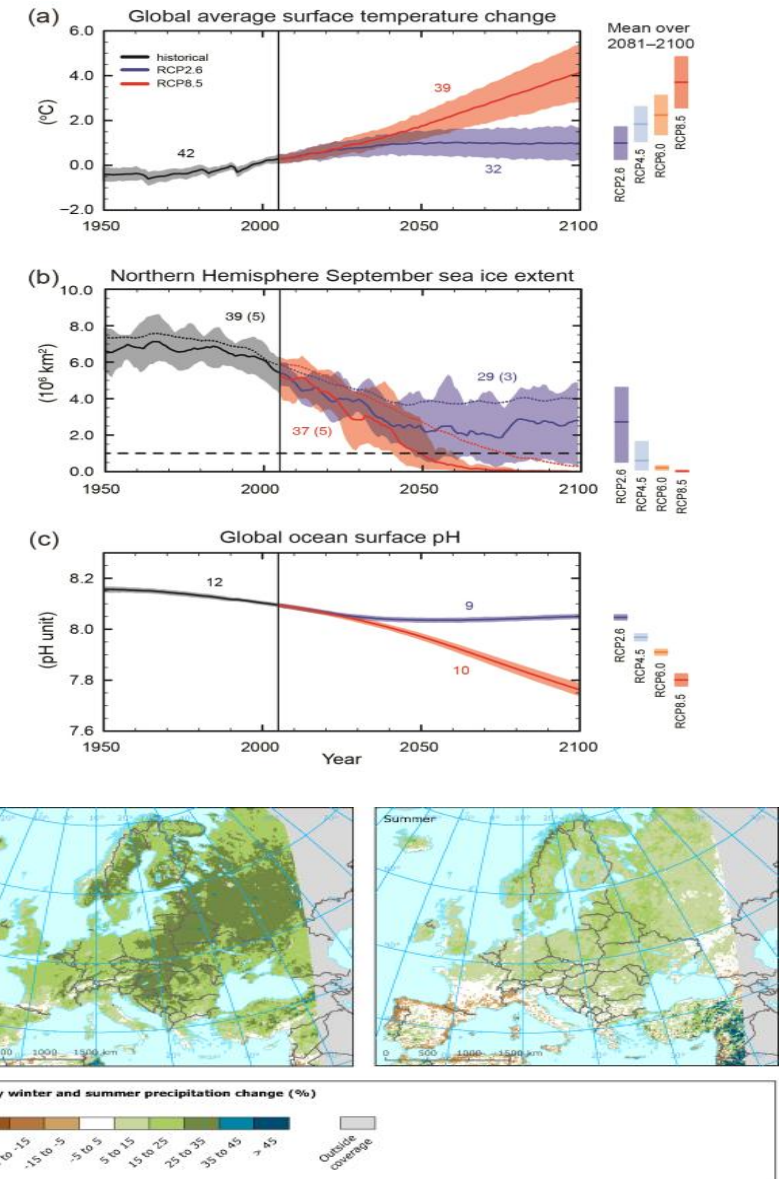
Multi-model seasonal forecast products

- ITT for provision of seasonal forecast data has been issued
- Asking for Core Providers and Additional Providers
- Multi-model products to be generated at ECMWF
- Review process completed
- Contracts will be signed before end of 2015

Multi model seasonal forecast products



Climate projections



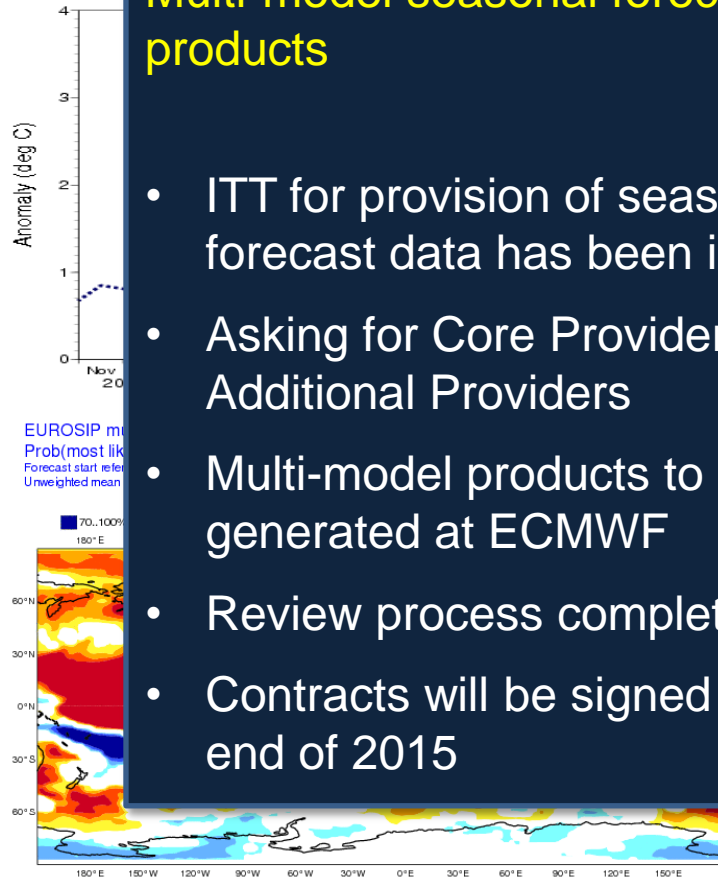
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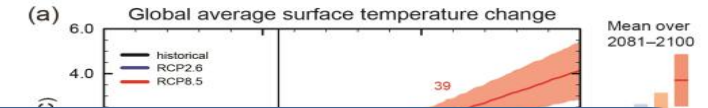
Multi model seasonal forecast products

Climate projections

Global climate projections: Access to data and product generation

- Lot 1: Support for access to an ESGF node in Europe
- Lot 2: Multi-model product generation
- Lot 3: Roadmap to a reference set of climate projections for Europe (EUCP)
- Deadline extended to 9 Dec 2015

ITT for regional climate projections to be published in 2016



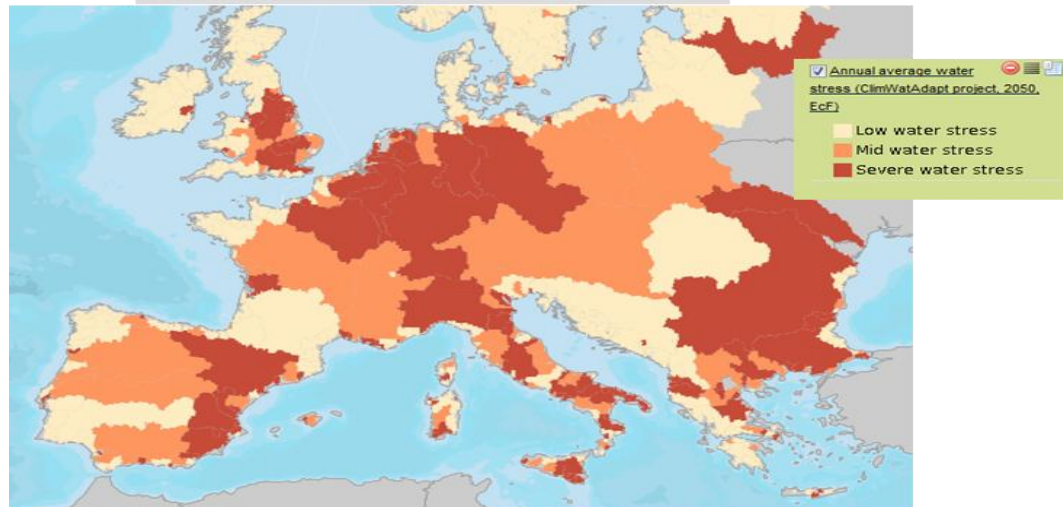
C3S Service elements: Sectoral Information System

Tailored climate indicators for primary users:

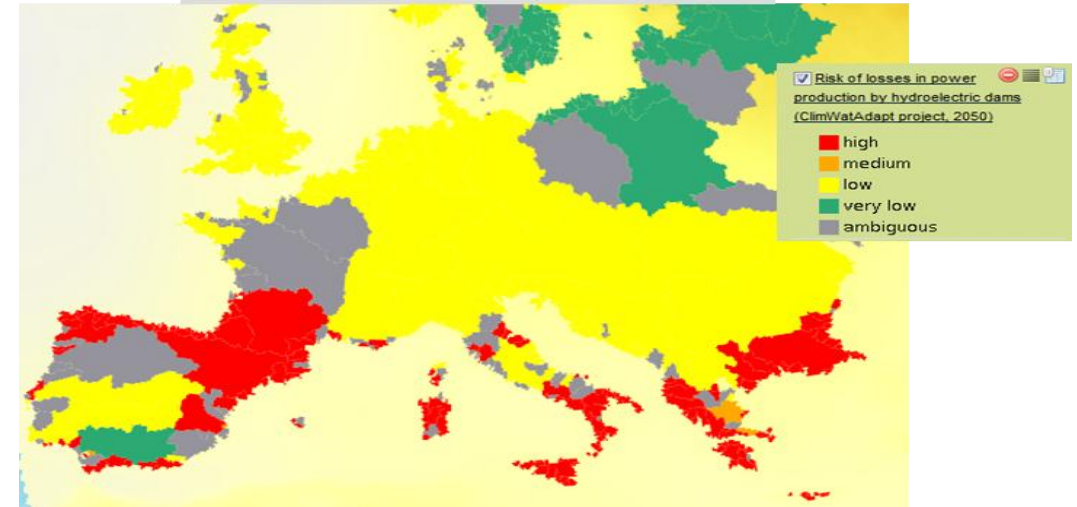
- Institutional users at European level, EEA Climate-Adapt,...
- Science users, innovation and business development

Data and tools to support public and commercial applications, policy development and strategic planning

Water management



Energy

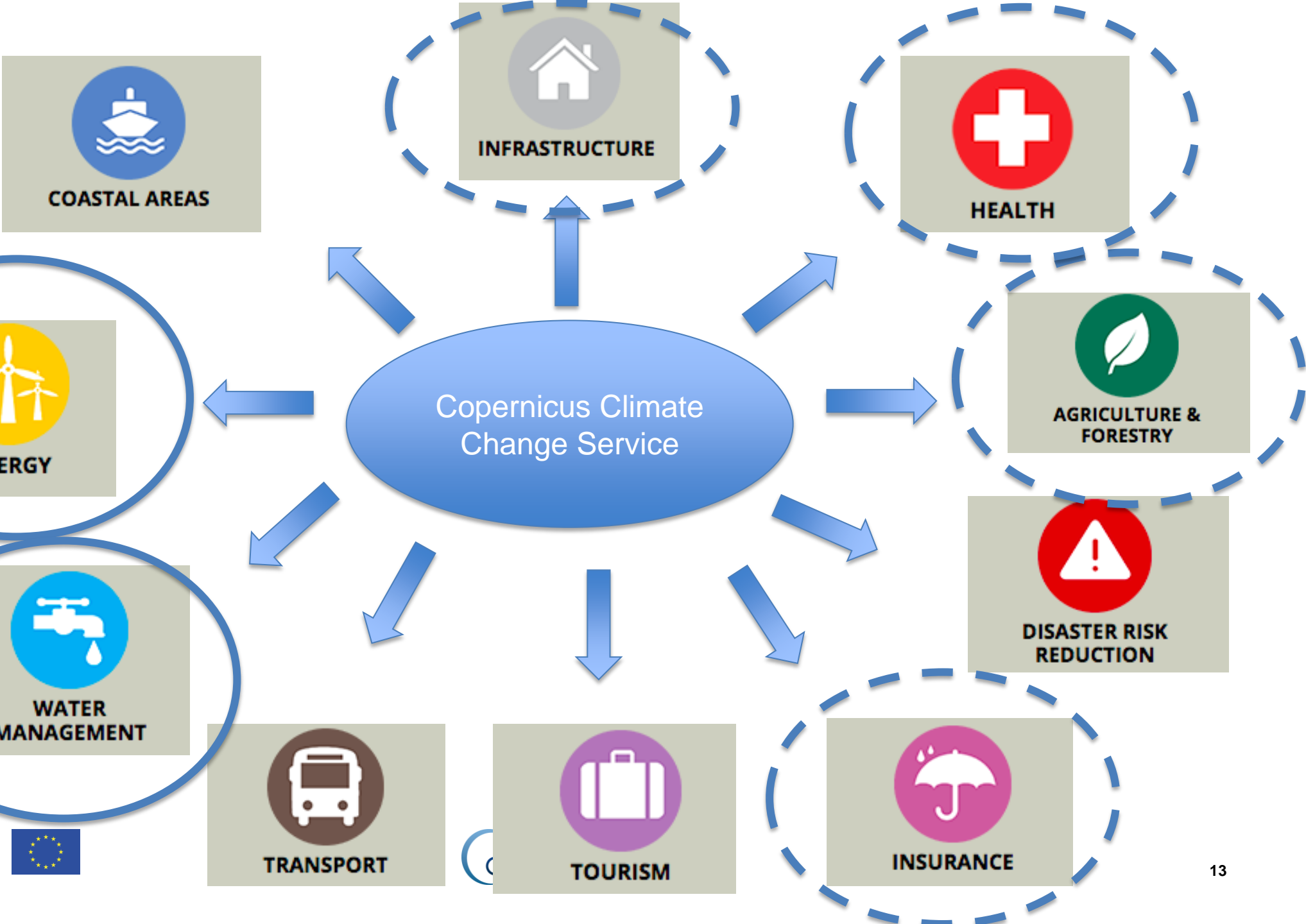


- ~ 30 ECV datasets and ~ 10 Sectors to be addressed by 2020-2021

Credit: EEA



Proof
-
Of
-
Concept



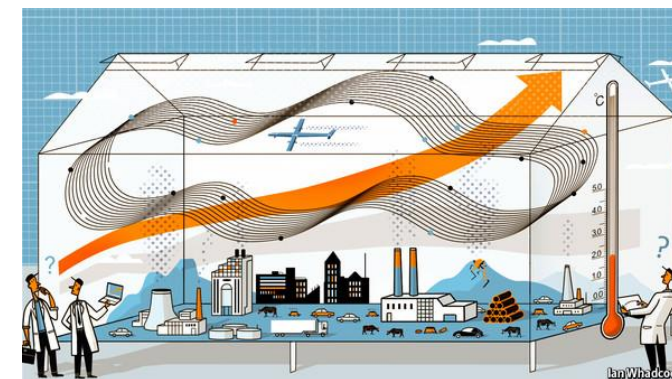
C3S service elements: Evaluation and Quality Control

Ensures C3S delivers state-of-the art climate information to end users



Identifies gaps in the Service

Bridges Copernicus with the Research Agenda in Europe (e.g. H2020, national research projects)



Monitors continually quality of C3S products and services

“Quality Assurance” body



C3S Service elements: Outreach and dissemination

Web content provision and management

- Coherence throughout the C3S, interfaces between pillars, pan-European dimension,...

Public outreach:

- All media, e.g. press, newsletters, climate impact visuals, twitter..
- Annual State of Climate for Europe
- Downstream application and service providers

Coordination with national outreach efforts

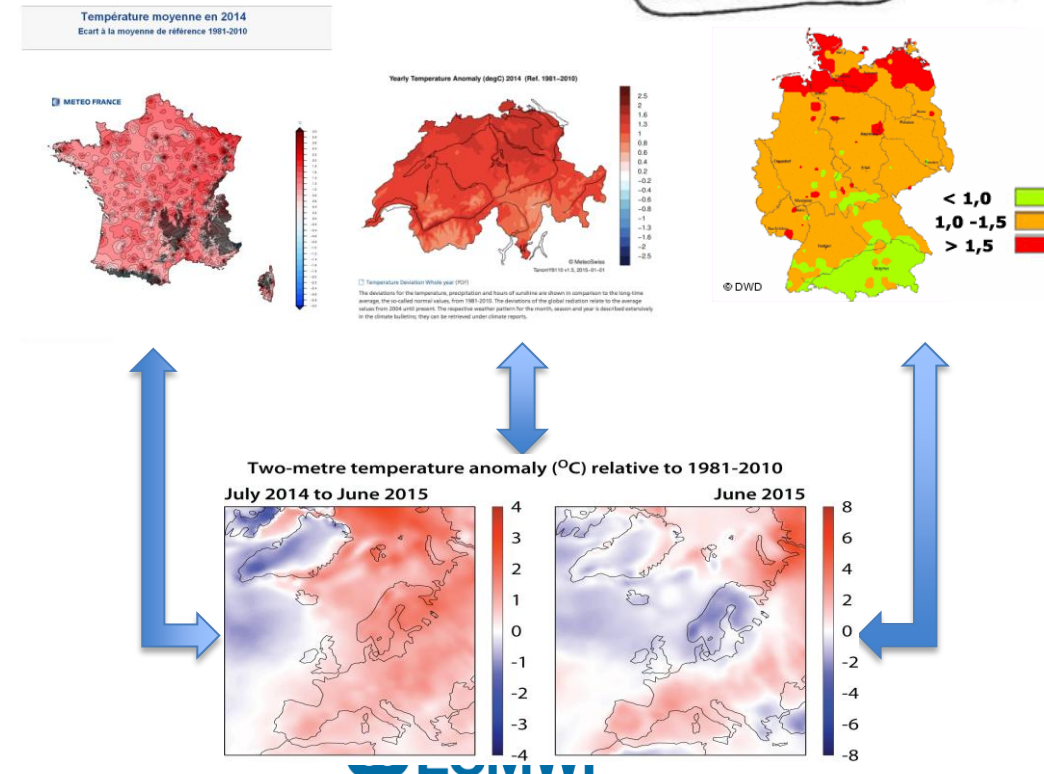
- On communicating events, findings, etc.
- National workshops

Liaison with public authorities

- Communicate C3S products

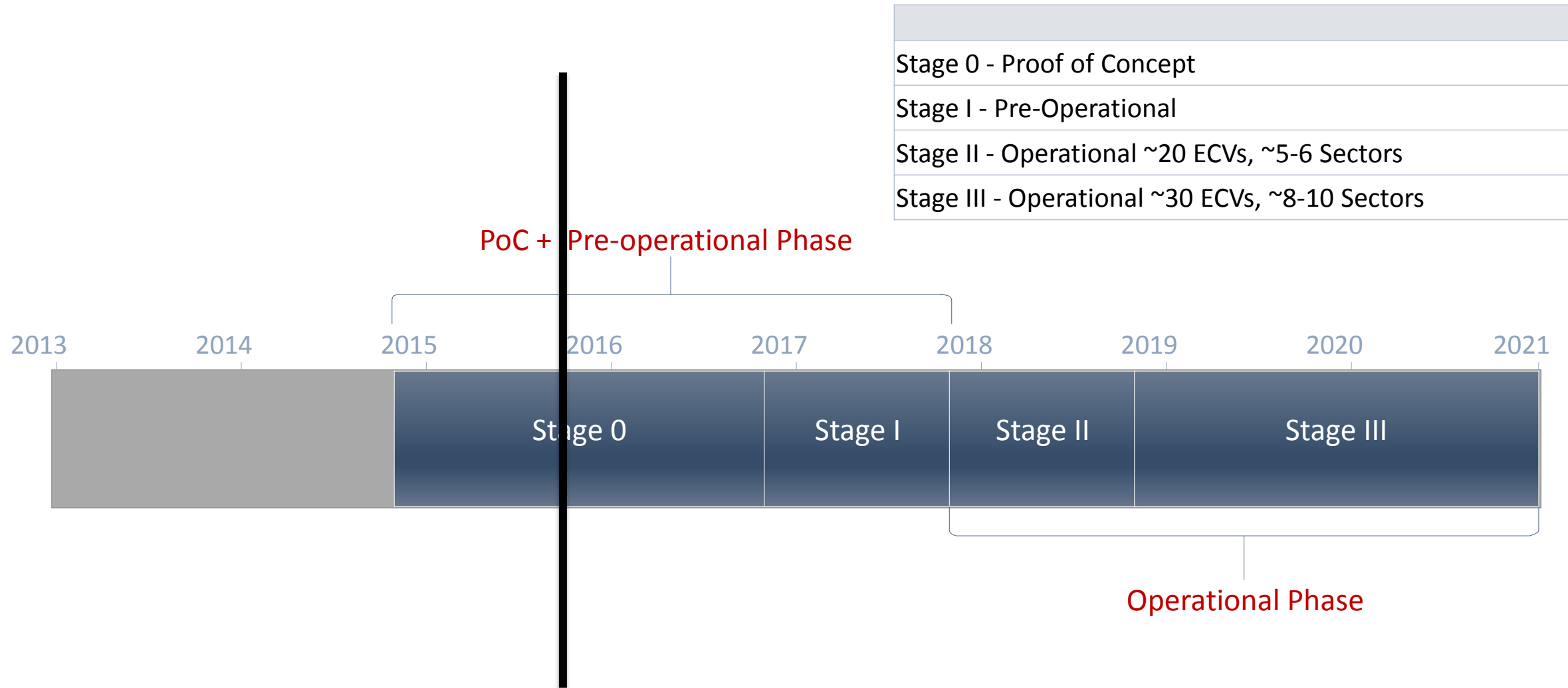
Events (conferences, seminars,..)

Training and Education



Copernicus Climate Change Service (C3S)

Provisional timing



Copernicus Climate Change Service

C3S brings a unique pan-European dimension to Climate Services

Build upon, complement and add value to the current capabilities in Europe

Provide a “one-stop-shop” access to quality assured climate information, tools and good practices

Facilitate uptake and growth of the climate service market

Cross-cutting role and exploit synergies with other Copernicus Services



Tenders

[home](#)

Deadline: Wednesday, 25 November 2015 - 15:00

COP_001 M... **information**

Communication
ECMWF is setting up
Copernicus Climate
activities.

[Read more](#)

Deadline: Wednesday, 25 November 2015 - 15:00

C3S_34a Glo... **and impact**

ECMWF invites
global climate p
general circulat
pre-operational stage of the Service.

[Read more](#)

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C3S_25 Software Development for the Climate Data Store (CDS) **Toolbox**

climate.copernicus.eu

Watch opportunities to
contribute

Thank you

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next round of

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Jean Noel Thepaut on the Copernicus Climate
Change Service

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