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ECMWF

*: Copernicus G2 Unit

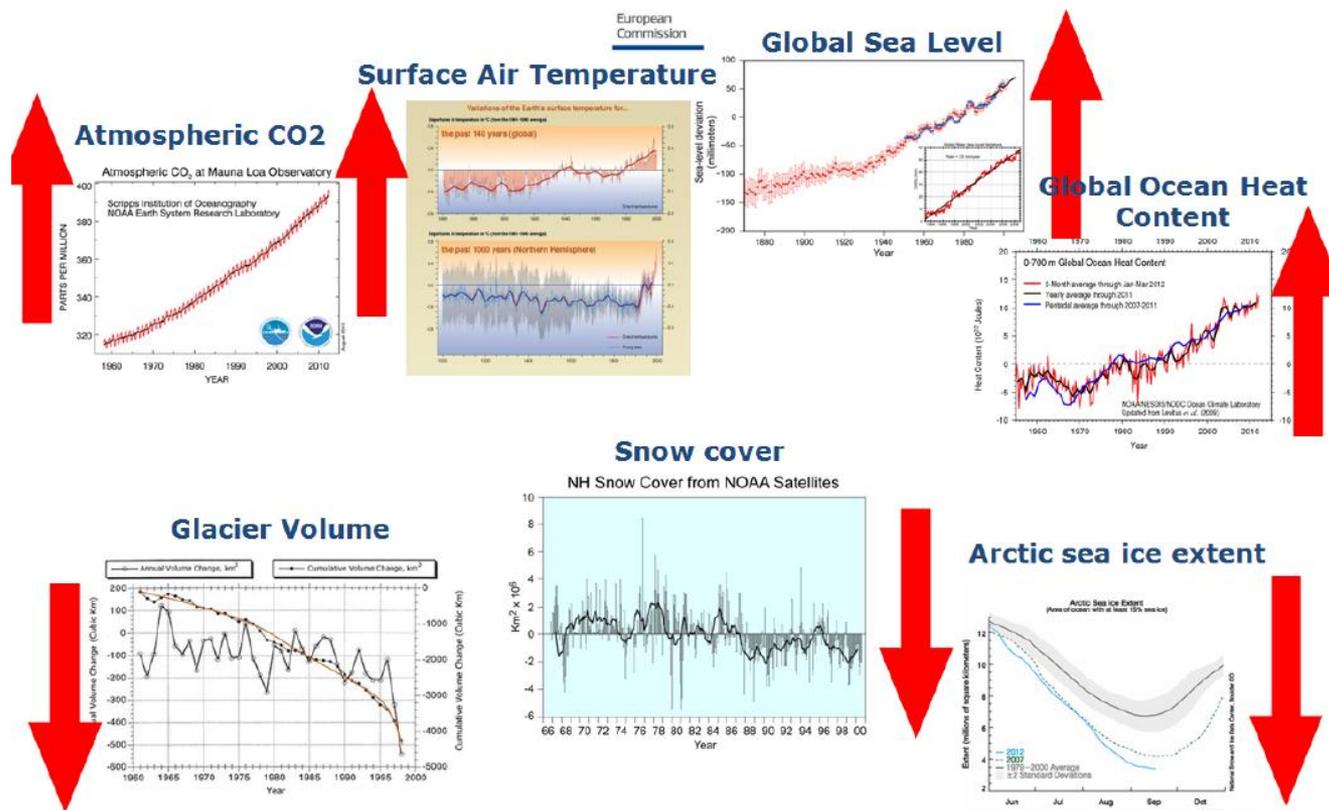


ECMWF has been negotiating with the EC to become the Entrusted Entity that will operate:

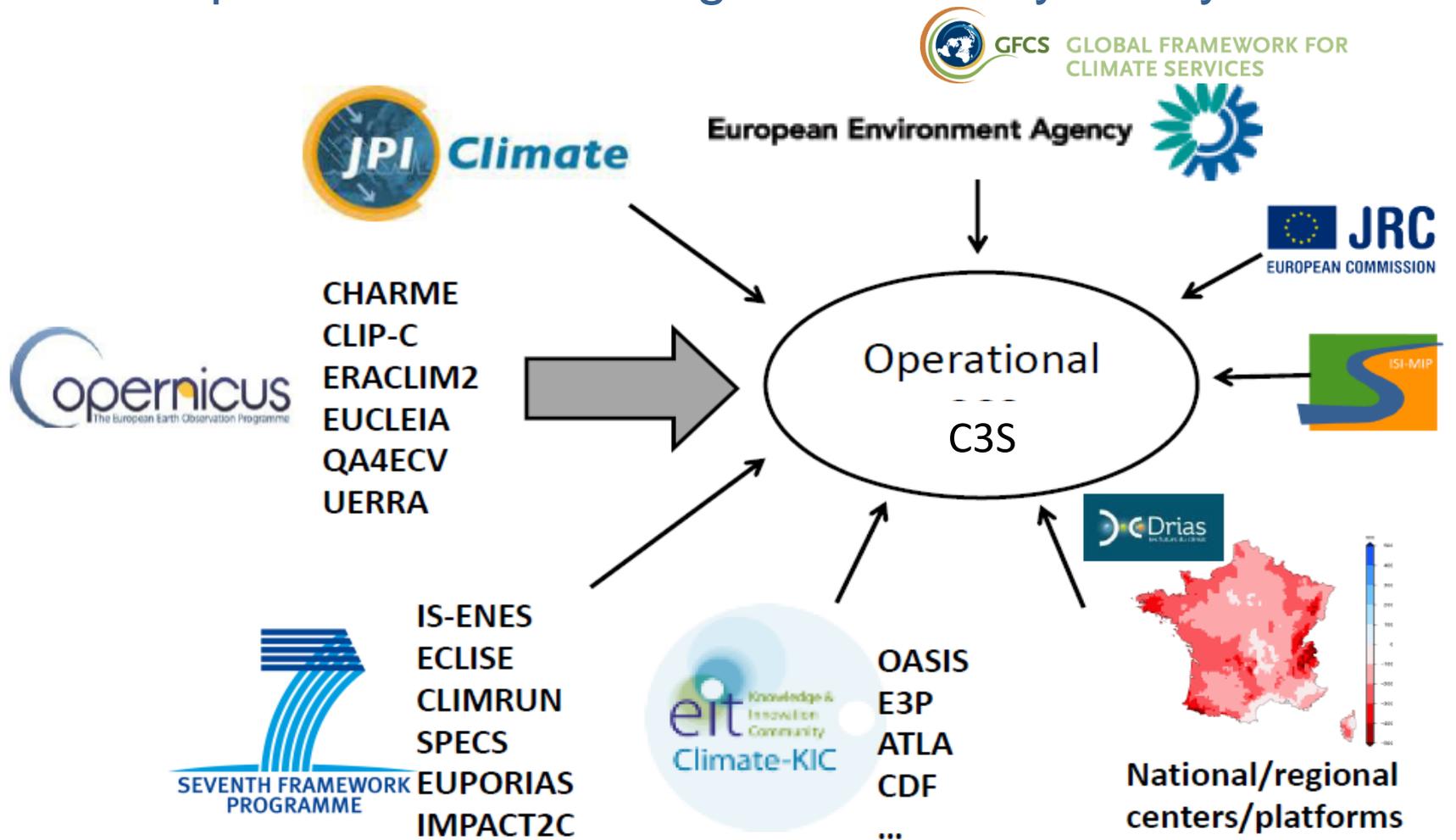
- CAMS: Copernicus Atmosphere Monitoring Service
- C3S: Copernicus Climate Change Service

From the Copernicus regulation (EU) 377/2014:

"the Climate Change service shall provide information to increase the knowledge base to support **adaptation and mitigation policies**. It shall in particular contribute to the **provision of Essential Climate Variables (ECVs)**, **climate analyses, projections** and **indicators** at temporal and spatial scales relevant to adaptation and mitigation strategies for various Union's sectoral and societal benefit areas."



No need to start from scratch: European Climate Change Community ecosystem



C3S vision

To be an authoritative source of climate information for Europe

To build upon national investments and complement national climate service providers

Is the climate changing?

- Earth observations
- Reanalyses

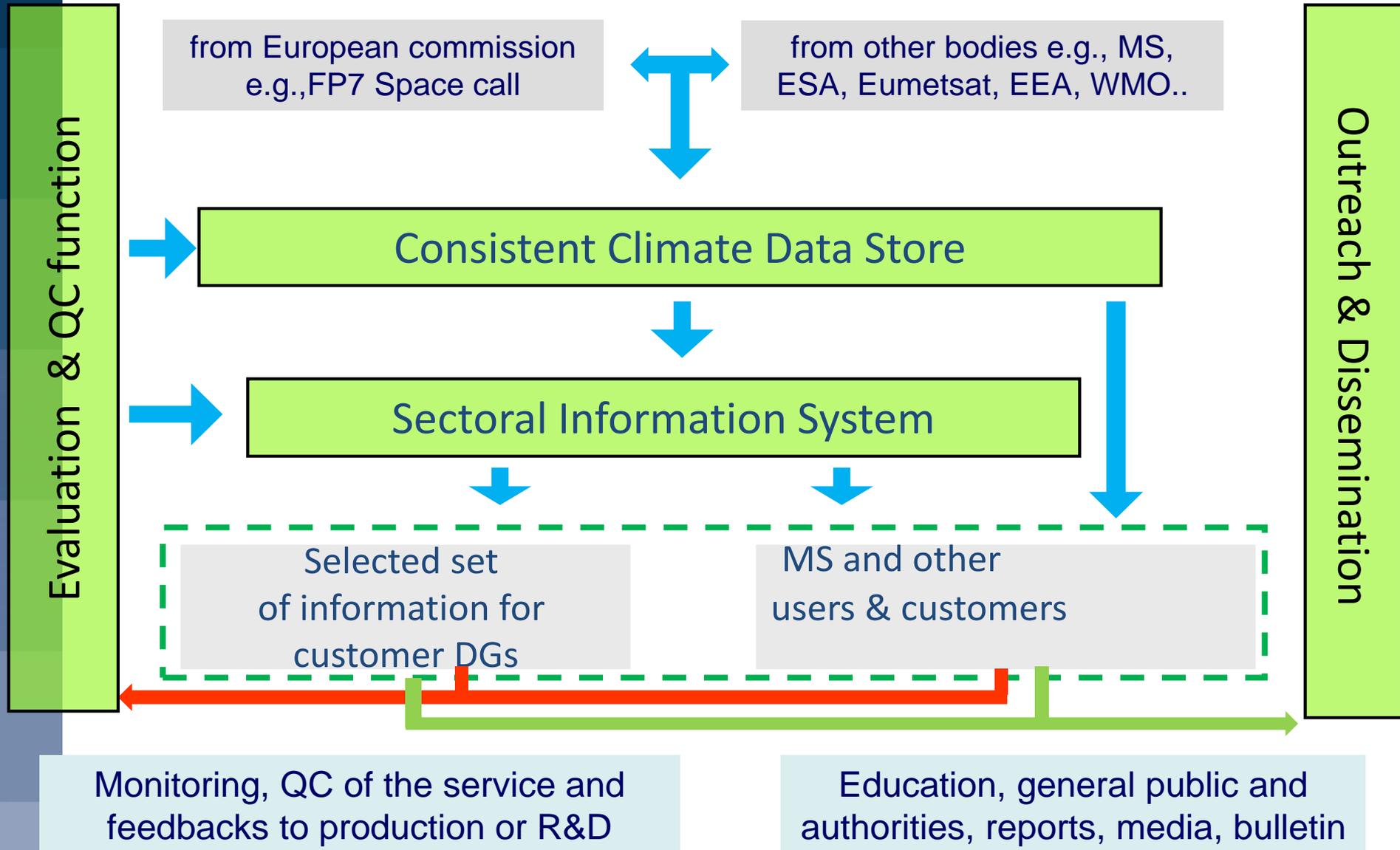
Will climate change continue, accelerate?

- Predictions
- Projections

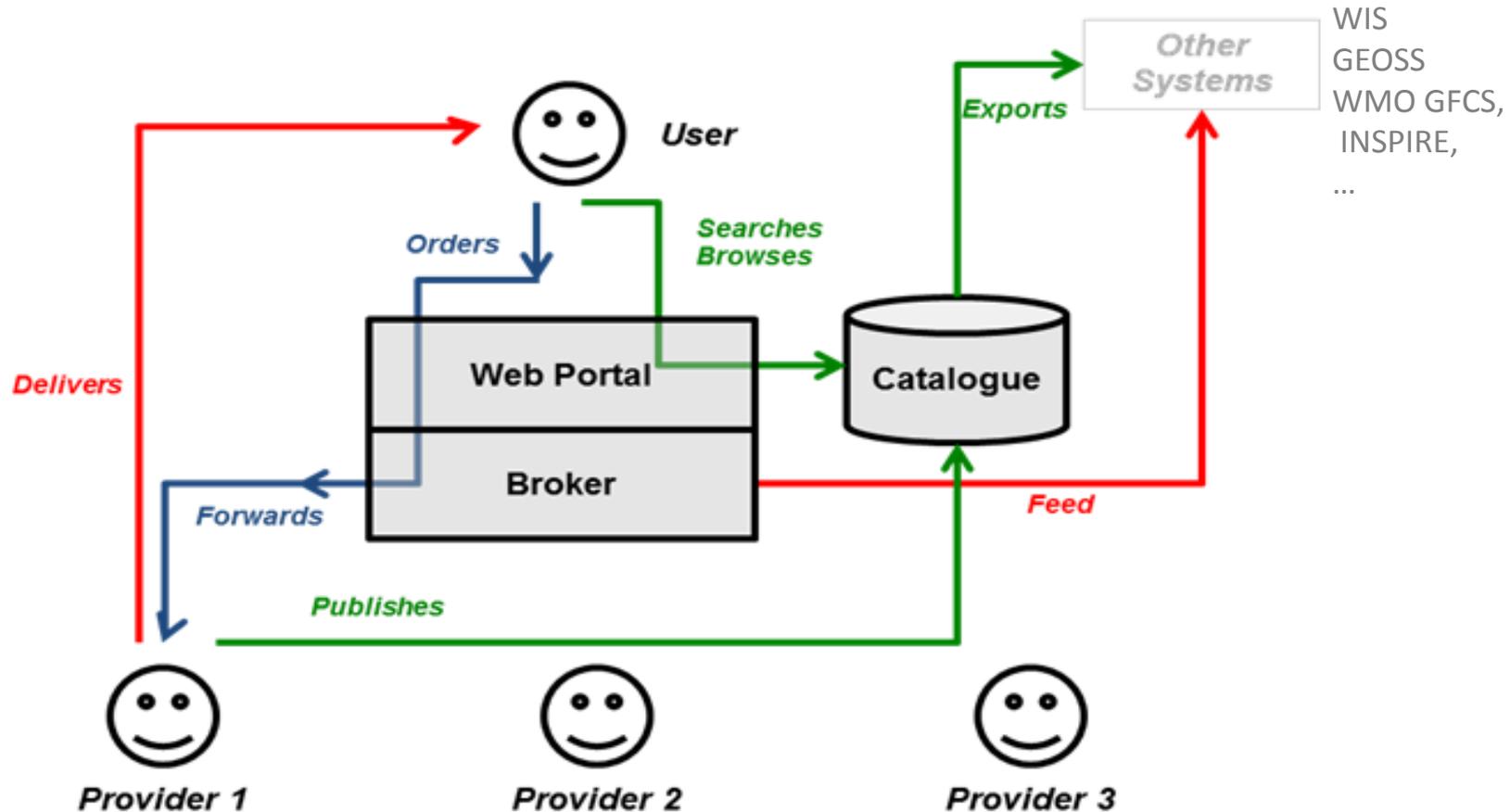
What are the societal impacts?

- Climate indicators
- Sectoral information

C3S architecture



C3S infrastructure: Market place concept

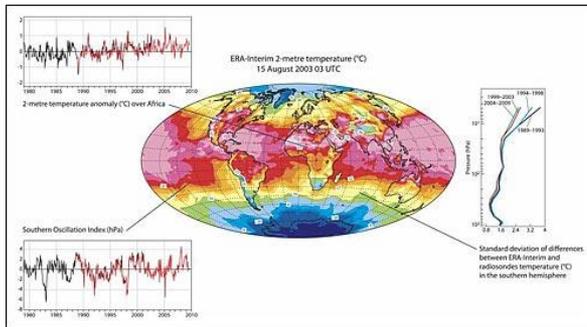


- Distributed architecture
- Exploiting existing infrastructures

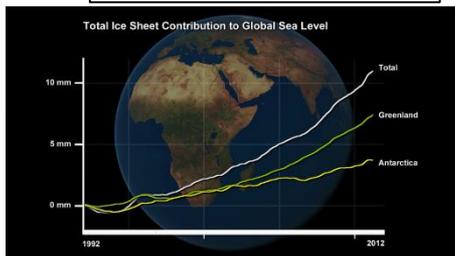
C3S Service elements: Climate Data Store

- Series of ECV datasets and climate indicators

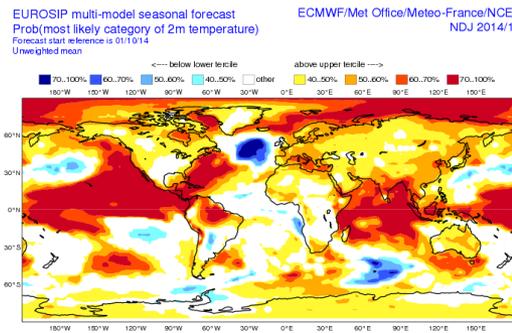
- Observed, reanalysed and simulated
- Relevant to support adaptation/mitigation policies at European level and wider



Reanalyses



Other ECV datasets



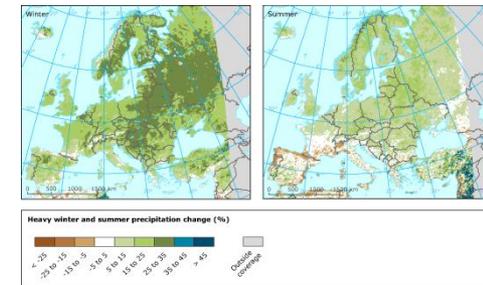
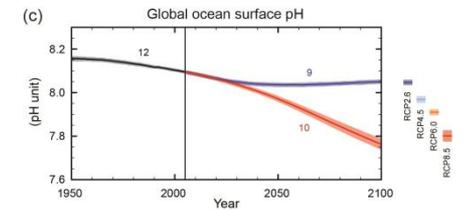
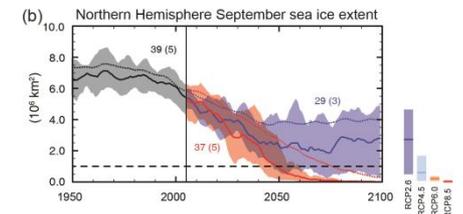
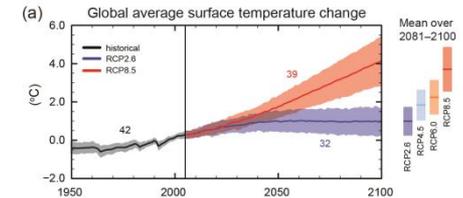
Multi model seasonal forecast products



Data reprocessing



Data collection and data rescue

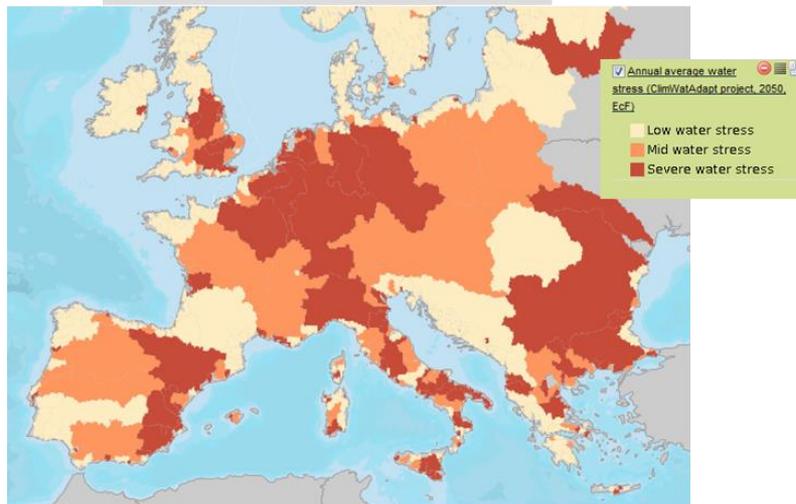


Climate projections

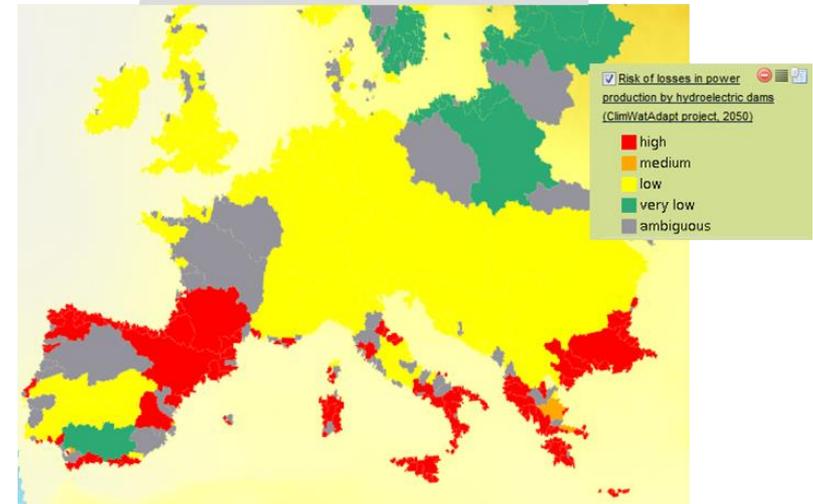
C3S Service elements: Sectoral Information System

- Tailored climate indicators for primary users:
 - CLIMATE-ADAPT, institutional users at European level,...
 - Science users, innovation and business development
- Data and tools to support sectoral applications and policy development

Water management



Energy



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

C3S Service elements: Evaluation and Quality Control

- **User engagement:**
 - Workshops, surveys, reports,...
 - User forum to ensure interaction and capacity building
- **Continual evaluation of C3S products and services**
 - Translation of user requirements into technical specifications
 - Identification of gaps in the Service (decadal prediction?)
 - Provision of guidance on dataset resolution requirements
 - Recommendations for new service components
 - Liaison with research programmes (H2020, others)
 - Strong interaction with CDS & SIS (multi-disciplinarity)
 - Scientific and technical assessments
- **Support for expert groups and link with the EU F4P (Fitness for Purpose) function**

C3S Service elements: Outreach and dissemination

- **Web content provision and management**
 - Coherence throughout the C3S, interfaces between pillars, etc.
- **Public outreach:**
 - All media, e.g. press, newsletters, climate impact visuals, twitter..
 - Annual State of Climate for Europe
- **Coordination with national outreach efforts**
 - On communicating events, findings, etc.
- **Liaison with public authorities**
 - Market/communicate C3S products
- **Events (conferences, seminars, summer schools, ..)**
- **Training and educational material, smartphone apps, etc.**

Copernicus Climate Change (C3) service

Provisional timing

Stage 0 - Proof of Concept
Stage I - Pre-Operational
Stage II - Operational ~20 ECVs, ~5-6 Sectors
Stage III - Operational ~30 ECVs, ~8-10 Sectors

Pre-operational Phase

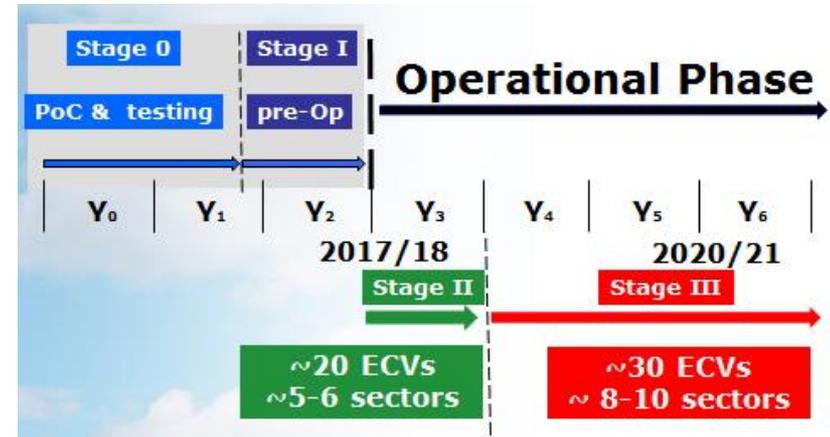


Operational Phase

C3S implementation timeline

Stage 0 (~2 years) is dedicated to infrastructure development and proof of concept:

- Building the CDS infrastructure
- Testing the mechanics of the C3S
 - Selecting two (three?) pilot sectors (energy, water, agriculture?)
 - Building and evaluating the value chain, from EO to tailored indicators
 - Coordinating and working with existing research projects
- Engaging with users (institutional and wider) to prioritize the ECV datasets and Sectors during preoperational phase



Implementation plans for later stages are sufficiently flexible to accommodate:

- Outcomes of FP7 precursor projects (ERA-CLIM2, CLIP-C, UERRA, EUCLEIA, QA4ECV)
- Products of CCI Phase 2
- New research, EQC recommendations, ...

Consistent Climate Data Store - ~ 20 ECVs & indicators -
Observed, re-analyzed and model projected products

ATMOSPHERE

Surface Air Temperature
Surface Precipitation
Water Vapor
Surface Radiation Budget
Earth Radiation Budget
Carbon Dioxide & Methane
Ozone & Aerosols
Cloud properties
Wind Speed & Direction

OCEAN

Ocean Color
Sea Ice
Sea Level
Sea Surface Temperature
Global Ocean Heat Content

LAND

Snow Cover
Glaciers & Ice Caps
Albedo
FAPAR
Fire Disturbances
Ice Sheets

Sectoral Information System – 6-8 sectors

Agriculture and forestry

Health

Energy

Infrastructure

Insurance

Coastal areas

Water management

Tourism

Copernicus Climate Change (C3) service

Indicative road map Stage II & III

Consistent Climate Data Store - ~ 33 ECVs & indicators -
Observed, re-analyzed and model projected products

ATMOSPHERE

Surface Air Temperature
Surface Precipitation
Water Vapor
Surface Radiation Budget
Earth Radiation Budget
Carbon Dioxide & Methane
Ozone & Aerosols
Cloud properties
Wind Speed & Direction
Upper Air Temperature
Other Long-Lived GHGs

OCEAN

Ocean Color
Sea Ice
Sea Level
Sea Surface Temperature
Global Ocean Heat Content

CO₂ partial pressure
Ocean Activity
Sea Surface Salinity
Current Salinity

LAND

Snow Cover
Glaciers & Ice Caps
Albedo
FAPAR
Fire Disturbances
Ice Sheets
Lakes
Permafrost
Land Cover
Leaf Area Index
Soil Moisture

Sectoral Information System – ~ 8-10 sectors

Agriculture and forestry

Health

Energy

Infrastructure

Coastal areas

Water management

Tourism

Insurance

Marine and fisheries

Biodiversity

Disaster risk reduction

Transportation

Thank You