The Copernicus Climate Change Service & interaction with EODC

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Outline

Copernicus and the Climate Change Service (C3S)

The Climate Data Store

EODC Contribution to C3S
Questions addressed in the Service

- How is climate changing?
  - Earth observations
  - Reanalyses
- Will climate change continue/accelerate?
  - Predictions
  - Projections
- What are the societal impacts?
  - Climate indicators
  - Sectoral information
From European commission e.g., FP7 Space call, H2020

From EU Member States, ESA, EUMETSAT, EEA, WMO.

Climate Data Store

Sectoral Information System

Stakeholders & users
**C3S – Where are we?**

**Signature of Delegation agreement**
- 2014
- 2015

**March 1st General Assembly**
- 2016
- 2017

**C3S first operations**
- 2018
- 2019

**2nd G. A. (Berlin)**
- 2020

**Phase 0/I prototype/pre-operations**

**Phase-II operations**

**Phase-III Copernicus 2**

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**Implementing Organizations**

- ECMWF
- Copernicus
- European Commission
**Content of CDS**

**Scientific basis:**
- Essential Climate Variables as defined by GCOS
- GCOS Status Report and Implementation Plan
- IPCC, CMIP

**Observations**
- Global estimates of ECVs from satellite and in-situ observations
- Reprocessed CDRs, reference observations
- Support for data rescue, climate data collections

**Climate reanalysis**
- Global atmosphere, ocean, land
- Regional reanalyses for Europe and Arctic
- Coupled climate reanalysis for 100 years

**Model output**
- Multi-model seasonal forecast products
- Access to CMIP data and products, global and regional
- Reference set of climate projections for Europe

**Climate Indicators**
- Action engaged
- In preparation (PIN or ITT out)
- Not started
ERA5 global reanalysis:

- Atmosphere/land/wave parameters
- 31 km global resolution, 137 levels
- Hourly output from 1979 onward
- Using improved input observations
- Providing uncertainty estimates
- 2000-NRT available end June

Reanalysis is now an operational service provided by ECMWF

And... focused reanalysis:

- European + Arctic domains
- ERA5-Land (global enhanced surface fields at 9 km)

ERA5 hourly temperatures for January 2016
Technical challenges:

- Diversity of users
- Diversity of data sets
- Very large data volumes
- Data residing at different locations
- Interoperability, efficiency
- User-defined workflows
- Variety of presentation methods
- Need for interactivity
- Access via API
- User management
- Performance monitoring

CDS toolbox (open in June); incremental until 2019
**C3S_312a:**
- 12 ECVs in 9 Lots

**C3S_312b:**
- 22 ECVs in 5 Lots
- Continuity of service

**October – 2016 ➔ Start of soil moisture service for a duration of 2 years**

**C3S_312a – Lot7: European Service of soil moisture based on satellite data**
- Routinely provision of soil moisture products with a maximum of 20 days delay from Real Time
Soil moisture products:

- Active daily, decadal and monthly,
- Passive daily, decadal and monthly
- Active+Passive daily, decadal and monthly
C3S_312b – Lot4: European Services of soil moisture, glaciers, lakes and ice sheets

- Continuation of provision of soil moisture service until end 2020.
- Management and coordination of hydrology-cryosphere theme.
European State of the Climate

- Discussion of the annual climate and the seasons in 2017
- Reference is climate from 1981-2010.
- Climate Indicators