



Climate Change

The Copernicus Climate Change Service & interaction with EODC

Joaquín Muñoz-Sabater
ECMWF, Copernicus Climate Change Service (C3S)
EODC Forum 23-24 May 2018





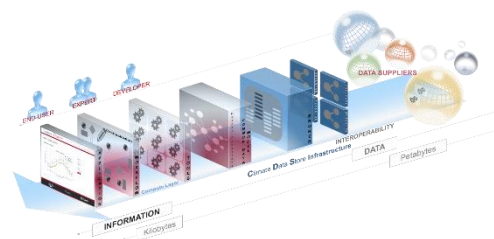
Climate
Change

Outline

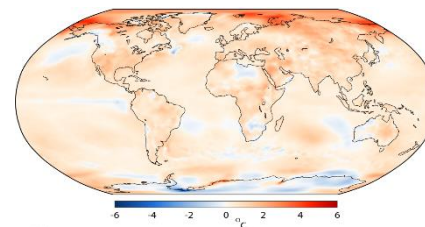
Copernicus and the Climate Change Service (C3S)



The Climate Data Store



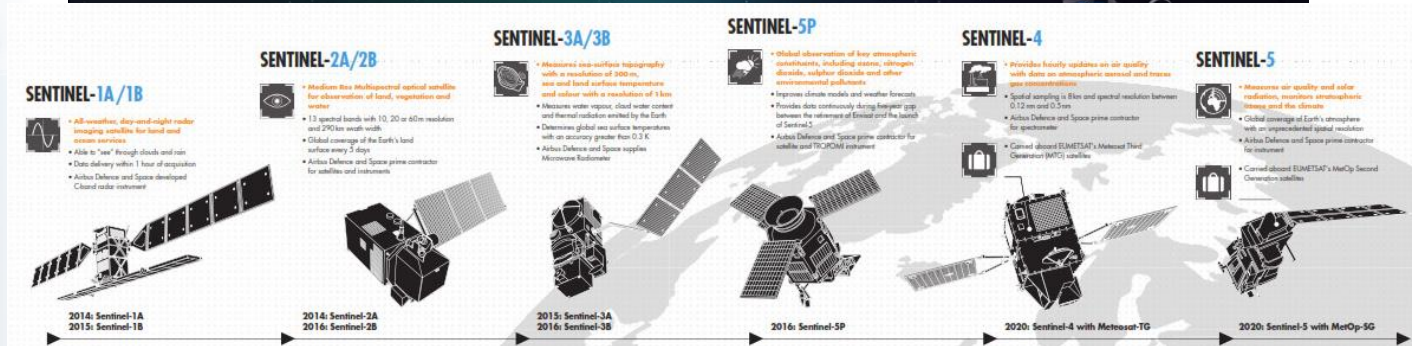
EODC Contribution to C3S





Climate Change

Copernicus: Earth observations and information services



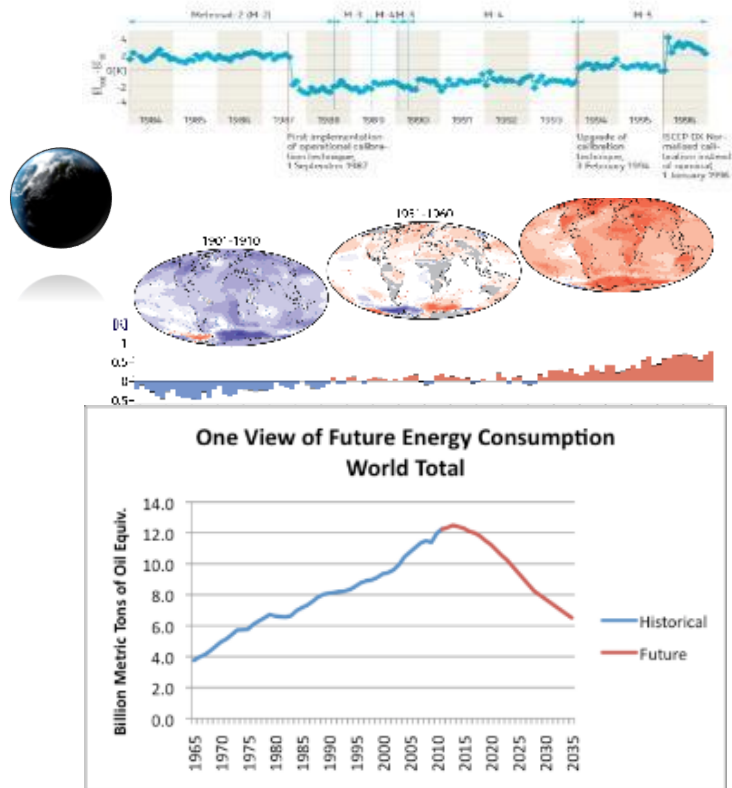


Climate
Change

The Climate Change Service (C3S)

Questions addressed in the Service

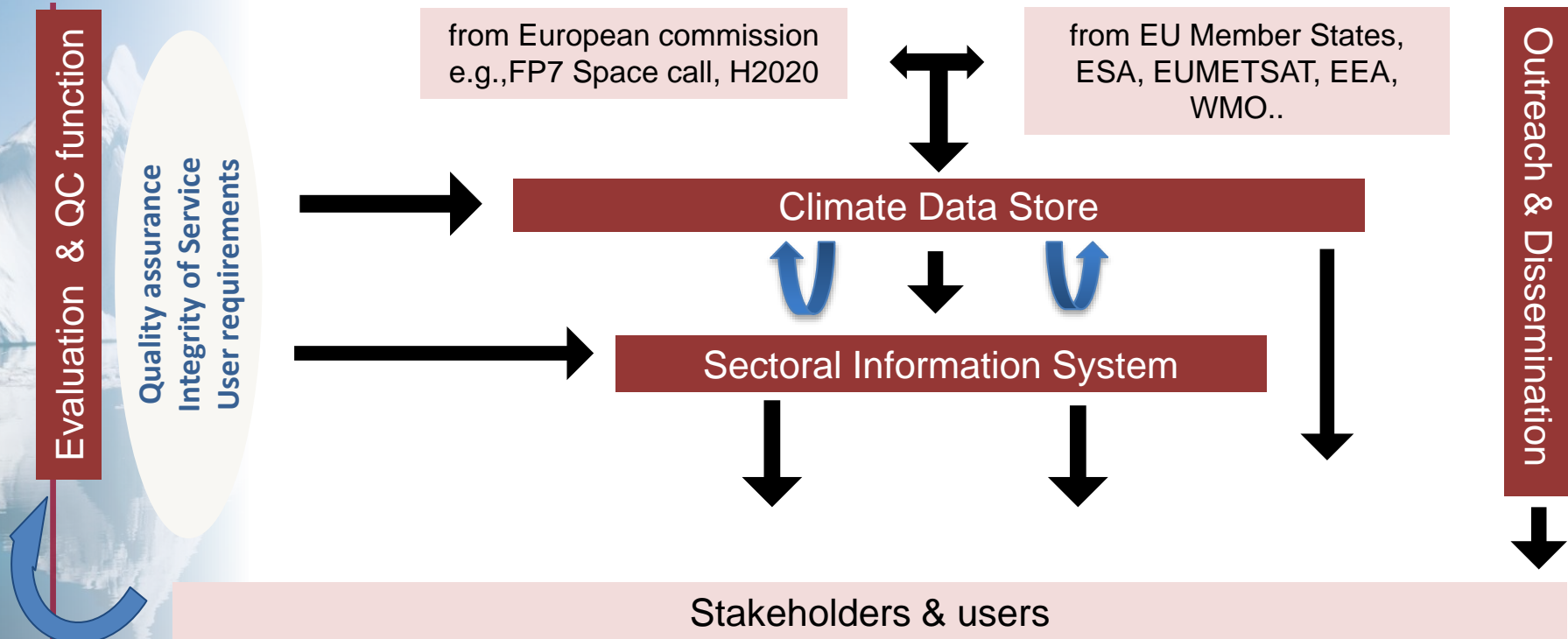
- **How is climate changing?**
 - Earth observations
 - Reanalyses
- **Will climate change continue/accelerate?**
 - Predictions
 - Projections
- **What are the societal impacts?**
 - Climate indicators
 - Sectoral information





Climate
Change

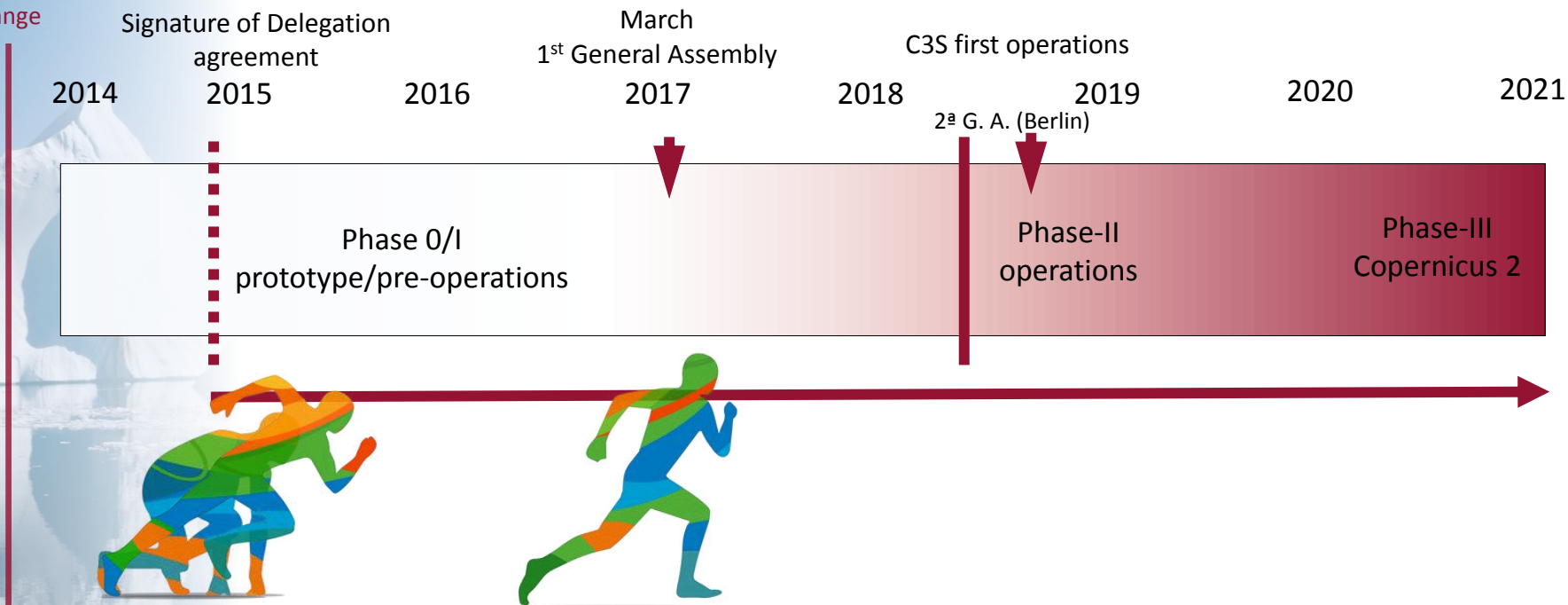
C3S structure





Climate
Change

C3S – Where are we?



IMPLEMENTED BY





Climate
Change

Content of CDS



Scientific basis:

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



Action engaged



In preparation
(PIN or ITT out)



Not started

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



Climate
Change

Climate Data Store: Reanalyses

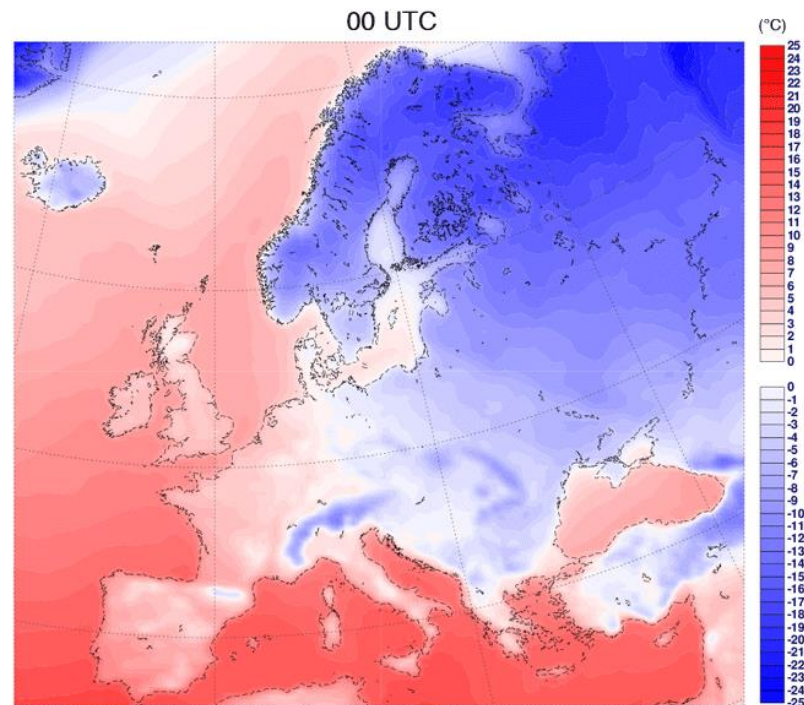
ERA5 global reanalysis:

- 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



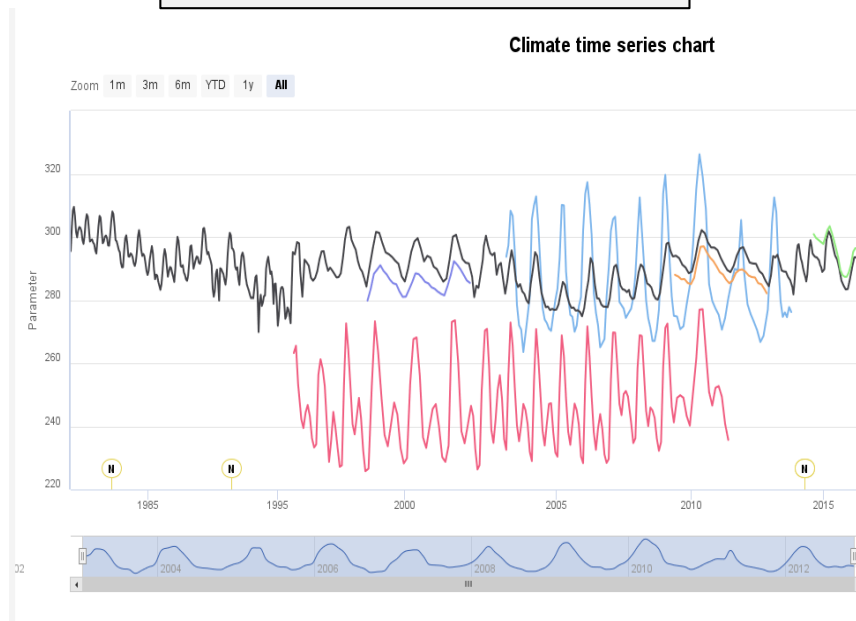
Climate
Change

Climate Data Store: Toolbox

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

Global Total Column Ozone



MACC (CAMS)
reanalysis

ERA-interim

ERA5 (stream I)

(stream II)

(stream III)

ESA-CCI

Volcanic eruptions

CDS toolbox (open in June); incremental until 2019



Climate
Change

EODC contribution to C3S

		C3S_312a		C3S_312b		
	GCOS	2017	2018	2019	2020	2021
Atmospheric physics						
Precipitation	4.3.5					
Surface Radiation Budget	4.3.6					
Water Vapour	4.5.3					Lot 1
Cloud Properties	4.5.4					
Earth Radiation Budget	4.5.5					
Atmospheric composition						
						Lot 2
						Lot 3
Sea ice	5.3.5	Lot 1				
Ocean Colour	5.3.7					
Land hydrology & cryosphere						
Lakes	6.3.4					
Glaciers	6.3.6	Lot 8				Lot 4
Ice sheets and ice shelves	6.3.7					
Soil moisture	6.3.16	Lot 7				
Land use						
Albedo	6.3.9	Lot 9				
Land Cover	6.3.10					
Fraction of Absorbed Photosyntheti	6.3.11	Lot 9				Lot 5
Leaf Area Index	6.3.12	Lot 9				
Fire	6.3.15					
		2017	2018	2019	2020	2021

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

C3S_312a:

- 12 ECVs in 9 Lots

C3S_312b:

- 22 ECVs in 5 Lots
- Continuity of service

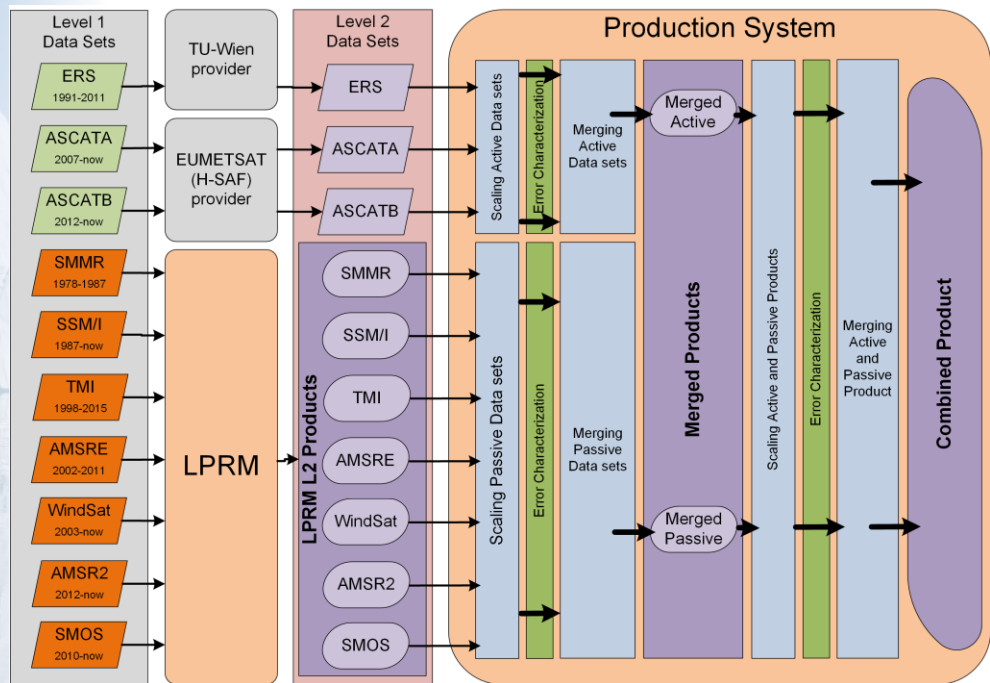
C3S_312a – Lot7: European Service of soil moisture based on satellite data

- Routinely provision of soil moisture products with a maximum of 20 days delay from Real Time



Climate
Change

EODC contribution to C3S



- credits EODC -

• Soil moisture products:

- ❑ Active daily, decadal and monthly,
- ❑ Passive daily, decadal and monthly
- ❑ Active+Passive daily, decadal and monthly

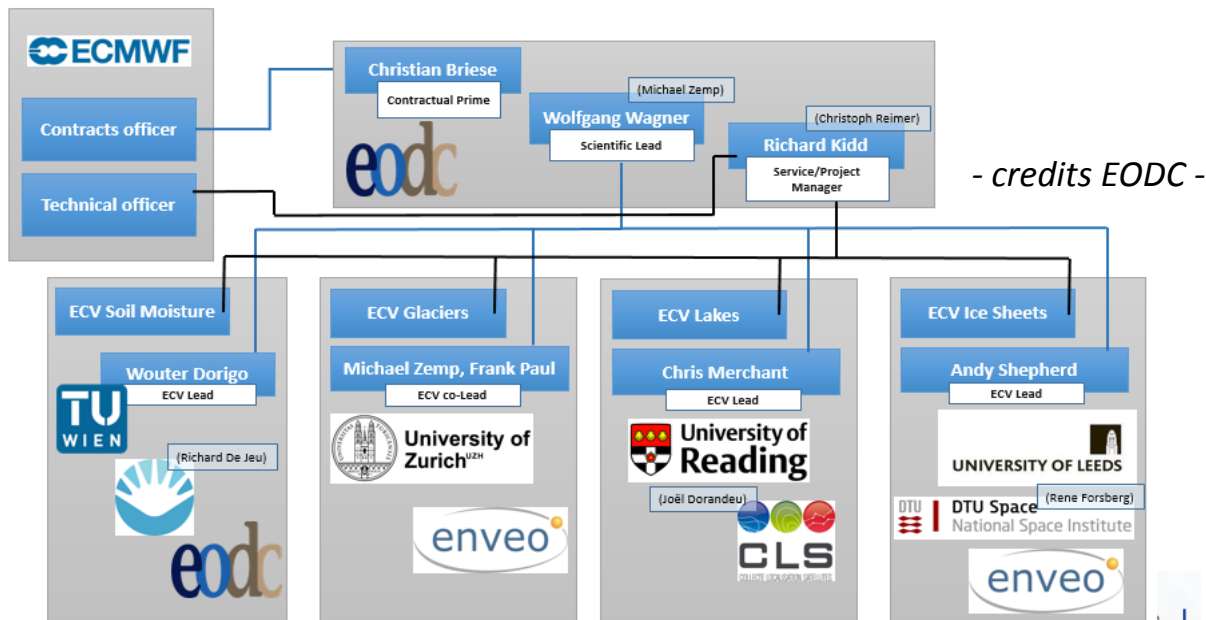


Climate
Change

EODC contribution to C3S

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.





Climate
Change

EODC contribution to C3S

ABOUT C3S NEWS & MEDIA EVENTS TENDERS PRODUCTS SERVICES HELP

European State of the Climate 2017



The *European State of the Climate 2017* covers two main themes, the Climate in 2017 and Headline Climate Indicators.

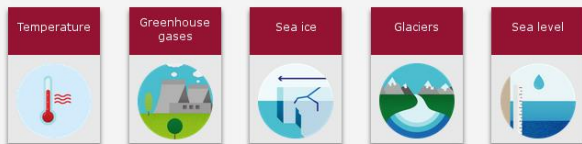
The Climate in 2017 discusses the annual and seasonal climate of last year in comparison with the 1981-2010 climate reference period. The Headline Climate Indicators focuses on long-term key indicators for global and regional climate change.

SUMMARY

Climate in 2017



Headline Climate Indicators

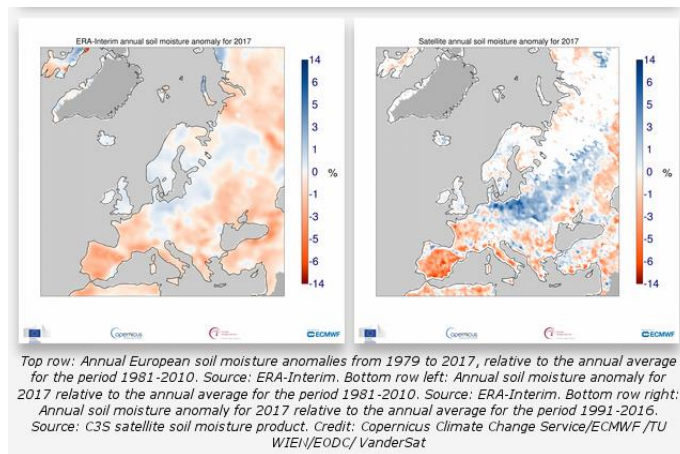


About



European State of the Climate

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

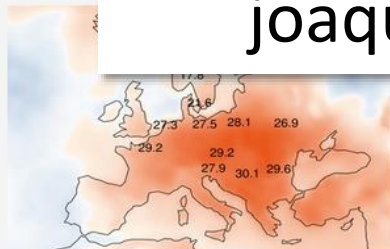


CLIMATE INFORMATION FOR YOUR PLANNING

climate.copernicus.eu

joaquin.munoz@ecmwf.int

IN FOCUS



Europe's warmest April since 1979

21 May 2018

READ MORE



Monthly maps and charts of essential climate variables

ARCHIVE



21 May 2018
Copernicus contributes to healthier city living through VITO mapping project



15 May 2018
Copernicus to launch operational service for energy sector

ARCHIVE