



# The Copernicus Climate Change Service

## C3S observations related activities

Jean-Noël Thépaut  
ECMWF





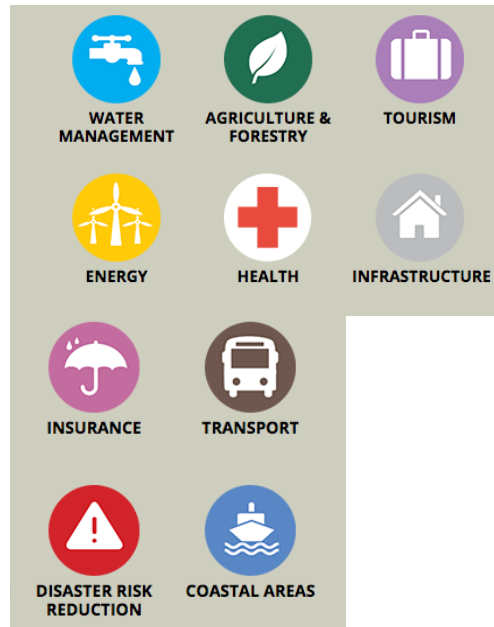
## Climate Data Store

## Sectoral Information System

## Evaluation and Quality Control

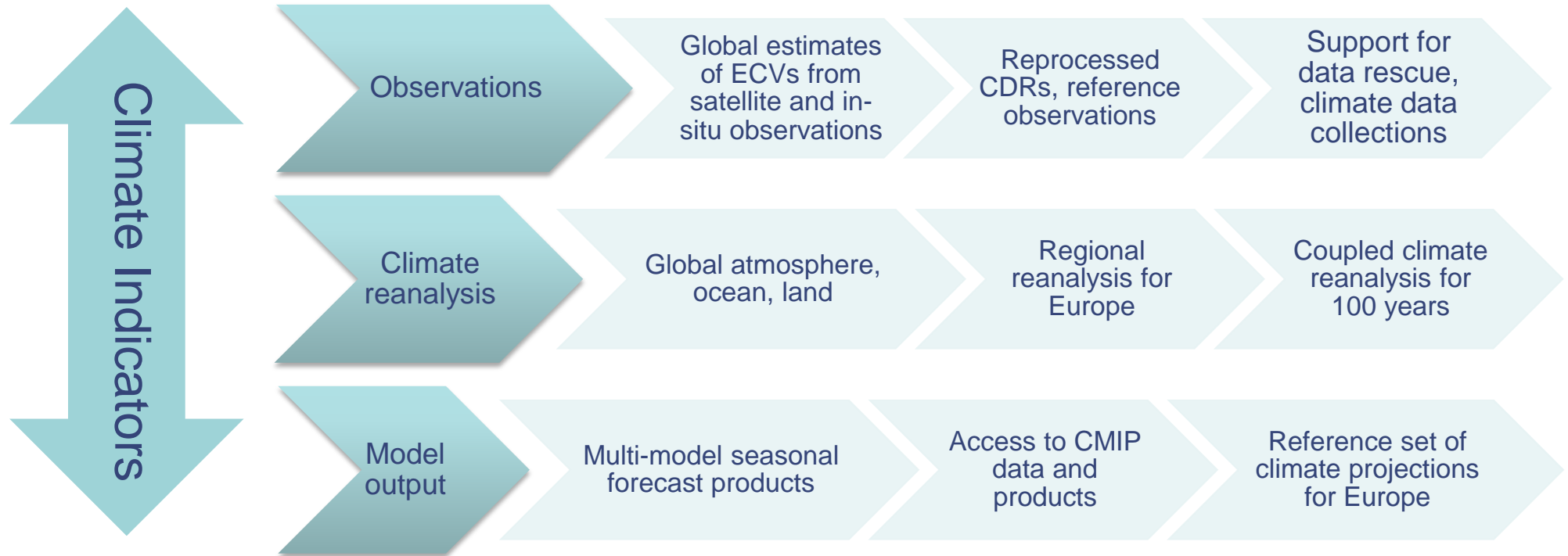
## Outreach and Dissemination

- ECVs past, present and future
- Observed, reanalysed and simulated
- Derived climate indicators
- Tools to support adaptation and mitigation at global and European level



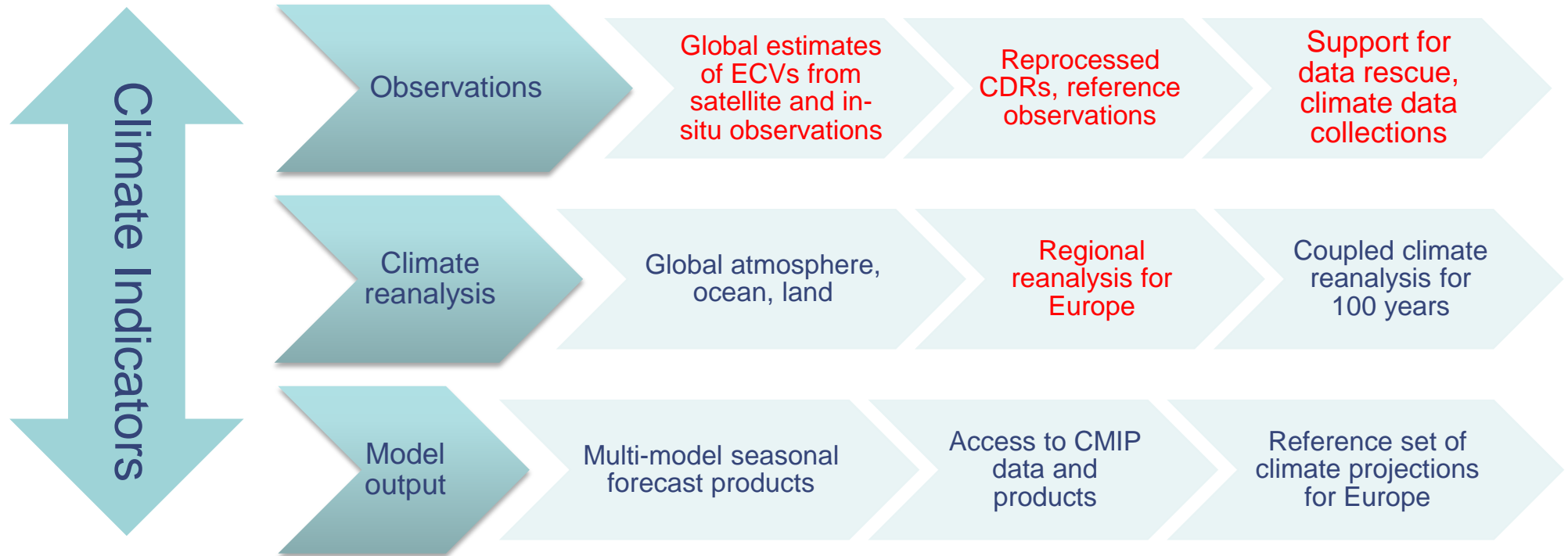
- Monitors quality of C3S products and services
- Ensures C3S delivers state-of-the-art climate information to end-users
- Identifies gaps in service provision
- Bridges Copernicus with the research agenda in Europe (e.g. H2020, national research projects)

- Web content
- Public outreach
- Coordination with national outreach
- Liaison with public authorities
- Conferences, seminars
- Training and education



### Science basis:

- Essential Climate Variables as defined by GCOS
- GCOS Status Report (GCOS-195)
- IPCC, CMIP, FP7/H2020, ESA CCI, ...



### Science basis:

- Essential Climate Variables as defined by GCOS
- GCOS Status Report (GCOS-195)
- IPCC, CMIP, FP7/H2020, ESA CCI, ...



	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
C3S_51 (Lot 2)	EQC on ECV products from observations	2016Q4	Contract negotiated
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
C3S_311a	In situ observations	2016Q4	4 Lots, bids under evaluation
C3S_311c	Satellite data rescue	2017Q2	PIN has been published
C3S_322	Regional reanalysis	2017Q1	ITT has been published
C3S_511	EQC on observations and reanalysis	2017Q1	PIN has been published
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
C3S_51 (Lot 2)	EQC on ECV products from observations	2016Q4	Contract negotiated
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
C3S_311a	In situ observations	2016Q4	4 Lots, bids under evaluation
C3S_311c	Satellite data rescue	2017Q2	PIN has been published
C3S_322	Regional reanalysis	2017Q1	ITT has been published
C3S_511	EQC on observations and reanalysis	2017Q1	PIN has been published
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



### **C3S\_312a: Gridded ECV products (9 contracts)**

CDRs and ICDRs primarily from satellite data  
Building on ESA CCI and EUMETSAT SAFs

### **C3S\_311a Lot 4: In situ data products for Europe**

High-resolution maps and homogenised time series  
Strong involvement of EUMETNET and EEA

### **C3S\_312b: Gridded ECV products (4-6 contracts)**

Mix of data from space and in situ  
Jointly with CAMS, CMEMS, GLS where possible





ECV roadmap for C3S		2016	Q2	Q3	Q4	2017	Q2	Q3	Q4	CAMS	CMEMS	CLMS	SAFS	GCOS Status Report	
<b>Work in progress</b>		Services in development				Operational data services									
<b>23 March 2016</b>		Data access via ECMWF/providers				Data access via CDS									
C3S Phase 1	Atmosphere	Surface Air Temperature	ERA5											4.3.1	
		Surface Precipitation	ERA5											✓	4.3.5
		Surface Humidity	ERA5												4.3.3
		Surface Radiation Budget	ERA5											✓	4.3.6
		Earth Radiation Budget	ERA5											✓	4.5.5
		Carbon Dioxide		C3S_312(a)							□				4.7.1
		Methane		C3S_312(a)							✓				4.7.2
		Ozone		C3S_312(a)							✓			✓	4.7.4
		Aerosol		C3S_312(a)							✓				4.7.5
		Cloud Properties	ERA5											✓	4.5.4
		Wind Speed and Direction	ERA5												✓
	Ocean	Ocean Colour						C3S_312(b)				✓			5.3.7
		Sea Ice		C3S_312(a)								✓		✓	5.3.5
		Sea Level		C3S_312(a)								✓			5.3.3
Sea-Surface Temperature			C3S_312(a)								✓			5.3.1	
Global Ocean Heat Content					ORAS						✓			5.4.1	
Land	Snow Cover	ERA5												6.3.5	
	Glaciers and Ice Caps		C3S_312(a)											6.3.6	
	Albedo		C3S_312(a)										✓	6.3.9	
	FAPAR		C3S_312(a)											6.3.11	
	Fire Disturbance							C3S_312(b)						6.3.15	
	Ice Sheets							C3S_312(b)						6.3.7	
C3S Phase 2	Atmo	Upper Air Temperature	ERA5											4.5.1	
		Other Long-Lived Greenhouse Gases						C3S_312(b)			✓			4.7.3	
	Ocean	Carbon Dioxide Partial Pressure							C3S_312(b)						5.3.8
		Ocean Acidity							C3S_312(b)						5.4.6
		Ocean Currents				ORAS					✓			5.3.6	
		Ocean Salinity				ORAS					✓			5.4.2	
	Land	Lakes							C3S_312(b)				✓		6.3.4
		Permafrost and seasonally frozen ground							C3S_312(b)				✓		6.3.8
		Land Cover (including Vegetation Type)							C3S_312(b)				✓		6.3.10
		Leaf Area Index (LAI)		C3S_312(a)											6.3.12
Soil Moisture		C3S_312(a)										✓	6.3.16		





	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
C3S_51 (Lot 2)	EQC on ECV products from observations	2016Q4	Contract negotiated
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
C3S_311a	In situ observations	2016Q4	4 Lots, bids under evaluation
C3S_311c	Satellite data rescue	2017Q2	PIN has been published
C3S_322	Regional reanalysis	2017Q1	ITT has been published
C3S_511	EQC on observations and reanalysis	2017Q1	PIN has been published
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



### C3S\_311b: Reprocessing of level-1 data (DN with EUMETSAT)

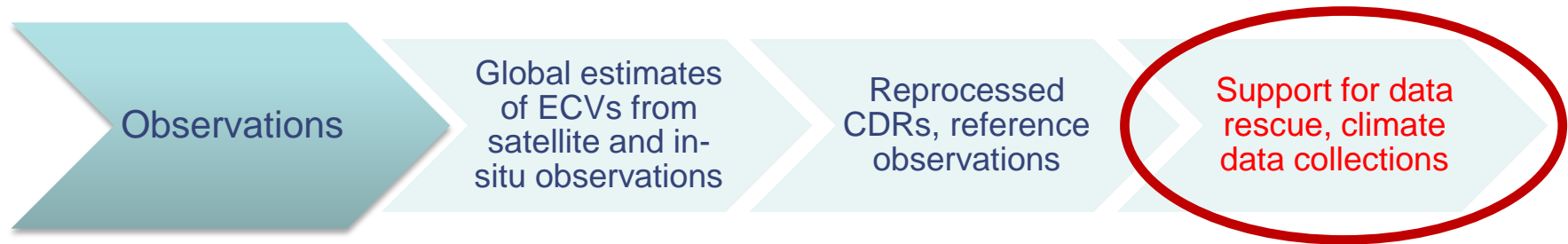
WP Number	WP Title	Start	End
<b>WP1</b>	Atmospheric Sounding FCDRs	Q1/2017	Q3/2019
<b>WP2</b>	Radio Occultation FCDRs	Q2/2017	Q2/2021
<b>WP3</b>	Scatterometer FCDR	Q1/2020	Q1/2021
<b>WP4</b>	Meteosat Radiance FCDR	Q4/2016	Q1/2021
<b>WP5</b>	Atmospheric Motion Vectors TCDRs	Q2/2017	Q4/2020
<b>WP6</b>	Polar Multi-Sensor Aerosol Product	Q3/2019	Q2/2021
<b>WP7</b>	Operational Preparation Activities	Q1/2018	Q2/2021
<b>WP8</b>	International Coordination	Q1/2020	Q2/2021
<b>WP9</b>	Activity Coordination and Management	Q4/2016	Q2/2021

### C3S\_311a Lot 3: Access to networks of observation sites

Harmonise data access from reference and baseline networks



	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
C3S_51 (Lot 2)	EQC on ECV products from observations	2016Q4	Contract negotiated
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
<b>C3S_311a</b>	<b>In situ observations</b>	<b>2016Q4</b>	<b>4 Lots, bids under evaluation</b>
<b>C3S_311c</b>	<b>Satellite data rescue</b>	<b>2017Q2</b>	<b>PIN has been published</b>
C3S_322	Regional reanalysis	2017Q1	ITT has been published
C3S_511	EQC on observations and reanalysis	2017Q1	PIN has been published
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



### **C3S\_311a Lot 1: Coordination of data rescue activities**

Data rescue registry and support services  
Building on ACRE, I-DARE, ERA-CLIM(2)

### **C3S\_311a Lot 2: Access to global climate data archives**

Harmonise data access, formats and metadata conventions

### **C3S\_311c: Satellite data rescue**

Preservation of perishable data and expert knowledge  
Aim for maximum impact on climate record  
Building on ERA-CLIM(2)



	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
C3S_51 (Lot 2)	EQC on ECV products from observations	2016Q4	Contract negotiated
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
C3S_311a	In situ observations	2016Q4	4 Lots, bids under evaluation
C3S_311c	Satellite data rescue	2017Q2	PIN has been published
<b>C3S_322</b>	<b>Regional reanalysis</b>	<b>2017Q1</b>	<b>ITT has been published</b>
C3S_511	EQC on observations and reanalysis	2017Q1	PIN has been published
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



## C3S\_322: Regional reanalysis

Heritage: UERRA

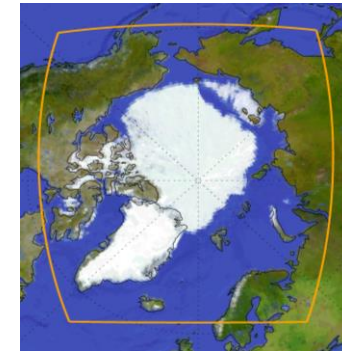
European and Arctic domains

Spatial resolution ~10km

2 separate contracts

Foster competition:

- Allow for some development
- ECMWF provides data archiving and data access services





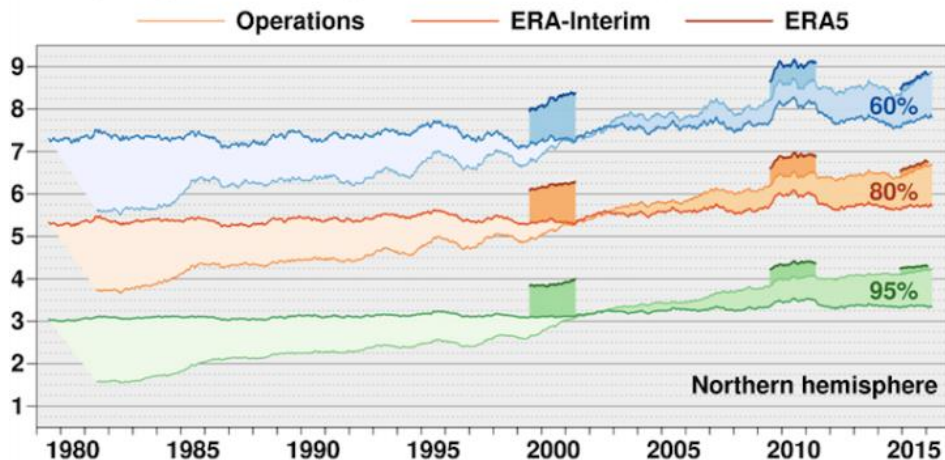
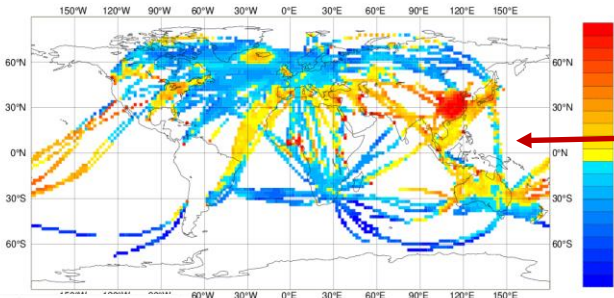


## Global reanalysis:

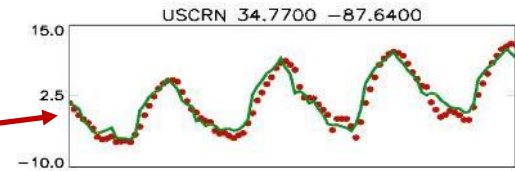
### ERA5 is now in production (3 streams)

- 32km global resolution
- Uncertainty estimates
- Improved use of observations
- Newly reprocessed satellite data
- Hourly data from 1979-NRT
- Access to all input observations

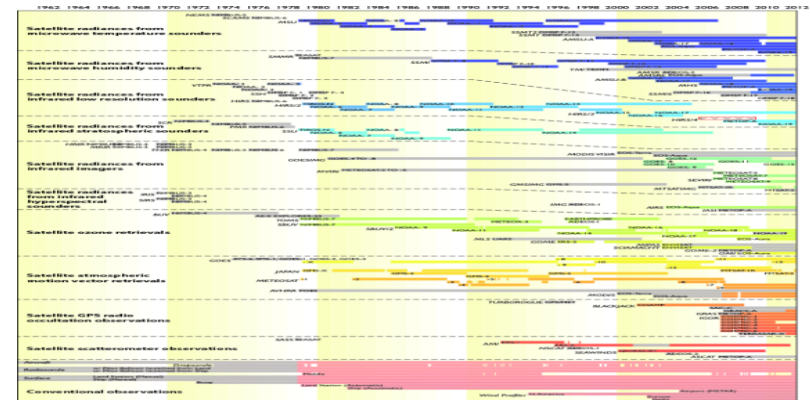
Range (days) when 365-day mean 500hPa height AC (%) falls below threshold

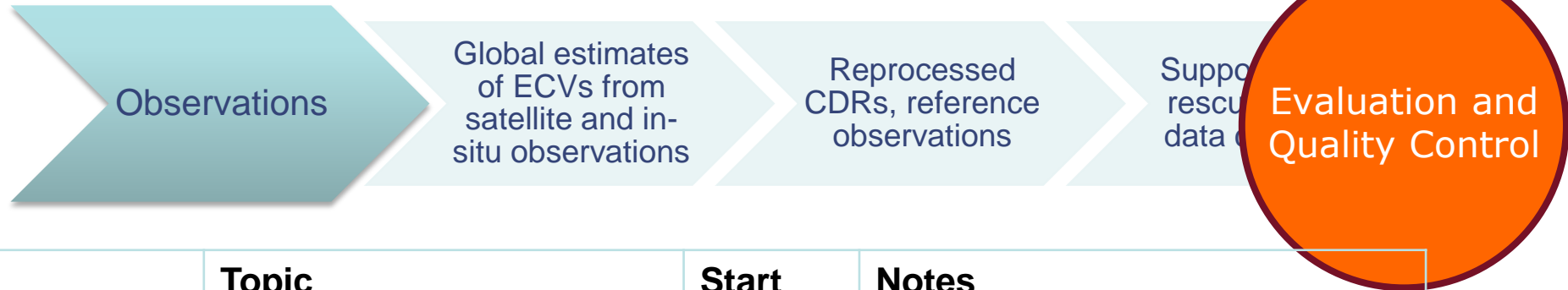
ERA5 2-metre temperature compared to independent data



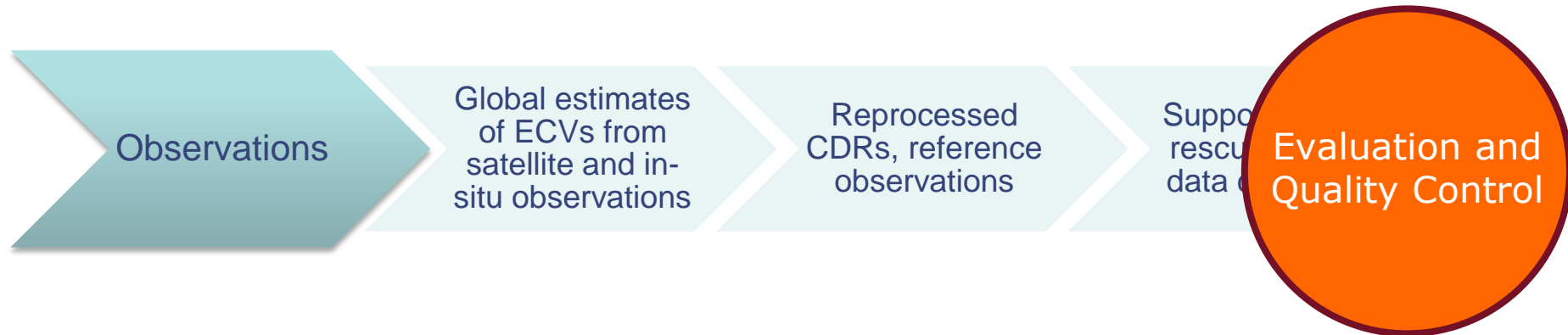
### Observation feedback archive







	Topic	Start	Notes
C3S_311b (DN)	Satellite data reprocessing	2016Q3	Contract signed with EUMETSAT
<b>C3S_51 (Lot 2)</b>	<b>EQC on ECV products from observations</b>	<b>2016Q4</b>	<b>Contract negotiated</b>
C3S_312a	Gridded ECV products (1)	2016Q4	9 contracts signed or negotiated
C3S_311a	In situ observations	2016Q4	4 Lots, bids under evaluation
C3S_311c	Satellite data rescue	2017Q2	PIN has been published
C3S_322	Regional reanalysis	2017Q1	ITT has been published
<b>C3S_511</b>	<b>EQC on observations and reanalysis</b>	<b>2017Q1</b>	<b>PIN has been published</b>
C3S_312b	Gridded ECV products (2)	2017Q3	Additional 4-6 contracts



## **C3S\_51 Lot 2: EQC for gridded ECV products from observations**

Metrological approach based on QA4ECV, FIDUCEO  
Framework for error traceability and documentation  
Elements of System Maturity Matrix (CORE-CLIMAX)  
Web portal for submitting uncertainty information

## **C3S\_511: Quality assessment of ECV products**

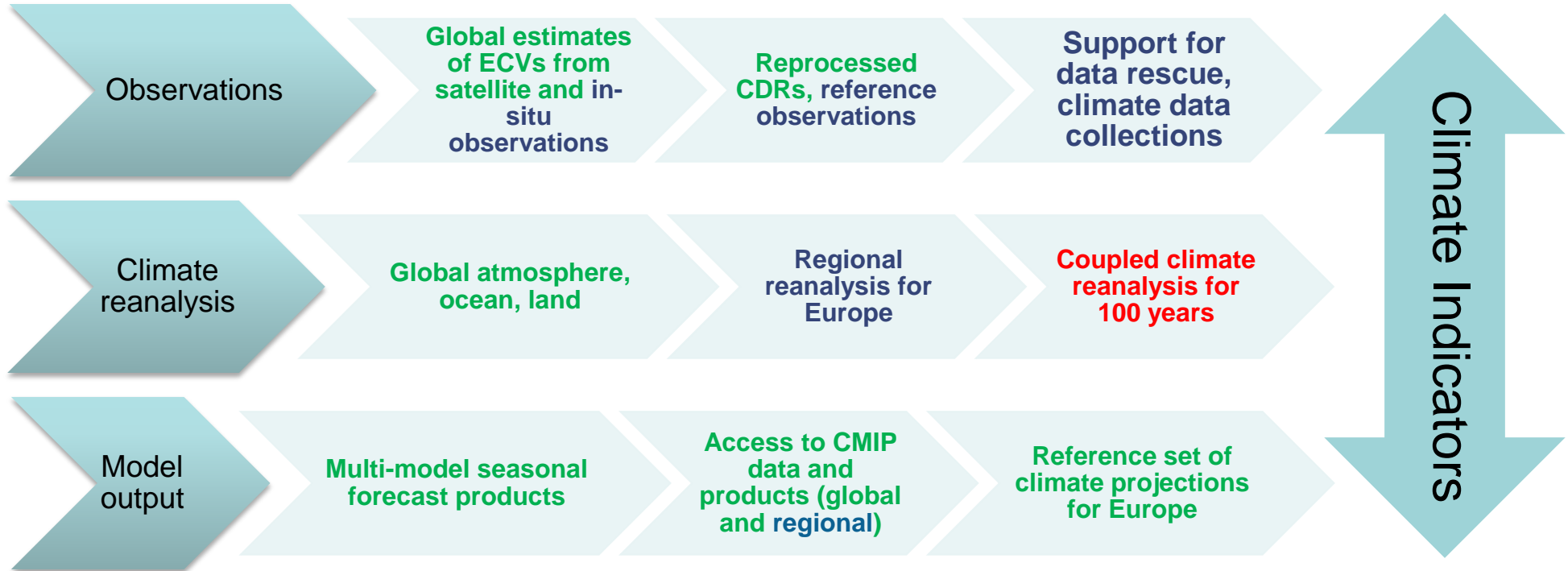
Multiple ECVs, multiple products  
Routinely assess CDRs and ICDRs for C3S  
Compare with reanalyses and existing CDRs  
(e.g. NOAA, SAFs, other Services)



## Scientific basis:

- Essential Climate Variables as defined by GCOS
- GCOS Status Report (GCOS-195)
- IPCC, CMIP

- Action engaged
- In preparation (PIN or ITT out)
- Not started



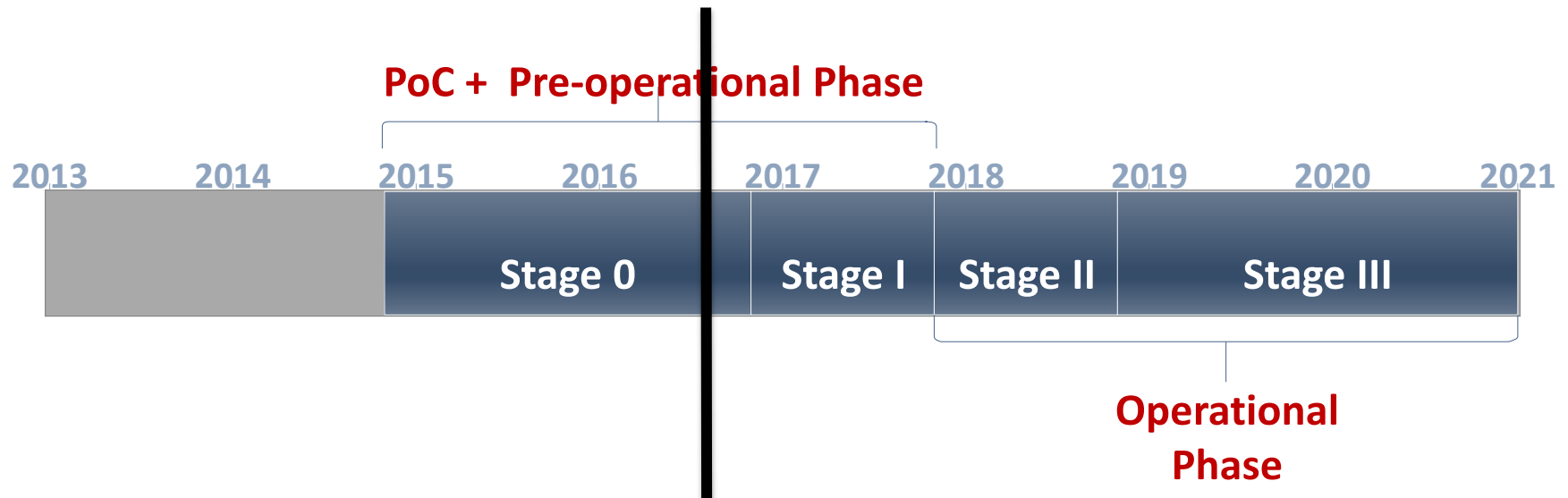


# Timeline

Stage 0/1 - Proof of Concept/Pre-operational

Stage II - Operational ~20 ECVs, ~5-6 Sectors

Stage III - Operational ~30 ECVs, ~10 Sectors

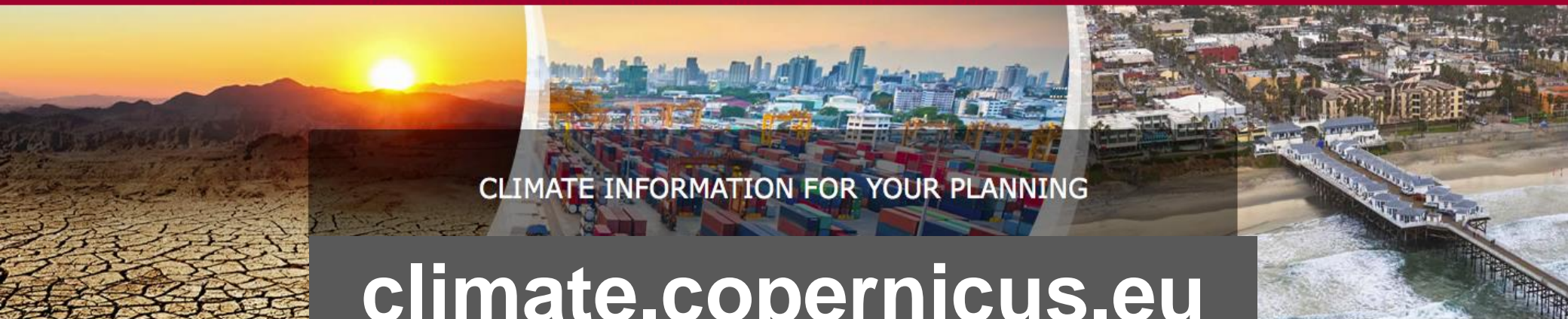




Contact us

Search

[Home](#)
[ABOUT C3S](#)
[NEWS & MEDIA](#)
[EVENTS](#)
[TENDERS](#)
[PRODUCTS](#)
[SERVICES](#)
[USER SUPPORT](#)



CLIMATE INFORMATION FOR YOUR PLANNING

# climate.copernicus.eu

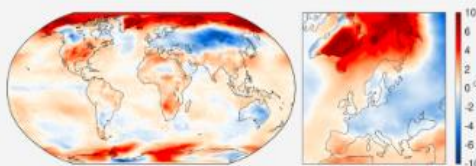
## IN FOCUS



**COP22: Temperatures, wildfires and CO2 – Copernicus 'Europe's eyes on earth' observes a year of extremes**

14 Nov 2016

## MONTHLY MAPS



**Average surface air temperatures for October 2016**

October 2016

## NEWS



01 Nov 2016  
**ODI Summit and Awards 2016**



14 Oct 2016  
**Climate projection dataset release for the energy sector**



11 Oct 2016  
**Copernicus first visit to INTERGEO**