Climate Change

Climate Change Service

Neuigkeiten zum C3S Service

Johannes Flemming, presenting
Jean-Noël Thépaut, ECMWF

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Climate Change Service: Vision

- Kompetenz fűr Klima Informationen in Europa
- Aufbauend auf Europas Investitionen in Wissenschaft und Technologie
- Schaffung eines Marktes fűr Klima Dienstleistungen

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Climate Change Service: Solutions

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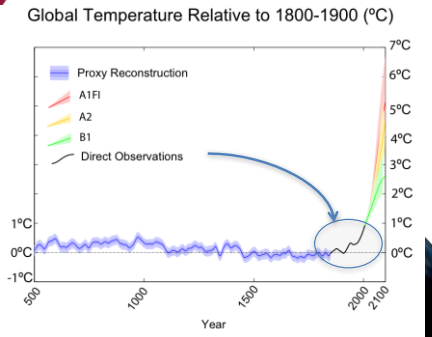
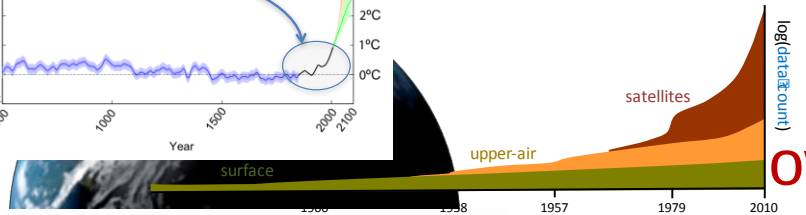
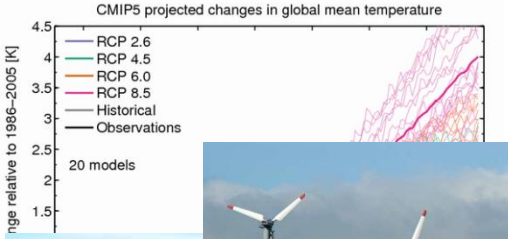




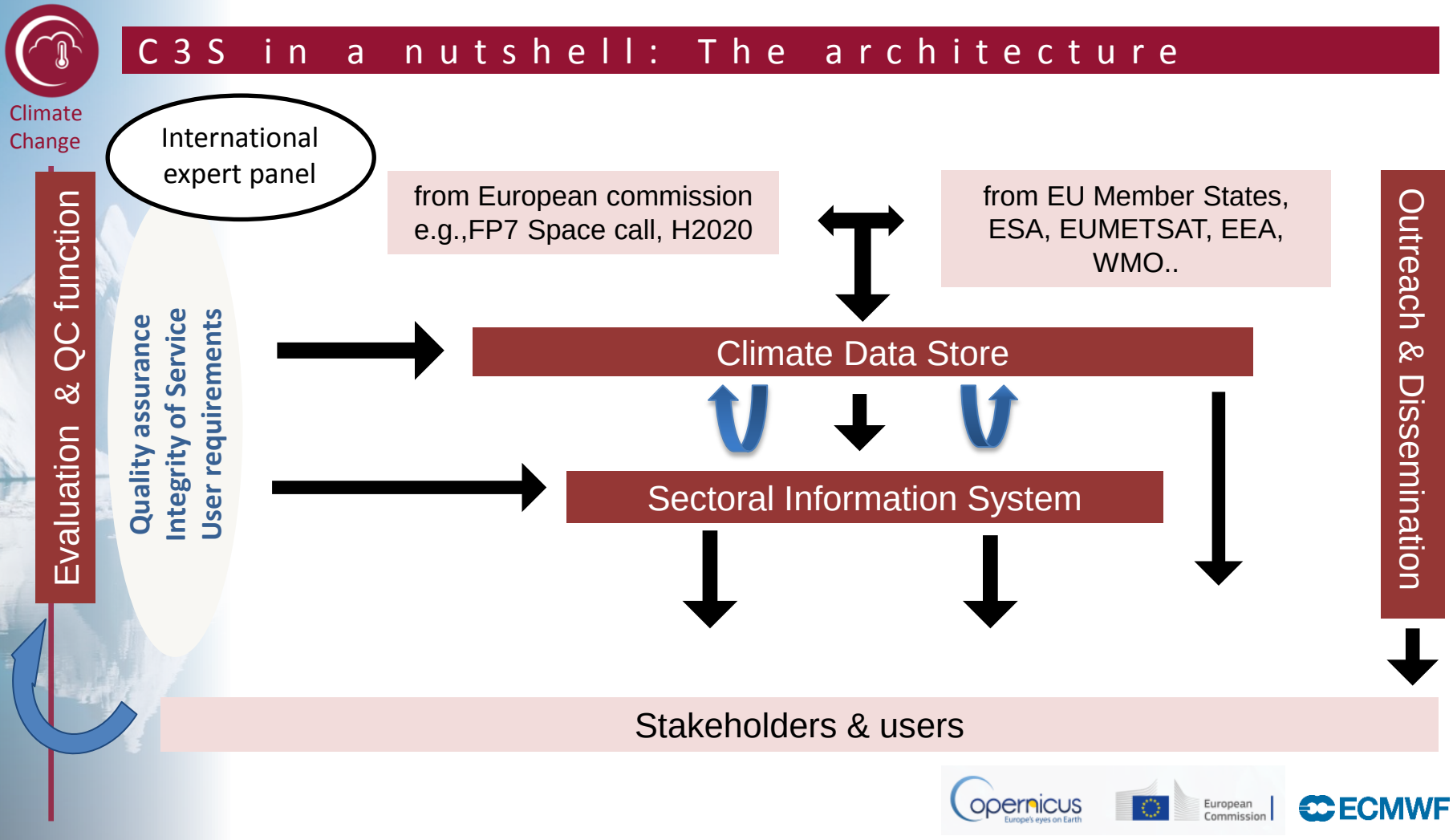
- How is climate changing ?

ow will it change in future?



- How will it impact society?

C3S in a nutshell: The architecture



C3S - Development timeline

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

Signature of Delegation Agreement

Today: first C3S General Assembly

C3S first operations

2014 2015 2016 2017 2018 2019 2020 2021

Stage 0/I

Stage II

Stage III

Mid-term review

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Building Upon National and European Investments

National investments: Modeling capabilities, in-situ observations, seasonal forecasts, …

ERA5, ERA6
Data rescue
Satellite reprocessing

Regional reanalysis workshop
Regional reanalysis ITT Q4 2016

EQC on gridded observations
ECV datasets production

Best practices
Vocabularies, provenance, metadata
User engagement

Workshop on Attribution in October 2017 to decide what next

Significant uptake on ECV datasets production

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Climate Data Store Content

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Climate Data Store content

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 Indicators
Climate reanalysis	Global atmosphere, ocean, land	Regional reanalysis for Europe	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	

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Roadmap for Atmospheric ECVs

	GCOS Status Report	C3S Technical Annex	CDS	Reanalysis	Observations
Atmosphere (surface)					
Air temperature	4.3.1	Stage III	2017	ERA5	C3S_311a
Wind speed and direction	4.3.2	Stage II	2017	ERA5	C3S_311a
Water vapour	4.3.3	Stage II	2017	ERA5	C3S_311a
Pressure	4.3.4		2017	ERA5	C3S_311a
Precipitation	4.3.5	Stage II	2017	ERA5	C3S_311a
Surface radiation budget	4.3.6	Stage II	2017	ERA5	
Atmosphere (upper air)					
Temperature	4.5.1		2017	ERA5	
Wind speed and direction	4.5.2	Stage II	2017	ERA5	
Water vapour	4.5.3		2017	ERA5	
Cloud properties	4.5.4	Stage II	2017	ERA5	
Earth radiation budget	4.5.5	Stage II	2017	ERA5	
Atmosphere (composition)					
Carbon dioxide	4.7.1	Stage II	2017		C3S_312a
Methane	4.7.2	Stage II	2017		C3S_312a
Other long-lived greenhouse gases	4.7.3	Stage III	2018		C3S_312b
Ozone	4.7.4	Stage II	2017	ERA5	C3S_312a
Aerosol	4.7.5	Stage II	2017		C3S_312a

Action engaged

In preparation (PIN or ITT out)

Auszug ....

Seasonal forecasts- first release 12/2016

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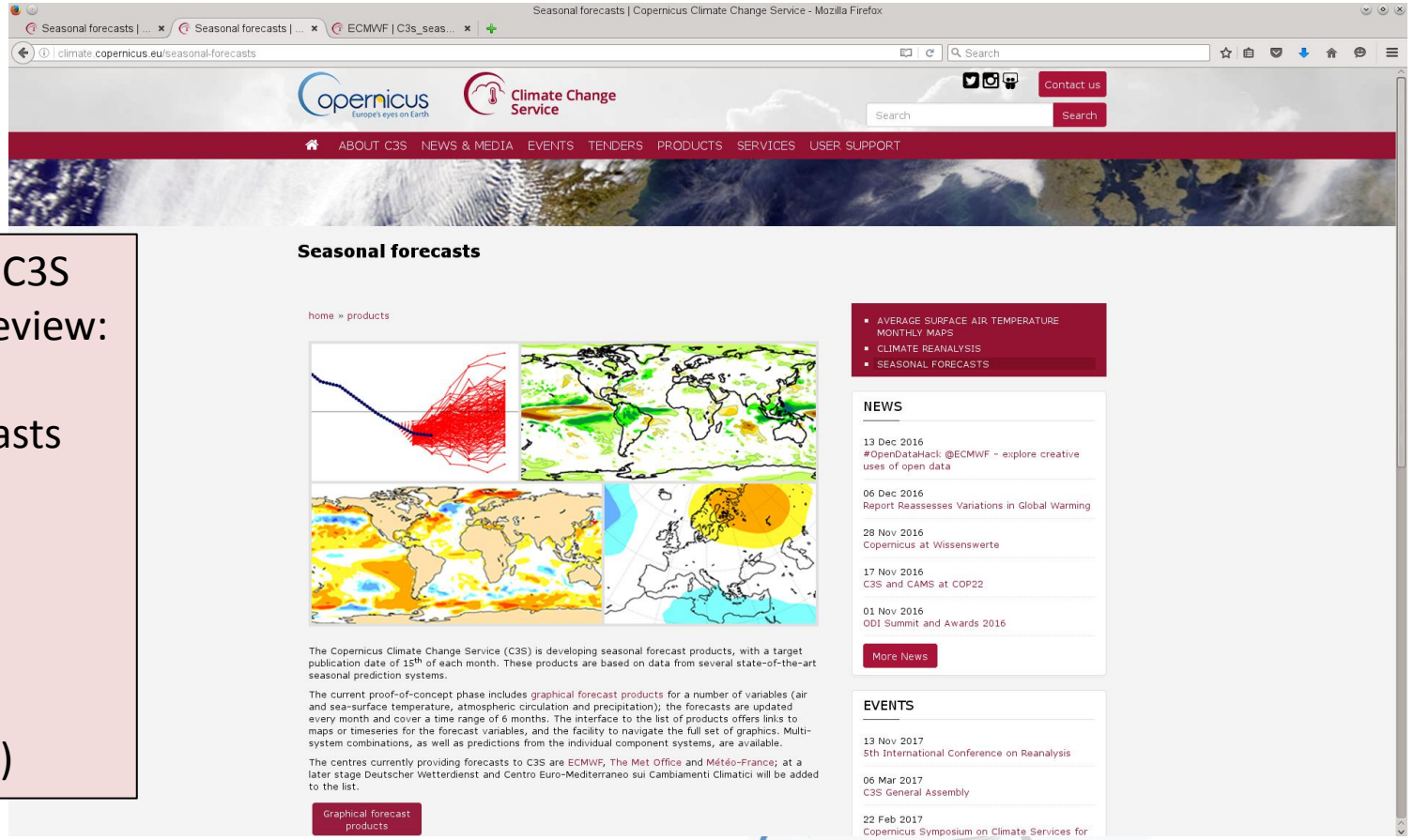
An example of C3S operational preview: Multi-model seasonal forecasts

Meteo-France
UK MetOffice
ECMWF

(CMCC & DWD)



http://climate.copernicus.eu/seasonal-forecasts

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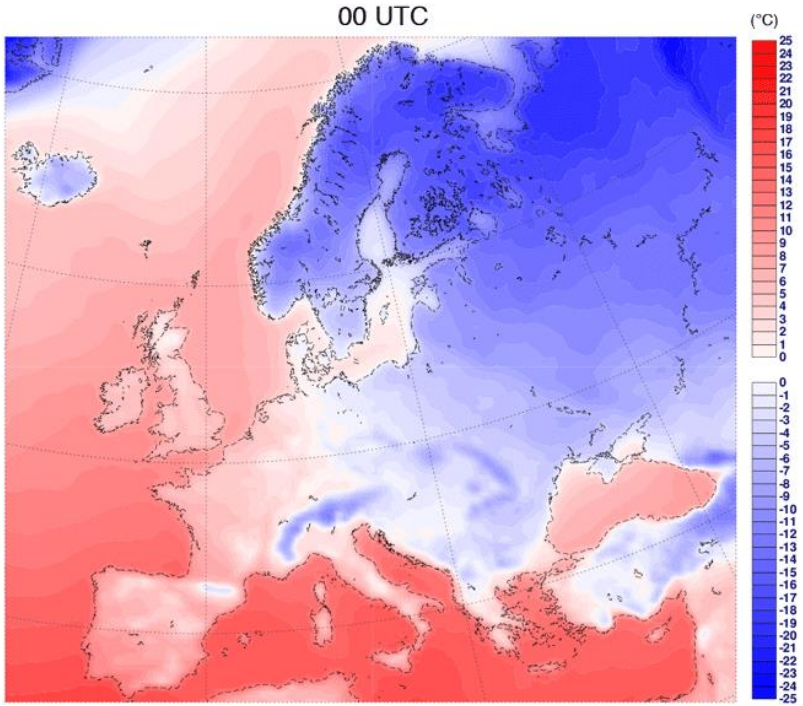
ERA5: The latest ECMWF reanalysis is now in production

Public release plan:

Nov 2016	Test data (Jan-Feb 2016)
Apr 2017	Hourly data from 2010 - 2016
May 2017	Daily updates at short delay
Apr 2018	Complete from 1979 onward



ERA5 hourly temperatures for January 2016

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Climate Data Store

Infrastructure and toolbox

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CDS infrastructure and toolbox

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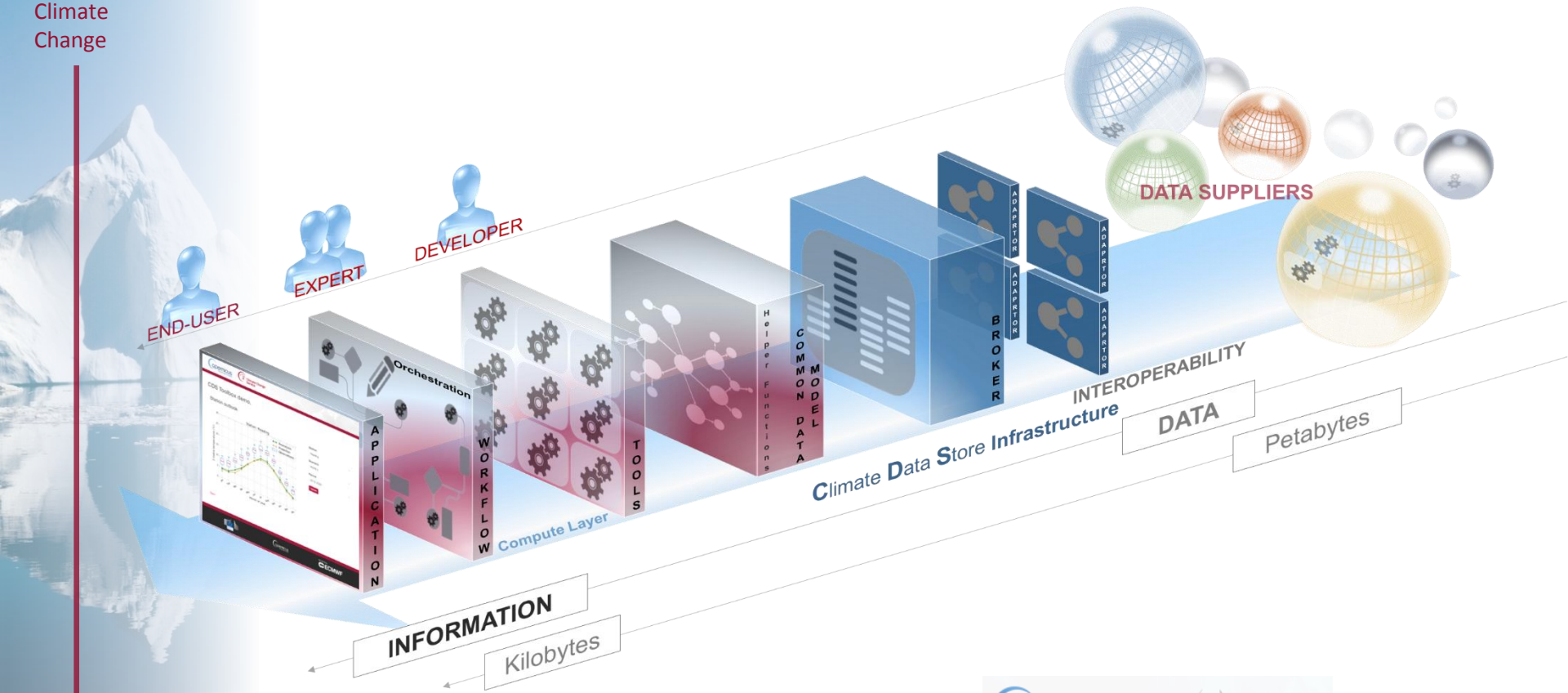

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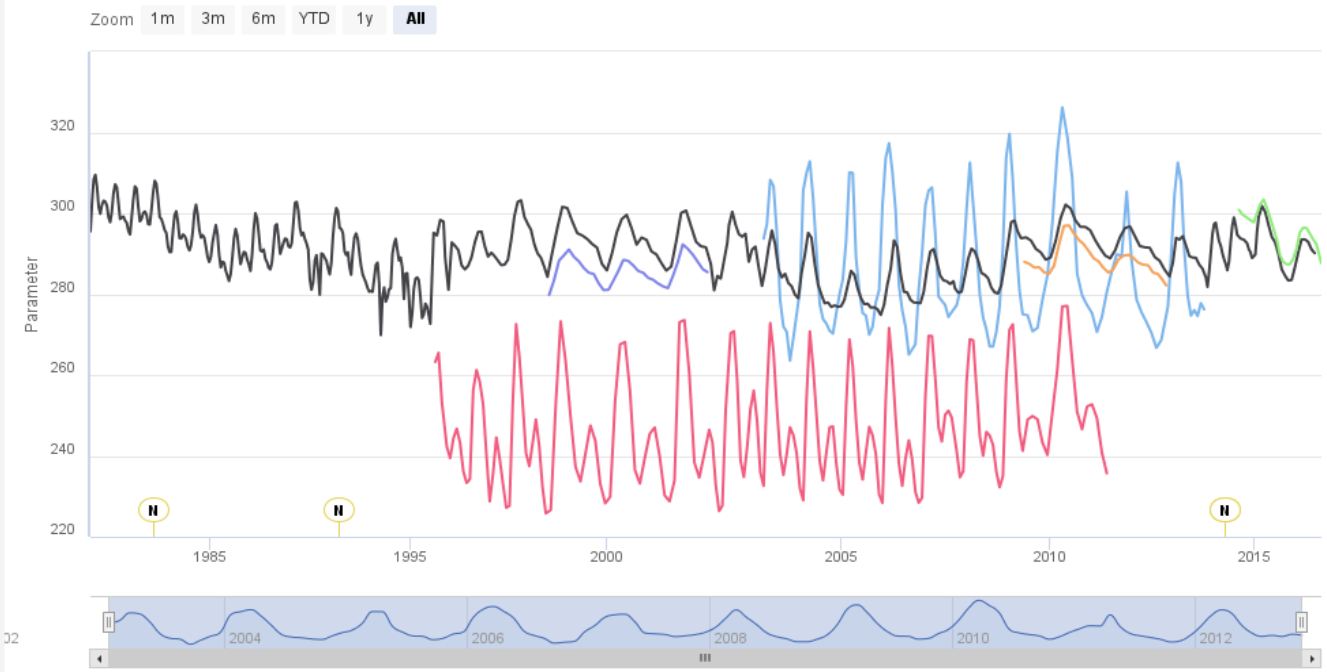
CDS toolbox: Climate Monitoring Facility

Global Total Column Ozone



MACC (CAMS) reanalysis
ERA-interim
ERA5 (stream I)
(stream II)
(stream III)
ESA-CCI

Volcanic eruptions

7 Proof-of-concepts with end-to-end demonstrators

WHAT WILL THE INFORMATION BE USED FOR?

The wealth of climate information will be the basis for generating a wide variety of climate indicators aimed at supporting adapt nd mitigation s in Europe in a number of sector e include, but are no ed to, the following:

C3S WILL DELIVER SUBSTANTIAL ECONOMIC VALUE TO EUROPE BY:

1. **INFORMING**
   POLICY DEVELOPMENT TO PROTECT CITIZENS FROM CLIMATE-RELATED HAZARDS SUCH AS HIGH-IMPACT WEATHER EVENTS
2. **IMPROVING**
   PLANNING OF MITIGATION AND ADAPTATION PRACTICES FOR KEY HUMAN AND SOCIETAL ACTIVITIES
3. **PROMOTING**
   THE DEVELOPMENT OF NEW SERVICES FOR THE BENEFIT OF SOCIETY

Very convincing POCs and demonstrators

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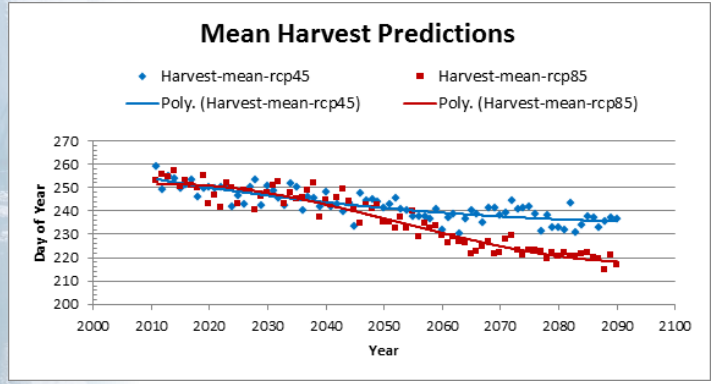
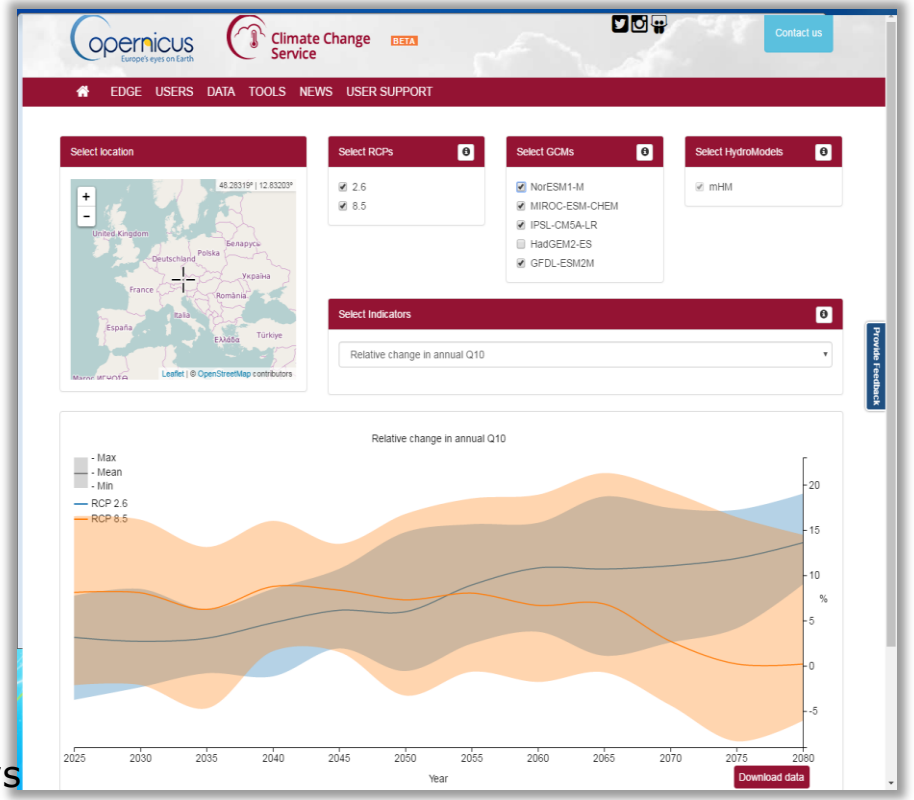
- Climate information is tailored to meet Sectoral needs





Predicted vine harvest date advances by 18 days (RCP4.5) and 32 days (RCP8.5)

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Evaluation and Quality Control

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EQC: Engaged and future activities

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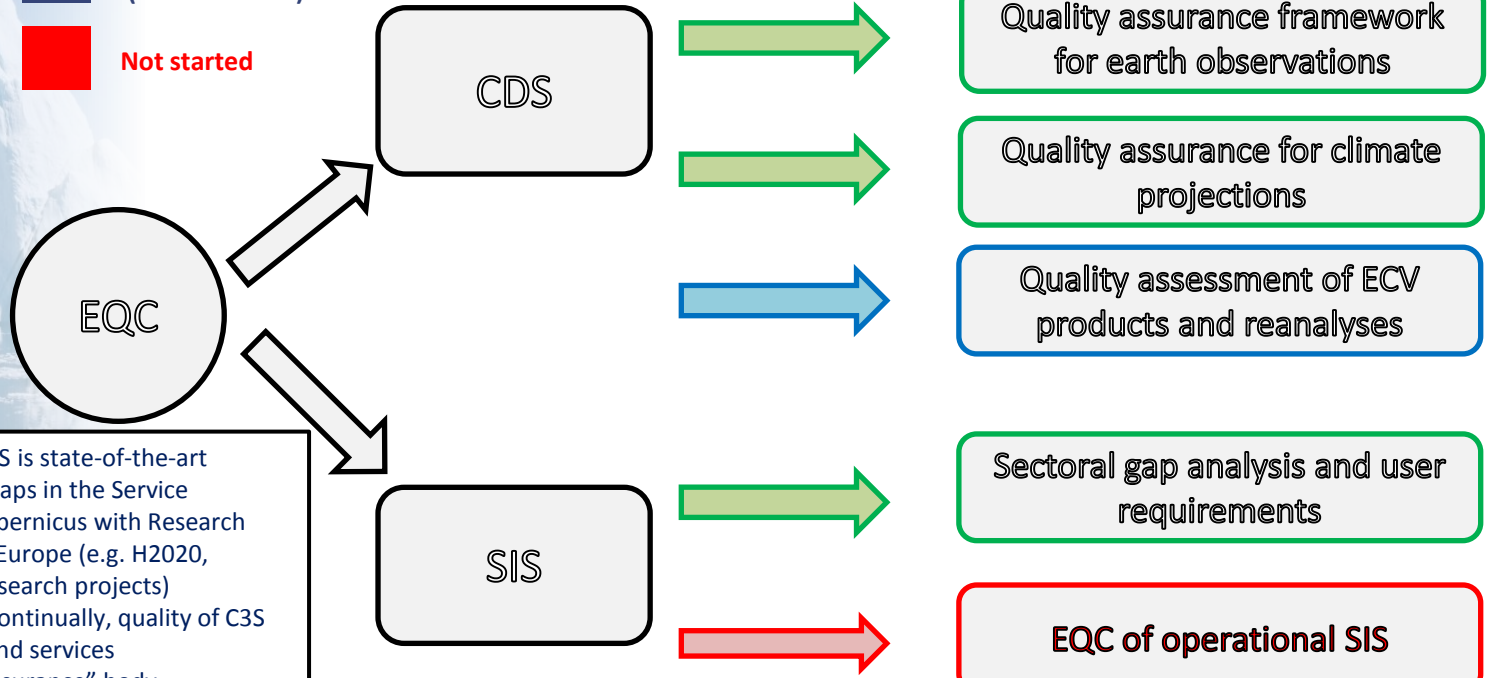
Action engaged

In preparation (PIN or ITT out)

Not started



Ensures C3S is state-of-the-art
Identifies gaps in the Service
Bridges Copernicus with Research Agenda in Europe (e.g. H2020, national research projects)
Monitors continually, quality of C3S products and services
"Quality Assurance" body
Contributes and develops URDB/SES/etc documents

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C3S have collectively achieved a lot over the past two years

There is still a lot to do to become fully operational

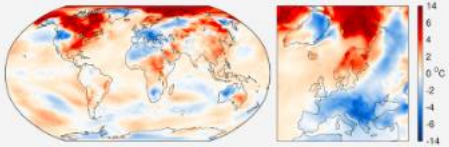
climate.copernicus.eu

IN FOCUS

C3S holds its inaugural General Assembly

03 Mar 2017

MONTHLY MAPS



Average surface air temperatures for January 2017

January 2017

NEWS

03 Mar 2017
#OpenDataHack @ECMWF - explore creative uses of open data

03 Mar 2017
C3S holds its inaugural General Assembly

26 Jan 2017
Copernicus at the 4th International Conference on Energy & Meteorology (ICEM)

C3S website- users' cities/countries

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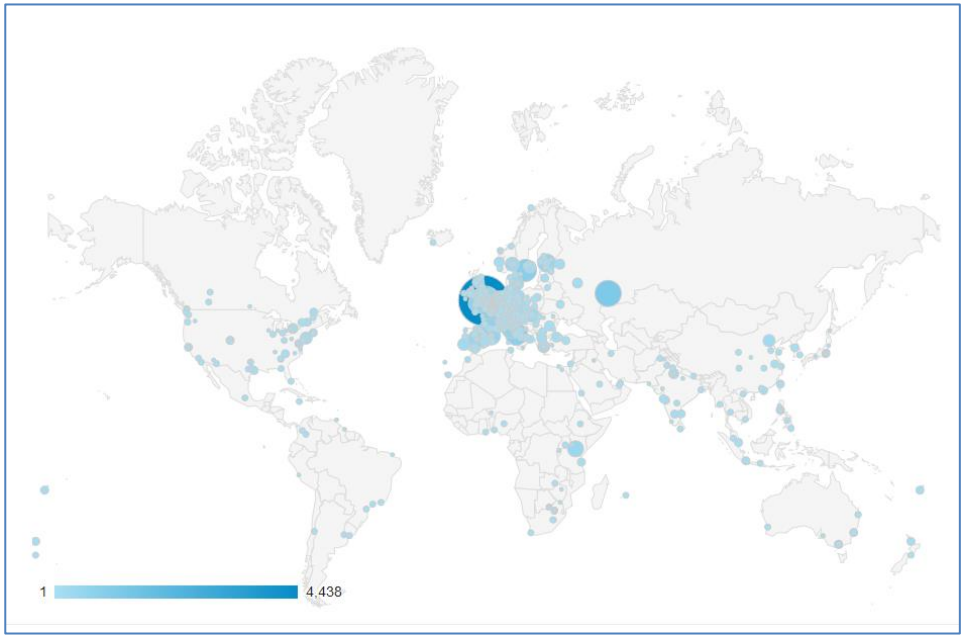
	Sessions	% New Sessions	New Users
	50,347 % of Total: 100.00% (50,347)	57.49% Avg for View: 57.48% (0.01%)	28,942 % of Total: 100.01% (28,939)
1. United Kingdom	11,179 (22.20%)	34.82%	3,893 (13.45%)
2. United States	3,870 (7.69%)	84.39%	3,266 (11.28%)
3. France	3,534 (7.02%)	51.70%	1,827 (6.31%)
4. Italy	3,525 (7.00%)	42.38%	1,494 (5.16%)
5. Germany	3,203 (6.36%)	54.42%	1,743 (6.02%)
6. Spain	2,378 (4.72%)	63.67%	1,514 (5.23%)
7. Netherlands	1,852 (3.68%)	63.77%	1,181 (4.08%)
8. Russia	1,528 (3.03%)	63.94%	977 (3.38%)
9. Belgium	1,454 (2.89%)	44.09%	641 (2.21%)
10. Sweden	1,401 (2.78%)	39.04%	547 (1.89%)
11. Canada	998 (1.98%)	85.87%	857 (2.96%)
12. Norway	958 (1.90%)	50.94%	488 (1.69%)
13. India	912 (1.81%)	86.18%	786 (2.72%)
14. Greece	771 (1.53%)	54.09%	417 (1.44%)
15. China	739 (1.47%)	77.67%	574 (1.98%)
16. Finland	695 (1.38%)	54.68%	380 (1.31%)
17. Denmark	558 (1.11%)	51.79%	289 (1.00%)
18. Switzerland	547 (1.09%)	64.35%	352 (1.22%)
19. Hungary	485 (0.96%)	47.63%	231 (0.80%)
20. Australia	477 (0.95%)	84.49%	403 (1.39%)
21. Kenya	472 (0.94%)	86.23%	407 (1.41%)
22. Czech Republic	440 (0.87%)	38.41%	169 (0.58%)
23. Philippines	412 (0.82%)	90.78%	374 (1.29%)
24. Austria	411 (0.82%)	72.02%	296 (1.02%)
25. Portugal	404 (0.80%)	60.64%	245 (0.85%)

C3S is still in its infancy
Outreach so far:



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User Consultation & Community Build Up

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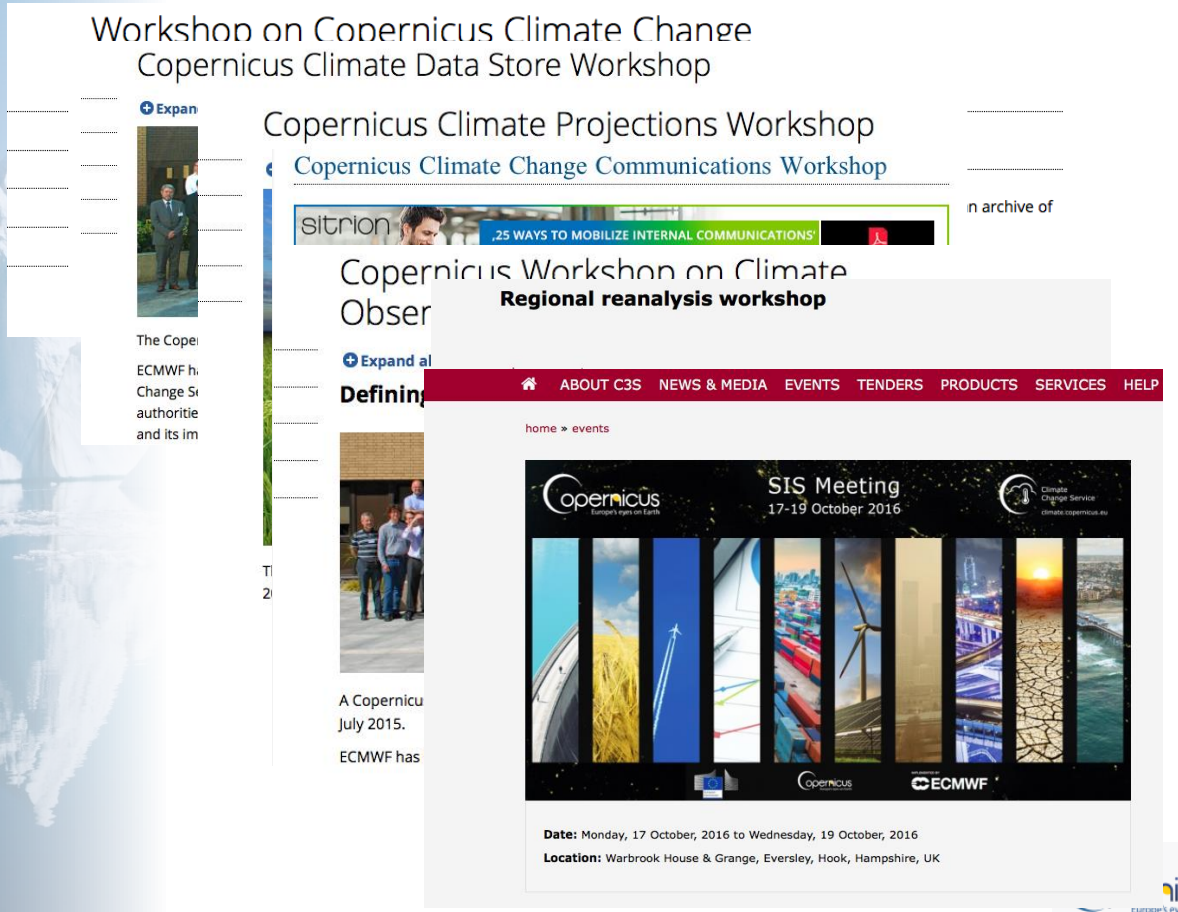

17-18 February 2014

3-6 March 2015

20-21 April 2015

16-17 June 2015

29 June-2 July 2015

19 -20 May 2016

17-19 October 2016

+ many user and stakeholder workshops organised by contractors

European Commission

ECMWF

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ECV ROADMAP

- ~ 30 ECVs, described in the C3S Technical Annex, and planned for stages II and III, are either:
  - **engaged** (via ERA5/ORA5, 312a lots all awarded, and 311a in-situ)

  or
  - under **PIN / ITT** (2nd set ECVs in 312b).
- These ECVs will progressively become available through 2017/2018.
- Will be complemented by additional ECVs (as outcomes or reanalysis products)

- Liaison with other Copernicus services (e.g. CAMS, CMEMS ..) and ESA-CCI, SAFs, NOAA, etc. is being implemented (Coordination, ITTs spec, evaluation and follow-up, etc.) to ensure complementary and synergies

- ECVs are all traceable to GCOS status report

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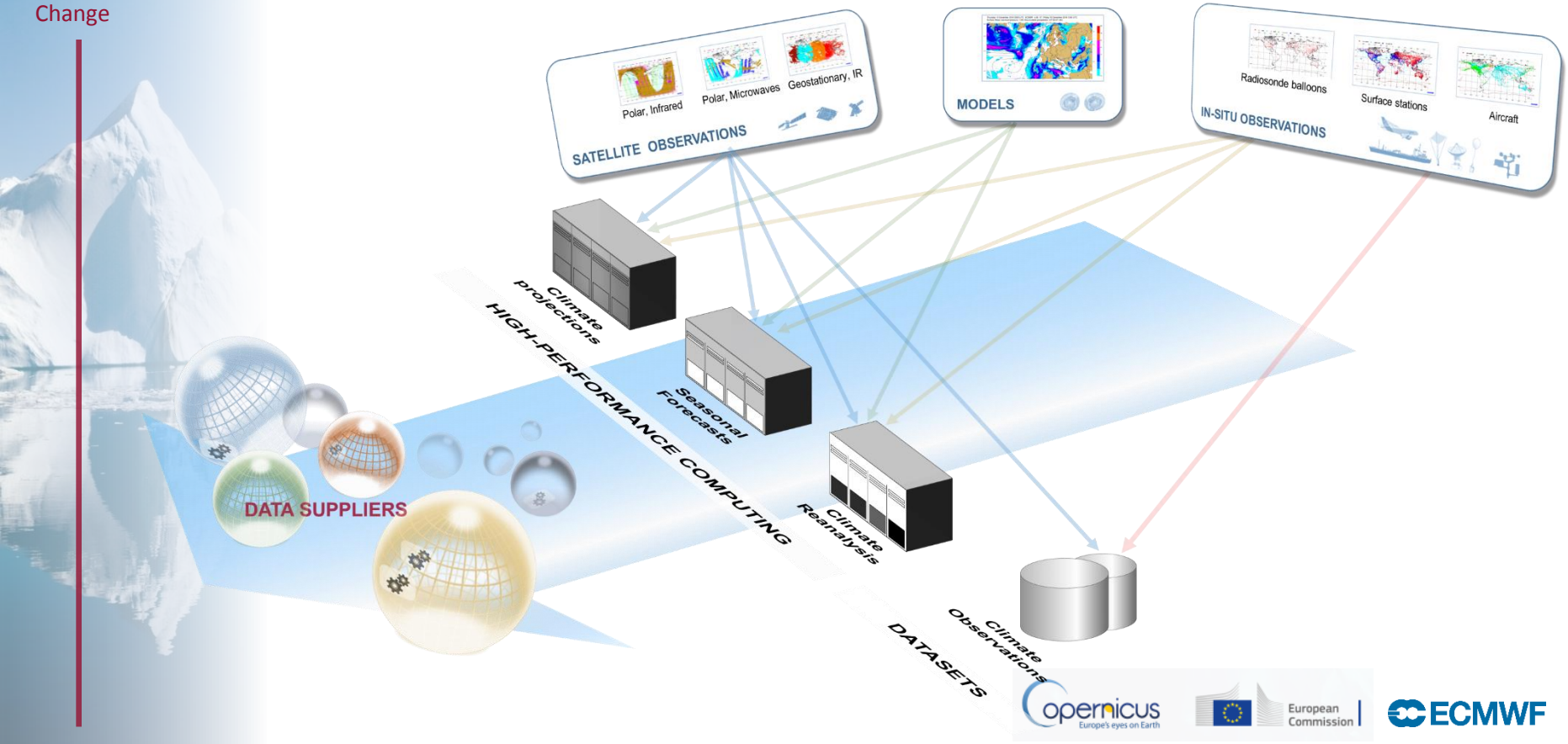
What do we mean by Data?



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