

# The Copernicus Climate Change Service (C3S) contribution to EO activities



Climate Change

**Joaquín Muñoz-Sabater**<sup>(1)</sup>, Rob Allan<sup>(2)</sup>, Bill Bell<sup>(1)</sup>, Iskander Benhadj<sup>(3)</sup>, Paul Berrisford<sup>(1)</sup>, Dick Dee<sup>(1)</sup>, Rossana Dragani<sup>(1)</sup>, Leo Haimberger<sup>(4)</sup>, Hans Hersbach<sup>(1)</sup>, Rainer Hollman<sup>(5)</sup>, Richard Kidd<sup>(6)</sup>, Jean-Francois Legeais<sup>(7)</sup>, Fabio Madonna<sup>(8)</sup>, Thomas Popp<sup>(9)</sup>, Pascal Prunet<sup>(10)</sup>, Dinand Schepers<sup>(1)</sup>, Jörg Schultz<sup>(11)</sup>, Cornel Soci<sup>(1)</sup>, Jean-Noël Thépaut<sup>(1)</sup>, Peter Thorne<sup>(12)</sup>, Paul van der Linden<sup>(2)</sup>, Gerard van der Schrier<sup>(13)</sup> and many others

<sup>(1)</sup> ECMWF, Reading, UK

<sup>(2)</sup> Met Office, Exeter, UK

<sup>(3)</sup> VITO, NV, Mol, Belgium

<sup>(4)</sup> UNVIE, Vienna, Austria

<sup>(5)</sup> DWD, Offenbach, Germany

<sup>(6)</sup> EODC, Vienna, Austria

<sup>(7)</sup> CLS, Ramonville-Saint-Agne, France

<sup>(8)</sup> CNR, IMAA, Potenza, Italy

<sup>(9)</sup> DLR, Cologne, Germany

<sup>(10)</sup> SPASCIA, Ramonville-Saint-Agne, France

<sup>(11)</sup> EUMETSAT, Darmstadt, Germany

<sup>(12)</sup> Maynooth University, Ireland

<sup>(13)</sup> KNMI, De Bilt, The Netherlands





Climate  
Change

# C3S EO activities: A European effort

The collage includes logos from the following organizations and institutions:

- Met Office** (Hadley Centre)
- Deutscher Wetterdienst** (Weather and Climate on your Hand)
- National Oceanography Centre** (Natural Environment Research Council)
- Maynooth University** (National University of Ireland Maynooth)
- NPL** (National Physical Laboratory)
- Universität Bremen**
- Royal Netherlands Meteorological Institute** (Ministry of Infrastructure and the Environment)
- CzechGlobe**
- University of the Witwatersrand Johannesburg**
- Royal Netherlands Meteorological Institute** (Ministry of Infrastructure and the Environment)
- CIRES**
- Met Office**
- National Centers for Environmental Information** (National Oceanic and Atmospheric Administration)
- SK Scientific**
- UNIVERSITÀ DEGLI STUDI DI BERGAMO**
- WORLD METEOROLOGICAL ORGANIZATION**
- Science & Technology Facilities Council**
- TALLINN UNIVERSITY OF TECHNOLOGY**
- Norwegian Meteorological Institute**
- EUMETSAT**
- SPACIA**
- University of Reading**
- Met Office**
- METEO FRANCE**
- universität wien**
- EUMETNET** (European Network of Earth Observing Satellites)
- University of East Anglia**
- ZAMG** (Zentralanstalt für Meteorologie und Geodynamik)
- OMSZ**
- MeteoSwiss**
- NOAA**
- UTM** (Universitat de Tarragona)
- ICARE**
- Capital High Tech**
- enveo**
- TU WIEN**
- vito** (vision on technology)
- DWD**
- Deutscher Wetterdienst**
- CLM**
- ISAC**
- RAL Space**
- Freie Universität Berlin**
- DLR**
- TELESPAZI** (ALTERNATIVE AND SATELLITE SYSTEMS)
- Swansea University Prifysgol Abertawe**
- University of Reading**
- Met Office**
- Darish Meteorological Institute**
- enveo**
- TU WIEN**
- University of Zurich**
- FastOpt** (Fast Optimisation and Sensitivity)
- KING'S COLLEGE LONDON**
- CLM** (Collecte Localisation Satellites)
- University of Zurich**
- HYGEOS**
- BROCKMANN CONSULT GMBH**
- DTU** (Technical University of Denmark)
- DTU Space** (National Space Institute)
- University of Reading**
- UCL** (Université catholique de Louvain)
- UCL** (Université catholique de Louvain)
- EOLAB**
- Free University of Berlin**
- Met Office**
- FMI** (Finnish Meteorological Institute)
- LATMOS**
- RAL Space**
- LMD** (Laboratoire de Mécanique des Fluides et d'Aérodynamique)
- Norwegian Meteorological Institute**
- PML** (Polar Meteorology and Marine Meteorology)
- Applications Ltd**
- ALFRED WEGENER-INSTITUT** (HELVETICUS-ZENTRUM FÜR POLAR- UND MEERESFORSCHUNG)
- SRON** (Radboud University Institute for Space Research)
- ICARE**
- Royal Netherlands Meteorological Institute** (Ministry of Infrastructure and the Environment)
- UNIVERSITÉ LIBRE DE BRUXELLES**
- ULB**
- Universidad de Alcalá**

**Page-Footer:** Copernicus (Europe's eyes on Earth), European Commission, ECMWF.



Climate  
Change

# The C3S mission

To support European adaptation and mitigation policies by:

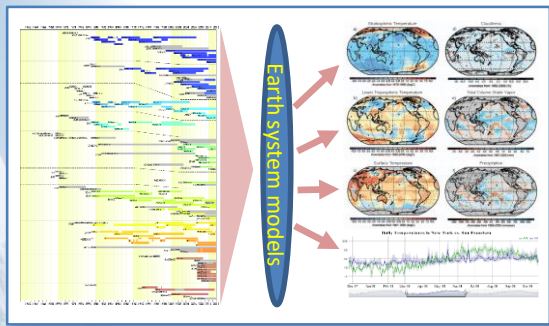
- Providing consistent and authoritative information about climate (past, present, future)
- Building on existing capabilities and infrastructures (nationally, in Europe and worldwide)
- Stimulating the market for climate services in Europe





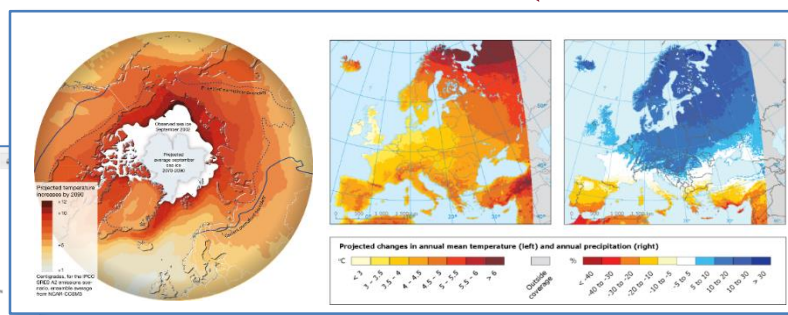
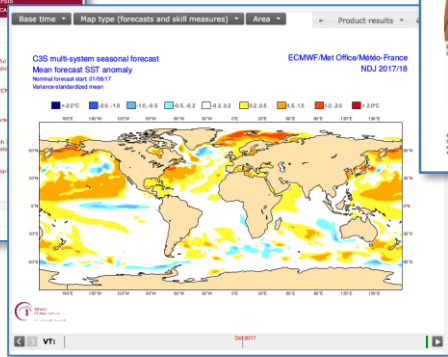
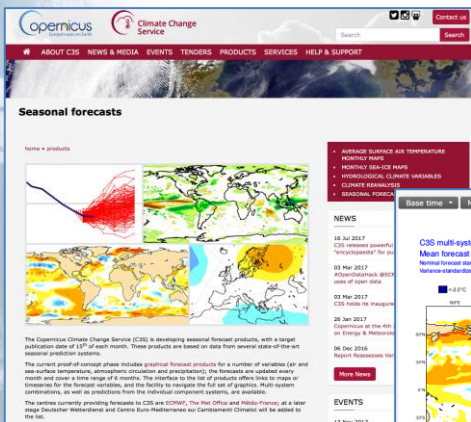
Climate Change

# C3S: ACCESS TO PAST, PRESENT AND FUTURE CLIMATE INFORMATION



Observations and climate reanalyses  
Seasonal forecast data and products

Climate model simulations  
Sectoral climate impact indicators



<http://climate.copernicus.eu>



Climate  
Change

## Current EO activities in C3S

C3S_311a	<b>Data rescue activities</b>	Lot1: Coordination of data rescue activities	Started 2017Q2/ End 2021Q2
		Lot2: Harmonised access to Global Data Archives	Started 2017Q2 / End 2021Q2
		Lot3: Harmonised access to data from reference networks	Started 2017Q2 / End 2021Q2
C3S_311c		Lot1: Satellite data rescue, mainly prior to 1978	Started 2018Q4 / End 2021Q2
		Lot2 : Upper-air data rescue	Started 2018Q4 / End 2021Q2
C3S_311b	<b>Reprocessing</b>	Reprocess of EUMETSAT L1 satellite data	Started 2016Q3 / End 2021Q2

### Gridded datasets

C3S_311a	Lot4: High-resolution ECV products for Europe	<b>Based on E-OBS</b>	Started 2017Q2 / End 2021Q2
C3S_312b	ECV products from satellite observations → 22 ECVs organized in 5 Lots	Lot1: Atmospheric Physics	Started 2018Q3 Will end 2021Q2
		Lot2: Atmospheric Composition	
		Lot3: Ocean	
		Lot4: Hydrology & Cryosphere	
		Lot5: Land Biophysics	



Climate  
Change

# Support services for data rescue

→ facilitate climate data rescue that builds upon existing WMO International Data Rescue activities.

- Linking of WMO I-DARE (<https://idare-portal.org/>) with new C3S DRS portal (<https://data-rescue.copernicus-climate.eu/>)
- Melding of various data registries with the new C3S DRS registry and portal
- Tools, Techniques and Best Practise Guidelines
- Capacity Building Workshops



C3S Data Rescue Metadata Service portal - beta version

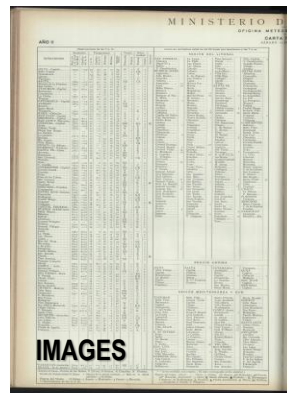


PORTAL

LSO

Field	Value
ID	588247
Project ID#	C3S DR001/ATRE Argentina
Collector name	DMR C3S DR001/ATRE Argentina
Original Country/Region	Argentina
Original City/Town/Village	
Station name	C. Rivadavia
Platform	
Altitude (m)	
Original Latitude (m)	
Original Longitude (m)	
Start Date	2013-01-28T01:36:00Z+01:00
Original Location/Recreation	
Start Year (Month/Day)	2013-01-28
Start Record Year (Month/Day)	2013-01-28
WMO Region	South America

REGISTRY



IMAGES

RAW TRANSCRIPTIONS.xls





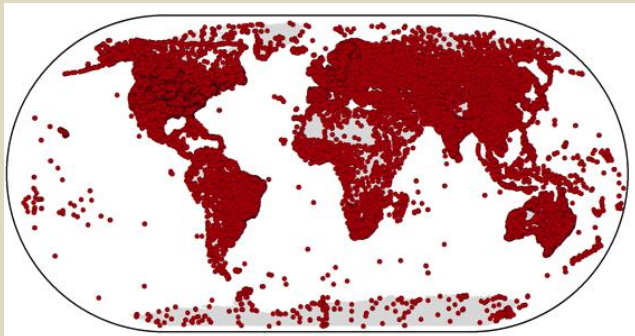
Climate  
Change

# Global land and marine observations database

→ Delivering fundamental holdings of near-surface meteorological parameters

## Land

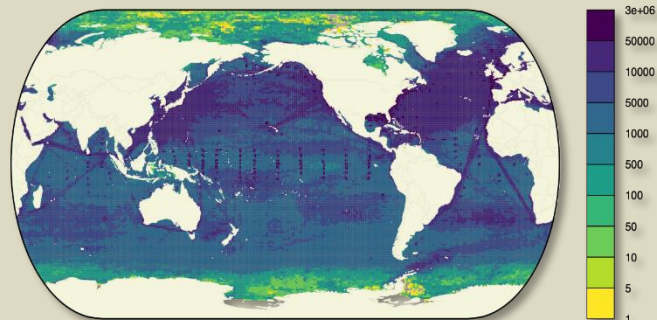
- Collect a vast wealth of data sources across all timescales and ECVs
- Harmonise, merge, and quality control
- Serve as integrated holdings consistent across ECVs and across sub-daily to monthly timescales



*Locations of land data acquired to date*

## Marine

- Use the raw data files underlying the latest ICOADS release
- Extract additional supplemental data
- Use improved ship tracking and quality control procedures
- Serve as integrated holdings



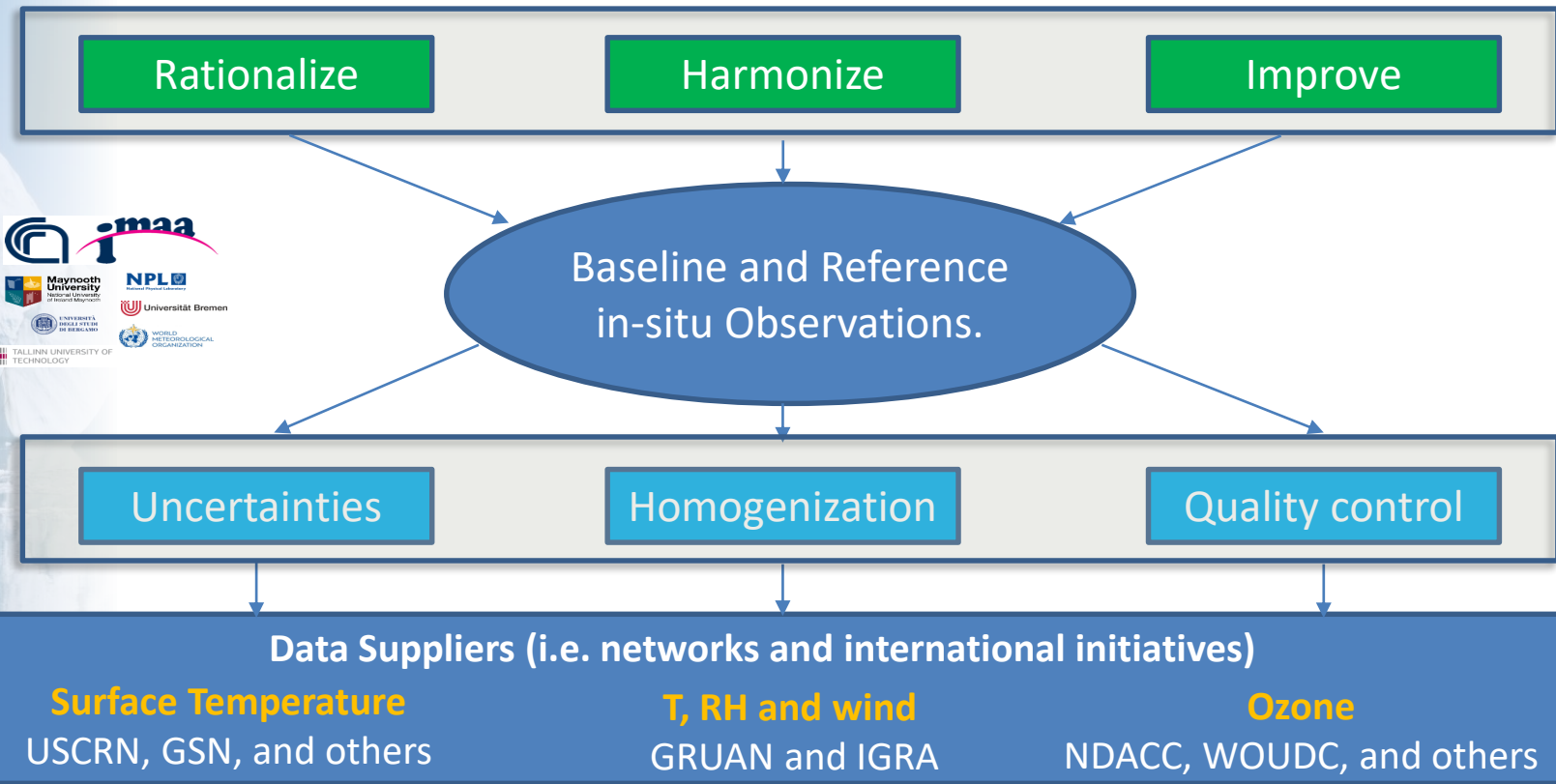
*Marine observations by 1 degree gridbox 1918-2017*





Climate  
Change

# Access to observational in-situ data records



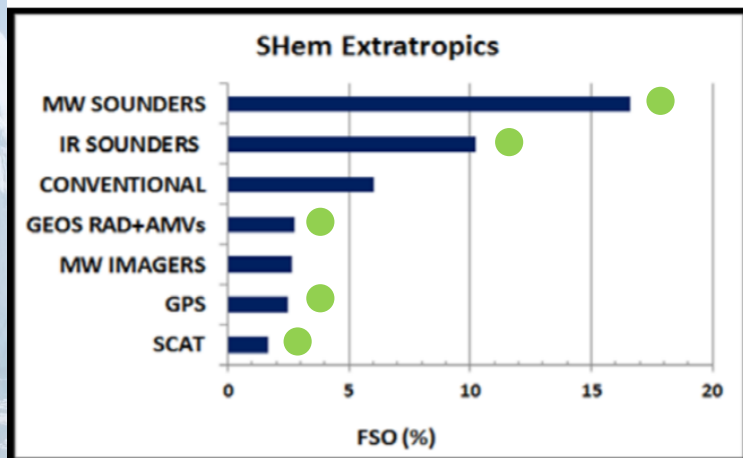




Climate  
Change

# Reprocessed Satellite Data Records

## EUMETSAT provides high impact CDRs for ERA6 back to the 1970s



*Ranked contributions to forecast error reduction estimated by Adjoint Sensitivity Diagnostics averaged over the test period in the Southern Hemisphere. From McNally (2014).*

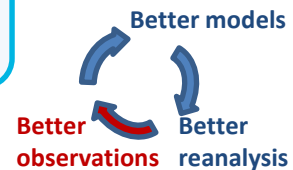
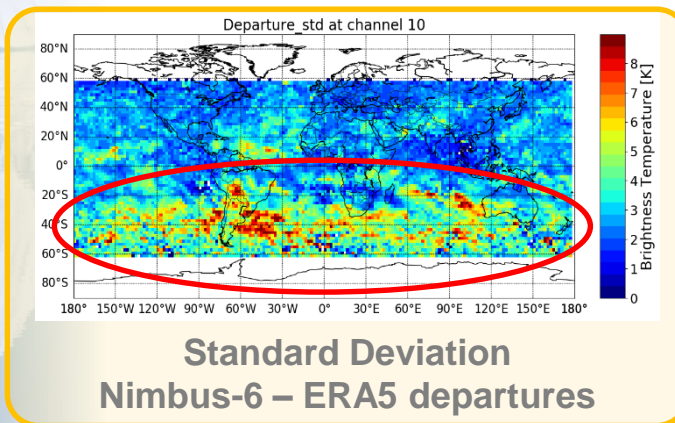
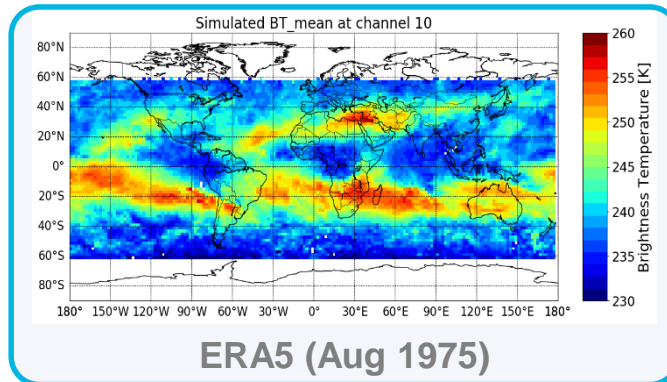
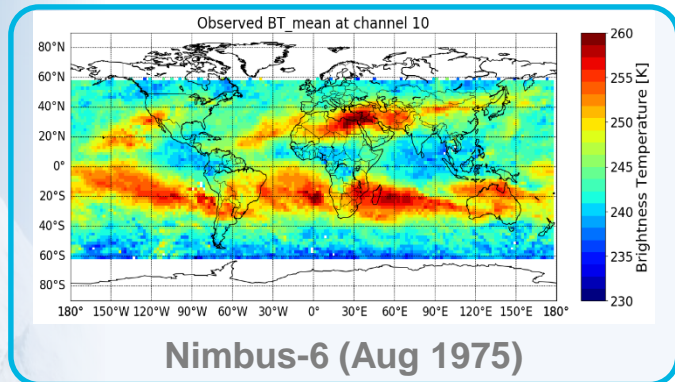
**Aims at** going back in time as far as possible, best possible individual instrument correction, error flagging, advanced uncertainty estimates and harmonisation over the time series.

- Atmospheric Sounding Radiance (Microwave and Infrared)
- Meteosat Radiance and Atmospheric Motion Vectors
- Radio Occultation bending angle profile
- Metop ASCAT backscatter
- Meteorological CDRs:
  - Metop global and polar Atmospheric Motion Vectors (LEO)
  - Metop multi-sensor aerosol AOD product



Climate  
Change

# Analysis of NIMBUS-6 HIRS-1 Data



- **Departure-based assessment of data quality.** Reanalysis provides a tool to analyse historical data in absence of satellite and ground-based references;
- High standard deviations in SH may point to additional information from HIRS-1 if assimilated.



Climate Change

# Support for climate reanalysis including satellite data rescue

Sensor	Task					
	2 Data provision	3 Quality assessment	4 RT modelling	5 Quality control	6 Uncertainty assessment	7 Bias modelling
<b>Early infrared sensors</b>						
PMR	✓	✓	?	✓	✓	✓
HIRS-1	EUMETSAT	EUMETSAT	?	?	EUMETSAT	✓
MVIRI	EUMETSAT	✓	?	?	✓	✓
IRIS	?	✓	✓	✓	✓	✓
VTPR	✓	ECMWF	✓	✓	✓	✓
HRIR	✓	LP	LP	LP	LP	LP
MRIR	✓	LP	LP	LP	LP	LP
SIRS	✓	LP	LP	LP	LP	LP
THIR	✓	✓	✓	✓	✓	✓
<b>Early microwave sensors</b>						
SMMR	CM SAF	✓	CM SAF	?	?	✓
SSM/T-2	EUMETSAT	✓	✓	✓	FIDUCEO	✓
<b>Reprocessed radiance data</b>						
HIRS-2→4	FIDUCEO	✓	?	ECMWF	FIDUCEO	ECMWF
SSU	?	✓	✓	✓	✓	✓
MSU	✓	ECMWF	✓	ECMWF	✓	ECMWF
SSM/I	CM SAF	✓	CM SAF	ECMWF	CM SAF	ECMWF
SSMIS (imaging channels)	CM SAF	✓	CM SAF	ECMWF	CM SAF	ECMWF
MVIRI	EUMETSAT	✓	?	?	?	✓
<b>Reprocessed wind retrievals</b>						
AVHRR	EUMETSAT	✓	NA	?	?	NA
MVIRI	EUMETSAT	✓	NA	?	?	NA

SPASCIA



## Satellite Data Rescue

- Focus on early datasets
- Range of activities: data provision → bias modelling and uncertainty assessment
- Start Q4 2018

## Historic Upper Air Data

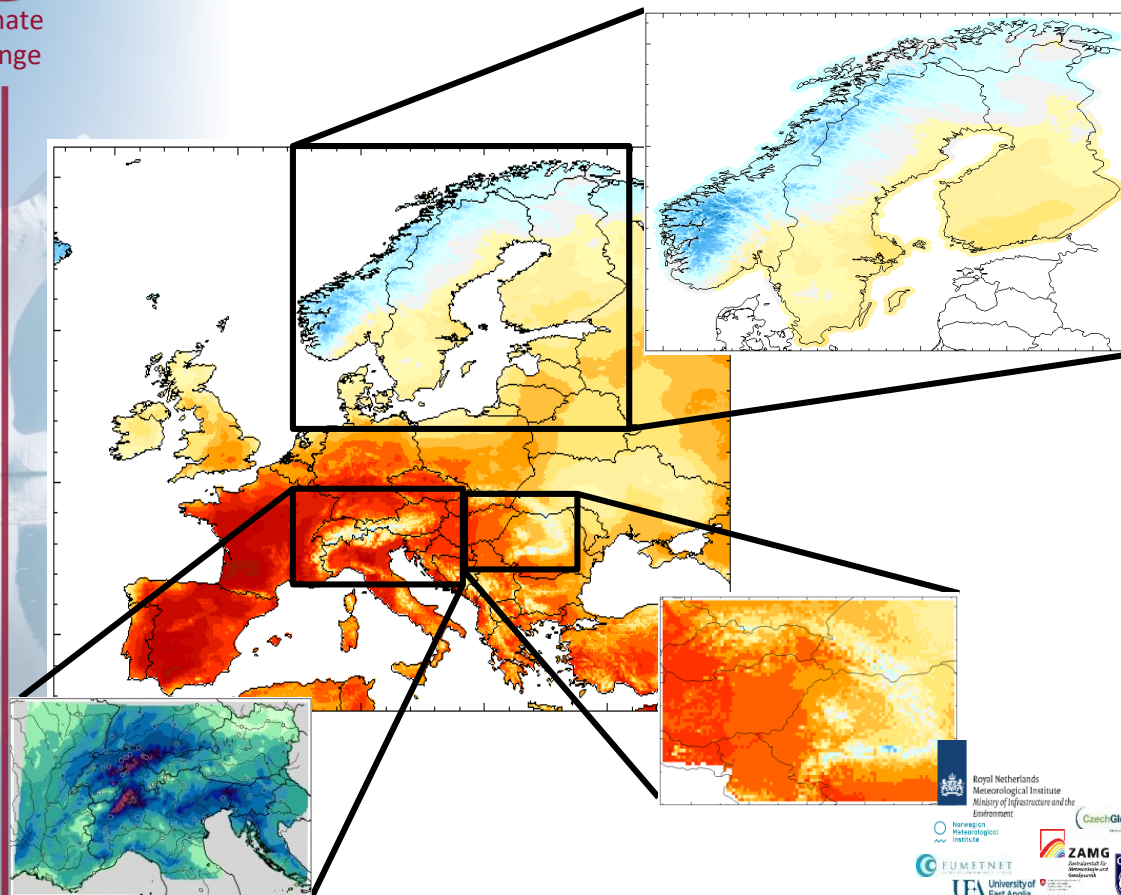
- Focus on observations prior to 1979
- Includes development of bias adjustments and uncertainty estimates
- Start Q4 2018





Climate  
Change

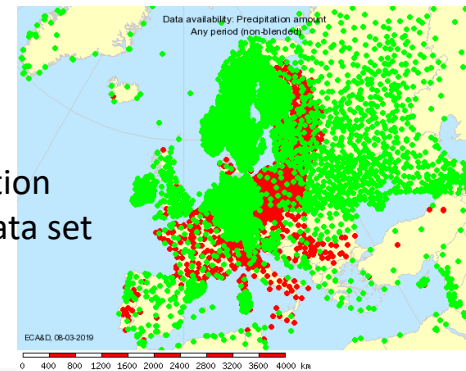
# High-resolution datasets for Europe



## Observation-based products

- Pan-European E-OBS gridded dataset
- High-resolution datasets for the Carpathians, the Alpine region and the Nordic countries
- Sector-specific indices

Precipitation  
station data set





Climate Change

# ECVs evolution in C3S (satellite data)

	GCOS	C3S_312a		C3S_312b		
		2017	2018	2019	2020	2021
<b>Atmospheric physics</b>						
Precipitation	4.3.5					
Surface Radiation Budget	4.3.6					
Water Vapour	4.5.3					
Cloud Properties	4.5.4					
Earth Radiation Budget	4.5.5					
<b>Atmospheric composition</b>						
Carbon Dioxide	4.7.1	Lot 6				
Methane	4.7.2	Lot 6				
Ozone	4.7.4	Lot 4				
Aerosol	4.7.5	Lot 5				
<b>Ocean</b>						
Sea Surface Temperature	5.3.1	Lot 3				
Sea Level	5.3.3	Lot 2				
Sea ice	5.3.5	Lot 1				
Ocean Colour	5.3.7					
<b>Land hydrology &amp; cryosphere</b>						
Lakes	6.3.4					
Glaciers	6.3.6	Lot 8				
Ice sheets and ice shelves	6.3.7					
Soil moisture	6.3.16	Lot 7				
<b>Land biosphere</b>						
Albedo	6.3.9	Lot 9				
Land Cover	6.3.10					
Fraction of Absorbed Photosyntheti	6.3.11	Lot 9				
Leaf Area Index	6.3.12	Lot 9				
Fire	6.3.15					
		2017	2018	2019	2020	2021

Coordination with CM-SAF / ROM SAF / ESA CCI / Uni. Maryland / NASA / NOAA

Coordination with ESA-CCI and other national projects

Coordination with ESA-CCI

Coordination with ESA-CCI, GloboLakes, Arc-Lake, HydroWeb

Coordination with ESA-CCI, CGL, QA4ECV, LSA-SAF



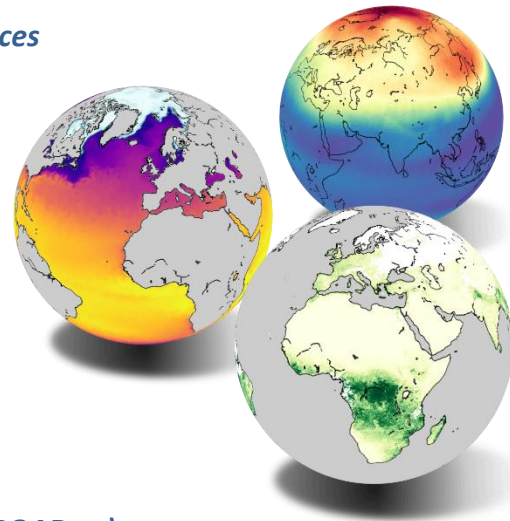


Climate  
Change

# ECVs operational services

## **With products that are**

- State-of-the-art products
  - *Coordination with ESA CCI, EUMETSAT, etc., & other Copernicus services*
- Long-term, consistent, complete (CDR)
  - **Single/Multi sensor approach**
- Regularly extended in time (ICDR)
  - **Frequent updates of data records**
- Gridded, aggregated
  - **Meeting user requirements**
  
- *Accessible & Tracible*
  - ✓ *Access through the Climate Data Store*
    - ✓ *Creation of adaptors, integration in CDS Toolbox*
  - ✓ *Documentation*
    - ✓ *Frequently supporting documentation produced in C3S (ATBD, PQAD, ...)*
  - ✓ *Evaluation and Assessment*
    - ✓ *EQC, own QC procedures, benchmarking, evaluation of cross-ECV consistency*
  - ✓ *User support*
    - ✓ *Service desks opened for many services*

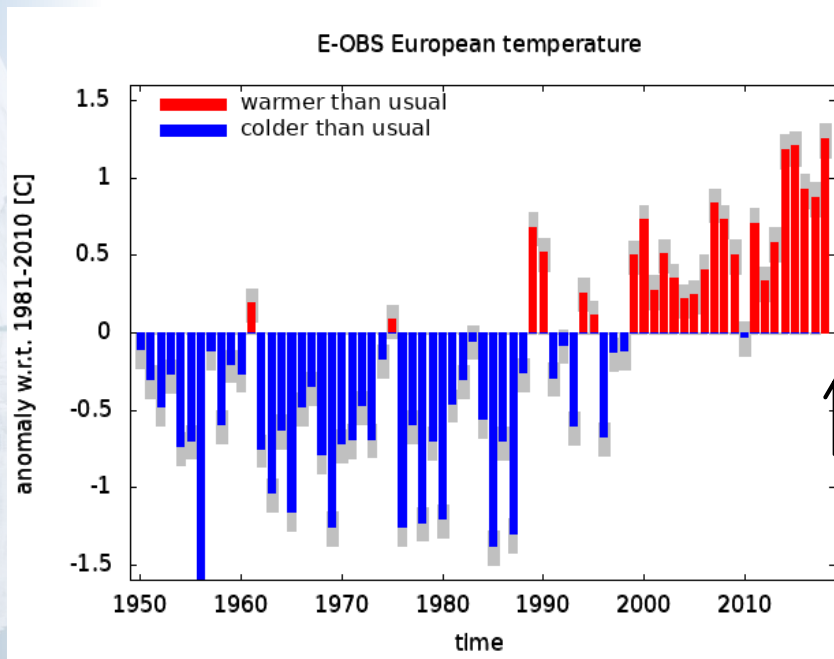




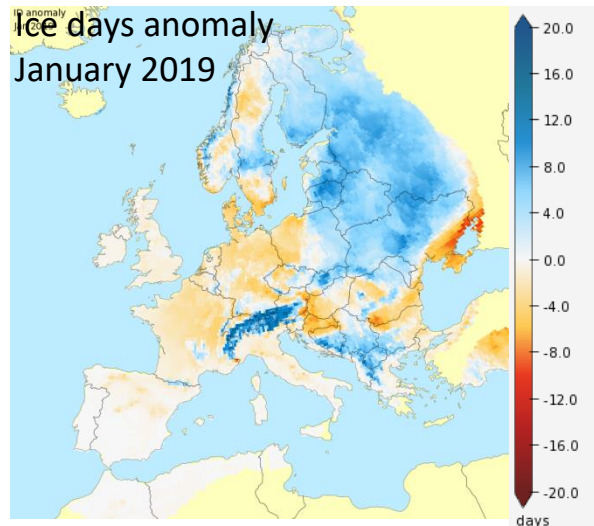
Climate Change

# Gridded Climate Data Records

- Monthly State of the Climate for Europe
- Annual State of the Climate (with ECMWF)



2018 in top-3 of *warmest* years



<http://surfobs.climate.copernicus.eu/stateofthecclimate/january2019.php>

→ Presentation of the 2018 European State of Climate today at 14h00



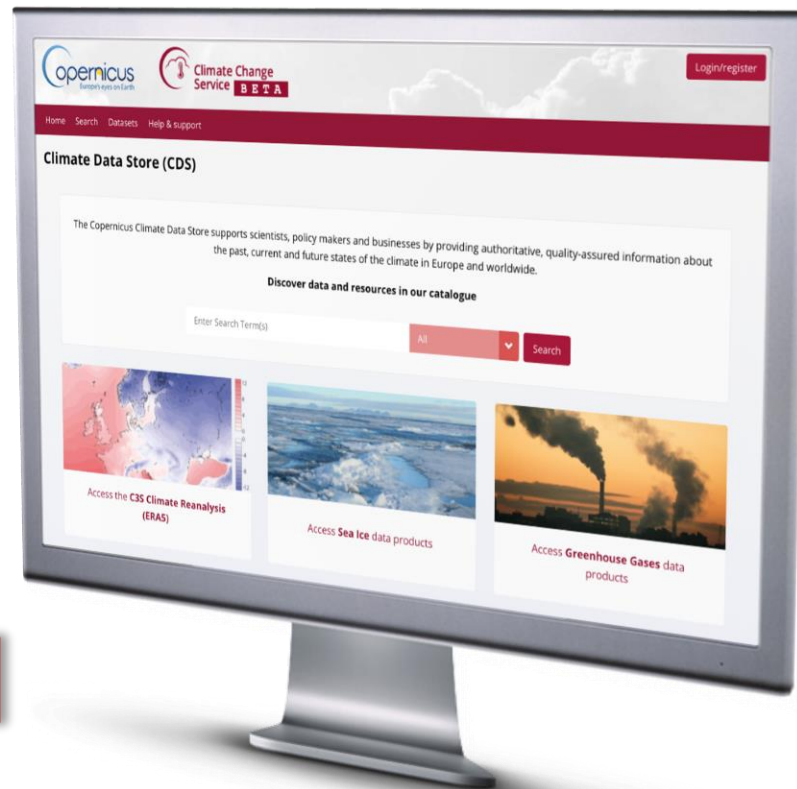


Climate  
Change

# Conclusion: What C3S offers to its users (EO)

- Access to climate data
- Tools needed to use the data
- Quality assurance
- User support and training
- Climate change assessments
- Outreach and communication

*A one-stop Climate Data Store*







Climate  
Change

# Thank You

## Get involved with the Copernicus Climate Change Service

Copernicus C3S; <https://climate.copernicus.eu>

Climate Data Store; <https://cds.climate.copernicus.eu/>



*@j\_munoz\_sabater*





Climate  
Change

# Back up slides





Copernicus

# THE COPERNICUS PROGRAMME OBJECTIVES

## The Union **Earth Observation** and monitoring programme

Increase general knowledge on the state of the Planet



Protect people and assets



Improve environmental policy effectiveness



Monitor the environment



Facilitate adaptation to climate change

Foster downstream applications in a number of fields



Help managing emergency and security related situations



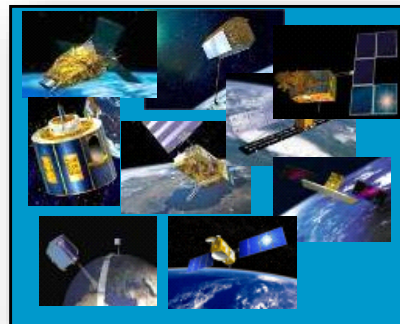
Copernicus

# PROGRAMME ELEMENTS

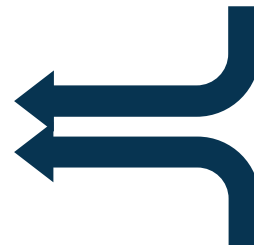


Copernicus Sentinels

6 services use Earth Observation data to deliver ...



Other Satellites



"in-situ"



...added-value products





Climate  
Change

# Monthly climate bulletins

Implemented by ECMWF as part of The Copernicus Programme

Climate Change Service

News Events Press Tenders Help & Support

ABOUT US WHAT WE DO DATA QSEARCH

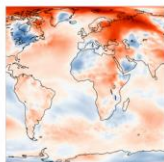
WHAT WE DO ► CLIMATE BULLETIN

## Climate bulletins

Through our monthly maps, we present the current condition of the climate using key climate change indicators. We also provide analysis of the maps and guidance on how they are produced.

HIGHLIGHTS OF THE LATEST MONTHLY SUMMARIES MONTHLY CLIMATE UPDATE FEATURED STORY MONTHLY SUMMARIES

### Monthly summaries



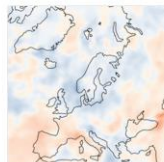
#### Surface air temperature

This series of monthly maps and charts, generated from ERA-interim data, covers



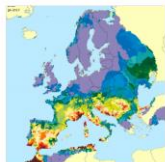
#### Sea ice

We produce sea-ice maps every month. Based on ERA-interim reanalysis data, these provide near real-time



#### Hydrological variables

This series of monthly maps and charts, based on ERA-interim data, covers several



#### Surface in-situ monitoring for Europe

Monthly and yearly State-of-the-European-climate reports provided

### Monthly climate update

15TH OCTOBER 2018

In Europe, it was the warmest September on record. Portugal and western Spain were particularly warm.

Iceland, Ireland and Scotland saw generally cooler than average temperatures.

Japan was hit by two devastating storms, Jebi and Trami following rains, landslides, floods and record-breaking heat this year.

Strong tropical cyclone Mangkhut caused at least 134 fatalities in the Philippines, Hong Kong and China.



### Featured story

29TH OCTOBER 2018



#### A stormy September

One of the **warmest summers on record** has come to an end with a September full of storms. Modelling of historic storms can help us prepare for such events. We use two of the recent storms to demonstrate the improvements we have made with the release of our new **dataset**.

[Read more](#)

➤ [climate.copernicus.eu/climate-bulletins](https://climate.copernicus.eu/climate-bulletins)





# C3S 311a Lot 1: the C3S Data Rescue Service (DRS)

(<https://insitu.copernicus.eu/news/the-c3s-data-rescue-service>)

This service brings together fourteen partners in a consortium led by the Met Office to provide a service to facilitate climate data rescue that builds upon existing WMO International Data Rescue activities. The service will run an online repository (portal and registry) of information about past, current and planned climate data rescue, provide a wide range of data rescue tools and run capacity building workshops. The consortium has existing relationships and experience of working with ACRE (Atmospheric Circulation Reconstructions over the Earth) (<http://www.met-acre.net>).

**WP 1: Linking of WMO I-DARE** (<https://idare-portal.org/>) **with new C3S DRS portal** (<https://data-rescue.copernicus-climate.eu/>)

**WP 2: Melding of various data registries with the new C3S DRS registry and portal**

**WP 3: Tools, Techniques and Best Practise Guidelines**

**WP 4: Capacity Building Workshops**

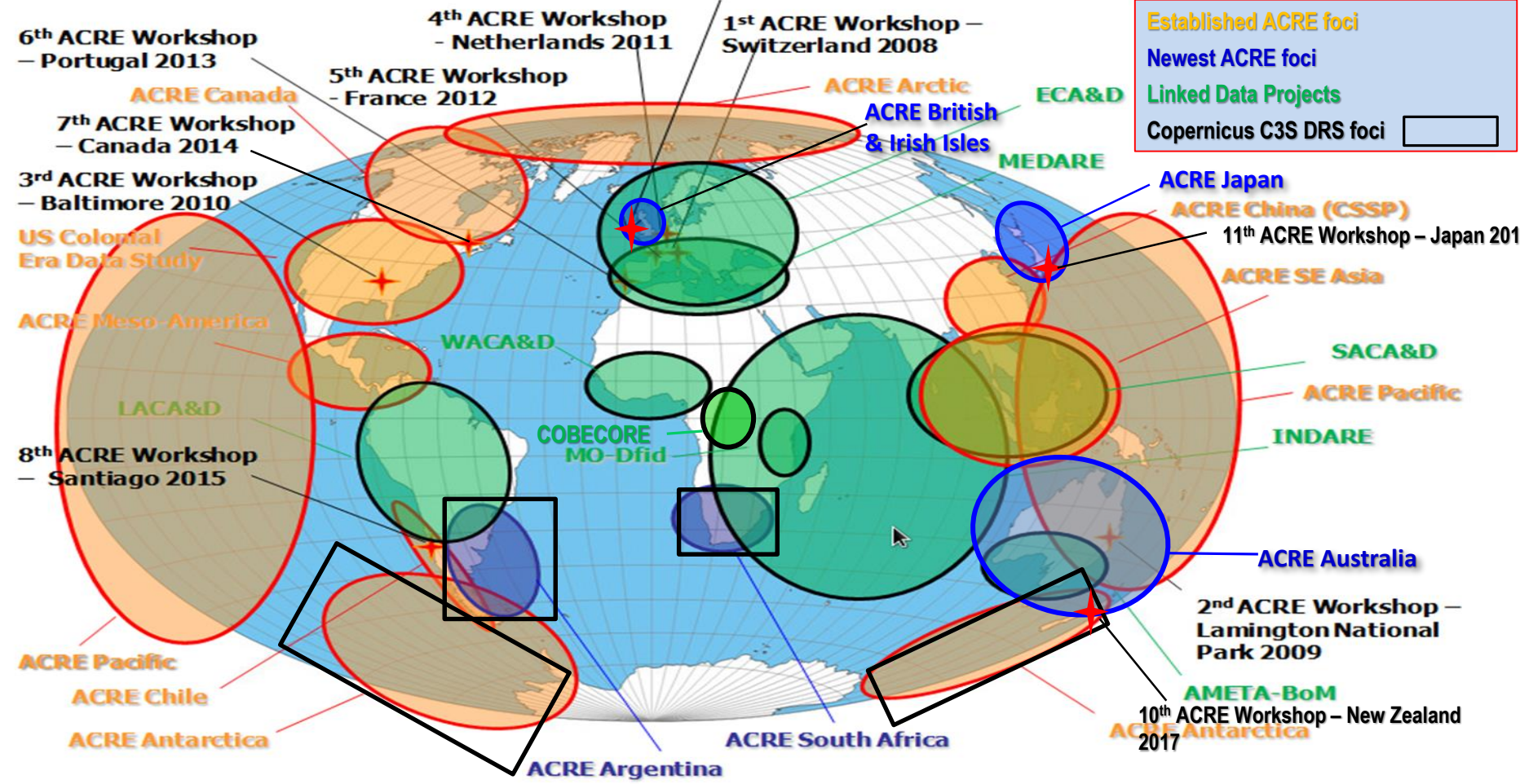
Thus, the service will develop and maintain the technical support services needed by users to facilitate all steps of the data rescue procedure; from consolidating paper archives to imaging data formatting and quality control, whilst piloting the use of new techniques and approaches to data digitisation.

The service has identified three high priority regions for financial support to facilitate data rescue work as part of the C3S DRS. These regional projects are ACRE Antarctica, ACRE South Africa and ACRE Argentina.

C3S DRS is closely linked to C3S 311a Lot 2, and these efforts are served via the Copernicus Climate Data Store (CDS) to end-users.



# ACRE & C3S DRS DATA RESCUE FOCI



**Established ACRE foci**  
**Newest ACRE foci**  
**Linked Data Projects**  
**Copernicus C3S DRS foci**

6th ACRE Workshop - Portugal 2013

4th ACRE Workshop - Netherlands 2011

9th ACRE Workshop - Ireland 2016

1st ACRE Workshop - Switzerland 2008

5th ACRE Workshop - France 2012

ACRE Canada

7th ACRE Workshop - Canada 2014

ACRE Arctic

ECA&D

ACRE British & Irish Isles

3rd ACRE Workshop - Baltimore 2010

US Colonial Era Data Study

ACRE Meso-America

8th ACRE Workshop - Santiago 2015

LACA&D

WACA&D

COBECORE MO-Dfid

MEDARE

ACRE Japan

ACRE China (CSSP)

11th ACRE Workshop - Japan 2018

ACRE SE Asia

SACA&D

ACRE Pacific

ACRE Australia

2nd ACRE Workshop - Lamington National Park 2009

AMETA-BoM

10th ACRE Workshop - New Zealand 2017

ACRE Pacific

ACRE Chile

ACRE Antarctica

ACRE South Africa

ACRE Argentina

ACRE Antarctica

# C3S DRS (Lot 1) and Lot 2 interactions and work flows

**C3S Data Rescue Metadata Service portal - beta version**

**C3S Data Rescue Metadata Service Portal**

The Service  
The C3S Data Rescue Metadata Service Portal is a web-based user-interactive system to coordinate and facilitate global data rescue activities. It provides metadata services, information and metadata on past, current, and planned data rescue projects, as well as tools, software, and guidelines to facilitate all stages of the data rescue process.

The registry  
C3S Data Rescue Services includes an online Registry Service for users to upload metadata information related to rescued data. The Registry metadata base contains descriptions for Land Surface Stations, Upper Air, Flood and Heavy Rainfalls and Storm Surges.

The tool received **Guidelines for Inventory metadata standards and formats** can be downloaded too. It is used in writing and formatting metadata information for land surface, upper air and heavy rainfalls of the data, resulting from past, present and future Data Rescue Activities and related Observation Databases. The metadata descriptors form the database for the C3S Data Rescue Registry Service.

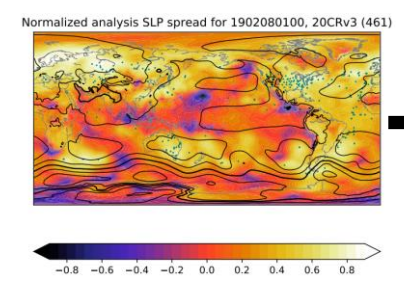
With the Registry containing many growing inventories for general field research and collection, such as ERA-CLM/ERA-CLM2, QRS, WMS and other ACIS related activities it is possible to search the Registry for metadata such as Country, Station name, SIC, Time span, and other options. Download metadata is also possible, as well as the possibility to add the entire list of a work item. It is also possible to download the search results in CSV file and JSON.

Goal of the activities on this service is to provide the most comprehensive metadata archive for rescued data. In order to avoid duplication of DRS efforts, with this service the user is informed about the DRS status of the year, present and planned activities, from the extension of a station or territory, period, frequency, observation quality control and procedure to a global objective. Through of DRSD project the Registry supports the file and content of the metadata repository, as well as the digital repository of metadata. The metadata rescue work item results in users' file in a given condition.

The C3S Data Rescue Metadata Service is being developed as a module for the ERA-CLM/ERA-CLM2 Portal which is available at <http://climate4global-registry.ec.europa.eu/drs/>.

**LSO**  
Home - LSO - 05247

Site	LSO0247
Site ID	LSO0247
Project title	C3S DRSLC/ACR Argentina
Collection name	DRM C3S DRSLC/ACR Argentina
Original Country/Region	Argentina
Original City/Town/Village	
Station Name	C. Rabadon
Platform	
Altitude (m)	
Original Latitude (Units)	
Original Longitude (Units)	
Original Altitude (Units)	
Local Grids	
Last modified	2018-01-28T12:41:36.000Z+00:00
Original Location/Altitude	
Start Station Year/Month/Day	1962-01-01
End Station Year/Month/Day	
Start Record Year/Month/Day	1962-01-01
End Record Year/Month/Day	
WMO Region	South America



**Services and Impacts**

**Experimental Products**  
e.g. 20CR 4.6.1

**Operational Products**  
e.g. HadCRUT5?

**Big Hopper**

**Harmonised Holdings**

**Portal**

**Registry**

**C3S DRS**

**Images**

**Raw transcriptions.xls**

Year	Month	Day	Pressure	Temp	Humidity	Wind	Clouds	Other
1962	1	1	1014.0	10.0	70	10	0	
1962	1	2	1014.0	10.0	70	10	0	
1962	1	3	1014.0	10.0	70	10	0	
1962	1	4	1014.0	10.0	70	10	0	
1962	1	5	1014.0	10.0	70	10	0	
1962	1	6	1014.0	10.0	70	10	0	
1962	1	7	1014.0	10.0	70	10	0	
1962	1	8	1014.0	10.0	70	10	0	
1962	1	9	1014.0	10.0	70	10	0	
1962	1	10	1014.0	10.0	70	10	0	
1962	1	11	1014.0	10.0	70	10	0	
1962	1	12	1014.0	10.0	70	10	0	
1962	1	13	1014.0	10.0	70	10	0	
1962	1	14	1014.0	10.0	70	10	0	
1962	1	15	1014.0	10.0	70	10	0	
1962	1	16	1014.0	10.0	70	10	0	
1962	1	17	1014.0	10.0	70	10	0	
1962	1	18	1014.0	10.0	70	10	0	
1962	1	19	1014.0	10.0	70	10	0	
1962	1	20	1014.0	10.0	70	10	0	
1962	1	21	1014.0	10.0	70	10	0	
1962	1	22	1014.0	10.0	70	10	0	
1962	1	23	1014.0	10.0	70	10	0	
1962	1	24	1014.0	10.0	70	10	0	
1962	1	25	1014.0	10.0	70	10	0	
1962	1	26	1014.0	10.0	70	10	0	
1962	1	27	1014.0	10.0	70	10	0	
1962	1	28	1014.0	10.0	70	10	0	
1962	1	29	1014.0	10.0	70	10	0	
1962	1	30	1014.0	10.0	70	10	0	
1962	1	31	1014.0	10.0	70	10	0	

**Exchange format.sef**

```

REF 6-0-1
ID DRSLC_Arg
Name LSO
Lat -33.433213
Lon -62.416411000000004
Alt
All
Resource
Ref
Var ref_pressure
Meta
Name PSC-F_PSC-F
Units Pa
1962 2 21 1817 0 1008.4505574000002 Original+756.5mm
1962 2 22 1817 0 1012.4505574000002 Original+756.5mm
1962 2 23 1817 0 1013.2148877000004 Original+761.2mm
1962 2 24 1817 0 1009.2544920000002 Original+752.0mm
1962 2 25 1817 0 1006.2844440000002 Original+751.0mm
1962 2 26 1817 0 1012.2844440000002 Original+756.5mm
1962 2 27 1817 0 1008.2844440000002 Original+761.2mm
1962 2 28 1817 0 1013.2844440000002 Original+756.5mm
1962 2 29 1817 0 1014.2844440000002 Original+761.2mm
1962 2 30 1817 0 1014.2844440000002 Original+761.2mm
1962 2 31 1817 0 1014.2844440000002 Original+756.5mm
1962 3 1 1817 0 1014.2844440000002 Original+756.5mm
1962 3 2 1817 0 1014.2844440000002 Original+756.5mm
1962 3 3 1817 0 1014.2844440000002 Original+756.5mm
1962 3 4 1817 0 1009.2544920000002 Original+751.0mm
1962 3 5 1817 0 1013.2844440000002 Original+756.5mm
1962 3 6 1817 0 1009.2844440000002 Original+751.0mm
1962 3 7 1817 0 1014.2844440000002 Original+756.5mm
1962 3 8 1817 0 1013.2844440000002 Original+761.2mm
1962 3 9 1817 0 1012.2844440000002 Original+756.5mm
1962 3 10 1817 0 1013.2844440000004 Original+761.2mm
1962 3 11 1817 0 1005.2844440000002 Original+756.5mm
1962 3 12 1817 0 1013.2844440000002 Original+761.2mm
1962 3 13 1817 0 1013.2844440000002 Original+761.2mm
1962 3 14 1817 0 1014.2844440000002 Original+761.2mm
1962 3 15 1817 0 1012.2844440000002 Original+756.5mm
1962 3 16 1817 0 1014.2844440000002 Original+756.5mm
1962 3 17 1817 0 1016.2844440000002 Original+761.2mm
1962 3 18 1817 0 1014.2844440000002 Original+761.2mm
1962 3 19 1817 0 1012.2844440000002 Original+756.5mm
1962 3 20 1817 0 1012.2844440000002 Original+756.5mm
1962 3 21 1817 0 1012.2844440000002 Original+756.5mm
1962 3 22 1817 0 1012.2844440000002 Original+756.5mm
1962 3 23 1817 0 1012.2844440000002 Original+756.5mm
1962 3 24 1817 0 1006.2844440000002 Original+756.5mm
1962 3 25 1817 0 1006.2844440000002 Original+756.5mm
1962 3 26 1817 0 1017.2144440000004 Original+767.2mm
    
```