

Operational climate data & cultural heritage.

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Funded by the European Union



Implemented by  **ECMWF**



Summary

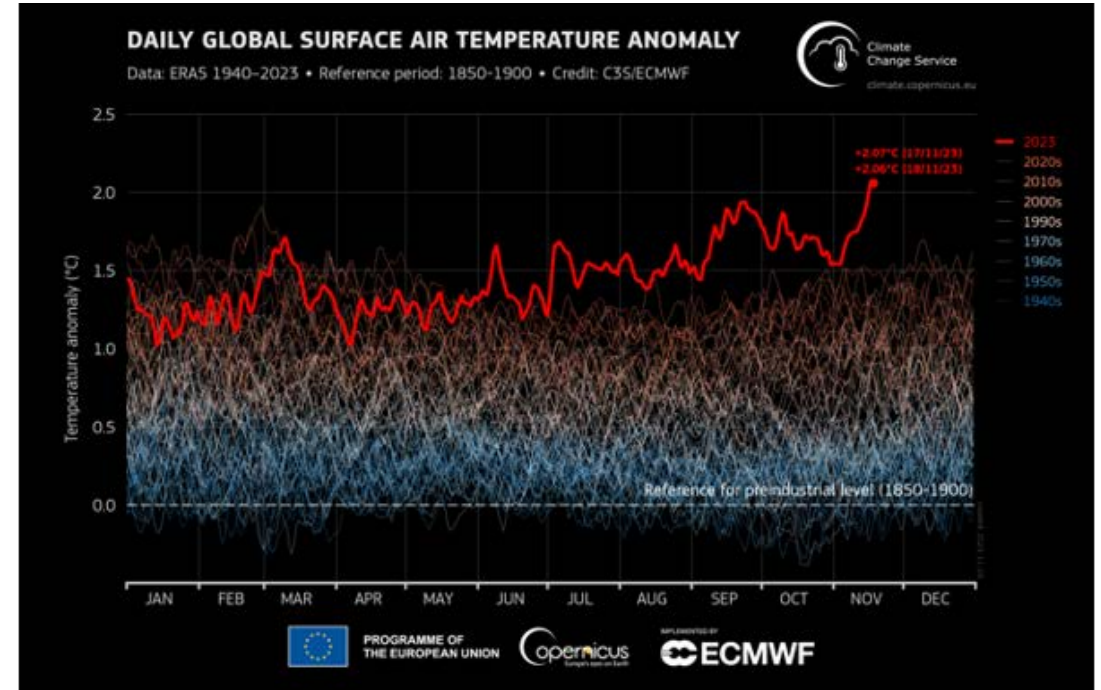
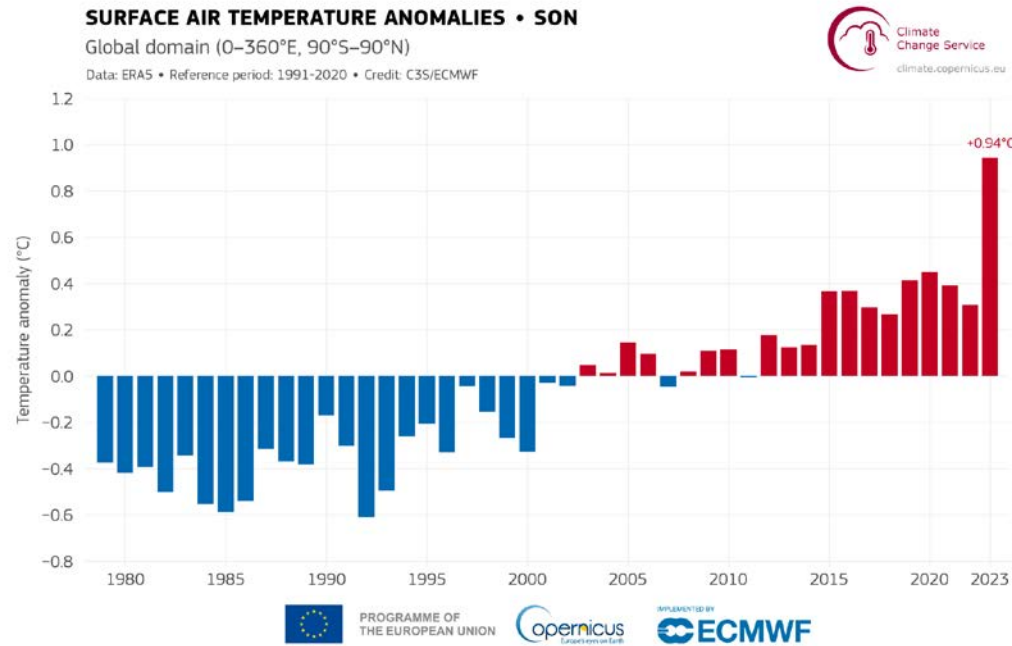


- A present.
- A changing climate.
- The tools we have.
- Actions for cultural heritage.
- Wrap-up and suggestions.



Climate
Change




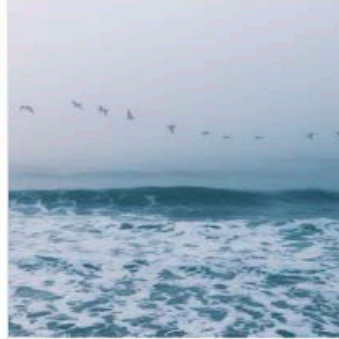
Evidence #1 a climate our civilisation has never seen





Climate
Change

Evidence #2 we now have accessible information and data

			
<h3>Observations</h3> <p>Observations are key to understanding the climate system. C3S users can access a vast variety of instrumental data records, ranging from historic weather observations to the latest measurements from space.</p> <p>Read more ></p>	<h3>Climate reanalyses</h3> <p>Climate reanalyses combine past observations with models to generate consistent time series for a large set of climate variables. Reanalyses are among the most-used datasets in the geophysical sciences.</p> <p>Read more ></p> <p>Reanalysis data on the CDS ></p>	<h3>Seasonal forecasts</h3> <p>C3S seasonal forecasts combine outputs from several state-of-the-art seasonal prediction systems from providers in Europe and elsewhere. The latest data and products are published monthly on the Climate Data Store.</p> <p>Read more ></p> <p>Seasonal forecast data on the CDS ></p>	<h3>Climate projections</h3> <p>Projections of future climate change are available for different scenarios for concentrations of greenhouse gases and aerosols, based on outputs from multiple global and regional climate models.</p> <p>Read more ></p> <p>Climate projection data on the CDS ></p>

C3S: An **operational** climate service embedded in the **Copernicus** Earth observation program

Implemented by ECMWF together with **over 300 public and private entities** from more than 40 countries in Europe and elsewhere

C3S provides **reliable, open, and free access** to state of the art data available on the past, present, and potential evolution of climate

10.1175/BAMS-D-21-0315.1

EUROPEAN STATE OF THE CLIMATE

KEY EVENTS 2022

RECORDS

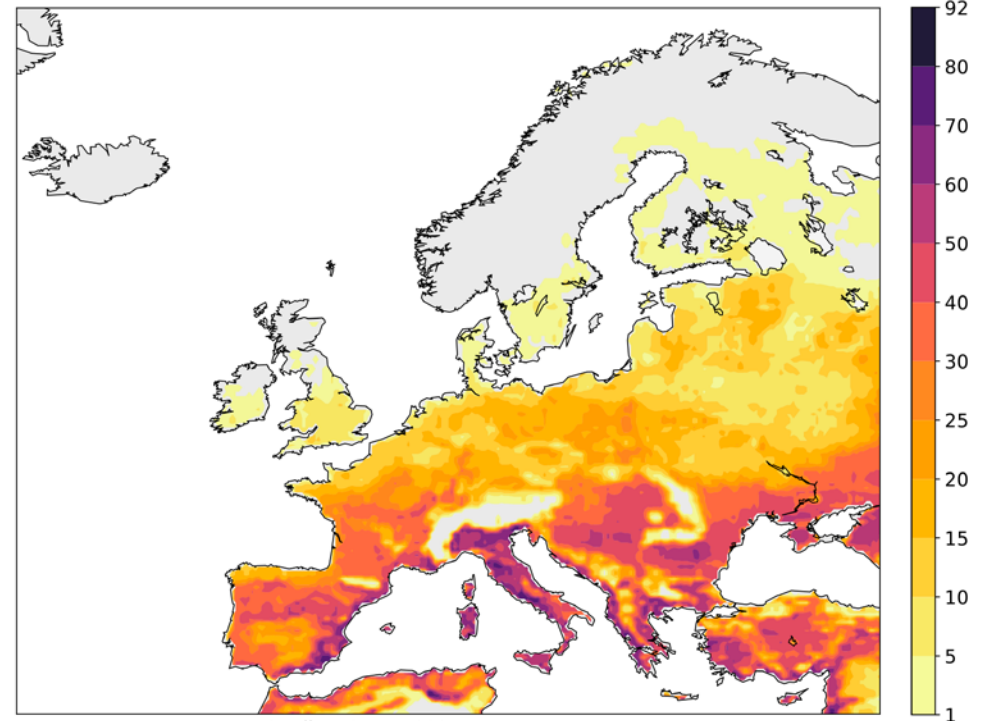
- > Warmest summer on record
- > Record loss of glacier ice from European Alps
- > Record sunshine duration
- > 2nd lowest river flow on record
- > 2nd largest wildfire burnt area on record



KEY EVENTS

- Drought**
Spring through summer across much of Europe
- Heatwaves**
MAY: Southwestern Europe
SUMMER: Affecting much of Europe
SEPTEMBER: Greenland
- Marine Heatwave**
MAY ONWARDS: The western Mediterranean Sea
- Wildfires**
JULY, AUGUST: Czechia, France, Portugal, Slovenia, Spain, UK
- Storms**
FEBRUARY: 3 storms in 1 week
- Heavy Rainfall and Flooding**
SEPTEMBER: Bulgaria, Croatia, Italy, Portugal, Slovenia, Spain
- Coldwave**
DECEMBER: Northern Europe

Number of days that experienced strong heat stress - JJA 2022



Data source: ERA5-HEAT, Credit: ECMWF/C3S

2022

Drought in 2022



At its peak, the drought affected more than one third of Europe.

ESOTC 2022 highlights:
Extreme Heat and Drought

Action on cultural heritage

What drives the different users in the cultural heritage community and what type of data do they need?

USER WORKSHOP (ONLINE, 2021) CLIMATE CHALLENGES FOR CULTURAL & NATURAL HERITAGE WITH HIGH LEVEL SPEAKERS FROM UNESCO, ICOMOS, ICCROM, THE GREEK GEO OFFICE AND THE ITALIAN MINISTRY OF CULTURE.

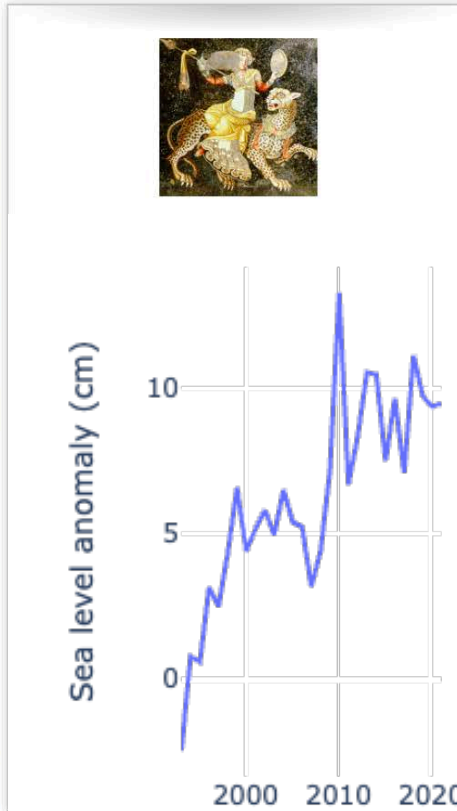
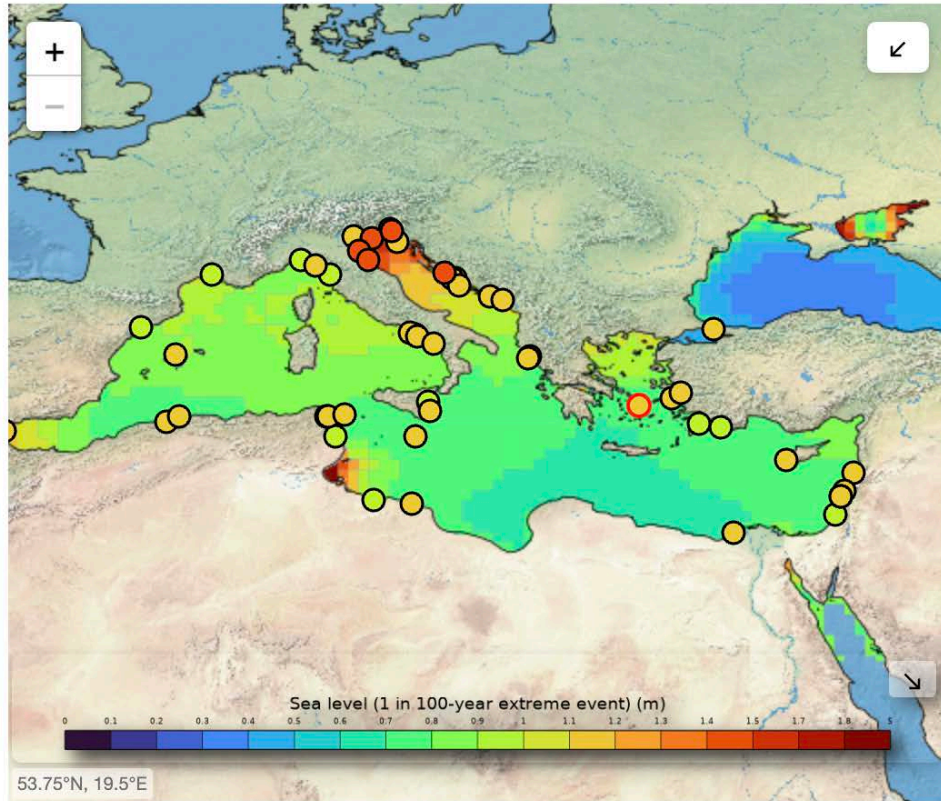


EUROPEAN MINISTERS OF CULTURE CONFERENCE IN NAPLES, ITALY (2022), UPON INVITATION FROM THE UNION FOR THE MEDITERANEAN SECRETARY: PRESENTATION ON C3S AND DEMONSTRATION OF SIS APPLICATION

COP27 MEDITERRANEAN PAVILION IN EGYPT (2022): DEMONSTRATING DATA SPECIALIST USERS THE ABILITY TO CREATE THEIR OWN TAILORED PRODUCTS FOR CULTURAL HERITAGE BASED ON FREE AND OPEN C3S DATA AND



Example C3S application: Extreme sea levels on Mediterranean UNESCO World Heritage Sites



Sea level rise is impacting the Mediterranean region's cultural heritage. Many UNESCO World Heritage Sites in the Mediterranean are situated on the coast and are therefore under increasing risk from coastal flooding from sea level rise and extreme storm surge events.

This application demonstrates how climate data may be harnessed to explore the risk from coastal flooding to a number of world heritage sites in the Mediterranean, based on a 1 in 100 year extreme event combined with sea level projections for the year 2050.

Developed in collaboration with the [Union for the Mediterranean](#)



<https://cds.climate.copernicus.eu/apps/c3s/app-climate-mediterranean-sea-level>



Mediterranean nostalgia



- The climate of the Mediterranean basin is changing fast and will continue to do so.

The climate my son's olive tree will grow (?) in a climate that will be fundamentally different to that of our forebearers.

- This is a painful prospect but it is a fact we must grapple with.
- νόστος (*nóstos*, "return") + αλγία (-*algía* from ἄλγος pain)
- Two actions:
 1. Improve the use the information we already have to better prepare for the future (present).
 2. develop a narrative to present our cultural heritage in the context of a rapidly changing world.



Climate Change

Thank you !

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