Copernicus Climate Change Service

Climate Change

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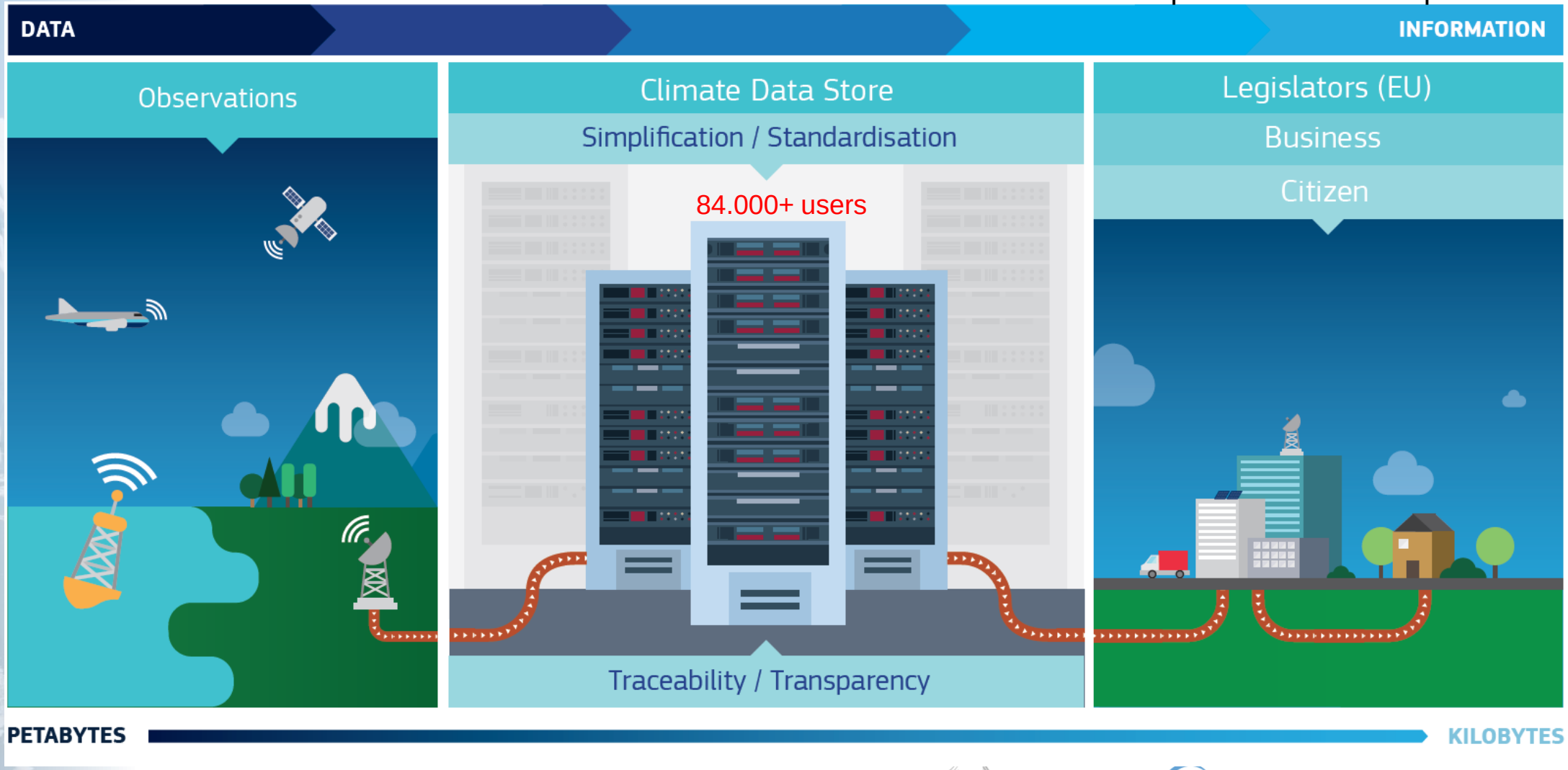
What is the Copernicus Climate Change Service (C3S)?

https://cds.climate.copernicus.eu



Typical download: 70 TB /day

Total data downloaded: 47 PB

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Multiple sources of information

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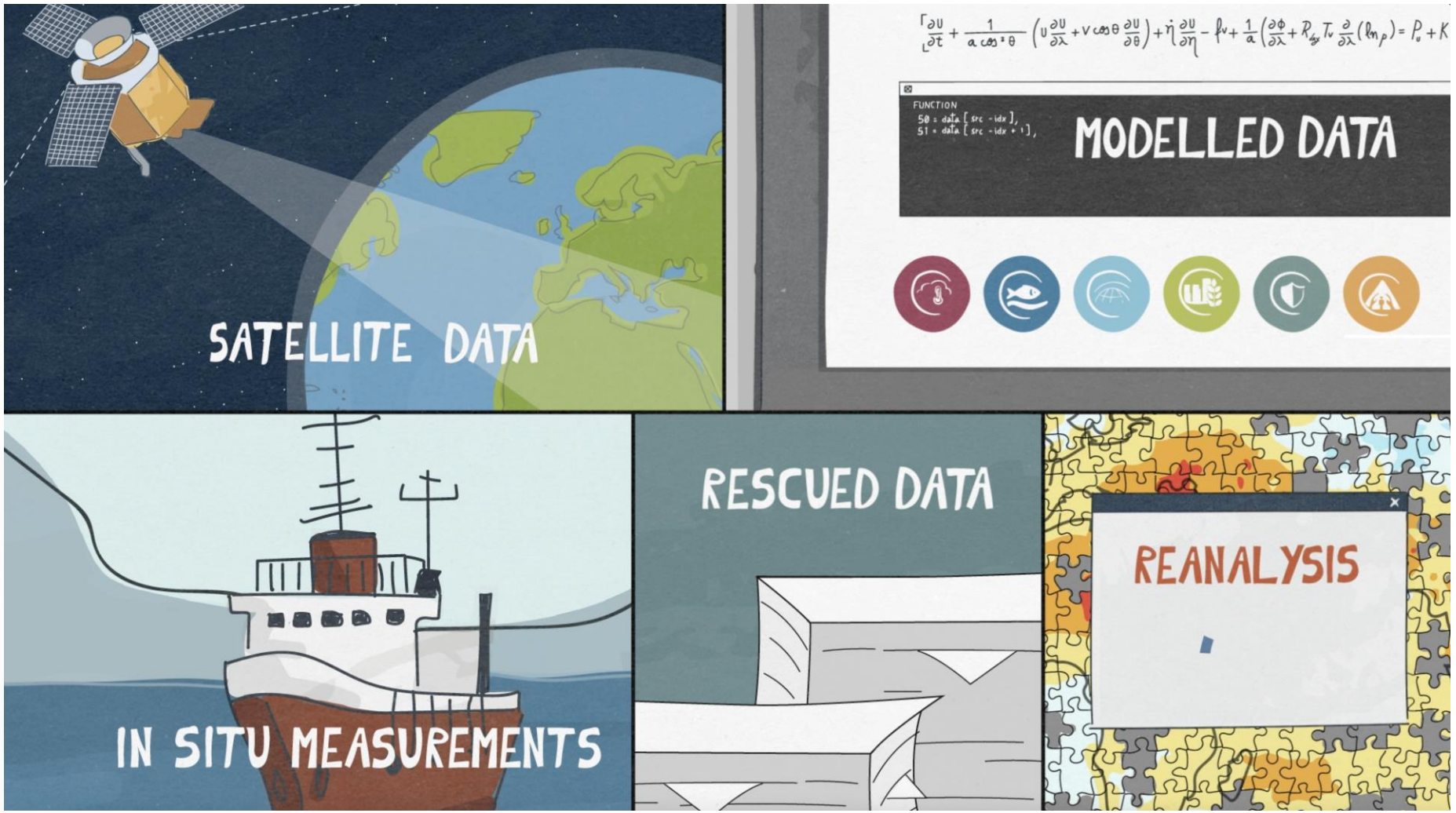

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Essential Climate Variables

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Status C3S Reanalysis: global (ERA5, ERA5-Land) and regional (Europe, Arctic)

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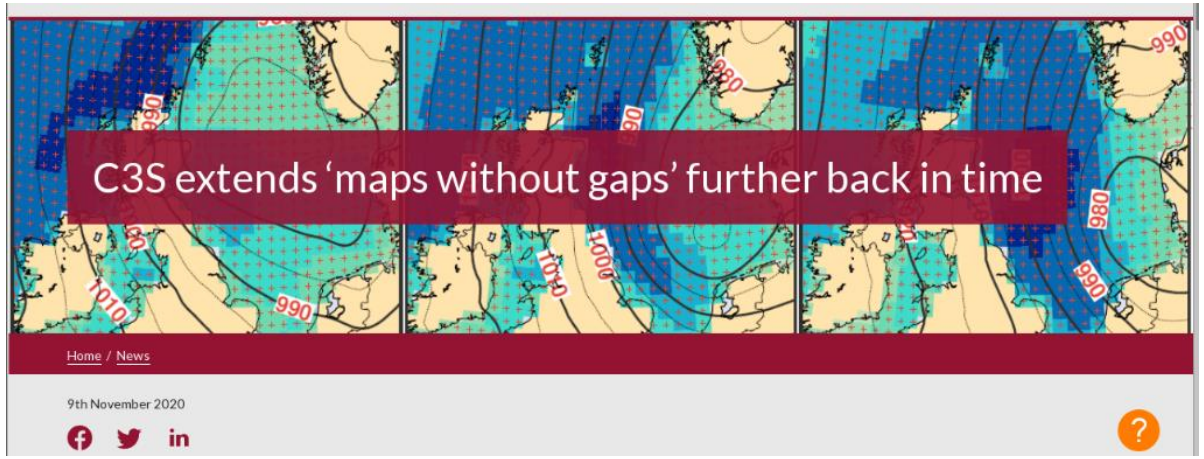
ERA5 (global, 31km)

Daily updates 5 days behind real time from 1979 onwards

Preliminary back extension (1950-1978) is available in the CDS

Final back extension is currently in production:

1) 1959-1978: four parallel streams of 5 year each: right now
2) 1950-1958, potentially 1940-1958: after completion of 1)



ERA5-Land (global, dynamical downscaling to 9km)

Available from 1981, updates 2-3 months latency

Back extension from 1950 has completed and is currently being evaluated

European reanalysis (CERRA, 5.5km)

Production is well underway (including a dedicated land component)

Predecessor (UERRA) is available in the CDS

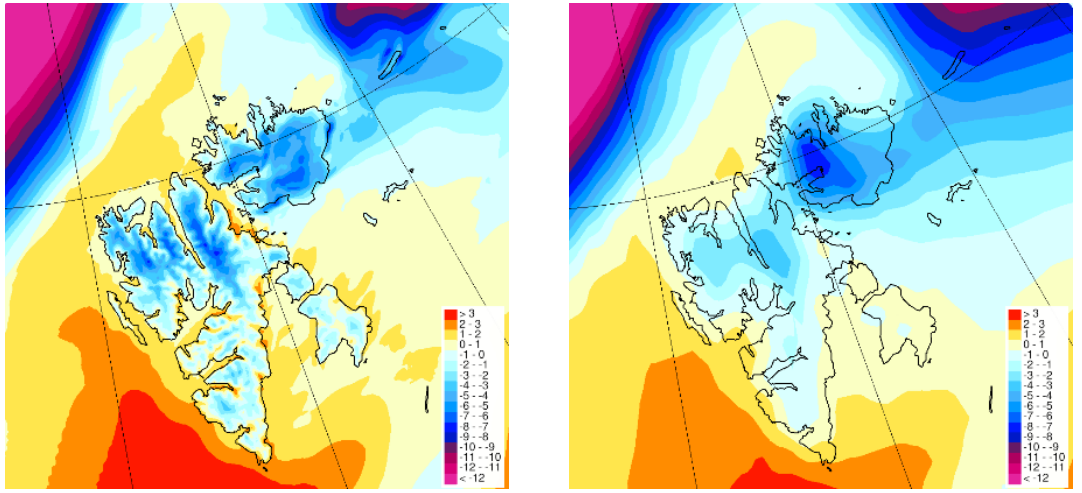
Arctic reanalysis (CARRA, 2 sub-areas, 2.5km)

Period of 1998-2019 (22 years) was recently published in the CDS

A back extension from 1991 should be completed by the end 2021

A pan-Arctic one-year test period has started; a full pan-Arctic is to be produced in COP2.

Near-surface temperature



CARRA ERA5

C3S climate predictions

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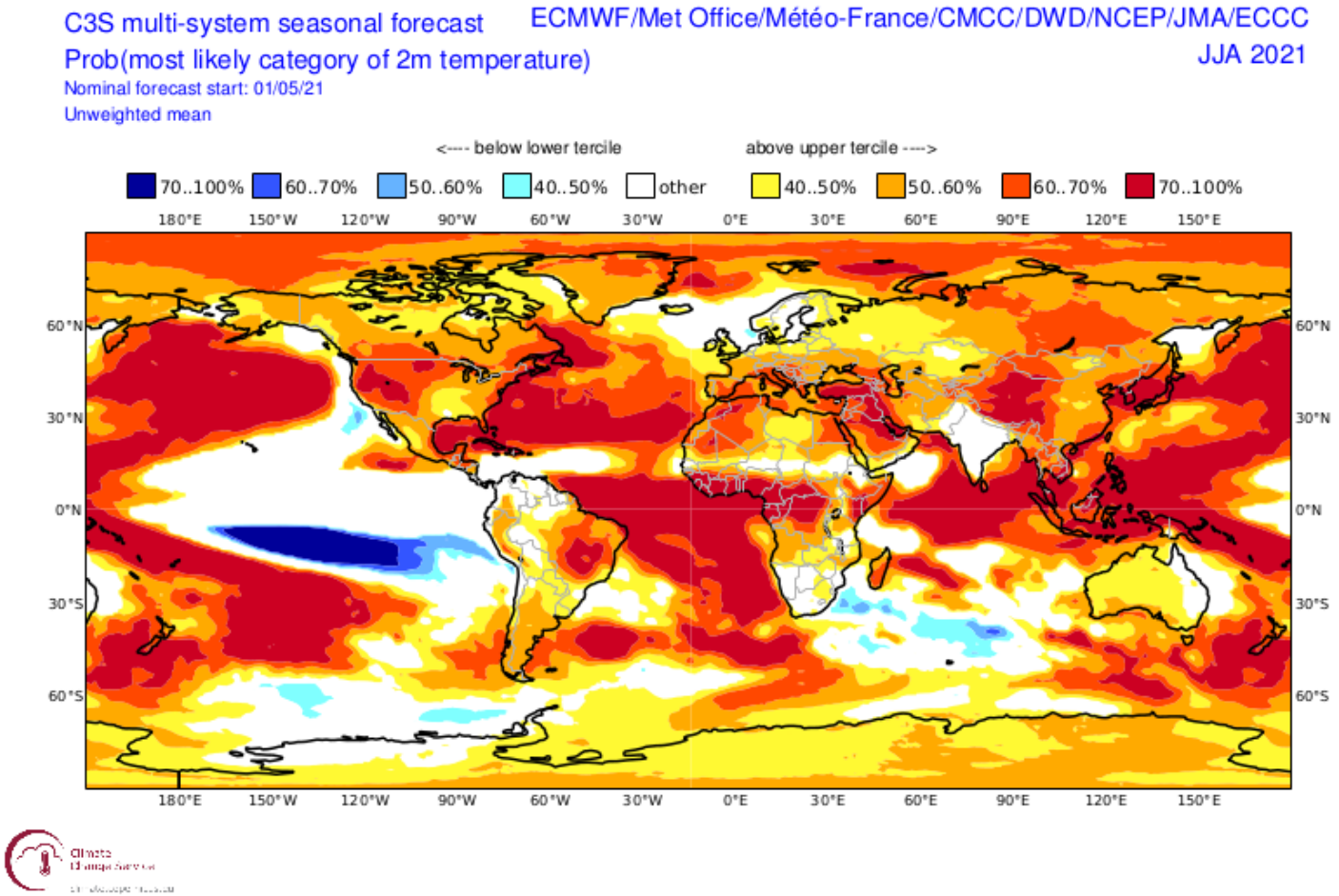
Seasonal

- **Operational service:** 6-month forecasts issued each month
- **Upgrade** of forecast systems from existing providers: UKMO (March)
- **Launch of new contributions** to the C3S multi-system: ECCC, Canada (May)



Decadal

- Completion of **case studies** for **agriculture, insurance, infrastructure** (water management)**, energy**

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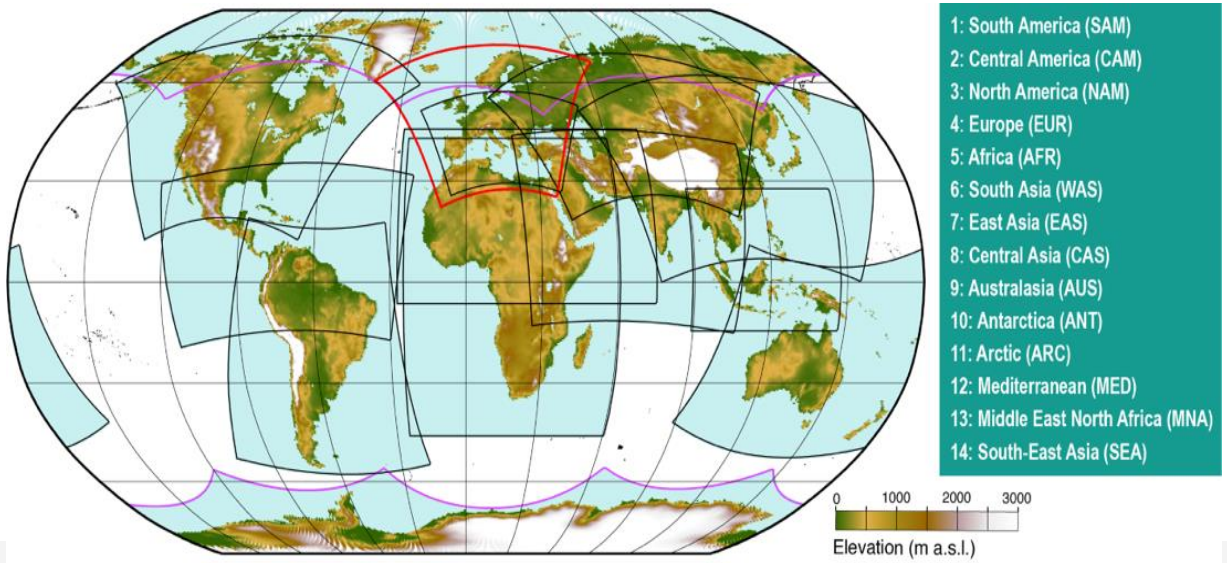
Climate projections

New CORDEX simulations, connected to the IPCC Climate Atlas, published in the CDS:

all (14) CORDEX regions now available

https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cordex-domains-single-levels



First batch of CMIP6 projections published in the CDS in March

https://cds.climate.copernicus.eu/cdsapp#!/dataset/projections-cmip6?tab=overview

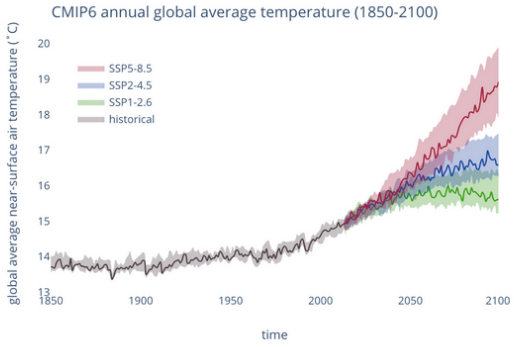
CMIP6 climate projections

Overview | Download data | Documentation

This catalogue entry provides daily and monthly global climate projections data from a large number of experiments, models and time periods computed in the framework of the sixth phase of the Coupled Model Intercomparison Project (CMIP6).

CMIP6 data underpins the Intergovernmental Panel on Climate Change 6th Assessment Report. The use of these data is mostly aimed at:

- addressing outstanding scientific questions that arose as part of the IPCC reporting process;
- improving the understanding of the climate system;
- providing estimates of future climate change and related uncertainties;
- providing input data for the adaptation to the climate change;
- examining climate predictability and exploring the ability of models to predict climate on decadal time scales;
- evaluating how realistic the different models are in simulating the recent past.



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CMIP6 - Data Access - Terms of Use

Publication date

2021-03-23

References

DOI: 10.24381/cds.d7eaec3d

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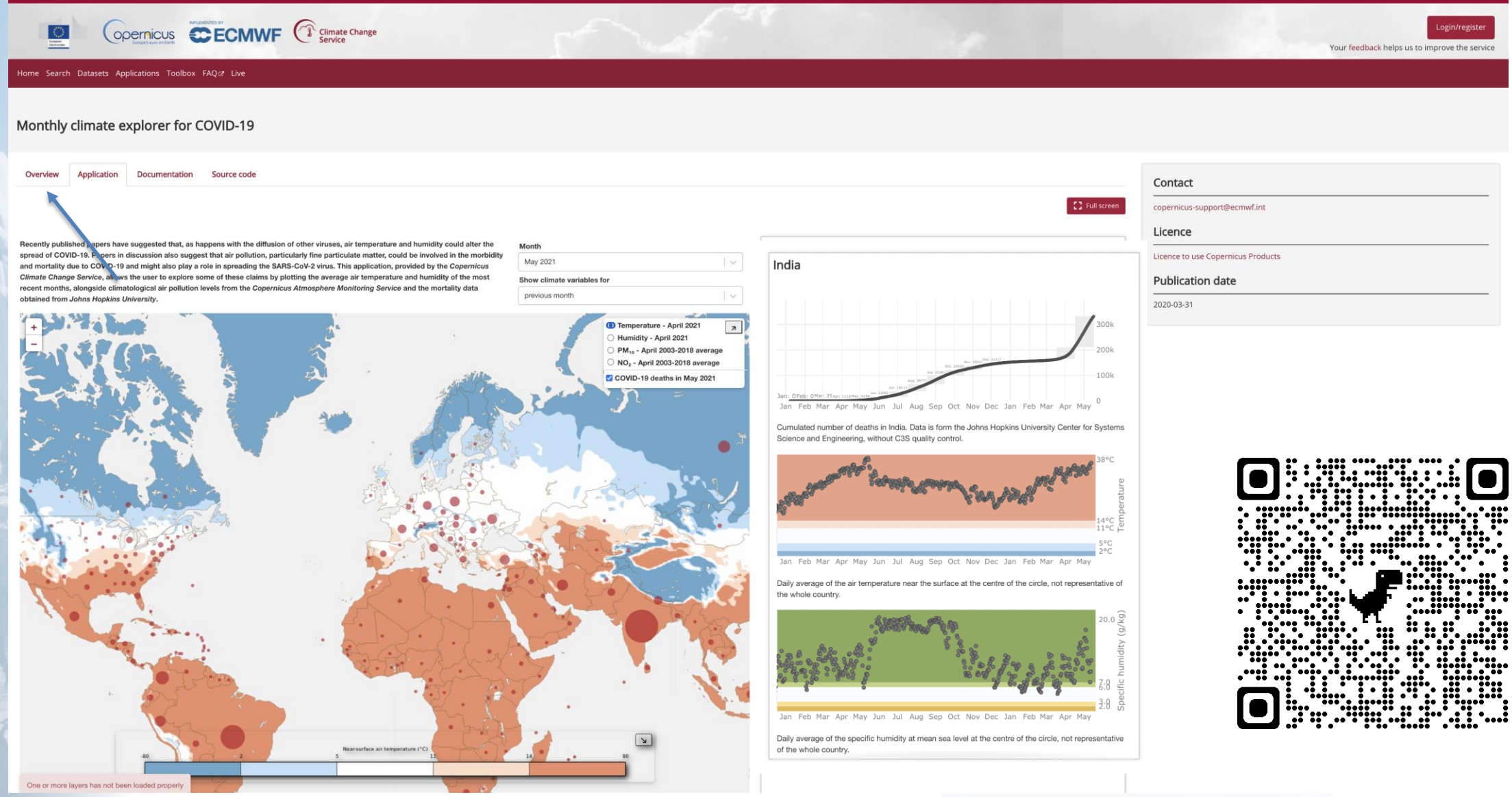
Covid app



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Overview

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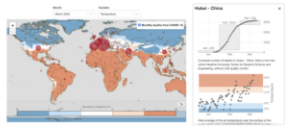
Monthly climate explorer for COVID-19

Overview | Application | Documentation | Source code



This application provides visualizations of data related to the COVID-19 virus spread along with climate information from the C3S Climate Data Store and atmospheric composition data from the CAMS Atmosphere Data Store. An interactive world map shows time averages of air temperature, humidity over selectable predefined periods and climatological surface concentrations of fine particulate matter (PM10) and nitrogen dioxide (NO_2). Circles, representing the number of deaths related to COVID-19, are placed on regions where the virus has spread. Clicking on each circle, the time evolution of the number of fatalities in the corresponding region is shown, together with information on the local temperature and humidity for the selected period.

This application is inspired by a series of research studies exploring the diffusion efficiency of the COVID-19 and the Influenza virus in different atmospheric stable conditions (e.g., see Sajadi et al., 2020; Lowen et al., 2007; Tamerius et al., 2013), as well as some recent work investigating at links between SARS-CoV-2, COVID-19 and air pollution which are still in the peer-review process (Wu et al., 2020; Setti et al., 2020). Given the novelty of the COVID-19 virus and the lack of confirmed relationships between the infection and the relevant climate variables, the application should only be considered as an exploratory tool.

For simplicity, the map shows meteorological and atmospheric composition variables averaged over the same periods which fatalities numbers refer to, without taking into account any delay between infection and eventual death. While the white regions in both the temperature (humidity) map and the time series correspond to the values identified in Sajadi et al. (2020) as the most favorable ones for the spread of the virus, the other ranges used for the color palettes have been chosen arbitrarily. The number of fatalities has been chosen as indicator for the virus spread given its robustness with respect to the other available data (number of confirmed cases and number of recovered patients). The values represented in the meteorological time series refer to single points located approximately at the centre of each circle.

COVID-19 related data are provided by Johns Hopkins University Center for Systems Science and Engineering (JHU CSSE), and are available at the following GitHub repository. These are used in the application without any prior quality control by C3S. Meteorological data are from ERA5 reanalysis: hourly data on single levels and pressure levels and monthly averages on single levels and pressure levels. Atmospheric composition data (PM10 and NO_2) are from the CAMS EAC4 global reanalysis (Inness et al., 2019). Shown are monthly means at the model level closest to the surface averaged over the period 2003-2018. The atmospheric composition fields therefore represent climatological conditions over a long period of time. It is noted that, over the period, anthropogenic emissions have changed in time due to evolving economies and in some areas abatement measures to improve air quality, but such a long period is useful to capture the variability of the natural sources of particulate matter such as wind-blown dust, wildfires and sea salts.

The designations employed and the presentation of material on the map do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

User-selectable parameters

- Variable: temperature, humidity, particulate matter (PM10) and nitrogen dioxide;
- Month for COVID-19 related data and for climate data;
- Previous month for climate data.

Description of the graphical output

The application presents an interactive world map showing time averages of one variable, selectable between air temperature, specific humidity, particulate matter (PM10) and nitrogen dioxide. The averaging month can be selected via a drop-down menu: for the meteorological variables for months since the beginning of 2020, values for 2020 are shown; for the remaining months of the year, a climatological average (2000-2019) is presented. For the meteorological variables, the average for the previous month may also be selected through a second drop-down menu. For the atmospheric composition variables, a climatological average (2003-2018) is presented. On the map, circles are placed in the centre of regions where the virus has spread; their size is proportional to the number of the deaths related to COVID-19 occurred in that region during the selected month. Clicking on a circle, a side window appears showing a plot of the daily time evolution of the local number of fatalities attributed to the virus, and plots of air temperature and specific humidity at a grid-point close to the centre of the circle, for the same time steps.

INPUT VARIABLES			
Name	Units	Description	Source
Daily cumulated number of deaths attributed to COVID-19 virus	Counts	Daily cumulated number of deaths attributed to COVID-19 virus	CSSEGISand Data - Brokered externally
Hourly specific humidity at 1000 hPa	kg kg^{-1}	ERA5 hourly specific humidity at 1000 hPa	ERA5
Hourly surface air temperature	K	ERA5 hourly 2m air temperature	ERA5
Monthly average NO2 mass fraction in air	kg kg-1	CAMS EAC4 monthly average NO2 mass fraction in air at surface	CAMS EAC4
Monthly average PM10 concentration	kg m-3	CAMS EAC4 monthly average PM10 concentration at surface	CAMS EAC4
Monthly average specific humidity at 1000 hPa	kg kg^{-1}	ERA5 monthly average specific humidity at 1000 hPa	ERA5
Monthly average surface air temperature	K	ERA5 monthly average 2m air temperature	ERA5

Record updated 2021-04-23 10:30:13 UTC

Contact

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