

An aerial photograph of the Aral Sea in 2019. The sea is a dark, irregular shape in the center, surrounded by a vast, arid, brownish-yellow desert landscape. The sea's surface is dark green/black, and the surrounding land is a mix of light brown and tan, with some white patches of salt or sand. The sea is surrounded by a wide, light-colored, sandy or silty area, which is the result of the sea's retreat. The overall image has a high-contrast, almost abstract quality, with the sea's shape being the central focus.

# Decoding the climate

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A guide for journalists to understand climate data

*Aral Sea, 2019 - Copernicus ESA*

# if only I knew ...

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Where can i find the data?

Weather, climate, but what is  
**'anomaly'**?

Why do I always encounter  
the **'ERA5'** acronym?

Total precipitation, Standardized precipitation,  
Standardized precipitation  
evapotranspiration...and now what do I choose?

What are **.nc** files and how  
can I read them?

Is **reanalysis** a kind of analysis?





# What we will do today

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Climate toolkit for beginners

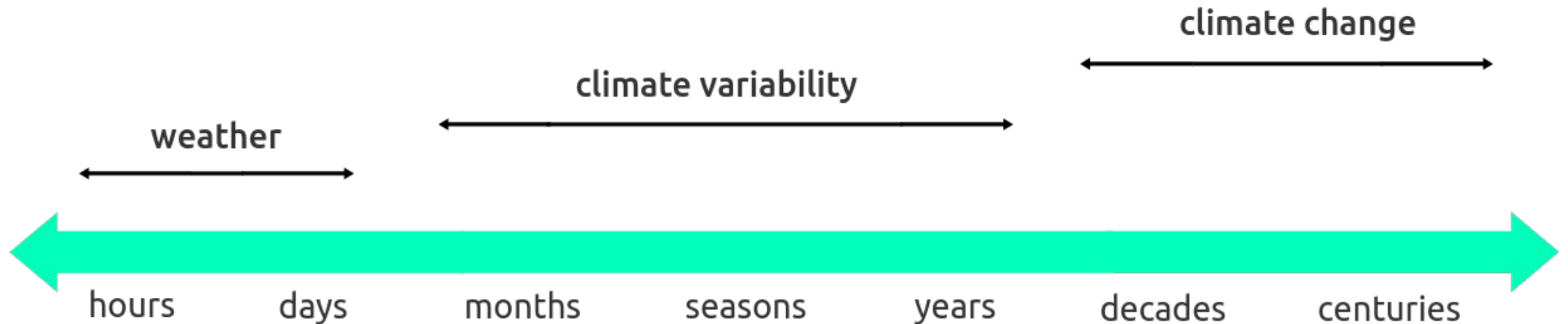


Let's get hands-on

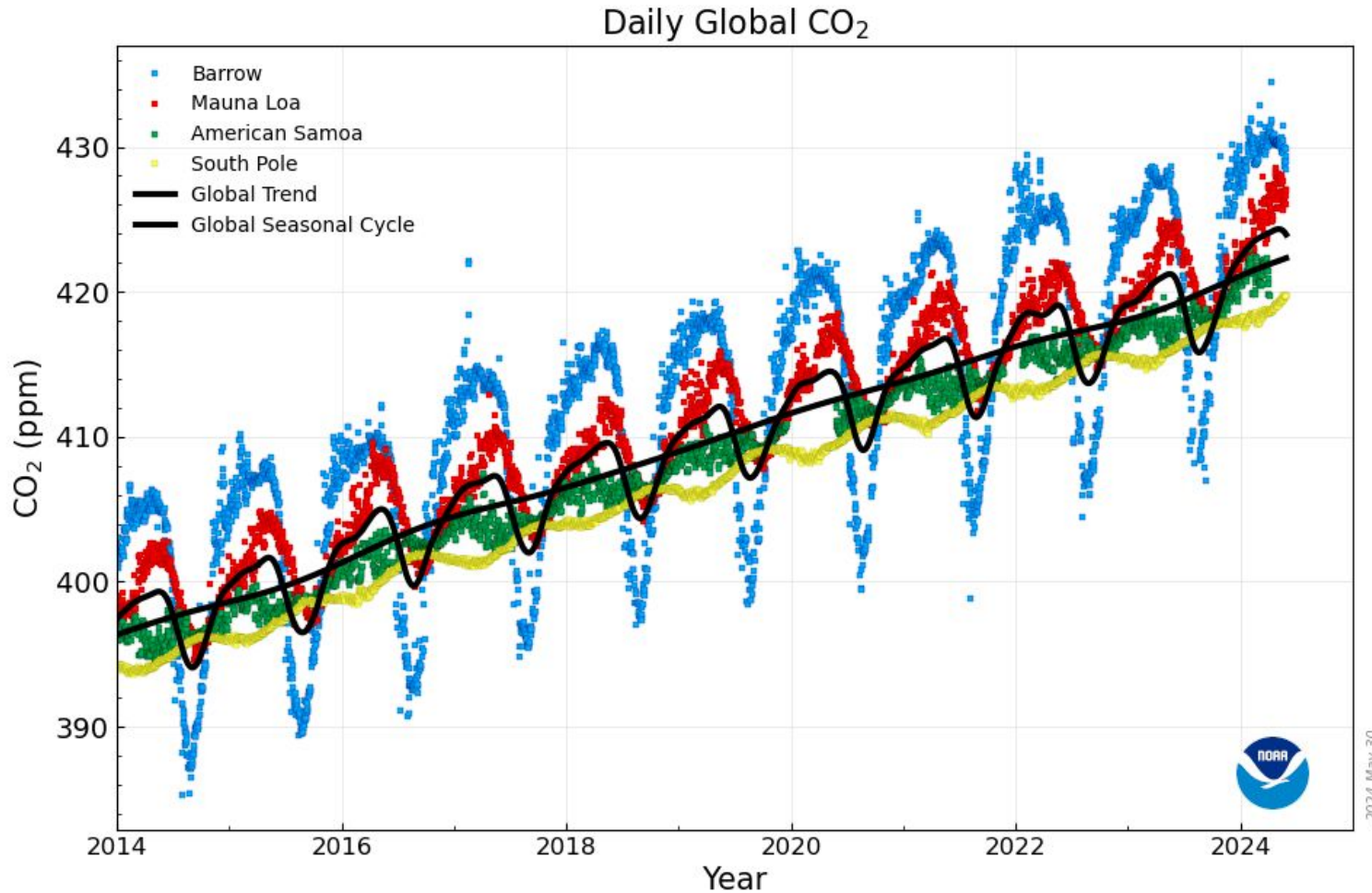


# Weather, climate, but what is 'anomaly'?

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# Trend vs variation



**NOAA Global  
Monitoring  
Laboratory**

# Tp, SPI, SPEI...and now what do I choose?

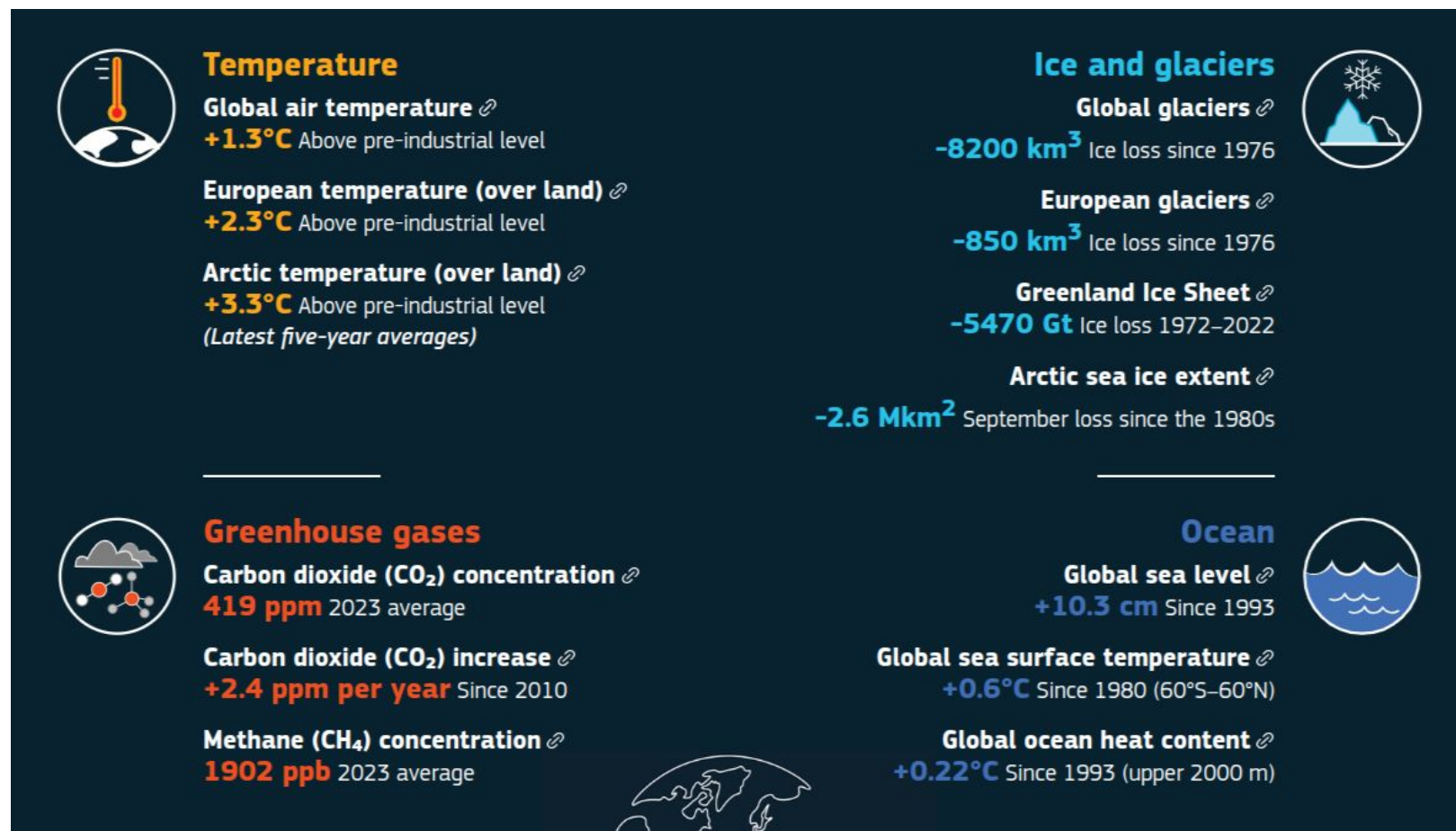
## Climate variables



[Global Climate Observing System \(GCOS\) website](#)

# Tp, SPI, SPEI...and now what do I choose?

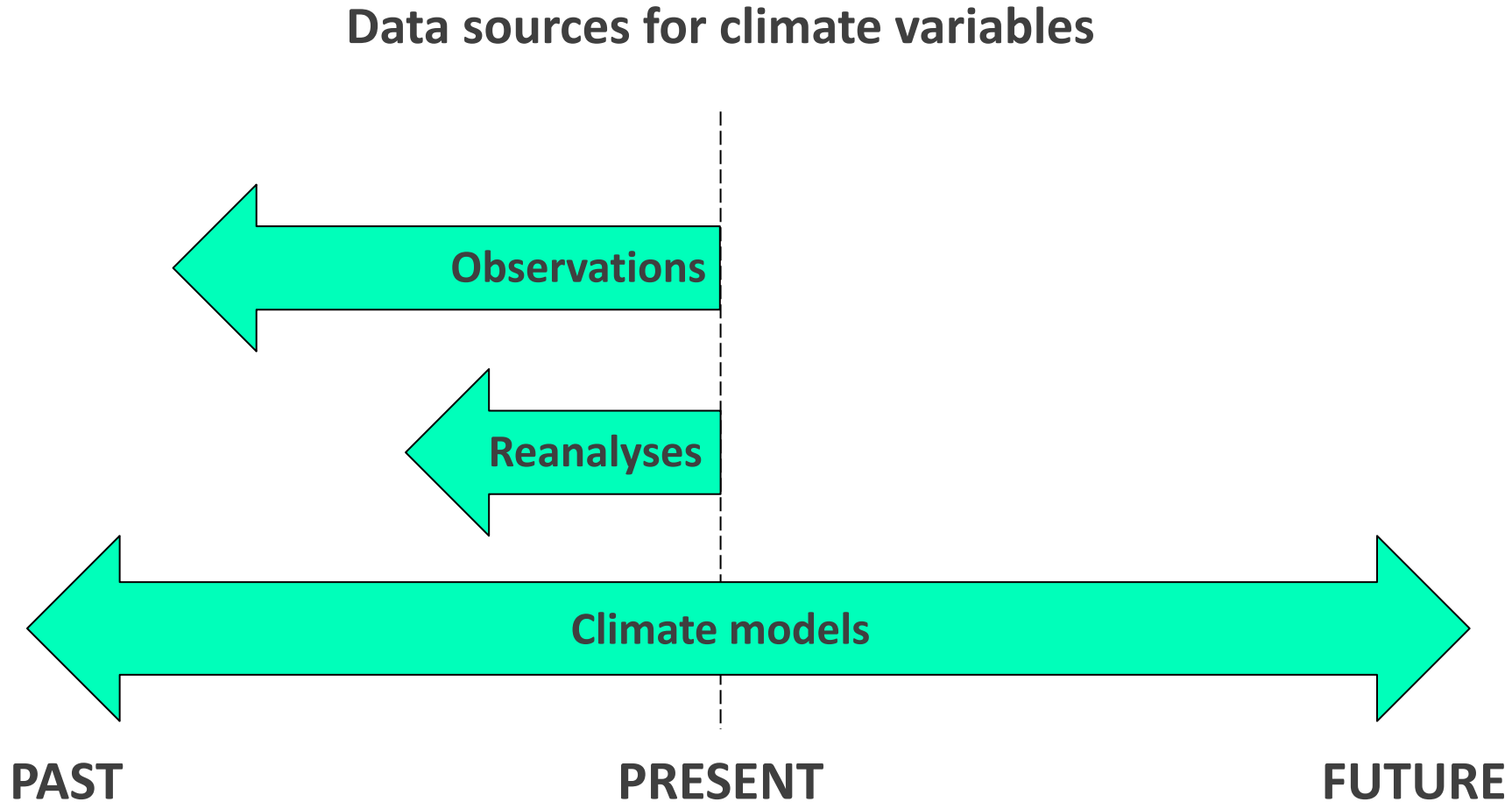
## Climate indicators



[Copernicus website](#)

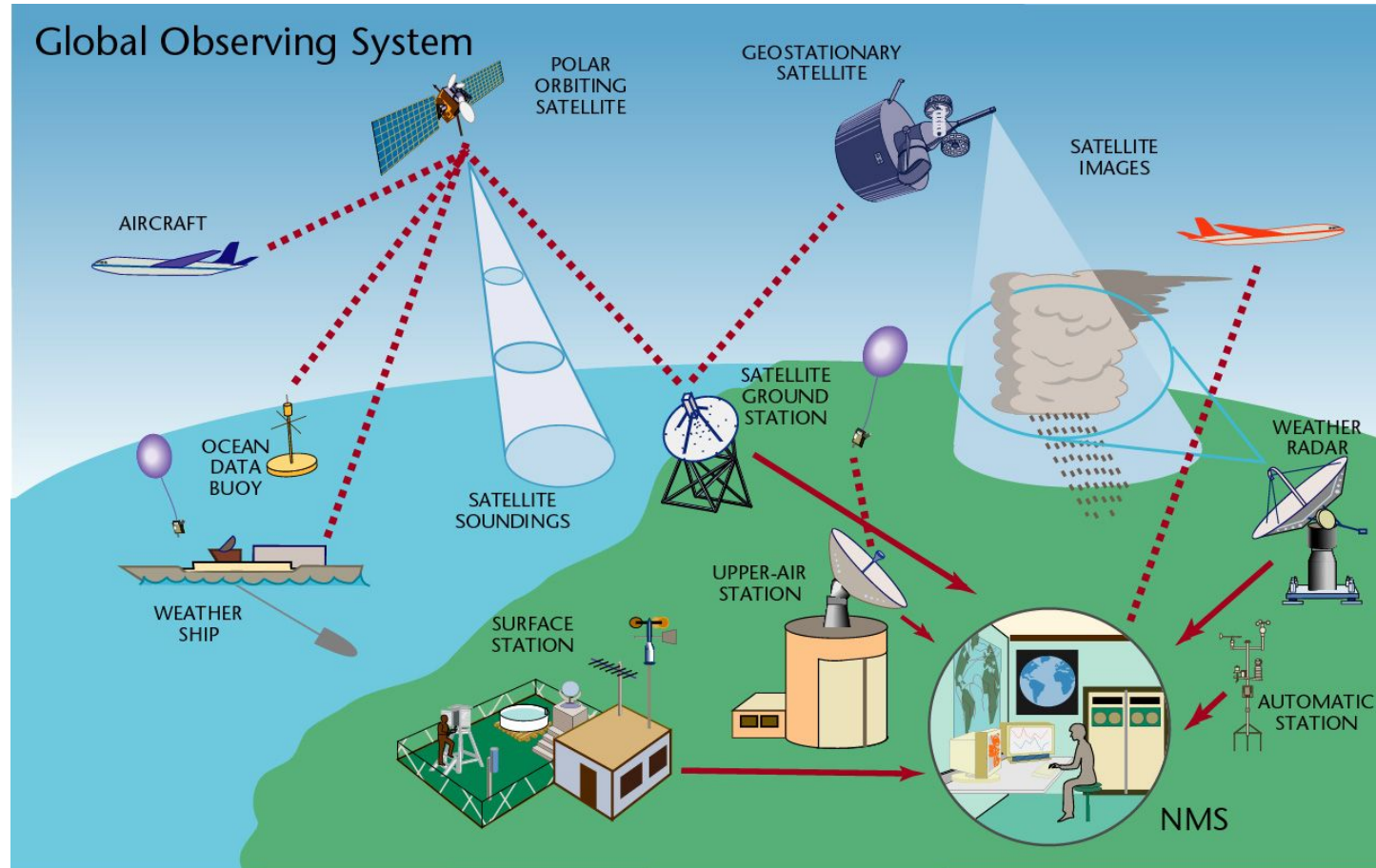
# Is reanalysis a kind of analysis?

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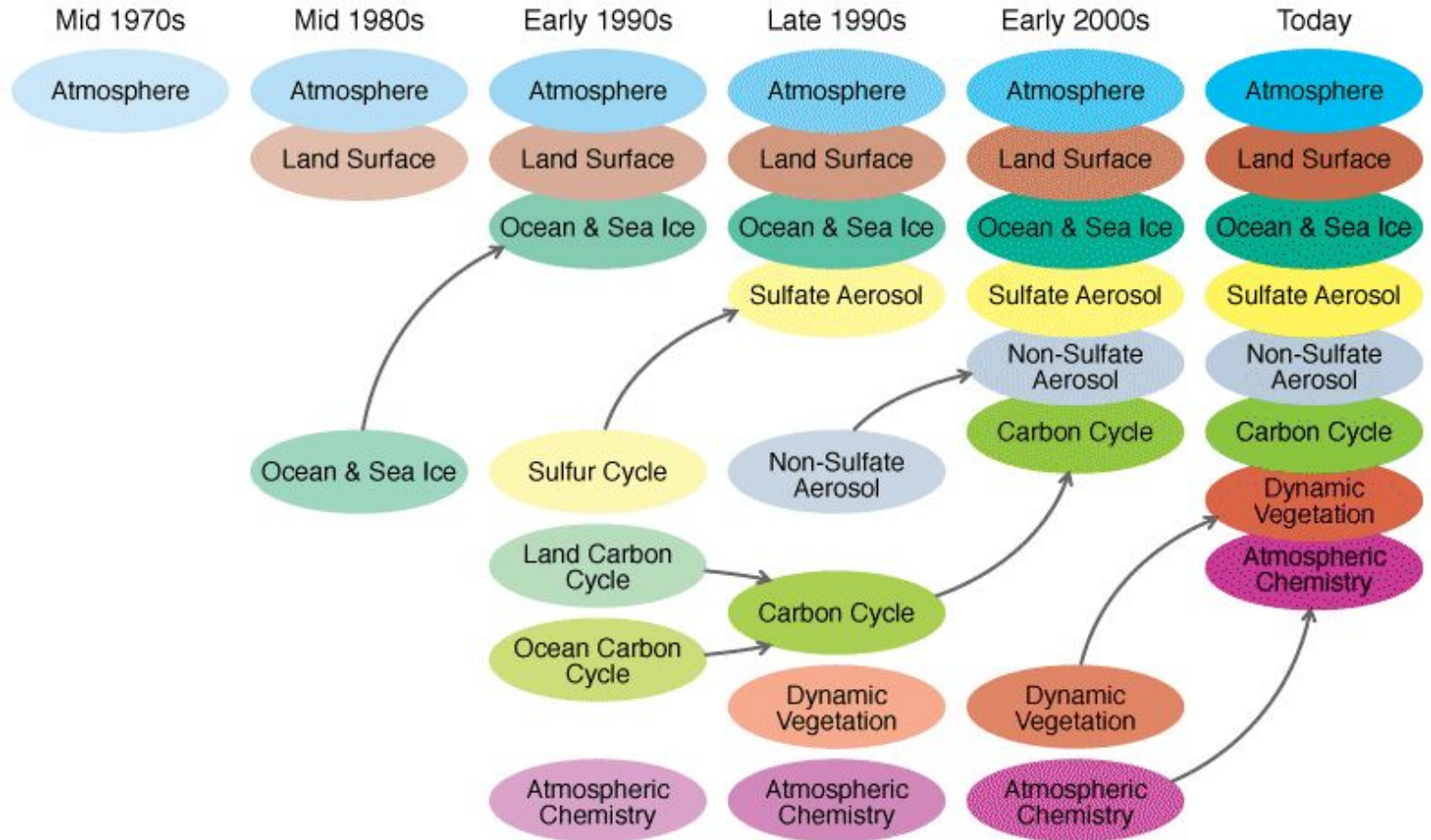
# (Direct) Observations



**WMO - Observation components of the Global Observing System**

# Climate models

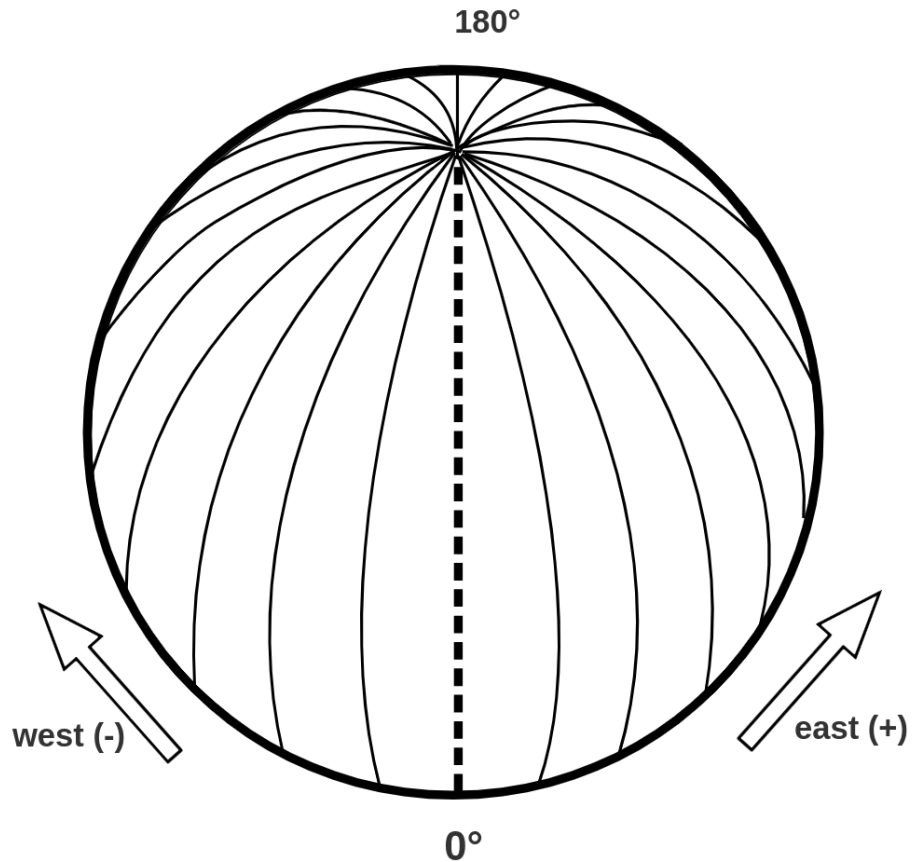
## The development of climate models (NASA)



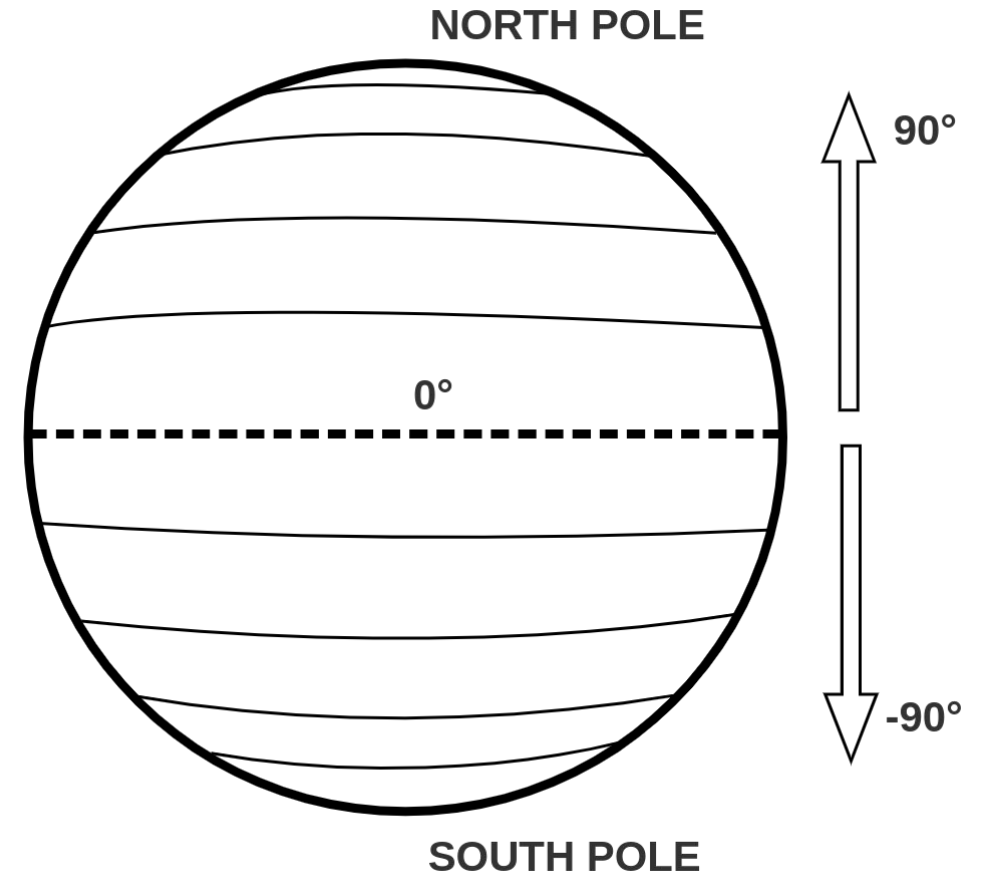
# Back to school (The Earth's coordinate system)

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## Meridians and longitude



## Parallels and latitude



# Climate models

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History of climate  
modeling (figure 2)

**click me to view  
the image**



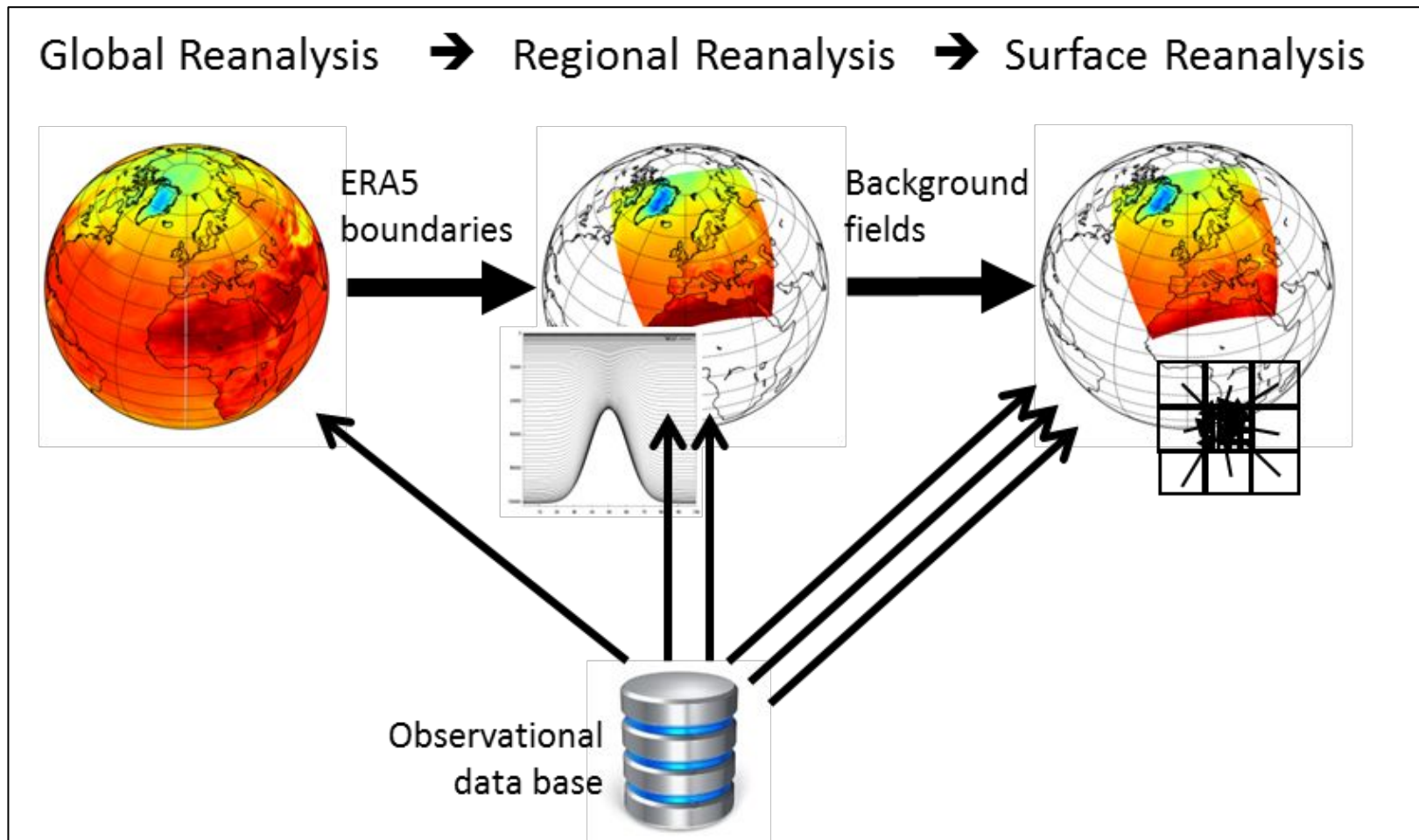
# Resolution of climate models

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click me to view  
the image

A national strategy  
for advancing climate  
modeling (page 64)

# Why do I always encounter the 'ERA5' acronym?



Copernicus Climate Change Service

# Uncertainties

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- Natural variability
- Measuring errors
- Inhomogeneities
- Uncertainties in statistics due to limited data
- Biases of the models
- Imperfect knowledge about the development of the climate system
- Imperfect knowledge about the socio-economic future

# What are .nc files and how can I read them?

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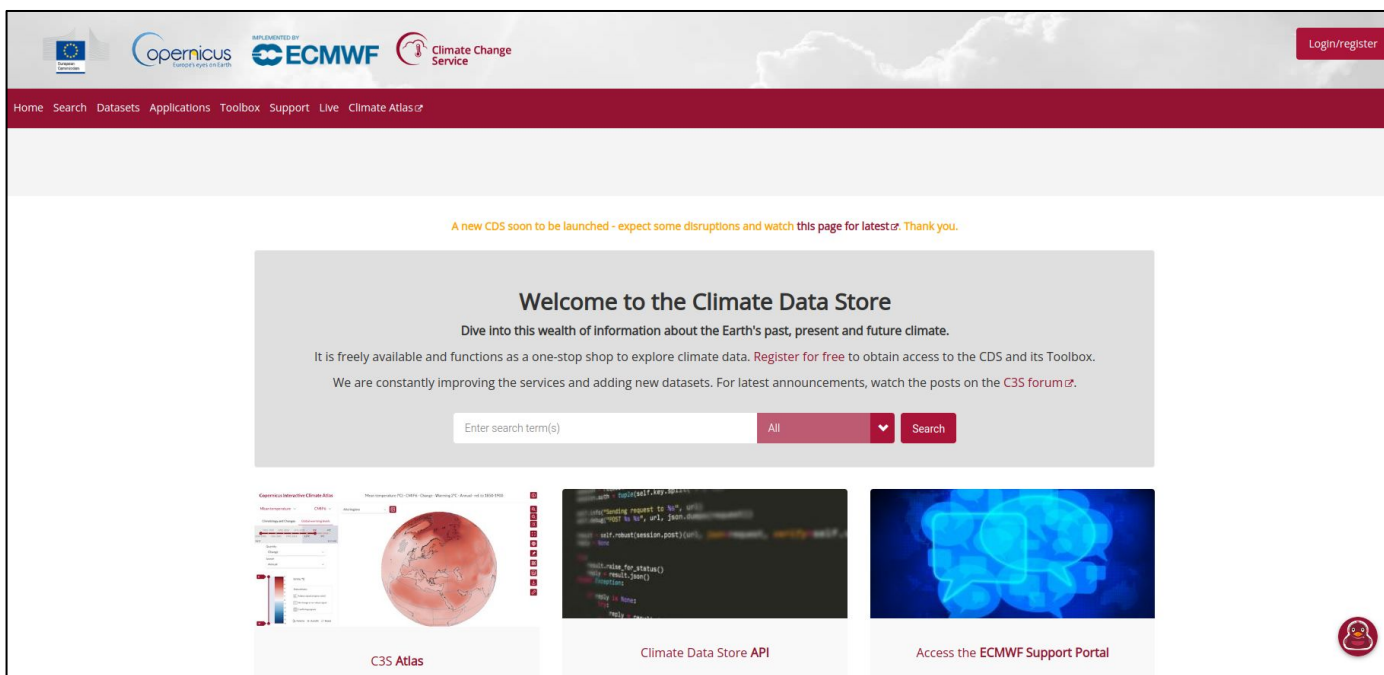
click me to view  
the image

[netCDF overview](#)



# Where can i find the data?

## Copernicus Data Store



<https://cds.climate.copernicus.eu/>

# Climate Data Store Toolbox

The screenshot displays the Climate Data Store Toolbox website. At the top, there is a header with logos for the European Commission, Copernicus, ECMWF, and the Climate Change Service, along with a 'Login/register' button. Below the header is a navigation bar with links: Home, Search, Datasets, Applications, Toolbox, Support, Live, and Climate Atlas. The main content area is titled 'Welcome to the Toolbox' and features a yellow banner announcing a new CDS launch. Below this, there are four main sections: 'Toolbox Documentation' (showing learning bundles), 'Toolbox Editor' (showing a workspace for crafting applications), 'API' (showing API reference), and 'Application Gallery' (showing a gallery of applications). A small penguin icon is visible in the bottom right corner of the interface.

European Commission

Copernicus  
Europe's eyes on Earth

IMPLEMENTED BY  
ECMWF

Climate Change  
Service

Login/register

Home Search Datasets Applications Toolbox Support Live Climate Atlas

## Welcome to the Toolbox

A new CDS soon to be launched - expect some disruptions and watch this page for latest. Thank you.

### Toolbox Documentation

Learning Bundles

CDS Toolbox fundamentals  
Introductory material on the Toolbox, the Editor and application management.

Retrieving and processing data  
An in-depth set of material on handling data from the CDS. Topics include retrieval, mathematical operations, statistical functions and visualizations.

Plotting data  
An essential set of material for producing maps, graphs and bar charts of CDS data.

Access the full set of documentation material, including tutorials, how-to guides and a glossary.

### Toolbox Editor

Enter your personal workspace where you can craft, edit and run applications.

### API


API Reference

### Application Gallery

Application gallery

<https://cds.climate.copernicus.eu/cdsapp#!/toolbox>


# Find out more



AllForecastingResearchSoftware Data and ComputingMOOCsC3S


C3S

Search ECMWF eLearning




**Climate Data Discovery – Introduction**

This lesson provides an introduction to the different sources of climate data and guides you to find the data you need.




**Climate Data Discovery – Advanced**

This lesson provides details on the various data sources, and strategies to find the data needed: Processing steps, choosing projections, scenarios, ensembles, variables etc. The lesson is a follow-up of "Climate Data Discovery – Introduction".




**Data Resources - Introduction**

This lesson provides an overview of the various types of climate data resources, and teaches what Essential Climate Variables are. It will indicate the main advantages and disadvantages of the various data sources.



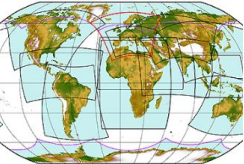
**Data Resources - Observations**

This lesson provides training on observations data. The different types of measurements are explained, the types of observing systems and the measurement uncertainty are explained.




**Data Resources - Reanalyses**

This lesson teaches users the basics of climate reanalysis. The lesson explains how reanalyses are made, an overview of global reanalyses datasets, and their strengths and limitations.



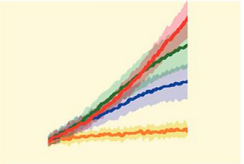
**Data Resources - Climate Models**

This lesson explains how climate models work and how the quality of climate models can be evaluated. Differences between climate projections, predictions and scenarios are explained.



**Bias Correction and Downscaling**

This lesson teaches about downscaling and bias correction methods. An exercise for bias correction is included.



**Using climate models for climate scenarios**

This lesson teaches how to use climate models in the development of national climate scenarios. Examples are provided for The Netherlands, Switzerland and the U.K.

## ECMWF moocs

- Climate Data Discovery – Introduction
- Climate Data Discovery – Advanced
- Data Resources - Introduction
- Data Resources - Observations
- Data Resources - Reanalyses
- Data Resources - Climate Models
- Bias correction and Downscaling



A close-up photograph of hands kneading dough in a wooden bowl. Flour is being dusted onto the dough, creating a cloud of white particles. The background is dark with warm, out-of-focus lights.

**Let's get hands-on!**