COMPUTATIONAL TOOLS FOR CLIMATE SCIENCE

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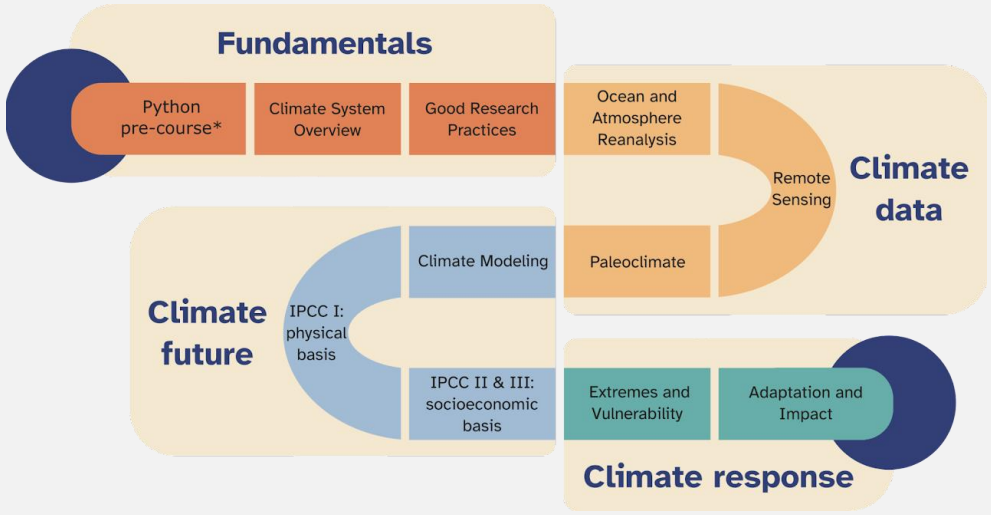
AGENDA

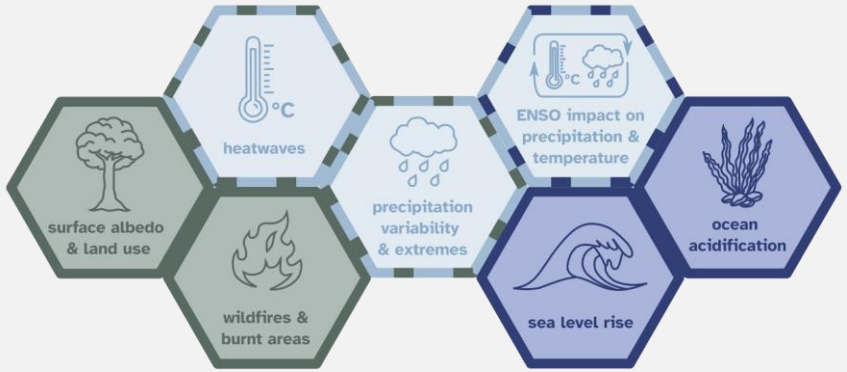
- Computational Tools for Climate Science 2023
- Introduction to Climate Science
- import xarray as xr
- Tutorial
- Conclusion

COMPUTATIONAL TOOLS FOR CLIMATE SCIENCE 2023

Curriculum



Research Projects



INTRODUCTION

Introduction to Climate Science

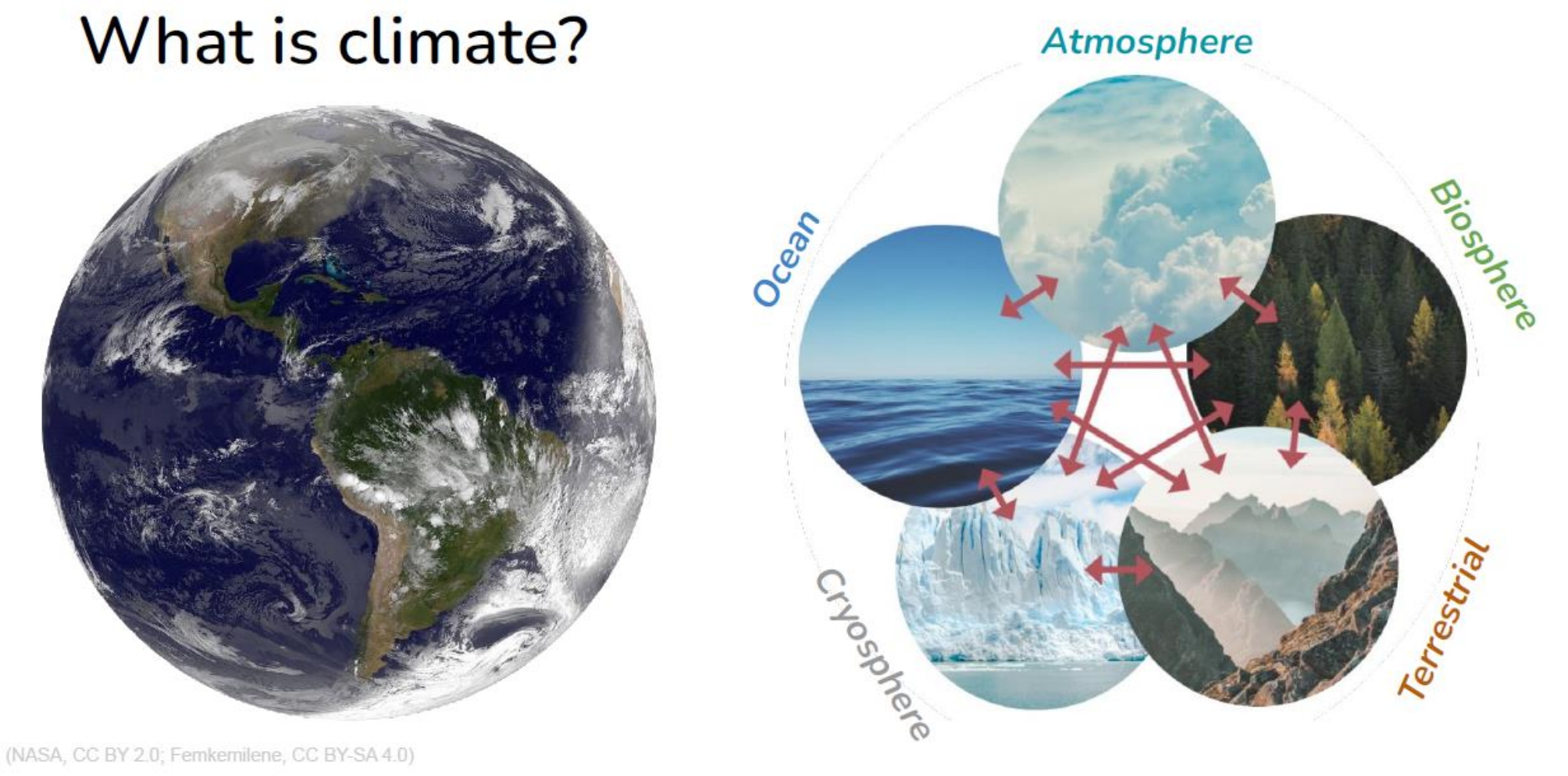
Andreas Schmittner

This book describes how Earth's climate is changing, how it has been changing in the recent geological past and how it may change in the future. It covers the physical sciences that build the foundations of our current understanding of global climate change such as radiation, Earth's energy balance, the greenhouse effect and the carbon cycle. Both natural and human causes for climate change are discussed. Impacts of climate change on natural and human systems are summarized. Ethical and economical aspects of human-caused climate change and solutions are presented.

Download this book

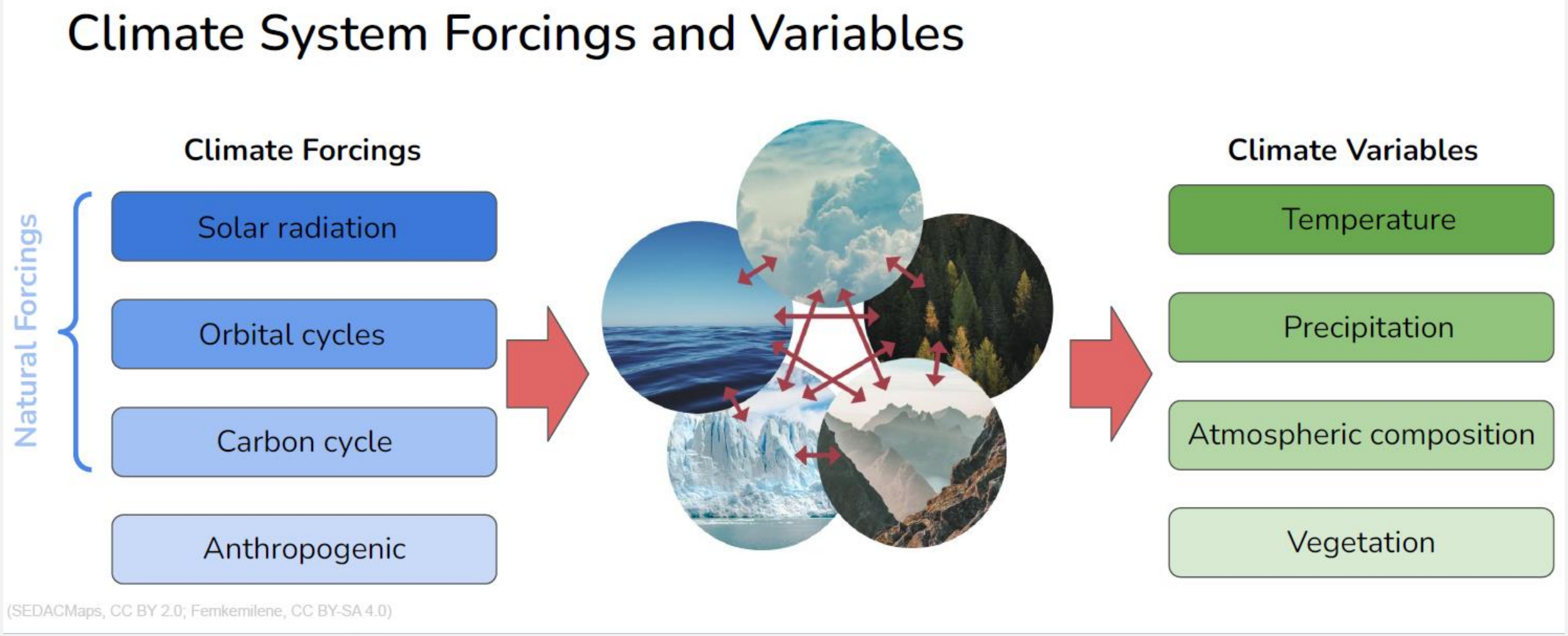
https://open.oregonstate.education/climatechange/

INTRODUCTION



Climate is what you expect. Weather is what you get.

INTRODUCTION



INTRODUCTION

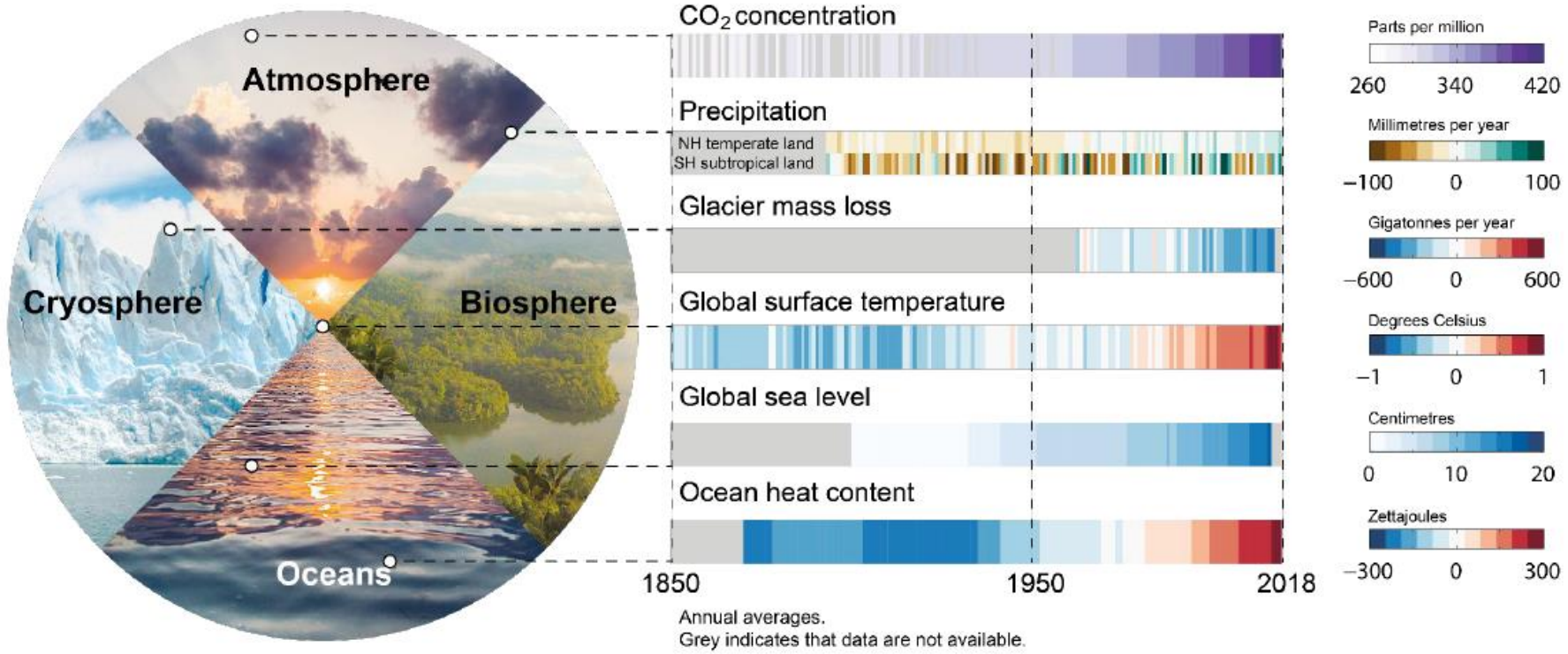
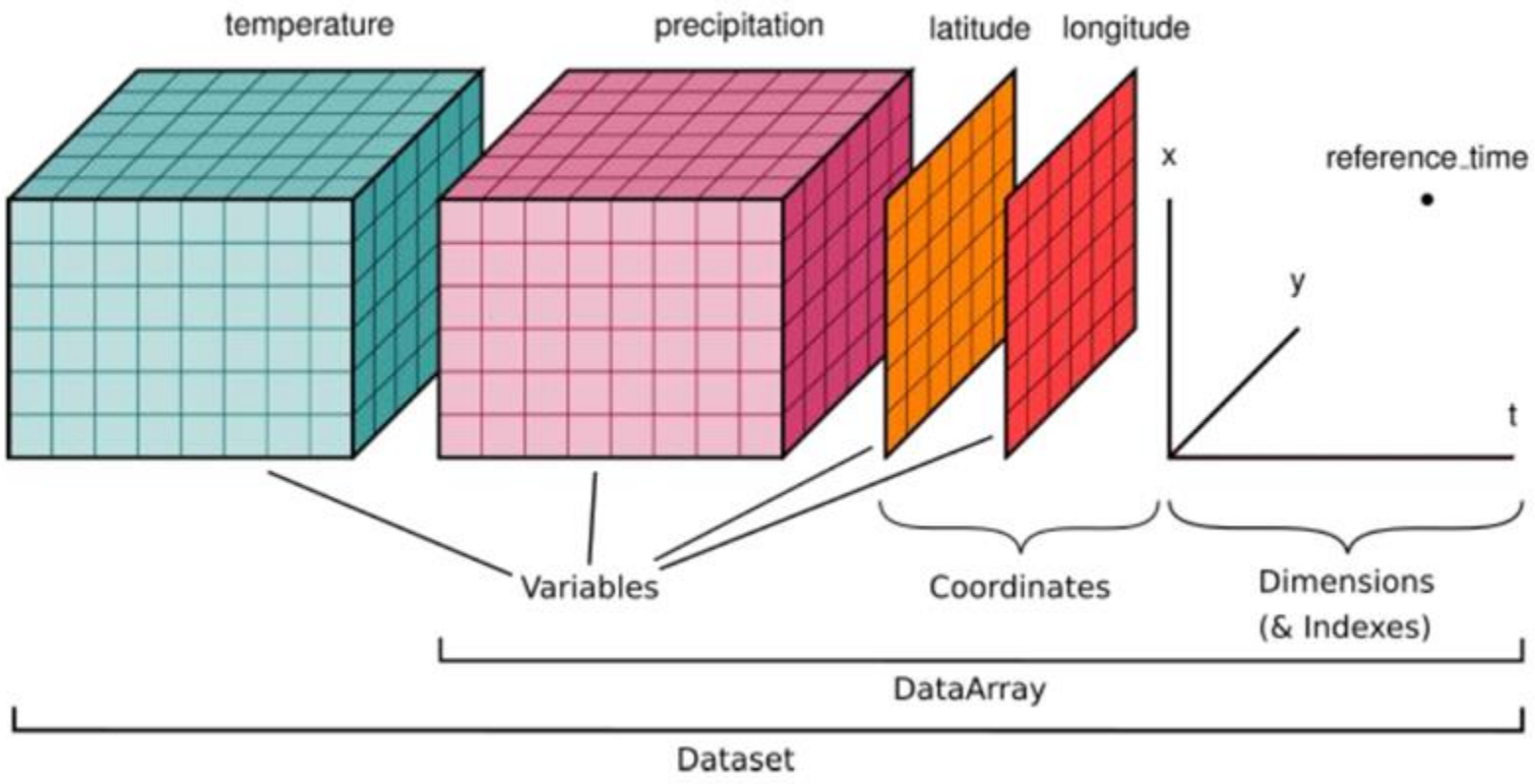


Figure 1.4 | Changes are occurring throughout the climate system. Left: Main realms of the climate system: atmosphere, biosphere, cryosphere and ocean. Right: Six key indicators of ongoing changes since 1850, or the start of the observational or assessed record, through 2018. Each stripe indicates the global (except for precipitation which shows two latitude band means), annual mean anomaly for a single year, relative to a multi-year baseline (except for CO2 concentration and glacier mass loss, which are absolute values). Grey indicates that data are not available. Datasets and baselines used are: (i) CO2: Antarctic ice cores (Lüthi et al., 2008; Bereiter et al., 2015) and direct air measurements (Tans and Keeling, 2020) (see Figure 1.5 for details); (ii) precipitation: Global Precipitation Climatology Centre (GPCC) V8 (updated from Beckeret al., 2013), baseline 1961–1990 using land areas only with latitude bands 33°N–66°N and 15°S–30°S; (iii) glacier mass loss: Zemp et al. (2019); (iv) global surface air temperature (GMST): HadCRUT5 (Morice et al., 2021), baseline 1961–1990; (v) sea level change: (Dangendorf et al., 2019), baseline 1900–1929; (vi) ocean heat content (model–observation hybrid): Zanna et al. (2019), baseline 1961–1990. Further details on data sources and processing are available in the chapter data table (Table 1.SM.1).

Figure 1.4 in IPCC, 2021: Chapter 1. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Chen, D. et al.)

IMPORT XARRAY AS XR

Tutorial: Creating DataArrays and Datasets in Xarray



(Project Pythia)

- Assessing changes in global climate systems and their forcings, involves large, global datasets with multiple dimensions and variables
- In this tutorial, we'll use the DataArray and Dataset objects to, organize and interpret these large datasets

TUTORIAL

CONCLUSION

The following excerpt from Carl Sagan's book *Pale Blue Dot* was inspired by an image taken, at Sagan's suggestion, by Voyager 1 on 14 February 1990. As the spacecraft was departing our planetary neighborhood for the fringes of the solar system, it turned it around for one last look at its home planet.

QUESTIONS?

Speak Now Or Forever Hold Your Peace.

THANK YOU!

That's all Folks!