

HAS Tools:

Working with ERA5 &
Downscaled CMIP6 data

December 2, 2024

Welcome back!

- Topics this week:
 - Today: Prep/background for final assignment
 - Weds: Generative AI tools
 - Fri: GIS/mapping extra content
- Next Week:
 - Monday: Course reflection/discussion
 - Wednesday: Work time/time off
- Please fill out course evaluations!
- Anything else?

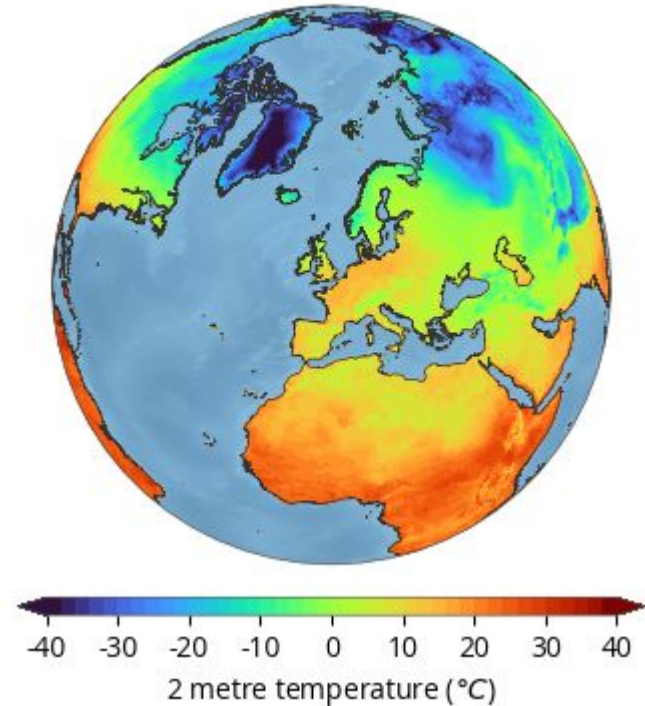


On reanalysis

The role of reanalysis:

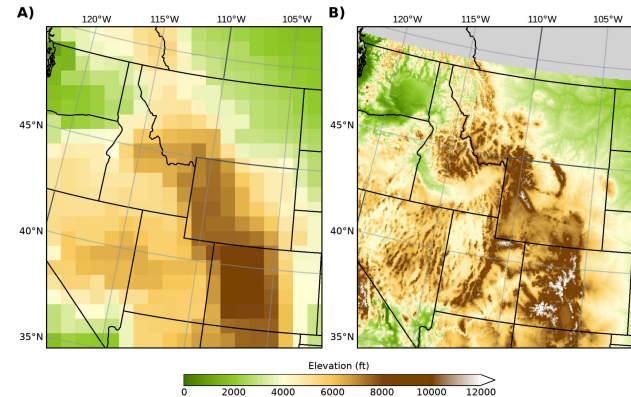
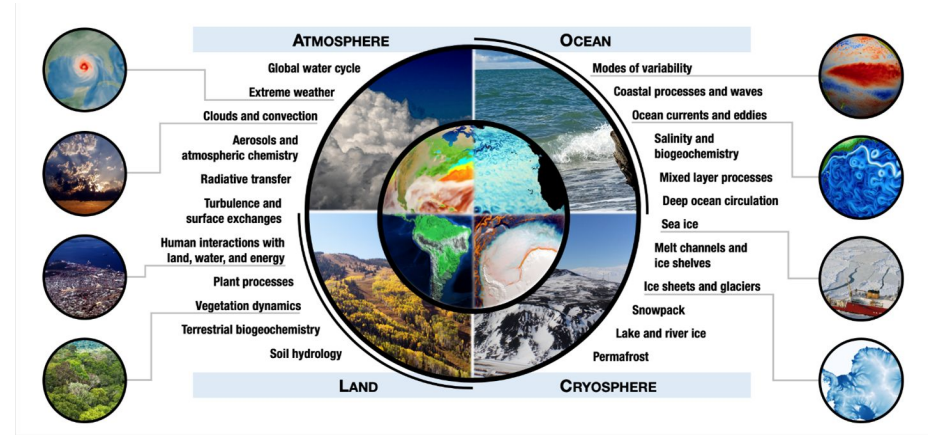
- Learn as much as we possibly can by synthesizing as much data as possible
- Uses model results, historic data, and modern observations
- Produce a spatiotemporally complete view of the Earth System

ERA5-Land 2 metre temperature
1 January 2023 at 00:00 UTC



Climate projections & downscaling

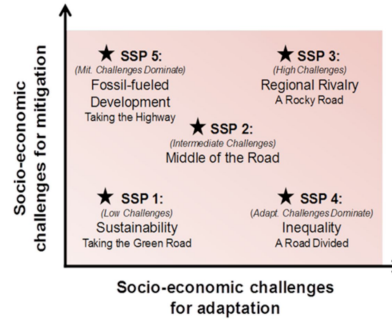
- You have certainly heard of climate projections
- Earth systems models represent the best state of our knowledge
- High process complexity tends to mean low spatial resolution
- To understand regional/local impacts downscaling is done
 - Dynamical vs statistical



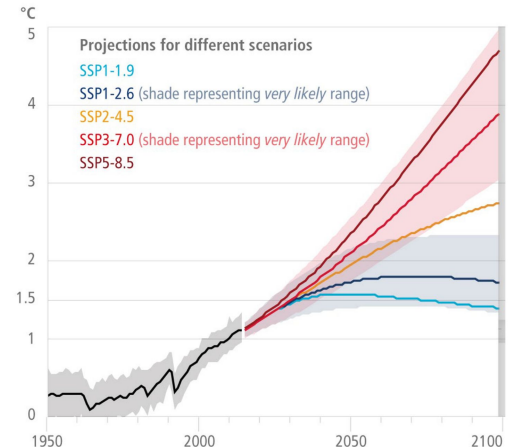
Shared socio-economic pathways

- While we understand and can encode much of the physics/chemistry/etc of the Earth system, humans are harder to model
- SSPs are how we talk about how human actions may change the Earth system
- Mitigation vs adaptation
- We will focus on SSP2-4.5 and SSP5-8.5 for simplicity

THE SHARED SOCIO-ECONOMIC PATHWAYS (SSPs)

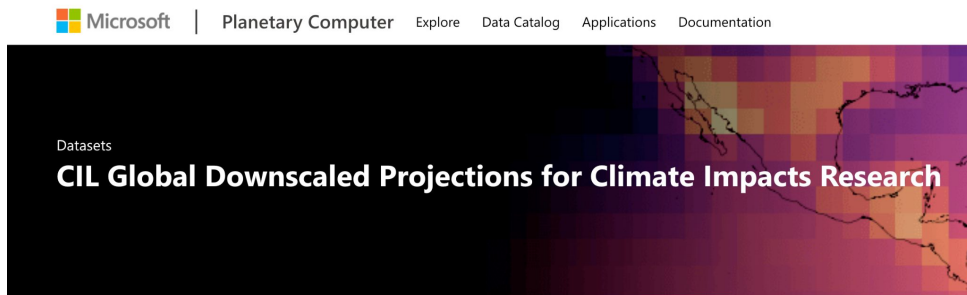


Global surface temperature change
Increase relative to the period 1850–1900



Climate Impacts Lab Downscaled Data

- This is the new dataset we will use for the final assignment
- It contains temperature and precipitation data at 25km scale for:
 - Multiple SSPs
 - Multiple Climate models
- Data is stored on MS Planetary Computer and accessed via a STAC catalog



Overview

The World Climate Research Programme's [6th Coupled Model Intercomparison Project \(CMIP6\)](#) represents an enormous advance in the quality, detail, and scope of climate modeling.

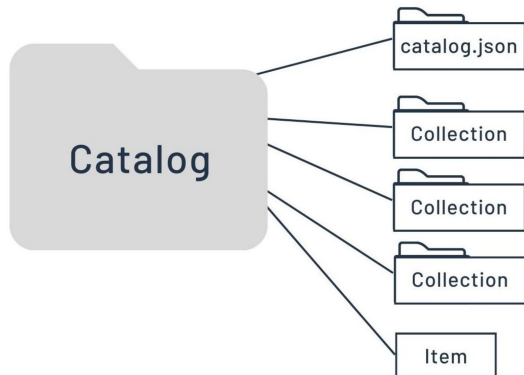
The [Global Downscaled Projections for Climate Impacts Research](#) dataset makes this modeling more applicable to understanding the impacts of changes in the climate on humans and society with two key developments: trend-preserving bias correction and downscaling. In this dataset, the [Climate Impact Lab](#) provides global, daily minimum and maximum air temperature at the surface (`tasmin` and `tasmax`) and daily cumulative surface precipitation (`pr`) corresponding to the CMIP6 historical, `ssp1-2.6`, `ssp2-4.5`, `ssp3-7.0`, and `ssp5-8.5` scenarios for 25 global climate models on a 1/4-degree regular global grid.

GDPCIR data can be accessed on the Microsoft Planetary Computer. The dataset is made up of two collections, distinguished by data license. More information about the dataset is available in these collections, including access instructions and examples, data formats, available models, methods, and citation/licensing requirements, on each dataset's homepage linked below.

SpatioTemporal Asset Catalog



- Aims to provide a unified language to talk about geospatial data
- Makes large datasets/collections of datasets:
 - Searchable
 - Queryable
- Three main building blocks:
 - item, catalog, collection



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jump to codespaces for tutorial