Water Data Analysis & Modeling
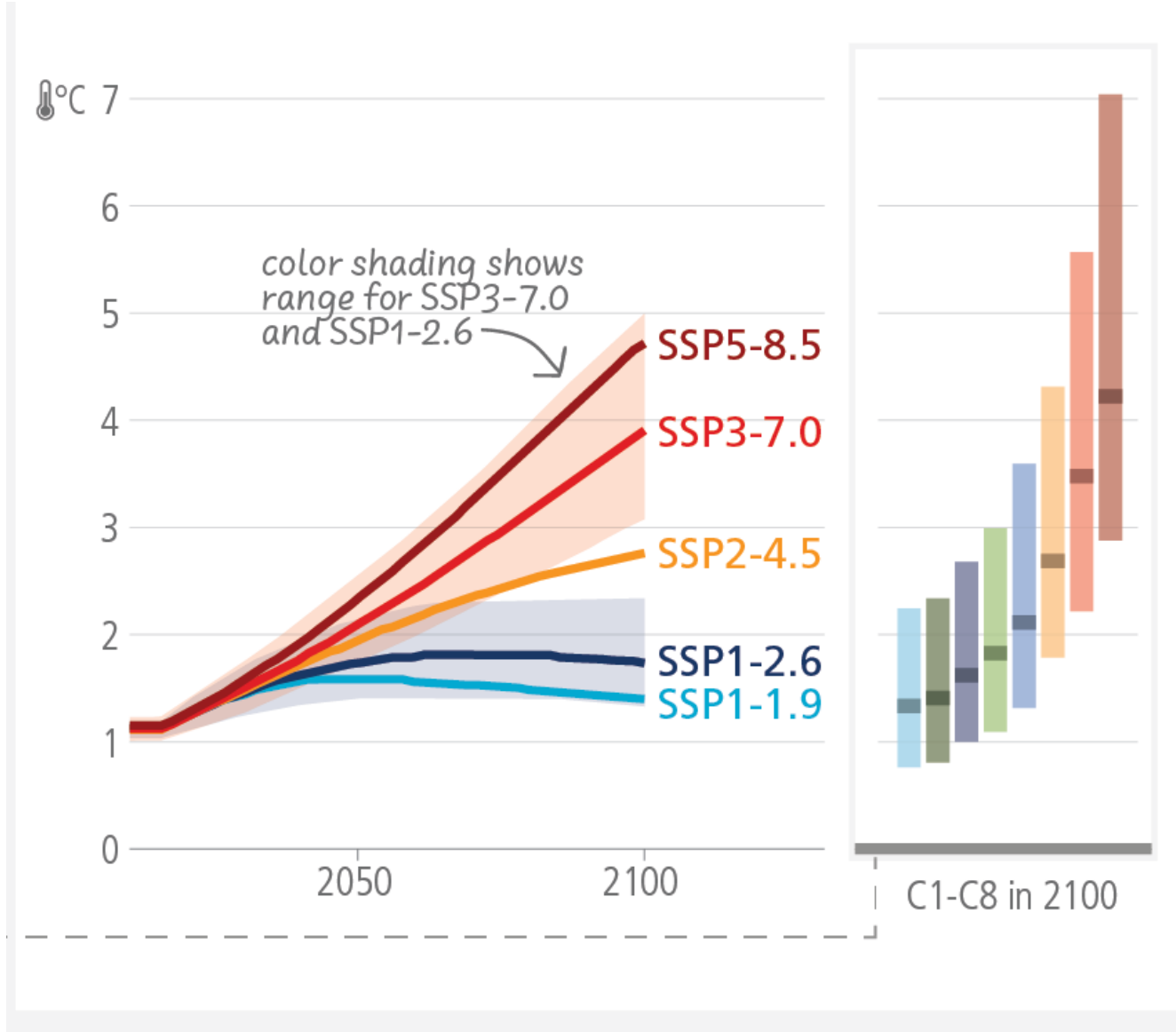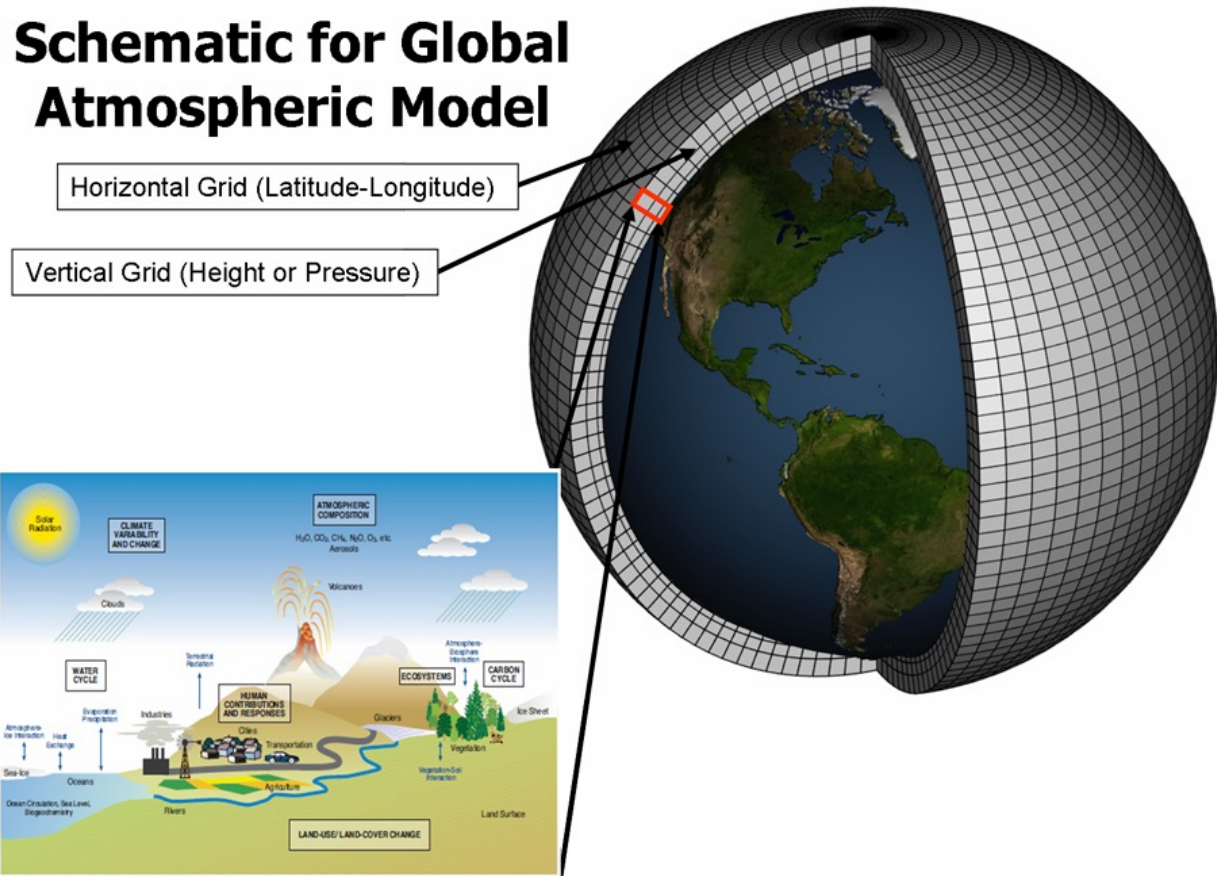
Do you recognize what this figure shows?

Source: AR6 synthesis reports
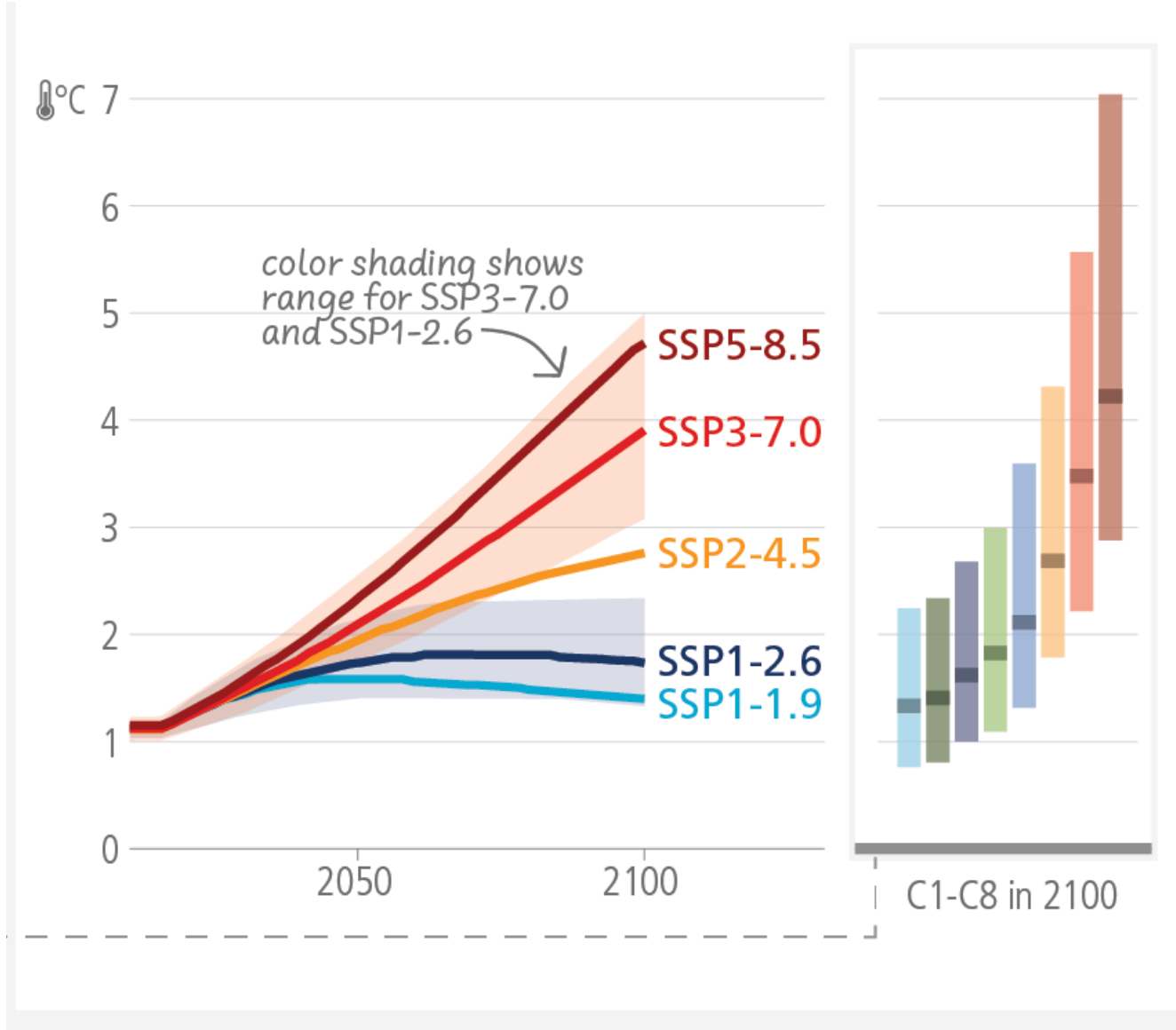
Temperature for different carbon emission scenarios over 21st century

Source: AR6 synthesis reports

Schematic for Global Atmospheric Model

Horizontal Grid (Latitude-Longitude)
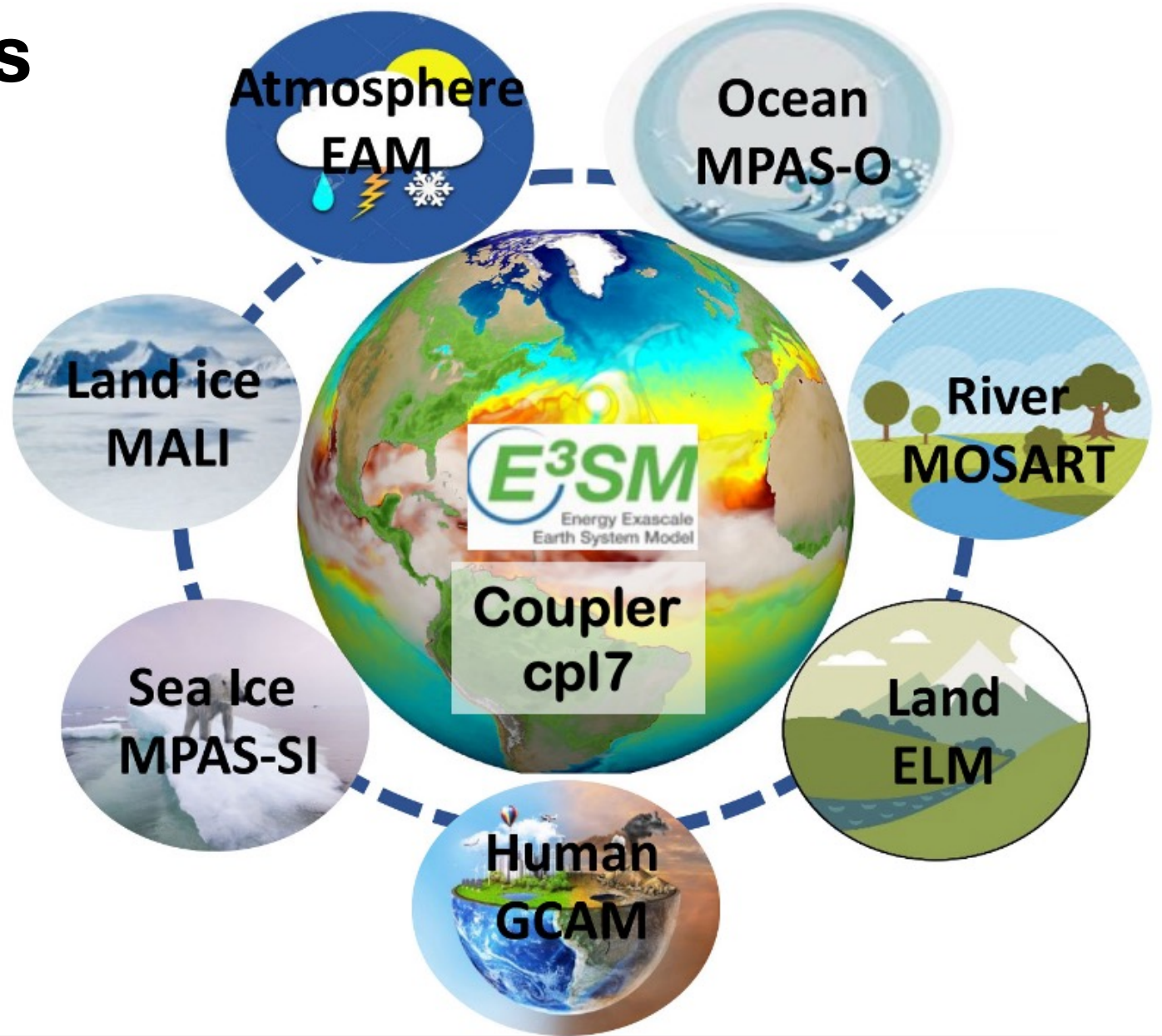
Vertical Grid (Height or Pressure)

Numerical models are widely used in earth system sciences

Source: wiki (https://en.wikipedia.org/wiki/Climate_model)

Earth System Models (ESM)

Multiple components
- Land
- Atmosphere
- Ocean
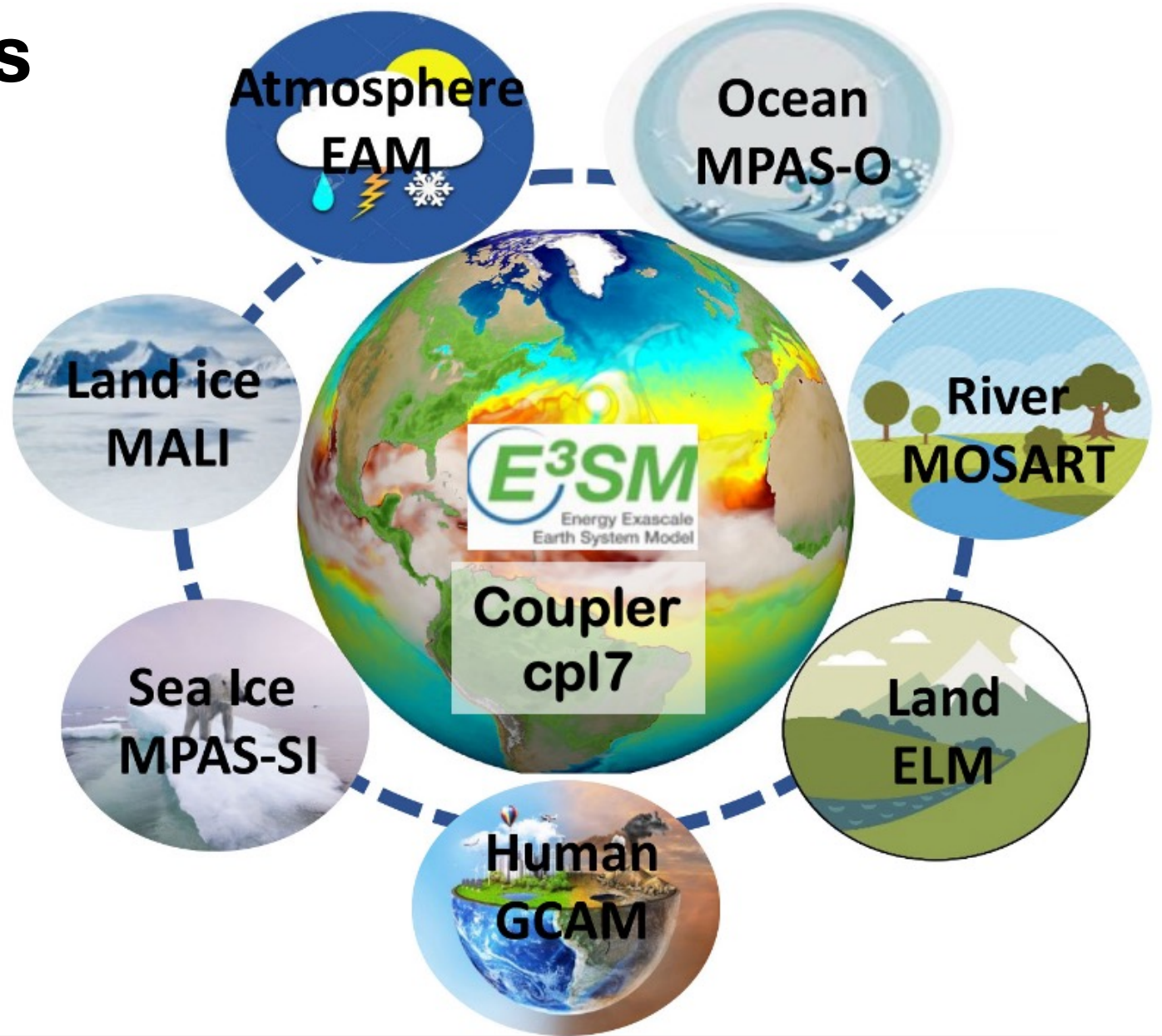- Sea ice
- Land ice (or glacier)
- River
- …

Model framework of E3SM

Earth System Models (ESM)

Multiple components

- **Land**
- Atmosphere
- Ocean
- Sea ice
- Land ice (or glacier)
- **River**
- ...

Model framework of E3SM
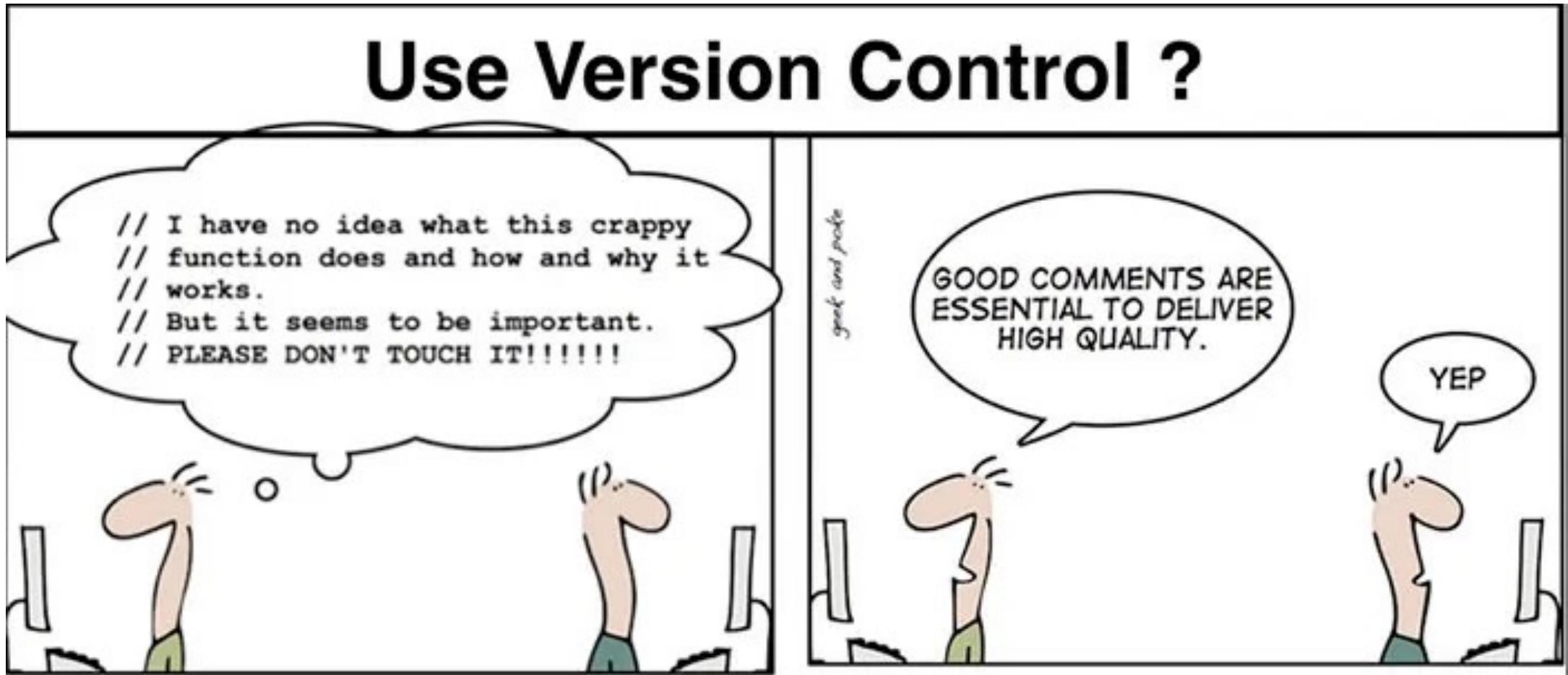
Learning objectives

Learning objectives

Learning objectives

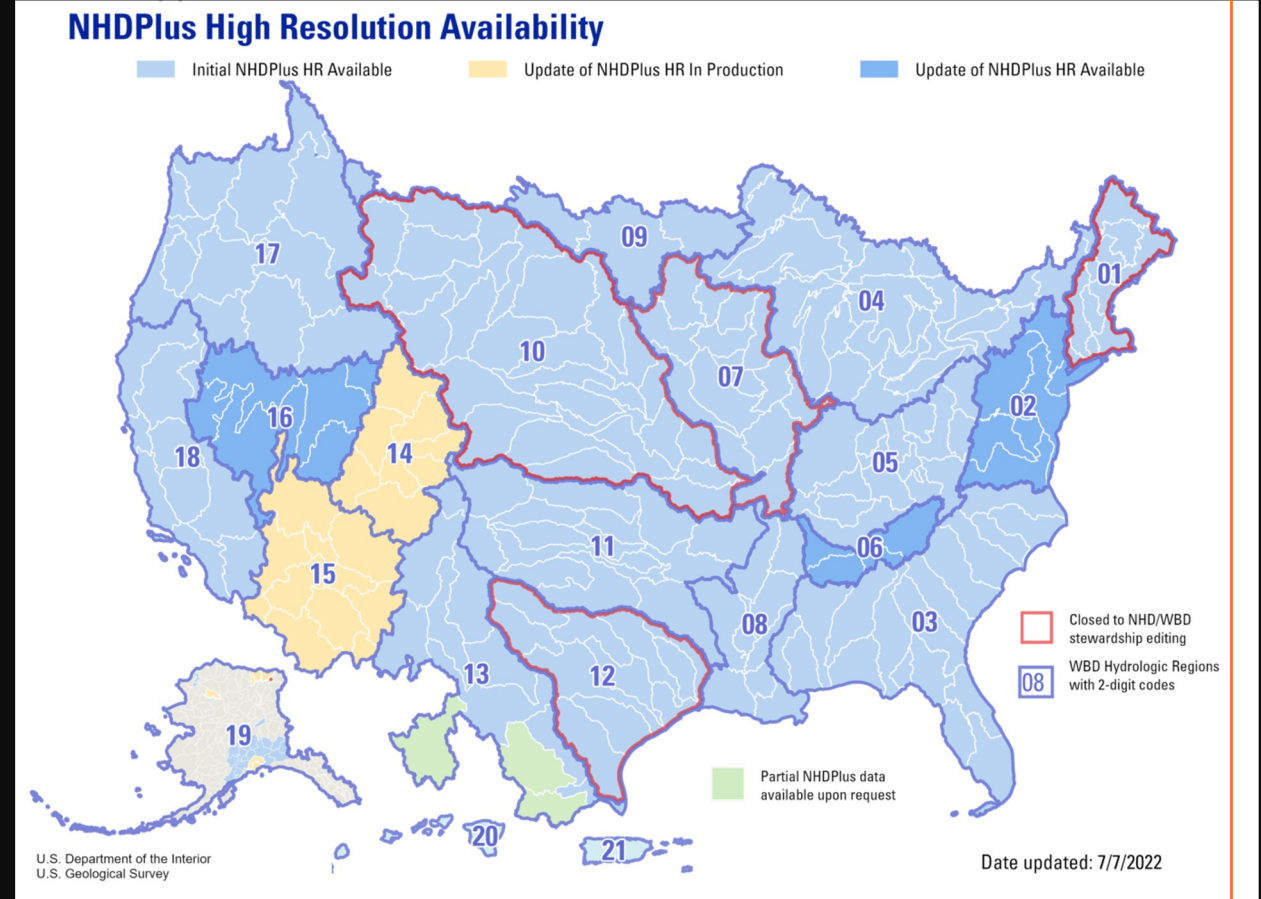- Learn how to deal with (not afraid of) command lines/bash scripts

Learning objectives

Find and access the widely used hydrology/climate datasets

Learning objectives
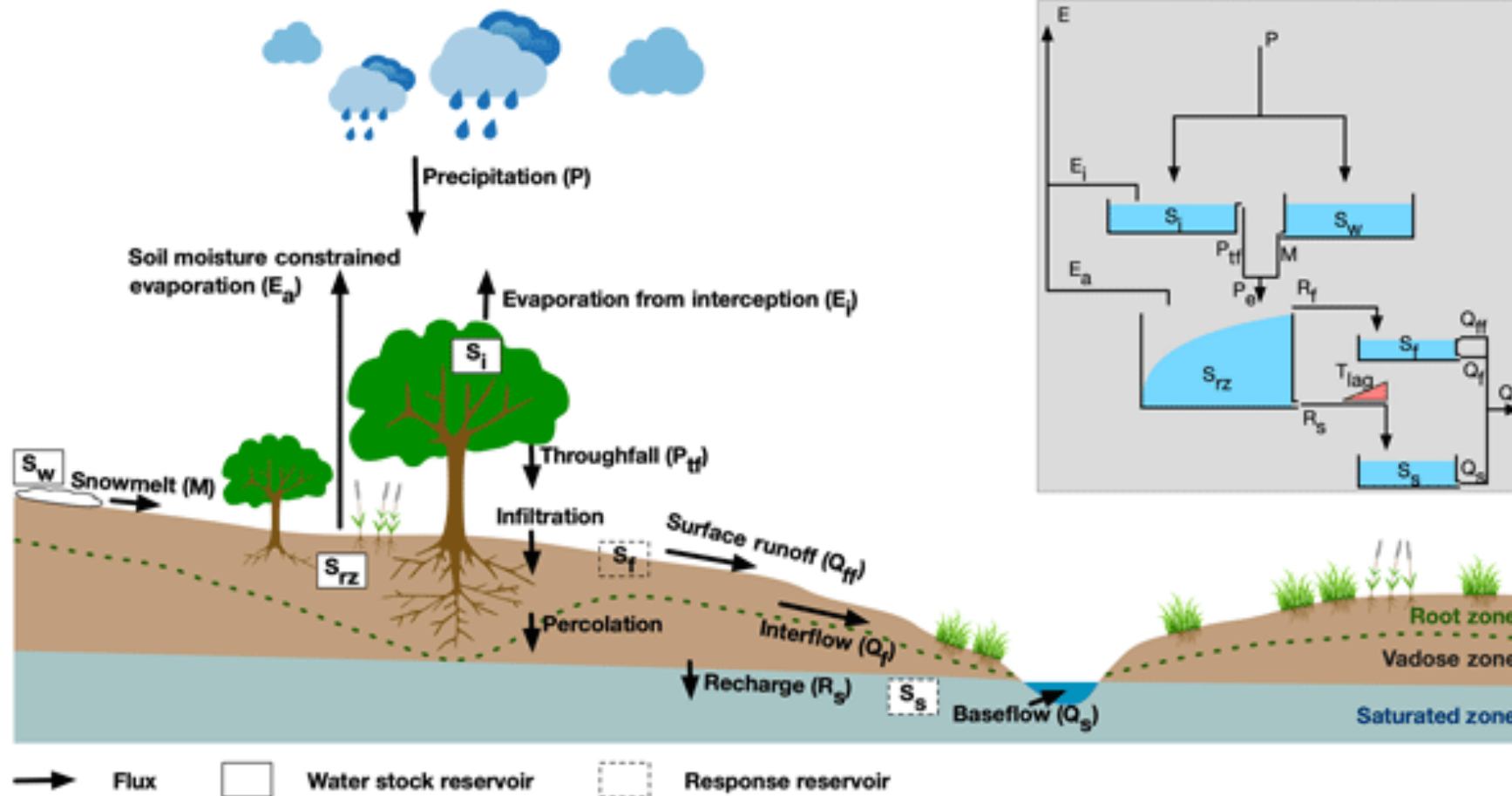
Let's talk about you!

- What's your background?
- What are you interested in?
- What do you already know?
- What do you want to know?
- Fun facts about yourself (cool pets, good recipes, or random thoughts to share with the class?

A little about me...

- New to UB!

- Research interest
  - Hydrologic **model**!
  - How to improve **model tangibility and usability**?
  - **Interdisciplinary** collaboration such as ecosystem and electrical systems

- My lab!

a.c.t.
actionable & computational terrestrial
hydrology
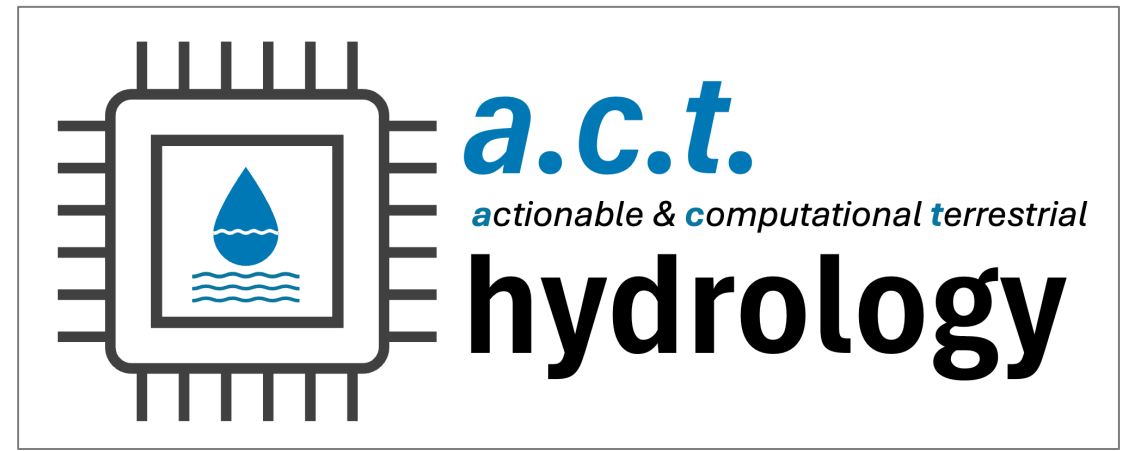
Logistics

- **Class participation (15%)**

- **Assignments (35%)**

- **Midterm (10%)**

- **Final project (40%)**

Logistics

- **Class participation (15%)**

- Assignments (35%)

- Midterm (10%)

- Final project (40%)

- In lectures, you would expect traditional lectures with instructors presenting course materials.
- In *hands-on workshops*, you will perform coding exercises in your laptops or the computers in Hoch 430 under instructions.
- In **interactive discussions**, you are expected to actively participate in the discussion fostered by the instructor.

Logistics

- **Class participation (15%)**

- **Assignments (35%)**

- **Midterm (10%)**

- **Final project (40%)**

- For assignments that will be discussed in the **Interactive discussion** (see course schedule), they are due 2 hour before the class (i.e., 1PM).

- For all other assignments, they are due <u>1PM the following Wednesday.</u>

- Due date will be specified for each assignment

Logistics

- **Class participation (15%)**

- **Assignments (35%)**

- **Midterm (10%)**

- **Final project (40%)**

- Format of the midterm is TBD.

- Communications and collaborations are *strictly forbidden* during the midterm.

Logistics

- **Class participation (15%)**

- **Assignments (35%)**

- **Midterm (10%)**

- **Final project (40%)**

- Will be introduced after mid-term

- The project will be evaluated through an oral presentation (20% of total grade), code (20% of total grade), a written report (60% of total grade)

- Several examples will be provided but you may define your own project upon instructor's approval.

- Assignments after mid-term will be mostly relevant to the final projects.

Logistics

- Classes: MWF 3-3:50PM, Cooke 434

- Office hours: MW 4-4:30PM (after class) or email for appointment

- Contact me via emails (ycheng46@buffalo.edu) or UBLearns (until I have access to it)
  - I will try my best to respond in 24 hours.
  - Lengthy, substantial, or technical questions should be saved for office hours and appointment.

Course policy: Late work & attendance

- For assignments that will be discussed in the **Interactive discussion** (see course schedule), no late assignments will be accepted and will receive a zero.

- For all other assignments, the score for the late assignment will be deductions of 1% per hour the assignment is late. <u>Less than one hour will be rounded up to one hour.</u> These assignments will no longer be accepted once the maximum score is 0, or 4 days and 4 hours after the deadline (for example: a project that would earn 100 % but is submitted 2 days or 48 hours after the deadline, it would earn 52 %).

Course policy: Late work & attendance

- For extenuating circumstances (e.g., extended illness, family emergency), a late work policy can be worked out. These cases require verifiable written documentation of the circumstance and discussion with the instructor.

- In-person attendance in all formats of lectures are highly encouraged. If you have an emergency where you have to skip classes, you need to inform the instructor <u>before</u> your absence.

How to access course resources?

- All slides & assignments will be posted through UBLearns (until I have access to it)

- Coding practices will be conducted in CUAHSI Community JupyterHub.

Get yourself access to Hydroshare!!

- Follow the instructions on this website (https://www.cuahsi.org/data-services/jupyterhub) to
  - Create a HydroShare account
  - Be able to launch JupyterHub

- Join the group "UB_GLY606_2024"
  - Log into HydroShare
  - Select "Collaborate" in the top panel
  - Select "Groups"
  - Search "UB_GLY606_2024"
  - Click "Ask to join"