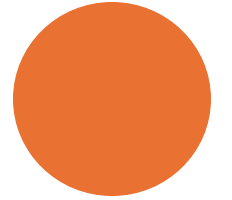
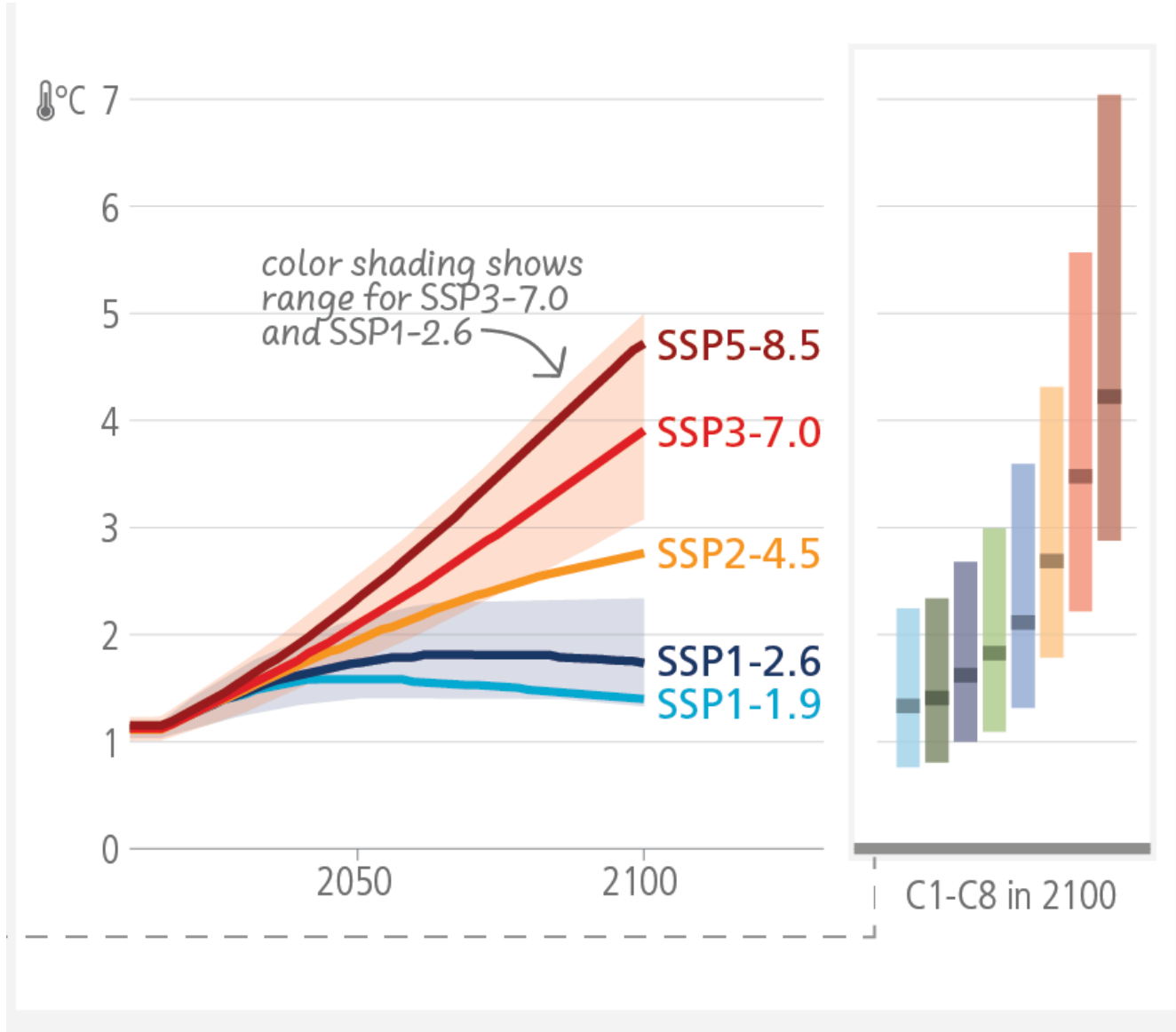


Open-Source Hydrologic Data Analytics

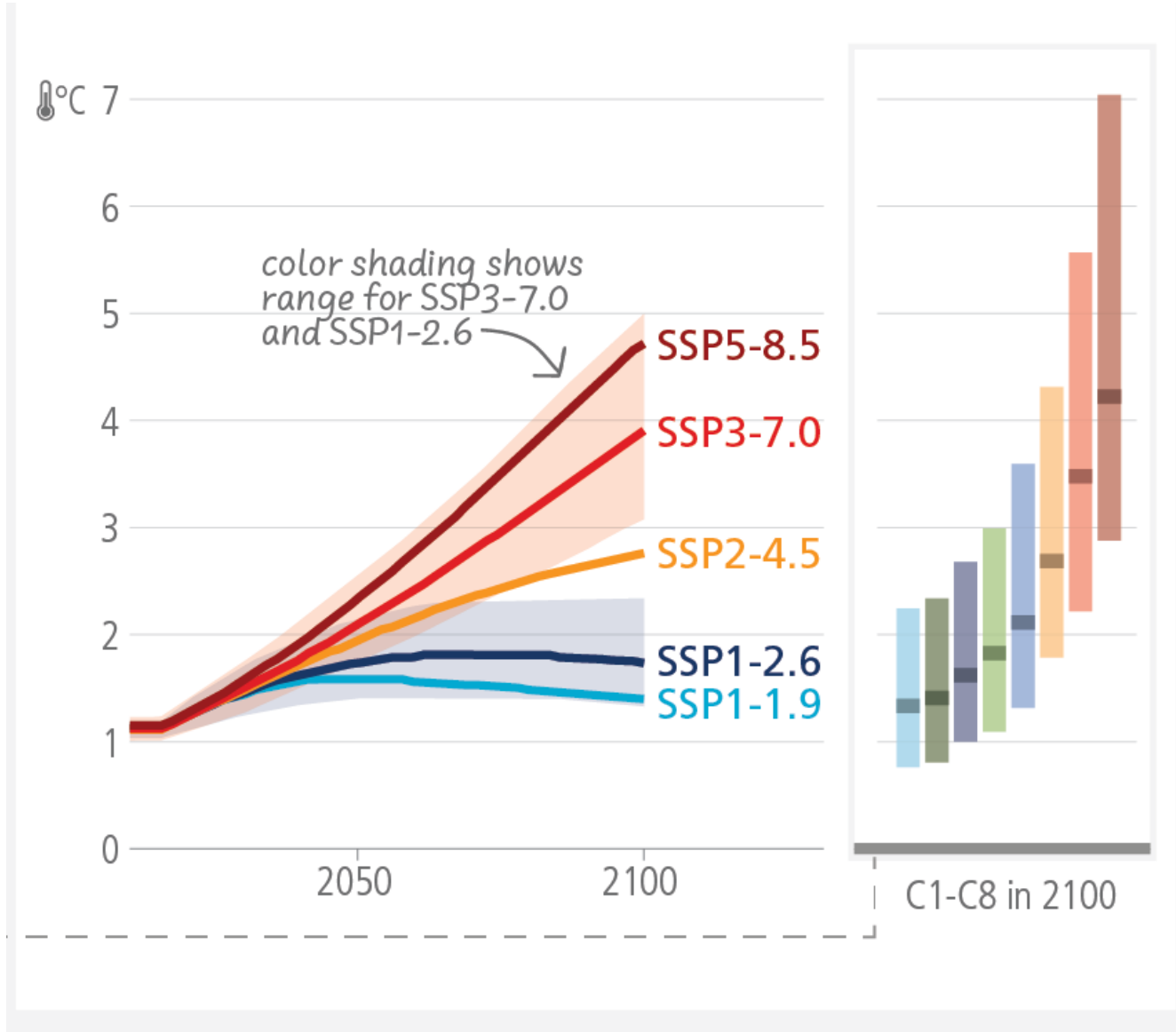
Instructor

- I am interested in hydrologic **model**.
- How to improve **model tangibility and usability?**
- I like **WATER** in various settings (**interdisciplinary** collaboration)
- I do most coding in **Python**
- Just call me **Yifan!**



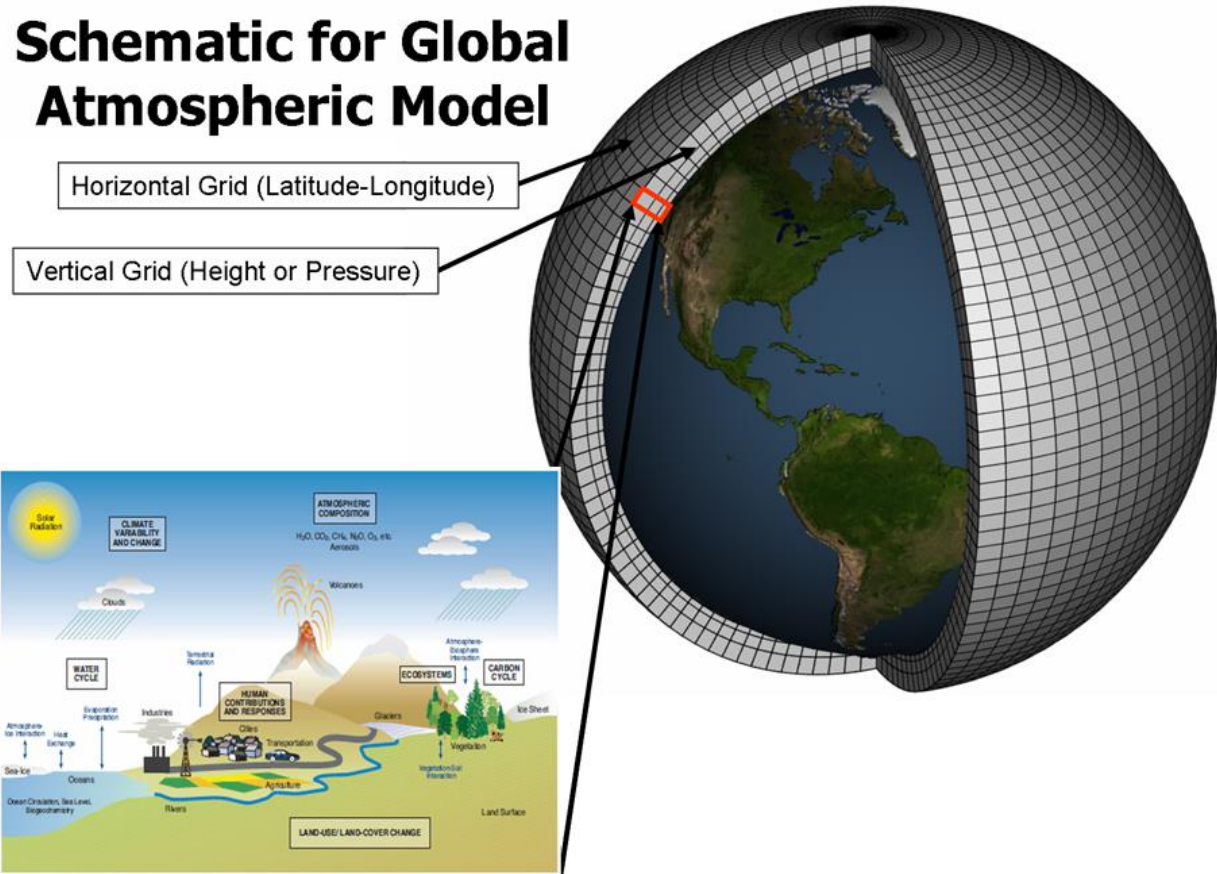


Do you recognize what this figure shows?



Projected temperature changes under different carbon emission scenarios over the 21st century (compared to pre-industrial level)

Schematic for Global Atmospheric Model



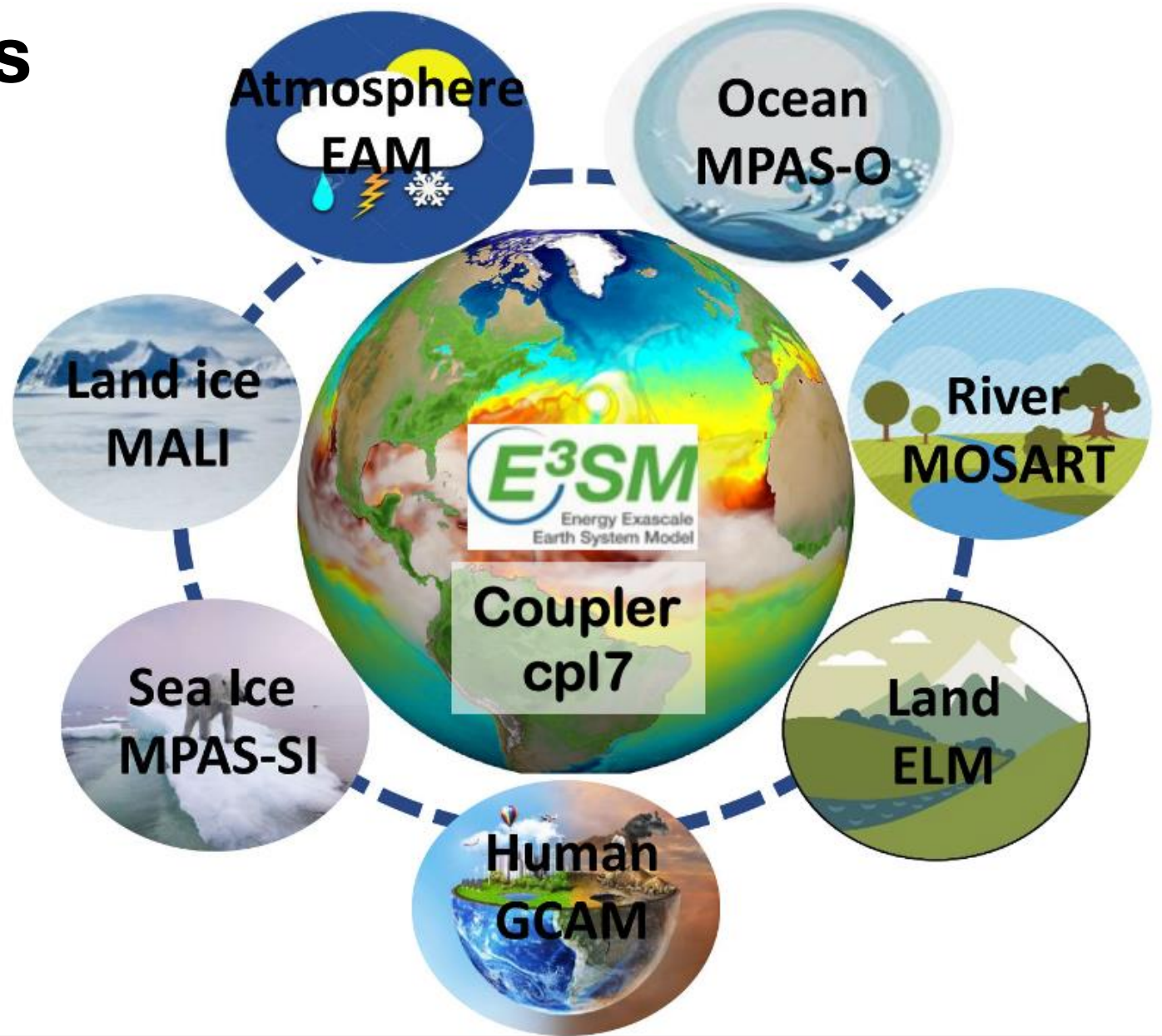
Numerical models
are widely used in
Earth Sciences

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
- ...

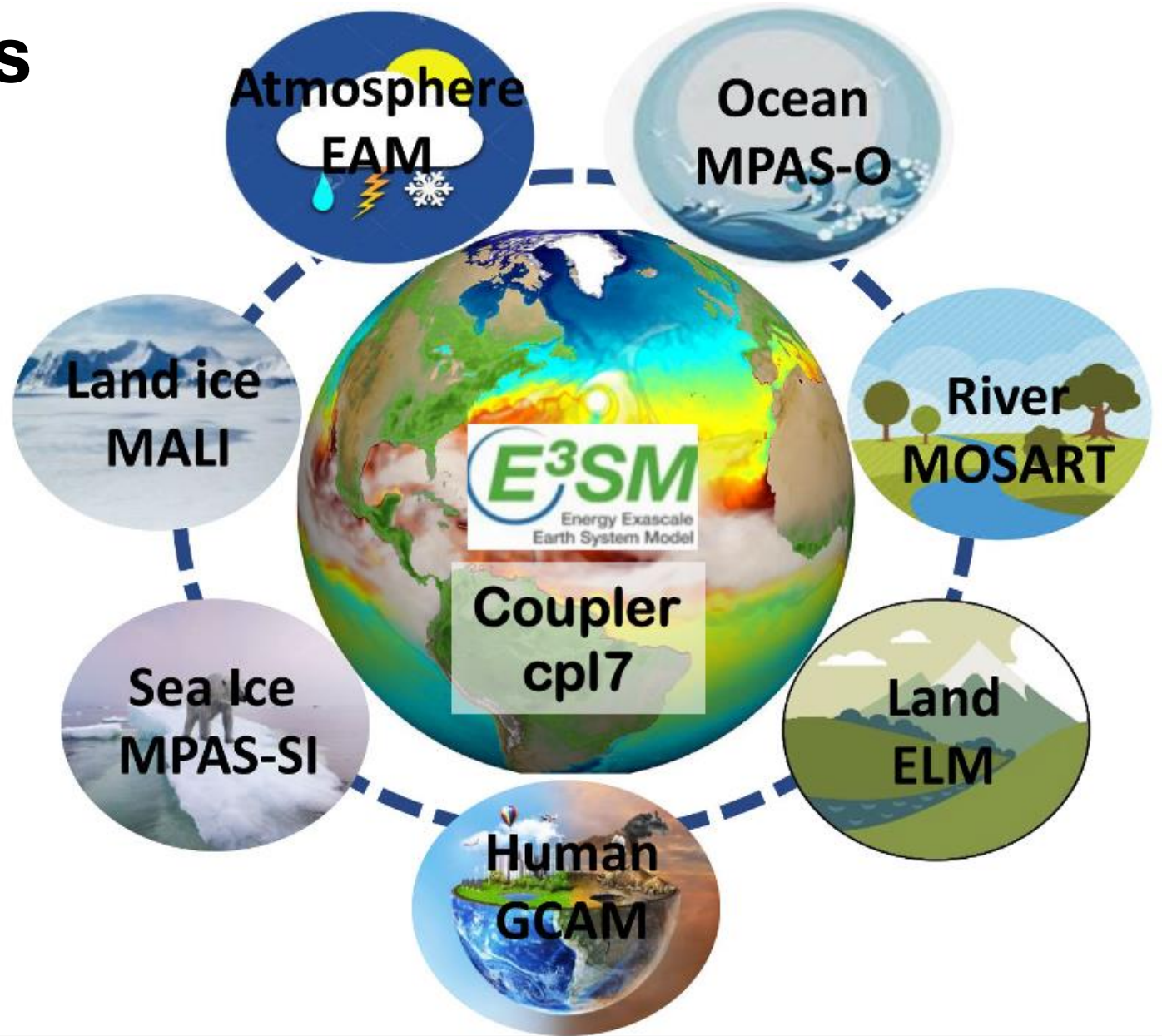


Model framework of E3SM

Earth System Models (ESM)

Multiple components

- **Land**
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Model framework of E3SM

Earth System Models (ESM)

Multiple components

- Land
- Atmosphere
- Ocean
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- Land ice (e.g. glacier)
- River
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E3SM and many other ESMs
are OPEN-SOURCE!

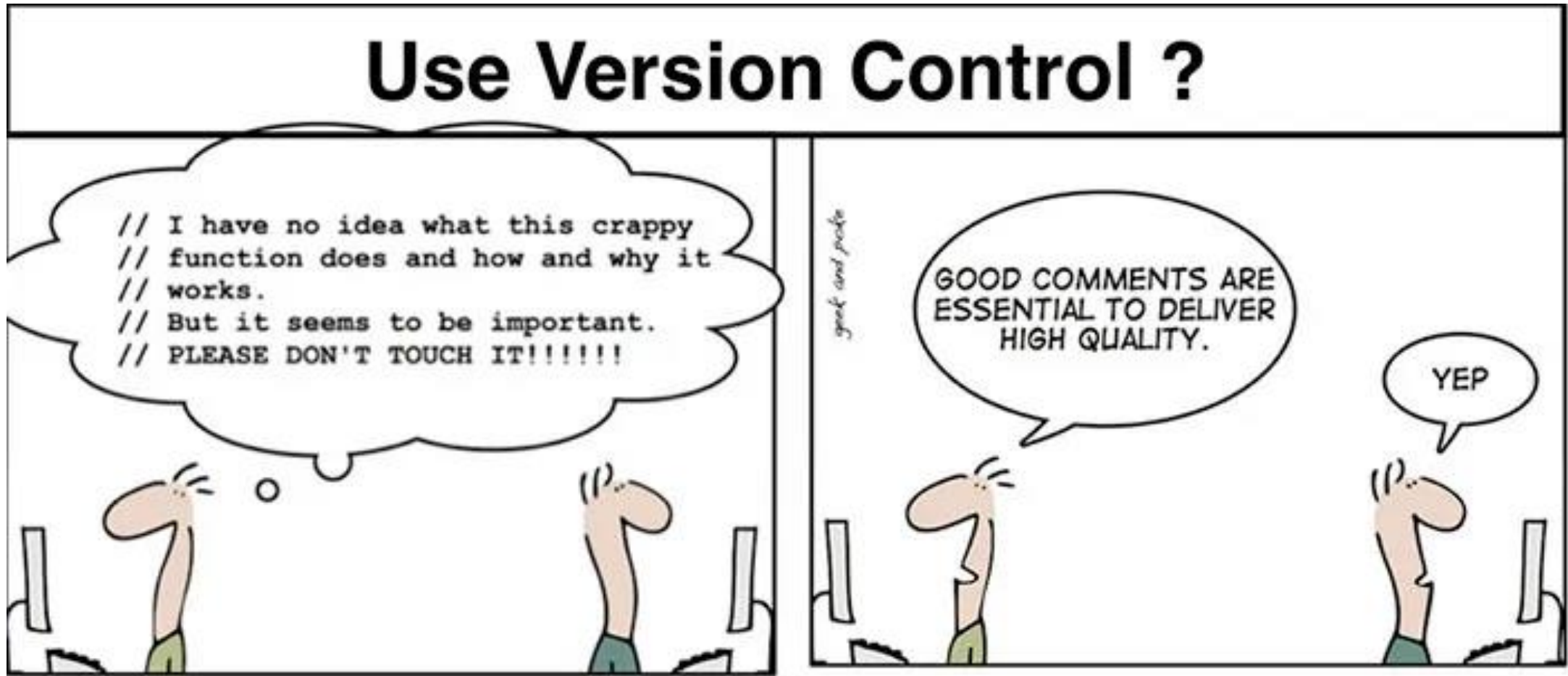
Learning objectives

Get comfortable with
coding in python



Learning objectives

Develop the mindset of
version control



Learning objectives

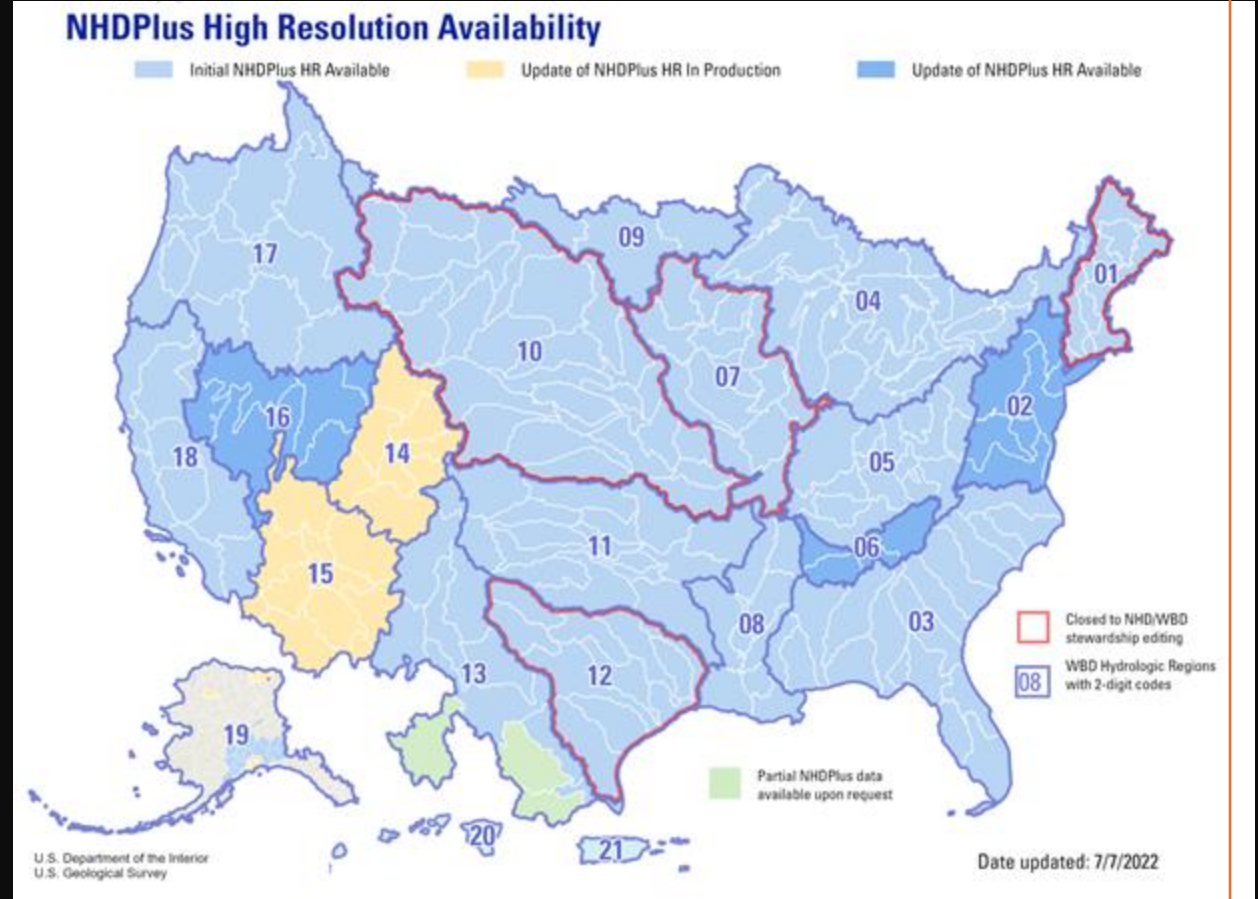
Develop the mindset of
version control



GitHub

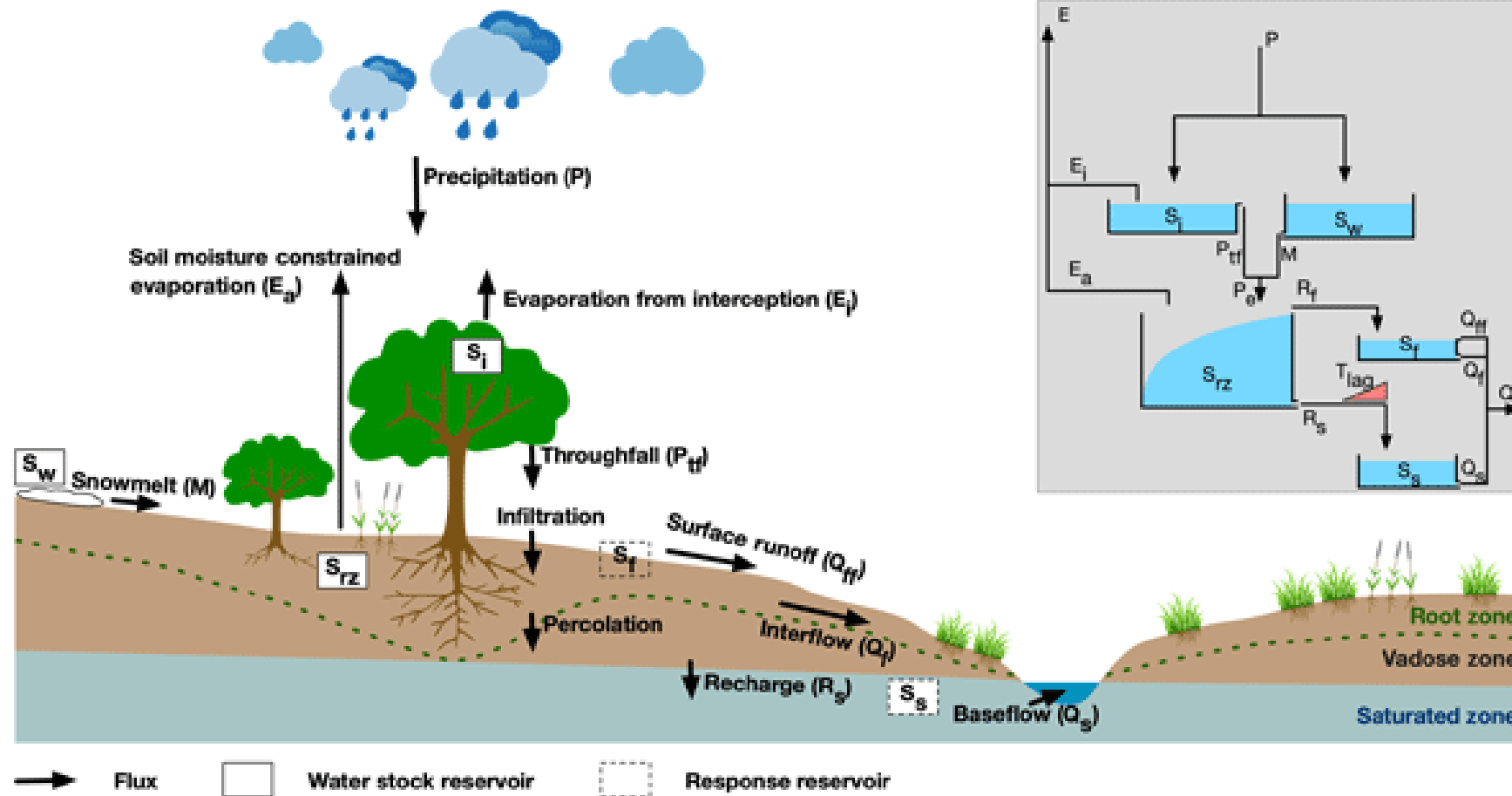
Learning objectives

Find and access the widely used hydrology/climate datasets



Learning objectives

Basics of hydrologic models



Quick Survey

- How many of you have experience programming?

Quick Survey

- How many of you have experience programming? More than 2 years?

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- Have you used Python packages such as pandas or matplotlib before?
- Have you used GitHub before?

Logistics

- **Class participation (15%)**
- **Assignments (35%)**
- **Midterm (10%)**
- **Final project (40%)**

Logistics

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 - 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%)**
 - 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 1PM the following Wednesday.
 - Due date will be specified for each assignment
- Midterm (10%)
- Final project (40%)

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

- Lectures: MW 1-1:50PM, Hoch 430
- Labs: W 4-6 PM, Hoch 430
- Office hours: MW 2-2:30PM (after class) or email for appointment
- Contact me via emails (ycheng46@buffalo.edu) or UBLearns
 - 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. Less than one hour will be rounded up to one hour. 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 before your absence.

Your first assignments:

Create your GitHub account & send me your usernames

- GitHub: <https://github.com/signup>
- Additionally, as a student you get free access to GitHub Pro with the student developer pack - please also sign up for that
- GitHub student developer pack:
<https://education.github.com/pack>
- Please do this before the next class period so that we can get started!

Introduction & Discussion Time

