REU Boot Camp Week 1
Processing and Visualization of Climate Data

Instructor:
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Learning Goals:

1. Learn to read, process, and visualize climate data on LEAP-Pangeo
2. Understand climate concepts, such as ‘seasonality’ and ‘climatology’
3. Get familiar with the unstructured E3SM dataset and prepare to use it for climate analysis & ML tasks

Schedule

The workplan for the week is on the following page. Students will have lectures in the morning and complete the assignments & reading tasks in the afternoon. We’ll mainly follow the book An Introduction to Earth and Environmental Data Science and workshop 2023 Train-the-Trainer Bootcamp Day 1: Climate and Geospatial Data Analysis by Prof. Ryan Abernathey. Students are asked to follow the instructor’s operations step by step using LEAP-Pangeo Hub. There are reading tasks, exercise assignments and student presentations every day. Students are encouraged to work in groups.

Schedule			
Day	**Time**	**Topic**	**Assignments & Reading**
1	9:30 – 9:40	Intro of REU Week1	Reading: more Xarray data loading and plotting Assignment #1: Q1-4 in Xarray Fundamentals with Atmospheric Radiation Data
	9:40 – 9:55	Intro of LEAP-Pangeo & Python environment management	
	9:55 – 10:05	Intro of climate data	
	10:05 – 10:40	Basic Xarray	
	10:40 – 10:50	Break	
	10:50 – 11:50	Basic Xarray	
	11:50 – 12:00	Lab practice; Q & A	
2	9:30 – 10:00	Student presentation of Assignment #1	Reading: a. An advanced example b. Pandas Groupby Assignment #2: a. More Xarray with El Niño-Southern Oscillation (ENSO) Data b. Making maps with cartopy
	10:00 – 10:15	Advanced Xarray	
	10:15 – 10:30	Greetings from faculty advisors	
	10:30 – 10:40	Break	
	10:40 – 11:30	Advanced Xarray Maps and projections with Cartopy	
	11:30 – 12:00	Lab practice; Q & A	
3	9:30 – 10:00	Student presentation of Assignment #2	Reading: a. CMIP, b. E3SM, c. parametrization Assignment #3: Exploration of the REU dataset (work in pairs, finish 2+ analysis)
	10:00 – 10:20	Git on JupyterHub	
	10:20 – 10:40	Intro to Earth System Models and CMIP6	
	10:40 – 10:50	Break	
	11:00 – 11:30	Intro of REU demo dataset	

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	11:30 – 12:00	Lab practice; Q & A	
4	9:30 – 9:50	Group1 presentation of REU analysis	Reading: Adventures in Physics-AI Climate Modeling and Full AI Weather Prediction with Mike Pritchard Assignment #4: a. Pandas Groupby with Hurricane data b. Push 4 assignments to your Github repository and add @YuHuang3019 as the collaborator
	9:50 – 10:10	Group2 presentation of REU analysis	
	10:10 – 10:30	Group3 presentation of REU analysis	
	10:30 – 10:40	Break	
	10:40 – 11:00	Group4 presentation of REU analysis	
	11:00 – 12:00	Lab practice; Q & A	