



2025 CESM Tutorial

Day 4 Daily Logistics

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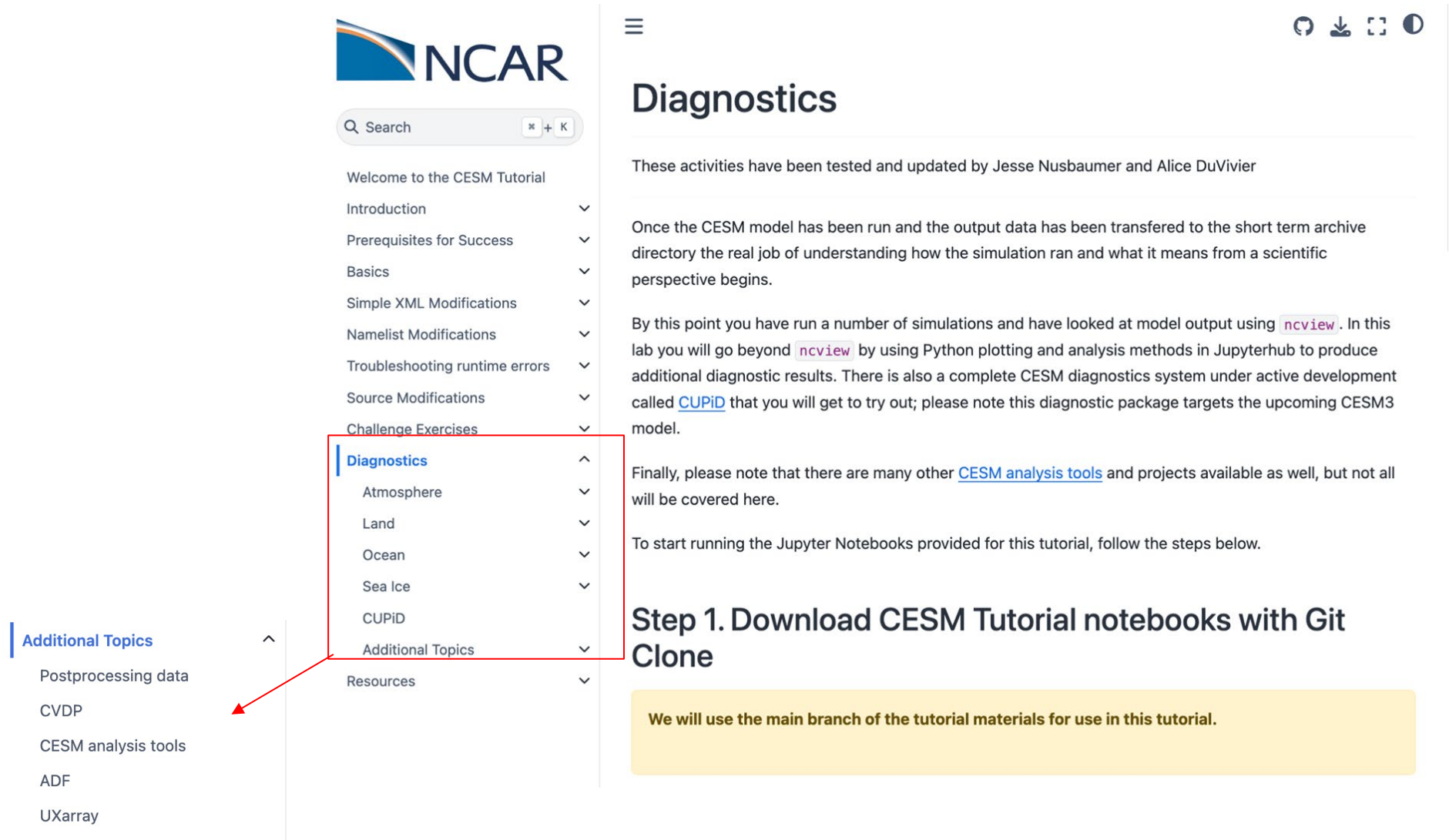
Agenda

Thursday, July 10

8:25-8:30	Daily logistics
8:30-9:00	CAM-chem (<i>Rebecca Buchholz</i>)
9:00-9:15	Break (Group photo)
9:15-9:45	WACCM (<i>Mijeong Park</i>)
9:45-10:15	Break (CESM cafe)
10:15-10:45	Climate Variability (<i>Clara Deser</i>)
10:45-11:00	Intro to Lab: diagnostics (<i>Jesse</i>)
11:00-12:00	Lab exercises (Library)
12:00-1:15	Lunch on your own + activities ML private tour Meet a scientist (Breakout rooms : 12:15-1:00)
1:15-2:00	Land Ice Modeling (<i>Gunter Leguy</i>)
2:00-2:15	Break
2:15-2:45	Paleoclimate (<i>Sophia Macarewich</i>)
2:45-2:55	Lab exercises check-in
2:55-4:20	Lab exercises (Library)
4:20-4:35	Daily debrief
4:45	Shuttle Departs ML

Lab documentation

<https://ncar.github.io/CESM-Tutorial/README.html>



NCAR

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Welcome to the CESM Tutorial

- Introduction
- Prerequisites for Success
- Basics
- Simple XML Modifications
- Namelist Modifications
- Troubleshooting runtime errors
- Source Modifications
- Challenge Exercises
- Diagnostics**
- Atmosphere
- Land
- Ocean
- Sea Ice
- CUPiD
- Additional Topics
- Resources

Additional Topics

- Postprocessing data
- CVDP
- CESM analysis tools
- ADF
- UXarray

Diagnostics

These activities have been tested and updated by Jesse Nusbaumer and Alice DuVivier

Once the CESM model has been run and the output data has been transferred to the short term archive directory the real job of understanding how the simulation ran and what it means from a scientific perspective begins.

By this point you have run a number of simulations and have looked at model output using `ncview`. In this lab you will go beyond `ncview` by using Python plotting and analysis methods in Jupyterhub to produce additional diagnostic results. There is also a complete CESM diagnostics system under active development called `CUPiD` that you will get to try out; please note this diagnostic package targets the upcoming CESM3 model.

Finally, please note that there are many other [CESM analysis tools](#) and projects available as well, but not all will be covered here.

To start running the Jupyter Notebooks provided for this tutorial, follow the steps below.

Step 1. Download CESM Tutorial notebooks with Git Clone

We will use the main branch of the tutorial materials for use in this tutorial.

survey on scientific computing



What are your Biggest Software Struggles with CESM Code?

This is a small informal survey for scientists who work with code in CESM (any subcomponent) to find out what your biggest struggles are. We will use it in CSEG to inform how we can better engage with scientists who work on the code. Both to educate them on Research Software Engineering (RSE) methodologies to help improve and speed up in bringing in their science, as well as figuring out how we can work together to improve our science code in CESM making it:

- Easier to use
- More flexible
- More robust with changes
- More maintainable
- Verifiable
- Correct
- Reproducible

All of which are critical aspects of making CESM a finely tuned, precision scientific instrument to advance Earth System Science.

Because the science of CESM is expressed in software, in order to contribute to the science of CESM, some familiarity with Software languages and methodologies is required. There is no way around that. However, different science contributors have different levels of interest in learning about technical High Performance Computing (HPC) things as well as RSE methodologies. Some have minimal interest, others might want to divide their efforts between science and RSE activity. And some may even want to switch from science to RSE. Here we want to help you to do what you need to do based on your level of interest in learning more.

For any questions or comments please reach out to erik@ucar.edu