

# Introduction to Wednesday practicals

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CESM tutorial, August 7, 2024



# What are we going to do today?

- **Namelist Modifications**
- **Troubleshooting model errors**
- **Code Modifications**

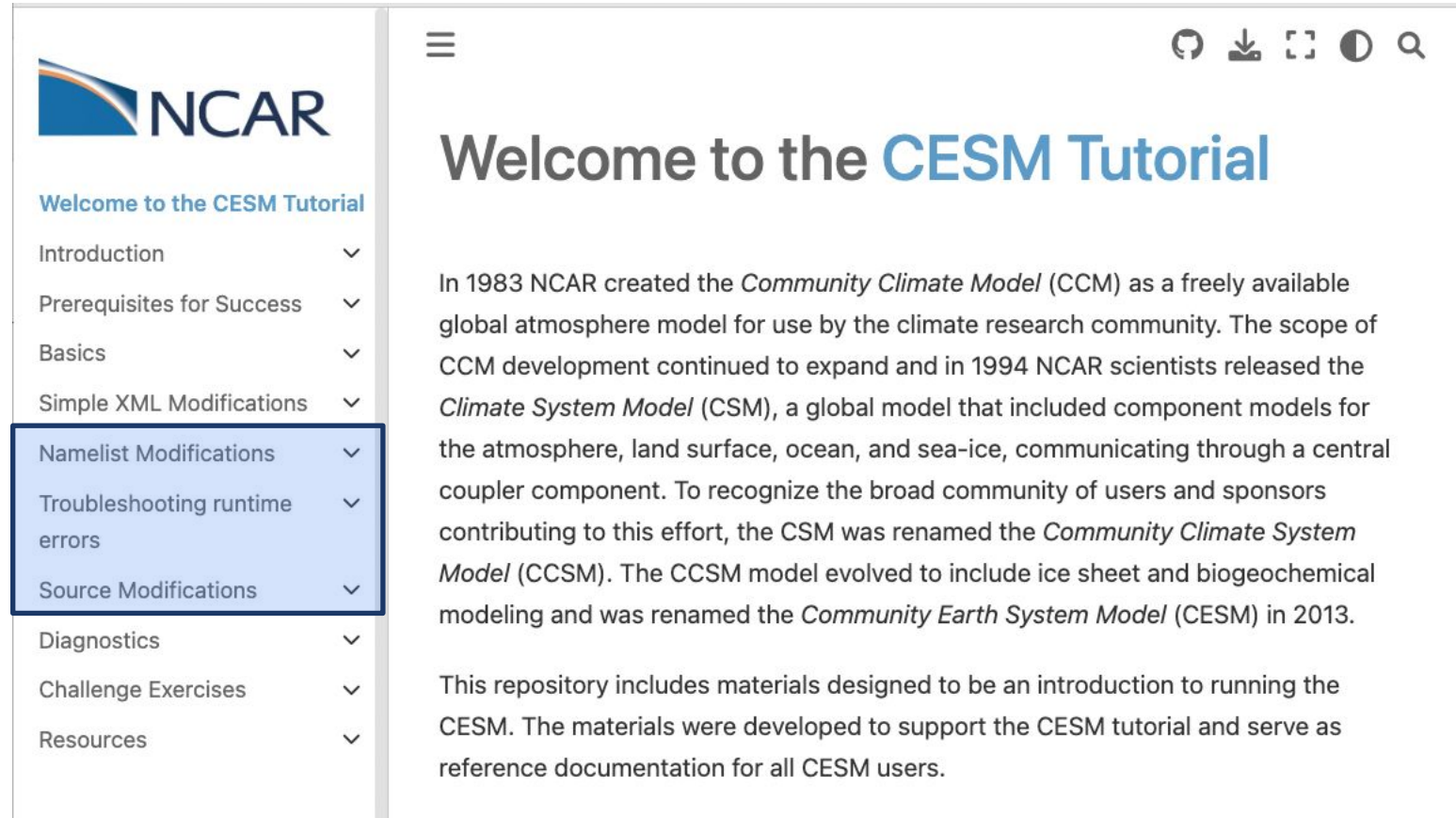
**“I can only show you the door.  
You're the one that has to walk through it”**

*(The Matrix, 1999)*



# What are we going to do today?

- **Namelist Modifications**
- **Troubleshooting model errors**
- **Code Modifications**



**NCAR**

Welcome to the CESM Tutorial

- Introduction
- Prerequisites for Success
- Basics
- Simple XML Modifications
- Namelist Modifications**
- Troubleshooting runtime errors
- Source Modifications
- Diagnostics
- Challenge Exercises
- Resources

## Welcome to the CESM Tutorial

In 1983 NCAR created the *Community Climate Model* (CCM) as a freely available global atmosphere model for use by the climate research community. The scope of CCM development continued to expand and in 1994 NCAR scientists released the *Climate System Model* (CSM), a global model that included component models for the atmosphere, land surface, ocean, and sea-ice, communicating through a central coupler component. To recognize the broad community of users and sponsors contributing to this effort, the CSM was renamed the *Community Climate System Model* (CCSM). The CCSM model evolved to include ice sheet and biogeochemical modeling and was renamed the *Community Earth System Model* (CESM) in 2013.

This repository includes materials designed to be an introduction to running the CESM. The materials were developed to support the CESM tutorial and serve as reference documentation for all CESM users.

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

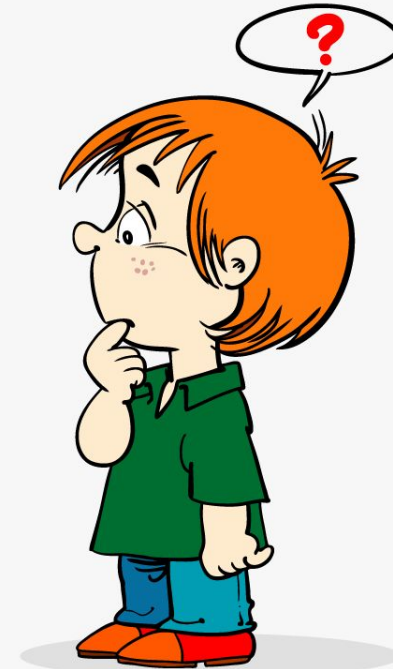
# **Namelist Modifications**

- **What are namelists? How to modify them?**
- **For instance, let's change the output frequency of the model.**

# Namelist Modifications

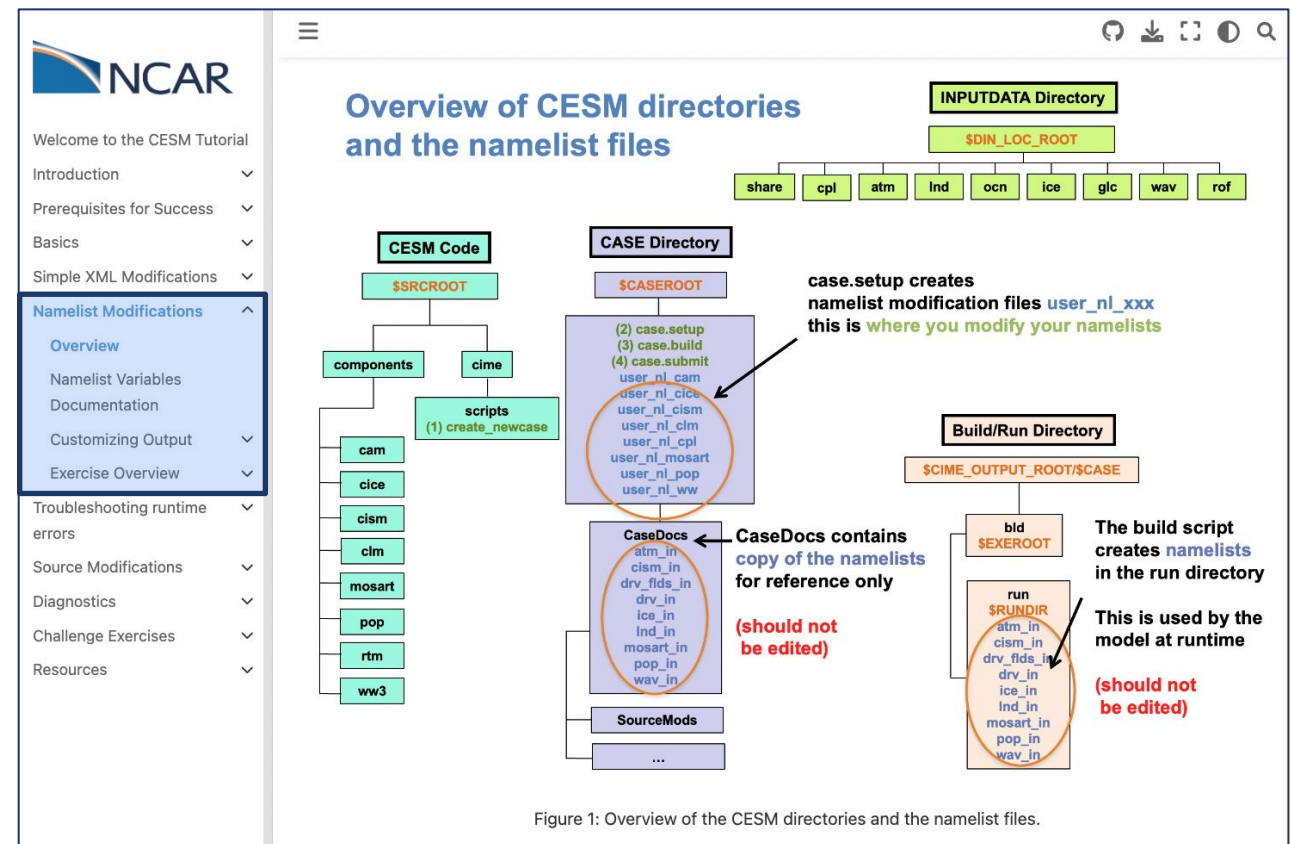
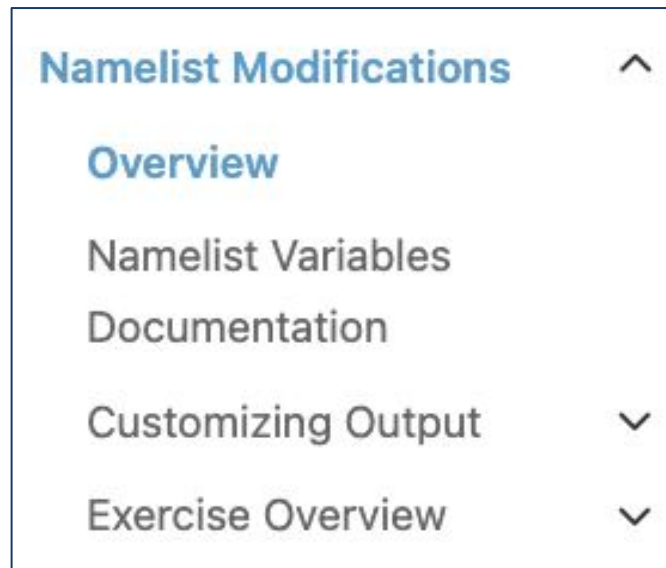
- What are namelists? How to modify them?
- For instance, let's change the output frequency of the model.

Question: By default, the model outputs **monthly** data and I need to look at the **daily** cycle...



# Namelist Modifications

- What are namelists? How to modify them?
- For instance, let's change the output frequency of the model.



Go step by step into the chapter:  
**Namelist Modifications**

# Troubleshooting runtime errors

- **“Help! My run crashed”**
- **Where/how can I find information about the crash?**



# Troubleshooting runtime errors

- “Help! My run crashed”
- Where/how can I find information about the crash?



# Troubleshooting runtime errors

- “Help! My run crashed”
- Where/how can I find information about the crash?

Troubleshooting runtime errors	^
The log files	
Adding debugging info	
Exercise Overview	v



**NCAR**

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- Troubleshooting runtime errors**
- The log files
- Adding debugging info
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## The log files

The log files are files in the format `$model.Log.*`

- When the model is running, it produces the log files in the **run directory**: `RUNDIR`.
- When the run completes successfully, the model moves the log files into the **archive** directory: `SDOUT_S_ROOT`
- When the model fails, the log files remains in the run directory `RUNDIR`

### Overview of CESM directories and Log files

**INPUTDATA Directory**  
\$DIR\_LOC\_ROOT

**CESM Code**  
\$SRCROOT

**CASE Directory**  
\$CASEROOT

**Build/Run Directory**  
\$CIME\_OUTPUT\_ROOT/\$CASE

**Archive Directory**  
\$SDOUT\_S\_ROOT

Log files:  
- in RUNDIR while it is running  
- moved to CASE/logs when run completes

**QUICK TIPS**  
If the model crashes the log files will stay in the run directory RUNDIR

Go step by step into the chapter:  
**Troubleshooting runtime errors**

# Source Modifications

- **I am bored and I want to go to the next level and modify CESM.**
- **For instance, let's add a variable into CAM**

# Source Modifications

- I am bored and I want to go to the next level and modify CESM.
- For instance, let's add a variable into CAM



Your choice: The **Red** Pill or the **Blue** Pill

*The Matrix (1999): Neo, the main character is offered the choice between a red pill and a blue pill.*

- The **blue pill** would allow him to remain in the Matrix (a fictional computer-generated world)
- The **red pill** would lead to his "escape" from the Matrix into the real world and embracing the sometimes painful truth of reality.

# Source Modifications

- I am bored and I want to go to the next level and modify CESM.
- For instance, let's add a variable into CAM

Source Modifications	^
Overview	
Source Modification Example	
Exercise Overview	v

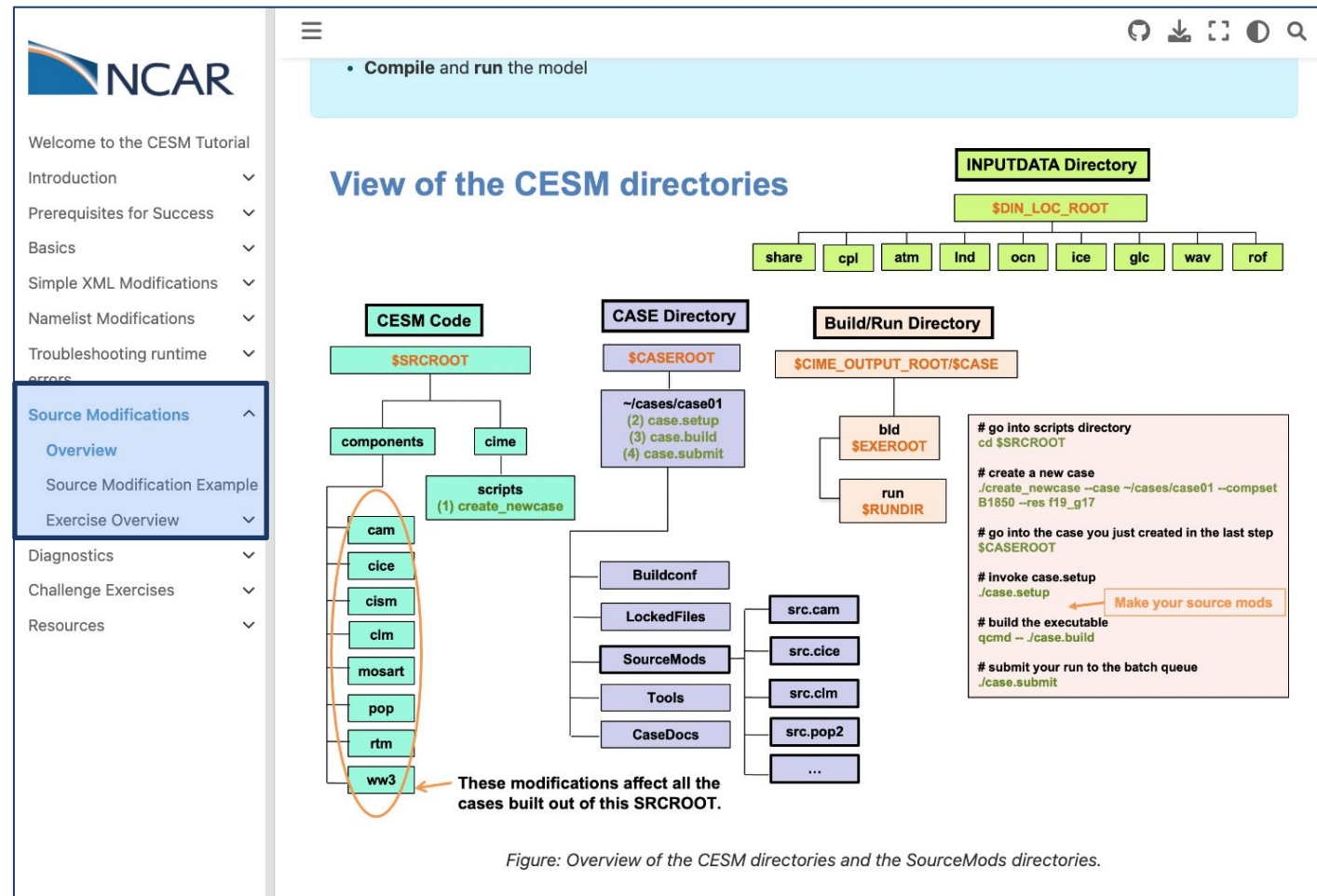
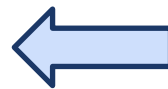
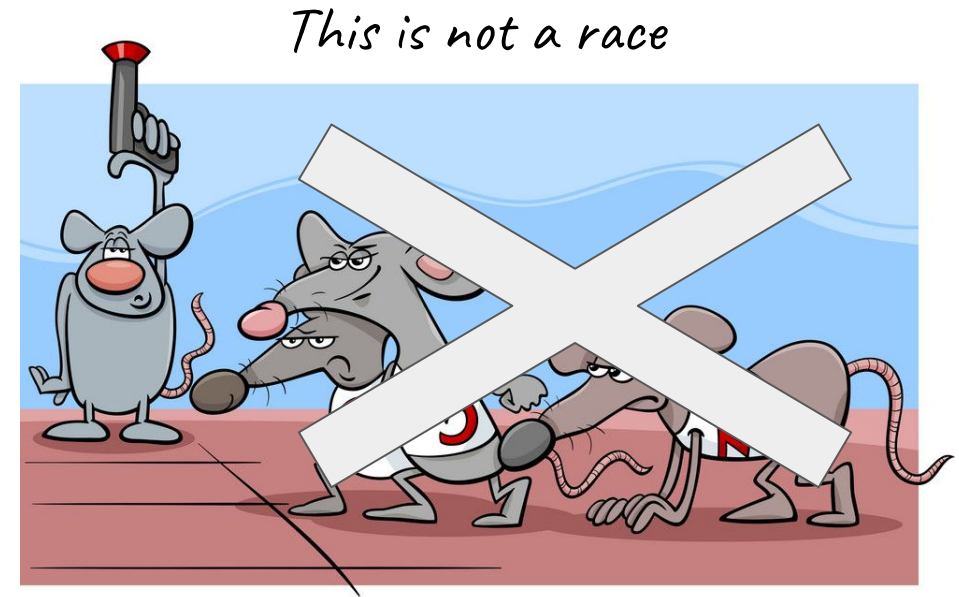


Figure: Overview of the CESM directories and the SourceMods directories.

Go step by step into the chapter:  
**Source Modifications**

## FAQs

- I have not finish Monday's exercise.  
What should I do?
- I already completed all of these chapters.  
What should I do?



# FAQs

- I am completely confused about the tutorial special queue. What should I do?

NCAR

Q Search

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Resources

- NCAR Supercomputer
- Modules on NCAR HPC
- Tutorial one time setup
- Tutorial queue and account**

Terminal windows

## Tutorial queue and account

### Tutorial Project Account

You should have access to project account **UESM0013** and use this for your simulations.

You can change the account in your case directory using the following command:

```
./xmlchange PROJECT=UESM0013
```

### Special Queues

**Schedule for Tutorial Reservation Queues**

- We have a special queue **tutorial** during the lab sessions to ensure you get through the derecho queues quickly and get your jobs run. This queue are only active during our lab sessions.
- Outside the lab sessions, you should use the queue **main** to run cesm.

Questions ?

