

Abrupt 4xCO₂ Run Instructions

In order to run CESM2 for an abrupt 4xCO₂ for 100 years, we must make several modifications:

1. Instead of running with the standard B1850 compset, we will use this compset: [1850_CAM60_CLM50%BGC-CROP_CICE_POP2_MOSART_CISM2%NOEVOLVE_WW3](#)
2. To maximum run speed, we must add the following changes to our build script. This is changing the pe-layout (number of cpu per model component).

```
# Modify tasks/cores: env_mach_pes.xml
```

```
# cam
```

```
./xmlchange NTASKS_ATM=-8
```

```
./xmlchange NTHRDS_ATM=1
```

```
./xmlchange ROOTPE_ATM=0
```

```
# cpl
```

```
./xmlchange NTASKS_CPL=-8
```

```
./xmlchange NTHRDS_CPL=1
```

```
./xmlchange ROOTPE_CPL=0
```

```
#cism
```

```
./xmlchange NTASKS_GLC=64
```

```
./xmlchange NTHRDS_GLC=1
```

```
./xmlchange ROOTPE_GLC=0
```

```
# cice
```

```
./xmlchange NTASKS_ICE=192
```

```
./xmlchange NTHRDS_ICE=1
```

```
./xmlchange ROOTPE_ICE=64
```

```
# clm
```

```
./xmlchange NTASKS_LND=768
```

```
./xmlchange NTHRDS_LND=1
```

```
./xmlchange ROOTPE_LND=256
```

```
# pop
```

```
./xmlchange NTASKS_OCN=256
```

```
./xmlchange NTHRDS_OCN=1
```

```
./xmlchange ROOTPE_OCN=-8
```

```
# mosart
```

```
./xmlchange NTASKS_ROF=64
```

```
./xmlchange NTHRDS_ROF=1
```

```
./xmlchange ROOTPE_ROF=0
```

```
# wav
```

```
./xmlchange NTASKS_WAV=64
```

```
./xmlchange NTHRDS_WAV=1
./xmlchange ROOTPE_WAV=0
```

Make sure to add this **before** `./case.setup` in the build script.

3. Make two new files in the same directory as your build script: `user_nl_cam` and `user_nl_pop`. These are called namelist files and we can specify changes to the model in these files without having to perform source code modification. Inside `user_nl_cam` include the following line:

```
co2vmr = 1120e-6
```

This changes the CO₂ value to be four times pre-industrial. Inside `user_nl_pop`, include the following line:

```
dt_count=48
```

This cuts the ocean timestep in half (default value is 24), which is necessary for high CO₂ runs in CESM2 to avoid instability. **If you do not do this step, your model will crash after about 50 years.**

4. Change your `STOP_N` and `RESUBMIT` so that you run ten years at a time for a total of 100 years.

A sample build script and namelist files can be found on the course webpage. Remember to change you roots (marked with XXs)!