**1. Log into snow server**

**2. Set up the environment variables**

<https://hackmd.io/@yuanjenlin/CESM_on_SNOW>

**if you want to examine some details of the model:**

cd $CCSMROOT

**3. Run CESM**

**3.1 Create Case (set case name, resolution, component sets)**

/network/rit/lab/roselab\_rit/cesm/cesm1\_2\_1/scripts/create\_newcase -mach snow -compset F\_AMIP -res f19\_f19 -case AMIP

**Available Component Sets:**

<https://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/compsets.html>

**Description of grids:**

See notes *Tutorial.docs*

**Description of models:**

<https://www.cesm.ucar.edu/models/cesm1.2/>

**Grid settings:**

<https://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/grid.html>

***Attention:***

Recommend to use options using CAM4 to save time.

For PiControl run use "-compset B\_1850\_CN"

For 1%, 2% and other increasing CO2 runs, use "-compset B\_1850\_RAMPCO2\_CN"; ??

For climatological SST forced CAM4 runs with fixed current CO2 level, use "-compset F\_2000"

Recommend "-res f19\_g16" for most cases

If new input data are needed from NCAR, use "guestuser" and "friendly" to login when asked.

**Change the PE layout here (optional; this must be done before cesm\_setup is invoked if you want to do it):**

sbatch env\_mach\_pes.sh

Page 23 in the *Tutorial.pdf (I do not think the illustration is clear)*

Explanation of the files after you create the case:

Page 19 in the *Tutorial.pdf*

**3.2 Set up the case**

./cesm\_setup

Explanation of the files after you setup the case:

Page 22 in the *Tutorial.pdf*

In <casename>.run, change the value of --mem from MaxMemPerNode to 3584M (the max seems to be 128G).

#SBATCH --mem-per-cpu=3584M

**3.3 Build the executable**

Modify env\_run.xml (Page 27 in the *Tutorial.pdf*): running time period, running type, running directory, output directory

Details:

<https://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/env_run.html>

Normally, do these changes when you do the first simulation (test simulation):

xmlchange RUNDIR=/network/rit/lab/zhoulab\_rit/lzhuo/AMIP/run

xmlchange DOUT\_S\_ROOT=/network/rit/lab/zhoulab\_rit/lzhuo/AMIP/run

xmlchange RUN\_STARTDATE=

xmlchange STOP\_OPTION=nyears

xmlchange STOP\_N=1

For AMIP runs: (set the SST data)

xmlchange SSTICE\_YEAR\_ALIGN=1979 (Normally, set to the same year of RUN\_STARTYEAR)

xmlchange SSTICE\_YEAR\_START=1979

xmlchange SSTICE\_YEAR\_END=1980

when you really begin to run the simulation:

xmlchange STOP\_N=2

xmlchange RESUBMIT=19

~~xmlchange CONTINUE\_RUN=TRUE?? (Is this needed?: No!)~~

Note:

This runs the model for STOP\_N\*(1+RESUBMIT)=40 years in STOP\_N-year chunks. SNOW has a 12-hour time limit, so make sure each job does not go over that.

xmlchange SSTICE\_YEAR\_END=2020 (make sure the SST is right!)

Modify component-specific namelist:

CAM namelist:

<https://www2.cesm.ucar.edu/models/cesm2/settings/current/cam_nml.html>

Normally, add the following line to control the GHG concentrations:

scenario\_ghg=’RAMPED’

if you want to fix the GHG value, say at value at year 1979 from the dataset:

rampyear\_ghg=1979

otherwise, do not set this parameter!

if you want the GHG value to be directly interpolated from the dataset, say the model starts from 1979 to 2014, while the data starts from 1765 (I am not 100% sure):

ghg\_yearstart\_data=1979 ?? (Does this correspond to the first year you want to use in the data or does it correspond to the first year in the data?: **the former**)

ghg\_yearstart\_model=1979

see the code:

<https://www.cesm.ucar.edu/models/cesm1.1/cesm/cesmBbrowser/html_code/cam/chem_surfvals.F90.html>

other potential necessary modifications to the input data:

aerodep\_flx\_file='aerosoldep\_rcp8.5\_monthly\_1849-2104\_1.9x2.5\_c100201.nc'

prescribed\_volcaero\_file='CCSM4\_volcanic\_1949115-21010115\_prototype1\_c200319.nc'

solar\_data\_file='/data/rose\_scr/cesm\_inputdata/atm/cam/solar/SOLAR\_TSI\_Lean\_1610-2112\_annual\_c100224.nc'

DOCN namelist:

<https://www.cesm.ucar.edu/models/cesm1.2/cesm/doc/modelnl/nl_docn.html#nonstream>

Modify build settings in env\_build.xml (optional-normally, do not do this).

./$CASE.build

*Note*: this will check for the required input data sets and download missing data automatically

on local disk

**if you want to clean it**:

$CASE.clean\_build

$CASE.build

**3.4 Run the case**

$CASE.submit

**4. Restart CESM (branch run):**

**(Note:** branch run is a bit-for-bit run for the previous run, which means that all the settings, including the input data are the same as those used in the previous run, even if you manually change the input data. If you want to restart a simulation with different forcings, use hybrid run instead.**)**

**4.1 Create a new case that has the same component and resolution for the previous case**

/network/rit/lab/roselab\_rit/cesm/cesm1\_2\_1/scripts/create\_newcase -mach snow -compset F\_AMIP -res f19\_f19 -case AMIP\_restart

**4.2 Copy all other modifications you did to the env\_mach\_pes.xml in AMIP to env\_math\_pes.xml here in AMIP\_restart**

**4.3 cesm\_setup**

**4.4. Copy all other modifications you did to the env\_run.xml in AMIP and apply them to the env\_run.xml in AMIP\_restart, and doing the following modifications:**

xmlchange RUN\_TYPE=branch

xmlchange RUN\_REFCASE=AMIP

xmlchange RUN\_REFDATE=2019-01-01 (be careful! This date should be set according to the restart file, i.e., AMIP.cam.r.1999-01-01-00000.nc)

if you want to change the running time:

xmlchange CONTINUE\_RUN=TRUE ??

xmlchange RESUBMIT=2

**SST needs to be modified?**

**4.5 Copy all other modifications you did to the user\_nl\_cam in AMIP to user\_nl\_cam here in AMIP\_restart**

**GHG forcing year needs to be modified?**

**4.6 AMIP\_restart.build**

**4.7 Submit your job**

**5. Restart CESM (hybrid run)**

**4.1 Create a new case that has the same component and resolution for the previous case**

/network/rit/lab/roselab\_rit/cesm/cesm1\_2\_1/scripts/create\_newcase -mach snow -compset F\_AMIP -res f19\_f19 -case AMIP\_restart

**4.2 Copy all other modifications you did to the env\_mach\_pes.xml in AMIP to env\_math\_pes.xml here in AMIP\_restart**

**4.3 cesm\_setup**

**4.4. Copy all other modifications you did to the *env\_run.xml* in AMIP and apply them to the env\_run.xml in AMIP\_restart, and doing the following modifications:**

xmlchange RUN\_TYPE=hybrid

xmlchange RUN\_REFCASE=AMIP

xmlchange RUN\_REFDATE=1999-01-01 (be careful! This date should be set according to the restart file, i.e., AMIP.cam.r.1999-01-01-00000.nc)

xmlchange STARTDATE=1999-01-01

if you want to change the running time:

xmlchange CONTINUE\_RUN=TRUE

xmlchange RESUBMIT=2

(this must be done if you use new input data to user\_nl\_cam that are not present in the user\_nl\_cam in the previous case)

xmlchange SSTICE\_YEAR\_ALIGN=1999

xmlchange SSTICE\_YEAR\_START=1999

**4.5 Add some modifications to the *user\_nl\_cam***

ghg\_yearstart\_data=1999??

ghg\_yearstart\_model=1999

**4.6 AMIP\_restart.build**

**4.7 Submit your job**