

NorESM user workshop 2021

15 - 17 Nov. 2021

Alok K. Gupta, Yanchun He, Mats Bentsen, Ada Gjermundsen, Tomas Torsvik



Agenda

For this workshop we will demonstrate how to set up, build and run the NorESM model. We will go through the process two times, first time with a minimal setup and second time focusing on different options for each step.

1. Basic steps to set up a NorESM experiment, build the model and start a simulation run (Ada)
2. NorESM model structure (Tomas)
3. HPC resources provided by Sigma2 (Tomas)
4. Creating a new case (Tomas)
5. Options for building the case (Ada)
6. Options for running the case (Ada)
7. NorESM log files (Tomas)
8. Use a github fork for NorESM model development (Tomas)
9. Including your own code contributions for a case (Tomas)



Web services:

- Research Data Archive : <https://archive.norstore.no/>
- Diagnostic output : <http://ns2345k.web.sigma2.no/>
- ESGF node : <https://noresg.nird.sigma2.no/thredds/>
- NorESM git repository : <https://github.com/NorESMhub>
- NIRD toolkit : <https://apps.sigma2.no/nird>
- NorESM documentation : <https://noresm-docs.readthedocs.io/en/latest/>
- NorESM inputdata Server : <https://www.noresm.org/inputdata>

Resources for NorESM workshop



Reserved queue on Betzy for NorESM user workshop

During the user workshop we have access to a reserved queue on Betzy. The queue reservation is in place until 16 Nov 2021 at 23:59.

ReservationName = noresm

Accounts = nn9560k

PartitionName = normal

Nodes=b[4149-4162,4169-4171] NodeCnt=17 CoreCnt=2176

StartTime=2021-11-15T08:00:00 EndTime=2021-11-17T00:00:00 Duration=1-16:00:00

You can use this reservation by specifying it in sbatch as

```
#SBATCH --res=noresm
```

or in interactive command line as

```
--reservation=noresm
```



NIRD storage location

Output from NorESM runs can be copied to NS2345K project location on Nird:

1. Log in to Nird: `ssh <username>@login.nird.sigma2.no`
2. `cd /projects/NS2345K/workshop2021`
3. Create a subfolder for your own output files, e.g.
`mkdir <username>`
4. On Betzy : Copy output from Betzy to Nird
`scp -r <path/to/noesm/output>
<username>@login.nird.sigma2.no:/projects/NS2345K/workshop2021/<username>/`

NOTE: The workshop2021 directory will be deleted from NS2345K shortly after the end of the workshop.

Downloading the NorESM code (Ada)

- An recipe for downloading the CMIP6 version of NorESM

Downloading the NorESM code

Please deactivate your conda environment
if you have one on betzy:
\$ conda deactivate

Recipe:

1. Log on to betzy
2. Make a directory which will contain the NorESM code and the experiments
3. Enter the folder
4. Make a directory called cases. Here you will store all your NorESM experiments.
5. Get the NorESM code from GitHub
6. Enter the noresm repository
7. Checkout the CMIP6 version of NorESM
8. Get the corresponding code for the model component and cime

```
1. $ ssh username@betzy.sigma2.no
2. $ mkdir NorESM
3. $ cd NorESM
4. $ mkdir cases
5. $ git clone https://github.com/NorESMhub/NorESM.git noresm2.0
6. $ cd noresm2.0
7. $ git checkout release-noresm2.0.5
8. $ ./manageExternals/checkoutExternals
```

Documentation: https://noresm-docs.readthedocs.io/en/latest/access/download_code.html

All the steps needed for downloading the CMIP6 version of NorESM2

```
[adagj@login-1.BETZY ~]$ mkdir NorESM
[adagj@login-1.BETZY ~]$ cd NorESM
[adagj@login-1.BETZY ~/NorESM]$ mkdir cases
[adagj@login-1.BETZY ~/NorESM]$ git clone https://github.com/NorESMhub/NorESM.git noresm2.0
Cloning into 'noresm2.0'...
remote: Enumerating objects: 8270, done.
remote: Counting objects: 100% (2472/2472), done.
remote: Compressing objects: 100% (1229/1229), done.
remote: Total 8270 (delta 1574), reused 1956 (delta 1231), pack-reused 5798
Receiving objects: 100% (8270/8270), 41.16 MiB | 5.12 MiB/s, done.
Resolving deltas: 100% (5230/5230), done.
[adagj@login-1.BETZY ~/NorESM]$ cd noresm2.0/
[adagj@login-1.BETZY ~/NorESM/noresm2.0]$ git checkout release-noresm2.0.5
Note: checking out 'release-noresm2.0.5'.
```

You are in 'detached HEAD' state. You can look around, make experimental changes and commit them, and you can discard any commits you make in this state without impacting any branches by performing another checkout.

If you want to create a new branch to retain commits you create, you may do so (now or later) by using `-b` with the checkout command again. Example:

```
git checkout -b new_branch_name
```

```
HEAD is now at 133cc12... Merge pull request #279 from DirkOlivie/noresm2
[adagj@login-1.BETZY ~/NorESM/noresm2.0]$ ./manageExternals/checkoutExternals
Processing externals description file : Externals.cfg
Checking status of externals: clm, mosart, ww3, cime, cice, pop, cism, rtm, cam, blom,
Checking out externals: clm, mosart, cime, cice, cam, blom,
Processing externals description file : Externals_CLM.cfg
Checking out externals: fates, ptclm,
```

```
[adagj@login-1.BETZY ~/NorESM/noresm2.0]$
```

Basic steps to run NorESM (Ada)

- The Newbies Guide

Basic steps to run NorESM: Create case

The `create_newcase` script is an executable python script located in `cime/scripts`

```
./create_newcase --case $PATH_TO_cases/$CASENAME --mach $MACHINE --res $RESOLUTION
```

```
--compset $COMPSET --project $PROJECT --user-mods-dir $USER_MOD_DIRS
```

`--case $CASENAME` -> name of the NorESM experiment you are creating

`--mach $MACHINE` -> name of the HPC you are using e.g. betzy, fram, nebula

`--res $RESOLUTION` -> running with 1 (f09_tn14) or 2 degree (f19_tn14) atmosphere/land resolution

`--compset $COMPSETNAME` -> e.g. piControl (N1850frc2), historical, ssp585, abrupt-4xCO2

`--project $PROJECT` -> which project provides the cpu hours you are using (e.g. nn9560k = INES)

(`--user-mods-dir` -> predefined namelists and source mods)

Tomas will give a
detailed description
in the next session




```
$ cd ~/NorESM/noresm2.0/cime/scripts/
```

```
$ ./create_newcase --case ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115 --mach betzy --res f19_tn14  
--compset N1850frc2 --project nn9560k --pecount=128
```

```
./create_newcase --help
```

 will provide you all input options including a description

During this workshop
we will run NorESM on 1
node = 128 processors



Documentation: <https://noresm-docs.readthedocs.io/en/latest/configurations/newbie-guide.html>

Basic steps to run NorESM: Create case

```
[adagj@login-1.BETZY ~]$ cd ~/NorESM/noresm2.0/cime/scripts/
[adagj@login-1.BETZY ~/NorESM/noresm2.0/cime/scripts]$ ./create_newcase --case ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115 --mach betzy --res f19_tn14 --compset N1850frc2 --project nn9560k --user-mods-dir cmip6_noresm_DECK
Compset longname is 1850_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOSART_SGLC_SWAV_BGC%BDRDDMS
Compset specification file is /cluster/home/adagj/NorESM/noresm2.0/cime/./cime_config/config_compsets.xml
Compset forcing is 1850
ATM component is CAM cam6 physics:
LND component is clm5.0:BGC (vert. resol. CN and methane) with prognostic crop:
ICE component is Sea ICE (cice) model version 5 :with NORESM modifications appropriate for CMIP6 experiments
OCN component is BLOM default:BLOM/Ecosystem:
ROF component is MOSART: Model for Scale Adaptive River Transport
GLC component is Stub glacier (land ice) component
WAV component is Stub wave component
ESP component is
Pes      specification file is /cluster/home/adagj/NorESM/noresm2.0/cime/./cime_config/config_pes.xml
Compset specific settings: name is RUN_STARTDATE and value is 0001-01-01
Could not find machine match for 'login-1.betzy.sigma2.no' or 'login-1.betzy.sigma2.no'
Machine is betzy
Pes setting: grid match      is a%1.9x2.5.+l%1.9x2.5.+o%1%tnx1v4
Pes setting: machine match  is betzy
Pes setting: compset_match  is CAM60%NORESM.+CLM50%BGC-CROP.+CICE.+BLOM%ECO
Pes setting: pesize match   is M
Pes setting: grid           is a%1.9x2.5_l%1.9x2.5.o%1%tnx1v4_r%r05_g%null_w%null_m%tnx1v4
Pes setting: compset        is 1850_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOSART_SGLC_SWAV_BGC%BDRDDMS
Pes setting: tasks          is {'TASKS_ATM': 768, 'TASKS_ICE': 544, 'TASKS_CPL': 768, 'TASKS_LND': 192, 'TASKS_WAV': 32, 'TASKS_ROF': 128, 'TASKS_OCN': 256, 'TASKS_GLC': 768}
Pes setting: threads        is {'NTHRDS_ICE': 1, 'NTHRDS_ATM': 1, 'NTHRDS_ROF': 1, 'NTHRDS_LND': 1, 'NTHRDS_WAV': 1, 'NTHRDS_OCN': 1, 'NTHRDS_CPL': 1, 'NTHRDS_GLC': 1}
Pes setting: rootpe         is {'ROOTPE_OCN': 768, 'ROOTPE_LND': 0, 'ROOTPE_ATM': 0, 'ROOTPE_ICE': 224, 'ROOTPE_WAV': 192, 'ROOTPE_CPL': 0, 'ROOTPE_ROF': 0, 'ROOTPE_GLC': 0}
Pes setting: pstrid         is {}
Pes other settings: {}
Pes comments: none
Compset is: 1850_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOSART_SGLC_SWAV_BGC%BDRDDMS
Grid is: a%1.9x2.5_l%1.9x2.5.o%1%tnx1v4_r%r05_g%null_w%null_m%tnx1v4
Components in compset are: ['cam', 'clm', 'cice', 'blom', 'mosart', 'sglc', 'swav', 'sesp', 'drv', 'dart']
```

This is a CESM or NorESM scientifically supported compset at this resolution.

No charge_account info available, using value from PROJECT

No project info available

cesm model version found: release-noresm2.0.5

Batch system type is slurm_nor

job is case.run USER_REQUESTED_WALLTIME None USER_REQUESTED_QUEUE None

job is case.st_archive USER_REQUESTED_WALLTIME None USER_REQUESTED_QUEUE None

Creating Case directory /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test01_20211115

This component includes user_mods /cluster/home/adagj/NorESM/noresm2.0/components/cice/cime_config/usermods_dirs/noresm-cmip6

Adding user mods directory /cluster/home/adagj/NorESM/noresm2.0/components/cice/cime_config/usermods_dirs/noresm-cmip6

Adding user mods directory /cluster/home/adagj/NorESM/noresm2.0/cime_config/usermods_dirs/cmip6_noresm_DECK

Adding SourceMod to case /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/SourceMods/src.cam/preprocessorDefinitions.h

README

```
$ cd ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/
```

\$ vi README.case

You will find the information about your case in README

Including compset long name, grid files, components, git branch, git commit etc.

README can be very useful if you want to reproduce a case (either your own or somebody else's case)

```

File Edit View Search Terminal Tabs Help
adag[at]login-1:/NorESM/cases/N1850rc2_f19_in14_test01_20211115
adag[at]login-1:/NorESM/cases/N1850rc2_f19_in14_test01_20211115
adag[at]c355--
adag[at]login-1:/NorESM/cases/N1850rc2_f19_in14_test01_20211115
adag[at]login-1:/NorESM/cases/N1850rc2_f19_in14_test01_20211115 --mach betzy --res f19_in14 --compset N1850rc2 --project nor560K --user-mods drn cnrnp_noresm_DEC
2021-11-10 09:18:26: ./create_newcase -case /cluster/home/adag/NorESM/cases/N1850rc2_f19_in14_test01_20211115
2021-11-10 09:18:26: Compset Longname is 1850_CAM66NORHSMFR2_CUSN60C-BDCP_CICENORHSM-CNMP6_BLOWECO_MOSART_SGLC_SWAG_BVCNBDORDMS
2021-11-10 09:18:26: Compset specification file is /cluster/home/adag/NorESM/noresm2.0/cme_config/config_compsets.xml
2021-11-10 09:18:26: Pes specification file is /cluster/home/adag/NorESM/noresm2.0/cme_config/config_pes.xml
2021-11-10 09:18:26: Forcing is 1850
2021-11-10 09:18:26: Using Nane coupler instances
2021-11-10 09:18:26: Component ATM is CAM cano physics
2021-11-10 09:18:26: ATM_GRID is 1.9x2.5
2021-11-10 09:18:26: Component LND is clns.c0:BOG (vert. resol. CN and methane) with prognostic crop:
2021-11-10 09:18:26: LND_GRID is 1.9x2.5
2021-11-10 09:18:26: Component ICE is sea ice (cice) model version 5 with NORESM modifications appropriate for CNMP6 experiments
2021-11-10 09:18:26: ICE_GRID is tcnv4
2021-11-10 09:18:26: This component includes user_mods /cluster/home/adag/NorESM/noresm2.0/components/cice/cme_config/usermods_dtrs/noresm-cnmp6
2021-11-10 09:18:26: Component OCN is BLOW default:BLON/Ecosystem:
2021-11-10 09:18:26: OCN_GRID is tcnv4
2021-11-10 09:18:26: Component ROP is MOSART: Model for Scale Adaptive River Transport
2021-11-10 09:18:26: ROP_GRID is r05
2021-11-10 09:18:26: Component GLC is Stub glacier (land ice) component
2021-11-10 09:18:26: GLC_GRID is null
2021-11-10 09:18:26: Component WAV is Stub wave component
2021-11-10 09:18:26: WAV_GRID is null
2021-11-10 09:18:26: ESP_GRID is None
2021-11-10 09:18:26: INFORMATION ABOUT YOUR GIT VERSION CONTROL SYSTEM :
2021-11-10 09:18:26: remote branch:origin https://github.com/NorESMhub/cme (fetch)
2021-11-10 09:18:26: git branch: (detached from cme6.6.0_cesm2.1_rel_60-Nor-v1.0.5) d30a3c Merge pull request #27 from montseurak/cme6.6.0_cesm2.1_rel_60-Nor-master
2021-11-10 09:18:26: git log:commit d30a3c3ba912bfaef2d63b079d19a18d2c66c
Merge: dbdeefb 9c4dc5
Author: montseurak@aok.gutenberg.no
Date: Fri Apr 9 11:09:53 2021 +0200
Merge pull request #27 from montseurak/cme6.6.0_cesm2.1_rel_60-Nor
changes for FRAM as preproc queue has removed
"README" case: 611, 3981C
1.1

```

Basic steps to run NorESM: Set up the case

Enter the case folder:

```
$ cd ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/  
$ ./xmlchange NTASKS_OCN=123  
$ ./case.setup
```

NOTE!

During this workshop we will run NorESM on 1 node.

Thus, we need to make changes to env_mach_pes.xml before running ./case.setup

You can do so by the use of xmlchange

Documentation:

- <https://noresm-docs.readthedocs.io/en/latest/configurations/newbie-guide.html>
- <https://noresm-docs.readthedocs.io/en/latest/configurations/experiments.html#create-and-configure-a-new-case>
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#machine-specific-environment

Basic steps to run NorESM: Set up the case

```
$ ./case.setup
```

```
[adagj@login-2.BETZY ~/NorESM/cases]$ cd ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/
[adagj@login-2.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115]$ ./xmlchange NTASKS_OCN=123
[adagj@login-2.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115]$ ./case.setup
Setting resource.RLIMIT_STACK to -1 from (8388608, -1)
/cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/env_mach_specific.xml already exists, delete to replace
job is case.run USER_REQUESTED_WALLTIME None USER_REQUESTED_QUEUE None
Creating batch scripts
Writing case.run script from input template /cluster/home/adagj/NorESM/noresm2.0/cime/config/cesm/machines/template.case.run
Creating file .case.run
Writing case.st_archive script from input template /cluster/home/adagj/NorESM/noresm2.0/cime/config/cesm/machines/template.st_archive
Creating file case.st_archive
Creating user_nl_xxx files for components and cpl
If an old case build already exists, might want to run 'case.build --clean' before building
You can now run './preview_run' to get more info on how your case will be run
[adagj@login-2.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115]$
```

Basic steps to run NorESM: Build the case

After running `./case.setup` you should see your case in the noresm run directory

```
$ ls /cluster/work/users/adagj/noresm/
```

```
N1850frc2_f19_tn14_test01_20211115
```

Please use your own username
(instead of mine :-)

```
$ ls /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/  
bld run
```

bld: the build folder

run: the run folder. Here you'll find logs, output data, restart files etc. More on that later ...

```
$ ./case.build
```

Creating an executable **cesm.exe**; found in
`/cluster/work/users/$USER/noresm/$CASENAME/bld`

Basic steps to run NorESM: Building the case

```
adagj@login-1:~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115
File Edit View Search Terminal Tabs Help
adagj@login-1:~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115
adagj@login-1:~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115
adagj@pc5355:~
Writing case.st_archive script from input template /cluster/home/adagj/NorESM/noresm2.0/cime/config/cesm/machines/template.st_archive
Creating file case.st_archive
If an old case build already exists, might want to run 'case.build --clean' before building
You can now run './preview_run' to get more info on how your case will be run
[adagj@login-1.BETZY ~]~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115$ vi env_mach_pes.xml
[adagj@login-1.BETZY ~]~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115$ ./case.build
Building case in directory /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test01_20211115
sharedlib only is False
model_only is False
Setting resource.RLIMIT_STACK to -1 from (8388608, -1)
Generating component namelists as part of build
Creating component namelists
  Calling /cluster/home/adagj/NorESM/noresm2.0/components/cam//cime_config/buildnml
  ...calling cam buildcpp to set build time options
CAM namelist copy: file1 /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/Builddconf/camconf/atm_in file2 /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/run/atm_in
  Calling /cluster/home/adagj/NorESM/noresm2.0/components/clm//cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/components/cice//cime_config/buildnml
  ...calling cice buildcpp to set build time options
Running /cluster/home/adagj/NorESM/noresm2.0/components/blom//cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/components/mosart//cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/components/stub_comps/sglc/cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/components/stub_comps/swav/cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/components/stub_comps/seps/cime_config/buildnml
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/drivers/mct/cime_config/buildnml
Finished creating component namelists
Building gptl with output to file /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/gptl.bldlog.211110-103407
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/build_scripts/buildlib.gptl
Component gptl build complete with 1 warnings
Building mct with output to file /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/mct.bldlog.211110-103407
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/build_scripts/buildlib.mct
Building pio with output to file /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/pio.bldlog.211110-103407
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/build_scripts/buildlib.pio
Component pio build complete with 5 warnings
Building csm_share with output to file /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/csm_share.bldlog.211110-103407
  Calling /cluster/home/adagj/NorESM/noresm2.0/cime/src/build_scripts/buildlib.csm_share
Component csm_share build complete with 20 warnings
  - Building cln4.5/cln5.0 libary
Building lnd with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/lnd.bldlog.211110-103407
Component lnd build complete with 6 warnings
clm built in 112.430128 seconds
Building atm with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/atm.bldlog.211110-103407
Building ice with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/ice.bldlog.211110-103407
Building ocn with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/ocn.bldlog.211110-103407
Building rof with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/rof.bldlog.211110-103407
Building gle with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/gle.bldlog.211110-103407
Building wav with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/wav.bldlog.211110-103407
Building esp with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/esp.bldlog.211110-103407
sglc built in 3.168113 seconds
swav built in 3.165164 seconds
seps built in 3.195031 seconds
mosart built in 17.860215 seconds
Component ice build complete with 1 warnings
cice built in 73.162975 seconds
Component atm build complete with 17 warnings
cam built in 104.515379 seconds
blom built in 182.317174 seconds
Building cesm with output to /cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_test01_20211115/bld/cesm.bldlog.211110-103407
Component cesm exe build complete with 2 warnings
time spent not building: 8.273195 sec
time spent building: 390.352136 sec
MODEL BUILD HAS FINISHED SUCCESSFULLY
[adagj@login-1.BETZY ~]~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115$
```

Basic steps to run NorESM: Submitting the case

```
$ vi env_batch.xml
```

In env_batch.xml on line 37 (37G), change p to q (i activates insert):

`<arg flag="-p" name="$JOB_QUEUE"/>` `<arg flag="-q" name="$JOB_QUEUE"/>`

And on line 81 (**81G**), change **queue** from **normal** to **devel** (development):

`<entry id="JOB_QUEUE" value="normal">`  `<entry id="JOB_QUEUE" value="devel">`

```
$ ./case.submit
```

```

[adag@login1-BE2TY ~]# ./NorESM/cases/N1850frc2_f19_tn14_test03_20211115.js ./case.submit
File /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test03_20211115/Lockedfiles/env_batch.xnl has been modified
Found difference in JOB_QUEUE : case 'devel' locked 'preproc'

env_batch.xnl appears to have changed, regenerating batch scripts
manual edits to these file will be lost!

Creating batch scripts
Writing case.run script from Input template /cluster/home/adagj/NorESM/noresn2.0/ctmne/config/cesm/machines/template.case.run
Creating file case.run
Writing case.st_archive script from Input template /cluster/home/adagj/NorESM/noresn2.0/ctmne/config/cesm/machines/template.st_archive
Creating file case.st_archive
Setting resource RLIMIT_STACK to -1 from (-1, -1)
Creating component namelists
Calling /cluster/home/adagj/NorESM/noresn2.0/components/can/ctmne_config/buildnml
can namelists copy file /cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test03_20211115/Buildconf/canconf/atm_in file2 /cluster/work/users/adagj/nor/esm/N1850frc2_f19_tn14_test03_20211115/run/atm_in
Calling /cluster/home/adagj/NorESM/noresn2.0/components/clm/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/components/ctcne/ctmne_config/buildnml
Running /cluster/home/adagj/NorESM/noresn2.0/components/blom/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/components/mosart/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/ctmne/src/components/stub_comps/sglc/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/ctmne/src/components/stub_comps/sawc/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/ctmne/src/components/stub_comps/resp/ctmne_config/buildnml
Calling /cluster/home/adagj/NorESM/noresn2.0/ctmne/src/drivers/mct/ctmne_config/buildnml
Finished creating component namelists
Checking that Inputdata is available as part of case submission
Setting resource.RLIMIT_STACK to -1 from (-1, -1)
Loading Input file list: 'Buildconf/can.input_data_list'
Loading Input file list: 'Buildconf/cpl.input_data_list'
Loading Input file list: 'Buildconf/blom.input_data_list'
Loading Input file list: 'Buildconf/ctcne.input_data_list'
Loading Input file list: 'Buildconf/mosart.input_data_list'
Loading Input file list: 'Buildconf/clm.input_data_list'
Check case OK
Submit_jobs case.run
Submit job case.run
Submitting job script sbatch --time 00:59:00 -q devel --account nm9560k .case.run --resubmit
Submitted job id is 253504
Submit job case.st_archive
Submitting job script sbatch --time 0:59:00 -q preproc --account nm9560k --dependency=afterok:253504 case.st_archive --resubmit
Submitted job id is 253505
Submitted job case.run with id 253504
Submitted job case.st_archive with id 253505

```

Please note!

Usually you will not make these changes, because you will run NorESM on several more nodes



Monitoring your jobs: some useful commands

queue: overview of job(s) running and the job id(s)

scontrol: see more details about the job running

scancel: stop job from running

```
$ queue -u $USER
```

```
$ queue -p $PROJECT
```

```
$ scontrol show job $JOBID
```

```
$ scancel $JOBID
```

Note! queue -u \$USER: If you don't see your job, it has either finished or crashed!

Monitoring jobs : <https://documentation.sigma2.no/jobs/monitoring.html>

Hands-on session 1

Download the CMIP6 version of NorESM2:

1. `$ ssh username@betzy.sigma2.no`
 2. `$ mkdir NorESM`
 3. `$ cd NorESM`
 4. `$ mkdir cases`
 5. `$ git clone https://github.com/NorESMhub/NorESM.git noresm2.0`
 6. `$ cd noresm2.0`
 7. `$ git checkout release-noresm2.0.5`
 8. `$./manageExternals/checkoutExternals`
-

Hands-on session 1

Create, setup, build and submit your (first?) NorESM2-LM piControl simulation running on 1 node by repeating these steps:

```
$ cd ~/NorESM/noresm2.0/cime/scripts/
```

```
$ ./create_newcase --case ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115 --mach betzy  
--res f19_tn14 --compset N1850frc2 --project nn9560k --pecount=128
```

```
$ cd ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/
```

```
$ ./xmlchange NTASKS_OCN=123
```

```
$ ./case.setup
```

```
$ ./case.build
```

```
$ vi env_batch.xml
```

```
./case.submit
```

In env_batch.xml on line 37 (37G), change p to q (i activates insert):

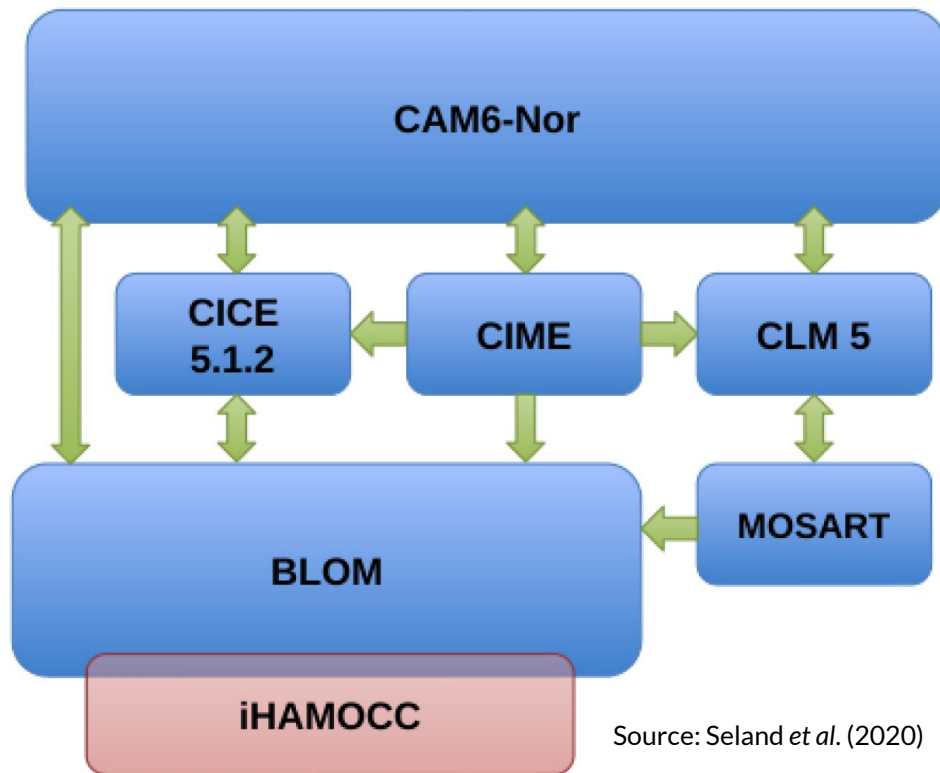
<arg flag="-p" name="\$JOB_QUEUE"/> <arg flag="-q" name="\$JOB_QUEUE"/>

And on line 81, change queue from normal to devel (development):

<entry id="JOB_QUEUE" value="normal"> <entry id="JOB_QUEUE" value="devel">

NorESM model system (Tomas)

NorESM framework



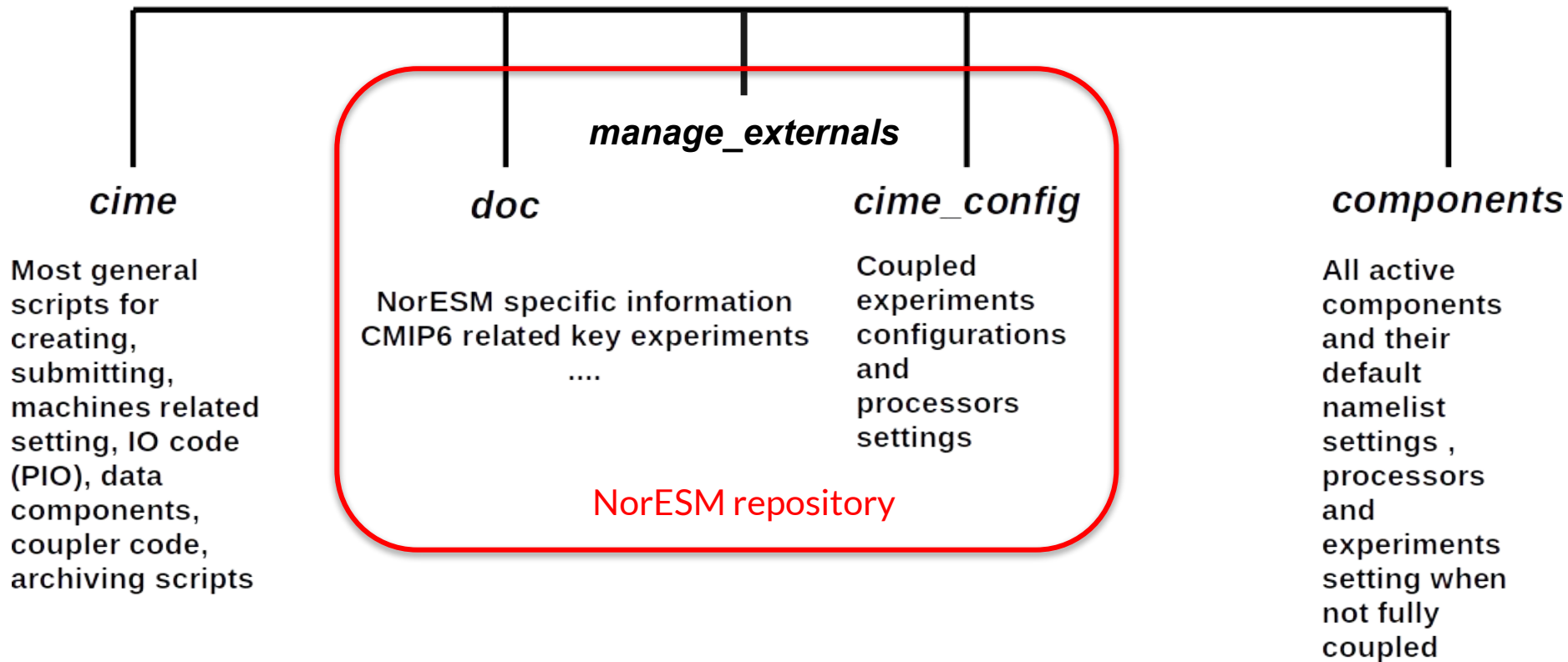
Source: Seland *et al.* (2020)

NorESM2 is based on the second version of the Community Earth System Model, CESM2, and share most of the CESM2 structure, but modifies model component.

- Atmosphere model :
CAM6-Nor replaces standard CAM
- Atmospheric chemistry:
OsloAero6
- Ocean model :
Isopycnic coordinate model BLOM
- Ocean biogeochemical model :
iHAMOCC
- Sea-ice model:
Wind drift of snow



NorESM model structure





cime

CIME
“Common Infrastructure
for Modelling the Earth”

- scripts
- create_newcase
 - create_clone
 - query_config

config

src

lib

Tools

- case.setup
- case.build
- case.submit

cesm

- config_archive.xml
- config_files.xml
- config_grids.xml
- config_inputdata.xml

components

drivers

externals

CIME

- Python scripts to support “Tools”

machines

- config_compilers.xml
- config_machines.xml

data_comps

stub_comps

xcpl_comps

mct

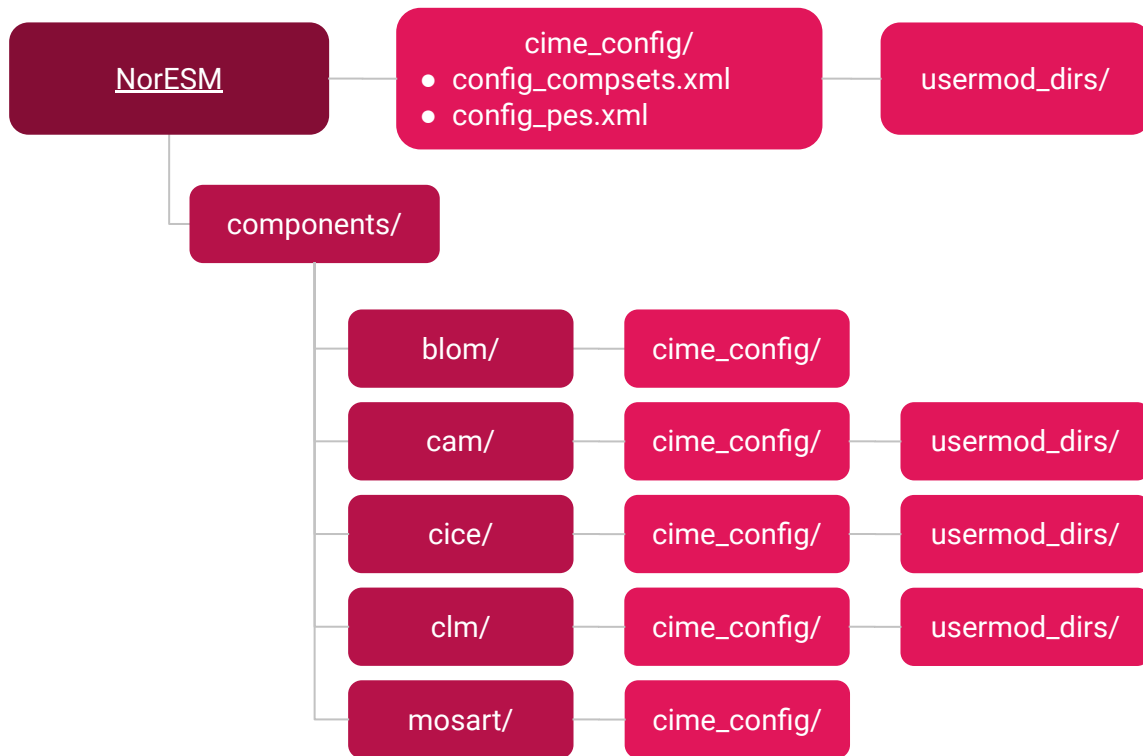
model coupling toolkit

pio1, pio2
parallel IO

Replacement
model comp.

NorESM2.0.5 tag version:
cime5.6.10_cesm2_1_rel_06-Nor_v1.0.5

cime_config directory



Files in cime_config/ :

config_compsets.xml : compset configuration file

config_pes.xml : processor config for particular compsets

Additional component scripts

buildnml : build component namelist

buildlib : build component library



Fetching the source: *checkoutExternals* script

<code>./manageExternals/checkoutExternals</code>	Fetch model components defined in the <code>Externals.cfg</code> file
<code>./checkoutExternals -e [EXTERNALS]</code>	Fetch model components defined in <code>[EXTERNALS]</code> file
<code>./checkoutExternals -S</code>	Check status of downloaded model components
<code>./checkoutExternals -h</code>	See all options for <code>checkoutExternals</code>

Entries from **Externals.cfg** file :

```
[cam]
tag = cam_cesm2_1_rel_05-Nor_v1.0.4
protocol = git
repo_url = https://github.com/NorESMhub/CAM
local_path = components/cam
required = True
```

```
[clm]
tag = release-clm5.0.14-Nor_v1.0.3
protocol = git
repo_url = https://github.com/NorESMhub/ctsm
local_path = components/clm
externals = Externals_CLM.cfg
required = True
```

**HPC resources provided by Sigma2
(Tomas)**



Sigma2 HPC machines

See Sigma2 documentation for more HPC info:
https://documentation.sigma2.no/hpc_machines/hardware_overview.html

Sigma2 provides 3 HPC systems:

- Betzy for large parallel jobs (Normal queue: 4-512 nodes, 4 days max walltime)
- Fram for intermediate parallel jobs (Normal queue: 1-32 nodes, 7 days max walltime)
- Saga for serial or single node jobs (Not configured for NorESM)

HPC job types: https://documentation.sigma2.no/jobs/choosing_job_types.html

	Fram	Betzy
System	Lenovo NeXtScale nx360	BullSequana XH2000
CPU type	Intel E5-2683v4 ; 2.1 GHz	AMD Epyc 7742 ; 2.25GHz
Nodes / Cores	1006 / 32256	1344 / 172032
(core / mem) per node	32 / 64 GB	128 / 256 GB
	largemem: 8x 512GB, 2x 6TB	16 Nvidia A100 GPUs



Fram and Betzy storage areas

Directory	Alias	Purpose
/cluster/home/\$USER	\$HOME	User data
/cluster/work/users/\$USER	\$USERWORK	Staging and job data
/cluster/work/jobs/\$SLURM_JOB_ID	\$SCRATCH	Per-job data
/cluster/projects/<project_name>		Project data
/cluster/shared/<folder_name>		Shared data

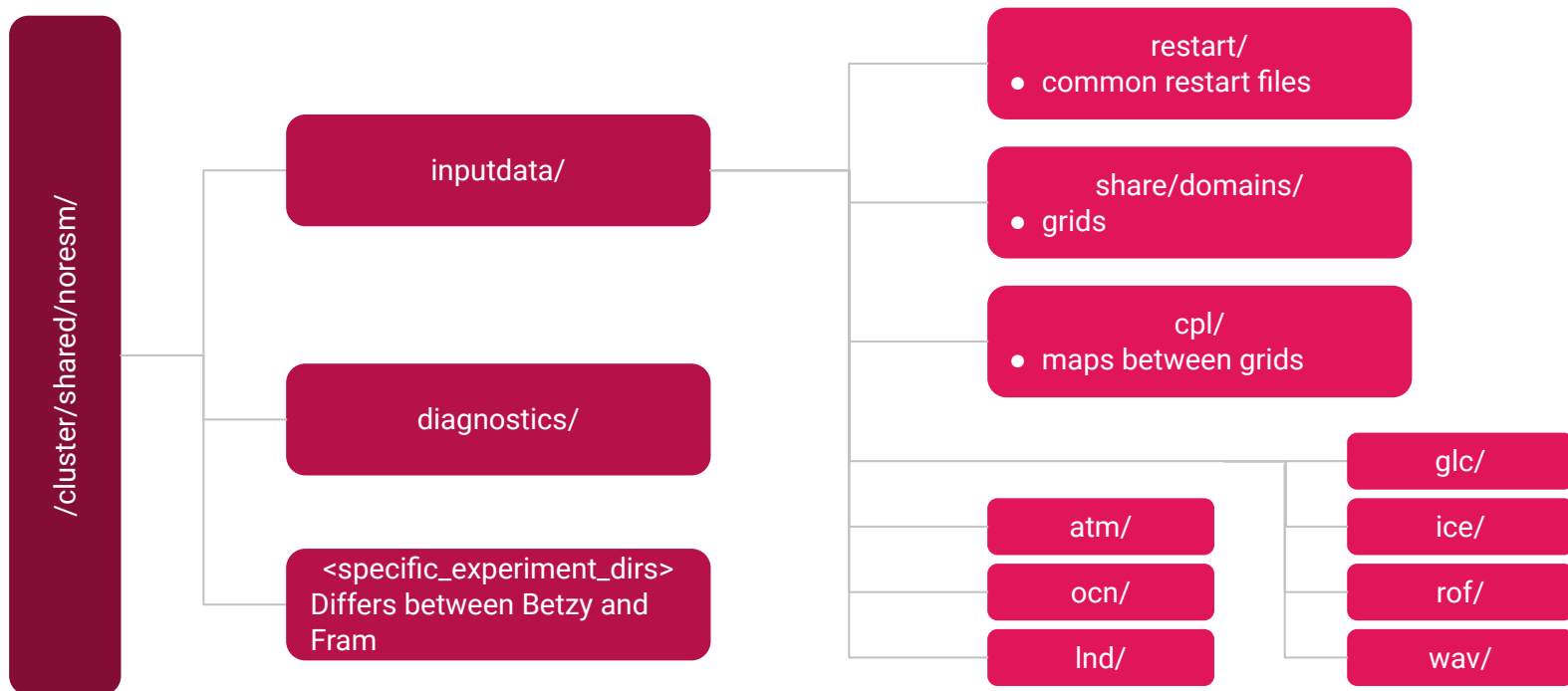
NorESM copies build and run files to subdirectories in \$USERWORK. These files are not backed up, and are subject to automatic deletion after 42 days. Therefore, make sure you copy output files you want to keep to a permanent storage area.

Documentation: https://documentation.sigma2.no/files_storage/clusters.html

NorESM shared resources on Fram and Betzy

Shared resources for NorESM are available on both Fram and Betzy under directory:

`/cluster/shared/noresm/`





Where to learn more about HPC computing

- Sigma2 “getting started” web pages:
https://documentation.sigma2.no/getting_started/getting_started.html
- Sigma2 “Running jobs” web page:
<https://documentation.sigma2.no/jobs/overview.html>
- Sigma2/NRIS training material:
<https://documentation.sigma2.no/training/material.html>
- NRIS training events:
<https://www.sigma2.no/training>

Setting up a new NorESM case (Tomas)

- Creating a new case or cloning existing case
- Compsets
- Grids



Creating a new case

A new case is created by running the script `<NorESM>/cime/scripts/create_newcase`, where `<NorESM>` refers to the base directory of your personal clone of NorESM.

General command structure:

```
./create_newcase
  --case <path/to/casedir/casename> [required]
  --compset <compset_name>           [required]
  --res <grid_name>                   [required]
  --machine <machine_name>           [usually required (options: fram, betzy)]
  --project <project_name>           [usually required (options: nn????k)]
  --pecount <label/number>            [optional (number of cores required for job)]
  --user-mod-dirs <path/to/usermods> [optional (used for some common run setups)]
  --run-unsupported                   [optional (used for some non-standard setups)]
```

Documentation: <https://noresm-docs.readthedocs.io/en/latest/configurations/experiments.html>



Creating a clone case

A clone case is created by running the script `<NorESM>/cime/scripts/create_clone`.

General command structure:

```
./create_clone
  --case <path/to/casedir/casename> [required]
  --clone <path/to/existing/case>    [required]
  --project <project_name>           [usually required (options: nn????k)]
  --user-mod-dirs <path/to/usermods> [optional (used for some common run setups)]
  --keepexe                          [optional (set EXEROOT link to original build)]
```

Cloning without `--keepexe` will copy all case files, but the case needs to be re-built (run `./case.build`) before submitting a job.

Cloning a case with `--keepexe` will not create a `bld/` directory (no re-build required), and the `SourceMods` directory will be changed to a symbolic link pointing to the original case directory.



Compsets

- An experiment with some sets of components and forcing

- List of all compsets

```
./query_config --compsets
```

list all existing compsets;

```
./query_config --compsets allactive
```

all fully coupled compsets;

```
./query_config --compsets blom
```

all ocean-only compsets;

```
./query_config --compsets cam
```

all atmosphere-only compsets;

- All compsets starting with N are NorESM related compsets



Compset string

- The compset longname has the specified order atm, lnd, ice, ocn, river, glc, wave, cesm-options
- The notation for the compset longname is

TIME_ATM[%phys]_LND[%phys]_ICE[%phys]_OCN[%phys]_ROF[%phys]_GLC[%phys]_WAV[%phys]_[_ESP%phys]_[_BGC%phys]

TIME = Time period (e.g. 1850, 2000, HIST, SSP126, SSP245, SSP370, SSP585)

ATM = [CAM40, CAM50, CAM54, CAM60]; LND = [CLM45, CLM50, SLND]; ICE = [CICE, DICE, SICE]

OCN = [DOCN, ,AQUAP, SOCN, BLOM]; ROF = [RTM, MOSART, SROF]; GLC = [CISM1, CISM2, SGLC]

WAV = [WW3, DWAV, XWAV, SWAV]; ESP = [SESP]; BGC = optional BGC scenario

- The OPTIONAL %phys attributes specify submodes of the given system
- For example DOCN%DOM is the data ocean model for DOCN
- ALL the possible %phys choices for each component are listed.
- ALL data models must have a %phys option that corresponds to the data model mode
- Each compset node is associated with the following elements
 - - lname ; alias ; support (optional description of the support level for this compset)
- Each compset node can also have the following attributes
 - - grid (optional regular expression match for grid to work with the compset)

Documentation: <https://noresm-docs.readthedocs.io/en/latest/configurations/experiments.html>,
https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html#cmip6-deck-compsets



Some fully coupled compsets

<short_name> : (description)

TIME_ATM[%phys]_LND[%phys]_ICE[%phys]_OCN[%phys]_ROF[%phys]_GLC[%phys]_WAV[%phys]_ES
P[%phys]_BGC[%phys]

N1850frc2 : (piControl)

1850_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOSAR
T_SGLC_SWAV_BGC%BDRDDMS

NHISTfrc2 : (historical)

HIST_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOSAR
T_SGLC_SWAV_BGC%BDRDDMS

NSSP126frc2 : (scenario)

SSP126_CAM60%NORESM%FRC2_CLM50%BGC-CROP_CICE%NORESM-CMIP6_BLOM%ECO_MOS
ART_SGLC_SWAV_BGC%BDRDDMS

Documentation: https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html#cmip6-deck-compsets,
https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html#cmip6-scenario-compsets-only-frc2-compsets
https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html#reproduce-cmip6-picontrol-historical-and-ssp5-8-5-experiments



Where to find compset definitions

- Fully coupled compsets:

`cime_config/config_compsets.xml`

- Component specific components (not fully coupled – data atmosphere, stub atmosphere, stub or data ocean, ..)

`cam/cime_config/config_compsets.xml`

`blom/cime_config/config_compsets.xml`

`clm/cime_config/config_compsets.xml`

`cice/cime_config/config_compsets.xml`

`cism/cime_config/config_compsets.xml`



Grid resolution

Grid definition: `cime/config/cesm/config_grids.xml`

Grids for scientifically supported NorESM2 experiments include:

Atmosphere & land:

f19 : $1.9 \times 2.5 = 1.9$ degree latitude and 2.5 degree longitude resolution = 144×96

f09 : $0.9 \times 1.25 = 0.9$ degree latitude and 1.25 degree longitude resolution = 288×192

Ocean & sea ice:

tnx1v4 : tripolar 1 degree grid = 360×384

Data atmosphere: (OMIP experiments)

T62, TL319 : approx. 2 degree Gaussian and 0.5 degree spectral grid

More grid configurations are defined, but they may not be available on a specific HPC or may require additions to NorESM2 config files in order to work properly.



Mapping files

- There is different resolution for ocean, atmosphere and river runoff grid
- Coupler is used to interpolate/transfer fields from one grid to another grid
- Map files are generated for weight factors (cime/tools) and these factors are stored; for that purpose ESMF tool is used.
- List of some map files: `cime/config/cesm/config_grids.xml`
 - `map_tnx1v4_to_fv0.9x1.25_aave_da_170609.nc` (ocean → atmosphere)
 - `map_tnx1v4_to_fv1.9x2.5_aave_da_170609.nc` (ocean → atmosphere)
 - `map_fv0.9x1.25_to_tnx1v4_aave_da_170609.nc` (atmosphere → ocean)
 - `map_fv1.9x2.5_to_tnx1v4_aave_da_170609.nc` (atmosphere → ocean)
 - `map_r05_to_tnx1v4_e1000r300_170609.nc` (river → ocean)

Hands-on session 2 : checkout externals

In release-noresm2.0.5 there is a second externals file:

`Externals_continuous_development.cfg`

This file is used to build NorESM with alternative development branches of model components.

1. Look at differences between externals files:

```
diff -u Externals.cfg Externals_continuous_development.cfg
```

2. Examine status for current and alternative externals file

```
./manage_externals/checkout_externals -S _____ ← for current externals  
-e Externals_continuous_development.cfg -S _____ ← for alternative externals
```

Symbols used by status checker:

: all is fine

s : out-of-sync

o : optional source

e : empty

? : unknown (no .git or .svn)

M : modified source

Hands-on session 2 : query_config

Use query_config to learn more about NorESM model options

1. Go to scripts directory: `cd cime/scripts`
 2. Find details about compsets N1850frc, NorESM coupled, and blom
`./query_config --compsets | grep N1850frc2`
`./query_config --compsets | awk '$1 ~ /^N/'`
`./query_config --compsets blom`
 3. Find config options for a component or data replacement
`./query_config --components blom` ← Active ocean component
`./query_config --components docn` ← Data ocean component
 4. Find details about grids
`./query_config --grids | grep -A 2 tn14` ← All grids using tn1v4 ocean grid
-

Configure build and run settings for a case (Ada)

- `env_mach_pes.xml`
- `user_nl_*`
- `env_run.xml`
- `env_batch.xml`

Basic steps to run NorESM: Set up the case

```
$ ./xmlchange NTASKS_OCN=123
```

```
$ vi env_mach_pes.xml
```

During this workshop we will
run NorESM on 1 node.

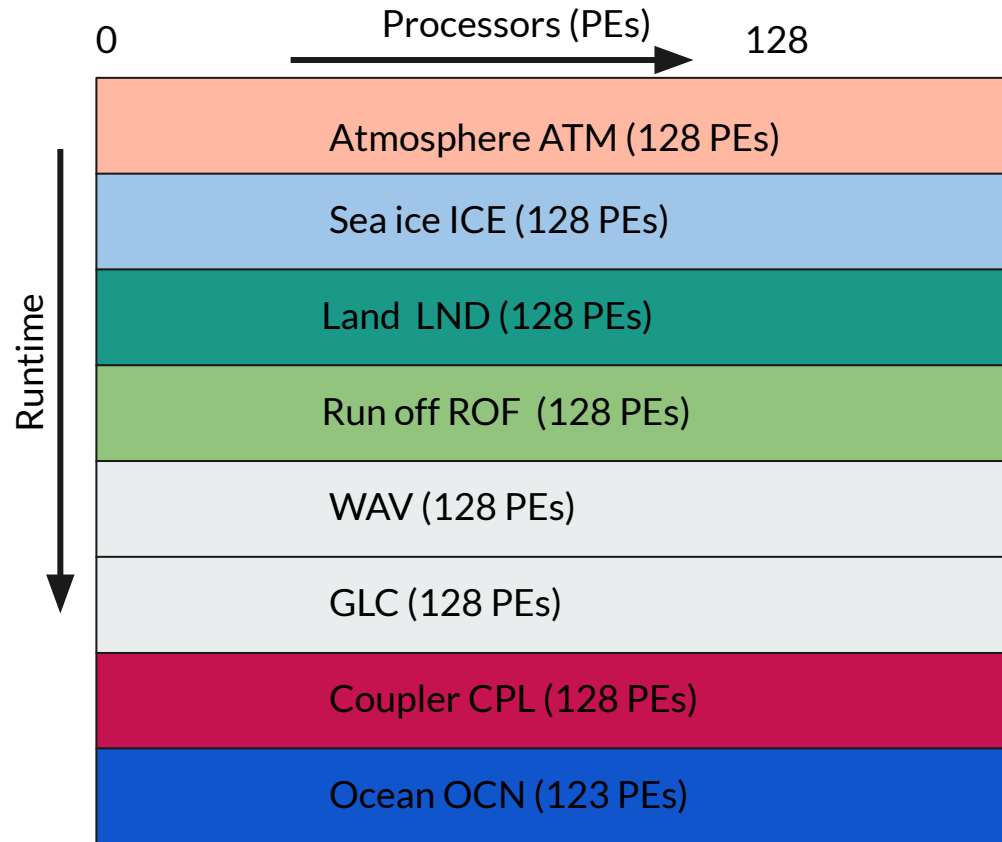
Change to 123 on line 63 (you can type **63G** to get to the correct line) and type **i** (insert) to make changes:

```
<entry id="NTASKS">
  <type>integer</type>
  <values>
    <value compclass="ATM">128</value>
    <value compclass="CPL">128</value>
    <value compclass="OCN">128</value>
    <value compclass="WAV">128</value>
    <value compclass="GLC">128</value>
    <value compclass="ICE">128</value>
    <value compclass="ROF">128</value>
    <value compclass="LND">128</value>
    <value compclass="ESP">1</value>
  </values>
  <desc>number of tasks for each component</desc>
</entry>
```

```
<entry id="NTASKS">
  <type>integer</type>
  <values>
    <value compclass="ATM">128</value>
    <value compclass="CPL">128</value>
    <value compclass="OCN">123</value>
    <value compclass="WAV">128</value>
    <value compclass="GLC">128</value>
    <value compclass="ICE">128</value>
    <value compclass="ROF">128</value>
    <value compclass="LND">128</value>
    <value compclass="ESP">1</value>
  </values>
  <desc>number of tasks for each component</desc>
</entry>
```

```
$ ./case.setup
```

Configure run settings: env_mach_pes.xml



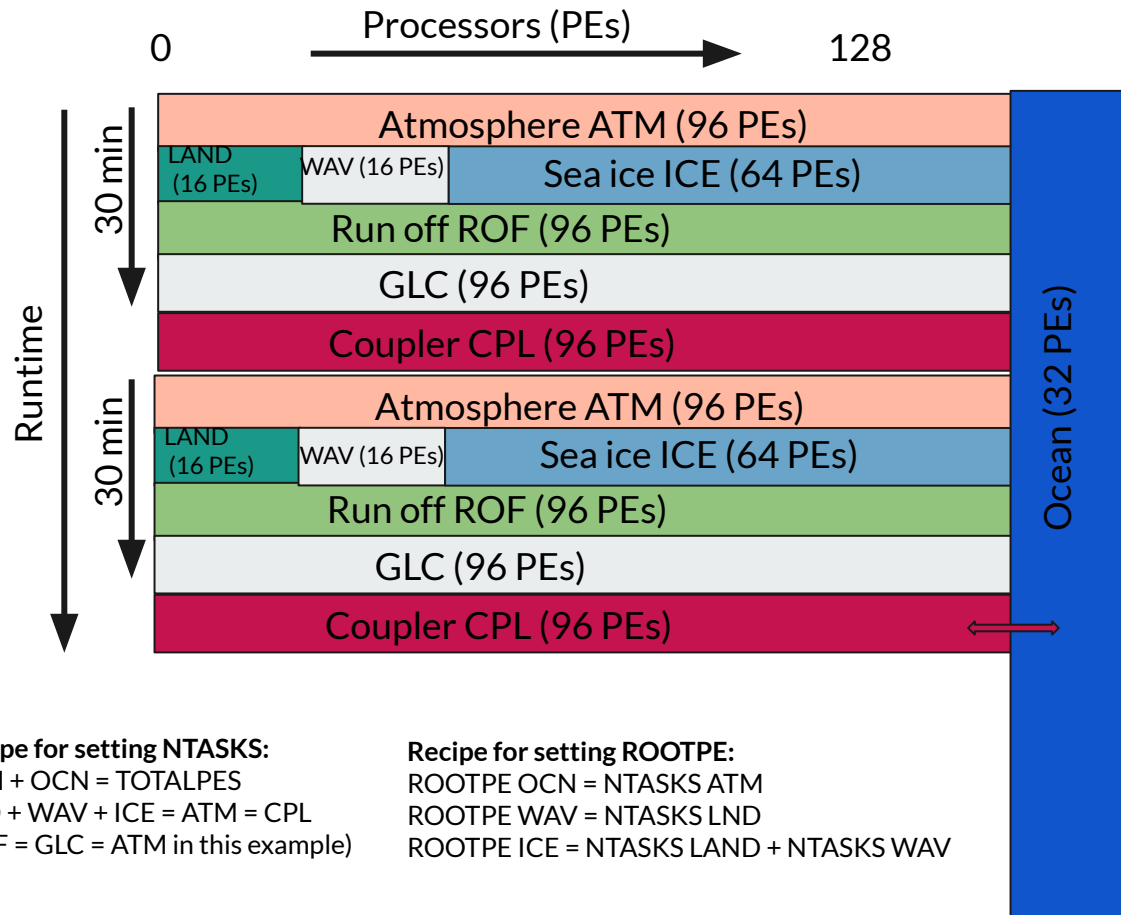
In the previous case we used 128 PEs with each component running sequentially over the entire set of processors:

```
<entry id="COST_PES" value="128">
  <type>integer</type>
  <desc>pes or cores used relative to MAX_MPITASKS_PER_NODE for accounting (0
means TOTALPES is valid)</desc>
</entry>
<entry id="TOTALPES" value="128">
  <type>integer</type>
  <desc>total number of physical cores used (setup automatically - DO NOT
EDIT)</desc>
</entry>

<entry id="NTASKS">
  <type>integer</type>
  <values>
    <value compclass="ATM">128</value>
    <value compclass="CPL">128</value>
    <value compclass="OCN">123</value>
    <value compclass="WAV">128</value>
    <value compclass="GLC">128</value>
    <value compclass="ICE">128</value>
    <value compclass="ROF">128</value>
    <value compclass="LND">128</value>
    <value compclass="ESP">1</value>
  </values>
  <desc>number of tasks for each component</desc>
</entry>
```

WAV and GLC are stub components which are present only to meet interface requirements, but not active model components in NorESM. Still need to set NTASKS!

Configure run settings: env_mach_pes.xml



Recipe for setting NTASKS:

ATM + OCN = TOTALPES

LND + WAV + ICE = ATM = CPL

(ROF = GLC = ATM in this example)

Recipe for setting ROOTPE:

ROOTPE OCN = NTASKS ATM

ROOTPE WAV = NTASKS LND

ROOTPE ICE = NTASKS LAND + NTASKS WAV

Now, we still use 128 PEs, running on 1 node:

```
<entry id="NTASKS">
  <type>integer</type>
  <values>
    <value compclass="ATM">96</value>
    <value compclass="CPL">96</value>
    <value compclass="OCN">32</value>
    <value compclass="WAV">16</value>
    <value compclass="GLC">96</value>
    <value compclass="ICE">64</value>
    <value compclass="ROF">96</value>
    <value compclass="LND">16</value>
    <value compclass="ESP">1</value>
  </values>
  <desc>number of tasks for each component</desc>
</entry>
```

```
<entry id="ROOTPE">
  <type>integer</type>
  <values>
    <value compclass="ATM">0</value>
    <value compclass="CPL">0</value>
    <value compclass="OCN">96</value>
    <value compclass="WAV">16</value>
    <value compclass="GLC">0</value>
    <value compclass="ICE">32</value>
    <value compclass="ROF">0</value>
    <value compclass="LND">0</value>
    <value compclass="ESP">0</value>
  </values>
  <desc>ROOTPE (mpi task in MPI_COMM_WORLD) for each
  component</desc>
</entry>
```

PE "Starting point"

Configure run settings: env_mach_pes.xml

Usually we run on more nodes. When building a case on BETZY you can set the number of nodes by setting `--pecount = S, M, L or X1` when creating a case. Then you don't need to change `env_mach_pes.xml`:

- NorESM2-LM (grid = f19_tn14)
 - S = 4 nodes
 - M = 8 nodes
 - X1 = 10 nodes
- NorESM2-MM (grid = f09_tn14)
 - S = 4 nodes
 - M = 9 nodes
 - L = 15 nodes
 - X1 = 17 nodes

E.g. for running NorESM2-LM on 8 nodes:

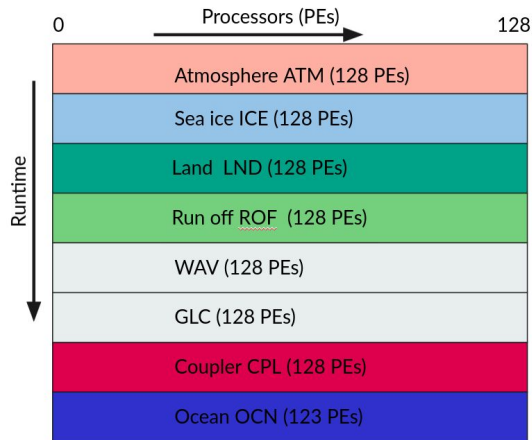
```
$ cd ~/NorESM/noresm2.0/cime/scripts/
```

```
$ ./create_newcase --case ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115 --mach betzy --res  
f19_tn14 --compset N1850frc2 --project nn9560k --user-mods-dir cmip6_noresm_DECK --pecount=S
```

Documentation:

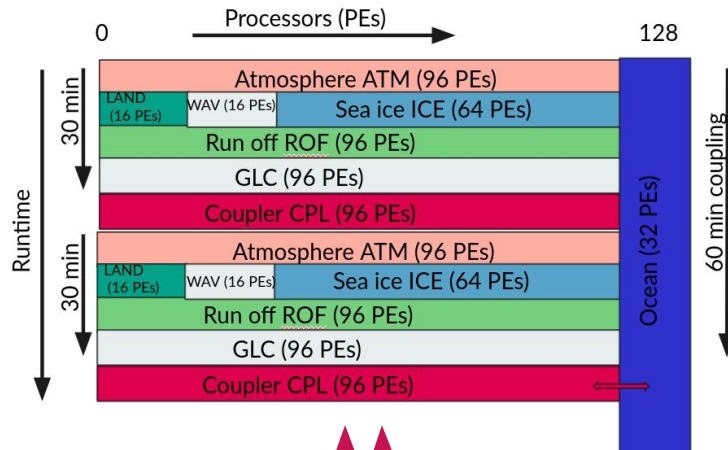
<https://noresm-docs.readthedocs.io/en/latest/configurations/platforms.html#setting-number-of-nodes-on-betzy>

Configure run settings: why do we care?



Cost:

- 1 node (--pecount = 128):
 - Model Cost: 729.36 pe-hrs/simulated_year
 - Model Throughput: 4.21 simulated_years/day
 - TOT Run Time: 1742.223 seconds
- 2 noder (--pecount = 256):
 - Model Cost: 802.65 pe-hrs/simulated_year
 - Model Throughput: 7.65 simulated_years/day
 - TOT Run Time: 958.643 seconds
- 4 noder (--pecount = 512):
 - Model Cost: 1010.31 pe-hrs/simulated_year
 - Model Throughput: 12.16 simulated_years/day
 - TOT Run Time: 603.331 seconds
- 8 noder (--pecount = 1024):
 - Model Cost: 1634.02 pe-hrs/simulated_year
 - Model Throughput: 15.04 simulated_years/day
 - TOT Run Time: 487.899 seconds



Cost:

- 1 node (--pecount =):
 - Model Cost: 865.16 pe-hrs/simulated_year
 - Model Throughput: 3.55 simulated_years/day
 - TOT Run Time: 2066.618 seconds
- 2 noder (--pecount = 2x):
 - Model Cost: 932.70 pe-hrs/simulated_year
 - Model Throughput: 6.59 simulated_years/day
 - TOT Run Time: 1113.970 seconds
- 4 noder (--pecount = S):
 - Model Cost: 924.545 pe-hrs/simulated_year
 - Model Throughput: 13.29 simulated_years/day
 - TOT Run Time: 552.269 seconds
- 8 noder (--pecount = M):
 - Model Cost: 1241.76 pe-hrs/simulated_year
 - Model Throughput: 19.79 simulated_years/day
 - TOT Run Time: 370.774 seconds

Configure run settings: env_mach_pes.xml

```
[adagj@login-1.BETZY ~]$ cd NorESM/cases/N1850frc2_f19_tn14_test02_20211115/
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_ATM=96
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_CPL=96
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_GLC=96
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_ROF=96
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_OCN=32
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_WAV=16
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_LND=16
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_ESP=1
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange NTASKS_ICE=64
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange ROOTPE_ICE=32
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange ROOTPE_OCN=96
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./xmlchange ROOTPE_WAV=16
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$ ./case.setup
Setting resource.RLIMIT_STACK to -1 from (8388608, -1)
/ccluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test02_20211115/env_mach_specific.xml already exists, delete to replace
job is case.run USER_REQUESTED_WALLTIME None USER_REQUESTED_QUEUE None
Creating batch scripts
Writing case.run script from input template /ccluster/home/adagj/NorESM/noresm2.0/cime/config/cesm/machines/template.case.run
Creating file .case.run
Writing case.st_archive script from input template /ccluster/home/adagj/NorESM/noresm2.0/cime/config/cesm/machines/template.st_archive
Creating file case.st_archive
Creating user_nl_xxx files for components and cpl
If an old case build already exists, might want to run 'case.build --clean' before building
You can now run './preview_run' to get more info on how your case will be run
[adagj@login-1.BETZY ~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115]$
```

Basic steps to run NorESM: Set up the case

Enter the case folder:

```
$ cd ~/NorESM/cases/N1850frc2_f19_tn14_test01_20211115/
```

`./case_setup` : Creates namelists and various files and directories needed to build and run the case.

- Any changes to `env_mach_pes.xml` and `env_case.xml` must be made before running `./case.setup`
- To run this initially for the experiment, simply run: `./case.setup`
- To rerun after making changes to `env_mach_pes.xml`, run: `./case.setup --reset`
- `./case.setup --clean` do not remove `user_nl_*` files and Macros file

Documentation:

- <https://noresm-docs.readthedocs.io/en/latest/configurations/newbie-guide.html>
- <https://noresm-docs.readthedocs.io/en/latest/configurations/experiments.html#create-and-configure-a-new-case>
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#machine-specific-environment

Configure run setting: user namelists

In user_nl_\$component you can set e.g. :

- new parameter values
- restart files
- output variables and time frequency
- activate e.g. amount of aerosol output

E.g. to change only the initial state of the sea ice, in user_nl_cice:

```
&setup_nml  
ice_ic = "/cluster/work/users/adagj/noresm/N1850frc2_f19_tn14_keyclim_snow/run/N1850_piControl_snow_KeyClim.cice.r.1855-01-01-00000.nc"
```

E.g. change some (mixing) parameters in BLOM, in user_nl_blom:

```
EGC    = 2.0  
EGIDFQ = 0.25  
BDMC2 = .15  
NIWGF = .5
```

Unique for user_nl_blom: it does not matter
which namelist group the variable belongs to

E.g. to double the atmospheric CO2 concentration, in user_nl_cam:

```
&chem_surfvals_nl  
co2vmr    = 568.64e-6
```

Documentation:

- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#user-namelists
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#user-namelists
- https://noresm-docs.readthedocs.io/en/latest/output/aerosol_output.html
- <https://noresm-docs.readthedocs.io/en/latest/configurations/omips.html#modify-user-namelist-for-blom-ihamocc>
- <https://noresm-docs.readthedocs.io/en/latest/configurations/omips.html#modify-user-name-lists-for-cice>
- <https://noresm-docs.readthedocs.io/en/latest/configurations/clm.html#user-name-list-modifications>

Configure run setting: SourceMods

The SourceMods folder: for **code modification(s)** beyond what is possible from user namelists

- contains sub-directories for all model component.
- Make a copy of the fortran file(s) you want to modify in the relevant sub-folder and modify the file(s) as needed before building the model.
- When compiling, the model will prioritize the modified file located under the SourceMods folder over the default version of the file located in the model source code under <noresm-base>.
- **Aerosol diagnostics and output** can be enabled by the use of SourceMods:
 - <case_folder>/**SourceMods**/src.cam/preprocessorDefinitions.h
 - #define AEROCOM: additionally 149 variables are written (+ ca. 13% CPU-time)
 - #define AEROFFL: additional radiation-diagnostics for aerosol indirect effect. Gives 8 additionally variables (+ ca. 5% CPU-time).

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html?highlight=SourceMods#code-modifications

https://noresm-docs.readthedocs.io/en/latest/output/aerosol_output.html?highlight=SourceMods#decomposition-of-aerosol-direct-semidirect-and-indirect-radiative-forcing

Configure run setting: --user_mods_dir

--user-mods-dir is important for the *output*, and should be changed according to your needs.

The usermods under noresm2.0/cime_config/usermods_dirs/ include:

cmip6_noresm_DECK (AEROFFL)

cmip6_noresm_hifreq (high frequency output, AEROFFL)

cmip6_noresm_hifreq_xaer (high frequency output, AEROFFL and AEROCOM)

cmip6_noresm_keyCLIM (used for KeyCLIM experiments, AEROFFL)

cmip6_noresm_xaer (AEROFFL and AEROCOM)

To activate the cmip6_noresm_DECK usermod, run the create_newcase script with the option
--user-mods-dir cmip6_noresm_DECK

Remember that the amount of diagnostics and the output frequency have a huge impact on both the run time and storage.

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html

https://noresm-docs.readthedocs.io/en/latest/output/standard_output.html

https://noresm-docs.readthedocs.io/en/latest/output/aerosol_output.html

Configure run setting: user namelists

env_mach_pes.xml and user_nl_component must be changed **before building**

In the case directory, there is a **CaseDocs** folder:

- there you'll find the namelists (i.e. component_in) containing all the input files and parameters used.
- e.g. CaseDocs/ocn_in , CaseDocs/atm_in , CaseDocs/lnd_in etc.
- *You should never have to edit the contents of this directory.*
- If you wish to make changes to the component_in files, you need to change user_nl_component and rebuild the case.

```
$ ./case.build
```

env_run.xml and env_batch.xml can be changed **after building**

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html

Basic steps to run NorESM: Building the case

Creating an executable

```
$ ./case.build
```

- You can see all software modules in **env_mach_specific.xml** and all compiler flags in **Macros.make**
- Processors configuration in **env_mach_pes.xml**
- **./case.build** – it will create namelist files and compile all the required libraries (mct, gptl, csm_share and pio) and components (cam, blom, clm, cice, ..).
- Finally, build the binary **cesm.exe**; found in **/cluster/work/users/\$USER/noresm/\$CASENAME/bld**

After this, you can modify only **env_batch.xml** and **env_run.xml**:

BUT.... if you change your mind, make a clean:

./case.build --clean component removes object files of components

or

./case.build --clean-all removes bld directory

and try again:

./case.build

Configure run settings: env_run.xml

Branch run

In a branch run, all components are initialized using a consistent set of restart files from a previous run. Mostly used for tuning experiments and investigating parameter space

- RUN_TYPE to “branch”
- RUN_REFDIR directory containing reference data
- RUN_REFCASE name of reference case
- RUN_REFDATE Reference date branch run
- GET_REFCASE TRUE else you have to copy data to run folder

Hybrid run

Not as strict as a branch run, all components are initialized but can have reference files from several experiments. Used e.g. for a historical experiment starting from piControl

- RUN_TYPE to “hybrid”
- RUN_REFDIR directory containing reference data
- RUN_REFCASE name of reference case
- RUN_REFDATE Reference date branch run
- GET_REFCASE TRUE else you have to copy data to run folder
- RUN_STARTDATE set the date for the beginning of the simulation

Documentation:

- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#some-common-configuration-settings

Configure run settings: env_run.xml

Setting the length of the simulation:

- STOP_OPTION : nseconds,nsecond,nminutes,nhours,nhour,ndays,nmonths, nyears
- STOP_N: numerical value

Writing restart files in middle of simulation:

Restart files are written end of the simulation by default; But, if you are having a long simulation of 100 years; for safety reason you want to write restart files at some frequency you can set below option

- REST_OPTION: nseconds,nsecond,nminutes,nminute,nhours,nhour,nmonths, nyears
- REST_N: numerical value
- DOUT_S_SAVE_INTERIM_RESTART_FILES: TRUE or FALSE. Set to TRUE if you want to archive all restart files and FALSE if you only want to archive restart files from the end of the simulation

Documentation:

- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#some-common-configuration-settings

Configure run settings: env_run.xml

Continue a simulation: when you are having WALLCLOCK time limitation on system. For example, you want to have 200 years simulation and WALLCLOCK time limitation is 5 days; you are able to simulate 10 model years/day; to complete 200 model years simulation set RESUBMIT=3, STOP_N to 50 and STOP_OPTION to nyears

- **CONTINUE_RUN** in env_run.xml; TRUE or FALSE.
 - You need all restart files and rpointer.* files in run folder.
 - Please note that CONTINUE_RUN needs to be FALSE first time you submit an experiment.
 - Will automatically be set to TRUE if the job is automatically resubmitted, i.e. if RESUBMIT > 0
- **RESUBMIT** in env_run.xml ; an integer value.
 - will auto resubmit till specified value; you will have total simulation period $STOP_N * (RESUBMIT + 1)$

Documentation:

- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#some-common-configuration-settings

Configure run settings: env_run.xml

Two scripts which you may (or may not) find helpful (located in the case folder):

1. `xmlquery`: provides the information and its value which are set in the *.xml files, e.g. `env_run.xml`
2. `xmlchange`: used to change values/parameters set in the *.xml files, e.g. in `env_run.xml`

```
$ ./xmlquery --value STOP_OPTION,STOP_N
ndays,5
$ ./xmlchange STOP_OPTION=nyears,STOP_N=1
$ ./xmlquery --value STOP_OPTION
nyears,1
```

I usually just open `env_run.xml` in vim and change whatever I need to change:

```
$ vi env_run.xml
```

Documentation:

- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html
- https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#some-common-configuration-settings

Configure run setting: env_batch.xml

You also need to modify **env_batch.xml**:

- XML block for case.run
- env_batch.xml sets the arguments for the batch job commands
- Need to set JOB_WALLCLOCK_TIME
- XML block for case.st_archive
- case.st_archive is a pending job which moves files from the run directory to the archive directory after a successful simulation.
- also here you need to set JOB_WALLCLOCK_TIME
- you can also modify project for CPU hours if required
(usually it is set during experiment creation, but you may need to change it)

After setting the walltime for the two jobs, you can submit your case:

```
$ ./case.submit
```

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/experiment_environment.html#batch-job-environment

Experiment status and timing statistics

In your case directory: the file CaseStatus logs all information on what you have done and if it worked or not:

```
2021-11-10 14:45:01: case.setup starting
-----
2021-11-10 14:45:02: case.setup success
-----
2021-11-10 14:45:07: case.buuld starting
-----
2021-11-10 14:51:31: case.build success
-----
2021-11-10 14:52:04: case.submit starting
-----
2021-11-10 14:52:12: case.submit error
ERROR: Command: 'sbatch --time 00:59:00 -q devel --account nn9560k .case.run --resubmit' failed with error 'sbatch: error: QOSGrpNodeLimit
sbatch: error: Batch job submission failed: Job violates accounting/QOS policy (job submit limit, user's size and/or time limits)' from dir '/cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test02_2021
1115'
-----
2021-11-10 14:52:52: case.submit starting
-----
2021-11-10 14:52:59: case.submit error
ERROR: Command: 'sbatch --time 00:29:00 -q devel --account nn9560k .case.run --resubmit' failed with error 'sbatch: error: QOSGrpNodeLimit
sbatch: error: Batch job submission failed: Job violates accounting/QOS policy (job submit limit, user's size and/or time limits)' from dir '/cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test02_2021
1115'
-----
2021-11-10 14:53:32: case.submit starting
-----
2021-11-10 14:53:39: case.submit error
ERROR: Command: 'sbatch --time 00:29:00 -q devel --account nn9560k .case.run --resubmit' failed with error 'sbatch: error: QOSGrpNodeLimit
sbatch: error: Batch job submission failed: Job violates accounting/QOS policy (job submit limit, user's size and/or time limits)' from dir '/cluster/home/adagj/NorESM/cases/N1850frc2_f19_tn14_test02_2021
1115'
-----
2021-11-10 14:57:08: case.setup starting
-----
2021-11-10 14:57:09: build.clean starting
-----
2021-11-10 14:57:27: build.clean success
-----
2021-11-10 14:57:28: case.setup success
-----
2021-11-10 14:57:52: case.buuld starting
-----
2021-11-10 14:59:37: case.build success
-----
2021-11-10 15:00:26: case.submit starting
-----
2021-11-10 15:00:34: case.submit success case.run:253485, case.st_archive:253486
-----
2021-11-10 15:05:37: case.run starting
-----
2021-11-10 15:05:46: model execution starting
-----
2021-11-10 15:15:35: model execution success
-----
2021-11-10 15:15:35: case.run success
-----
2021-11-10 15:15:56: st_archive starting
-----
2021-11-10 15:16:29: st_archive success
-----
```

Experiment status and timing statistics

In your case directory: in the timing sub-directory; the file `cesm_timing.$CASE` provides information on grid type, run length, compset, processors configuration and many others.

Most important are timing statics : Model throughput, Model cost and run time

Overall Metrics:

Model Cost:	985.36	pe-hrs/simulated_year
Model Throughput:	3.12	simulated_years/day

Model Throughput increases to
~20 simulated_years/day
if you use 4 nodes instead of 1

Init Time	:	201.411 seconds	
Run Time	:	379.632 seconds	75.926 seconds/day
Final Time	:	0.183 seconds	

Actual Ocn Init Wait Time	:	5.450 seconds
Estimated Ocn Init Run Time	:	2.344 seconds
Estimated Run Time Correction	:	0.000 seconds

(This correction has been applied to the ocean and total run times)

Runs Time in total seconds, seconds/model-day, and model-years/wall-day

CPL Run Time represents time in CPL pes alone, not including time associated with data exchange with other components

TOT Run Time:	379.632 seconds	75.926 seconds/mday	3.12 myears/wday
CPL Run Time:	8.458 seconds	1.692 seconds/mday	139.93 myears/wday
ATM Run Time:	233.509 seconds	46.702 seconds/mday	5.07 myears/wday
LND Run Time:	106.004 seconds	21.201 seconds/mday	11.17 myears/wday
ICE Run Time:	36.725 seconds	7.345 seconds/mday	32.23 myears/wday
OCN Run Time:	281.239 seconds	56.248 seconds/mday	4.21 myears/wday
ROF Run Time:	18.111 seconds	3.622 seconds/mday	65.35 myears/wday
GLC Run Time:	0.000 seconds	0.000 seconds/mday	0.00 myears/wday
WAV Run Time:	0.000 seconds	0.000 seconds/mday	0.00 myears/wday
ESP Run Time:	0.000 seconds	0.000 seconds/mday	0.00 myears/wday
CPL COMM Time:	127.679 seconds	25.536 seconds/mday	9.27 myears/wday

Experiment status and timing statistics

In your RUN directory: `/cluster/work/users/$USER/noresm/$CASE/run/`

You will find all the namelists; component_in files, the timing folder, restart files and `rpointer.*` and if your model simulation for some reason crashes; the log files.

- the `cesm.log.$JOBID` file can provide some hints of which component caused the crash
- the `component.log.$JOBID` file can provide information about which subroutine caused the crashed

If your model simulation is successful, the log files are archived in:

`/cluster/work/users/$USER/archive/$CASE/logs/`

For a successful simulation the `cpl.log.$JOBID` file will end with:

```
(seq_mct_drv): ===== SUCCESSFUL TERMINATION OF CPL7-cesm =====
(seq_mct_drv): ===== at YMD,TOD = 00010106 0 =====
(seq_mct_drv): ===== # simulated days (this run) = 5.000 =====
(seq_mct_drv): ===== compute time (hrs) = 0.105 =====
(seq_mct_drv): ===== # simulated years / cmp-day = 3.118 =====
(seq_mct_drv): ===== pes min memory highwater (MB) -0.001 =====
(seq_mct_drv): ===== pes max memory highwater (MB) -0.001 =====
(seq_mct_drv): ===== pes min memory last usage (MB) 521.612 =====
(seq_mct_drv): ===== pes max memory last usage (MB) 1174.614 =====
```


If you find your experiment great: Create a clone

If you really like your set up and you want to run very similar cases, you can make a clone (or several) of your case. The clone will be set up as if it was created with the same `create_newcase` options as the existing case (except the case name) and will have identical `env_*.xml`, `user_nml_<component>` and `SourceMods` files (these files can of course be modified before building the case).

The `create_clone` script is an executable python script located in `cime/scripts`

```
./create_clone --case $PATH_TO_cases/$CASENAME --clone $PATH_TO_cases/$CLONENAME
```

`--case $CASENAME` -> name of the NorESM experiment you are creating

`--clone $CLONENAME` -> of the case you want to clone

```
$ cd ~/NorESM/noresm2.0/cime/scripts/
```

```
$ ./create_clone --case ~/NorESM/cases/N1850frc2_f19_tn14_test03_20211115 --clone  
~/NorESM/cases/N1850frc2_f19_tn14_test02_20211115
```

`./create_clone --help` will provide you all input options including a description

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/experiments.html?highlight=create_clone#create-a-clone-case

Hands-on session 3

A) piControl

- create a new case with resolution f19_tn14
- use 128 processors and optimal env_mac_pes.xml settings
- make it a branch run
- reference case: N1850_f19_tn14_11062019
- reference date: 1600-01-01
- 1 mnd simulation time

- env_batch.xml wall time set to

B) historical

- create a new case with resolution f19_tn14
- use 128 processors and optimal env_mac_pes.xml settings
- make it a hybrid run
- reference case: N1850_f19_tn14_11062019
- reference date: 1600-01-01
- 1 month + 1 month simulation time i.e. run for 1 month, resubmit simulation once and run for 1 more month (set RESUBMIT=1)
- Dump restart files every 10 days
- env_batch.xml wall time set to

Path to restart files: /cluster/projects/nn9560k/userWorkShop_restfiles/NorESM2-LM/

Documentation:

https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html#reproduce-cmip6-picontrol-historical-and-ssp5-8-5-experiments

Log files (Tomas)



Log files produced by NorESM

NorESM produce log output for case creation, build process, run process and archiving process.

Log files in the case directory:

`CaseStatus` : Summary of all processes (case setup, build, job submission and job completion).

Good place to start looking at the logs!

`README.case` : Log for case creation

`software_environment.txt` : System environments (modules) used during model build

`logs/run_environment.txt.<id>.<time>` : System environment (modules) loaded during model run.

`<casename>` : Log for job execution, CPU, memory and disk usage.

Documentation: https://noresm-docs.readthedocs.io/en/latest/output/noresm_logs.html



Log files produced by NorESM

Build logs : `<workdir>/noresm/<casename>/bld/` (`<workdir>` = `/cluster/work/users/<username>`)

<code>cesm.bldlog.<timestamp>.gz</code>	: Build the coupled model executable <code>cesm.exe</code> .
<code><component>.bldlog.<timestamp>.gz</code>	: Build log for individual model components.

Run logs : `<workdir>/archive/<casename>/logs/` (assuming run and archive processes finished)

<code>cesm.log.<jobid>.<timestamp>.gz</code>	: Run log for coupled model system.
<code><component>.log.<jobid>.<timestamp>.gz</code>	: Run log for individual model components.

If NorESM fails during run, you may find these log files in `<workdir>/noresm/<casename>/run/`.

Archiving logs : `<workdir>/archive/<casename>/`

<code>archive.log.<timestamp></code>	: Log for short term archiving of model output.
<code>case.log</code>	: Log for archiving of case directory.

NOTE: Archived *.gz files should be expanded before reading: `gunzip <filename>.gz`

**Include your own code changes
(Tomas)**

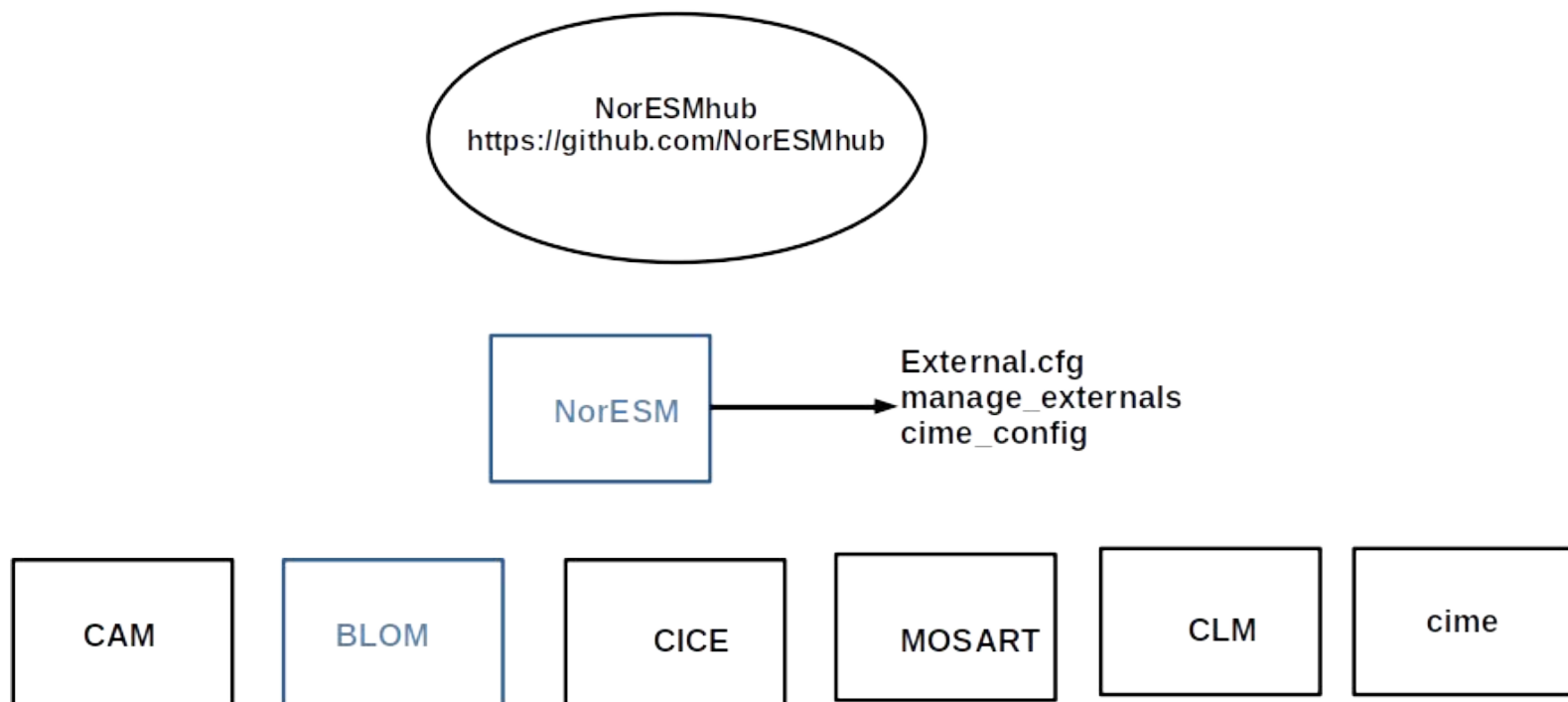
- **Work with fork repository on github**



Contribute your own code to NorESM: basic steps

1. Create a user account on gitHub
<https://docs.github.com/en/get-started/signing-up-for-github/signing-up-for-a-new-github-account>
 - A basic account is sufficient. Note that all NorESM repositories are public by default.
2. Fork NorESM and/or a NorESM model component to your own account
3. Create an issue in the main repository describing the changes you want to make
 - Mainly used for discussions on severe bugs or feature changes, not so much for minor changes (e.g. documentation, small config changes)
4. Make changes in your fork repository
 - To minimize risk of code conflicts, do not make changes directly in branches that duplicate the main repository, but create “throw away” branches for your changes
5. Create a pull request to the main repository
6. Keep things in sync:
 - Remove your “throw away” branches after merging
 - Sync your fork with the main repository

NorESM git repositories



Repository in black are forked from CESM

Fork repository

Fork NorESM from gitHub

NorESMhub / NorESM

Unwatch 13 Unstar 9 Fork 38


<> Code Issues 21 Pull requests Actions Projects 1 Wiki Security Insights

master 4 branches 4 tags

Go to file

Add file

Code

	MichaelSchulzMETNO Update readme, to explain master meaning	5b39f24 20 days ago	🕒 871 commits
📁 cime_config	corrected naming of covid compsets	2 months ago	
📁 doc	Update download_input.rst	2 months ago	
📁 manageExternals	Modified .gitignore and set execute permission to manageExternals/ch...	8 months ago	
📄 .gitignore	Ignore "doc/_build" folder.	8 months ago	
📄 Copyright-CESM.txt	Updated NorESM specific copyright and license in LICENSE.txt, referri...	5 months ago	
📄 Externals.cfg	updated Externals.cfg for release of NorESM2.0.2; removed Externals_t...	2 months ago	
📄 Externals_continuous_development.cfg	added Externals_continuous_development.cfg : refers to branches of dl...	2 months ago	
📄 LICENSE-CESM.txt	Updated NorESM specific copyright and license in LICENSE.txt, referri...	5 months ago	
📄 LICENSE.txt	Updated NorESM specific copyright and license in LICENSE.txt, referri...	5 months ago	
📄 README.md	Update readme, to explain master meaning	20 days ago	
📄 requirements.txt	Add requirement file for bibtext generation	8 months ago	

README.md

About

Norwegian Earth System Model and Documentation


[noresm-docs.readthedocs.io/en/nor...](#)

noresm cesm norwegian

Readme

View license

Releases 4

 **release-noresm2.0.2** Latest on Jul 19


+ 3 releases

Packages

No packages published
[Publish your first package](#)

Contributors 25

Create an issue : discussion forum for code changes

 NorESMhub / **NorESM** ← in main repository

Unwatch 13

Unstar 9

Fork 38

<> Code

Issues 21

Pull requests

Actions

Projects 1

Wiki

Security

Insights

Label issues and pull requests for new contributors

Dismiss

Now, GitHub will help potential first-time contributors discover Issues labeled with **good first issue**

Go to Labels









Filters

is:issue is:open

Labels 10

Milestones 0

New Issue

	21 Open	27 Closed	Author	Label	Projects	Milestones	Assignee	Sort
	clcoagTend output looks bizarre							3
	#158 opened on Aug 13 by sarambl							
	Copyright of documentation							1
	#152 opened on Jul 13 by mvhulten							
	Misleading comment for suuported compsets							2
	#147 opened on Jul 1 by oyvindseland							
	Writing a release note Next release							1
	#142 opened on Jun 23 by MichaelSchulzMETNO							
	OMIP case examples: do we need '--run-unsupported' flag? Documentation							5
	#141 opened on Jun 21 by TomasTorsvik							

Create a fork : feature branch (highly recommended)

The screenshot shows the GitHub interface for the repository 'TomasTorsvik / NorESM-TTfork'. The repository is a fork from 'NorESMhub/NorESM'. The top navigation bar includes links for 'Code', 'Pull requests', 'Actions', 'Projects', 'Wiki', 'Security', 'Insights', and 'Settings'. The repository header shows 'master' as the current branch, with 4 branches and 4 tags. A 'Switch branches/tags' dialog is open, showing a search bar with 'my_new_feature' entered. Below the search bar, there are tabs for 'Branches' and 'Tags'. Under the 'Branches' tab, it says 'Create branch: my_new_feature from 'master''. To the right of the dialog, there are buttons for 'Go to file', 'Add file', and 'Code'. The 'About' section on the right describes the repository as 'Norwegian Earth System Model and Documentation' and provides a link to 'noresm-docs.readthedocs.io/en/nor...'. Below the 'About' section, there are links for 'Readme' and 'View license'.

- Create a new feature branch before making any changes
 - Allows updating of root branch (e.g. “master”) without interfering with your own work
- Apply your changes in the feature branch, either directly in the gitHub fork or your local clone of the fork

Review changes : from fork

TomasTorsvik / NorESM-TTfork

forked from NorESMhub/NorESM

Watch

0

Star

0

Fork

38

<> Code

Pull requests

Actions

Projects

Wiki

Security

Insights

Settings

my_new_feature had recent pushes less than a minute ago

Compare & pull request

my_new_feature

5 branches

4 tags

Go to file

Add file

Code

This branch is 1 commit ahead, 1 commit behind NorESMhub:master.

Pull request

Compare



TomasTorsvik Update README.md ...

6afcfb 1 minute ago 871 commits

clme_config

corrected naming of covid compsets

2 months ago

doc

Update download_input.rst

2 months ago

About



Norwegian Earth System Model and Documentation

noresm-docs.readthedocs.io/en/nor...

Readme

View license

Releases

4 tags

Review changes : from “Network”

NorESMhub / NorESM

Unwatch 13 Unstar 9 Fork 38

Code Issues 21 Pull requests Actions Projects 1 Wiki Security Insights

Pulse

Contributors

Community

Traffic

Commits

Code frequency

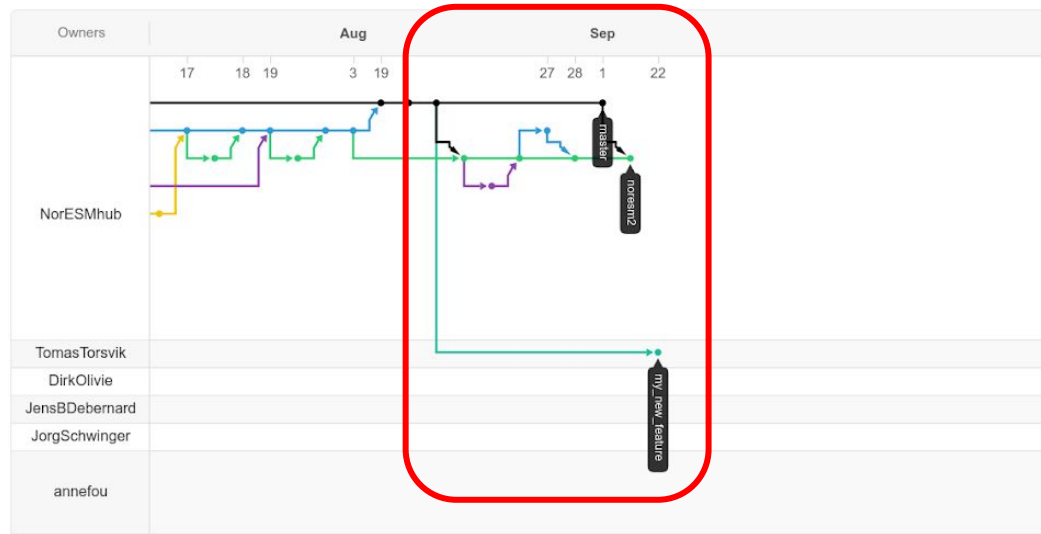
Dependency graph

Network

Forks

Network graph

Timeline of the most recent commits to this repository and its network ordered by most recently pushed to.



Create a pull request

TomasTorsvik / NorESM-TTfork

forked from NorESMhub/NorESM

Watch

0

Star

0

Fork

38

<> Code

Pull requests

Actions

Projects

Wiki

Security

Insights

Settings

Many options, same result

my_new_feature had recent pushes less than a minute ago

Compare & pull request

my_new_feature

5 branches

4 tags

Go to file

Add file

Code

This branch is 1 commit ahead, 1 commit behind NorESMhub:master.

Pull request

Compare



TomasTorsvik Update README.md ...

6afcfbb 1 minute ago 871 commits

clme_config

corrected naming of covid compsets

2 months ago

doc

Update download_input.rst

2 months ago

About



Norwegian Earth System Model and Documentation

noresm-docs.readthedocs.io/en/nor...

Readme

View license

Releases

4 tags

Create a pull request

NorESMhub / NorESM

Unwatch 13 Unstar 9 Fork 38

Code Issues 21 Pull requests Actions Projects 1 Wiki Security Insights

Open a pull request

Create a new pull request by comparing changes across two branches. If you need to, you can also [compare across forks](#).

Destination repo and branch

Source repo and branch

base repository: NorESMhub/NorESM base: master ← head repository: TomasTorsvik/NorESM-TTfork compare: my_new_feature

✓ Able to merge. These branches can be automatically merged.



Update README.md

Write Preview

H B I ≡ <> 🔗 ≡ ≡ ≡ ☑ @ 🗨 ↶

Latest documentation version is now pointing to NorESM2.

Attach files by dragging & dropping, selecting or pasting them.

M4

☒ Allow edits by maintainers ?

Create pull request

Reviewers

Suggestions

MichaelSchulzM...

Request

Assignees

No one—assign yourself

Labels

None yet

Projects

None yet

Milestone

No milestone

Pull request : completed example

Replace MICOM with BLOM in documentation files. #118

Edit Open with

Merged TomasTorsvik merged 1 commit into NorESMhub:norasm2 from TomasTorsvik:replace_micom_with_blom on Jun 11

Conversation 4

Commits 1

Checks 0

Files changed 1

+2 -2



TomasTorsvik commented on Jun 11

Member

Some, but not all, instances of MICOM should be replaced by BLOM in the noersm2 documentation.



TomasTorsvik added Documentation Next release labels on Jun 11



TomasTorsvik requested review from YanchunHe and matsbn on Jun 11



TomasTorsvik self-assigned this on Jun 11



TomasTorsvik linked an Issue that may be closed by this pull request on Jun 11

Integration of BLOM in NorESM (instead of MICOM) #102

Closed



matsbn marked this pull request as ready for review on Jun 11



matsbn approved these changes on Jun 11

View changes

Reviewers

YanchunHe

matsbn

Assignees

TomasTorsvik

Labels

Documentation

Next release

Projects

None yet

Milestone

No milestone

Linked issues

Successfully merging this pull request may close these issues.

Integration of BLOM in NorESM (instead of ...

Pull request : completed example

The screenshot displays a vertical timeline of actions on a GitHub pull request. At the top, a green checkmark icon indicates an approval by YanchunHe on Jun 11, with a 'View changes' button. Below this, a commit icon shows a replacement of MICOM with BLOM in experiment_environment.rst by 841bff5. A force-push icon follows, showing TomasTorsvik updating the branch from b540f66 to 841bff5. A comment icon leads to a comment by TomasTorsvik on Jun 11, stating that input.rst changes have been removed to avoid conflicts. A bookmark icon shows a link to an issue being removed by TomasTorsvik on Jun 11, with a 'Closed' button. Another bookmark icon shows a link to the same issue being added by TomasTorsvik on Jun 11, also with a 'Closed' button. A merge icon shows the commit 9d34776 being merged into NorESMhub:norasm2 by TomasTorsvik on Jun 11, with a 'Revert' button. Finally, a delete branch icon at the bottom shows the branch TomasTorsvik:replace_micom_with_bloom being deleted by TomasTorsvik on Jun 11, with a 'Restore branch' button. This last action is highlighted with a red rectangular box.

YanchunHe approved these changes on Jun 11 [View changes](#)

Replace MICOM with BLOM in experiment_environment.rst 841bff5

TomasTorsvik force-pushed the TomasTorsvik:replace_micom_with_bloom branch from b540f66 to 841bff5 on Jun 11

TomasTorsvik commented on Jun 11 [Author](#) [Member](#) [😊](#) [⋮](#)

In the meantime input.rst changed, so this has been removed from the pull request to avoid conflicts.

TomasTorsvik removed a link to an Issue on Jun 11 [🔒 Closed](#)

Integration of BLOM in NorESM (instead of MICOM) #102

TomasTorsvik linked an Issue that may be closed by this pull request on Jun 11 [🔒 Closed](#)

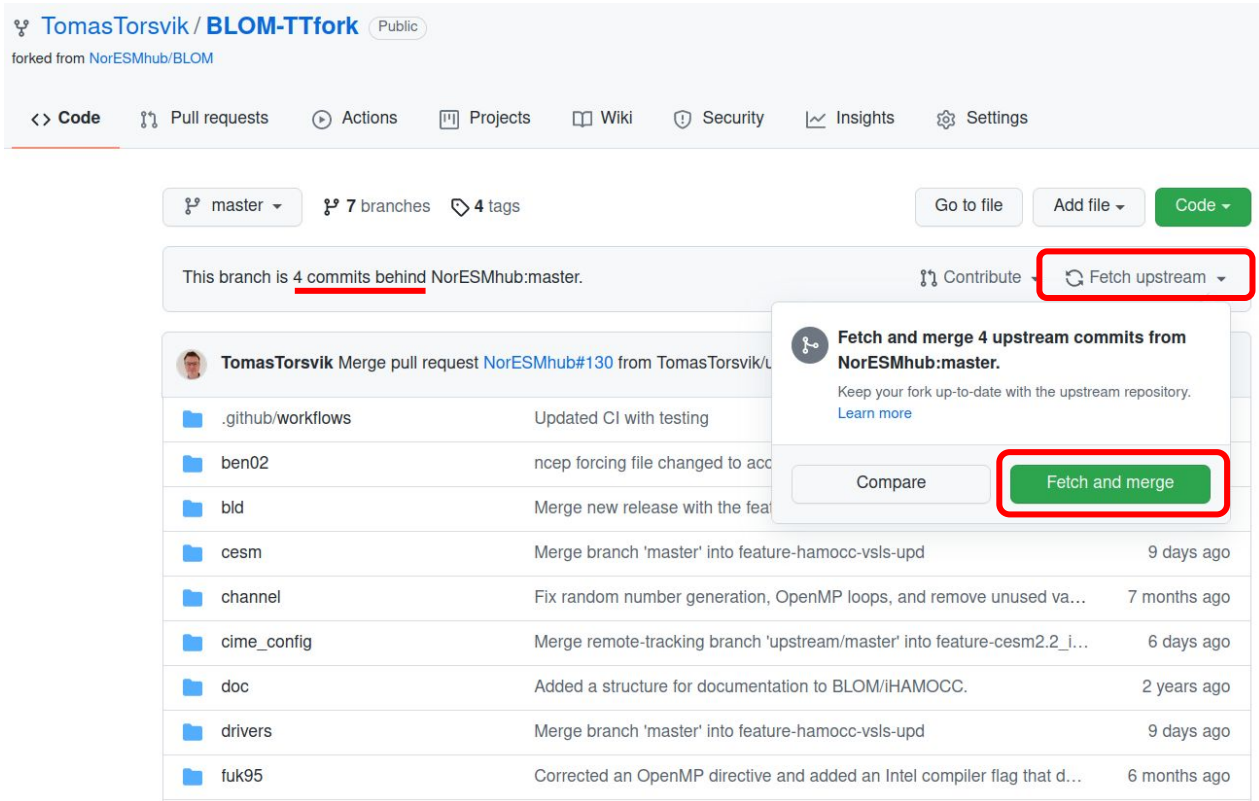
Integration of BLOM in NorESM (instead of MICOM) #102

TomasTorsvik merged commit 9d34776 into NorESMhub:norasm2 on Jun 11 [Revert](#)

TomasTorsvik deleted the TomasTorsvik:replace_micom_with_bloom branch on Jun 11 [Restore branch](#)

Delete “throw away” branch
In personal fork

Keep fork in sync with main repository



The screenshot shows a GitHub repository page for 'TomasTorsvik / BLOM-TTfork', which is a public fork of 'NorESMhub / BLOM'. The repository is currently 4 commits behind the upstream master branch. A modal dialog is open, showing the 'Fetch and merge 4 upstream commits from NorESMhub:master' option, which is highlighted with a red box. The 'Fetch and merge' button is also highlighted with a red box.

TomasTorsvik / BLOM-TTfork (Public)
forked from NorESMhub/BLOM

<> Code Pull requests Actions Projects Wiki Security Insights Settings

master 7 branches 4 tags Go to file Add file Code

This branch is 4 commits behind NorESMhub:master. Contribute Fetch upstream

Fetch and merge 4 upstream commits from NorESMhub:master.
Keep your fork up-to-date with the upstream repository.
[Learn more](#)

Compare Fetch and merge

File	Commit Message	Time Ago
.github/workflows	Updated CI with testing	
ben02	ncep forcing file changed to acc	
bld	Merge new release with the fea	
cesm	Merge branch 'master' into feature-hamocc-vsls-upd	9 days ago
channel	Fix random number generation, OpenMP loops, and remove unused va...	7 months ago
cime_config	Merge remote-tracking branch 'upstream/master' into feature-cesm2.2_i...	6 days ago
doc	Added a structure for documentation to BLOM/IHAMOCC.	2 years ago
drivers	Merge branch 'master' into feature-hamocc-vsls-upd	9 days ago
fuk95	Corrected an OpenMP directive and added an Intel compiler flag that d...	6 months ago

The “Fetch and merge” option will bring the “master” branch in sync with the main repository ...

-- without conflicts or additional merge commits --

... if you have not made any changes in the “master” branch for your own fork.

Include your own code changes (Tomas)

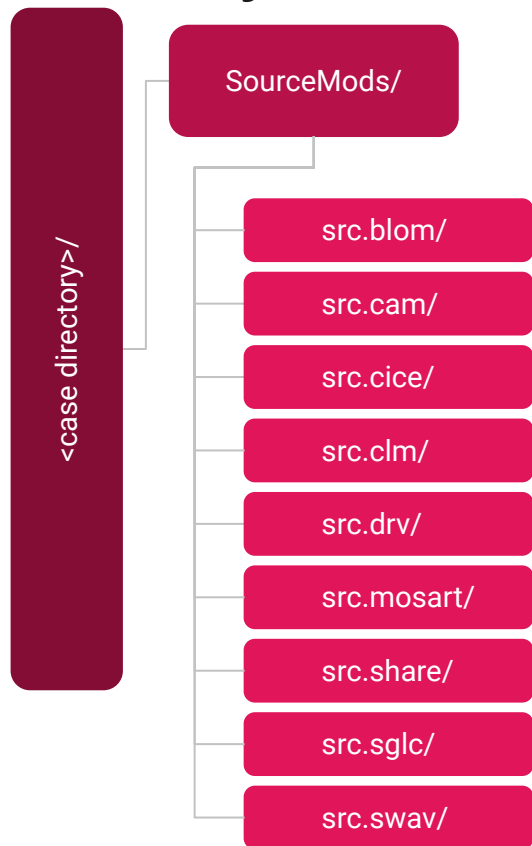
- Run NorESM with code modifications



How to include code modifications

1. Include changes directly in a case SourceMods directory
 - Suitable for testing small code changes and debugging.
2. Copy existing SourceMods into your case directory
 - Used for some standard NorESM2 model configs, preferably included when the case is created.
3. Include link to modified source files that exist in a git/github repository
 - This is the most consistent option when working with model (component) development

Include your own SourceMods



Each model component (also data and stub components) have a dedicated sub-directory under SourceMods/ where a user can include their own source modification.

Steps to use SourceMods:

1. Copy a file (subroutine, module) from a NorESM component source directory into the corresponding src.<component> directory.
2. Make changes in the SourceMods file
3. Build and run the modified model using standard scripts (./case.build , ./case.submit)



Include pre-defined sourceMods for piControl run

NorESM2-MM piControl :

```
./create_newcase --case <casename> --compset N1850 --res f09_tn14 --machine betzy --project  
<nn???k> --user-mods-dir cmip6_noresm_DECK
```

- In case directory, change RUN_TYPE to branch, RUN_REFCASE to the CMIP6 piControl casename, and RUN_REFDATE to the start of the piControl experiment

```
./xmlchange RUN_TYPE=branch  
./xmlchange RUN_REFCASE=N1850_f09_tn14_20190913  
./xmlchange RUN_REFDATE=1200-01-01
```

- Copy restart and rpointer files to run directory, and unzip files:

```
cp /trd-project3/NS9560K/noresm/cases/N1850_f09_tn14_20190913/rest/1200-01-01-00000/*  
/cluster/projects/$PROJECT/$USER/noresm/<casename>/run/  
gunzip /cluster/projects/$PROJECT/$USER/noresm/<casename>/run/*.gz
```

Documentation: Reproduce CMIP6 piControl, historical and SSP5-8.5 experiments

https://noresm-docs.readthedocs.io/en/latest/configurations/cmip6_compsets.html?highlight=user-mods-dir#reproduce-cmip6-picontrol-historical-and-ssp5-8-5-experiments



Configure External.cfg file

```
[cam]
tag = cam_cesm2_1_rel_05-Nor_v1.0.4
protocol = git
repo_url = https://github.com/NorESMhub/CAM
local_path = components/cam
required = True
```

```
[clm]
tag = release-clm5.0.14-Nor_v1.0.3
protocol = git
repo_url = https://github.com/NorESMhub/ctsm
local_path = components/clm
externals = Externals_CLM.cfg
required = True
```

Format

[component name]

One of the following:

tag = checkout tag

hash = checkout commit hash (only git)

branch = a branch from the specified repository

protocol = [git, svn]

repo_url = location of external source repository
[github.url] or [local/path]

local_path = where to place local clone of source

externals = (optional) sub-externals required by
the specific component

required = is the component required?

[true, false]



Configure External.cfg file

Source from github:

```
[blom]
branch = bugfix_write_tracer_restart
protocol = git
repo_url = https://github.com/TomasTorsvik/BLOM-TTfork
local_path = components/blom
required = True
```

Source from local repository:

```
[blom]
branch = master
protocol = git
repo_url = ${HOME}/nn2980k/tomast/BLOM/BLOM-TTfork
local_path = components/blom
required = True
```

Externals.cfg can be changed to download source files from a fork repository on github or a locally cloned repository.

`checkoutExternals` will complain if your repository is not in a clean state (includes unmerged changes), but you can still run `createNewcase` with the unmerged files.

`checkoutExternals` will NOT automatically update branches that have been changed remotely on github. Update these manually

```
git fetch
```

```
git checkout origin/<branch>
```


Hands-on session 4

Try to fetch source code from a different location than defined by Externals.cfg

1. Create a copy of a NorESM component to store your own code modifications.
(do one of the following)
 - a. Create a fork of a NorESM component in your own github account
 - b. Clone a NorESM component from github
 2. Make a copy of Externals.cfg for your modifications, e.g.
`cp Externals.cfg My_Externals.cfg`
 3. Edit `My_Externals.cfg` to point to your own source (repo_url) and optionally a different tag/branch/hash
 4. Run `./manage_externals/checkout_externals -e My_Externals.cfg` and confirm that your modified component has been included in NorESM
-