

How to make SST file and nudging region file?

- SST (nudging SST file)

- ❖ **NOTE1**: Needs daily NC file, one NC file per day, no leap year.

- ❖ **NOTE2**: You can nudge the SST to (obs anomaly+obs climatology) or (obs anomaly+model climatology).

- `sst_anom.ncl` → calculate anomaly SST from HadISST. (Or just the total SST field if you want to nudge to obs total SST.)
 - `cdo_sst.csh` → interpolate SST file into daily resolution and remove Feb29th.
 - `jls_add_sstanomaly_modclm.ncl` → output SST file into one file per day, the file name needs to be specified as the script. (obs anomaly+model climatology, you can also do obs anomaly+obs climatology)

- SPC (nudging region file)

- ❖ **NOTE**: Needs daily NC file, one NC file per day.

- `ncl construct_PAC_forcing.ncl`
 - `cd day`
 - `sh spc.sh`

192.168.2.103

/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/sst/yearobs/day

名称	大小	类	修改时间
..			
sst.1976.001.12.nc	480KB	N.	2019/11/15, 21:58
sst.1976.002.12.nc	480KB	N.	2019/11/15, 21:55
sst.1976.003.12.nc	480KB	N.	2019/11/15, 22:06
sst.1976.004.12.nc	480KB	N.	2019/11/15, 22:04
sst.1976.005.12.nc	480KB	N.	2019/11/15, 22:05
sst.1976.006.12.nc	480KB	N.	2019/11/15, 22:02
sst.1976.007.12.nc	480KB	N.	2019/11/15, 21:58
sst.1976.008.12.nc	480KB	N.	2019/11/15, 22:02
sst.1976.009.12.nc	480KB	N.	2019/11/15, 21:55
sst.1976.010.12.nc	480KB	N.	2019/11/15, 21:57
sst.1976.011.12.nc	480KB	N.	2019/11/15, 22:07
sst.1976.012.12.nc	480KB	N.	2019/11/15, 22:02
sst.1976.013.12.nc	480KB	N.	2019/11/15, 22:03
sst.1976.014.12.nc	480KB	N.	2019/11/15, 21:56
sst.1976.015.12.nc	480KB	N.	2019/11/15, 22:00
sst.1976.016.12.nc	480KB	N.	2019/11/15, 22:06
sst.1976.017.12.nc	480KB	N.	2019/11/15, 21:57
sst.1976.018.12.nc	480KB	N.	2019/11/15, 22:01
sst.1976.019.12.nc	480KB	N.	2019/11/15, 22:01
sst.1976.020.12.nc	480KB	N.	2019/11/15, 22:06
sst.1976.021.12.nc	480KB	N.	2019/11/15, 22:06

/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/sst/yearobs/day/sst

→ SST files used for nudging (can be observed total SST or observed SST anomaly plus model climatology)

NOTE: For the observed monthly SST data, it has to be interpolated into daily data (365_day calendar) and the file name need to be the same as what is shown here.

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/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/spc/ATL/day

名称	大小	类	修改时间
spc.1977.001.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.002.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.003.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.004.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.005.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.006.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.007.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.008.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.009.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.010.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.011.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.012.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.013.12.nc	480KB	N.	2019/12/18, 13:14
spc.1977.014.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.015.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.016.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.017.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.018.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.019.12.nc	480KB	N.	2019/12/18, 13:13
spc.1977.020.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.021.12.nc	480KB	N.	2019/12/18, 13:12
spc.1977.022.12.nc	480KB	N.	2019/12/18, 13:14

/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/spc/ATL/day/spc

→ Nudging region files

NOTE: The variable name in this file is “X2” and if you want to modify this name, you also need to modify the name “X2” in /sst_forcing/restoring_mod.F90. The spc files also need to be daily files.

How to modify the runscript?

```
55
56 export CCSMTAG='cesm1_2_0'
57 export CASE_INI='prest'
58 export RUNDIR_INI=/THL7/home/timli02/jiangls/CESM1_2_0/INITIAL_CONDITION/prest/1971-01-01
59 export DIR_ASSIM=/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/sst/yearobs/day
60
61 export YEAR_INI='1971'
62 export MONTH_INI='01'
63 export DAY_INI='01'
64
65 export YEAR_INI_OCN='1972'
66 export MONTH_INI_OCN='01'
67 export DAY_INI_OCN='01'
68
69 #for YEAR_INI in 1851 ; do
70 #for MONTH_INI in 01 ; do
71 #for DAY_INI in 01 ; do
72
73 export CASE='tna_obs_1'
74 ## =====
75 #   define directories
76 ## =====
77 export MACH='tianhe'
78 export CCSMROOT=/THL7/home/timli02/jiangls/${CCSMTAG}
79 export CASEROOT=/THL7/home/timli02/jiangls/CESM1_2_0/script/${CASE}
80 export EXEROOT=/THL7/home/timli02/jiangls/CESM1_2_0/run/${CASE}
81 export RUNDIR=${EXEROOT}/run/
82 export DATADIR=/THL7/home/timli02/jiangls/cesm1_0/data
83
84 test_case_created ${CASE_INI}.cam.r.${YEAR_INI}-${MONTH_INI}-01-00000.nc
85 test_case_ready ${CASE_INI}.cam.r.${YEAR_INI}-${MONTH_INI}-01-00000.nc sst.1980.001.12.nc
86 ## =====
87 #   create new case, configure, compile and run
88 ## =====
```

The path for initial condition, you can use your own free run files, just check my folder to see which kinds of files you need.

```

170 #cp -rf ${CASEROOT_INI}/SourceMods ${CASEROOT}
171 cp -rf /THL7/home/timli02/jiangls/CESM1_2_0/sst_nudging/* ${CASEROOT}/SourceMods/src.pop2
172
173 sed -i "62s/^.*$/set nrevsn_rtm = \"nrevsn_rtm=\"'\${RUN_REFCASE}\'.rtm.r.\${RUN_REFDATE}\-\\${RUN_REFTOD}\.nc\"'\\" ${CASEROOT}/SourceMods/src.pop2
174
175 cd ${CASEROOT}
176 csh ./${CASE}.build
177
178 cp ${RUNDIR_INI}/${CASE_INI}*${YEAR_INI}-${MONTH_INI}-01* ${RUNDIR}
179 cp ${RUNDIR_INI}/${CASE_INI}*${YEAR_INI_OCN}-${MONTH_INI_OCN}-01* ${RUNDIR}
180 cp ${RUNDIR_INI}/rpointer* ${RUNDIR}
181 change_rpointer ${RUNDIR} ${YEAR_INI} ${MONTH_INI} 01
182 change_rpointer_ocn ${RUNDIR} ${YEAR_INI_OCN} ${MONTH_INI_OCN} 01
183
184 sed -i "/chmod.*\+x.*yhbbatch_use.csh/,+2000d" ./${CASE}.run
185
186 csh ./${CASE}.run
187
188 cat << EOF >> ${RUNDIR}/pop2_in
189 &res_nml
190 forcing_infile_sst='/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/sst/yearobs/day/sst'
191 forcing_infile_spc='/THL7/home/timli02/jiangls/CESM1_2_0/sst_flow/spc/TNA/day/spc'
192 /
193 EOF
194
195 #done
196 #done
197 #done
198
199 exit
200

```

The path for SST nudging file and nudging region file.

```

1 #!/bin/bash
2
3 change_rpointer () {
4
5     local RUN_DIR=$1
6     local YEAR=$2
7     local MONTH=$3
8     local DAY=$4
9
10    sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.atm
11    sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.drv
12    sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.lnd
13    sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.rof
14    sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.ice
15 }
16 ## =====
17 change_rpointer_ocn () {
18
19     local RUN_DIR=$1
20     local YEAR=$2
21     local MONTH=$3
22     local DAY=$4
23
24     sed -i "ls/ro\.....-.../ro\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.ocn.ovf
25     sed -i "ls/r\.....-.../r\.${YEAR}-${MONTH}-${DAY}/g" ${RUN_DIR}/rpointer.ocn.restart
26 }
27 ## =====
28
29

```

This function only can change the date in rpointer.* files and cannot change the file name, you need to change the file name by your self or modify this function a little bit.