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User's Manual for the Global Ocean Forecast System (GOFS) Version 3.0

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1.0 SCOPE

1.1 Introduction

The Global Ocean Forecast System (GOFS) Version 3.0 (V3.0) consists of the 1/12° global HYbrid Coordinate Ocean Model (HYCOM) and uses the Navy Coupled Ocean Data Assimilation (NCODA). This User's Manual (UM) describes the sequence of scripts run daily in the normal processing stream at the Naval Oceanographic Office (NAVOCEANO) and is geared toward those users. A more generalized HYCOM User's Manual for running simulations in research mode may be found on the HYCOM consortium website (<http://hycom.rsmas.miami.edu>). Accompanying documents to this manual are the Software Design Document (SDD) (Wallcraft et al., 2009) and the Phase I Validation Test Report (VTR) (Metzger et al., 2008). It should be noted that when the VTR was written, the system as a whole was referred to as Global Ocean Prediction System (GOPS) V3.0. However, NRL-developed global ocean nowcast/forecast systems have since been renamed the Global Ocean Forecast System (GOFS). It is referred to as such in the SDD and this UM. However, GOPS and GOFS are interchangeable between these documents.

The GOFS V3.0 runstream is depicted in Figure 1. Relative to the nowcast time, the first NCODA ocean analysis is performed at $\tau = -126$ hours with the analysis window for altimeter (and all other) data spanning ± 36 (± 12) hours. (The first hindcast goes back 5+ days from the nowcast due to late-arriving satellite altimeter data. An examination of the timeliness of the historical altimeter data determined an additional data gain of 18% between four and five days; orbits also improve with the age of the data.)

- Ocean Prediction System V3.0 – 1/12° HYCOM/NCODA: Phase I, *NRL Memo. Rpt.*, NRL/MR/7320—08-9148, Ocean Modeling Division, Naval Research Laboratory, Stennis Space Center, MS.
- Wallcraft, A.J., Metzger E.J. and Carroll S.N., (2009). Software Design Description for the HYbrid Coordinate Ocean Model (HYCOM) Version 2.2. *NRL Memo. Rpt.*, NRL/MR/7320—09-9166, Ocean Modeling Division, Naval Research Laboratory, Stennis Space Center, MS.

3.0 APPLICATION

3.1 Description of GOFS Usage

This manual describes the procedures for running the Global Ocean Forecast System Version 3.0. It is designed for NAVOCEANO personnel who will be running GOFS in their operational queues. The user may also refer as needed to the HYCOM Software Design Description (SDD), which describes the code, physics and basic equations (Wallcraft et al., 2009), and the Validation Test Report (Metzger et al., 2008) for this system. Additionally, the NCODA UM (Cummings and Carroll, 2006) may be of use.

3.2 Memory and Processor Allocation

HYCOM can run on any number of processors and its footprint can be changed accordingly. It is currently configured to use 619 processors, but 596 or 713 processors are other multiples for which the code is compiled. Memory requirements for NCODA vary depending upon the amount of data that goes into the analysis.

3.3 GOFS V3.0 Runstream Scripts

For a daily integration of GOFS V3.0, a sequence of scripts are generated and run. All scripts contain environmental variables $\{E\}$ and $\{EXPT\}$ which define the experiment number. The example that follows uses

```
setenv E          727
setenv EXPT      expt_72.7.
```

If a new experiment number is desired, these variables would have to be changed in all scripts and the appropriate directory structures would need to be created. Figure 2 is a schematic flowchart of the system and all scripts are provided in Appendices A-F.

Several scripts are used to direct the running of GOFS V3.0. These are summarized in Table 1 below. The script names often begin with the experiment number, in this example, 727.

Table 1: GOFS V3.0 .csh and .com scripts.

| Script | Description |
|---|--|
| 727shellsub_submit_ncoda.csh | Main driver script. Generates scripts for each daily run. See Section 3.3.1 and Appendix A. |
| 727lsf_wind_prep_\${idtgtd}18_\${idtg}18.com | Atmospheric forcing generation script. See Section 3.3.2 and Appendix B. |
| 727extr_\${subreg}_\${idtgtd}18_\${idtg}18.csh | Extracts NCODA <i>z</i> -levels and surface fields from the HYCOM archive file for each NCODA subregion. See Section 3.3.3 and Appendix C. |
| 727ncoda_\${subreg}_\${idtgtd}18_\${idtg}18.csh | Runs the NCODA analysis for each subregion. See Section 3.3.4 and Appendix D. |
| 727ncoda2arch_\${idtgtd}18_\${idtg}18.csh | Converts the NCODA analysis on <i>z</i> -levels to HYCOM vertical coordinates. See Section 3.3.5 and Appendix E. |
| 727lsf_ncoda_\${idtgtd}18_\${idtg}18.com | Runs HYCOM. See Section 3.3.6 and Appendix F. |

3.3.1 Main Driver Script

The main driver script may be found at

`/u/home/ooc/models/hycom/GLBa0.08/expt_72.7/mvoi/727shellsub_submit_ncoda.csh.`

Running as a cron job, it generates the set of scripts needed for each daily run. Most of the work is simply script creation, but its final task is submitting a job to create the atmospheric forcing needed by GOFS V3.0. A subsequent sequence of scripts then gets executed. Appendix A provides the complete script for viewing.

The following command sets the number of hindcast days. It is currently set to five days.

```
#
# --- Go back 5 days from today to do a 5 day hindcast
# --- idtg: date-time-group for today minus 5 days
#
set idtg=`/u/home/${user}/bin/addndays yyyyymmdd ${idtgtd} -5`
#
```

3.3.2 Atmospheric Forcing Generation Script

The atmospheric forcing generation script is found at

`/scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/727lsf_wind_prep_${idtgtd}18_${idtg}18.com`

Here environmental variable `${idgtod}` is the date-time-group for today (e.g. 20081206) and variable `${idtg}` is the date-time-group for today minus the hindcast length (e.g. 20081201). See Appendix B for a copy of the entire script.

3.3.3 NCODA Z-level Extraction Script

This script extracts NCODA z-levels from the HYCOM archive file.

```
/scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/72.7extr_${subreg}_${idgtod}18_${idtg}18.csh
```

Environmental variable `${subreg}` is the subregion identifier. Currently there are seven: ANTarc, ARCatl, ARCoen, ARCpac, MERat1, MERin1, and MERpa1. Appendix C provides the complete script and an example from MERpa1.

3.3.4 NCODA Subregion Run Script

This script runs the NCODA analysis for each subregion.

```
/scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/727ncoda_${subreg}_${idgtod}18_${idtg}18.csh.
```

All subregions are run in parallel. These jobs also start the NCODA plotting and file transfer to the permanent storage machine. See Appendix D for the complete script and an example from MERpa1.

3.3.5 NCODA Z-level to HYCOM Vertical Coordinate Conversion Script

This script converts the NCODA analysis on z-levels to HYCOM vertical coordinates.

```
/scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/727ncoda2arch_${idgtod}18_${idtg}18.csh.
```

This job is submitted by one of the NCODA analysis scripts and will wait until all the subregions are completed before it executes. Upon completion, it submits a plotting job to HYCOM. Appendix E shows a copy of this script.

3.3.6 HYCOM Run Script

```
/scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/727lsf_ncoda_${idgtod}18_${idtg}18.com
```

is the script that runs HYCOM. At the end of this script, the next day is submitted by

727shellsub_daily.csh, which is very similar to the cron script that initiates the entire sequence. See Appendix F for the complete run script.

4.0 TROUBLESHOOTING

Table 2 provides a brief troubleshooting guide for when problems are encountered. It is followed by a more detailed discussion of each specific problem.

Table 2: GOFS V3.0 Troubleshooting Guide.

| Problem | Solution |
|---|---|
| 1) System has stopped running. | Check log files in /scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs to find the part of the system where the problem occurred. |
| 2) HYCOM stopped running due to negative layer thicknesses, i.e. “neg. dp” is seen in the log file. | a) Reduce the baroclinic time step (baclin) in /u/home/ooc/models/hycom/GLBa0.08/expt_72.7/blkdat.input. If unsuccessful, try, b) Turn off the incremental updating (in blkdat.input) by setting 'incflg' = incremental update flag (0=no, 1=yes, 2=full-velocity). |
| 3) Error message: Cannot load ntbl_windows on all selected nodes... | This is a machine problem and resubmitting the script usually works. |
| 4) Cholesky decomposition failed error in a NCODA subregion. | Adjust the diagonal of the covariance matrices by changing the <i>oanl</i> namelist variable <code>err_plus() = 1</code> . Set it to a negative value after the analysis has gotten past the problem, see oanl.h , the NCODA namelist file. |

4.1 The System Has Stopped Running

Explanation: One of the jobs has died for some reason.

Solution: See /scr/ooc/data/hycom/GLBa0.08/expt_72.7/logs/.

At the system prompt, enter

```
ls -lat | more
```

to see where the run died. Check the appropriate log files for errors.

4.2 GOFS Runs Fine For A While And Then Suddenly Negative Layer Thicknesses Appear

The user may see “neg. dp” in the log file.

Explanation: Model is unstable.

Solution 1: Reduce the baroclinic time step (baclin) in

```
/u/home/ooc/models/hycom/GLBa0.08/expt_72.7/blkdat.input
```

Use the table in *blkdat.input*, as illustrated in Table 3 below, to change the baroclinic time step and incstp so that the increments are put in over 6 hours.

Table 3: Baroclinic time step and increment step options found in blkdat.input.

| baclin | incstp |
|--------|--------|
| 75 | 288 |
| 120 | 180 |
| 150 | 144 |
| 240 | 90 |
| 300 | 72 |

Solution 2: If lowering the time step does not work, the observations might be bad. Turn the assimilation off for the day. In

```
/u/home/ooc/models/hycom/GLBa0.08/expt_72.7/blkdat.input
```

change

```
2 'incflg' = incremental update flag (0=no, 1=yes, 2=full-velocity)
```

to

```
0 'incflg' = incremental update flag (0=no, 1=yes, 2=full-velocity).
```

It is possible that the user must go back to the previous day, since the instability could have begun earlier.

NOTE: Remember to change *incflg* back to 2 after the problem day has run successfully.

4.3 The NCODA Analysis or The Model Log Files Contains An Error

The error could be, for example,

```
Sat Nov 29 11:32:09 GMT 2008 [poejob]: Cannot load
ntbl_windows on all selected nodes ...
```

Explanation: An error such as this usually indicates a machine problem. Resubmitting the job usually solves the problem.

Solution: Resubmit the script that failed. If it is one of the NCODA analysis scripts, uncomment the line

```
#!/u/home/wallcraf/bin/msub  
${E}ncoda2arch_${idtgtd}_${curr_dtg}.csh 1
```

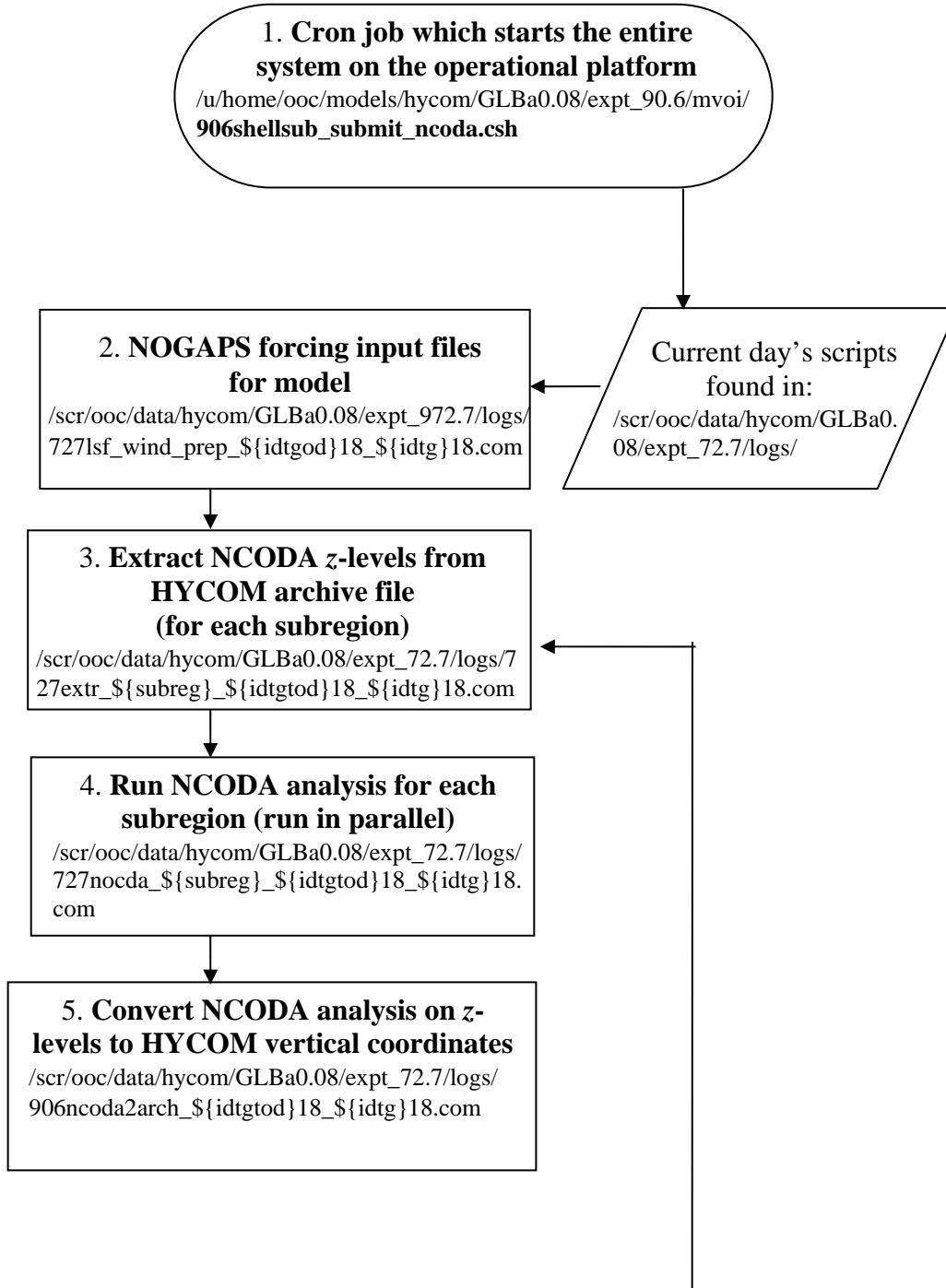
in e.g., *727ncoda_ARCatl_2008112918_2008112518.csh* at the bottom of the script. This is done so that the NCODA-to-HYCOM script is submitted and the model run continues. Make sure that the *ncoda2arch* script is not already running. If so, kill the job before resubmitting the NCODA analysis for the subregion.

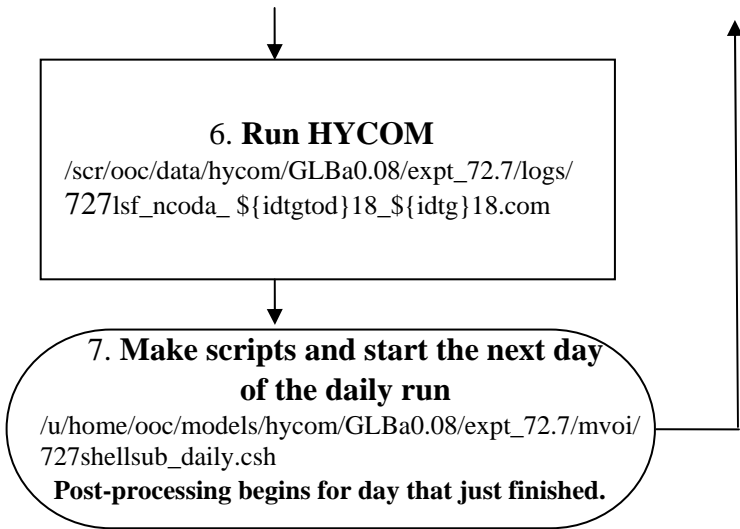
4.4 Cholesky Decomposition Failed

Explanation: Either the background error is too large or the observation error is too small. This results in very small diagonal elements. With converging grid locations and super-obs based on grid i,j indices, the data can be very close and the off-diagonal correlations can be large. The result is a poorly conditioned matrix.

Solution: Adjust the diagonal of the covariance matrices by changing the *oanl* namelist variable *err_plus()* = 1. Set it to a negative value after the analysis has moved past the problem. See the NCODA namelist file *oanl.h*.

5.0 GOFS V3.0 OPERATIONAL FLOWCHART





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Naval Research Laboratory, Code 7323
January 2009*

Figure 2: Flowchart of the GOFS V3.0 runstream. All scripts are provided in Appendices A-F.

6.0 FUNCTIONAL DESCRIPTION

For a discussion of the HYCOM 2.2 model theory and code description see the accompanying Software Design Description (Wallcraft *et al.*, 2009).

7.0 NOTES

7.1 Acronyms and Abbreviations

| Acronym | Definition |
|---------|--|
| GOFS | Global Ocean Forecast System |
| HYCOM | HYbrid Coordinate Ocean Model |
| MPI | Message Passing Interface |
| NCAR | National Center for Atmospheric Research |
| NCODA | Navy Coupled Ocean Data Assimilation |
| NRL | Naval Research Laboratory |
| SDD | Software Design Description |
| UM | User's Manual |
| VTR | Validation Test Report |

APPENDIX A

Script 727shellsub_submit_ncoda.csh

This is the main driver script.

```

#!/bin/csh -f
#
# --- This script generates the first set of scripts needed for todays
# --- HYCOM-NCODA run. Most of the work is simply script creation, but
# --- the last thing it does is submit a job to create the forcing needed
# --- by the ocean model. A subsequent sequence of scripts gets executed
# --- in turn.
#
# --- Originally scripted by O.M. Smedstad, QinetIQ-PSI, Inc.
# --- ole.smedstad.ctr@nrlssc.navy.mil
# --- office phone: 228-688-4365
#
set path=( $path /usr/bin/X11 /u/home/wallcraf/bin /u/home/${user}/bin . )
echo $path
#
# --- The environmental variables ${E} and ${EXPT} define the experiment
# --- number. If setting up for a new experiment, these need to be changed
# --- throughout all scripts.
#
setenv E 727
setenv REG1 GLBa0.08
setenv EXPT expt_72.7
setenv MVOI /u/home/${user}/hycom/${REG1}/${EXPT}/mvoi
setenv LOGS /scr/${user}/hycom/${REG1}/${EXPT}/logs
#
# --- Make directories in case they do not exist
#
mkdir -p ${LOGS}
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/wind
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/flux
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/ssta
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/pcip
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/wspd
mkdir -p /scr/${user}/hycom/${REG1}/${EXPT}/data/incup
#
# --- The time of the NCODA analysis
#
setenv HR 18
setenv HR2 ${HR}
#
# --- The day model is submitted (run) (format 20070101)
# --- idtgtod: date-time-group for today
#
setenv idtgtod `date +%Y%m%d`
#setenv idtgtod $1
#
# --- Go back 5 days from today to do a 5 day hindcast
# --- idtg: date-time-group for today minus 5 days
#
set idtg=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -5`
#

```

```

# --- Total number of days to create forcing files
#
#set maxnumdays=15
set maxnumdays=3
#
# --- Number of days of model integration between each NCODA analysis
#
setenv nmdays 1
#
# --- idtgml: one day prior to the system start date
# --- idtgtodml: one day prior to the system start date
#
setenv idtgml `/u/home/${user}/bin/addndays yyyymmdd ${idtg} -1`
setenv idtgtodml `/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
#
echo 'idtgtod=' ${idtgtod} ' idtg=' ${idtg}
#
# --- Start job at this time
#
setenv month `echo ${idtgtod} |cut -c5-6`
setenv day `echo ${idtgtod} |cut -c7-8`
setenv nxd 20:00
#
# --- Delete forcing files that may exist with idtg
#
/bin/rm -f /scr/${user}/hycom/${REG1}/${EXPT}/data/ssta/*${idtg}*
/bin/rm -f /scr/${user}/hycom/${REG1}/${EXPT}/data/wind/*${idtg}*
/bin/rm -f /scr/${user}/hycom/${REG1}/${EXPT}/data/flux/*${idtg}*
/bin/rm -f /scr/${user}/hycom/${REG1}/${EXPT}/data/wspd/*${idtg}*
/bin/rm -f /scr/${user}/hycom/${REG1}/${EXPT}/data/pcip/*${idtg}*
#
cd /u/home/${user}/hycom/${REG1}/${EXPT}
#
# --- Make necessary scripts for each NCODA analysis subregion
# --- for the given date
#
foreach REG( ANTarc MERat1 MERin1 MERpal ARCat1 ARCPac ARCoen )
#
# --- Generate the script to plot NCODA fields
#
/bin/rm ${LOGS}/${E}plot_${REG}_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk tod=${idtgtod} hr=${HR} t1=${idtg} tr=${REG} \
  ${MVOI}/${E}plot.csh > \
  ${LOGS}/${E}plot_${REG}_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to rcp NCODA plots
#
/bin/rm ${LOGS}/${E}plotrcp_${REG}_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk hr=${HR} tod=${idtgtod} t1=${idtg} tr=${REG} \
  ${MVOI}/${E}plotrcp.csh > \
  ${LOGS}/${E}plotrcp_${REG}_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to perform the NCODA analysis
#
/bin/rm ${LOGS}/${E}ncoda_${REG}_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk reg=${REG} tod=${idtgtod}${HR} t1=${idtg}${HR} \
  t2=1 t3=${idtgml}${HR} t4=${E}ncoda_${REG}_${idtg}.csh \
  ${MVOI}/${E}ncoda_${REG}.job > \

```

```

    ${LOGS}/${E}ncoda_${REG}_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to extract HYCOM fields for NCODA analysis
# --- todml=idtgtodml for the first analysis
#
/bin/rm ${LOGS}/${E}extr_${REG}_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI_daily.awk nnextd=${nnextd} calnmb=1 hr=${HR} hr2=${HR}
t1=${idtg} \
    tod=${idtgtod} tod1=${idtgtod} todml=${idtgtodml}
${MVOI}/${E}extr_${REG}.csh_zi > \
    ${LOGS}/${E}extr_${REG}_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Change file permissions
#
    chmod u+rx ${LOGS}/*${idtg}*
#
end
#
# --- Generate script to interpolate to uniform 1/12 deg grid (GLBu0.083)
# --- and write netcdf files
#
/bin/rm ${LOGS}/${E}subreg_GLBu0.083_${idtgtod}${HR}_${idtg}${HR}*.csh,log
#awk -f ${MVOI}/MVOI.awk hr=${HR} tod=${idtgtod}00 t1=${idtgtod}00 \
#t2=1 t3=${idtgml}00 ${MVOI}/../subregion/${E}subreg_GLBu0.083.com > \
# ${LOGS}/${E}subreg_GLBu0.083_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the NCODA prep script (get all data for the period idtg to
# --- idtgtod) not necessary for a real time job if the data are already on
# --- the machine
#
/bin/rm ${LOGS}/${E}ncoda_PREP_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk nnextd=${nnextd} reg=PREP1 hr=${HR} tod=${idtgtod}00 \
    t1=${idtgtod}00 t2=1 t3=${idtgml}00 t4=${E}ncoda_${REG1}_${idtg}.csh \
    ${MVOI}/${E}ncoda_PREP.job > \
    ${LOGS}/${E}ncoda_PREP_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to convert a HYCOM restart file to
# --- a HYCOM archive file
#
/bin/rm ${LOGS}/${E}rest2archv_${idtgtod}${HR}_${idtg}${HR}.csh
#awk -f ${MVOI}/MVOI.awk nnextd=${nnextd} hr=${HR} tod=${idtgtod} tod1=${idtgtod} \
# t1=${idtg} ${MVOI}/${E}restart_archv_1.csh > \
# ${LOGS}/${E}rest2archv_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to convert an NCODA file to a HYCOM archive file
#
/bin/rm ${LOGS}/${E}ncoda2arch_${idtgtod}${HR}_${idtg}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk hr=${HR} tod=${idtgtod} tod1=${idtgtod} t1=${idtg} \
    todml=${idtgtodml} ${MVOI}/${E}ncoda2arch_all.csh > \
    ${LOGS}/${E}ncoda2arch_${idtgtod}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to copy log files to newton
#
/bin/rm ${LOGS}/${E}cplogs_${idtgtod}${HR}_${idtgml}${HR}*.csh,log
awk -f ${MVOI}/MVOI.awk hr=${HR} t1=${idtgml} tod=${idtgtod} \
    ${MVOI}/../cplogs.csh > ${LOGS}/${E}cplogs_${idtgtod}${HR}_${idtgml}${HR}.csh
#

```

```

# --- Generate the script to copy gmeta files to NRL anonymous ftp server
#
/bin/rm ${LOGS}/${E}cpgmeta_${idtgtd}${HR}_${idtgml}${HR}*. {csh,log}
awk -f ${MVOI}/MVOI.awk hr=${HR} t1=${idtgml} tod=${idtgtd} \
  ${MVOI}/../cpgmeta.csh > ${LOGS}/${E}cpgmeta_${idtgtd}${HR}_${idtgml}${HR}.csh
#
# --- Generate the script to copy archv_1 files to newton
#
/bin/rm ${LOGS}/${E}cparchv_1_${idtgtd}${HR}_${idtgml}${HR}*. {csh,log}
awk -f ${MVOI}/MVOI.awk hr=${HR} t1=${idtgml} tod=${idtgtd} \
  ${MVOI}/../cparchv_1.csh > \
  ${LOGS}/${E}cparchv_1_${idtgtd}${HR}_${idtgml}${HR}.csh
#
# --- Generate the script to copy files to NRL anonymous ftp server
#
/bin/rm ${LOGS}/ztar_${idtgtd}${HR}_${idtg}${HR}.csh
awk -f ${MVOI}/MVOI.awk hr=${HR} hr=${HR} t1=${idtg} tod=${idtgtd} \
  ${MVOI}/../${E}maktar_glba0.08.com >
${LOGS}/ztar_${idtgtd}${HR}_${idtg}${HR}.csh
#
# --- Generate the script to get the BOGUS files from file server
#
/bin/rm ${LOGS}/getfro_${idtgtd}${HR}.sh
awk -f ${MVOI}/MVOI.awk hr=${HR} hr=${HR} t1=${idtg} tod=${idtgtd} \
  ${MVOI}/../getfro.sh > ${LOGS}/getfro_${idtgtd}${HR}.sh
#
cd ${LOGS}
#
# --- Submit job getting the BOGUS files
#
/u/home/wallcraf/bin/q_nav0 getfro_${idtgtd}${HR}.sh
#
# --- Generate the script to create forcing files for the number of
# --- days in todays run (maxnumdays)
#
/bin/rm ${LOGS}/${E}cpforcing_${idtgtd}${HR}_${idtg}${HR}*. {sh,log}
awk -f ${MVOI}/../HYCOM.awk nmdays=${maxnumdays} t0=${E}pbs_${idtg} hr=${HR} \
  tod=${idtgtd} t1=${idtg} ${MVOI}/../${E}cpforcingtomsr_real.sh > \
  ${LOGS}/${E}cpforcing_${idtgtd}${HR}_${idtg}${HR}.sh
#
/bin/rm ${LOGS}/${E}pbs_wind_prep_${idtgtd}${HR}_${idtg}${HR}*. {com,log}
awk -f ${MVOI}/../HYCOM.awk nmdays=${maxnumdays} t0=${E}pbs_${idtg} hr=${HR} \
  tod=${idtgtd} t1=${idtg} ${MVOI}/../${E}pbs_wind_prep.com > \
  ${LOGS}/${E}pbs_wind_prep_${idtgtd}${HR}_${idtg}${HR}.com
#
# --- Generate the HYCOM run script for today
#
/bin/rm ${LOGS}/${E}pbs_ncoda_${idtgtd}${HR}_${idtg}${HR}*. {com,log}
awk -f ${MVOI}/../HYCOM.awk nmdays=${nmdays} t0=${E}pbs_${idtg} hr=${HR} \
  hr2=${HR} tod=${idtgtd} t1=${idtg} ${MVOI}/../${E}pbs_ncoda.com > \
  ${LOGS}/${E}pbs_ncoda_${idtgtd}${HR}_${idtg}${HR}.com
#
# --- Submit the forcing preparation job
#
# on XT5
/u/home/wallcraf/bin/q_nav0 ${E}cpforcing_${idtgtd}${HR}_${idtg}${HR}.sh
# on IBM
#/u/home/wallcraf/bin/q_nav0 ${E}pbs_wind_prep_${idtgtd}${HR}_${idtg}${HR}.com

```

```
#  
# --- Submit job to transfer observations files for NCODA  
#  
/u/home/wallcraf/bin/q_nav0 ${E}ncoda_PREP_${idtgtood}${HR}_${idtg}${HR}.csh  
exit
```

APPENDIX B

Script 727lsf_wind_prep_\${idtgtod}18_\${idtg}18.com

This is the atmospheric forcing generation script.

```
#!/bin/csh -f
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=1
#PBS -l mppnppn=1
#PBS -l walltime=3:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J 727ncodawind
#BSUB -n 1
#BSUB -R "span[ptile=1]"
#BSUB -W 4:00
#BSUB -q share
#BSUB -P NAVOSHYC
#
# --- Job to create the forcing needed for a HYCOM-NCODA run
#
set echo
set timestamp
C
C --- Preamble.
C
setenv OS `uname`
switch ($OS)
case 'Linux':
    which yod
    if (! $status) then
        setenv OS XT3
        setenv TMPDIR /tmp
    else
        setenv TMPDIR /tmp
    endif
    which aprun
    if (! $status) then
#       setenv OS XT4
        setenv OS XT5
        setenv TMPDIR /scr
    endif
    breaksw
case 'AIX':
    hostname
    setenv TMPDIR /scr/${user}
    breaksw
default:
    echo 'Unknown Operating System: ' $OS
```



```

    echo 'configured for AIX only'
    exit (1)
endsw
C
if ($?JOBNAME) then
    setenv PBS_JOBNAME ${JOBNAME}
    setenv PBS_JOBID $$
endif
echo PBS_JOBNAME $PBS_JOBNAME PBS_JOBID $PBS_JOBID
C
C --- E is expt, P is permanent directory, S is /tmp directory.
C
#
setenv E 727
setenv EXPT expt_72.7
setenv REG GLBa0.08
#
# --- These variables are set by the awk script
#
setenv nmdays 10
setenv idtg 20070209
setenv idtg2 `/u/home/${user}/bin/addndays yyyymmdd ${idtg} +1`
setenv idtgtod 20070214
setenv HR 00
setenv HR2 00
#
echo ${idtg} ${idtgtod}
#
set LOGS=/scr/${user}/hycom/${REG}/${EXPT}/logs
mkdir -p ${LOGS}
set RUN=/u/home/${user}/hycom/${REG}/${EXPT}
cd ${RUN}
#
setenv P $cwd
switch ($OS)
case 'AIX':
case 'XT5':
#
# --- substitute /scr for /u/home
#
    setenv S `echo $cwd | awk '{print "/scr" substr($0,8,length)}'`
    breaksw
case 'XT3':
case 'XT4':
case 'OSF1':
#
    substitute /work for /???????
    setenv S `echo $cwd | awk '{print "/work" substr($0,3,length)}'`
    breaksw
case 'IRIX64':
#
    substitute /scr for /u/home
    setenv S `echo $cwd | awk '{print "/scr" substr($0,8,length)}'`
    breaksw
case 'unicos':
#
    substitute /tmp for /u/b
    setenv S `echo $cwd | awk '{print "/tmp" substr($0,5,length)}'`
    breaksw
endsw
C

```

```

ls -laFq
set idtgtod1=`echo ${idtgtod} | cut -c1-8`
C
C --- check the RUNNING flag.
C
if ( -e RUNNING && ! -e RUNNING_$PBS_JOBID) then
C
C --- MODEL IS ALREADY RUNNING - EXIT.
C
    exit
endif
touch RUNNING
touch RUNNING_$PBS_JOBID
C
C --- Generate the next model script.
C
    setenv Y01 103
    setenv AB a
#
    setenv SCRIPT ${E}y${idtg}.com
    /bin/rm -f ${SCRIPT}
    awk -f ${RUN}/${E}.awk nmdays=${nmdays} y01=${Y01} hr=${HR} tod=${idtgtod} \
        ab=${AB} td=${idtg} ${RUN}/${E}_wind.com > ${SCRIPT}
#
# --- Run the Script.
#
set script = ${SCRIPT}
set reqname = ${PBS_JOBNAME}
ln -fs ${reqname}.log $script:r.log
#
mkdir -p $$
cp ${SCRIPT} $$/${SCRIPT}
cd $$
#
# -----
csh ${SCRIPT}
# -----
#
ls -laFq
#
cd $P
#
# --- Final Clean Up.
#
/bin/rm -f RUNNING
/bin/rm -f RUNNING_$PBS_JOBID
#
# --- Make links for the forcing files created today
#
while(${idtg2} <= ${idtgtod1})
#
cd /scr/${user}/hycom/${REG}/${EXPT}/data/wind
/bin/rm *${idtg2}.*
ln -s tauewd_${idtg}.a tauewd_${idtg2}.a
ln -s tauewd_${idtg}.b tauewd_${idtg2}.b
ln -s taunwd_${idtg}.a taunwd_${idtg2}.a
ln -s taunwd_${idtg}.b taunwd_${idtg2}.b
#

```

```

cd /scr/${user}/hycom/${REG}/${EXPT}/data/flux
/bin/rm *${idt2}.*
ln -s airtmp_${idt}.a airtmp_${idt2}.a
ln -s airtmp_${idt}.b airtmp_${idt2}.b
ln -s radflx_${idt}.a radflx_${idt2}.a
ln -s radflx_${idt}.b radflx_${idt2}.b
ln -s shwflx_${idt}.a shwflx_${idt2}.a
ln -s shwflx_${idt}.b shwflx_${idt2}.b
ln -s vapmix_${idt}.a vapmix_${idt2}.a
ln -s vapmix_${idt}.b vapmix_${idt2}.b

cd /scr/${user}/hycom/${REG}/${EXPT}/data/ssta
/bin/rm *${idt2}.*
ln -s surtmp_${idt}.a surtmp_${idt2}.a
ln -s surtmp_${idt}.b surtmp_${idt2}.b

cd /scr/${user}/hycom/${REG}/${EXPT}/data/pcip
/bin/rm *${idt2}.*
ln -s precip_${idt}.a precip_${idt2}.a
ln -s precip_${idt}.b precip_${idt2}.b

cd /scr/${user}/hycom/${REG}/${EXPT}/data/wspd
/bin/rm *${idt2}.*
ln -s wndspd_${idt}.a wndspd_${idt2}.a
ln -s wndspd_${idt}.b wndspd_${idt2}.b
#
set idtg2=`/u/home/${user}/bin/addndays yyyyymmdd ${idt2} +1`
end
cd ${LOGS}
#
# --- Submit the job extracting an archive file from a restart file.
# --- The job will wait for the time slot dedicated to the HYCOM run
#
#/u/home/wallcraf/bin/q_nav0 ${E}rest2archv_${idt2tod}${HR}_${idt}${HR}.csh
/u/home/wallcraf/bin/q_nav0 ${E}ncoda_PREP_${idt2tod}${HR}_${idt}${HR}.csh
#
# --- Exit.
#
exit

```

APPENDIX C

Script 727extr_\${subreg}_\${idtgtod}18_\${idtg}18.com

This script extracts NCODA z-levels from the HYCOM archive file for each NCODA subregion.

```
#!/bin/csh -f
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=1
#PBS -l mppnppn=1
#PBS -l walltime=1:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J pmast
#BSUB -n 1
#BSUB -W 0:30
#BSUB -R "span[ptile=1]"
#BSUB -q challenge
#BSUB -P NRLSSC3J
#####BSUB -q internal3d
#####BSUB -b 10:24:20:00
#
date
set echo
set pget=~wallcraf/bin/pget
#
set OS=`uname`
switch ($OS)
case 'Linux':
    which aprun
    if (! $status) then
        set APRUN='aprun -n 1 '
        set SRC=~wallcraf/hycom/ALLcn1
    else
        set APRUN=''
        set SRC=~wallcraf/hycom/ALL
    endif
    breaksw
case 'AIX'
    set APRUN=''
    set SRC=~wallcraf/hycom/ALL
    breaksw
default:
    set APRUN=''
    set SRC=~wallcraf/hycom/ALL
endsw
#
# --- extract 3-d fields from a single HYCOM archive file.
#
setenv CALNMB 1
setenv HR 18
setenv HR2 18
setenv idtg 20080501
```

```

setenv idtgtod 20080501
setenv idtgtodp1 20080501
setenv idtgtodml 20080501
set idtgout=`/u/home/${user}/bin/addndays yyyymmdd ${idtg} -1`
#
echo 'DATES TO EXTRACT ' ${idtg}
#
set EXPTN=expt_72.7
set REGN=MERpa10.08
#
setenv E 727
set EXPT=expt_72.7
set REG=GLBa0.08
set CASE=nowcast
setenv T 09
#
set maxdepth=002500
set surface=000000
set forecast=00240000
#
set TOPO=/u/home/${user}/hycom/${REG}/topo
set SCR=/scr/${user}/hycom/${REG}/${EXPT}
set LOGS=/scr/${user}/hycom/${REG}/${EXPT}/logs
set SCRN=/scr/${user}/hycom/${REGN}/${EXPTN}
mkdir -p /scr/${user}/hycom/${REG}/topo
mkdir -p ${SCR} ${SCRN}
set INP=${SCR}/${CASE}
set OUT=${SCRN}/raw/${CASE}
mkdir -p ${OUT}
echo ${SCR} ${SCRN}
#
cd ${OUT}
/bin/rm ${OUT}/*[ab]
#
goto TOPO
touch ${TOPO}/regional.depth.a ${TOPO}/regional.depth.b
if (-z ${TOPO}/regional.depth.a) then
    ${pget} ${D}/../../../../topo/depth_${REG}_${T}.a ${TOPO}/regional.depth.a &
endif
if (-z ${TOPO}/regional.depth.b) then
    ${pget} ${D}/../../../../topo/depth_${REG}_${T}.b ${TOPO}/regional.depth.b &
endif
touch ${TOPO}/regional.grid.a ${TOPO}/regional.grid.b
if (-z ${TOPO}/regional.grid.a) then
    ${pget} ${D}/../../../../topo/regional.grid.a ${TOPO}/regional.grid.a &
endif
if (-z ${TOPO}/regional.grid.b) then
    ${pget} ${D}/../../../../topo/regional.grid.b ${TOPO}/regional.grid.b &
endif
touch ${TOPO}/regional_mask.a
if (-z ${TOPO}/regional_mask.a) then
    ${pget} ${D}/../../../../topo/landsea_${REG}.a ${TOPO}/regional_mask.a &
endif
wait
TOPO:
#
#ln -s ${TOPO}/depth_${REG}_${T}.a regional.depth.a
#ln -s ${TOPO}/depth_${REG}_${T}.b regional.depth.b
#ln -s ${TOPO}/regional.grid.a .
#ln -s ${TOPO}/regional.grid.b .
#ln -s ${TOPO}/regional_mask.a .
#
ln -s ${INP}/../data/regional.depth.a .

```

```

ln -s ${INP}/../data/regional.depth.b .
ln -s ${INP}/../data/regional.grid.a .
ln -s ${INP}/../data/regional.grid.b .
#/bin/cp ${TOPO}/regional_mask.a .
#
#/bin/cp ${TOPO}/depth_${REG}_${T}.a regional.depth.a
#/bin/cp ${TOPO}/depth_${REG}_${T}.b regional.depth.b
#/bin/cp ${TOPO}/regional.grid.a .
#/bin/cp ${TOPO}/regional.grid.b .
#/bin/cp ${TOPO}/regional_mask.a .
#
setenv FOR022A ${OUT}/hycom2dath_000000_${idtgout}${HR}_${forecast}.a
setenv FOR022 ${OUT}/hycom2dath_000000_${idtgout}${HR}_${forecast}.b
setenv FOR033A ${OUT}/hycom3dt_${maxdepth}_${idtgout}${HR}_${forecast}.a
setenv FOR033 ${OUT}/hycom3dt_${maxdepth}_${idtgout}${HR}_${forecast}.b
setenv FOR034A ${OUT}/hycom3ds_${maxdepth}_${idtgout}${HR}_${forecast}.a
setenv FOR034 ${OUT}/hycom3ds_${maxdepth}_${idtgout}${HR}_${forecast}.b
#
setenv FOR035A ${OUT}/hycom3dden_${maxdepth}_${idtgout}${HR}_${forecast}.a
#
setenv FOR035 ${OUT}/hycom3dden_${maxdepth}_${idtgout}${HR}_${forecast}.b
setenv FOR037A ${OUT}/hycom3du_${maxdepth}_${idtgout}${HR}_${forecast}.a
setenv FOR037 ${OUT}/hycom3du_${maxdepth}_${idtgout}${HR}_${forecast}.b
setenv FOR038A ${OUT}/hycom3dv_${maxdepth}_${idtgout}${HR}_${forecast}.a
setenv FOR038 ${OUT}/hycom3dv_${maxdepth}_${idtgout}${HR}_${forecast}.b
#
setenv FOR040A ${OUT}/hycom3dp_${maxdepth}_${idtgout}${HR}_${forecast}.a
#
setenv FOR040 ${OUT}/hycom3dp_${maxdepth}_${idtgout}${HR}_${forecast}.b
/bin/rm $FOR033A $FOR034A $FOR037A $FOR038A
/bin/rm $FOR033 $FOR034 $FOR037 $FOR038
/bin/rm $FOR022
/bin/rm $FOR022A
#
${APRUN} ${SRC}/archive/src/archv2data3z <<E-o-D
${INP}/archv.${idtgtodml}${HR}_${idtg}${HR2}.a
HYCOM
000 'iexpt' = experiment number x10 (000=from archive file)
3 'yrflag' = days in year flag (0=360J16,1=366J16,2=366J01,3-actual)
4500 'idm' = longitudinal array size
3298 'jdm' = latitudinal array size
32 'kdm' = number of layers
34.0 'thbase' = reference density (sigma units)
0 'smooth' = smooth the layered fields (0=F,1=T)
1 'baclin' = extract baroclinic velocity (0=total,1=baroclinic)
1 'xyward' = output original unrotated velocities (0=no:DEFAULT,1=yes)
199 'iorign' = i-origin of plotted subregion
360 'jorign' = j-origin of plotted subregion
2525 'idmp' = i-extent of plotted subregion (<=idm; 0 implies idm)
1841 'jdmp' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
2 'itype' = interpolation type (0=sample,1=linear,2=parabolic)
42 'kzi' = number of depths to sample
0.0 'zi' = sample cell interfaces 1
3.5 'zi' = sample cell interfaces 2
6.5 'zi' = sample cell interfaces 3
9.5 'zi' = sample cell interfaces 4
14.5 'zi' = sample cell interfaces 5
19.5 'zi' = sample cell interfaces 6
30.5 'zi' = sample cell interfaces 7
41.5 'zi' = sample cell interfaces 8
58.5 'zi' = sample cell interfaces 9
87.5 'zi' = sample cell interfaces 10
112.5 'zi' = sample cell interfaces 11
137.5 'zi' = sample cell interfaces 12
162.5 'zi' = sample cell interfaces 13
187.5 'zi' = sample cell interfaces 14
212.5 'zi' = sample cell interfaces 15

```

```

237.5 'zi      ' = sample cell interfaces 16
262.5 'zi      ' = sample cell interfaces 17
287.5 'zi      ' = sample cell interfaces 18
312.5 'zi      ' = sample cell interfaces 19
375.0 'zi      ' = sample cell interfaces 20
425.0 'zi      ' = sample cell interfaces 21
475.0 'zi      ' = sample cell interfaces 22
525.0 'zi      ' = sample cell interfaces 23
650.0 'zi      ' = sample cell interfaces 24
750.0 'zi      ' = sample cell interfaces 25
850.0 'zi      ' = sample cell interfaces 26
950.0 'zi      ' = sample cell interfaces 27
1050.0 'zi     ' = sample cell interfaces 28
1150.0 'zi     ' = sample cell interfaces 29
1250.0 'zi     ' = sample cell interfaces 30
1350.0 'zi     ' = sample cell interfaces 31
1450.0 'zi     ' = sample cell interfaces 32
1550.0 'zi     ' = sample cell interfaces 33
1650.0 'zi     ' = sample cell interfaces 34
1750.0 'zi     ' = sample cell interfaces 35
1850.0 'zi     ' = sample cell interfaces 36
1950.0 'zi     ' = sample cell interfaces 37
2050.0 'zi     ' = sample cell interfaces 38
2150.0 'zi     ' = sample cell interfaces 39
2250.0 'zi     ' = sample cell interfaces 40
2350.0 'zi     ' = sample cell interfaces 41
2450.0 'zi     ' = sample cell interfaces 42
2550.0 'zi     ' = sample cell interfaces 43
0      'botio ' = bathymetry I/O unit (0 no I/O)
22     'athio ' = average density I/O unit (0 no I/O)
0      'mltio ' = mix.l.thk. I/O unit (0 no I/O)
0.0    'tempml' = temperature jump across mixed-layer (degC, 0 no I/O)
0.0    'densml' = density jump across mixed-layer (kg/m3, 0 no I/O)
0      'infio ' = intf. depth I/O unit (0 no I/O, <0 label with layer #)
0      'wvlio ' = w-velocity I/O unit (0 no I/O)
37     'uvlio ' = u-velocity I/O unit (0 no I/O)
38     'vvlio ' = v-velocity I/O unit (0 no I/O)
0      'splio ' = speed I/O unit (0 no I/O)
33     'temio ' = temperature I/O unit (0 no I/O)
34     'salio ' = salinity I/O unit (0 no I/O)
0      'tthio ' = density I/O unit (0 no I/O)
E-o-D
#
# /usr/lpp/LoadL/full/bin/llq -w $LOADL_STEP_ID
#
# --- convert HYCOM .a files to RAW files (no padding, spval=1.e10).
# --- comment this out if you don't need RAW files.
#
    foreach t ( 3dt 3ds 3du 3dv )
        if (-e ${OUT}/hycom${t}_${maxdepth}_${idtgin}${HR}_${forecast}.a) then
            /bin/rm -f ${OUT}/hycom${t}_${maxdepth}_${idtgin}${HR}_${forecast}.A
            ${APRUN} ${SRC}/bin/hycom2raw
            ${OUT}/hycom${t}_${maxdepth}_${idtgin}${HR}_${forecast}.a 2525 1841 -999.0
            ${OUT}/hycom${t}_${maxdepth}_${idtgin}${HR}_${forecast}.A
        endif
    end
#
cd ${OUT}
#
# --- extract 2-d fields from a single HYCOM archive file.
#
set idtgin=${idtgin}
#   foreach HR2 ( 21 00 03 06 09 12 15 18 )

```

```

    foreach HR2 ( 18 )
if( ${HR2} == 21 ) then
    set forecast=00030000
    set idtgin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgin} -1`
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 00 ) then
    set forecast=00060000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 03 ) then
    set forecast=00090000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 06 ) then
    set forecast=00120000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 09 ) then
    set forecast=00150000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 12 ) then
    set forecast=00180000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif
if( ${HR2} == 15 ) then
    set forecast=00210000
    set idtgin=${idtgin}
    if( ${CALNMB} == 1 ) then
        set idtgtodin=`/u/home/${user}/bin/addndays yyyymmdd ${idtgtod} -1`
    else
        set idtgtodin=${idtgtod}
    endif
endif

```



```

endif
if( ${HR2} == 18 ) then
  set forecast=00240000
  set idtgin=${idtgin}
  set idtgtodin=${idtgtodin}
endif
#
#   setenv FOR022A  ${OUT}/hycom2dSfsd_${surface}_${idtginout}${HR}_${forecast}.a
#   setenv FOR022  ${OUT}/hycom2dSfsd_${surface}_${idtginout}${HR}_${forecast}.b
setenv FOR023A  ${OUT}/hycom2dSfsd_${surface}_${idtginout}${HR}_${forecast}.a
setenv FOR023  ${OUT}/hycom2dSfsd_${surface}_${idtginout}${HR}_${forecast}.b
#   setenv FOR024A  ${OUT}/hycom2dNfsd_${surface}_${idtginout}${HR}_${forecast}.a
#   setenv FOR024  ${OUT}/hycom2dNfsd_${surface}_${idtginout}${HR}_${forecast}.b
setenv FOR025A  ${OUT}/hycom2dt_${surface}_${idtginout}${HR}_${forecast}.a
setenv FOR025  ${OUT}/hycom2dt_${surface}_${idtginout}${HR}_${forecast}.b
setenv FOR026A  ${OUT}/hycom2dice_${surface}_${idtginout}${HR}_${forecast}.a
setenv FOR026  ${OUT}/hycom2dice_${surface}_${idtginout}${HR}_${forecast}.b
setenv FOR027A  ${OUT}/hycom2dmix_${surface}_${idtginout}${HR}_${forecast}.a
setenv FOR027  ${OUT}/hycom2dmix_${surface}_${idtginout}${HR}_${forecast}.b
/bin/rm $FOR023A $FOR025A $FOR026A $FOR027A
/bin/rm $FOR023 $FOR025 $FOR026 $FOR027
#
${APRUN} ${SRC}/archive/src/archv2data2d <<E-o-D
${INP}/archv.${idtgtodin}${HR}_${idtgin}${HR2}.a
HYCOM
000   'iexpt ' = experiment number x10 (000=from archive file)
      3   'yrflag' = days in year flag (0=360J16,1=366J16,2=366J01,3=actual)
4500   'idm   ' = longitudinal array size
3298   'jdm   ' = latitudinal array size
      1   'kdm   ' = number of layers
34.0   'thbase' = reference density (sigma units)
      0   'smooth' = smooth fields before plotting (0=F,1=T)
      0   'mthin ' = mask thin layers from plots (0=F,1=T)
      1   'xyward' = output original unrotated velocities (0=no:DEFAULT,1=yes)
199    'iorign' = i-origin of plotted subregion
360    'jorign' = j-origin of plotted subregion
2525   'idmp   ' = i-extent of plotted subregion (<=idm; 0 implies idm)
1841   'jdmp   ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
      0   'botio ' = bathymetry I/O unit (0 no I/O)
      0   'flxio ' = surf. heat flux I/O unit (0 no I/O)
      0   'empio ' = surf. evap-pcip I/O unit (0 no I/O)
      0   'ttrio ' = surf. temp trend I/O unit (0 no I/O)
      0   'strio ' = surf. saln trend I/O unit (0 no I/O)
      0   'icvio ' = ice coverage I/O unit (0 no I/O)
      0   'ithio ' = ice thickness I/O unit (0 no I/O)
      0   'ictio ' = ice temperature I/O unit (0 no I/O)
      0   'sshio ' = sea surf. height I/O unit (0 no I/O)
      0   'bsfio ' = baro. strmf. I/O unit (0 no I/O)
      0   'uvmio ' = mix. lay. u-vel. I/O unit (0 no I/O)
      0   'vvmio ' = mix. lay. v-vel. I/O unit (0 no I/O)
      0   'spmio ' = mix. lay. speed I/O unit (0 no I/O)
      0   'bltio ' = bnd. lay. thick. I/O unit (0 no I/O)
      0   'mltio ' = mix. lay. thick. I/O unit (0 no I/O)
      0   'sstio ' = mix. lay. temp. I/O unit (0 no I/O)
      0   'sssio ' = mix. lay. saln. I/O unit (0 no I/O)
      0   'ssdio ' = mix. lay. dens. I/O unit (0 no I/O)
-1     'kf     ' = layer to plot (=0 end layer plots; <0 label with layer #)
      1   'kl     ' = last output layer
      0   'uvmio ' = layer k u-vel. I/O unit (0 no I/O)
      0   'vvmio ' = layer k v-vel. I/O unit (0 no I/O)
      0   'spmio ' = layer k speed. I/O unit (0 no I/O)
      0   'infio ' = layer k i.dep. I/O unit (0 no I/O)
      0   'thkio ' = layer k thick. I/O unit (0 no I/O)

```

```

25      'temio ' = layer k   temp   I/O unit (0 no I/O)
0       'salio ' = layer k   saln.  I/O unit (0 no I/O)
0       'tthio ' = layer k   dens,  I/O unit (0 no I/O)
0       'sfnio ' = layer k   strmf. I/O unit (0 no I/O)
0       'kf    ' = first output layer (=0 end output; <0 label with layer #)
E-o-D
#
# convert ice concentration to percent
#
/bin/rm hycom2dice_${surface}_${idtgout}${HR}_${forecast}.a2
${APRUN} ${SRC}/bin/hycom_expr
hycom2dice_${surface}_${idtgout}${HR}_${forecast}.a ONE 2525 1841 100.0 0.0
hycom2dice_${surface}_${idtgout}${HR}_${forecast}.a2
/bin/mv hycom2dice_${surface}_${idtgout}${HR}_${forecast}.a2
hycom2dice_${surface}_${idtgout}${HR}_${forecast}.a
#
    foreach t ( fsd t ice mix)
        if (-e ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.a) then
            /bin/rm -f ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.A
                ${APRUN} ${SRC}/bin/hycom2raw
            ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.a 2525 1841 -999.0
            ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.A
        endif
    end
#
# /usr/lpp/LoadL/full/bin/llq -w $LOADL_STEP_ID
#
# calculate steric ssh
#
set MEAN=094_archMNA.0011_0015_ATH_${REGN}.a
/bin/cp /u/home/${user}/hycom/${REG}/meanstd/094_archMNA.0011_0015_ATH_${REGN}.a
.
#
foreach a ( 000000_${idtgout}${HR}_${forecast} )
    /bin/rm -f hycom2d[NS]fsd*.*
    ${APRUN} ${SRC}/bin/hycom_stericssh hycom2dath_${a}.a ${MEAN} 2525 1841
hycom2dSfsd_${a}.a >! hycom2dSfsd_${a}.b
    ${APRUN} ${SRC}/bin/hycom_expr          hycom2dfsd_${a}.a hycom2dSfsd_${a}.a 2525
1841 1.0 -1.0 hycom2dNfsd_${a}.a >! hycom2dNfsd_${a}.b
end
#
    foreach t ( Nfsd Sfsd)
        if (-e ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.a) then
            /bin/rm -f ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.A
                ${APRUN} ${SRC}/bin/hycom2raw
            ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.a 2525 1841 -999.0
            ${OUT}/hycom2d${t}_${surface}_${idtgout}${HR}_${forecast}.A
        endif
    end
#
# forecash HR2
end
#
date
#
# submit ncoda analysis
#
cd ${LOGS}
~wallcraf/bin/q_navio ${E}ncoda_MERpa1_${idtgtodp1}${HR}_${idtg}${HR}.csh

```

APPENDIX D

Script 727nocda_\${subreg}_\${idtg}18_\${idtg}18.com

This is a script to run the NCODA analysis for each subregion.

```
#!/bin/ksh
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=416
#PBS -l mppnppn=8
#PBS -l walltime=4:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J 727nocda_MERpal.job
#BSUB -n 192
#BSUB -a poe
#BSUB -W 3:30
#BSUB -R "rusage[ntbl_windows=32]span[ptile=16]"
#BSUB -q challenge
#BSUB -P NRLSSC3J
#####BSUB -q internal3d
#####BSUB -P NAVOSHYC
#BSUB -e err_MERpal.%J
#
# --- set days to run
#
inumd=1
#
# --- analysis date
#
idtg=2008050118
#
# --- forecast from this date
#
ifrcst=2008043018
#
# --- day when this run is done (just in output and script being submitted)
#
idtgtod=2008050118
#
# Change note:
# Removed the TMPDIR exclusion.

### @ environment      = COPY_ALL; !TMPDIR;

# -----
#      Script:   ncoda_MERpal.job
#      Purpose:  to setup and cycle the CODA analysis only
#                in the HYCOM 1/12 deg Gulf of Mexico grid
#      Author:   Steve Lowder, NRL-CSC
#                hacked by Jim Cummings
#      Created:  1 Mar 2004
#      Platform: IBM SP5 at NAVO
#      Usage:    see usage() function, below
# -----
```

```

# -----
# DATA NOTE:
# This script copies data from a mass storage server to
# a local archive area (scratch). When the analysis
# runs it operates in another run directory (scratch). At the
# end of the run, this script does not move the results to
# a mass storage server. The move to the permanent storage
# is done with the plotting script submitted at the end of the script.
# -----

# -----
# FUNCTIONS
# Most of the work in this script is organized into
# functions which are defined at the beginning of the
# script. Search for "Begin script" to skip them.
# -----

function usage {
    print ncoda_MERpal.job
    print "usage: ncoda_MERpal.job start_dtg num_days frcst_dtg"
    print "      start_dtg is the first day in yyyyymmddhh format"
    print "      num_days  is the total number of days to cycle"
    print "      frcst_dtg is the forecast day in yyyyymmddhh format"
}

function fatal {
    echo " "
    echo " "
    echo "====="
    echo " "
    echo " "
    echo "Script stopped on error condition at " `date +%T`
    echo " "
    echo " "
    echo "====="
    exit 1
}

function setup_paths {
#
# There are three logical areas to this script.
# 1. The mass storage areas where data is permanently stored.
# 2. The archive area on the computer where mass storage data is
#    copied prior to a run.
# 3. The run area on the computer where the application does its
#    work.
# Setup paths to the mass storage server
#
# SAL change:
    T=09
    E=727
    EXPT=expt_72.7
    REG=MERpal0.08
    REG1=MERpal
    REG0=GLBa0.08
    MSASv=newton
    MSAS_LOCA_MDL=/scr/${USER}/hycom/${REG}/${EXPT}/raw/nowcast
    MSAS_WORK_TOP=/u/home/${USER}/hycom/${REG0}/subtopo/${REG1}
    MSAS_WORK_MDL=/u/home/${USER}/hycom/${REG0}/meanstd
    MSAS_WORK_OBS=${MSASv}:/u/home/ooc/data/ncoda/ocnqc
#
# Setup paths on the computer in the user's scratch and home directory

```

```

#
# BIN_DIR      - the location of all executables
# SCRATCH_DIR - the location of user's scratch area
# MODEL_DIR   - the location of model specific static data
# DB_DIR      - the location of static database files like clim,land-sea
# OBS_DIR     - the location of ocean data observations like ship, ssmi
#
BIN_DIR=/u/home/jac/ncoda_mpi/bin
DTG=/u/home/jac/ncoda_dtg/bin/dtg
# BIN_DIR=/u/home/ooc/models/ncoda/ncoda_mpi/bin
# DDTG=/u/home/ooc/models/ncoda/ncoda_dtg/bin/dtg
SCRATCH_DIR=/scr/$USER
RUN_DIR=$SCRATCH_DIR/${REG}/${EXPT}
SAVE_DIR=$SCRATCH_DIR/${REG0}/ncoda/${EXPT}
RESTART_DIR=$RUN_DIR/restart
DB_DIR=$SCRATCH_DIR/database
OBS_DIR=$DB_DIR/ocnqc
}

function setup_dirs {
    cd $SCRATCH_DIR

    export TMPDIR=$SCRATCH_DIR/tmp
    mkdir -p $TMPDIR

#
# Make the static database dir, obs, dir, and model dir if
# they do not exist.
#

    mkdir -p $DB_DIR
    mkdir -p ${DB_DIR}/clim
    mkdir -p ${DB_DIR}/gdem

    mkdir -p $OBS_DIR
    mkdir -p ${OBS_DIR}/beta
    cd ${OBS_DIR}/beta
    mkdir -p altim
    mkdir -p goes
    mkdir -p lac
    mkdir -p profile
    mkdir -p ship
    mkdir -p ssmi
    mkdir -p ${OBS_DIR}/gamma
    cd ${OBS_DIR}/gamma
    mkdir -p altim
    mkdir -p goes
    mkdir -p lac
    mkdir -p profile
    mkdir -p ship
    mkdir -p ssmi
    mkdir -p ${OBS_DIR}/kappa
    cd ${OBS_DIR}/kappa
    mkdir -p altim
    mkdir -p goes
    mkdir -p lac
    mkdir -p profile
    mkdir -p ship
    mkdir -p ssmi
    mkdir -p ${OBS_DIR}/godae
    cd ${OBS_DIR}/godae
    mkdir -p altim

```

```

    mkdir -p mcsst
    mkdir -p profile
    mkdir -p ship
    mkdir -p ssmi
#
# Now remake the run directory to be sure it is clean.
#
# rm -rf $RUN_DIR/analysis
# rm -rf $RUN_DIR/restart
# mkdir -p $RUN_DIR
mkdir -p $RUN_DIR/analysis
mkdir -p $RUN_DIR/restart
mkdir -p $RUN_DIR/output
mkdir -p $SAVE_DIR
}

function setup_data {
#
# Define local variables
#
    typeset last_dtg
    typeset -i n_back f_frwd
#
# Prepare the data for the entire run. You will need data from
# three logical areas:
# 1. Static data    2. Observation data    3. Model area data
#
# Build or replenish the Model area data
#
    echo " "
    echo "====="
    echo " "

#
# Set the parameters for the number of days forward
# and backward to look for obs.
#
    let n_back=-10
    let n_frwd=2+${inumd}
#
    print -n "    Checking depth file (date time group independent)"
    cd ${RESTART_DIR}
#   if [ ! -r depths_sfc_000000_000000_1o2525x1841_${prev_dtg}_00000000_datafld
]; then
        /bin/cp $MSAS_WORK_TOP/depth_${REG}_${T}.A
depths_sfc_000000_000000_1o2525x1841_${prev_dtg}_00000000_datafld
#   fi
    echo "..... ready"

    print -n "    Checking initial model error file (should be name with
initial date)"
    cd ${RESTART_DIR}
#   if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr
]; then
#       rcp
$MSAS_WORK_MDL/seahgt_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr .
#       rcp
$MSAS_WORK_MDL/seatmp_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr .
#       rcp
$MSAS_WORK_MDL/seatmp_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#       rcp
$MSAS_WORK_MDL/salint_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .

```

```

#       rcp
$MSAS_WORK_MDL/uucurr_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#       rcp
$MSAS_WORK_MDL/vvcurr_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#       fi
#       echo "..... ready"

FCST=${ifrcst}
echo 'FORECAST DATE '${FCST}

print -n "      Checking first guess fields valid tau 024"
cd ${RESTART_DIR}
#   if [ ! -r seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dt_000000_${FCST}_00240000.A
seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dt_000000_${FCST}_00240000.A
seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dsfsd_000000_${FCST}_00240000.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dsfsd_000000_${FCST}_00240000.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#for tau in 00030000 00060000 00090000 00120000 00150000 00180000 00210000
00240000
#do
#       /bin/cp $MSAS_LOCA_MDL/hycom2dsfsd_000000_${FCST}_${tau}.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_${tau}_fcstfld
#done
#       fi
#       if [ ! -r seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dice_000000_${FCST}_00240000.A
seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dice_000000_${FCST}_00240000.A
seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dmix_000000_${FCST}_00240000.A
mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dmix_000000_${FCST}_00240000.A
mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld ];
then
#       /bin/cp $MSAS_WORK_MDL/RS_094_${T}_${REG1}0.08.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/056_archMNA.0009_0013_fsd.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/micomecmwf.year04_05_${REG}.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/zero_008_hycom.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       fi
#       if [ ! -r densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
##       rcp $MSAS_WORK_MDL/hycom3dden_002500_${FCST}_00240000.A
densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#       /bin/cp $MSAS_LOCA_MDL/hycom3dden_002500_${FCST}_00240000.A
densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld

```

```

#   fi
#   if [ ! -r seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3dt_002500_${FCST}_00240000.A
seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
    /bin/cp $MSAS_LOCA_MDL/hycom3dt_002500_${FCST}_00240000.A
seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3ds_002500_${FCST}_00240000.A
salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
    /bin/cp $MSAS_LOCA_MDL/hycom3ds_002500_${FCST}_00240000.A
salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3du_002500_${FCST}_00240000.A
uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
    /bin/cp $MSAS_LOCA_MDL/hycom3du_002500_${FCST}_00240000.A
uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3dv_002500_${FCST}_00240000.A
vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
    /bin/cp $MSAS_LOCA_MDL/hycom3dv_002500_${FCST}_00240000.A
vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
    if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "seahgt sfc forecast does not exist for "${FCST}
        exit
    fi
    if [ ! -r seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "seatmp sfc forecast does not exist for "${FCST}
        exit
    fi
    if [ ! -r seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "seatmp forecast does not exist for "${FCST}
        exit
    fi
    if [ ! -r salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "salint forecast does not exist for "${FCST}
        exit
    fi
    if [ ! -r uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "uucurr forecast does not exist for "${FCST}
        exit
    fi
    if [ ! -r vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
        echo "vvcurr forecast does not exist for "${FCST}
        exit
    fi

    echo "..... ready"

    print -n "          Checking binary files "

```



```

    if [ ! -r $BIN_DIR/ncoda_prep ]; then
        echo "Error: ncoda_prep not found"
    fi
    if [ ! -r $BIN_DIR/ncoda ]; then
        echo "Error: ncoda not found"
    fi
    if [ ! -r $BIN_DIR/ncoda_post ]; then
        echo "Error: ncoda_post not found"
    fi
    echo "..... ready"

    echo " "
    echo " "
    echo "======"
    echo " "
    echo "    Data preparation complete:"
    echo " "
    echo "======"
}

function setup_processors {
#
# Set OpenMP environment
# Set number of OpenMP processors
#
# Note: The pre and post analysis use OpenMP and the
# analysis uses MPI only.
#
# Set number of MPI processors
#   MPICMD='mpirun.lsf '
#   MPICMD='poe '
#   nprc=416

# Set number of OpenMP processors
#   mprc=1

#
# Set OpenMP environment
#
((SLAVE=512*1024*1024))
export OMP_NUM_THREADS=${mprc}
# IBM
export XLSMPOPTS="stack=$SLAVE"
# XT5
#   export MPSTKZ=512M
#   export OMP_SCHEDULE="DYNAMIC,1"
#
#   export OMPCMD='timex -p -mt '
#   export MPICMD='timex -p -mt 'poe
#   export MPICMD='timex -p -mt 'mpirun.lsf
# XT5
export OMPCMD='aprun -n 1 -d '${OMP_NUM_THREADS}
export MPICMD='aprun -n '${nprc}

echo ""
echo "## PE Environment Overview {"
printenv | grep -e '^OMP_' -e '^MP_' -e '^_DSM_' -e '^CHUNK_' -e '^PAGE_' -e
'^MPI_'
echo "## }"
echo ""
#
# Print the hard and soft limits.
#

```

```

    ulimit -aH
    ulimit -aS
}

function setup_namelists {
#
# Setup the namelist files
#
    rm -f odsetnl
    rm -f gridnl
    rm -f oanl
#
# data path settings
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.odsetnl
#
# grid definition namelist settings
#   kko is the number of vertical levels; levels are defined in oanl
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.gridnl
#
# ocean analysis namelist settings
#   for CH assimilation of altimeter SSH, set direct = .true.
#   for MODAS assimilation of altimeter SSH, set modas = .true.
#   for SST assimilation, set st_asm = .true.
#   for potential temperature analysis, set pt_anl = .true.
#   (assumes potential temperature background fields)
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.oanl
#
    echo " "
}

function run_analysis {
    typeset analysis_dtg
    typeset -i cycle_index

    analysis_dtg=${idtg}
    cycle_index=${inumd}
#
# Remove the work files created by the analysis
#
    /bin/rm -f pout*

    echo "    Start Ocean Prep 2D at " `date +%T` >> pout1
    echo " " >> pout1
    ${OMPCMD} $BIN_DIR/ncoda_prep 2D gridnl $analysis_dtg >> pout1
    if [ $? -ne 0 ]; then
        echo " " >> pout1
        echo " " >> pout1
        echo "    Error: Ocean Prep 2D failed at " `date +%T` >> pout1
        echo "    Check pout1" >> pout1
        echo " " >> pout1
        echo " " >> pout1
        fatal
    else
        echo " " >> pout1
        echo " " >> pout1
        echo "    End Ocean Prep 2D at " `date +%T` >> pout1
        echo "    Completed successfully" >> pout1
        echo " " >> pout1
        echo " " >> pout1
    fi
}

```

```

echo "      Start Ocean Analysis 2D at " `date +%T` >> pout2
echo " " >> pout2
${MPICMD} $BIN_DIR/ncoda 2D gridnl $analysis_dtg >> pout2
if [ $? -ne 0 ]; then
    echo " " >> pout2
    echo " " >> pout2
    echo "      Error: Ocean Analysis 2D failed at " `date +%T` >> pout2
    echo "      Check pout2" >> pout2
    echo " " >> pout2
    echo " " >> pout2
    fatal
else
    echo " " >> pout2
    echo " " >> pout2
    echo "      End Ocean Analysis 2D at " `date +%T` >> pout2
    echo "      Completed successfully" >> pout2
    echo " " >> pout2
    echo " " >> pout2
fi

echo "      Start Ocean Post 2D at " `date +%T` >> pout3
echo " " >> pout3
${OMPCMD} $BIN_DIR/ncoda_post 2D gridnl $analysis_dtg >> pout3
if [ $? -ne 0 ]; then
    echo " " >> pout3
    echo " " >> pout3
    echo "      Error: Ocean Post 2D failed at " `date +%T` >> pout3
    echo "      Check pout3" >> pout3
    echo " " >> pout3
    echo " " >> pout3
    fatal
else
    echo " " >> pout3
    echo " " >> pout3
    echo "      End Ocean Post 2D at " `date +%T` >> pout3
    echo "      Completed successfully" >> pout3
    echo " " >> pout3
    echo " " >> pout3
fi

echo "      Start Ocean Prep 3D at " `date +%T` >> pout4
echo " " >> pout4
${OMPCMD} $BIN_DIR/ncoda_prep 3D gridnl $analysis_dtg >> pout4
if [ $? -ne 0 ]; then
    echo " " >> pout4
    echo " " >> pout4
    echo "      Error: Ocean Prep 3D failed at " `date +%T` >> pout4
    echo "      Check pout4" >> pout4
    echo " " >> pout4
    echo " " >> pout4
    fatal
else
    echo " " >> pout4
    echo " " >> pout4
    echo "      End Ocean Prep 3D at " `date +%T` >> pout4
    echo "      Completed successfully" >> pout4
    echo " " >> pout4
    echo " " >> pout4
fi

echo "      Start Ocean Analysis 3D at " `date +%T` >> pout5

```

```

echo " " >> pout5
${MPICMD} $BIN_DIR/ncoda 3D gridnl $analysis_dtg >> pout5
if [ $? -ne 0 ]; then
  if (( $cycle_index == 1 )); then
    echo " " >> pout5
    echo " " >> pout5
    echo "   Error: Ocean Analysis 3D failed at " `date +%T` >> pout5
    echo "   Check pout5" >> pout5
    echo "   This is not a fatal condition, continuing ..." >> pout5
    echo " " >> pout5
    echo " "
  else
    echo " " >> pout5
    echo " " >> pout5
    echo "   Error: Ocean Analysis 3D failed at " `date +%T` >> pout5
    echo "   Check pout5" >> pout5
    echo " " >> pout5
    echo " " >> pout5
    fatal
  fi
fi
else
  echo " " >> pout5
  echo " " >> pout5
  echo "   End Ocean Analysis 3D at " `date +%T` >> pout5
  echo "   Completed successfully" >> pout5
  echo " " >> pout5
  echo " " >> pout5
fi

echo "   Start Ocean Post 3D at " `date +%T` >> pout6
echo " " >> pout6
${OMPCMD} $BIN_DIR/ncoda_post 3D gridnl $analysis_dtg >> pout6
if [ $? -ne 0 ]; then
  if (( $cycle_index == 1 )); then
    echo " " >> pout6
    echo " " >> pout6
    echo "   Error: Ocean Post 3D failed at " `date +%T` >> pout6
    echo "   Check pout6" >> pout6
    echo "   This is not a fatal condition, continuing ..." >> pout6
    echo " " >> pout6
    echo " " >> pout6
  else
    echo " " >> pout6
    echo " " >> pout6
    echo "   Error: Ocean Post 3D failed at " `date +%T` >> pout6
    echo "   Check pout6" >> pout6
    echo " " >> pout6
    echo " " >> pout6
    fatal
  fi
fi
else
  echo " " >> pout6
  echo " " >> pout6
  echo "   End Ocean Post 3D at " `date +%T` >> pout6
  echo "   Completed successfully" >> pout6
  echo " " >> pout6
  echo " " >> pout6
fi

#
# rename diagnostic files (creation controlled by debug options in oanl)
#
mv fort.25 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.rpr
mv fort.27 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.vfy

```

```

mv fort.31 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.syn
mv fort.32 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.rej
mv fort.33 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.prf
mv fort.34 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.gpt
mv fort.35 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.err
mv fort.36 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.mvo
mv fort.37 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.drc
mv fort.38 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.lyp
mv fort.39 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.fix
#
# combine program outputs into single file and finish
#
/bin/rm $analysis_dtg.out
cat pout1 pout2 pout3 pout4 pout5 pout6 >> $analysis_dtg.out
echo "----- odsetnl -----" >> $analysis_dtg.out
cat odsetnl >> $analysis_dtg.out
echo "----- gridnl -----" >> $analysis_dtg.out
cat gridnl >> $analysis_dtg.out
echo "----- oanl -----" >> $analysis_dtg.out
cat oanl >> $analysis_dtg.out
echo "    Analysis ended at " `date +%T`
echo "    Output file: $analysis_dtg.out in " `pwd`
echo "    " `date -u +%Y%m%d'00`
echo " "
echo " "
echo "====="
mv $analysis_dtg.out ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.out
}

function cleanup {
    cd $RUN_DIR/analysis
    # /bin/rm -f coda.*obs&
    # /bin/ls | egrep '^MVOI' | xargs /bin/rm
    /bin/rm MVOI*&
    # rm -f pout*
}

#
#-----
#-----
#
# Begin script execution, check command line arguments
#
#-----
#-----
#

#if [ "$#" -ne 3 ]; then
#    clear
#    usage
#    print ERROR: incorrect number of input args
#    exit 1
#else
    FIRST_DTG="${idtg}"
    NUM_DAYS="${inumd}"
    FCST="${ifrcst}"
#fi

if [[ ${FIRST_DTG} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 1 is not an integer
    exit 1

```

```

fi

if [[ ${NUM_DAYS} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 2 is not an integer
    exit 1
fi

if [[ ${FCST} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 3 is not an integer
    exit 1
fi

if [ ${#FIRST_DTG} -ne 10 ]; then
    clear
    usage
    print ERROR: incorrect format for arg 1
    exit 1
fi

if [ ${#FCST} -ne 10 ]; then
    clear
    usage
    print ERROR: incorrect format for arg 3
    exit 1
fi

#
# The batch process may set file creation mask to 600, change
# this with the mask.
#
    umask 022
#
# Define some useful variables for the model name, dimensions,
# and number of hours in update cycle.
#
    MODEL=hycom
    UPDATE_CYCLE=24
    setup_paths ${MODEL}
#
# Setup date-time-groups for the script
#
    let "day_index=${NUM_DAYS} - 1"
    export CRDATE=${FIRST_DTG:-1999060600}

    prev_dtg=`$DDTG -d -1 2> /dev/null`
#    prev_dtg=`$DDTG -d -7 2> /dev/null`
    LAST_DTG=`$DDTG -d ${day_index} 2> /dev/null`
    curr_dtg=`$DDTG 2> /dev/null`

    echo "====="
    echo " "
    echo " "
    echo "CODA analysis processor(ncoda_${REG1}.job)"
    echo "    The current date/time is" $( date)
    echo " "
    echo " "
    echo "    Dates:"
    echo "        First cycle date           : ${FIRST_DTG}"
    echo "        Last cycle date            : ${LAST_DTG}"

```

```

    echo "      Forecast date          : $FCST"
    echo " "
    echo " "
    echo "      Path setting:"
    echo "      Binary locations:          $BIN_DIR"
    echo "      Scratch directory:        $SCRATCH_DIR"
#   echo "      Model directory:          $MODEL_DIR"
    echo "      Restart directory:        $RESTART_DIR"
    echo "      CODA database directory:  $DB_DIR "
    echo "      CODA obs data directory:  $OBS_DIR "
    echo " "
    echo " "
    echo "===== "

    setup_dirs

#
# Clean the temporary directory structure
#
if [[ ! -e $RUN_DIR ]]; then
    echo "The run directory is missing, can not proceed: $RUN_DIR"
    exit 1
fi

if [[ ! -e $RUN_DIR/restart ]]; then
    echo "The Restart directory is missing, can not proceed: $RUN_DIR/restart"
    exit 1
fi

cd $RUN_DIR
setup_data ${FIRST_DTG} ${NUM_DAYS} ${FCST}
setup_processors

#
# Execute the coda mvoi programs
#
echo " "
echo " "
echo "Start Analysis"
echo "  Directories created"
echo "  Date-time-group: $curr_dtg"
echo "  MPI processes: $nprc"
echo "  OpenMP threads: $mprc"
echo "  Initial directory " `pwd`
echo " "

cd $RUN_DIR/analysis
setup_namelists

#
# loop over update cycles
#
i=1
h=0

num_cycles=${NUM_DAYS}
#while (( $i <= $num_cycles )) do

#
# set analysis dtg
#
curr_dtg=`$DDTG -h $h 2> /dev/null`
echo 'UPDATE_CYCLE : '$UPDATE_CYCLE

```

```
    echo 'curr_dtg : '${curr_dtg} ${i}
    idtg=${idtg}

# execute ncoda mpi mvoi programs
  run_analysis ${idtg} ${i}
#   run_analysis ${curr_dtg} ${i}

#   update counters
#   (( i = i + 1 ))
#   (( h = h + $UPDATE_CYCLE ))
#done

#cleanup
#
cd /scr/${USER}/hycom/${REG0}/${EXPT}/logs
touch done_${REG1}_${idtgtod}_${curr_dtg}
/u/home/wallcraf/bin/q_nav0 ${E}ncoda2arch_${idtgtod}_${curr_dtg}.csh
#
/u/home/wallcraf/bin/q_nav0 ${E}plot_${REG1}_${idtgtod}_${curr_dtg}.csh
echo ""
echo "======"
exit 0
```


APPENDIX E

Script 727ncoda2arch_\${idtg}18_18.com

This script converts the NCODA analysis on z-levels to HYCOM vertical coordinates.

```
#!/bin/ksh
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=416
#PBS -l mppnppn=8
#PBS -l walltime=4:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J 727ncoda_MERpal.job
#BSUB -n 192
#BSUB -a poe
#BSUB -W 3:30
#BSUB -R "rusage[ntbl_windows=32]span[ptile=16]"
#BSUB -q challenge
#BSUB -P NRLSSC3J
#####BSUB -q internal3d
#####BSUB -P NAVOSHYC
#BSUB -e err_MERpal.%J
#
# --- set days to run
#
inumd=1
#
# --- analysis date
#
idtg=2008050118
#
# --- forecast from this date
#
ifrcst=2008043018
#
# --- day when this run is done (just in output and script being submitted)
#
idtgtod=2008050118
#
# Change note:
# Removed the TMPDIR exclusion.

### @ environment      = COPY_ALL; !TMPDIR;

# -----
#      Script:   ncoda_MERpal.job
#      Purpose:  to setup and cycle the CODA analysis only
#                in the HYCOM 1/12 deg Gulf of Mexico grid
#      Author:   Steve Lowder, NRL-CSC
#                hacked by Jim Cummings
#      Created:  1 Mar 2004
#      Platform: IBM SP5 at NAVO
#      Usage:    see usage() function, below
# -----
```

```

# -----
# DATA NOTE:
# This script copies data from a mass storage server to
# a local archive area (scratch). When the analysis
# runs it operates in another run directory (scratch). At the
# end of the run, this script does not move the results to
# a mass storage server. The move to the permanent storage
# is done with the plotting script submitted at the end of the script.
# -----

# -----
# FUNCTIONS
# Most of the work in this script is organized into
# functions which are defined at the beginning of the
# script. Search for "Begin script" to skip them.
# -----

function usage {
    print ncoda_MERpal.job
    print "usage: ncoda_MERpal.job start_dtg num_days frcst_dtg"
    print "      start_dtg is the first day in yyyyymmddhh format"
    print "      num_days  is the total number of days to cycle"
    print "      frcst_dtg is the forecast day in yyyyymmddhh format"
}

function fatal {
    echo " "
    echo " "
    echo "======"
    echo " "
    echo " "
    echo "Script stopped on error condition at " `date +%T`
    echo " "
    echo " "
    echo "======"
    exit 1
}

function setup_paths {
#
# There are three logical areas to this script.
# 1. The mass storage areas where data is permanently stored.
# 2. The archive area on the computer where mass storage data is
#    copied prior to a run.
# 3. The run area on the computer where the application does its
#    work.
# Setup paths to the mass storage server
#

# SAL change:
    T=09
    E=727
    EXPT=expt_72.7
    REG=MERpal0.08
    REG1=MERpal
    REG0=GLBa0.08
    MSASv=newton
    MSAS_LOCA_MDL=/scr/${USER}/hycom/${REG}/${EXPT}/raw/nowcast
    MSAS_WORK_TOP=/u/home/${USER}/hycom/${REG0}/subtopo/${REG1}
    MSAS_WORK_MDL=/u/home/${USER}/hycom/${REG0}/meanstd
    MSAS_WORK_OBS=${MSASv}:/u/home/ooc/data/ncoda/ocnqc
#

```

```

# Setup paths on the computer in the user's scratch and home directory
#
# BIN_DIR          - the location of all executables
# SCRATCH_DIR     - the location of user's scratch area
# MODEL_DIR       - the location of model specific static data
# DB_DIR          - the location of static database files like clim,land-sea
# OBS_DIR         - the location of ocean data observations like ship, ssmi
#
  BIN_DIR=/u/home/jac/ncoda_mpi/bin
  DDTG=/u/home/jac/ncoda_dtg/bin/dtg
#  BIN_DIR=/u/home/ooc/models/ncoda/ncoda_mpi/bin
#  DDTG=/u/home/ooc/models/ncoda/ncoda_dtg/bin/dtg
  SCRATCH_DIR=/scr/$USER
  RUN_DIR=$SCRATCH_DIR/${REG}/${EXPT}
  SAVE_DIR=$SCRATCH_DIR/${REG0}/ncoda/${EXPT}
  RESTART_DIR=$RUN_DIR/restart
  DB_DIR=$SCRATCH_DIR/database
  OBS_DIR=$DB_DIR/ocnqc
}

function setup_dirs {
  cd $SCRATCH_DIR

  export TMPDIR=$SCRATCH_DIR/tmp
  mkdir -p $TMPDIR

#
#  Make the static database dir, obs, dir, and model dir if
#  they do not exist.
#

  mkdir -p $DB_DIR
  mkdir -p ${DB_DIR}/clim
  mkdir -p ${DB_DIR}/gdem

  mkdir -p $OBS_DIR
  mkdir -p ${OBS_DIR}/beta
  cd ${OBS_DIR}/beta
  mkdir -p altim
  mkdir -p goes
  mkdir -p lac
  mkdir -p profile
  mkdir -p ship
  mkdir -p ssmi
  mkdir -p ${OBS_DIR}/gamma
  cd ${OBS_DIR}/gamma
  mkdir -p altim
  mkdir -p goes
  mkdir -p lac
  mkdir -p profile
  mkdir -p ship
  mkdir -p ssmi
  mkdir -p ${OBS_DIR}/kappa
  cd ${OBS_DIR}/kappa
  mkdir -p altim
  mkdir -p goes
  mkdir -p lac
  mkdir -p profile
  mkdir -p ship
  mkdir -p ssmi
  mkdir -p ${OBS_DIR}/godae
  cd ${OBS_DIR}/godae

```

```

    mkdir -p altim
    mkdir -p mcsst
    mkdir -p profile
    mkdir -p ship
    mkdir -p ssmi
#
# Now remake the run directory to be sure it is clean.
#
# rm -rf $RUN_DIR/analysis
# rm -rf $RUN_DIR/restart
# mkdir -p $RUN_DIR
  mkdir -p $RUN_DIR/analysis
  mkdir -p $RUN_DIR/restart
  mkdir -p $RUN_DIR/output
  mkdir -p $SAVE_DIR
}

function setup_data {
#
# Define local variables
#
  typeset last_dtg
  typeset -i n_back f_frwd
#
# Prepare the data for the entire run. You will need data from
# three logical areas:
# 1. Static data    2. Observation data    3. Model area data
#
# Build or replenish the Model area data
#
  echo " "
  echo "======"
  echo " "

#
# Set the parameters for the number of days forward
# and backward to look for obs.
#
  let n_back=-10
  let n_frwd=2+${inumd}
#
  print -n "      Checking depth file (date time group independent)"
  cd ${RESTART_DIR}
#   if [ ! -r depths_sfc_000000_000000_1o2525x1841_${prev_dtg}_00000000_datafld
]; then
      /bin/cp $MSAS_WORK_TOP/depth_${REG}_${T}.A
depths_sfc_000000_000000_1o2525x1841_${prev_dtg}_00000000_datafld
#   fi
  echo "..... ready"

  print -n "      Checking initial model error file (should be name with
initial date)"
  cd ${RESTART_DIR}
#   if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr
]; then
#     rcp
$MSAS_WORK_MDL/seahgt_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr .
#     rcp
$MSAS_WORK_MDL/seatmp_sfc_000000_000000_1o2525x1841_1999080900_00000000_modlerr .
#     rcp
$MSAS_WORK_MDL/seatmp_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#     rcp
$MSAS_WORK_MDL/salint_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .

```

```

#       rcp
$MSAS_WORK_MDL/uucurr_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#       rcp
$MSAS_WORK_MDL/vvcurr_pre_000000_002500_1o2525x1841_1999080900_00000000_modlerr .
#       fi
#       echo "..... ready"

FCST=${ifrcst}
echo 'FORECAST DATE '${FCST}

print -n "      Checking first guess fields valid tau 024"
cd ${RESTART_DIR}
#   if [ ! -r seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dt_000000_${FCST}_00240000.A
seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dt_000000_${FCST}_00240000.A
seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dsfsd_000000_${FCST}_00240000.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dsfsd_000000_${FCST}_00240000.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#for tau in 00030000 00060000 00090000 00120000 00150000 00180000 00210000
00240000
#do
#       /bin/cp $MSAS_LOCA_MDL/hycom2dsfsd_000000_${FCST}_${tau}.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_${tau}_fcstfld
#done
#       fi
#       if [ ! -r seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dice_000000_${FCST}_00240000.A
seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dice_000000_${FCST}_00240000.A
seaice_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom2dmix_000000_${FCST}_00240000.A
mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom2dmix_000000_${FCST}_00240000.A
mixlyr_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld
#       fi
#       if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld ];
then
#       /bin/cp $MSAS_WORK_MDL/RS_094_${T}_${REG1}0.08.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/056_archMNA.0009_0013_fsd.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/micomecmwf.year04_05_${REG}.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       rcp $MSAS_WORK_MDL/zero_008_hycom.A
seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00000000_meanfld
#       fi
#       if [ ! -r densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
##       rcp $MSAS_WORK_MDL/hycom3dden_002500_${FCST}_00240000.A
densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#       /bin/cp $MSAS_LOCA_MDL/hycom3dden_002500_${FCST}_00240000.A
densty_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld

```

```

#   fi
#   if [ ! -r seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3dt_002500_${FCST}_00240000.A
seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom3dt_002500_${FCST}_00240000.A
seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3ds_002500_${FCST}_00240000.A
salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom3ds_002500_${FCST}_00240000.A
salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3du_002500_${FCST}_00240000.A
uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom3du_002500_${FCST}_00240000.A
uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
#   if [ ! -r vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
#       rcp $MSAS_WORK_MDL/hycom3dv_002500_${FCST}_00240000.A
vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
/bin/cp $MSAS_LOCA_MDL/hycom3dv_002500_${FCST}_00240000.A
vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld
#   fi
if [ ! -r seahgt_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "seahgt sfc forecast does not exist for "${FCST}
exit
fi
if [ ! -r seatmp_sfc_000000_000000_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "seatmp sfc forecast does not exist for "${FCST}
exit
fi
if [ ! -r seatmp_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "seatmp forecast does not exist for "${FCST}
exit
fi
if [ ! -r salint_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "salint forecast does not exist for "${FCST}
exit
fi
if [ ! -r uucurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "uucurr forecast does not exist for "${FCST}
exit
fi
if [ ! -r vvcurr_pre_000000_002500_1o2525x1841_${FCST}_00240000_fcstfld ];
then
echo "vvcurr forecast does not exist for "${FCST}
exit
fi

echo "..... ready"

print -n "      Checking binary files "

```

```

    if [ ! -r $BIN_DIR/ncoda_prep ]; then
        echo "Error: ncoda_prep not found"
    fi
    if [ ! -r $BIN_DIR/ncoda ]; then
        echo "Error: ncoda not found"
    fi
    if [ ! -r $BIN_DIR/ncoda_post ]; then
        echo "Error: ncoda_post not found"
    fi
    echo "..... ready"

    echo " "
    echo " "
    echo "======"
    echo " "
    echo "    Data preparation complete:"
    echo " "
    echo "======"
}

function setup_processors {
#
# Set OpenMP environment
# Set number of OpenMP processors
#
# Note: The pre and post analysis use OpenMP and the
# analysis uses MPI only.
#
# Set number of MPI processors
#   MPICMD='mpirun.lsf '
#   MPICMD='poe '
#   nprc=416

# Set number of OpenMP processors
#   mprc=1

#
# Set OpenMP environment
#
((SLAVE=512*1024*1024))
export OMP_NUM_THREADS=${mprc}
# IBM
export XLSMPOPTS="stack=$SLAVE"
# XT5
#   export MPSTKZ=512M
#   export OMP_SCHEDULE="DYNAMIC,1"
#
#   export OMPCMD='timex -p -mt '
#   export MPICMD='timex -p -mt 'poe
#   export MPICMD='timex -p -mt 'mpirun.lsf
# XT5
export OMPCMD='aprun -n 1 -d '${OMP_NUM_THREADS}
export MPICMD='aprun -n '${nprc}

echo ""
echo "## PE Environment Overview {"
printenv | grep -e '^OMP_' -e '^MP_' -e '^_DSM_' -e '^CHUNK_' -e '^PAGE_' -e
'^MPI_'
echo "## }"
echo ""
#
# Print the hard and soft limits.
#

```

```

    ulimit -aH
    ulimit -aS
}

function setup_namelists {
#
# Setup the namelist files
#
    rm -f odsetnl
    rm -f gridnl
    rm -f oanl
#
# data path settings
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.odsetnl
#
# grid definition namelist settings
#   kko is the number of vertical levels; levels are defined in oanl
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.gridnl
#
# ocean analysis namelist settings
#   for CH assimilation of altimeter SSH, set direct = .true.
#   for MODAS assimilation of altimeter SSH, set modas = .true.
#   for SST assimilation, set st_asm = .true.
#   for potential temperature analysis, set pt_anl = .true.
#   (assumes potential temperature background fields)
#
    . /u/home/${USER}/${REG0}/ncoda/${EXPT}/${REG1}_${E}.oanl
#
    echo " "
}

function run_analysis {
    typeset analysis_dtg
    typeset -i cycle_index

    analysis_dtg=${idtg}
    cycle_index=${inumd}
#
# Remove the work files created by the analysis
#
    /bin/rm -f pout*

    echo "    Start Ocean Prep 2D at " `date +%T` >> pout1
    echo " " >> pout1
    ${OMPCMD} $BIN_DIR/ncoda_prep 2D gridnl $analysis_dtg >> pout1
    if [ $? -ne 0 ]; then
        echo " " >> pout1
        echo " " >> pout1
        echo "    Error: Ocean Prep 2D failed at " `date +%T` >> pout1
        echo "    Check pout1" >> pout1
        echo " " >> pout1
        echo " " >> pout1
        fatal
    else
        echo " " >> pout1
        echo " " >> pout1
        echo "    End Ocean Prep 2D at " `date +%T` >> pout1
        echo "    Completed successfully" >> pout1
        echo " " >> pout1
        echo " " >> pout1
    fi
}

```



```

echo "      Start Ocean Analysis 2D at " `date +%T` >> pout2
echo " " >> pout2
${MPICMD} $BIN_DIR/ncoda 2D gridnl $analysis_dtg >> pout2
if [ $? -ne 0 ]; then
    echo " " >> pout2
    echo " " >> pout2
    echo "      Error: Ocean Analysis 2D failed at " `date +%T` >> pout2
    echo "      Check pout2" >> pout2
    echo " " >> pout2
    echo " " >> pout2
    fatal
else
    echo " " >> pout2
    echo " " >> pout2
    echo "      End Ocean Analysis 2D at " `date +%T` >> pout2
    echo "      Completed successfully" >> pout2
    echo " " >> pout2
    echo " " >> pout2
fi

echo "      Start Ocean Post 2D at " `date +%T` >> pout3
echo " " >> pout3
${OMPCMD} $BIN_DIR/ncoda_post 2D gridnl $analysis_dtg >> pout3
if [ $? -ne 0 ]; then
    echo " " >> pout3
    echo " " >> pout3
    echo "      Error: Ocean Post 2D failed at " `date +%T` >> pout3
    echo "      Check pout3" >> pout3
    echo " " >> pout3
    echo " " >> pout3
    fatal
else
    echo " " >> pout3
    echo " " >> pout3
    echo "      End Ocean Post 2D at " `date +%T` >> pout3
    echo "      Completed successfully" >> pout3
    echo " " >> pout3
    echo " " >> pout3
fi

echo "      Start Ocean Prep 3D at " `date +%T` >> pout4
echo " " >> pout4
${OMPCMD} $BIN_DIR/ncoda_prep 3D gridnl $analysis_dtg >> pout4
if [ $? -ne 0 ]; then
    echo " " >> pout4
    echo " " >> pout4
    echo "      Error: Ocean Prep 3D failed at " `date +%T` >> pout4
    echo "      Check pout4" >> pout4
    echo " " >> pout4
    echo " " >> pout4
    fatal
else
    echo " " >> pout4
    echo " " >> pout4
    echo "      End Ocean Prep 3D at " `date +%T` >> pout4
    echo "      Completed successfully" >> pout4
    echo " " >> pout4
    echo " " >> pout4
fi

echo "      Start Ocean Analysis 3D at " `date +%T` >> pout5

```

```

echo " " >> pout5
${MPICMD} $BIN_DIR/ncoda 3D gridnl $analysis_dtg >> pout5
if [ $? -ne 0 ]; then
  if (( $cycle_index == 1 )); then
    echo " " >> pout5
    echo " " >> pout5
    echo "   Error: Ocean Analysis 3D failed at " `date +%T` >> pout5
    echo "   Check pout5" >> pout5
    echo "   This is not a fatal condition, continuing ..." >> pout5
    echo " " >> pout5
    echo " "
  else
    echo " " >> pout5
    echo " " >> pout5
    echo "   Error: Ocean Analysis 3D failed at " `date +%T` >> pout5
    echo "   Check pout5" >> pout5
    echo " " >> pout5
    echo " " >> pout5
    fatal
  fi
fi
else
  echo " " >> pout5
  echo " " >> pout5
  echo "   End Ocean Analysis 3D at " `date +%T` >> pout5
  echo "   Completed successfully" >> pout5
  echo " " >> pout5
  echo " " >> pout5
fi

echo "   Start Ocean Post 3D at " `date +%T` >> pout6
echo " " >> pout6
${MPCMD} $BIN_DIR/ncoda_post 3D gridnl $analysis_dtg >> pout6
if [ $? -ne 0 ]; then
  if (( $cycle_index == 1 )); then
    echo " " >> pout6
    echo " " >> pout6
    echo "   Error: Ocean Post 3D failed at " `date +%T` >> pout6
    echo "   Check pout6" >> pout6
    echo "   This is not a fatal condition, continuing ..." >> pout6
    echo " " >> pout6
    echo " " >> pout6
  else
    echo " " >> pout6
    echo " " >> pout6
    echo "   Error: Ocean Post 3D failed at " `date +%T` >> pout6
    echo "   Check pout6" >> pout6
    echo " " >> pout6
    echo " " >> pout6
    fatal
  fi
fi
else
  echo " " >> pout6
  echo " " >> pout6
  echo "   End Ocean Post 3D at " `date +%T` >> pout6
  echo "   Completed successfully" >> pout6
  echo " " >> pout6
  echo " " >> pout6
fi

#
# rename diagnostic files (creation controlled by debug options in oanl)
#
mv fort.25 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.rpr
mv fort.27 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.vfy

```

```

mv fort.31 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.syn
mv fort.32 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.rej
mv fort.33 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.prf
mv fort.34 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.gpt
mv fort.35 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.err
mv fort.36 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.mvo
mv fort.37 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.drc
mv fort.38 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.lyp
mv fort.39 ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.fix
#
# combine program outputs into single file and finish
#
/bin/rm $analysis_dtg.out
cat pout1 pout2 pout3 pout4 pout5 pout6 >> $analysis_dtg.out
echo "----- odsetnl -----" >> $analysis_dtg.out
cat odsetnl >> $analysis_dtg.out
echo "----- gridnl -----" >> $analysis_dtg.out
cat gridnl >> $analysis_dtg.out
echo "----- oanl -----" >> $analysis_dtg.out
cat oanl >> $analysis_dtg.out
echo "    Analysis ended at " `date +%T`
echo "    Output file: $analysis_dtg.out in " `pwd`
echo "    " `date -u +%Y%m%d'00`
echo " "
echo " "
echo "====="
mv $analysis_dtg.out ${SAVE_DIR}/${REG1}_${E}_${idtgtod}_${analysis_dtg}.out
}

function cleanup {
    cd $RUN_DIR/analysis
    # /bin/rm -f coda.*obs&
    # /bin/ls | egrep '^MVOI' | xargs /bin/rm
    /bin/rm MVOI*&
    # rm -f pout*
}

#
#-----
#-----
#
# Begin script execution, check command line arguments
#
#-----
#-----
#

#if [ "$#" -ne 3 ]; then
#    clear
#    usage
#    print ERROR: incorrect number of input args
#    exit 1
#else
    FIRST_DTG="${idtg}"
    NUM_DAYS="${inumd}"
    FCST="${ifrcst}"
#fi

if [[ ${FIRST_DTG} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 1 is not an integer
    exit 1

```

```

fi

if [[ ${NUM_DAYS} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 2 is not an integer
    exit 1
fi

if [[ ${FCST} != +([0-9]) ]]; then
    clear
    usage
    print ERROR: arg 3 is not an integer
    exit 1
fi

if [ ${#FIRST_DTG} -ne 10 ]; then
    clear
    usage
    print ERROR: incorrect format for arg 1
    exit 1
fi

if [ ${#FCST} -ne 10 ]; then
    clear
    usage
    print ERROR: incorrect format for arg 3
    exit 1
fi

#
# The batch process may set file creation mask to 600, change
# this with the mask.
#
    umask 022
#
# Define some useful variables for the model name, dimensions,
# and number of hours in update cycle.
#
    MODEL=hycom
    UPDATE_CYCLE=24
    setup_paths ${MODEL}
#
# Setup date-time-groups for the script
#
    let "day_index=${NUM_DAYS} - 1"
    export CRDATE=${FIRST_DTG:-1999060600}

    prev_dtg=`$DDTG -d -1 2> /dev/null`
#   prev_dtg=`$DDTG -d -7 2> /dev/null`
    LAST_DTG=`$DDTG -d ${day_index} 2> /dev/null`
    curr_dtg=`$DDTG 2> /dev/null`

    echo "====="
    echo " "
    echo " "
    echo "CODA analysis processor(ncoda_${REG1}.job)"
    echo "   The current date/time is" $( date)
    echo " "
    echo " "
    echo "   Dates:"
    echo "       First cycle date           : $FIRST_DTG"
    echo "       Last cycle date            : $LAST_DTG"

```

```

    echo "      Forecast date          : $FCST"
    echo " "
    echo " "
    echo "      Path setting:"
    echo "      Binary locations:          $BIN_DIR"
    echo "      Scratch directory:        $SCRATCH_DIR"
#   echo "      Model directory:          $MODEL_DIR"
    echo "      Restart directory:        $RESTART_DIR"
    echo "      CODA database directory:  $DB_DIR "
    echo "      CODA obs data directory:  $OBS_DIR "
    echo " "
    echo " "
    echo "===== "

    setup_dirs

#
# Clean the temporary directory structure
#
if [[ ! -e $RUN_DIR ]]; then
    echo "The run directory is missing, can not proceed: $RUN_DIR"
    exit 1
fi

if [[ ! -e $RUN_DIR/restart ]]; then
    echo "The Restart directory is missing, can not proceed: $RUN_DIR/restart"
    exit 1
fi

cd $RUN_DIR
setup_data ${FIRST_DTG} ${NUM_DAYS} ${FCST}
setup_processors

#
# Execute the coda mvoi programs
#
echo " "
echo " "
echo "Start Analysis"
echo "  Directories created"
echo "  Date-time-group: $curr_dtg"
echo "  MPI processes: $nprc"
echo "  OpenMP threads: $mprc"
echo "  Initial directory " `pwd`
echo " "

cd $RUN_DIR/analysis
setup_namelists

#
# loop over update cycles
#
i=1
h=0

num_cycles=${NUM_DAYS}
#while (( $i <= $num_cycles )) do

#
# set analysis dtg
#
curr_dtg=`$DDTG -h $h 2> /dev/null`
echo 'UPDATE_CYCLE : '$UPDATE_CYCLE

```

```

    echo 'curr_dtg : '${curr_dtg} ${i}
    idtg=${idtg}

# execute ncoda mpi mvoi programs
  run_analysis ${idtg} ${i}
#   run_analysis ${curr_dtg} ${i}

#   update counters
#   (( i = i + 1 ))
#   (( h = h + $UPDATE_CYCLE ))
#done

#cleanup
#
cd /scr/${USER}/hycom/${REG0}/${EXPT}/logs
touch done_${REG1}_${idtgtod}_${curr_dtg}
/u/home/wallcraf/bin/q_nav0 ${E}ncoda2arch_${idtgtod}_${curr_dtg}.csh
#
/u/home/wallcraf/bin/q_nav0 ${E}plot_${REG1}_${idtgtod}_${curr_dtg}.csh
echo ""
echo "======"
exit 0

#!/bin/csh -f
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=1
#PBS -l mppnppn=1
#PBS -l mppmem=16gb
#PBS -l walltime=2:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J 727ncoda2arch_all
#BSUB -n 1
#BSUB -W 2:30
#BSUB -R "span[ptile=1]"
#BSUB -q internal3d
#BSUB -P NAVOSHYC
#
set echo
set time = 1
set BIN=/u/home/${user}/bin
set pget=~wallcraf/bin/pget
#
set OS=`uname`
switch ($OS)
case 'Linux':
  which aprun
  if (! $status) then
    set APRUN='aprun -n 1 -m 16g '
    set SRC=/u/home/wallcraf/hycom/ALLcn1
  else
    set APRUN=''
    set SRC=/u/home/wallcraf/hycom/ALL
  endif
  breaksw
case 'AIX'
  set APRUN=''
  set SRC=/u/home/wallcraf/hycom/ALL
  breaksw

```

```

default:
  set APRUN=''
  set SRC=/u/home/wallcraf/hycom/ALL
endsw
#
C
C --- Remap an archive file to an NCODA analysis, new layer depths.
C
  setenv pget cp
  setenv pput cp
  setenv pget ~wallcraf/bin/pget
  setenv pput ~wallcraf/bin/pput
C
C --- E    is experiment number
C --- REG  is region identifier
C --- T    is topog. identifier
C --- EN   is ncoda experiment number
C --- REGN is ncoda region identifier
C
#
# analysis hour
#
setenv HR 18
#
setenv idtg 20080501
setenv idtg1 ${idtg}
setenv idtgtod 20080501
setenv idtgtodp1 20080501
setenv idtgtodm1 20080501
setenv idtgtodplt `${BIN}/addndays yyyyymmdd ${idtgtod} -1`
#setenv idtgmax `${BIN}/addndays yyyyymmdd ${idtg} +0`
#
setenv E 727
set REG=GLBa0.08
set EXPT=expt_72.7
set case=nowcast
setenv T 09
setenv MVOI /u/home/${user}/hycom/${REG}/${EXPT}/mvoi
set TOPO=/u/home/${user}/hycom/${REG}/topo
set RUN=/u/home/${user}/hycom/${REG}/${EXPT}/mvoi
set LOGS=/scr/${user}/hycom/${REG}/${EXPT}/logs
set INP=/scr/${user}/hycom/${REG}/${EXPT}/${case}
#
set arcl=archv
set arc2=archv_1
#
cd ${INP}
C
touch  ncoda_archv_vel
/bin/rm ncoda_archv_vel
touch  ncoda_archv
/bin/rm ncoda_archv
#
foreach REGN( ANTarc MERat1 MERpal MERin1 ARCat1 ARCPac ARCOcn)
#
START:
if( -e ${LOGS}/done_${REGN}_${idtgtodp1}${HR}_${idtg}${HR}) then
  goto RUN
else
  echo 'Sleeping'
  sleep 60
  goto START
endif

```

```
RUN:
#
if(${REGN} == "ARCocn") then
  set SIZN="1600x1297"
  set ilstn=2459
  set jlstn=2650
  set idmn=1600
  set jdmn=1297
endif
if(${REGN} == "ARCat1") then
  set SIZN="1490x0551"
  set ilstn=2440
  set jlstn=2150
  set idmn=1490
  set jdmn=551
endif
if(${REGN} == "ARCPac") then
  set SIZN="1335x0551"
  set ilstn=730
  set jlstn=2150
  set idmn=1335
  set jdmn=551
endif
if(${REGN} == "ANTarc") then
  set SIZN="3827x0411"
  set ilstn=824
  set jlstn=1
  set idmn=3827
  set jdmn=411
endif
if(${REGN} == "MER1a") then
  set SIZN="4501x0511"
  set ilstn=3574
  set jlstn=360
  set idmn=4501
  set jdmn=511
endif
if(${REGN} == "MER2b") then
  set SIZN="4501x0511"
  set ilstn=3574
  set jlstn=820
  set idmn=4501
  set jdmn=511
endif
if(${REGN} == "MER3c") then
  set SIZN="4501x0511"
  set ilstn=3574
  set jlstn=1280
  set idmn=4501
  set jdmn=511
endif
if(${REGN} == "MER4d") then
  set SIZN="4501x0461"
  set ilstn=3574
  set jlstn=1740
  set idmn=4501
  set jdmn=461
endif
if(${REGN} == "MERat1") then
  set SIZN="1751x1841"
  set ilstn=2349
  set jlstn=360
  set idmn=1751
```



```

    set jdmn=1841
endif
#
if(${REGN} == "MERpal") then
    set SIZN="2525x1841"
    set ilstn=199
    set jlstn=360
    set idmn=2525
    set jdmn=1841
endif
#
if(${REGN} == "MERin1") then
    set SIZN="1313x1569"
    set ilstn=3949
    set jlstn=360
    set idmn=1313
    set jdmn=1569
endif
#
setenv EN 727
set EXPTN=expt_72.7
setenv TN ${T}
set TOPON=/u/home/${user}/hycom/${REG}/subtopo/${REGN}
#
set NCODA=/scr/${user}/${REGN}0.08/${EXPTN}/restart
mkdir -p ${INP}/../data/incup
#
#
set typet=seatmp_pre_000000_002500_lo${SIZN}
set types=salint_pre_000000_002500_lo${SIZN}
set typeu=ucurr_pre_000000_002500_lo${SIZN}
set typev=vvcurr_pre_000000_002500_lo${SIZN}
set typep=lyrprs_pre_000000_002500_lo${SIZN}
set typei=seaice_sfc_000000_000000_lo${SIZN}
C
touch zi42.txt
if (-z zi42.txt) then
# ${pget} ${RUN}/zi42.txt zi42.txt &
  /bin/cp ${RUN}/zi42.txt zi42.txt &
endif
C
touch regional.depth.a regional.depth.b
if (-z regional.depth.b) then
# ${pget} ${TOPO}/depth_${REG}_${T}.b regional.depth.b &
  cp ${TOPO}/depth_${REG}_${T}.b regional.depth.b &
endif
if (-z regional.depth.a) then
# ${pget} ${TOPO}/depth_${REG}_${T}.a regional.depth.a &
  cp ${TOPO}/depth_${REG}_${T}.a regional.depth.a &
endif
C
touch regional.grid.a regional.grid.b
if (-z regional.grid.b) then
# ${pget} ${TOPO}/regional.grid.b regional.grid.b &
  cp ${TOPO}/regional.grid.b regional.grid.b &
endif
if (-z regional.grid.a) then
# ${pget} ${TOPO}/regional.grid.a regional.grid.a &
  cp ${TOPO}/regional.grid.a regional.grid.a &
endif
touch iso.sigma.a iso.sigma.b
if (-z iso.sigma.b) then
  cp ${INP}/../data/iso.sigma.b iso.sigma.b &

```

```

endif
if (-z iso.sigma.a) then
  cp ${INP}/../data/iso.sigma.a iso.sigma.a &
endif
#
# subregion depth files
#
touch subregional.depth.${REGN}.a
if (-z subregional.depth.${REGN}.a) then
# ${pget} ${TOPON}/depth_${REGN}0.08_${TN}.a subregional.depth.${REGN}.a &
  /bin/cp ${TOPON}/depth_${REGN}0.08_${TN}.a subregional.depth.${REGN}.a &
endif
C
touch ncoda_archv_vel
touch ncoda_archv
#if (-z ncoda_archv_vel) then
# cp ~wallcraf/hycom/ALL/archive/src/ncoda_archv_vel . &
# cp ${SRC}/archive/src/ncoda_archv . &
#endif
wait
chmod a+rx ncoda_archv_vel
chmod a+rx ncoda_archv
C
#
/bin/rm ${arcl}.${idtgl}.a ${arcl}.${idtgl}.b
touch ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.a
if (-z ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.a) then
  echo ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.a is not there
else
  ln -s ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.a ${arcl}.${idtgl}.a
endif
touch ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.b
if (-z ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.b) then
  echo ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.b is not there
else
  ln -s ${arcl}.${idgtodml}${HR}_${idtgl}${HR}.b ${arcl}.${idtgl}.b
endif
C
/bin/rm seatmp_${idtg}_ncoda_${REGN}
touch seatmp_${idtg}_ncoda_${REGN}
if (-z seatmp_${idtg}_ncoda_${REGN}) then
  /bin/rm seatmp_${idtg}_ncoda_${REGN}
  ln -s ${NCODA}/${typet}_${idtg}${HR}_00000000_analfld
seatmp_${idtg}_ncoda_${REGN} &
endif
/bin/rm salint_${idtg}_ncoda_${REGN}
touch salint_${idtg}_ncoda_${REGN}
if (-z salint_${idtg}_ncoda_${REGN}) then
  /bin/rm salint_${idtg}_ncoda_${REGN}
  ln -s ${NCODA}/${types}_${idtg}${HR}_00000000_analfld
salint_${idtg}_ncoda_${REGN} &
endif
/bin/rm uucuri_${idtg}_ncoda_${REGN}
touch uucuri_${idtg}_ncoda_${REGN}
if (-z uucuri_${idtg}_ncoda_${REGN}) then
  /bin/rm uucuri_${idtg}_ncoda_${REGN}
  ln -s ${NCODA}/${typeu}_${idtg}${HR}_00000000_analinc
uucuri_${idtg}_ncoda_${REGN} &
endif
/bin/rm vvcuri_${idtg}_ncoda_${REGN}
touch vvcuri_${idtg}_ncoda_${REGN}
if (-z vvcuri_${idtg}_ncoda_${REGN}) then
  /bin/rm vvcuri_${idtg}_ncoda_${REGN}

```

```

    ln -s ${NCODA}/${typev}_${idtg}${HR}_00000000_analinc
vvcurl_${idtg}_ncoda_${REGN} &
endif
/bin/rm layprs_${idtg}_ncoda_${REGN}
touch layprs_${idtg}_ncoda_${REGN}
if (-z layprs_${idtg}_ncoda_${REGN}) then
    /bin/rm layprs_${idtg}_ncoda_${REGN}
    ln -s ${NCODA}/${typep}_${idtg}${HR}_00000000_analinc
layprs_${idtg}_ncoda_${REGN} &
endif
/bin/rm seaice_${idtg}_ncoda_${REGN}
touch seaice_${idtg}_ncoda_${REGN}
if (-z seaice_${idtg}_ncoda_${REGN}) then
    /bin/rm seaice_${idtg}_ncoda_${REGN}
    ln -s ${NCODA}/${typei}_${idtg}${HR}_00000000_analfld
seaice_${idtg}_ncoda_${REGN} &
endif

wait
C
/bin/rm -f ${arc2}.${idtg}.a ${arc2}.${idtg}.b
#
# foreach REGN
end
date
C
C --- do all subregions in a single invocation of ncoda_archv_vel
C
date
${APRUN} ./ncoda_archv <<E-o-D
${arc1}.${idtgl}.a
${arc2}.${idtgl}.a
0      'intflg' = vertical interpolation flag (0=T&S, 1=th&S)
2      'isoflg' = preserve isopycnal layer flag (0=n,1=y,2=y&layT,3=y&isoT)
000    'iexpt ' = experiment number x10 (000=from archive file)
3      'yrflag' = days in year flag (0=360, 1=366, 2=366J1, 3=actual)
4500   'idm   ' = longitudinal array size
3298   'jdm   ' = latitudinal array size
2460   'itest ' = longitudinal test point (optional, default 0)
1874   'jtest ' = latitudinal test point (optional, default 0)
32     'kdm   ' = number of layers
32     'nhybrd' = number of hybrid levels (0=all isopycnal)
14     'nsigma' = number of sigma levels (nhybrd-nsigma z-levels)
3.0    'dp00  ' = deep z-level spacing minimum thickness (m)
450.0  'dp00x  ' = deep z-level spacing maximum thickness (m)
1.18   'dp00f  ' = deep z-level spacing stretching factor (1.0=const.space)
0.5    'ds00  ' = shallow z-level spacing minimum thickness (m)
75.0   'ds00x  ' = shallow z-level spacing maximum thickness (m)
1.18   'ds00f  ' = shallow z-level spacing stretching factor (1.0=const.space)
1.0    'dp00i  ' = deep iso-pycnal spacing minimum thickness (m)
6.0    'isotop' = shallowest depth for isopycnal layers (m, <0 from file)
0.03   'deniso' = isopycnal if layer is within deniso of target density
34.0   'thbase' = reference density (sigma units)
1      'vsigma' = spacially varying isopycnal target densities (0=F,1=T)
28.10  'sigma ' = layer 1 isopycnal target density (sigma units)
28.90  'sigma ' = layer 2 isopycnal target density (sigma units)
29.70  'sigma ' = layer 3 isopycnal target density (sigma units)
30.50  'sigma ' = layer 4 isopycnal target density (sigma units)
30.95  'sigma ' = layer 5 isopycnal target density (sigma units)
31.50  'sigma ' = layer 6 isopycnal target density (sigma units)
32.05  'sigma ' = layer 7 isopycnal target density (sigma units)
32.60  'sigma ' = layer 8 isopycnal target density (sigma units)
33.15  'sigma ' = layer 9 isopycnal target density (sigma units)

```

```

33.70  'sigma ' = layer 10 isopycnal target density (sigma units)
34.25  'sigma ' = layer 11 isopycnal target density (sigma units)
34.75  'sigma ' = layer 12 isopycnal target density (sigma units)
35.15  'sigma ' = layer 13 isopycnal target density (sigma units)
35.50  'sigma ' = layer 14 isopycnal target density (sigma units)
35.80  'sigma ' = layer 15 isopycnal target density (sigma units)
36.04  'sigma ' = layer 16 isopycnal target density (sigma units)
36.20  'sigma ' = layer 17 isopycnal target density (sigma units)
36.38  'sigma ' = layer 18 isopycnal target density (sigma units)
36.52  'sigma ' = layer 19 isopycnal target density (sigma units)
36.62  'sigma ' = layer 20 isopycnal target density (sigma units)
36.70  'sigma ' = layer 21 isopycnal target density (sigma units)
36.77  'sigma ' = layer 22 isopycnal target density (sigma units)
36.83  'sigma ' = layer 23 isopycnal target density (sigma units)
36.89  'sigma ' = layer 24 isopycnal target density (sigma units)
36.97  'sigma ' = layer 25 isopycnal target density (sigma units)
37.02  'sigma ' = layer 26 isopycnal target density (sigma units)
37.06  'sigma ' = layer 27 isopycnal target density (sigma units)
37.10  'sigma ' = layer 28 isopycnal target density (sigma units)
37.17  'sigma ' = layer 29 isopycnal target density (sigma units)
37.30  'sigma ' = layer 30 isopycnal target density (sigma units)
37.42  'sigma ' = layer 31 isopycnal target density (sigma units)
37.48  'sigma ' = layer 32 isopycnal target density (sigma units)
0.5    'hicemn' = minimum ice thickness (m)
seatmp_${idtg}_ncoda_ANTarc
salint_${idtg}_ncoda_ANTarc
uucuri_${idtg}_ncoda_ANTarc
vvcuri_${idtg}_ncoda_ANTarc
layprs_${idtg}_ncoda_ANTarc
subregional.depth.ANTarc.a
seaice_${idtg}_ncoda_ANTarc
zi42.txt
824    'ilstn ' = i-origin of ncoda subregion
1      'jlstn ' = j-origin of ncoda subregion
3827   'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
411    'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
42     'kncoda' = number of ncoda levels
seatmp_${idtg}_ncoda_MERinl
salint_${idtg}_ncoda_MERinl
uucuri_${idtg}_ncoda_MERinl
vvcuri_${idtg}_ncoda_MERinl
layprs_${idtg}_ncoda_MERinl
subregional.depth.MERinl.a
seaice_${idtg}_ncoda_MERinl
zi42.txt
3949   'ilstn ' = i-origin of ncoda subregion
360    'jlstn ' = j-origin of ncoda subregion
1313   'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
1569   'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
42     'kncoda' = number of ncoda levels
seatmp_${idtg}_ncoda_MERat1
salint_${idtg}_ncoda_MERat1
uucuri_${idtg}_ncoda_MERat1
vvcuri_${idtg}_ncoda_MERat1
layprs_${idtg}_ncoda_MERat1
subregional.depth.MERat1.a
seaice_${idtg}_ncoda_MERat1
zi42.txt
2349   'ilstn ' = i-origin of ncoda subregion
360    'jlstn ' = j-origin of ncoda subregion
1751   'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
1841   'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
42     'kncoda' = number of ncoda levels

```

```

seatmp_${idtg}_ncoda_MERpal
salint_${idtg}_ncoda_MERpal
uucuri_${idtg}_ncoda_MERpal
vvcuri_${idtg}_ncoda_MERpal
layprs_${idtg}_ncoda_MERpal
subregional.depth.MERpal.a
seaice_${idtg}_ncoda_MERpal
zi42.txt
199 'ilstn ' = i-origin of ncoda subregion
360 'jlstn ' = j-origin of ncoda subregion
2525 'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
1841 'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
  42 'kncoda' = number    of ncoda levels
seatmp_${idtg}_ncoda_ARCatl
salint_${idtg}_ncoda_ARCatl
uucuri_${idtg}_ncoda_ARCatl
vvcuri_${idtg}_ncoda_ARCatl
layprs_${idtg}_ncoda_ARCatl
subregional.depth.ARCatl.a
seaice_${idtg}_ncoda_ARCatl
zi42.txt
2440 'ilstn ' = i-origin of ncoda subregion
2150 'jlstn ' = j-origin of ncoda subregion
1490 'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
  551 'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
  42 'kncoda' = number    of ncoda levels
seatmp_${idtg}_ncoda_ARCpac
salint_${idtg}_ncoda_ARCpac
uucuri_${idtg}_ncoda_ARCpac
vvcuri_${idtg}_ncoda_ARCpac
layprs_${idtg}_ncoda_ARCpac
subregional.depth.ARCpac.a
seaice_${idtg}_ncoda_ARCpac
zi42.txt
730 'ilstn ' = i-origin of ncoda subregion
2150 'jlstn ' = j-origin of ncoda subregion
1335 'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
  551 'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
  42 'kncoda' = number    of ncoda levels
seatmp_${idtg}_ncoda_ARCocn
salint_${idtg}_ncoda_ARCocn
uucuri_${idtg}_ncoda_ARCocn
vvcuri_${idtg}_ncoda_ARCocn
layprs_${idtg}_ncoda_ARCocn
subregional.depth.ARCocn.a
seaice_${idtg}_ncoda_ARCocn
zi42.txt
2459 'ilstn ' = i-origin of ncoda subregion
2650 'jlstn ' = j-origin of ncoda subregion
1600 'idmn ' = i-extent of ncoda subregion (<=idm; 0 implies idm)
1297 'jdmn ' = j-extent of ncoda subregion (<=jdm; 0 implies jdm)
  42 'kncoda' = number    of ncoda levels
NONE
E-o-D
/bin/mv ${arc2}.${idtg}.a ${arc2}.${idtg}todp1}${HR}_${idtg}${HR}.a
/bin/mv ${arc2}.${idtg}.b ${arc2}.${idtg}todp1}${HR}_${idtg}${HR}.b
#
date
#
# make links from files like archv.20020101.a to archv.2002_001_00.a
#
cd ${INP}
#

```

```

foreach FILE (`ls ${arc2}.${idtg}todp1}${HR}_${idtg}*`)
  set iyear=`echo ${FILE} |awk -F${HR}_ '{a=substr($NF,1,4);print a}'`
  set ii=`echo ${FILE} |awk -F${HR}_ '{a=substr($NF,5,2);print a}'`
  set imon=`echo ${ii} | sed 's/^0*(.*)$/\1/'`
  set ii=`echo ${FILE} |awk -F${HR}_ '{a=substr($NF,7,2);print a}'`
  set iday=`echo ${ii} | sed 's/^0*(.*)$/\1/'`
  set idtg=`${BIN}/ymd2doy.csh ${iyear} ${imon} ${iday}`
  set ab=`echo ${FILE} | sed -n 's/^.*\.(.*)$/\1/p'`
  echo ${iyear} ${imon} ${iday} ${ab} ${idtg}
  /bin/rm ../data/incup/incupd.${idtg}_${HR}.${ab}
  ln -s ../../${case}/${FILE} ../data/incup/incupd.${idtg}_${HR}.${ab}
end
#
date
#
#
# don't use this part unless you have dedicated time and you want to
# maximize the the use of the remainder of the time
#if(${idtg1} == ${idgtodp1})then
#echo '***** FORECAST *****'
#echo 'idtg= '${idtg} ' > idtgtod= '${idtgtod}
##
#set targhr=11
#set targmin=60
#set nowhr=`date +%H`
#set diffhr=`expr ${targhr} - ${nowhr}`
#set diffhr=`expr ${diffhr} - 1`
#set nowmin=`date +%M`
#set diffmin=`expr ${targmin} - ${nowmin}`
#set diffmin=`expr ${diffmin} - 5`
#if( ${diffmin} < 0 ) then
# set diffmin=`expr 60 - ${diffmin}`
# set diffhr=`expr ${diffhr} - 1`
#endif
##
#set diffmin=`echo ${diffmin} | awk '{printf "%02d \n", $1}'`
#set runtlim=${diffhr}:${diffmin}
#echo ${runtim}
##number of forecast days of model integration
#setenv frcstdays 2
##setenv frcstdays 3
##
##if(${diffhr} >= 4 && ${diffmin} >= 45) then
## setenv frcstdays 4
##endif
##if(${diffhr} == 5 && ${diffmin} >= 00) then
## setenv frcstdays 4
##endif
##if(${diffhr} >= 6 && ${diffmin} >= 20) then
## setenv frcstdays 5
##endif
#date
#echo diffhr ${diffhr} diffmin ${diffmin} runtlim ${runtim} frcstdays ${frcstdays}
# /bin/rm ${LOGS}/${E}pbs_ncoda_${idgtodp1}${HR}_${idtg1}${HR}*.com,log
## awk -f ${MVOI}/../HYCOM.awk_new runtlim=${runtim} hr=${HR} nmdays=${frcstdays}
t0=${E}pbs_${idtg1} tod=${idgtodp1} t1=${idtg1} ${MVOI}/../${E}pbs_ncoda.com >
${LOGS}/${E}pbs_ncoda_${idgtodp1}${HR}_${idtg1}${HR}.com
# awk -f ${MVOI}/../HYCOM.awk runtlim=${runtim} hr=${HR} nmdays=${frcstdays}
t0=${E}pbs_${idtg1} tod=${idgtodp1} t1=${idtg1} ${MVOI}/../${E}pbs_ncoda.com >
${LOGS}/${E}pbs_ncoda_${idgtodp1}${HR}_${idtg1}${HR}.com
##FORECAST
#endif
#

```

```
# submit hycom for next day
#
cd ${LOGS}
#OMS
/u/home/wallcraf/bin/q_nav0 ${E}pbs_ncoda_${idtgtodp1}${HR}_${idtg1}${HR}.com
#
# submit the plotting job
# hindcast
/u/home/wallcraf/bin/q_nav0 ${E}plotpost_${idtgtodplt}${HR}_${idtg1}00.csh
# real time
#/u/home/wallcraf/bin/q_nav0 ${E}plotpost_${idtgtodp1}${HR}_${idtg1}00.csh
```

APPENDIX F

Script 727pbs_ncoda_ \${idtg}18_ \${idtg}18.com

This is a Script to run HYCOM.

```

#!/bin/csh -x
#PBS -N 999pbs
#PBS -j oe
#PBS -o 999pbsXX.log
#PBS -l mppwidth=619
#PBS -l mppnppn=8
#PBS -l walltime=2:00:00
#PBS -W umask=027
#PBS -A NRLSS018
#PBS -q internal3d
#
#BSUB -J 727ncoda
#BSUB -M 1500000
#BSUB -a poe
#BSUB -n 379
#BSUB -R "rusage[ntbl_windows=32]span[ptile=16]"
#BSUB -W 4:00
#BSUB -q internal3d
#BSUB -P NAVOSHYC
#
set echo
set timestamp
date
C
C --- Preamble.
C
setenv OS `uname`
switch ($OS)
case 'AIX':
    hostname
#   setenv TMPDIR /scr/${user}
    breaksw
case 'Linux':
    which yod
    if (! $status) then
        setenv OS XT3
#   setenv TMPDIR /tmp
    else
#   setenv TMPDIR /tmp
    endif
    which aprun
    if (! $status) then
#   setenv OS XT4
        setenv OS XT5
#   setenv TMPDIR /scr
    endif
    breaksw
default:
    echo 'Unknown Operating System: ' $OS

```



```

    echo 'configured for AIX only'
    exit (1)
endsw
C
if ($?JOBNAME) then
    setenv PBS_JOBNAME ${JOBNAME}
    setenv PBS_JOBID  $$
endif
echo PBS_JOBNAME $PBS_JOBNAME PBS_JOBID $PBS_JOBID
C
C --- Automatic Run Script.
C --- Submit with msub, or msub_csh, or msub_ll command.
C --- Multiple segment version, set no. of segments on foreach below.
C
C --- Set up for incremental updating
C
C
C --- E is expt, P is permanant directory, S is /tmp directory.
C
#
setenv E 727
setenv REG GLBa0.08
setenv EXPT expt_72.7
#
# --- set by awk script for daily run
#
setenv nmdays 1
setenv idtg 20031102
setenv idtgtod 20031102
setenv HR 18
setenv HR2 00
#
# --- restart is "tomorrow" since we start at 18Z
#
set idtgrestart=`/u/home/${user}/bin/addndays yyymmdd ${idtg} +1`
echo idtg ${idtg} idtgtod ${idtgtod} idtgrestart ${idtgrestart}
#
set LOGS=/scr/${user}/hycom/${REG}/${EXPT}/logs
mkdir -p ${LOGS}
set RUN=/u/home/${user}/hycom/${REG}/${EXPT}
#
# --- remove temporary NCODA files
#
cd ${RUN}
/u/home/wallcraf/bin/q_nav0 ${E}removefiles_2.com
#
setenv P $cwd
switch ($OS)
case 'AIX':
case 'XT5':
#
#           substitute /scr for /u/home
#           setenv S `echo $cwd | awk '{print "/scr" substr($0,8,length)}'`
#           breaksw
e 'XT3':
case 'XT4':
case 'OSF1':
#
#           substitute /work for /???????
#           setenv S `echo $cwd | awk '{print "/work" substr($0,3,length)}'`

```

```

    breaksw
case 'IRIX64':
#           substitute /scr for /u/home
  setenv S `echo $cwd | awk '{print "/scr" substr($0,8,length)}'`
  breaksw
case 'unicos':
#           substitute /tmp for /u/b
  setenv S `echo $cwd | awk '{print "/tmp" substr($0,5,length)}'`
  breaksw
endsw
C
ls -laFq
C
C --- check the RUNNING flag.
C
if ( -e RUNNING && ! -e RUNNING_$PBS_JOBID ) then
C
C --- MODEL IS ALREADY RUNNING - EXIT.
C
  exit
endif
touch RUNNING
touch RUNNING_$PBS_JOBID
C
C --- Generate the next model script.
C
  setenv Y01 103
  setenv AB a
#
  setenv SCRIPT ${E}y${idtg}.com
  /bin/rm -f ${SCRIPT}
  awk -f ${RUN}/${E}.awk nmdays=${nmdays} hr=${HR} y01=${Y01} tod=${idtgtod}
ab=${AB} td=${idtg} ${RUN}/${E}.com > ${SCRIPT}
#
# --- Run the Script.
#
set script = $SCRIPT
set reqname = ${PBS_JOBNAME}
ln -fs ${reqname}.log $script:r.log
#
mkdir -p $$S
cp ${SCRIPT} $$S/${SCRIPT}
cd $$S
#
# -----
csh ${SCRIPT}
# -----
#
wait
date
#
# --- submit next day of todays run
#
# --- submit next day of todays run
# --- update only idtg if a real time run that goes back # of days
#
set idtg=`/u/home/${user}/bin/addndays yyyymmdd ${idtg} +1`
#

```

```
echo '***** IN lsf_ncoda.com *****'  
#  
echo idtg ${idtg} shellsub_hindcast.csh  
${RUN}/mvoi/${E}shellsub_hindcast.csh ${idtg}  
#  
#echo idtg ${idtg} idtgtod ${idtgtod} shellsub_daily.csh  
#${RUN}/mvoi/${E}shellsub_daily.csh ${idtg} ${idtgtod}  
#  
cd $P  
#  
ls -laFq  
#  
# --- Final Clean Up.  
#  
/bin/rm -f RUNNING  
/bin/rm -f RUNNING_${PBS_JOBID}  
#  
# --- Exit.  
#  
exit
```

