HYCOM Quick start's Guide
or
HYCOM for Dummies

Draft 2.
March, 2008
Alexandra Bozec
abozec@coaps.fsu.edu

Table of Contents:

Foreword:

This guide has been written for beginners and people who are just interested in learning how to run the HYCOM model as fast as possible. This guide explains step by step how to install and run the reference version of HYCOM in, I hope, an easy way.
For more detailed information and to go further on the use of HYCOM, please refer to the **HYCOM User's guide** and more specifically for the developers and curious people refer to the **HYCOM User's manual**, both available on the web at:
http://oceanmodeling.rsmas.miami.edu/hycom/documentation.html

1. Presentation of the HYCOM directories

The HYCOM model source code is available on the HYCOM website http://www.hycom.org via the **anonymous ftp site of the RSMAS**: http://oceanmodeling.rsmas.miami.edu/hycom/modelcode.html

- Create a directory HYCOM
- Download hycom_ALL.tar.gz and hycom_2.1.tar.gz (Warning, these files are actually links to the latest file versions) and put them in a HYCOM directory as follows:

```
~/HYCOM > gunzip hycom_ALL.tar.gz
~/HYCOM > tar xvf hycom_ALL.tar
~/HYCOM > gunzip hycom_2.1.tar.gz
~/HYCOM > tar xvf hycom_2.1.tar
~/HYCOM > ls
hycom hycom _ALL.tar hycom _2.1.tar
~/HYCOM > cd hycom
~/HYCOM/hycom > ls
ALL ATLb2.00
~/HYCOM/hycom >
```

Your HYCOM directory is now built as in Figure 1. The next step is the compilation of the ALL directory. This will make the pre- and post processing source available.

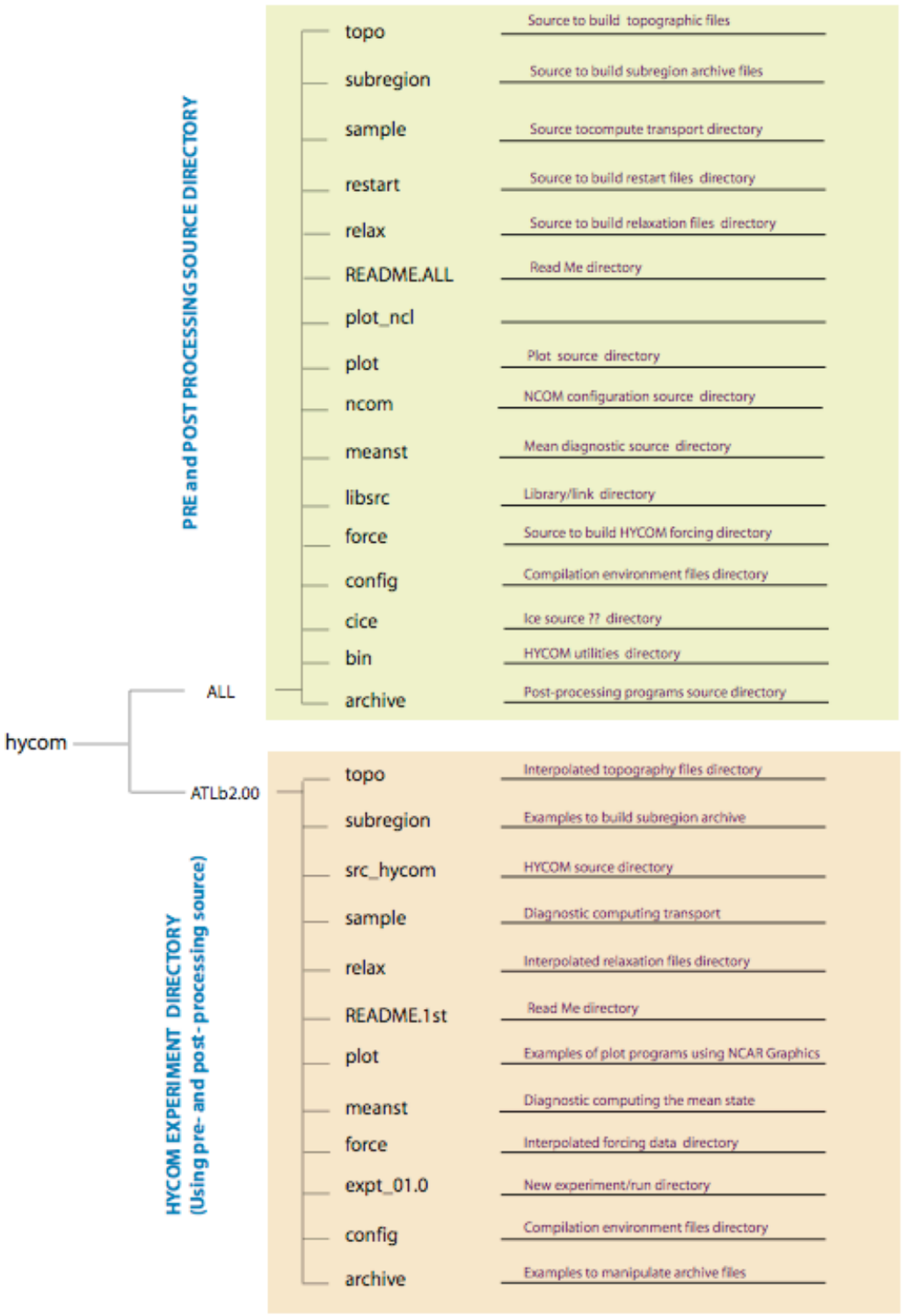


Figure 1: HYCOM model directories

a. ALL directory ***(Pre and post processing source directory)***

In this directory, you will find all the sources, written in FORTRAN, used in the shell scripts of the ATLb2.00 directory. These FORTRAN functions are able to manipulate all the kind of files needed or given by the HYCOM model.
After having downloaded the model sources in your computer, you must now compile the sources of several directories. Compiling option files are available in the `~/HYCOM/ALL/config` directory for several kind of machine compiler.

To compile the ALL directory, you have to compile the `Make_all.com` or the `Makefile` present in each subdirectory of `~/HYCOM/ALL` : `archive, force, meanstd, plot, relax, sample, subregion and topo.` In each subdirectory, you have to edit the `Make_all.src` to set the architecture `ARCH` corresponding to your machine and then launch the script to compile the directory.
(N.B: be sure your files are executable! Otherwise, use the `chmod` UNIX command as follows**):**

```
~/HYCOM/hycom/ALL/archive/src > chmod 744 Make_all.com
~/HYCOM/hycom/ALL/archive/src > ls –l Make_all.com
-rwxr--r--  1 abozec coaps 5536 Dec 18 11:11 Make_all.com
~/HYCOM/hycom/ALL/archive/src >
```

Example for the pacificocean machine at COAPS:

```
~/HYCOM/hycom > cd ALL/archive/src/
~/HYCOM/hycom/ALL/archive/src > vi Make_all.src
#
# --- set ARCH to the correct value for this machine.
#
#setenv ARCH alphaL
#setenv ARCH alpha
#setenv ARCH amd64
#setenv ARCH intelIFC
#setenv ARCH intel
#setenv ARCH macg5
#setenv ARCH o2k
#setenv ARCH sp3
#setenv ARCH sp4
#setenv ARCH sun64
#setenv ARCH sun
#setenv ARCH t3e
#setenv ARCH x1
#
setenv ARCH intelIFC
~
~
~
~
"Make_all.src" 18L, 314C
~/HYCOM/hycom/ALL/archive/src > ./Make_all.com
intelIFC
```

```
Make worked: hycomarchv
Make worked: micomarchv
Make worked: mrgl_archv
Make worked: remap_archv
Make worked: trim_archv
Make worked: archv2data2d
Make worked: archm2data2d
Make worked: archv2data2t
Make worked: archv2data3z
Make worked: archm2data3z
Make worked: archv2datasf
Make worked: archv2datasfl
Make worked: archv2ncombc
Make worked: archv2restart
Make worked: archm2restart
Make worked: remap_archv
Make worked: restart2archv
Make worked: restart2archv_sig2a
~/HYCOM/hycom/ALL/archive/src >
```

Congratulations! You have created the executables to manipulate the archive (i.e output) files of HYCOM. To be able to use these executables in every directory, please put `~/HYCOM/hycom/ALL/archive/src` in your `PATH` (defined in your `~/.cshrc`).
Some routines can also convert these binary archive files into NetCDF files. To compile these routines, a netCDF library is necessary and can be find at: http://www.unidata.ucar.edu/software/netcdf/. Then, edit the `Make_ncdf.src` in the `ALL` directory to specify the path of the NetCDF package and run the `Make_ncdf.com`.
Example for pacificocean:

```
~/HYCOM/hycom/ALL > vi Make_ncdf.src
#
#--- set NCDF to the root directory for netCDF version 3.5.
#--- available from: #http://www.unidata.ucar.edu/packages/netcdf/
#
#--- Note that the Fortran 90 routines and module files are #required.
#
#setenv NCDF /net/ajax/scrf/wallcraf/NETCDF/netcdf-3.5.0
#setenv NCDF /net/ajax/scrf/wallcraf/NETCDF/netcdf-3.5.1-intel
#setenv NCDF /u/home/wallcraf/netcdf-3.5.0
#PACIFIC
setenv NCDF /usr/local/netcdf
~
~
~
~
~
~
"Make_ncdf.src" 11L, 426C
~/HYCOM/hycom/ALL > cd archive/src
~/HYCOM/hycom/ALL/archive/src > ./Make_ncdf.com
NCDF =  /usr/local/netcdf
ARCH =  intelIFC
Make worked: archv2ncdf2d
Make worked: archm2ncdf2d
Make worked: archv2ncdf2t
```

```
Make worked: archv2ncdf3z
Make worked: archm2ncdf3z
Make worked: archv2ncdfsf
Make worked: archv2ncdfsfl
~/HYCOM/hycom/ALL/archive/src >
```

The NetCDF executables are now availables!
Repeat these procedures for: `force`, `meanstd`, `plot`, `relax`, `sample`, `subregion` and `topo` if necessary.
N.B. For the `plot` directory, please be sure to have the NCAR graphics directory in your `PATH` defined in your `.cshrc`. (COAPS user: the NCAR path is `/usr/local/medium/ncarg/bin`)

Most of the informations about the directory are available in the README files present in each directory.

In the `bin` directory, `Make_all.com` and `Make_ncdf.com` **do not use** the config_setup file to compile the directory. Consequently, you need to be sure that the compilation options corresponding to your OS are the same as those defined in the config_setup file you used in the other directories. To know your kernel and machine hardware, you can use respectively the following command lines:

```
~/HYCOM/hycom/ALL/bin > uname
Linux
~/HYCOM/hycom/ALL/bin > uname -m
x86_64
~/HYCOM/hycom/ALL/bin >
```

COAPS user corrections (labelled as **##Alex**) for the `Make_all.com` and `Make_ncdf.com` to compile on Pacificocean:

```
 ~/HYCOM/hycom/ALL/bin > vi Make_all.com
#!/bin/csh
# --- create HYCOM related executables.
#
set echo
#
#setenv OS `/bin/uname`
setenv OS `uname`
#if ($OS == "SunOS") then
#  setenv OS SunOS64
#endif
if ($OS == "Linux") then
  if (`/bin/uname -m` == "alpha") then
     setenv OS LinuxA
  endif
  if (`/bin/uname -m` == "x86_64") then
##Alex
##   setenv OS Linux64
     setenv OS Linux
##End Alex
  endif
# setenv OS LinuxIFC
endif
if ($OS == "UNICOS/mp") then
```

```
  setenv OS X1
endif
"Make_all.com" 180L, 5536
```

and later in the program below:

```
case 'Linux':
#       compile for Pentium 4 (also 32-bit AMD64)
##Alex     setenv FC   "pgf90"
##   setenv FFLAGS     "-g -fast -byteswapio -tp p7"
##   setenv FLIBS      "-Mlfs"
##   setenv CC   "gcc"
##   setenv CFLAGS     "-O -march=pentium4 -m32"

##Alex       compile for Pentium 4 (also 32-bit AMD64)
     setenv FC   "ifort"
     setenv FFLAGS     "-g -tpp7 -O3 -convert big_endian"
     setenv FLIBS      ""
     setenv CC   "gcc"
     setenv CFLAGS     "-O"
     breaksw
## End Alex
case 'Linux64':
```

These new compilation options correspond to the `config/intelIFC_setup` file used on pacificocean.

Congratulations! You have created all the executables of the `ALL` directory. To be able to use these executables in every directory, please put all the directory compiled in your `PATH (.cshrc)` as follows:

```
~/HYCOM/hycom/ > vi ~/.cshrc
##
#source /bin/csh
##source /usr/local/ferret_paths
set path = (/usr/local/medium/ncarg/bin $path
/pacific/abozec/HYCOM/hycom/ALL/plot/src
/pacific/abozec/HYCOM/hycom/ALL/archive/src /usr/local/netcdf/lib
/usr/local/netcdf /pacific/abozec/HYCOM/hycom/ALL/bin
/pacific/abozec/HYCOM/hycom/ALL/force/src
/pacific/abozec/HYCOM/hycom/ALL/meanstd/src
/pacific/abozec/HYCOM/hycom/ALL/relax/src
/pacific/abozec/HYCOM/hycom/ALL/sample/src
/pacific/abozec/HYCOM/hycom/ALL/subregion/src
/pacific/abozec/HYCOM/hycom/ALL/topo/src)
"~/.cshrc" 70L, 2722C
```

b. ATL directory/Atlantic configuration of HYCOM ***(Working Directory)***

In this directory, you will find the source of HYCOM model, the input and output files directory, the run directory and example of visualisation shell script (See figure 1).
Most of the informations about directories are available in the README files present in each directory.

2. HYCOM model source and compilation

The HYCOM source directory is labelled as: `src_version_#layers_#processors.`

For example: `src_2.1.03_22_one` is the source directory of the 2.1.03 version of HYCOM with 22 layers and running on one processor.

To compile the HYCOM source directory you need to edit the `Makefile` to define the right compiler.

(WARNING !! The compiler of the `config/intel_IFC_one` file is `ifc`. To avoid some warning message at the compilation, **edit** `config/intel_IFC_one` and **replace** `ifc` by `ifort`)
*Example for COAPS user : (corrections noted by **##Alex**)*

```
~/HYCOM/hycom/ > cd ATLb2.00/src_2.1.03_22_one
~/HYCOM/hycom/ATLb2.00/src_2.1.03_22_one/ > vi Makefile
#
# --- HYCOM 2.0 makefile
#
# --- Tunable parameters in ../config/$(ARCH)_$(TYPE)
#

.SUFFIXES:
.SUFFIXES: .c .F .f .o

.F:
     @echo "Must have an explicit rule for" $*
.f:
     @echo "Must have an explicit rule for" $*
.c:
     @echo "Must have an explicit rule for" $*

##Alex include ../config/$(ARCH)_$(TYPE)
include ../config/intelIFC_one
## End Alex
default: hycom


MODS =   mod_xc.o mod_za.o mod_pipe.o

"Makefile" 70L, 2722C
~/HYCOM/hycom/ATLb2.00/src_2.1.03_22_one/ >
```

Then run the `make` command to compile the model:

```
~/HYCOM/hycom/ATLb2.00/src_2.1.03_22_one/ > make
ifort -DIA32 -DREAL8 -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mod_xc.F
ifort -DIA32 -DREAL8 -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mod_za.F
ifort -DIA32 -DREAL8 -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mod_pipe.F
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c hycom.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c archiv.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c barotp.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c bigrid.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c blkdat.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c cnuity.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c convec.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c diapfl.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c dpthuv.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c dpudpv.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c forfun.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c geopar.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c hybgen.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c icloan.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c inicon.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c inikpp.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c inimy.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c latbdy.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c matinv.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c momtum.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mxkprf.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mxkrt.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mxkrtm.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c mxpwp.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c overtn.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c poflat.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c prtmsk.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c psmoo.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c restart.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c stencl.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c thermf.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c trcupd.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c tsadvc.f
ifort             -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c zebra.f
ifort -DIA32 -DREAL8 -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c machine.F
ifort -DIA32 -DREAL8 -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -c wtime.F
gcc -DIA32 -DREAL8 -O   -c machi_c.c
ifort   -g -convert big_endian -assume byterecl -cm -vec_report0 -w -O3 -tpp7 -xW -r8 -Bstatic -o hycom   mod_xc.o
mod_za.o  mod_pipe.o  hycom.o  archiv.o   barotp.o  bigrid.o   blkdat.o  cnuity.o  convec.o  diapfl.o  dpthuv.o   dpudpv.o
forfun.o   geopar.o  hybgen.o  icloan.o  inicon.o   inikpp.o   inimy.o   latbdy.o  matinv.o  momtum.o   mxkprf.o   mxkrt.o
mxkrtm.o   mxpwp.o  overtn.o  poflat.o   prtmsk.o   psmoo.o  restart.o  stencl.o  thermf.o  trcupd.o   tsadvc.o   zebra.o
machine.o  wtime.o machi_c.o
~/HYCOM/hycom/ATLb2.00/src_2.1.03_22_one/ >
```

If no problem occurs, Congratulations! The `hycom` executable is now available and ready to be used! If some problems occur, read the error messages, correct the errors and be sure to remove the `*.o` and `*.mod` files before running the `make` command again.

3. Forcing and initial state files

Shell scripts are available in the `ATLb2.00` directory to create/interpolate atmospheric forcing files and initial state file on the HYCOM grid. The procedures is explained in details in the HYCOM Users's guide available at :
http://oceanmodeling.rsmas.miami.edu/hycom/documentation.html.

The most important directories are:

- `ATLb2.00/force`: provide the atmospheric forcing
- `ATLb2.00/relax`: provide the initial condition and climatology of the buffer zone
- `ATLb2.00/topo`: provide the horizontal and vertical grid

In the reference version of HYCOM available on the web, some forcing and initial state files are provided to run a first experiment with the Atlantic configuration at a resolution of 2°. Then, the COADS atmospheric fluxes and wind are available in the `force/coads` directory as the levitus temperature, salinity and density for the initial state and buffer zone in `relax/levitus`. In `topo`, the horizontal and vertical grid corresponding to the 2° Atlantic configuration are also provided and matched the dimensions of the grid compiled in the HYCOM source directory.

Now, the important question is: what do we need in order to run the model?
(**N.B**: all the input/ouput files of HYCOM are presented as a couple of .a and .b files.
The .a file actually contains the binary data and the .b file describes what is in the .a file and how it is stored. In the following, the notation `*.[ab]` will correspond to the couple `*.a` and `*.b`

- In `force/coads`:

`airtmp.[ab]` defines the air temperature
`surtmp.[ab]` defines the surface temperature
`seatmp.[ab]` defines the sea temperature

`wndspd.[ab]` defines the windspeed
`taunwd.[ab]` defines the meridional windstress
`tauewd.[ab]` defines the zonal windstress

`shwflx.[ab]` defines the shortwave flux
`radflx.[ab]` defines the radiative flux

`precip.[ab]` defines the precipitation
`vapmix.[ab]` defines the evaporation

- In `topo`:

`regional.grid.[ab]` defines the horizontal grid of your configuration
`depth_ATLb2.00_01.[ab]` defines the vertical grid of your configuration

- In `relax/nb_expt`: (See **N.B** in section 4. for `nb_expt`)

`relax_tem.[ab]` defines the temperature of the initial state and of the buffer zones
`relax_sal.[ab]` defines the salinity of the initial state and of the buffer zones
`relax_int.[ab]` defines the depths of the layer interface of the initial state and of the buffer zones
`relax_rmu.[ab]` defines the locations of the buffer zones and the relaxation factor in each of them.

(N.B. The number of the experiment (`nb_expt`) is defined as explained in N.B. section 4. This directory must be created in `relax` directory for each experiment**!)**

Most of the informations about the directories are available in the README files present in each directory.

4. How to run the model

In this section, we present the method to build and run a new experiment. **Please keep in mind that some parameters can change depending of the HYCOM source version used.** Here we will use `src_2.1.03_22_one` as HYCOM source directory for our experiment.
Several examples of experiment directory are available in the `ATLb2.00` directory: `expt_01.0`, `expt_01.5`, `expt_01.6`. In each directory, you will find the shell scripts needed to run the model.

NB: please, follow some rules of notation:

- A new experiment directory is defined as: `expt_XX.Y` such as `expt_01.5` (`XX=01` and `Y=5`).
- The number of the experiment (`nb_expt`) is then: `XXY` such as `015`.
- A new directory, `nb_expt`, must be created in `relax` for each experiment!

The most important files (for example in `expt_01.5/`):

- `blkdata.input` : parameters of the experiment (namelist)
- `015y001.limits`: Time limits of the run (`XXYyddd.limits` with `ddd` beginning year of the run, here `ddd=001`)
- `015.com`: Shell script allowing to run the model on different OS

To create a new experiment, no need to copy all these files, just follow the following instructions:

- Create a new directory in `ATLb2.00`:

```
~/HYCOM/hycom/ATLb2.00/ > mkdir expt_01.7
~/HYCOM/hycom/ATLb2.00/ >
```

- Copy the `new_expt.com` shell script from `expt_01.5/` to `expt_01.7/`

```
~/HYCOM/hycom/ATLb2.00/ > cp expt_01.5/new_expt.com expt_01.7
~/HYCOM/hycom/ATLb2.00/ > cd expt_01.7
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

- Edit the `DO`, `O`, `DN` and `N` of `new_expt.com` as follows. This script will automatically copy and edit with the right number of experiment all the scripts that you need into this new experiment directory.

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi new_expt.com
#!/bin/csh
set echo
#
# --- build new expt files from old.
# --- some files will need additional manual editing.
#
# DO = old experiment directory name
```

```
#  O = old experiment number
# DN = new experiment directory name
#  N = new experiment number
#  R = region name.
#
setenv DO expt_01.5
setenv  O 015
setenv DN expt_01.7
setenv  N 017
setenv  R ATLb2.00
#
"new_expt.com" 40L, 907C
~/HYCOM/hycom/ATLb2.00/expt_01.7 > ./new_expt.com
setenv DO expt_01.5
setenv O 015
setenv DN expt_01.7
setenv N 017
setenv R ATLb2.00
setenv RO ATLb2.00
setenv D ../../ATLb2.00/expt_01.5
foreach t ( .com W.com F.com P.com y001.limits cod.com lsf.com nqs.com rll.com grd.com )
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015W.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015F.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015P.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015y001.limits
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015cod.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015lsf.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015nqs.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015rll.com
end
sed -e s/setenv E .*015.*/setenv E 017/g -e s/expt_01.5/expt_01.7/g -e s/ATLb2.00/ATLb2.00/g ../../ATLb2.00/expt_01.5/015grd.com
end
cp -i ../../ATLb2.00/expt_01.5/015.awk 017.awk
cp -i ../../ATLb2.00/expt_01.5/blkdat.input ../../ATLb2.00/expt_01.5/ports.input .
cp       -i       ../../ATLb2.00/expt_01.5/dummyA.com       ../../ATLb2.00/expt_01.5/dummyB.com       ../../ATLb2.00/expt_01.5/dummyC.com
../../ATLb2.00/expt_01.5/dummyD.com .
mlist 001 020 1
cp -i LIST LIST++
mkdir data
~/HYCOM/hycom/ATLb2.00/expt_01.7 > ls
017.awk     017F.com    017nqs.com  017W.com        data         dummyC.com  LIST++
017cod.com  017grd.com  017P.com    017y001.limits  dummyA.com   dummyD.com  new_expt.com
017.com     017lsf.com  017rll.com  blkdat.input    dummyB.com   LIST        ports.input
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

You have now all the files needed to run an experiment!! Let's go:
For a climatological run :

- Check or Edit the `017.com` to define:

    - The version of HYCOM used
    - The path of the HYCOM source directory
    - The topography used
    - The number of layer of the configuration
    - The path of the outputs directory

Lines between the two ##Alex have to be edited by the user.

(Warning: the following lines are not at the beginning of the 017.com script)

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi 017.com
```

```
C
C --- R is region name.
C --- V is source code version number.
C --- T is topography number.
C --- K is number of layers.
C --- E is expt number.
C --- P is primary path.
C --- D is permanent directory.
C --- S is scratch   directory, must not be the permanent directory.
C
##Alex
setenv R ATLb2.00
setenv V 2.1.03
setenv T 01
setenv K 22
setenv E 017
setenv P hycom/${R}/expt_01.7/data
setenv D /pacific/abozec/HYCOM/$P
##Alex
C
switch ($OS)
case 'SunOS':
"017.com"
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

- Edit also the 017.com to define the SCRATCH path corresponding to your OS:

(Warning: the following lines are not at the beginning of the 017.com script)

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi 017.com
switch ($OS)
case 'SunOS':
    if (-e /net/hermes/scrb) then
#                   NRLSSC
      setenv S     /net/hermes/scrb/${user}/$P
    else if (-e /scr) then
#                   NAVO MSRC
      mkdir        /scr/${user}
      chmod a+rx   /scr/${user}
      setenv S     /scr/${user}/$P
    else
#                   Single Disk
      setenv S     ~/$P/SCRATCH
    endif
    breaksw
case 'Linux':
    if (-e /export/a/$user) then
#               NRLSSC
      setenv S /export/a/${user}/$P
    else
#               Single Disk
## Alex (COAPS user)
      setenv S $D/SCRATCH
## Alex (COAPS user)
    endif
    breaksw
```

```
"017.com"
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

- Edit the 017.com to set the time limits of your run

(**Warning**: these time limits do not define the actual time limits that will drive your run. These time limits number the input forcing file and output files such as the restart file.)

(Warning: the following lines are not at the beginning of the 017.com script)

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi 017.com
mkdir -p $S
cd       $S
C
C --- For whole year runs.
C ---   Y01 initial model year of this run.
C ---   YXX is the last model year of this run, and the first of the next run.
C ---   A and B are identical, typically blank.
C --- For part year runs.
C ---   A is this part of the year, B is next part of the year.
C ---   Y01 is the start model year of this run.
C ---   YXX is the end   model year of this run, usually Y01.
C --- For a few hour/day run
C ---   A   is the start day and hour, of form "dDDDhHH".
C ---   B   is the end   day and hour, of form "dXXXhYY".
C ---   Y01 is the start model year of this run.
C ---   YXX is the end   model year of this run, usually Y01.
C --- Note that these variables are set by the .awk generating script.
C

##Alex
setenv A ""
setenv B ""
setenv Y01 "001"
setenv YXX "002"
##Alex
C
echo "Y01 =" $Y01 "YXX = " $YXX  "A =" ${A} "B =" ${B}
C
"017.com"
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

- Edit the `017.com` to define the paths of
  - the forcing directory (here, `coads`)
  - the horizontal and vertical grid

(N.B: As we choose the reference experiment, nothing had to been change for us in this part of the script.)

  - the Temperature/Salinity climatology for the initial state and buffer zone (`relax_sal`, `relax_tem`, etc … files)

These files need to be stored in the directory `nb_expt` (see section 4) that must be created in `relax` directory:

```
~/HYCOM/hycom/ATLb2.00/relax > mkdir 017
~/HYCOM/hycom/ATLb2.00/relax > ls
```

```
010   012   013   015   016   017   999   levitus   plot   plot_save  README.relax
README.relax.plot  README.relax.zonal
~/HYCOM/hycom/ATLb2.00/relax >
```

In this example, we will use the same files as experiment `expt_01.5`, then we just copy files `relax_sal.[ab]`, `relax_tem.[ab]`, `relax_int.[ab]` and `relax_rmu.[ab]` from `015` to `017`:

```
~/HYCOM/hycom/ATLb2.00/relax > cd 015
~/HYCOM/hycom/ATLb2.00/relax/015 > cp relax_sal.* relax_tem.* ../017/
~/HYCOM/hycom/ATLb2.00/relax/015 > cp relax_int.* relax_rmu.* ../017/
~/HYCOM/hycom/ATLb2.00/relax/015 >
```

(**N.B: Please refer to the HYCOM User's guide for the method used to create these HYCOM interpolated grid files from a regular grid climatology like Levitus.**)

We can now come back to our experiment directory:

- Edit the `blkdat.input` file in order to:
  - Put the right number of experiment `iexpt` (Unfortunately the `new_expt.com` does not take into account this one…)
  - Try to test others viscosity or diffusivity values… (**Warning**: just for the most adventurous users)

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi blkdat.input
COADS forcing: precip_zero; srelax;
boundary relax; iniflg=2; KPP mixed layer; Jerlov IA;
Z(22): dp00/f/x=3m/1.125/12m; ATLb2.00/src_2.1.03_22.
12345678901234567890123456789012345678901234567890123456789012345678901234567890
  21   'iversn' = hycom version number x10
 017   'iexpt ' = experiment number x10
  57   'idm   ' = longitudinal array size
  52   'jdm   ' = latitudinal  array size
  38   'itest ' = grid point where detailed diagnostics are desired
  17   'jtest ' = grid point where detailed diagnostics are desired
"blkdat.input" 108L, 7037C
```

- Edit the `017y001.limits`
  - The negative sign correspond to a run without restart. (None sign corresponds to a experiment using a restart file)
  - The first number corresponds to the starting day and the second to the end day of your experiment. (**Warning:** to be consistent, be sure that it corresponds to the dates of `017.com`. You can start your run at any day of the year)

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi 017y001.limits
-1.00      360.00    false    false
~
"017y001.limits" 1L, 43C
```

- Run the model in `expt_01.7` directory:

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > ./017.com
```

or if you want to keep a trace of the run

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > ./017.com >& 017.log
```

A tar file of the output archives is put in the `data/SCRATCH` directory. The output archives are presented as `*.a` and `*.b` files. The results are stored in the `*.a` files while the description of these data are in the `*.b` corresponding files.

- Starting from a **restart**:

  - Edit the `017.com` with the new start and end date
  - Create `017yddd.limits` (ddd is the end date (in year) of the previous run, for `expt_01.7`, ddd=002; i.e `017y002.limits`)
  - Edit the `017yddd.limits`. The starting date (in day) must be the end date of the previous run (**Warning**: do not put any sign at the beginning of the file).

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > vi 017y002.limits
360.00      720.00    false    false
~
"017y002.limits" 1L, 43C
~/HYCOM/hycom/ATLb2.00/expt_01.7 >
```

  - Run the model in `expt_01.7/`

```
~/HYCOM/hycom/ATLb2.00/expt_01.7 > ./017.com
```

5. HYCOM frequents error

Pwall2 error:

Generally happens when your climatology (relax files) are not in agreement with your topographic files.

6. How to visualize the result – NCAR graphics –

NCAR Graphics (Click to see Webpage), a time-tested UNIX package, consists mainly of over two dozen Fortran/C utilities for drawing contours, maps, vectors, streamlines, weather maps, surfaces, histograms, X/Y plots, annotations, and more.
Examples of plot script with NCAR graphic are given in `ATLb2.00/plot` directory.
Two main routines using NCAR graphics have been developed for HYCOM: `fieldproc` **and** `hycomproc`**.**
(Warning: be sure that `ALL/plot/src` **is in your path to use** `fieldproc` **and** `hycomproc`**)**

a. fieldproc

!!!WARNING !!! `fieldproc` is used **only for the 2D fields**. If you try to use `fieldproc` to make a section plot you will have an error message. For sections or 3D fields use `hycomproc` (see section 5.b).
The command line for `fieldproc` is:

```
~/HYCOM/hycom/ATLb2.00/plot > fieldproc < depth.IN
```

or

```
~/HYCOM/hycom/ATLb2.00/plot > fp < depth.IN
```

You then obtain a postscript file named: `gmeta1.ps`
`fp` and `hp` are some kind of `aliases` that can be used for respectively `fieldproc` and `hycomproc`. Others aliases can be useful as `hp2ps` or `fp2ps` that named directly your postcript file as your shell script file.

```
~/HYCOM/hycom/ATLb2.00/plot > fp2ps depth.IN
~/HYCOM/hycom/ATLb2.00/plot > ls *.ps
depth.ps
~/HYCOM/hycom/ATLb2.00/plot >
```

You just have to adapt or create your `.IN` files for your needs. In Appendix A, you find the options and the order of these options needed in the `.IN` files to use `fieldproc`.

***** Some tricks and examples to make pretty plots *****

Example to plot the salinity of an `archive` file:

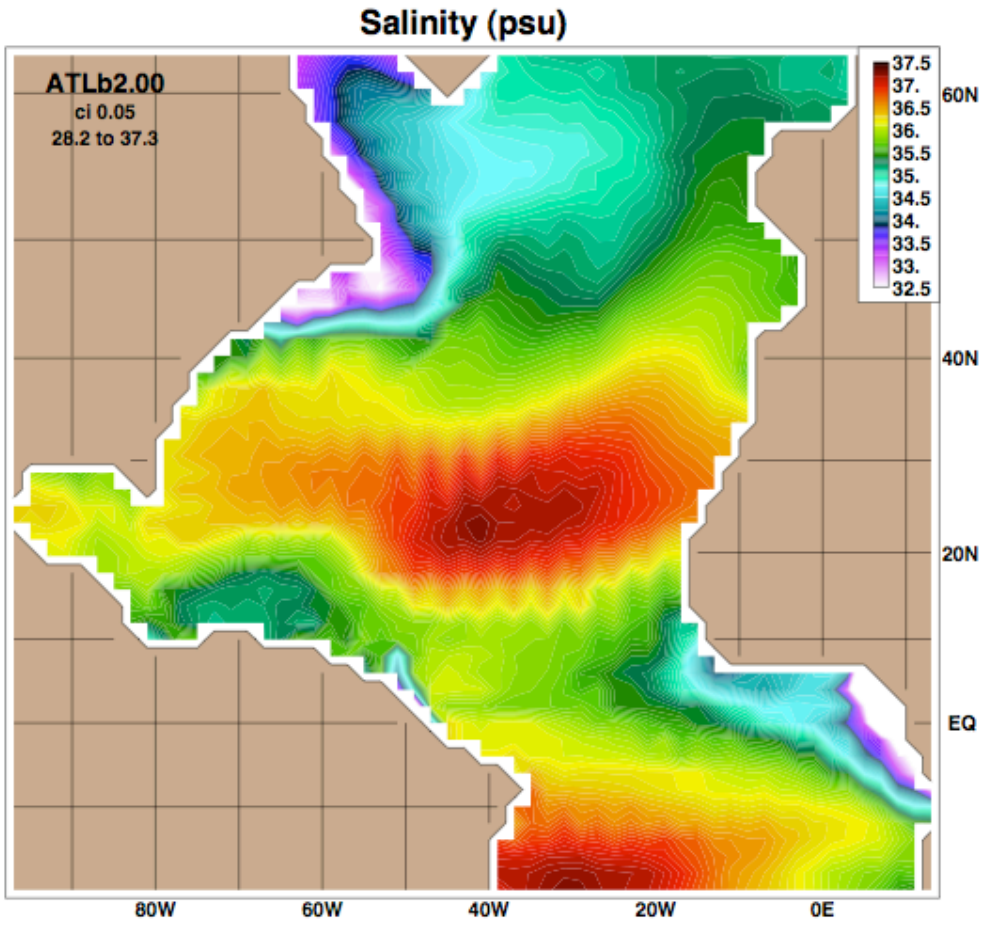
```
~/HYCOM/hycom/ATLb2.00/plot > vi salsurf.IN
../expt_01.7/data/017_archv.0004_016_00.a     <- file plotted
ATLb2.00                                      <- configuration
 57     'idm   ' = longitudinal array size
 52     'jdm   ' = latitudinal  array size
  1     'nperfr' = number of horizontal plots per frame
 20     'lalolb' = spacing of latitude/longitude labels
 10     'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
  4     'loclab' = location of the contour label (1=upr,2=lowr,3=lowl,4=upl)
 11     'locbar' = location of the color bar     (1[0-4]=vert,2[0-4]=horiz)
  5     'kpalet' = palete (0=none,1=pastel,2=sst,3=gaudy,4=2tone,5=fc,6=ifc)
  1     'iorign' = i-origin of plotted subregion
  1     'jorign' = j-origin of plotted subregion
  0     'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
  0     'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
  8     'nrec  ' = next record to plot  <- record of the plotted field in the .b file**
Salinity (psu)                                <- title of the plot

  1     'qscale' = scale factor for plot
  0.05     'qq ' = contour interval (<0 no plot; 0 from field)
  35    'center' = central contoured value (ignored if kpalet<2)
  -1    'nrec  ' = next record to plot   <- put -1 to say no more record to plot
~
"salsurf.IN" 24L, 1029C
~/HYCOM/hycom/ATLb2.00/plot > fp < salsurf.IN
~/HYCOM/hycom/ATLb2.00/plot >
```

** here is `.b` file corresponding to `017_archv.0004_016_00.a`

```
~/HYCOM/hycom/ATLb2.00/expt_01.7/data > more 017_archv.0004_016_00.b
COADS forcing: precip_zero; srelax;
boundary relax; iniflg=2; KPP mixed layer; Jerlov IA;
Z(22): dp00/f/x=3m/1.125/12m; ATLb2.00/src_2.1.03_22.
12345678901234567890123456789012345678901234567890123456789012345678901234567890
   21    'iversn' = hycom version number x10
   15    'iexpt ' = experiment number x10
    0    'yrflag' = days in year flag
   57    'idm   ' = longitudinal array size
   52    'jdm   ' = latitudinal  array size
field       time step  model day  k  dens        min              max
montg1  =      16200    1080.00  0  0.000  -4.3285275E+00   1.5129556E+01<- rec 1
```

```
srfhgt   =      16200    1080.00  0  0.000  -8.2809019E+00   4.9523196E+00
surflx   =      16200    1080.00  0  0.000  -4.8716431E+02   1.2126550E+02
salflx   =      16200    1080.00  0  0.000  -5.4276366E-02   8.2879849E-03
bl_dpth  =      16200    1080.00  0  0.000   2.8613521E+04   3.9396945E+06
mix_dpth =      16200    1080.00  0  0.000   2.8515463E+04   4.5268395E+06
tmix     =      16200    1080.00  0  0.000  -2.4326334E+00   3.1141809E+01
smix     =      16200    1080.00  0  0.000   2.8236820E+01   3.7296543E+01<- rec 8

thmix    =      16200    1080.00  0  0.000  -8.1621895E+00   2.5475187E+00
umix     =      16200    1080.00  0  0.000  -9.0958869E-01   7.7675802E-01
vmix     =      16200    1080.00  0  0.000  -3.2655844E-01   6.9026077E-01
u_btrop  =      16200    1080.00  0  0.000  -2.8341243E-01   3.9448869E-01
v_btrop  =      16200    1080.00  0  0.000  -1.1768365E-01   3.9088485E-01
u-vel.   =      16200    1080.00  1 19.500  -9.7741485E-01   7.7675802E-01
v-vel.   =      16200    1080.00  1 19.500  -3.6765459E-01   6.5599358E-01
thknss   =      16200    1080.00  1 19.500   2.9418000E+04   2.9418000E+04
temp     =      16200    1080.00  1 19.500  -2.4422240E+00   3.1139088E+01<-rec 17
--More-- 18%
```

As a result:



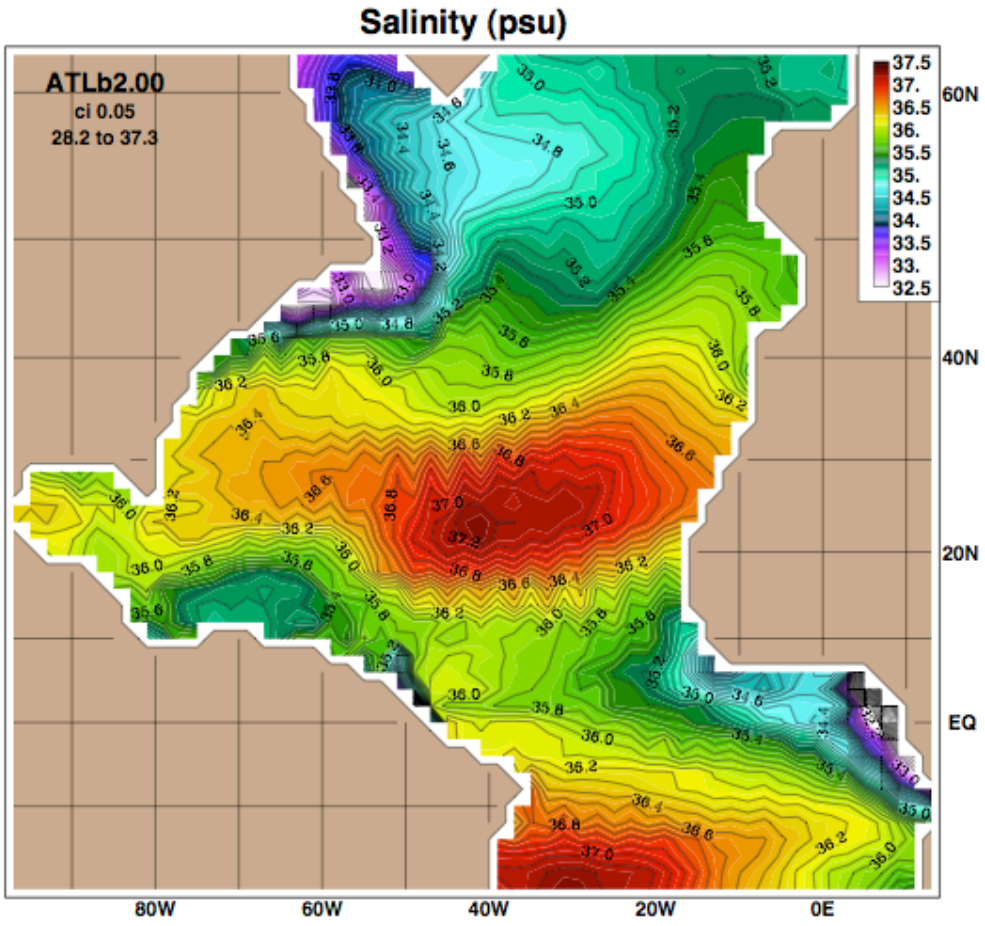
Example to plot the salinity with salinity **contours** of an `archive` file:
N.B: do not forget to put the right Unix environment!!

```
~/HYCOM/hycom/ATLb2.00/plot > vi salsurf_overlay.IN
../expt_01.7/data/017_archv.0004_016_00.a          <- file plotted
../expt_01.7/data/test.a                           <- file in contour*
ATLb2.00
 57     'idm   ' = longitudinal array size
 52     'jdm   ' = latitudinal  array size
  1     'nperfr' = number of horizontal plots per frame
 20     'lalolb' = spacing of latitude/longitude labels
 10     'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
  4     'loclab' = location of the contour label (1=upr,2=lowr,3=lowl,4=upl)
 11     'locbar' = location of the color bar     (1[0-4]=vert,2[0-4]=horiz)
```

```
  5     'kpalet' = palete (0=none,1=pastel,2=sst,3=gaudy,4=2tone,5=fc,6=ifc)
  1     'iorign' = i-origin of plotted subregion
  1     'jorign' = j-origin of plotted subregion
  0     'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
  0     'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
  8    'nrec  ' = next record to plot          <- record of the plotted field
  8   'nrec2  ' = next record to plot          <- record of the contour field
Salinity (psu)

  1     'qscale' = scale factor for plot
  0.05     'qq ' = contour interval (<0 no plot; 0 from field)
  35    'center' = central contoured value (ignored if kpalet<2)
  0.1     'qq2 ' = contour interval (<0 no plot; 0 from field)
  -1   'nrec  ' = next record to plot

c setenv OVERLAY CONTOUR
~
~
~
~
~
~
"salsurf_overlay.IN" 27L, 1162C
~/HYCOM/hycom/ATLb2.00/plot > setenv OVERLAY CONTOUR <- setting the environment
~/HYCOM/hycom/ATLb2.00/plot > fp < salsurf_overlay.IN
```

* contour file can not have the same name as the plot file …. Just copy the file you want to plot (here `017_archv.0004_016_00.a`)into another file (here `test.a`).

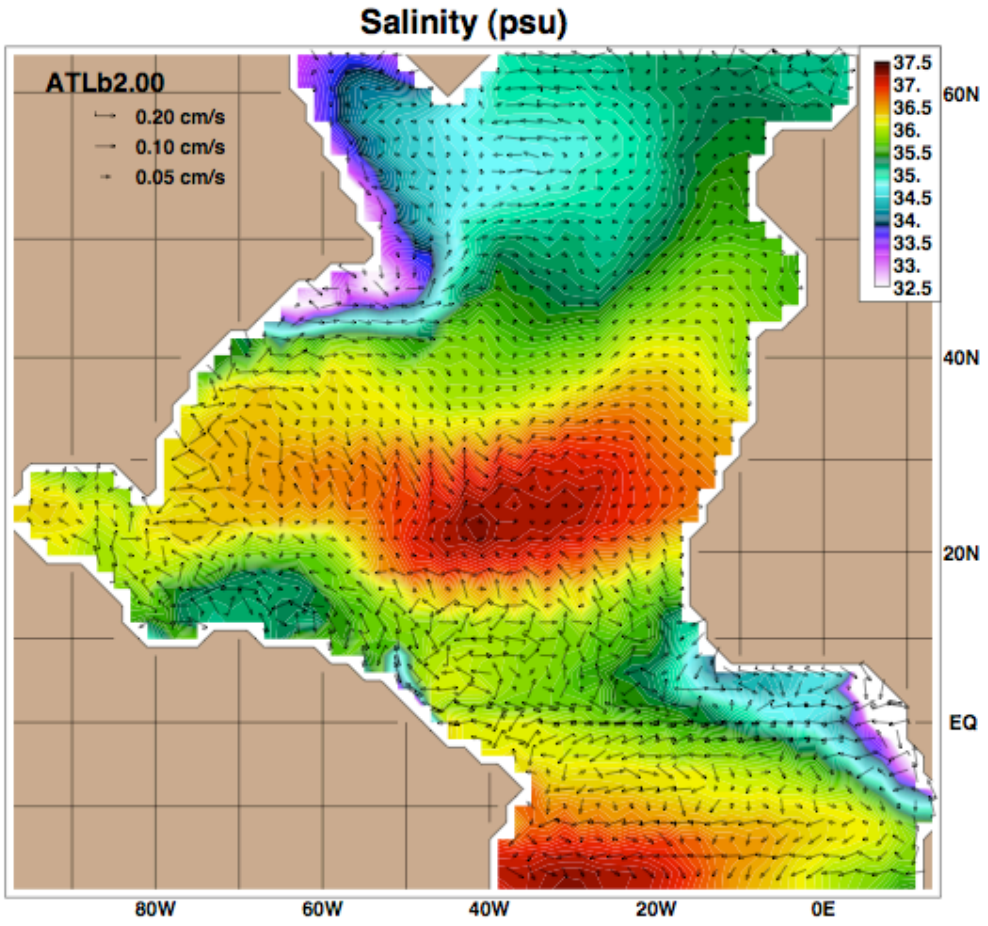
As a result:



Example to plot the salinity with **vectors** of an `archive` file:
N.B: don't forget to put the right Unix environment!!

```
~/HYCOM/hycom/ATLb2.00/plot > vi salsurf_vector.IN
../expt_01.7/data/017_archv.0004_016_00.a          <- file plotted
../expt_01.7/data/test.a                           <- file vector x
../expt_01.7/data/test.a                           <- file vector y
ATLb2.00
 57     'idm   ' = longitudinal array size
 52     'jdm   ' = latitudinal  array size
  1     'nperfr' = number of horizontal plots per frame
 20     'lalolb' = spacing of latitude/longitude labels
 10     'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
  4     'loclab' = location of the contour label (1=upr,2=lowr,3=lowl,4=upl)
 11     'locbar' = location of the color bar     (1[0-4]=vert,2[0-4]=horiz)
  5     'kpalet' = palete (0=none,1=pastel,2=sst,3=gaudy,4=2tone,5=fc,6=ifc)

  1     'i_th  ' = draw vector in only every i_th column
  1     'j_th  ' = draw vector in only every j_th row
  1     'iorign' = i-origin of plotted subregion
  1     'jorign' = j-origin of plotted subregion
  0     'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
  0     'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
  8     'nrec  ' = next record to plot     <- record of the plotted field
  10    'nrec2 ' = next record to plot     <- record of the vector x
Salinity (psu)

  1     'qscale' = scale factor for plot
  0.05    'qq ' = contour interval (<0 no plot; 0 from field)
  35    'center' = central contoured value (ignored if kpalet<2)
  1     'vscale' = scale factor for plot
  0.1    'vthrsh' = velocity plot threshold


  -1   'nrec  ' = next record to plot
  11    'nrec3 ' = next record to plot     <- record of the vector y
c setenv OVERLAY VECTOR

~
~
"salsurf_vector.IN" 34L, 1366C
~/HYCOM/hycom/ATLb2.00/plot > setenv OVERLAY VECTOR <- setting the environment
~/HYCOM/hycom/ATLb2.00/plot > fp < salsurf_vector.IN
```

As a result:



Please refer to the Appendix A for the `fieldproc` options used in these scripts

b. hycomproc

On the same way as `fieldproc` is used for the **2D fields**, `hycomproc` is used for the **3D fields and** especially for the section plot. The command line for `hycomproc` is:

```
~/HYCOM/hycom/ATLb2.00/plot > hycomproc < 015y021w_secISO.IN
```

or

```
~/HYCOM/hycom/ATLb2.00/plot > hp < 015y021w_secISO.IN
```

(N.B: `fp` and `hp` are some kind of `aliases` that can be used for respectively `fieldproc` and `hycomproc`**)**

You just have to adapt or create your `.IN` files for your needs. In Appendix B, you find the options and the order of these options needed in the `.IN` files to use `hycomproc`.

***** Some tricks and examples to make nice plots *****

(**Warning**: don't be scared by the length of the file, it's easier than you think!)

```
~/HYCOM/hycom/ATLb2.00/plot > more salsec.IN
../expt_01.7/data/017_archv.0004_016_00.a
ATLb2.00
017     'iexpt ' = experiment number x10 (000=from archive file)
  0     'yrflag' = days in year flag (0=360J16,1=366J16,2=366J01,3-actual)
 57     'idm   ' = longitudinal array size
 52     'jdm   ' = latitudinal  array size
 22     'kdm   ' = number of layers
 25.0   'thbase' = reference density (sigma units)
  1     'nperfr' = number of horizontal plots per frame
 20     'lalolb' = spacing of latitude/longitude labels
 10     'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
  4     'loclab' = location of the contour label (1=upr,2=lowr,3=lowl,4=upl)
 11     'locbar' = location of the color bar     (1[0-4]=vert,2[0-4]=horiz)
  5     'kpalet' = palete (0=none,1=pastel,2=sst,3=gaudy,4=2tone,5=fc,6=ifc)
  0     'smooth' = smooth fields before plotting (0=F,1=T)
  1     'mthin ' = mask thin layers from plots   (0=F,1=T)
  2     'i_th'   = current vector plotting spacing
  1     'iorign' = i-origin of plotted subregion
  1     'jorign' = j-origin of plotted subregion
  0     'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
  0     'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
                                   - 2D surface field that can be plotted from here -
 -1.0   'botqq ' = bathymetry       contour int (<0 no plot; 0 from field)

 -1.0   'flxqq ' = surf. heat flux  contour int (<0 no plot; 0 from field)
 -1.0   'empqq ' = surf. evap-pcip  contour int (<0 no plot; 0 from field)
 -1.0   'ttrqq ' = surf. temp trend contour int (<0 no plot; 0 from field)
 -1.0   'strqq ' = surf. saln trend contour int (<0 no plot; 0 from field)

 -1.0   'icvqq ' = ice coverage     contour int (<0 no plot; 0 from field)
 -1.0   'ithqq ' = ice thickness    contour int (<0 no plot; 0 from field)
 -1.0   'ictqq ' = ice temperature  contour int (<0 no plot; 0 from field)

  2.    'sshqq ' = sea surf. height contour int (<0 no plot; 0 from field)
 15.2   'center' = central contoured value (ignored if kpalet<2)
 -1.0   'bsfqq ' = baro. strmfn.    contour int (<0 no plot; 0 from field)
```

```
  0.0   'mthrsh' = mix lay velocity plot threshold (0 no plot; <0 contour int)
 -1.0   'bltqq ' = bnd. lay. thick. contour int (<0 no plot; 0 from field)
 -1.0   'mltqq ' = mix. lay. thick. contour int (<0 no plot; 0 from field)
 -1.0   'sstqq ' = mix. lay. temp.  contour int (<0 no plot; 0 from field)
 -1.0   'sssqq ' = mix. lay. saln.  contour int (<0 no plot; 0 from field)
 -1.0   'ssdqq ' = mix. lay. dens.  contour int (<0 no plot; 0 from field)

                                   - to there                                -
                                   - 2D depth field that can be plotted from here  -
 -1     'kf    ' = first plot layer (=0 end layer plots; <0 label with layer #)
  1     'kl    ' = last  plot layer
  0.0   'vthrsh' = layer k velocity plot threshold (0 no plot; <0 contour int)
 -1.0   'infqq ' = layer k   i.dep. contour int (<0 no plot; 0 from field)
 -1.0   'thkqq ' = layer k   thick. contour int (<0 no plot; 0 from field)
 -1.0   'temqq ' = temp contour int (<0 no temp plot; 0 from field)
 -1.0   'salqq ' = layer k   saln.  contour int (<0 no plot; 0 from field)
 -1.0   'tthqq ' = layer k   dens,  contour int (<0 no plot; 0 from field)
 -1.0   'sfnqq ' = layer k  strmfn. contour int (<0 no plot; 0 from field)
                                   - to there                                -
                                   - Section plot from here -
0       'kf    ' = first plot layer (=0 end layer plots; <0 label with layer #)
1500.0  'depth ' = cross section plot depth
  1.0   'vstep ' = velocity contours (1.0 stairstep, to 0.0 gently curved)
-1.0    'velqq ' = vel  contour int (<0 no vel  plot; 0 from field)
  0.0   'center' = central contoured value (ignored if kpalet<2)
 0.3    'temqq ' = temp contour int (<0 no temp plot; 0 from field)
 15.2   'center' = central contoured value (ignored if kpalet<2)
 0.05   'salqq ' = saln contour int (<0 no saln plot; 0 from field)
 35.0   'center' = central contoured value (ignored if kpalet<2)
 -1.    'tthqq ' = dens contour int (<0 no dens plot; 0 from field)
 27.    'center' = central contoured value (ignored if kpalet<2)
  2     'mxlflg' = plot mixed layer (0=no-plot,1=plot,2=smooth-plot)
  2     'kpalet' = palete (0=none,1=pastel,2=sst,3=gaudy,4=2tone,5=fc,6=ifc)
  1     'noisec' = number of i cross sections
  39    'isec'   = i cross section location
  1     'nojsec' = number of j cross sections
  30    'jsec'   = j cross section location
~/HYCOM/hycom/ATLb2.00/plot > hp2ps salsec.IN
~/HYCOM/hycom/ATLb2.00/plot >
```

As a result:

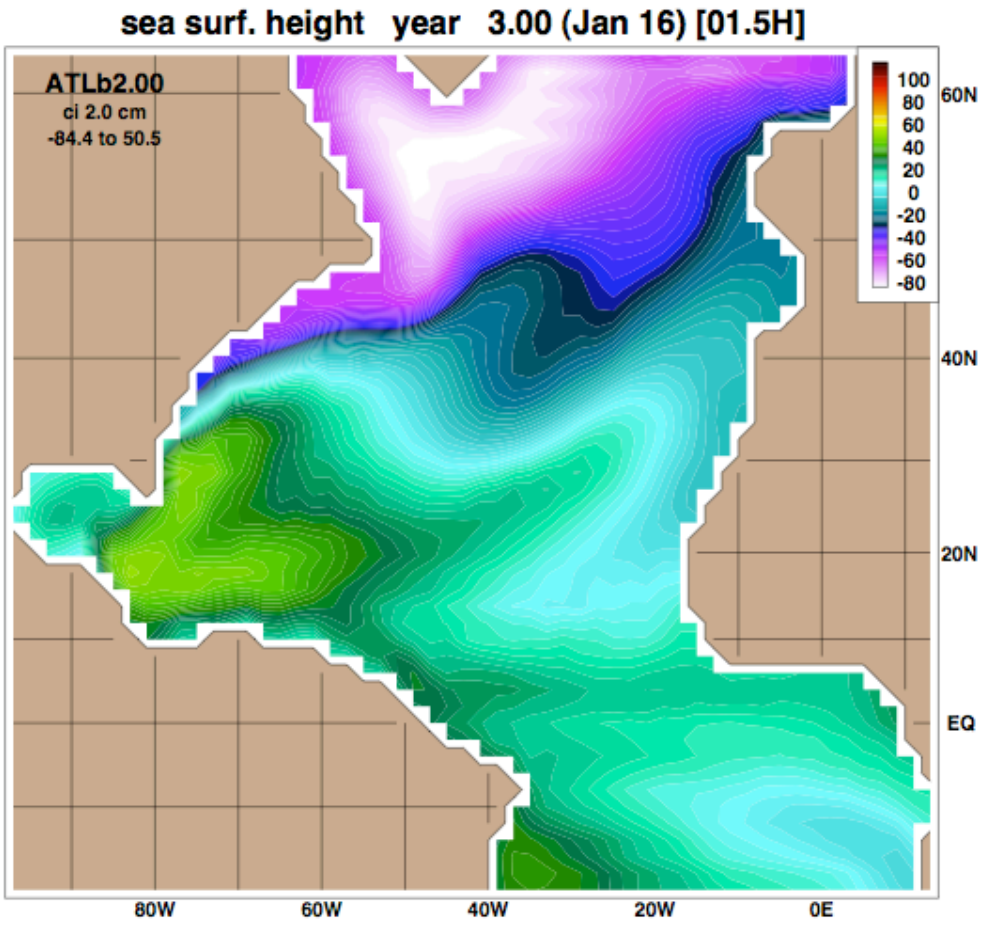


Figure-script 1: 2D surface field

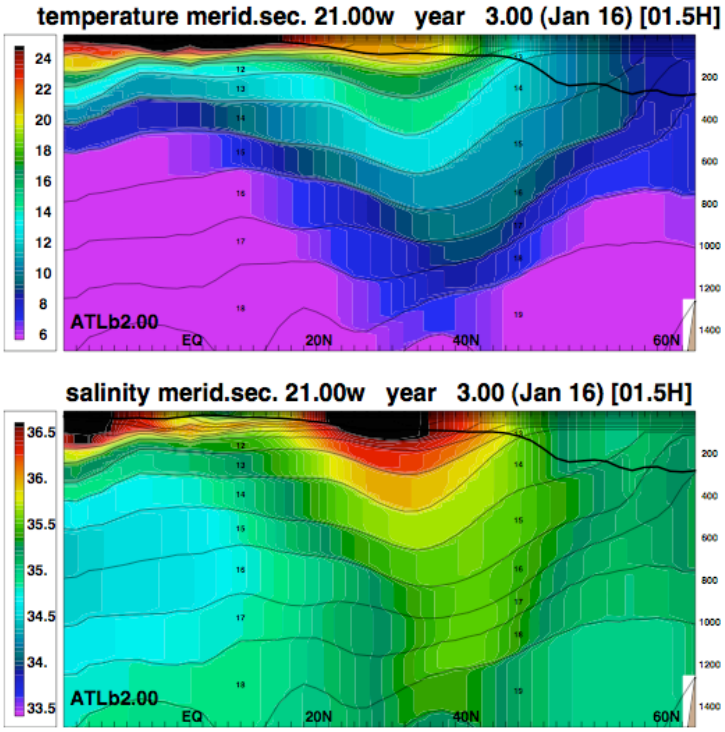


Figure-script 2: meridional sections of temperature and salinity

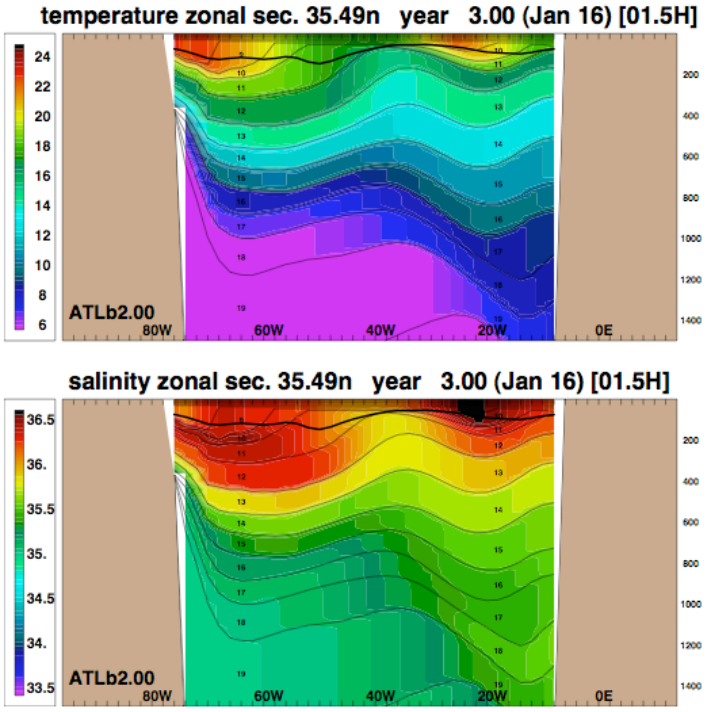


Figure-script 3: zonal sections of temperature and salinity

Please refer to the Appendix B for the `hycomproc` options used in this script

7. Archive files

Some scripts are also available to convert `*.a` archives files into `*.nc` NetCDF file. Examples are given in `ATLb2.00/archive`.

Example of script converting layer-coordinates `*.a` files into level-coordinates `*.nc` files:

```
~/HYCOM/hycom/ATLb2.00/archive > more ncdf3z_alex.com
#!/bin/csh
#
set echo
#
# --- interpolate to 3-d z-levels from a single HYCOM archive file.
# --- z-levels, via linear interpolation, at Levitus depths.
#
# --- output is netCDF.
# --- this is an example, customize it for your datafile needs.
#
touch regional.depth.a regional.depth.b
if (-z regional.depth.a) then
  /bin/rm regional.depth.a
  /bin/ln -s ../topo/depth_ATLb2.00_01.a regional.depth.a          <- vertical grid file
endif
if (-z regional.depth.b) then
  /bin/rm regional.depth.b
  /bin/ln -s ../topo/depth_ATLb2.00_01.b regional.depth.b
endif
#
touch regional.grid.a regional.grid.b
if (-z regional.grid.a) then
  /bin/rm regional.grid.a
  /bin/ln -s ../topo/regional.grid.a .                             <- horizontal grid file
endif
if (-z regional.grid.b) then
  /bin/rm regional.grid.b
  /bin/ln -s ../topo/regional.grid.b .
endif
#
# --- optional title and institution.
#
setenv CDF_TITLE        "HYCOM ATLc2.00"
#setenv CDF_INST        "RSMAS"
setenv CDF_INST         "Naval Research Laboratory"
#
# --- D,y,d select the archive files.
#
setenv D ../expt_01.7/OUTPUT
#
foreach y ( 0004 )
  foreach d ( 016 )
- definition of the  record CDFXXX corresponding to the NetCDF file  names -

#    setenv CDF051  ${D}/230_archv.${y}_${d}_00_bot.nc
#    setenv CDF021  ${D}/230_archv.${y}_${d}_00_mlt.nc
#    setenv CDF028  ${D}/230_archv.${y}_${d}_00_3di.nc
    setenv CDF033  ${D}/260_archv.${y}_${d}_00_3ztsr.nc
    setenv CDF034  ${D}/260_archv.${y}_${d}_00_3zs.nc
    setenv CDF035  ${D}/260_archv.${y}_${d}_00_3zr.nc
    setenv CDF037  ${D}/260_archv.${y}_${d}_00_3zu.nc
    setenv CDF038  ${D}/260_archv.${y}_${d}_00_3zv.nc
#    setenv CDF039  ${D}/230_archv.${y}_${d}_00_3zc.nc
#    setenv CDF040  ${D}/230_archv.${y}_${d}_00_3zw.nc
#    setenv CDF041  ${D}/230_archv.${y}_${d}_00_3zi.nc
```

```
#    /bin/rm $CDF051  $CDF021  $CDF028
    /bin/rm $CDF033  $CDF034  $CDF035  $CDF037  $CDF038
#    /bin/rm $CDF039  $CDF040  $CDF041
    ../../ALL/archive/src/archv2ncdf3z <<E-o-D
${D}/017_archv.${y}_${d}_00.a                          <- file interpolated
netCDF                                                 <- format of the output file
 000    'iexpt ' = experiment number x10 (000=from archive file)
   0    'yrflag' = days in year flag (0=360J16,1=366J16,2=366J01,3-actual)
  59    'idm   ' = longitudinal array size
  70    'jdm   ' = latitudinal  array size
  28    'kdm   ' = number of layers
  34.0  'thbase' = reference density (sigma units)
   0    'smooth' = smooth the layered fields (0=F,1=T)
   1    'iorign' = i-origin of plotted subregion
   1    'jorign' = j-origin of plotted subregion
   0    'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
   0    'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
   1    'itype ' = interpolation type (0=sample,1=linear)
  34    'kz    ' = number of depths to sample
   0.0  'z     ' = sample depth  1
  10.0  'z     ' = sample depth  2
  20.0  'z     ' = sample depth  3
  30.0  'z     ' = sample depth  4
  50.0  'z     ' = sample depth  5
  75.0  'z     ' = sample depth  6
 100.0  'z     ' = sample depth  7
 125.0  'z     ' = sample depth  8
 150.0  'z     ' = sample depth  9
 200.0  'z     ' = sample depth 10
 250.0  'z     ' = sample depth 11
 300.0  'z     ' = sample depth 12
 400.0  'z     ' = sample depth 13
 500.0  'z     ' = sample depth 14
 600.0  'z     ' = sample depth 15
 700.0  'z     ' = sample depth 16                     <-| target levels of the interpolated grid
 800.0  'z     ' = sample depth 17
 900.0  'z     ' = sample depth 18
1000.0  'z     ' = sample depth 19
1100.0  'z     ' = sample depth 20
1200.0  'z     ' = sample depth 21
1300.0  'z     ' = sample depth 22
1400.0  'z     ' = sample depth 23
1500.0  'z     ' = sample depth 24
1750.0  'z     ' = sample depth 25
2000.0  'z     ' = sample depth 26
2500.0  'z     ' = sample depth 27
3000.0  'z     ' = sample depth 28
3500.0  'z     ' = sample depth 29
4000.0  'z     ' = sample depth 30
4500.0  'z     ' = sample depth 31
5000.0  'z     ' = sample depth 32
5500.0  'z     ' = sample depth 33
6000.0  'z     ' = sample depth 34
- Field to be interpolated -
  0     'botio ' = bathymetry  I/O unit (0 no I/O)
  0     'mltio ' = mix.l.thk.  I/O unit (0 no I/O)
  0     'tempml' = temperature jump across mixed-layer (degC,  0 no I/O)
  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     'wviio ' = intf. veloc I/O unit (0 no I/O)
  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)
  33    'salio ' = salinity    I/O unit (0 no I/O)  <- record XXX where the interpolated data  will be stored
  33    'tthio ' = density     I/O unit (0 no I/O)
```

```
E-o-D
  end
end
~/HYCOM/hycom/ATLb2.00/archive >
```

Now you are ready to use the HYCOM ocean model! Hope you have enjoyed the trip! Do not hesitate to communicate some comments, corrections or contribution to this Quick start's guide!

THE END

Appendix A

FIELDPROC options:
c
c --- 2-D horizontal field plot processor
c
c --- Use environment variable OVERLAY to control overlay
c --- if OVERLAY is "CONTOUR" then overlay a 2nd field as a line contour
c --- if OVERLAY is "VECTOR" then overlay a vector field
c --- if OVERLAY is "VECBATH" then overlay a vector field and bathymetry
c --- "CONTOUR_NL" and "VECBATH_NL" turn off labeling of line contours.

c --- Use environment variable TRACKS or TRACKS_XY to (optionally) identify
c --- a file of locations to mark, and/or tracks to draw, on the plot.
c --- TRACKS contains lon,lat locations, and TRACKS_XY contains array
c --- locations. Specify only one of TRACKS or TRACKS_XY.
c --- Note that specifying array locations will be significantly faster
c --- than lon,lat locations for curvi-linear domains, but they are w.r.t.
c --- the plotted subregion and should therefore be used with caution.
c --- Use hycom_lonlat2xy to convert lon,lat to x,y on the original
c --- array, and hycom_subset_xy to convert these to the plotted subregion.
c --- For more information, see tracks.f.

OPTIONS order/needed by `fieldproc` in `*.IN` script (See `ATLb2.00/plot` for examples)

c --- color options (see colors.f for a complete list).
c --- ipalet = 0   -- contour lines only, no color
c --- ipalet = 1   -- alternate pastel shading of contour intervals
c --- ipalet = 2   -- use canonical sst color palette (64 intervals)
c --- ipalet = 3   -- use rainer's gaudy color palette (100 intervals)
c --- ipalet = 4   -- two-tone shades   (64 intervals)
c --- ipalet = 5   -- NRL's 100 false color palette   (100 intervals)
c --- ipalet = 6   -- NRL's inverted 100 fc palette   (100 intervals)
c --- ipalet = 7   -- MATLAB's JET   BlCyYeRe   (20 intervals)
c --- ipalet = 8   -- MATLAB's JETw BlCyWhYeRe   (20 intervals)
c --- ipalet = 9   -- MATLAB's JETww BlCyWhWhYeRe   (20 intervals)
c --- ipalet =10   -- MATLAB's JETw BlCyWhYeRe   (100 intervals)
c --- ipalet =11   -- NCL's WhViBlGrYeOrRe   (100 intervals)
c --- ipalet =12   -- NCL's ReOrYeGrBlViWh   (100 intervals)
c --- ipalet =13   -- NCL's +WhViBlGrYeOrRe   (100 intervals)
c --- ipalet =14   -- NCL's ReOrYeGrBlViWh+   (100 intervals)
c --- ipalet =15   -- MATLAB's HOT   (20 intervals)
c --- ipalet =16   -- MATLAB's HOT, inverted   (20 intervals)

!no overlay
c ---   'flnm ' = name of file containing the actual data

!field-overlay
c ---   'flnm ' = name of file containing the actual data
c ---   'flnm2 ' = name of file containing the actual data for overlay

!vector-overlay
c ---   'flnm ' = name of file containing the actual data
c ---   'flnm2 ' = name of file containing the actual data for u-vector

```
c ---     'flnm3 ' = name of file containing the actual data for v-vector
```

!vector-overlay and bathymetry

```
c ---     'flnm  ' = name of file containing the actual data
c ---     'flnm2 ' = name of file containing the actual data for u-vector
c ---     'flnm3 ' = name of file containing the actual data for v-vector
c ---     'qqbath' = bathymetry contour interval (<0 no plot; 0 from field)

c ---   Use environment variable TRACKS or TRACKS_XY for markers and tracks
c--      flnmtr = ' '

c ---   'region' = name of model region (e.g. ATLa2.00)
c ---   'idm   ' = longitudinal array size
c ---   'jdm   ' = latitudinal  array size
c
c ---   'nperfr' = number of horizontal plots per frame
c ---   'lalolb' = spacing of latitude/longitude labels
c ---   'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
c ---      (abs(lalogr)>1000: spacing is (abs(lalogr)-1000)/100.0)
c ---   'loclab' = flag indicating the location of the contour lablel
c ---      (0=input,1=upper-right,2=lower-right,3=lower-left,4=upper-left)
c ---   'ilabel' = i-index for contour lablel (loclab=0 only)
c ---   'jlabel' = j-index for contour lablel (loclab=0 only)
c ---   'locbar' = flag indicating the location of the color bar
c ---      (vertical:   10=right, 11=ur,12=lr,13=ll,14=ul,15=cr,16=cl)
c ---      (horizontal: 20=bottom,21=ur,22=lr,23=ll,24=ul,25=ct,26=cb)
c ---   'gray  ' = no color (0=F,1=T), OPTIONAL default 0
c ---   'kpalet' = palete (0=none,1=pastel/gray,>1 color)
c ---              paletes >1 require input of the central contour
c ---              -9 adds near-center line contours to palete 9
```

!vector-overlay

```
c ---   'i_th  ' = draw a vector in only every i_th column
c ---   'j_th  ' = draw a vector in only every j_th row
c ---   'iorign' = i-origin of plotted subregion
c ---   'jorign' = j-origin of plotted subregion
c ---   'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
c ---   'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)
c ---   'nrec  ' = next record to plot    (arbitrary order, <0 to end)
c ---   'nrec2 ' = next record to overlay (arbitrary order)

c ---   'plabel' = plot label
c ---   'qscale' = scale factor for plot
c ---   'qq    ' = contour interval (<0 no plot; 0 from field)
c ---      'center' = central contoured value
c ---     'qq2   ' = contour interval (<0 no plot; 0 from field)
c ---     'vscale' = scale factor for vector (convert to cm/s)
c ---     'vthrsh' = velocity plot threshold
```

Appendix B

HYCOMPROC options:

```
c
c --- hycom/micom processor (MKS real-basin version)
c
c --- use environment variable CROSS_LABELS to provide the
c --- name of a file containing a 4-character label for each
c --- layer on cross-section plots.  Note that CROSS_LABELS="NONE"
c --- indicates no cross section plots are needed (i.e. no[ij]sec=0),
c --- and can speed up the processing in such cases.
c
c --- Use environment variable TRACKS or TRACKS_XY to (optionally) identify
c --- a file of locations to mark, and/or tracks to draw, on the lon-lat plot.
c --- TRACKS contains lon,lat locations, and TRACKS_XY contains array
c --- locations.  Specify only one of TRACKS or TRACKS_XY.
c --- Note that specifying array locations will be significantly faster
c --- than lon,lat locations for curvi-linear domains, but they are w.r.t.
c --- the plotted subregion and should therefore be used with caution.
c --- Use hycom_lonlat2xy to convert lon,lat to x,y on the original
c --- array, and hycom_subset_xy to convert these to the plotted subregion.
c --- For more information, see tracks.f.
```

OPTIONS order/needed by hycomproc in *.IN script (See ATL/plot for examples)

```
c --- color options (see colors.f for a complete list).
c --- ipalet = 0      --  contour lines only, no color
c --- ipalet = 1      --  alternate pastel shading or negative gray
c --- ipalet = 2      --  use canonical sst color palette  ( 64 intervals)
c --- ipalet = 3      --  use rainer's gaudy color palette (100 intervals)
c --- ipalet = 4      --  two-tone shades                  ( 64 intervals)
c --- ipalet = 5      --  NRL's 100 false color palette    (100 intervals)
c --- ipalet = 6      --  NRL's inverted 100 fc palette    (100 intervals)
c --- ipalet = 7      --  MATLAB's JET   BlCyYeRe          ( 20 intervals)
c --- ipalet = 8      --  MATLAB's JETw  BlCyWhYeRe        ( 20 intervals)
c --- ipalet = 9      --  MATLAB's JETww BlCyWhWhYeRe      ( 20 intervals)
c --- ipalet =10      --  MATLAB's JETw  BlCyWhYeRe        (100 intervals)
c --- ipalet =11      --  NCL's WhViBlGrYeOrRe             (100 intervals)
c --- ipalet =12      --  NCL's ReOrYeGrBlViWh             (100 intervals)
c --- ipalet =13      --  NCL's +WhViBlGrYeOrRe            (100 intervals)
c --- ipalet =14      --  NCL's ReOrYeGrBlViWh+            (100 intervals)
c --- ipalet =15      --  MATLAB's HOT                     ( 20 intervals)
c --- ipalet =16      --  MATLAB's HOT, inverted           ( 20 intervals)
c
```

```
c
c ---   'region' = name of model region (e.g. ATLa2.00)
c ---   'iexpt ' = experiment number x10  (000=from archive file)
c ---   'yrflag' = days in year flag (-1=none,0=360,1=366J16,2=366J01,3=actual)
c ---   'ntracr' = number of tracers (to plot, optional with default 0)
c ---   one line per tracer: 8-letter title, 8-letter format, long name
```

```
c ---   'idm   ' = longitudinal array size
c ---   'jdm   ' = latitudinal  array size
c ---   'kdm   ' = number of layers
c
c ---   'thbase' = reference density (sigma units)
c ---   'nperfr' = number of horizontal plots per frame
c ---   'lalolb' = spacing of latitude/longitude labels (<0 use array spacing)
c ---   'lalogr' = spacing of latitude/longitude grid over land (<0 land+sea)
c ---      (abs(lalogr)>1000: spacing is (abs(lalogr)-1000)/100.0)
c ---   'loclab' = flag indicating the location of the contour lablel
c ---      (0=input,1=upper-right,2=lower-right,3=lower-left,4=upper-left)
c ---   'ilabel' = i-index for contour lablel (loclab=0 only)
c ---   'jlabel' = j-index for contour lablel (loclab=0 only)
c ---   'locbar' = flag indicating the location of the color bar
c ---      (vertical:   10=right, 11=ur,12=lr,13=ll,14=ul,15=cr,16=cl)
c ---      (horizontal: 20=bottom,21=ur,22=lr,23=ll,24=ul,25=ct,26=cb)
c ---   'gray  ' = no color (0=F,1=T), OPTIONAL default 0
c ---   'kpalet' = palete (0=none,1=pastel/gray,>1 color)
c ---              paletes >1 require input of the central contour
c ---   'smooth' = smooth fields before plotting
c ---   'mthin ' = mask thin layers from plots (0=F,1=T,2=T&mdens=T)
c ---   'baclin' = plot baroclinic velocity (0=total:DEFAULT,1=baroclinic)
c ---   'i_th  ' = draw only every i_th vector in every (i_th/2) row

c ---   'iorign' = i-origin of plotted subregion
c ---   'jorign' = j-origin of plotted subregion
c ---   'idmp  ' = i-extent of plotted subregion (<=idm; 0 implies idm)
c ---   'jdmp  ' = j-extent of plotted subregion (<=jdm; 0 implies jdm)


c --- ------------------------
c --- plot non-layered fields
c --- ------------------------
c

c --- 'botqq ' = bathymetry contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
c --- --------------------
c --- plot surface fluxes
c --- --------------------
c
c --- 'flxqq ' = surf. heat  flux contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'empqq ' = surf. evap-pcip contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'ttrqq ' = surf. temp trend contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'strqq ' = surf. saln trend contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
```

```
c --- ---------------
c --- plot ice fields
c --- ---------------
c
*     if     (icegln) then
c
c --- 'icvqq ' = ice coverage contour int (<0 no plot; 0 from field)
c ---     'center' = central contoured value
c --- 'ithqq ' = ice thickness contour int (<0 no plot; 0 from field)
c ---     'center' = central contoured value
c --- 'ictqq ' = ice temperature contour int (<0 no plot; 0 from field)
c ---     'center' = central contoured value


c --- -------------------
c --- plot surface fields
c --- -------------------
c
c --- 'sshqq ' = sea surf. height contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'bkeqq ' = baro. kinetic energy contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c --- -------------------------
c --- plot barotropic velocity
c --- -------------------------
c --- 'bspdqq' = barotropic speed contour interval  (<0 no plot; 0 from field)
c --- 'center' = central contoured value (if needed)
c --- 'bthrsh' = barotropic velocity plot threshold (0 no plot; <0 contour int)
c ---     'center' = central contoured value
c ---   also have 'vthrsh' and 'bsfqq '
c --- 'bsfqq ' = baro. strmfn. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value


c
c --- ------------------------
c --- plot mixed layer fields
c --- ------------------------
c
c --- 'mthrsh' = mix lay velocity plot threshold (0 no plot; <0 contour int)
c --- 'bltqq ' = bnd. lay. thick. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'mltqq ' = mix. lay. thick. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'sstqq ' = mix. lay. temp.  contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'sssqq ' = mix. lay. saln.  contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'ssdqq ' = mix. lay. dens.  contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c --- 'mkeqq ' = m.l. kinetic energy contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
```

```
c
c --- --------------------
c --- plot selected layers
c --- --------------------
c
c --- 'kf    ' = first plot layer (=0 end layer plots; <0 label with layer #)
c --- 'kl    ' = last  plot layer

c
c --- --------------------
c --- plot layer velocity
c --- --------------------
c --- 'spdqq ' = layer k speed contour int (<0 no plot; 0 from field)
c --- 'vthrsh' = layer k velocity plot threshold (0 no plot; <0 contour int)
c ---       'center' = central contoured value


c
c --- ----------------------------
c --- plot fluid vertical velocity
c --- ----------------------------
c --- 'wvelqq' = lay.  k w-vel. contour int (<0 no plot; 0 from field)
c --- 'infqq ' = lay.  k thick. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
c --- --------------------
c --- plot interface depth
c --- --------------------
c
c --- 'infqq ' = lay.  k thick. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
c --- --------------------
c --- plot layer thickness
c --- --------------------
c
c --- 'thkqq ' = lay.  k thick. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
c --- ----------------
c --- plot temperature
c --- ----------------
c
c --- 'temqq ' = layer k temp contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c
c --- -------------
c --- plot salinity
```

```
c --- -------------
c
c --- 'salqq ' = lay.  k saln. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c
c --- -------------
c --- plot density
c --- -------------
c
c --- 'tthqq ' = layer k density contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c
c --- ------------
c --- plot tracers
c --- ------------
c
c --- 'trcqq ' = layer k tracer contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c
c --- --------------------------
c --- plot layer kinetic energy
c --- --------------------------
c
c --- 'keqq  ' = kinetic energy contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value
c
c --- --------------------------
c --- plot layer stream function
c --- --------------------------
c
c --- 'sfnqq ' = layer k strmfn. contour int (<0 no plot; 0 from field)
c ---   'center' = central contoured value

c
c --- ----------------------------
c --- c r o s s   s e c t i o n s
c --- ----------------------------
c
c --- 'topsec' = cross section plot top (OPTIONAL, default 0.0)
c --- 'depth ' = cross section plot depth
c --- 'tthovr' = isopycnal overlay contour int (=0.0 overlay interfaces)
c --- 'vstep ' = velocity contours (1.0 stairstep, to 0.0 gently curved)
c --- 'velqq ' = uvel contour int (<0 no vel  plot; 0 from field)
c --- 'velqq ' = vvel contour int (<0 no vel  plot; 0 from field) (OPTIONAL)
c --- 'center' = central contoured value (ignored if kpalet<2)
c --- 'wvelqq' = wvel contour int (<0 no vel  plot; 0 from field) (OPTIONAL)
c --- 'center' = central contoured value (ignored if kpalet<2)
c --- 'temqq ' = temp contour int (<0 no temp plot; 0 from field)
c --- 'center' = central contoured value (ignored if kpalet<2)
c --- 'salqq ' = saln contour int (<0 no saln plot; 0 from field)
c --- 'center' = central contoured value (ignored if kpalet<2)
c --- 'tthqq ' = dens contour int (<0 no dens plot; 0 from field)
c --- 'center' = central contoured value (ignored if kpalet<2)
```

```
c --- 'mxlflg' = plot mixed layer (0=no,1-2=mxl,3-4=bl,5-6=mxl&bl,even=smooth)
c --- 'kpalet' = palete (0=none,1=pastel,2:7=sst,gaudy,2tone,fc,ifc,fc20)
c ---              negative to also line contour the field (no interfaces)
c ---
c --- if one 'velqq ' is provided it is for the normal velocity
c
c --- one section plot for each non-negative velqq,wvelqq,temqq,salqq,tthqq

c --- 'noisec' = number of i cross sections
c --- 'isec  ' = i cross section location (<0 for N to S section), or
c --- 'i1st  ' = i cross section location at i=1
c ---   'iend  ' = i cross section location at j=jdmp-1
c
c --- 'nojsec' = number of j sections
c --- 'jsec  ' = j cross section location, or
c --- 'j1st  ' = j cross section location at i=1
c ---   'jend  ' = j cross section location at i=idmp-1
```