**USING COAWST ON EAGLE**

Cloned repo ultimately from: <https://github.com/jcwarner-usgs/COAWST.git>

Branch: master, bgaudet/ysuwave

User manual in head directory: /projects/oracle/shared/COAWST/COAWST\_User\_Manual.doc

**COAWST v3.7**

**WRFv4.2.2**

**ROMSv3.9**

SWANv41.31 / **WW3 v6(?)**

**Modeling Coupling Toolkit (MCT) v2.6.0**

**SCRIP\_COAWST (modified for COAWST)**

**ENVIRONMENT**

*Modules:*

1) gcc/8.4.0 4) mkl/2020.1.217 7) hdf5/1.10.6/intel-impi

2) comp-intel/2020.1.217 5) netcdf-c/4.7.4/intel 8) pnetcdf/1.12.1/intel-impi

3) intel-mpi/2020.1.217 6) netcdf-f/4.5.3/intel-serial 9) ncl/6.6.2

*NetCDF settings in .bashrc:*

export NETCDF=/nopt/nrel/apps/netcdf-f/4.5.3-intel (for WRF)

export WRFIO\_NCD\_LARGE\_FILE\_SUPPORT=1

export NETCDF\_classic=1

export NETCDF\_INCDIR=/nopt/nrel/apps/netcdf-f/4.5.3-intel/include (for ROMS, SCRIP\_COAWST)

export NETCDF\_LIBDIR=/nopt/nrel/apps/netcdf-f/4.5.3-intel/lib (for ROMS)

export NETCDF\_CONFIG=/nopt/nrel/apps/netcdf-f/4.5.3-intel/bin/nf-config (for WW3, also assigned in coawst.bash build script)

*Other variables (e.g., paths of MCT libraries to be made) set in COAWST compilation script (coawst.bash).*

**COMPILATION**

cd Lib/MCT, mkdir lib and include subdirectories; run ./configure, edit ‘Makefile.conf’ appropriately (set libdir, includedir to new subdirectories; change default gfortran / gcc options to a specified set of ifort / icc options for that selection), then run ‘make’ followed by ‘make install’

Then – go to top level COAWST directory, for intel edit ‘makefile’ so USE\_MPI, USE\_MPIF90 are on, change FORT from pgi to ifort; default mpif90 is used to compile Master directory, but default mpif90 is gfortran, so need to also modify Linux-ifort.mk in Compilers directory to add -f90=ifort to FFLAGS when USE\_MPI and USE\_MPIF90 are invoked

Modify coawst.bash (MY\_ROOT\_DIR, MY\_HEADER\_DIR, MY\_ANALYTICAL\_DIR set as appropriate; set MCT\_LIBDIR, MCT\_INCDIR to point to recently created lib, include directories; keep WWATCH3\_NETCDF=NC4; have prepend path under openmpi be blank so default mpif90 path is used for ifort case, along with which\_MPI=openmpi; turn off USE\_LARGE and USE\_NETCDF4;

COAWST\_APPLICATION=name of .h header file with application (stand-alone or two-way), create as appropriate; WW3\_SWITCH\_FILE as appropriate (*NOTE: in WW3 switch file, LRB4 does not work with latest version!*) , must correspond to switch file in WW3/model/bin; create this as appropriate for the application if not otherwise existing; for other options, same as above

*Note: I needed to remove compiling WW3 util ww3\_prtide from WW3/model/bin/make\_MPI to get WW3 to compile.*

Run coawst.bash, for WRF configure choose options 15 / 1

First time for WW3: choose update WWATCH3\_DIR (u), update settings (y), enter for printer, FORTRAN compiler, add icc for C compiler, enter for scratch space, save source code, save listings, new settings OK (y),

Note that an error of undefined reference to MAIN\_\_ during the compilation of wrf.exe is OK, because in the preprocessor ‘PROGRAM WRF’ was changed to ‘SUBROUTINE WRF’ such that only the final coawst executable is created. If OK, real.exe should have been created.

Finally – in final link step, may have to relink with new order that has WRF library (and WW3 library) ahead of MCT libraries in line since the library with unresolved calling functions needs to be before the library containing those functions. Move MCT libraries last. Also add -lnetcdff after -lnetcdf.

**When successful, will get executable ‘coawstM’, along with real.exe, etc.**

**TO RUN COAWST**

**Stand-alone WRF:**

Should be same as normal. (coawstM will just be link to wrf.exe)

**One-way-coupled WRF**

Run as in stand-alone, but need code modifications (e.g., ysuwave); and need to manually map wave data into wrflowinp files.

**Two-way coupled**

Run real.exe as normal.

*SCRIP:*

To compile:

Modify local makefile to use ifort, make

Should generate *scrip\_coawst*

Need xcoord, ycoord, and bathymetry output files (value at one grid point per row in ASCII file, xcoord=longitude from -180 to 180, ycoord=latitude, bathymetry=depth as positive number or 9999 over land (all 2D fields cycling in longitude first, though latitude will not change with y, nor longitude with x). Can use variants of my makeww3coord.ncl script to do this from WW3 netcdf output files.

Also need wrfinput files from all domains to be used in the mapping.

Edit <nameofinput>.in to specify names of output netcdf4 file(s), number of grids (1 for WW3), ROMS grid files if applicable, paths to xcoord,ycoord,bathy files, number of WW3 grid points, and path to wrfinput file(s).

Run ./scrip\_coawst script\_coawst\_<nameofinput>.in, generate output netcdf mapping files.

*Running*

Modify appropriate coupling input file (e.g., ww3\_wrf\_coupling.in) in appropriate Projects subdirectory (In particular, path to ww3\_grid.inp file), as well as correct allocation of processors, coupling timestep, path to SCRIP file); link WW3 directory to run directory.

Need ww3\_grid.inp to be correct, run to generate mod.ww3 file.

Need to first run ww3\_strt file to create restart.ww3 if cold start.

Link over nest.ww3 BC as appropriate.