# NWM coupling using Fortran script

(1) download NWM discharge from batabase:

Take 2005/07 to 2005/09 as an example for downloading data:

aws s3 cp s3://nwm-archive/2005/ . --no-sign-req --recursive --exclude "*" --include "20050[7-9]*CHR*"

The data have been saved under:

/sciclone/home20/whuang07/data10/NWM/CHRTOUT

(2) preparing input files:

The projection is in lat/lon.

The NWM data is saved under:

/sciclone/home20/whuang07/data10/NWM/CHRTOUT

This should be changed if you have another directory of the database in the lines of fortran script:

```
character(len=*),parameter::REPODir='/sciclone/home20/whuang07/data10/NWM/CHRTOUT/'
```

Time should also be reset if time period is changed.

Shape file containing featureID of NWM streams: NWM_shp_ll.nc

(3) compile the script:

ifort -O2 -CB -g -traceback -o coupling_nwm  ~/git/schism/src/Utility/UtilLib/julian_date.f90 ~/git/schism/src/Utility/UtilLib/schism_geometry.f90 ~/git/schism/src/Utility/UtilLib/pt_in_poly_test.f90 coupling_nwm.f90 -I$NETCDF/include -I$NETCDF_FORTRAN/include -L$NETCDF_FORTRAN/lib -L$NETCDF/lib -L$NETCDF/lib -lnetcdf -lnetcdff

(4) run the script:

May need to login a node on sciclone:

qlogin –q 1000 1:x5672:ppn=1

NWM coupling process includes two parts, one is one by coupling_nwm.f90, and another is done by combine_sink_source.f90

The main purpose of coupling_nwm.f90 is to look for the intersections between SCHISM land boundary and NWM segments and save them to source_sink.in, and extract the flows from NWM at those intersections and save them as vsource.th, vsink.th. msource.th is also generated by this script, settting salinity as 0 and temperature as -9999.

To run this script, 3 inputs are required:

1) hgrid.ll (SCHISM horizontal grid)

2) NWM_shp_ll.nc (shape file containing NWM segments)

3) NWM outputs

Some parameters are also required:

1) Input nudging ratio (suggest 1.e-3)

2) Input number of days

3) Enter start time - dd,mm,yyyy (e.g. 1 1 1992)

The other script: combine_sink_source.f90 aims at merging adjacent source or sink elements using a given option. Since for some cases, the sink and source elements are close to each other, which will lead to large oscillations of the water elevation. To avoid this issue, use another post-processing script to merge the sink and source flux, so that all sink flux will be 0, which also means the sink flux will be added to the source flux. Number of source and sink elements are not changed.

To run this script, you will need five input files:

1) hgrid.cpp of which the coordinate is in meters (Cartesian coordinate).

2) source_sink.in : contains the element ID for each

intersection of the NWM streams and the land boundary.

3) msource.th : contains the salinity and temprature

of the source element along the land boundary.

Salinity is set to be 0, temp = -9999.

4) vsource.th : input of the stream flows of source elements.

5) vsink.th : input of the stream flows of sink elements.

Files 2) to 4) are generated by coupling_nwm.f90

You'll be asked for other inputs to decide which method will be used to merge the source/sinks

Inputs files:

inbr: 0 (distance-based); 1 (neighboring element based)

dist: distance if inbr; number of neighboring tiers

Output files

source_sink.in.1, msource.th.1, vsource.th.1, vsink.th.1

To run those scripts, after compile. simply by

./coupling_nwm

and

./combine_sink_source