
Toward a unified HYCOM framework

LOMW 2011, Miami

Why this divergence between the codes?

**Coastal? Regional? Global? Operational?
Research? Climate vs Mesoscale?**



Different needs, approach



Different evolution/development

Main differences HYCOM NRL/SHOM

- Non-linear terms in free surface formulation ($1+\eta$)
- Split vs. unsplit physical variables
- AGRIF
- E-P and river treatment (mass vs. salt flux)
- Mass vs. volume splitting
- Mass and tracer conservation
- Wetting and drying

...

non-exhaustive list:

contributions from other developers/institute

Motivation/Benefits of having a unified framework

A plethora:

- Easier communication in the community
- Sharing: a faster development of the model
- Gathering forces to have a more powerful tool
- Multiple approach to resolve a problem
- Easier benchmarking

Objectives

Short term

- Documentation of the differences made by some developments for academic scenarios
- Consult the community and the developers! They are the ones who will define how to converge best (e.g., CPP keys, meetings, etc.)

Middle term

- Have a svn that centralize the src code
- Test on the performance of the developments and implementation in the HYCOM-NRL
- Build list of scenarios (representing a particular process) for an easy benchmarking

Long term

- Have a procedure to rapidly test (exhaustive) and transfer developments made by all: benchmark configurations giving multiple indicators of performance (based on analytical solution, computer time, which process you are interesting in, etc.) ?

Centralizing the src code: svn

SVN at the NERSC

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root / HYCOM_2.2.12 / CodeOnly / src_2.2.12

View revision:

Name ▲	Size	Rev	Age	Last Change
⬆️ ../				
▶️ ALT_CODE		1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
▶️ dimensions		1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
▶️ nersc		147	7 days	annettes: Corrected some code Njord objected to
📄 archiv.F	23.7 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 barotp.f	13.3 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 bigrid.f	12.8 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 blkdat.F	66.8 kB	103	9 months	francois: Correct all bunch of inconsistency that causes problem on NJORD
📄 cnuity.f	40.7 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 common_blocks.h	35.8 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 convec.f	14.8 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 CPP.com	0.6 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 CPP.make	0.6 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 diapfl.f	43.2 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 diff_2.2.11.com	194 bytes	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 dimensions.h	3.9 kB	146	7 days	annettes: increased maximum number of tracers
📄 dpthuv.f	3.3 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 dpudpv.f	3.3 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 forfun.F	119.4 kB	145	8 days	francois: Correct major bug for offline forcing salinity flux and for perturbation
📄 geopar.F	21.8 kB	142	2 weeks	annettes: Modified print statements that made model crash
📄 hybgen.f	68.2 kB	26	20 months	francois: Add the possibility to use the WENO-like, PPM hybgen remmaper option
📄 hycom.F	5.8 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 hycom_cice.F	16.4 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 icloan.f	11.1 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 inicon.f	18.1 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 inigiss.f	50.9 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf
📄 inikpp.f	2.3 kB	1	2 years	francois: putting the code back on the disk after the disk crash for HYCOM2.2: Fanf

The initial effort: approach

For each model implementation difference (i.e., development)

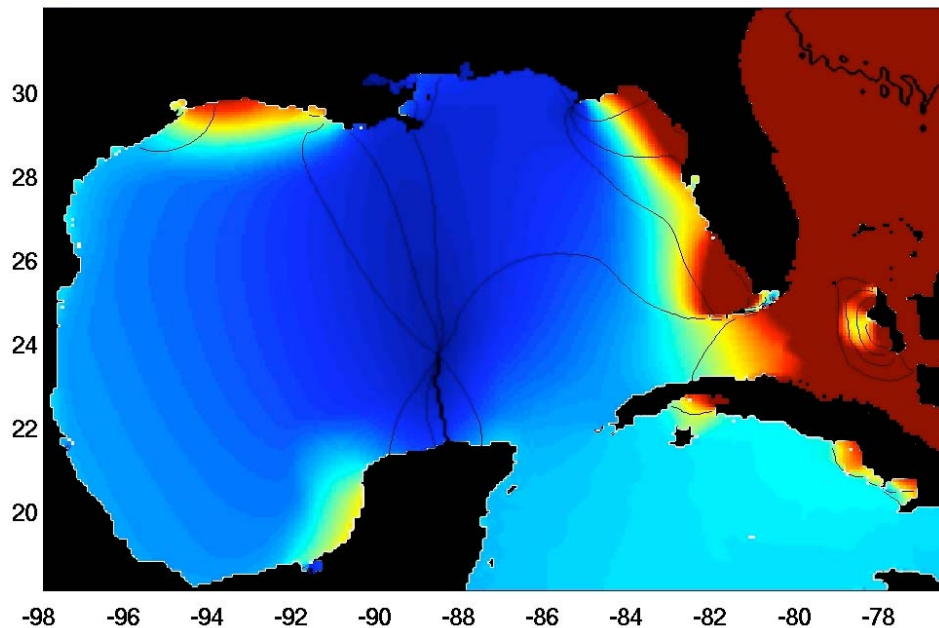
- Setup twin experiments original vs. modified**
- Document the differences**
- Analysis to show if accuracy of results is improved (based on certain indicators given by analytical solutions, obs or high resolution run) and if computing cost is increased or decreased?**

Example: Barotropic tides in the GoM

Recent studies on HYCOM-SHOM and HYCOM-NRL
(only different by the local tidal potential)

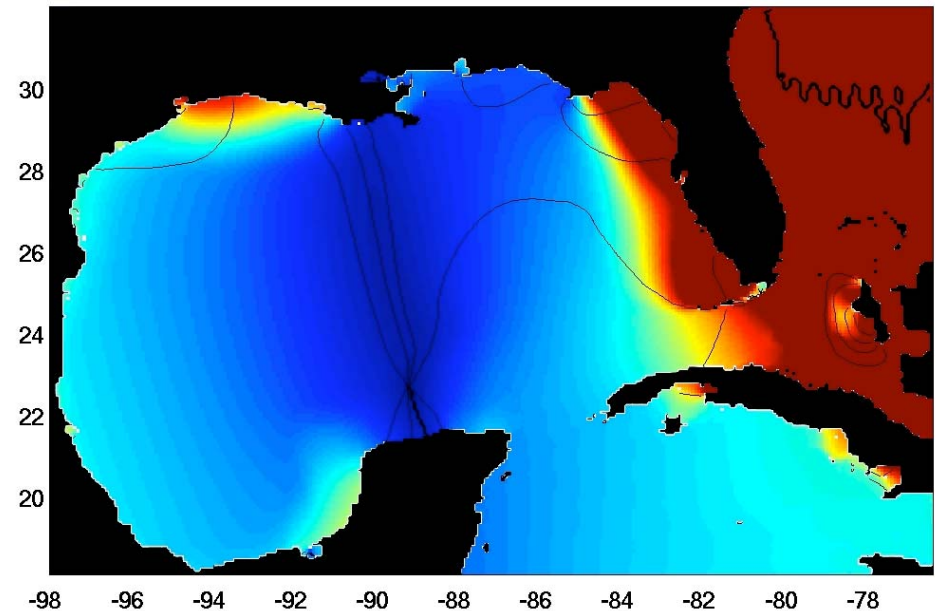
HYCOM-SHOM: Effect of non-linear terms ($1+\eta$)

Amplitudes and phases of M2 no η - obs



Longitude

Amplitudes and phases of M2 η - obs



Longitude

Future work

- Finish barotropic tide example, add baroclinicity
- Build a test case based on *Schiller et al. 2010* coastal configurations (idealized and realistic) with intern (coming for 6 months at the SHOM-Toulouse)
- Implementation of HYCOM-SHOM developments in the HYCOM-NRL from these configurations

Initiating the effort!