NEMO Developer's Committee: report on Configuration Manager work

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Last meeting's conclusions

Minutes of last Developer's Committee meeting
https://forge.ipsl.jussieu.fr/nemo/wiki/DevelopersCommittee/End2017:

- For the next 6 months, this WG is on hold, and decision to be made during next Developer's Committee meeting (mid 2018)
- For each of the 4 existing tools, complete a brief report, for April 2018, using the template sent by subgroup in March.
  List of reports : SIREN (Julien Paul), Nesting tools (J. Chanut), BDY tools (Stefania Ciliberti), pynemo (J. Harle). Same request to Test case WG on the tools to set up a test case configuration (S. Flavoni)
- Since the tools for setting up an AGRIF configuration are the priority of Consortium for now, move the SIREN Actions of 2018 Work plan from "Shared actions", to "Specific actions for Mercator"

Answers to questionnaire (1)

A questionnaire has been sent and the subgroup received 4 answers:

- RUNBDY :Stefania Ciliberti - CMCC
- Python tool (Unnamed): James Harle- NOCL
- SIREN : Julien Paul - Mercator
- NESTING: Jérôme Chanut - Mercator

Thanks to them for the detailed answers!

Answers to questionnaire (2)

RUNBDY

- Tool for defining lateral open boundary conditions for NEMO-based limited area models – FORTRAN
- Available at CMCC only
- Used by CMCC :operational Adriatic-Ionian Forecasting System (AIFS) and INGV for Atlantic boundary conditions, and for Med sea

Python tool

- Sets up the lateral boundary conditions for a regional NEMO model configuration – Python
- Available on bitbucket
- Used by NOCL

SIREN :

- Builds a configuration on a limited aread refined grid, from a global existing one – FORTRAN
- Available in NEMO reference 3.6.STABLE and 4.0
- Used within the NEMO community

NESTING

- Set-up a configuration with online refinement (e.g. AGRIF) – FORTRAN
- Available in NEMO reference 3.6.STABLE (not bug free) and 4.0 (improvements)
- Used within the NEMO community

Answers to questionnaire (3)

What is specific for each :

RUNBDY

- A Post-Processing Module, for applying integral constraint (Pinardi et al., 2003) to velocity components

Python tool

- Calendar stretching (e.g. input data on 360day and child on Gregorian)
- GUI for regional mask generation (can be defined by lat/lon, depth contour, shelf break or by freehand).
- Can access data over THREDDS (e.g. CMIP5 data portal) so do data files need be downloaded.
- Makes use of NCML so non NEMO input data (e.g. from GFDL model) can be re-defined and ingested by the tool

SIREN :

- Merges fine and coarse grid bathymetry to avoid issue on boundaries.
- Refines (or extracts) restart file on limited area, and change layout to the optimal one.
- Creates straight boundaries, however a boundary can be divided in independent segments and so create complex boundaries

NESTING

- Deals with configuring an AGRIF embedded zoom (one at a time for now)

Answers to questionnaire (4)

Foreseen developments and resources:

RUNBDY

- priority is to develop a version able to interface a NEMO-based model configuration with a non NEMO-based one

Developers: S. Ciliberti – CMCC (20%FTE) and L. Stefanizzi – CMCC (5%FTE)

Python tool

- Requires a period of robust stress testing and benchmarking
- Generic grid generation?
- Initial Conditions

Developers: J. Harle – NOCL (as a when time allows) and J. Polton NOCL

SIREN :

- create bathymetry from etopo or gebco dataset.
- create tide forcing fields from TPXO model file
- create runoff forcing fields from Dai and Trenberth dataset
- Add a module to change the grid (ORCA to regular and vice versa). Proposed in a tender, which received no response, including from any member of the NEMO Consortium

Developers: J. Paul - Mercator

NESTING

- Major issues will be fixed in NEMO 4.0.
- Compatibility with s or s-z vertical coordinates.
- Vertical coordinate change between grids.
- Create child ice restart files

For the longer term (2018-2020), complete rewriting is scheduled with use of AGRIF library and rationalizing the tool

Developers: J. Chanut and C. Rousset (in 2018), L. Debreu, R. Benshila

Configuration Manager in NEMO – History

The "Configuration Manager" as a tool to easily set up a configuration based on NEMO, has been a request from Developer's Committee from the very beginning of NEMO Consortium (2009), as a way to enhance NEMO community building.

- 2011 Developer's Committee:

Configuration creation :Identify necessary steps to build a configuration: bathymetry, horizontal/vertical grids, initial conditions, lateral boundary conditions.
We should share the tools since most of the consortium members are interested.
Comment from J.M. Molines: This could be merged with the AGRIF nesting tools.

- 2012 decision to start SIREN as an action of the workplan, so as to initiate the CONFIGMAN Working Group lead by J. Paul

- 2015: SIREN is available in the NEMO reference (3_6_STABLE release), and DevCom recommendations are to build a modular skeleton for future tool, in the perspective of gathering all developers effort on a unique shared tool
- 2016: S. Ciliberti becomes leader of WG in place of J. Paul

Where are we today?

Today, each developer in this field is successfully working on his own questions and tools.

For users to set up a new application based on NEMO, available tools are:

- The NEMO module usr_def as for tests cases
- GRIDGEN software allowing to build the global and limited area configurations
- SIREN in a stable version
- NESTING_TOOLS to build a NEMO configuration using AGRIF

So that for now, we do have in NEMO reference some basic tools to set up a new NEMO configuration.

Different institutions having an interest for collaborative development of a unique and shared software is the foundation of NEMO Consortium. Works fine for NEMO itself.

It appears not to be relevant in this case:

- Users are managing their configuration (although something is obviously needed for AGRIF)
- Consortium's institution are sufficiently happy each with their own tool and find little interest in bringing things together : probably would cost more than expected benefits

The idea of a shared tool to set up NEMO configuration, developed and supported by System Team appears to be inefficient.

Propositions of the subgroup

- Record that NEMO has now a set of basic tools to build new configurations
- Recognize that NEMO System Team is probably not the right group of experts to deal with this question
- Close the Configuration Manager Working group, so as the CONFIGMAN Stream of the workplan
- Ask Mercator if they could express recommendations on some future tasks of interest for CMEMS (maybe in the more focused context of MOI)