

CESM2 Ocean Biogeochemistry Update June 2017

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Ocean model physics parameterizations changes relevant to BGC since June 2016

- Estuary Box Model (EBM)
 - effect of estuary circulation implemented as additional vertical mixing
 - liquid runoff mapped to nearest ocean coastal point, not spread
 - local tracer concentration used for virtual flux computation
 - still uses virtual flux formulation
 - applied to all tracers, including BGC tracers
 - as of 01 June POP trunk tag (not in most recent coupled runs)
- One-hour coupling frequency with Robert time filter
- Caspian Sea transferred to land model

MARBL (Ocean BGC) Science changes

- use prognostic dust/iron deposition from atmospheric model
- automatic adjustment of sediment burial to achieve C, P, Si balance
- prognostic NH_x emissions to atmosphere
- prognostic iron-binding ligand
- variable C:P ratios in autotrophs and POM
- restoring of PO₄, NO₃, SiO₃, ALK in marginal seas
- follow OMIP protocols for gas flux parameterizations
- specified riverine fluxes coupled to EBM
 - inputs mapped to ocean grid the same way that liquid runoff is
 - N, P inputs have anthropogenic component

Other MARBL developments

- 1st take on tutorial and documentation
 - <https://marbl-ecosys.github.io/>
- get/put framework for model configuration and setting of parameters
 - accommodate GCMs that don't use namelist input (e.g., MOM)
- multistage initialization to accommodate get/put framework
- initialization and forcing specification dictated by driver
- forcings not directly used by MARBL moved into GCM
 - e.g. riverine tracer fluxes in GCM, PAR in MARBL
- performance timers
- better logging
- lots of code refactoring/cleanup, assorted bug fixes

MARBL Science not making the CESM2 cut

- N Isotopes
- Optional Phaeocystis functional group
- DMS module
- Methane module

Near Term Activities

- Switch coupled runs to recent version of MARBL
- Final tuning of MARBL parameters and forcings
- Ocean BGC spin-up for CESM2/CMIP6
- OMIP experiments for CMIP6
- Ocean-Ice hindcast w/ MARBL at 0.1° resolution

- CESM2 release
 - will include a version of MARBL

- MARBL 1.0 release
 - including post-CESM2 code cleanup and refactoring

- couple MARBL to MOM