

# Marine Working Group

## Breakout Group I: Gaps in Understanding and Models

- How do geotechnical properties contribute to failures and resulting fluxes to the deep sea?
- Subsurface flows and impacts on chemical fluxes, geotechnics, slope failures.
- Fluvial sources of sediment to the coastal ocean: vertical structure of flows, sediment load, and hydrodynamic properties of sediment delivered.
- Proper atmospheric forcing for coastal ocean / estuarine models.

## OVERARCHING THEMES for Marine Working Groups and CSDMS

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- **Enable coupling** of atmospheric, wave, ocean, sediment and biogeochemistry models.
- **Develop an understanding of global variability** of shelf morphology, stratigraphy, and margin transfer processes as a function of external forcings (e.g., river discharge, coastal energy, etc.) under past and present and future conditions.
- Produce tools for **quantifying human impacts** to the global ocean and coastal regions (including estuaries) including ramifications of climate change, sea level rise, pollution and nutrient input.
- **Advance interdisciplinary models**, including multiple disciplinary inputs and expertise and their ramifications in ecosystems and biogeochemical processing.
- **Link models across time scales as well as length scales.** Develop methods for transferring information from models working at small scales to be incorporated into larger time and space scale models?

Intermediate – to – long term goal:  
Marine Working Group should interface  
with other working group.

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- A key advantage of CSDMS is the coupling it allows. Should focus on identifying advances in our science that can be made by ease of coupling.
- Identify the research issues that could most benefit from improved connections between domains (marine, coastal, terrestrial, etc.).
- Carbonate group expressed an interest in having access to a set of marine sediment transport modules.
- Encourage proposals that involve Marine Working Group members and researchers from other working groups (proof-of-concept).

# Marine Working Group: Short Term Goals

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- Much effort during 2008 – 2012 expended to incorporate version(s) of Regional Ocean Modeling System (ROMS) within CSDMS.
- ROMS, however, has a steep learning curve and includes features that are not necessarily relevant to CSDMS (multiple advection schemes, vertical grids, data assimilation).
- Recommend that
  - CSDMS provide a stable version of a hydrodynamic model for research and teaching; stripped down model versions, perhaps ROMS in some form. Provide inputs and sample output for archetypal estuary and shelf configurations. Students and researchers could quickly get the code and run it, modify model inputs, and generate reasonable hydrodynamic (and sediment transport?) fields.
  - A second ocean model be incorporated (Delft-3D?, FVCOM?).
  - Perhaps a 1-D vertical bottom boundary layer model (like Wiberg, 1994 or the SEDTRANS code of Li, Amos, and colleagues).
- Provide a translate module from Matlab code to Python.
- CSDMS include reasonable wind model( WRF?). Coastal hydrodynamic models are especially sensitive to wind forcing.

# Marine Working Group: Short Term Goals

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- Strategies for encouraging funding: what models can be usefully coupled to a hydrodynamic model like ROMS?  
Hydrotrend, CHILD, Ltrans, atmospheric models such as WRF, wave models, WBMSED.
  - Chesapeake Focus Research Group: link to land use models to ChesROMS.
  - A simple land-use model to feed into a simple estuarine ROMS .
  - Link shelf and river circulation to the evolution of subaqueous deltas.
  - Couple turbidite/contourite models to hydrodynamic circulation models
  - Carbonates: Link carbonate production with morphology with circulation.
  - Link carbonate systems with ocean circulation, turbidity, nutrients, light penetration, etc.

# Marine Working Group: Breakout Group II: Short-term Goals

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~2008 the Marine Working Group wrote:

**“Identify the dominant marine processes that must be included the CSDMS.** Members attending the first Marine Working Group Meeting (March 8, 2008) identified the following processes as essential marine components in CSDMS: **particle aggregation/disaggregation**; **dynamics of muddy seabeds (including biological mixing and irrigation, diagenesis)**; **dynamics of sandy seabeds (including bed form dynamics)**; **dynamics of carbonate sediments (including effects on porewater chemistry)**; **dynamics of mixed sediment-size/ composition beds**; **gravity-driven flows**; **bedload and suspended load transport (including nepheloid layers)**; **seabed scour**; **sediment-related ice dynamics**; **isostasy**; **diagenesis**; **subsidence and tectonics.**”

We colored in **green** the topics that have seen a lot of work since 2008, and in **red** those that we do not think have had as much effort (to our knowledge).

Notes from listening to other working group reports.

- Other groups mentioned data sets; we didn't discuss that but it seems like something that is relevant to the marine working group.