

ROMS-Lite Clinic

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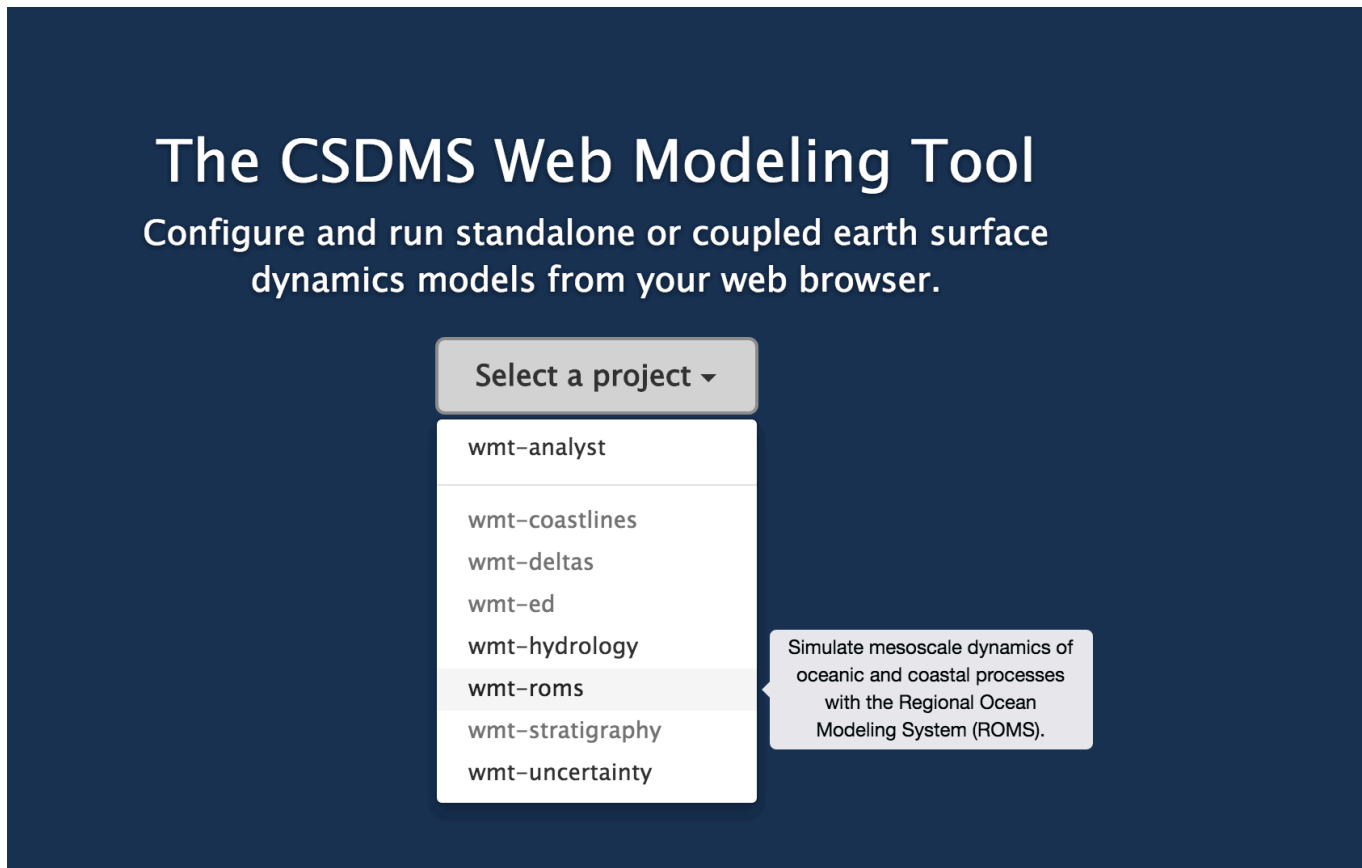
Irina Overeem, CSDMS

What is ROMS-Lite?

A basic configuration of the Regional Ocean Modeling System (ROMS) for inexperienced modelers to learn about ROMS, basic concepts in ocean modeling and look at a river plume affecting the coastal ocean and sediment transport.

ROMS-Lite in Web Modeling Tool

<https://csdms.colorado.edu/wmt/>



The CSDMS Web Modeling Tool

Configure and run standalone or coupled earth surface dynamics models from your web browser.

Select a project ▾

- wmt-analyst
- wmt-coastlines
- wmt-deltas
- wmt-ed
- wmt-hydrology
- wmt-roms**
- wmt-stratigraphy
- wmt-uncertainty


Simulate mesoscale dynamics of oceanic and coastal processes with the Regional Ocean Modeling System (ROMS).

ROMS-Lite in Web Modeling Tool

The CSDMS Web Modeling Tool irina.overeem@gmail.com [Sign Out](#)

Model/Tool (*RomsLite 0)

Parameters (RomsLite)

RomsLite 

Globals

| | |
|-------------------------|---------|
| Simulation run time [s] | 172,800 |
|-------------------------|---------|

Run

| | |
|-------------------------------------|-------|
| Model time step [s] | 120.0 |
| Number times to write output fields | 10 |

Settling Velocity

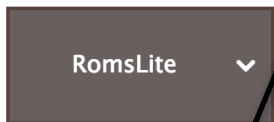
| | |
|---|------|
| Particle settling velocity for suspended cohesive sediment class 0 [mm/s] | 0.05 |
| Particle settling velocity for suspended cohesive sediment class 1 [mm/s] | 0.1 |
| Particle settling velocity for suspended cohesive sediment class 2 [mm/s] | 1.0 |
| Particle settling velocity for non-cohesive sediment [mm/s] | 1.0 |

Pre-compiled ROMS instance; with tested configuration.
User can manipulate a small set of parameters and run simulations

Run and Download Data

The CSDMS Web Modeling Tool

Model/Tool (RomsLite_waveheight6m)



Run Model...

Host: beach.colorado.edu

Username: blababal

Password:

Run Cancel

CLICK RUN and SUBMIT TO CSDMS HPCC

The CSDMS Web Modeling Tool

RomsLite_waveheight6m

Summary

| | |
|-------------|--------------------------------------|
| Started | 2016-05-14 14:51:40.426147 |
| Owner | irina.overeem@gmail.com |
| Last Update | 2016-05-14 14:55:24.402174 |
| Run Time | |
| ID | 67f1a91d-0347-41c4-9722-839b4f3f79c0 |
| Model | 16 |
| Status | success |



Standard Output

simulation is complete and available for pickup

DOWNLOAD DATA

Panoply for Data Visualization

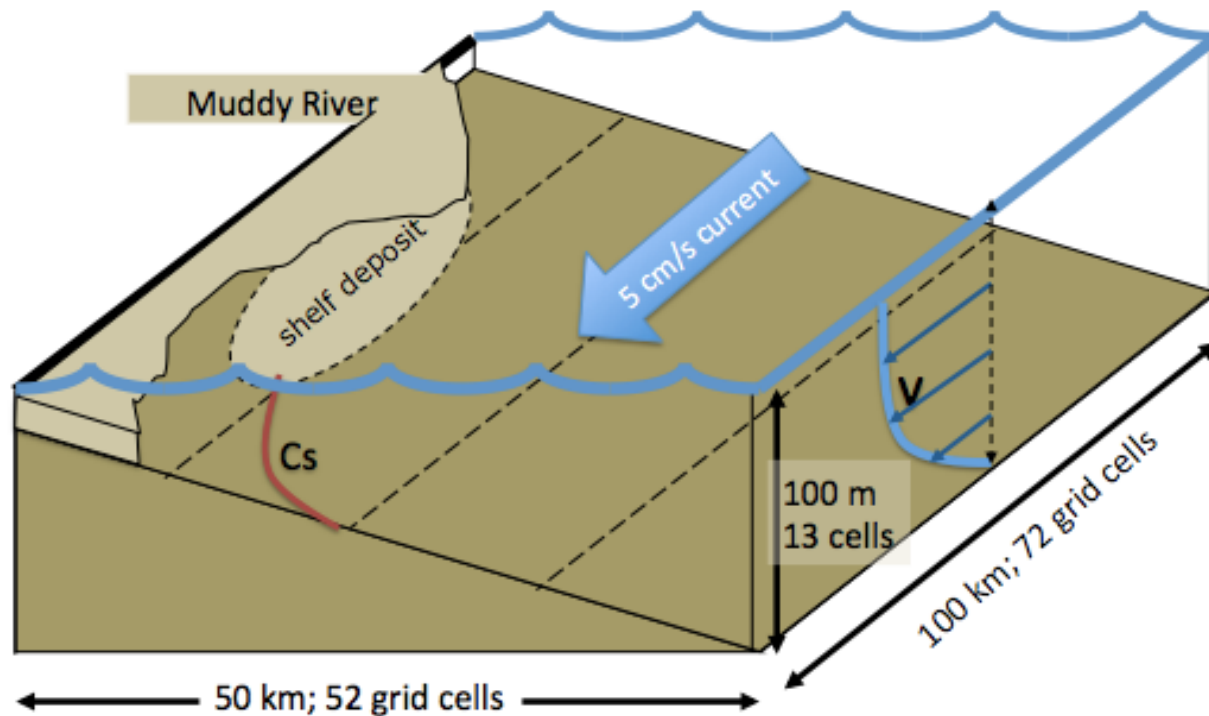
- Open source package Panoply for NetCDF files
Plots times-series, X-sections, gridded datasets.

Download it here:

- <http://www.giss.nasa.gov/tools/panoply/>

To get started CSDMS has a basic lab on using Panoply.

ROMS-Lite is based on RiverPlume 2

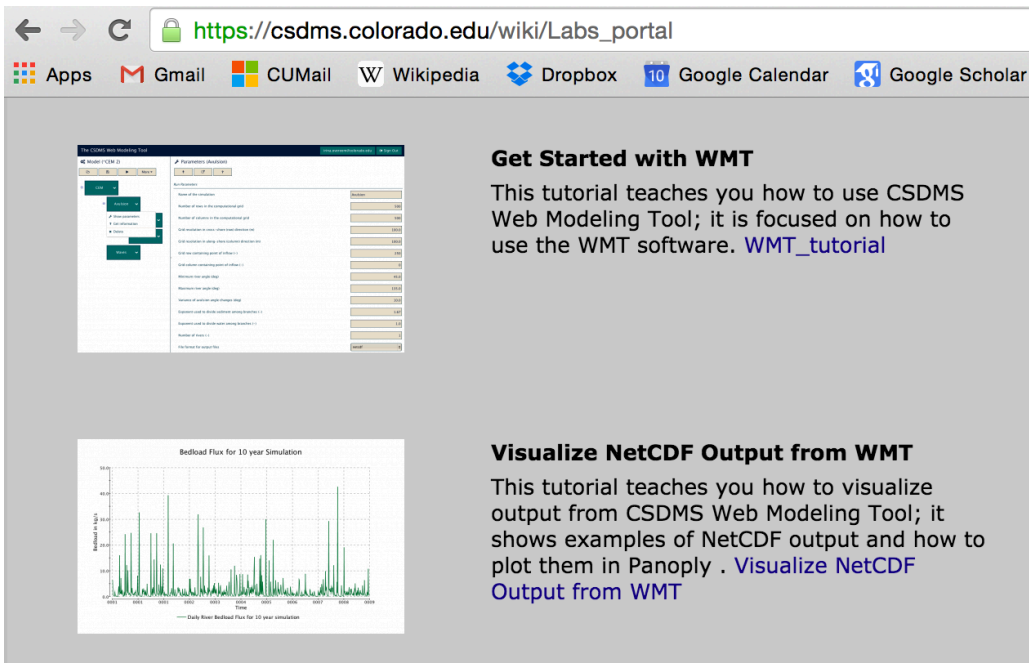


We set up a basic numerical experiment with inputs considered representative for a medium-sized river draining freshwater and sediment into the coastal ocean. The river discharge is kept constant at $1500 \text{ m}^3/\text{sec}$.

Domain is 72 by 52 gridcells. ROMS has 20 vertical layers in the water column, and stores 10 layers in the ocean bed.

Teaching Using ROMS-Lite

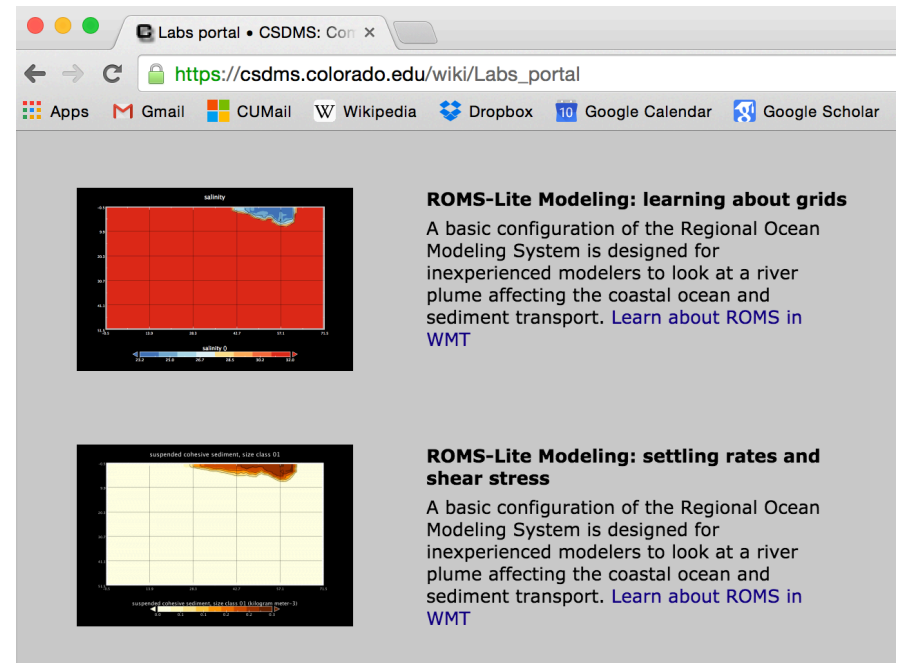
- As of May 2016, 3 ROMS labs are available
- https://csdms.colorado.edu/wiki/Labs_portal



The screenshot shows the CSDMS Labs Portal website. The top navigation bar includes links for Apps, Gmail, CUMail, Wikipedia, Dropbox, Google Calendar, and Google Scholar. The main content area is divided into two sections:

- Get Started with WMT**: This section features a thumbnail image of the WMT software interface and a text description: "This tutorial teaches you how to use CSDMS Web Modeling Tool; it is focused on how to use the WMT software. [WMT_tutorial](#)".
- Visualize NetCDF Output from WMT**: This section features a thumbnail image of a line graph titled "Bedload Flux for 10 year Simulation" and a text description: "This tutorial teaches you how to visualize output from CSDMS Web Modeling Tool; it shows examples of NetCDF output and how to plot them in Panoply. [Visualize NetCDF Output from WMT](#)".

To get students started with WMT & Panoply
(2 Labs)



The screenshot shows the CSDMS Labs Portal website. The top navigation bar is identical to the previous screenshot. The main content area is divided into two sections:

- ROMS-Lite Modeling: learning about grids**: This section features a thumbnail image of a 2D grid map labeled "salinity" and a text description: "A basic configuration of the Regional Ocean Modeling System is designed for inexperienced modelers to look at a river plume affecting the coastal ocean and sediment transport. [Learn about ROMS in WMT](#)".
- ROMS-Lite Modeling: settling rates and shear stress**: This section features a thumbnail image of a 2D grid map labeled "suspended cohesive sediment, size class 01" and a text description: "A basic configuration of the Regional Ocean Modeling System is designed for inexperienced modelers to look at a river plume affecting the coastal ocean and sediment transport. [Learn about ROMS in WMT](#)".

To get students started with ROMS-Lite
(3 Labs)

Lab 1 River Plume Exploration

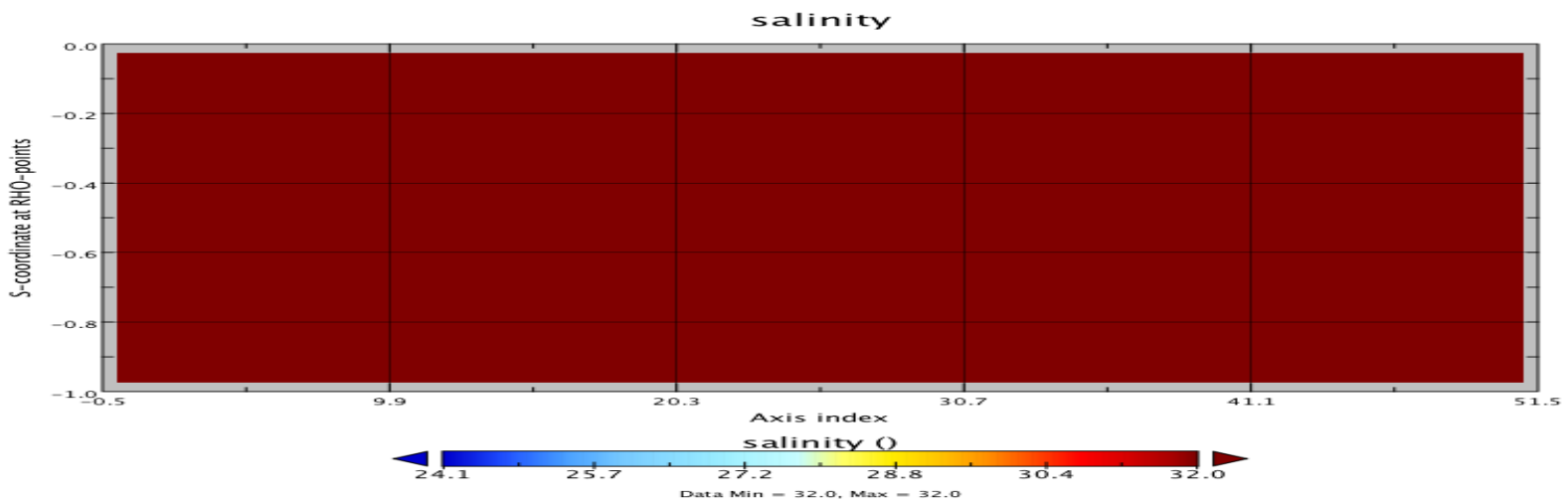
Skills

- Familiarize with a basic configuration of the Regional Ocean Modeling System
- Hands-on experience with visualizing NetCDF output with Matlab or Panoply.

Topical learning objectives

- Learn about grids in oceanographic modeling
- Get a basic feel for integration of the conservation of momentum, continuity equation and conservation of tracers into a specific advection-diffusion scheme
- Learn about a river freshwater plume evolving into a marine basin

Salinity at the River Mouth X-section, 96 hours simulation

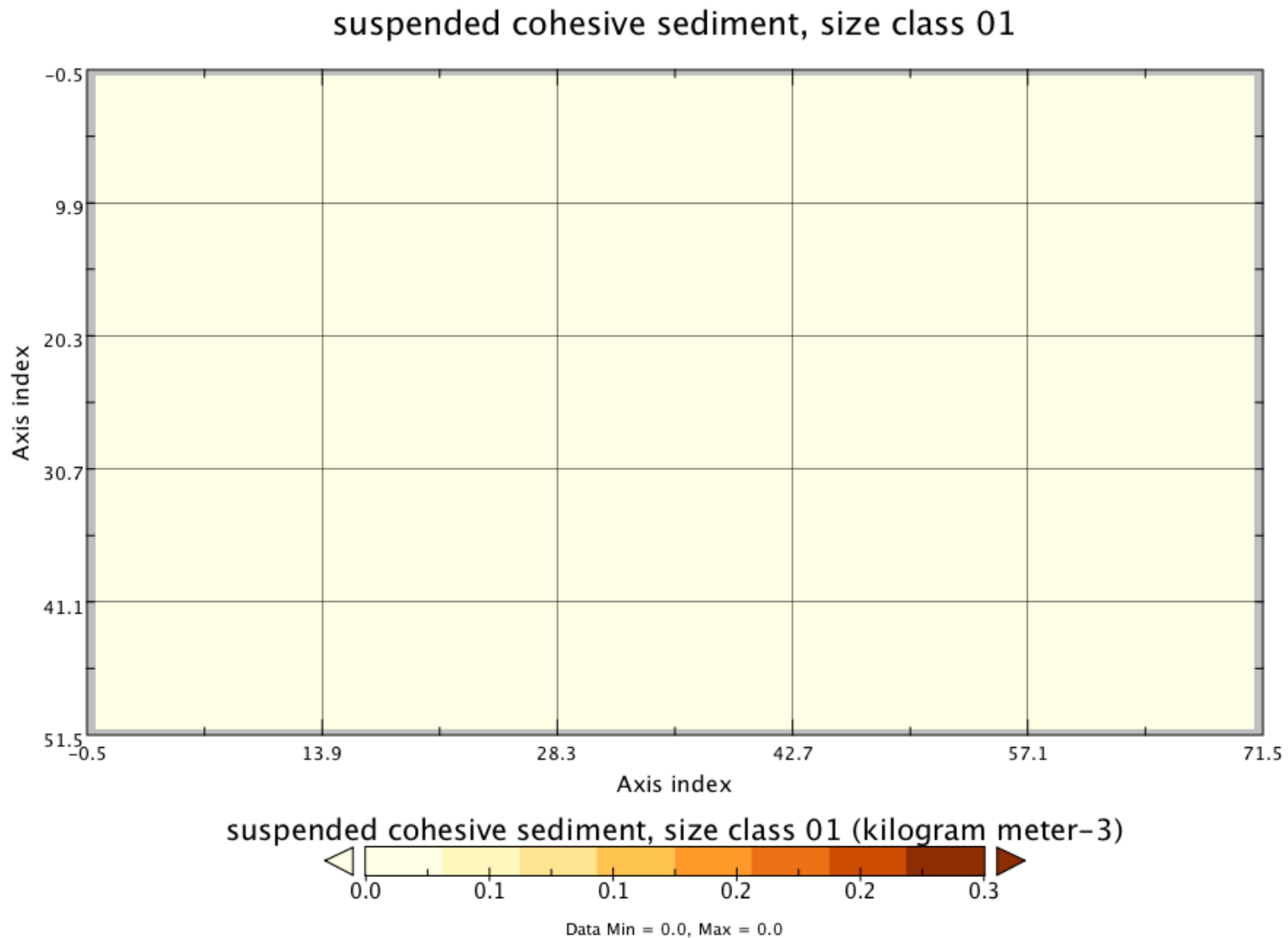


Lab 2 Settling Rates and Shear Stress

- Familiarize with sediment modeling approach of the Regional Ocean Modeling System
- Learn how to manipulate parameters in ROMS-Lite and set up different experiments

- Physics of settle rates
- Fluid exerting stress and threshold to incipient motion
- Shields and Yalin diagrams

Suspended Sediment Concentration Planview, 96 hours simulation



Settling Rates and Shear Stress

Parameters (RomsLite)

Settling Velocity

| | |
|---|-----------------------------------|
| Particle settling velocity for suspended cohesive sediment class 0 [mm/s] | <input type="text" value="0.05"/> |
| Particle settling velocity for suspended cohesive sediment class 1 [mm/s] | <input type="text" value="0.1"/> |
| Particle settling velocity for suspended cohesive sediment class 2 [mm/s] | <input type="text" value="1.0"/> |
| Particle settling velocity for non-cohesive sediment [mm/s] | <input type="text" value="1.0"/> |

Manipulate
Settling velocities



Critical Shear Stress for Erosion

| | |
|---|-----------------------------------|
| Critical shear stress for erosion for suspended cohesive sediment class 0 [N/m ²] | <input type="text" value="0.04"/> |
| Critical shear stress for erosion for suspended cohesive sediment class 1 [N/m ²] | <input type="text" value="0.14"/> |
| Critical shear stress for erosion for suspended cohesive sediment class 2 [N/m ²] | <input type="text" value="0.48"/> |
| Critical shear stress for erosion for non-cohesive sediment [N/m ²] | <input type="text" value="0.1"/> |

Manipulate
Shear stress



Critical Shear Stress for Deposition

| | |
|--|----------------------------------|
| Critical shear stress for deposition for suspended cohesive sediment class 0 [N/m ²] | <input type="text" value="0.1"/> |
| Critical shear stress for deposition for suspended cohesive sediment class 1 [N/m ²] | <input type="text" value="0.1"/> |
| Critical shear stress for deposition for suspended cohesive sediment class 2 [N/m ²] | <input type="text" value="0.1"/> |
| Critical shear stress for deposition for non-cohesive sediment [N/m ²] | <input type="text" value="0.1"/> |

Freeform manipulation, or manipulate after reviewing theory?

Wave Forcing

Waves Forcing

Significant wave height [m]

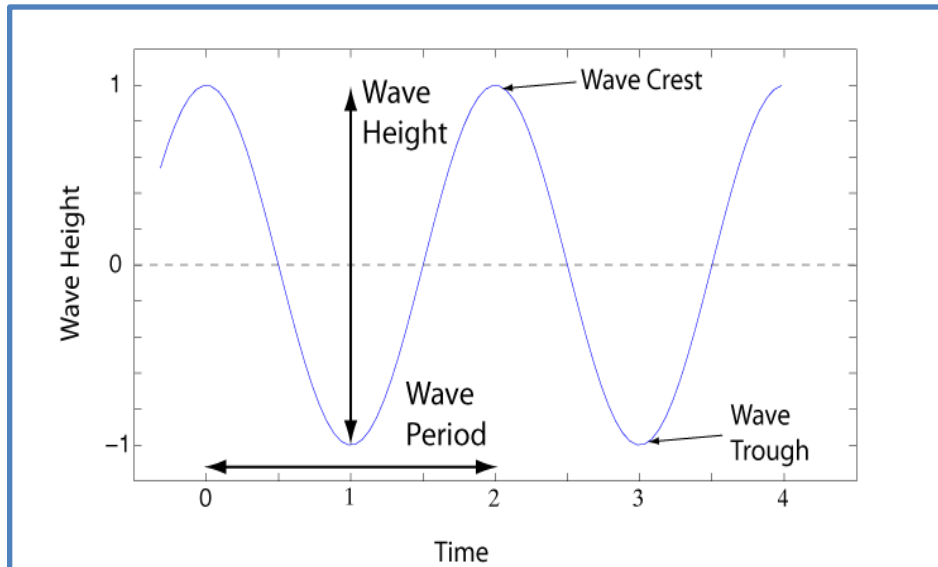
2.0

Wave period at the sea floor [s]

10.0

Wave direction [radians]

1.6



Discussion on Future of WMT and ROMS-Lite?

- Promote use for teaching faculty? Test the labs?
- Expand the number of labs?
(
- Expand the precompiled ROMS instances?
(e.g. SED-TOY, ROMS-Lite for estuarine processes)