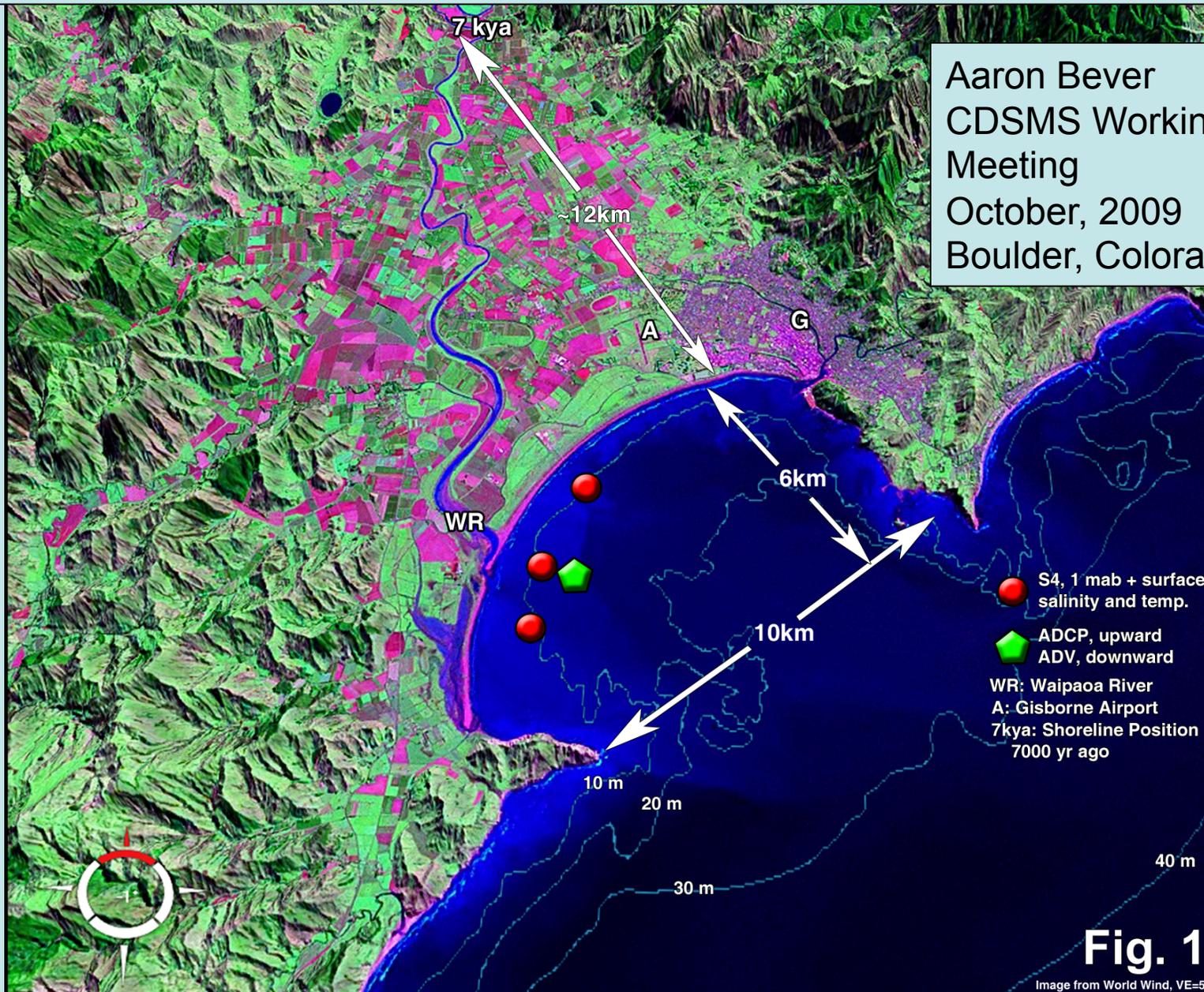


Modeling Hydrodynamics and Sediment Transport in Poverty Bay, New Zealand; A Basic ROMS overview.



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CDSMS Working Group
Meeting
October, 2009
Boulder, Colorado

Fig. 1

Image from World Wind, VE=5

Regional Ocean Modeling System: ROMS

- 3D hydrodynamic and “sediment transport” numerical model
- Fortran 90 with C preprocessing, thousands and thousands of lines
- Solves Reynolds-averaged equations
- Many different turbulence closure schemes
- Choice of horizontal and vertical advection schemes
- Serial, OMP, MPI implementation based on settings when compiled
- Curvilinear horizontal and stretched terrain following vertical grids
- IO based on netcdf files
- Different “modules” included based on compiling parameters
 - ✓ Sediment, suspended load, bedload, biology, point sources, etc.
 - ✓ Sediment requires basic input characteristics

Poverty Bay Forcing – Somewhat different “modules”

➤ **Bathymetry** was created using high resolution multibeam from within Poverty Bay, and shelf bathy provided by Scott Stephens (NIWA). 7 kya bathymetry was from Wolinsky et al. (in review).

➤ **Open boundaries** used gradient conditions, and Chapman and Flather for free surface and 2D momentum, respectively.

➤ **Tides** were included based on the OSU global tidal model.

➤ **Freshwater** was hourly observations, with sediment discharge based on the rating curve of Hicks et al. (2000) (Fig. 1AB).

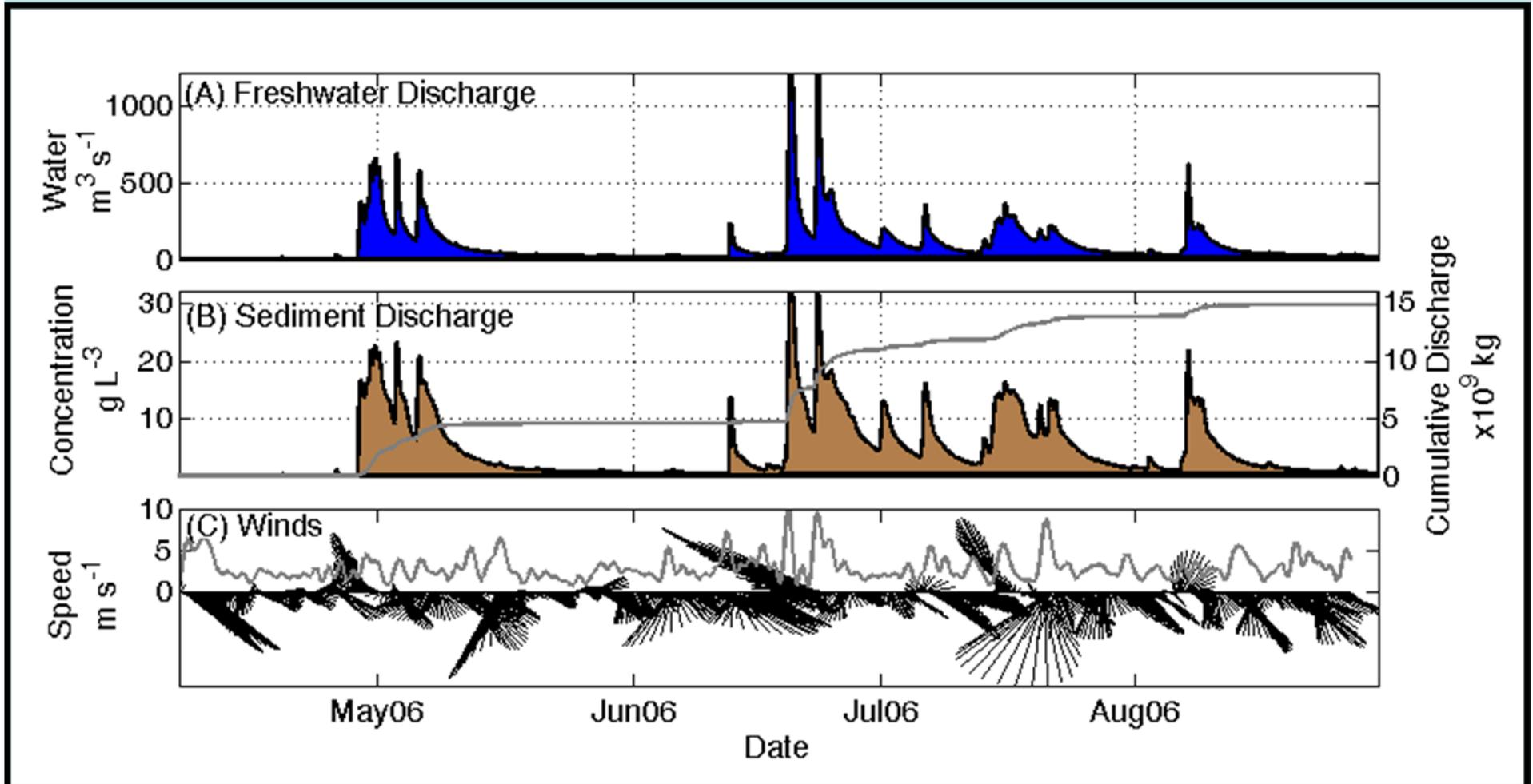
➤ **Meteorology** was based on observations; hourly winds from the Gisborne airport (Fig. 1C), with other variables monthly means.

➤ **Multiple fluvial sediment classes** were used (table 1), representing the average grain size of the Waipaoa discharge and a coarser floc.

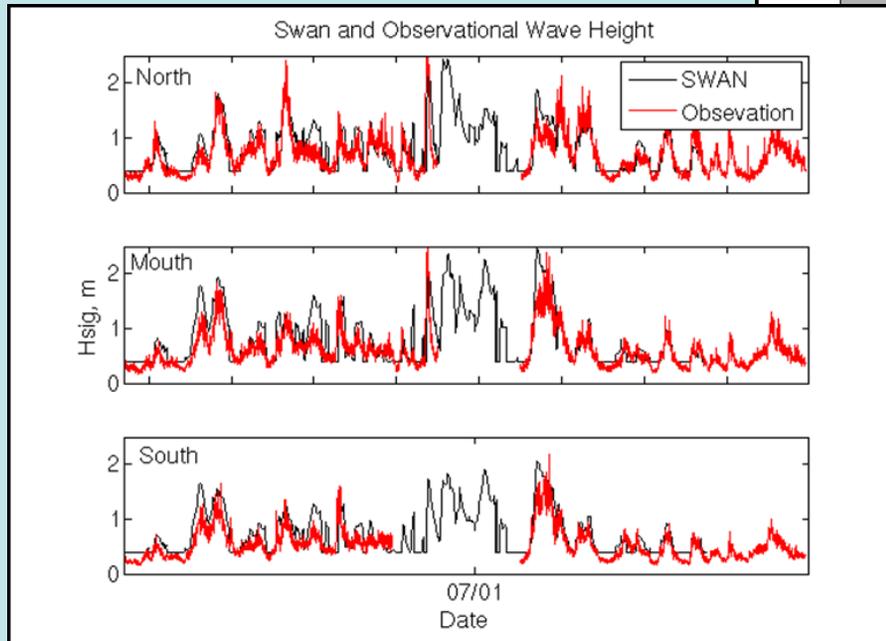
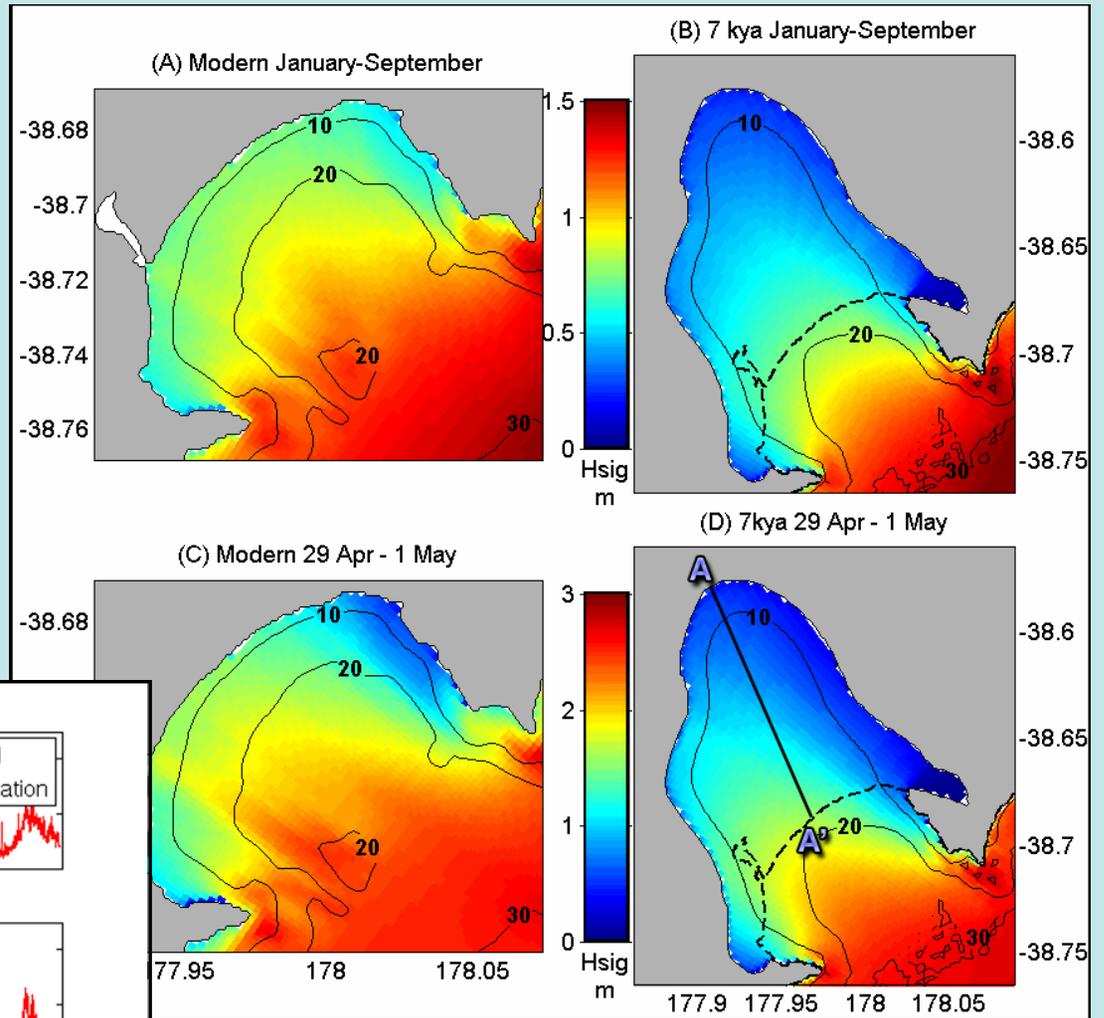
➤ **Time-varying 2D waves** for the modern and 7kya geometries were modeled by the SWAN model, using the winds from the Gisborne airport and open boundary conditions from the WW3 global model.

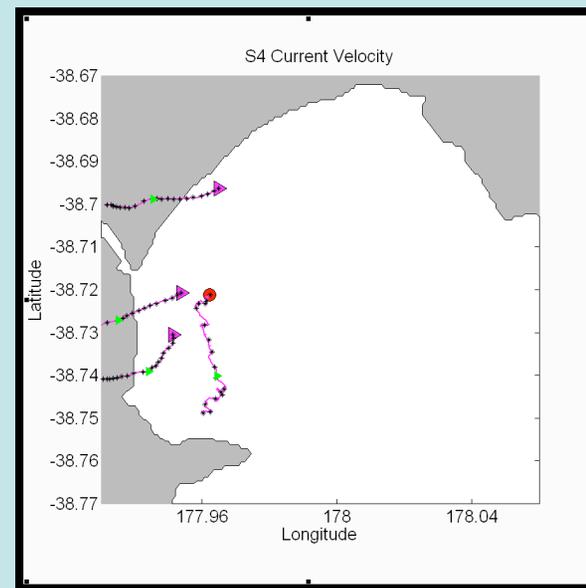
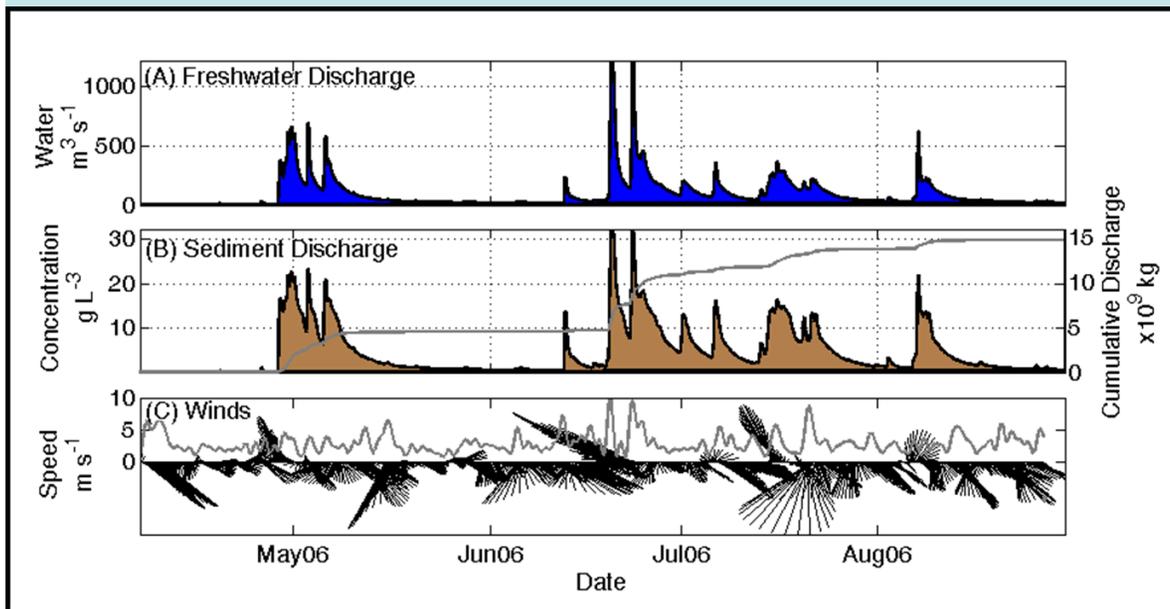
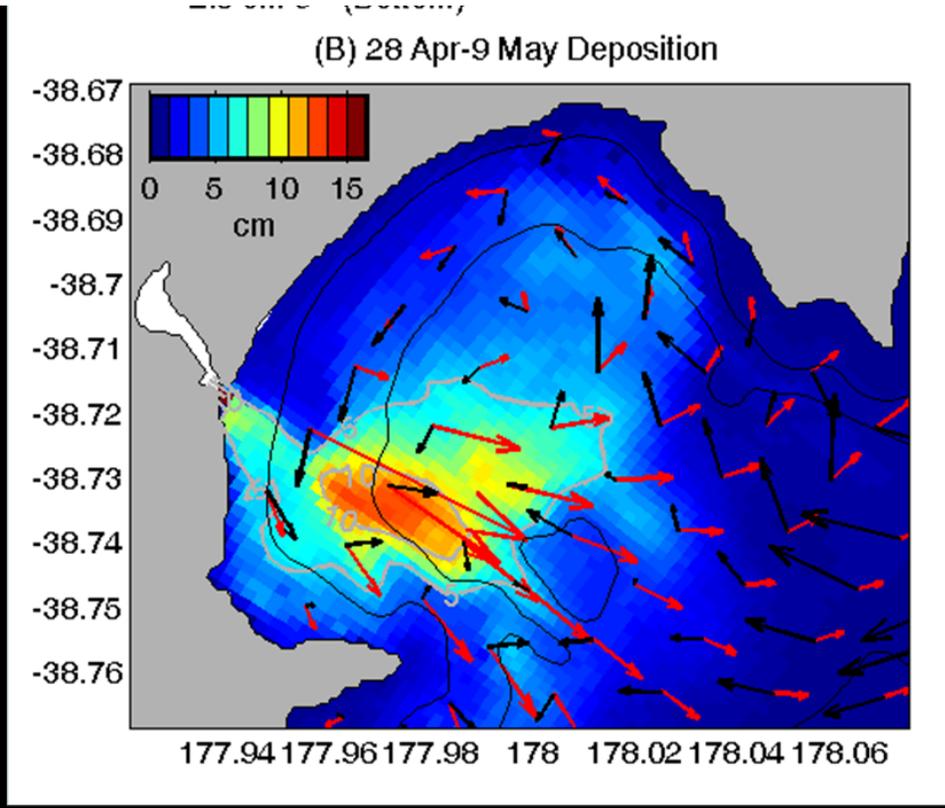
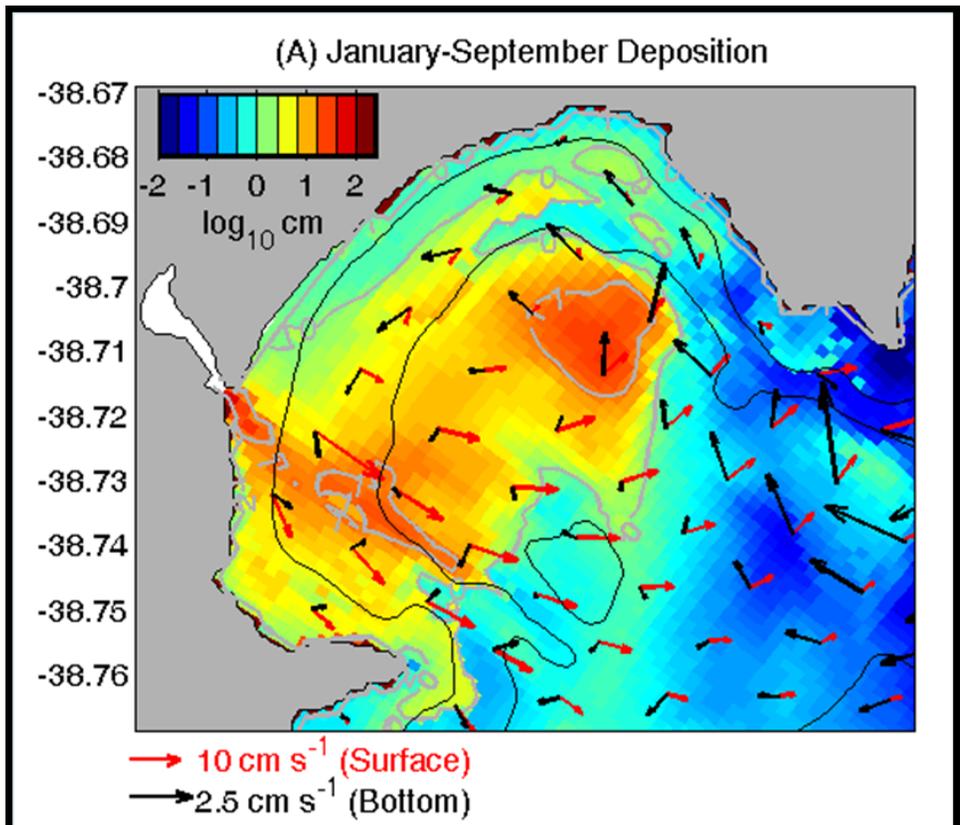
Forcing – Hourly water and sediment discharge, winds

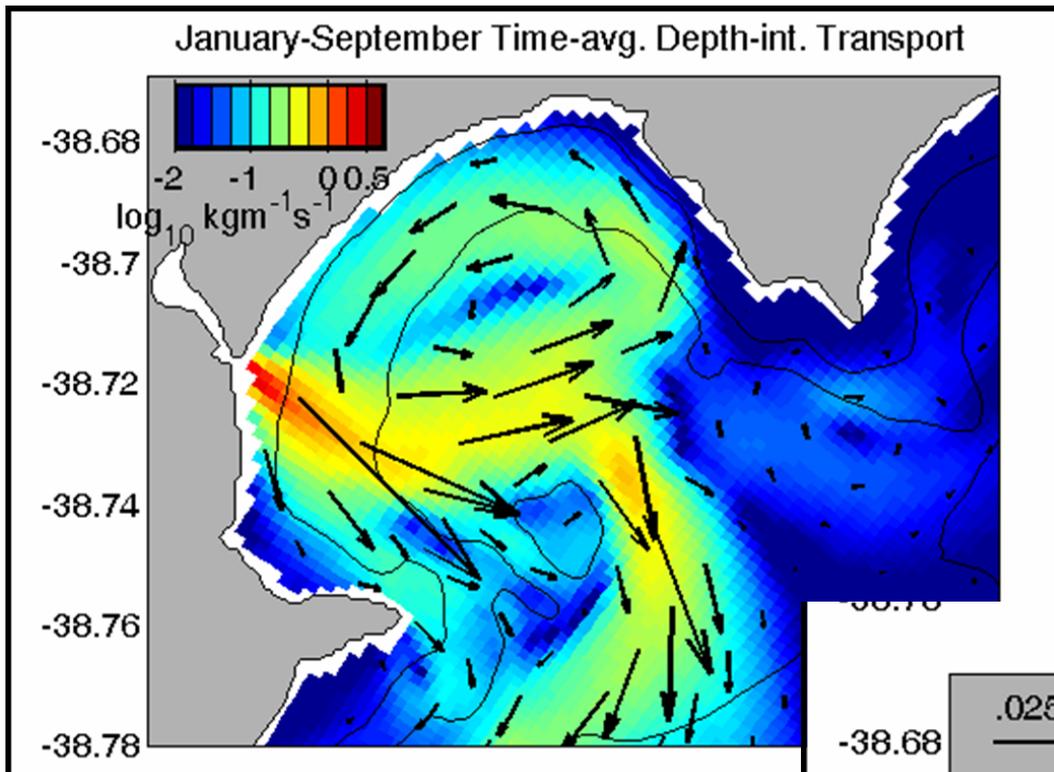
Monthly means: Air temp and pressure, relative humidity, cloud cover



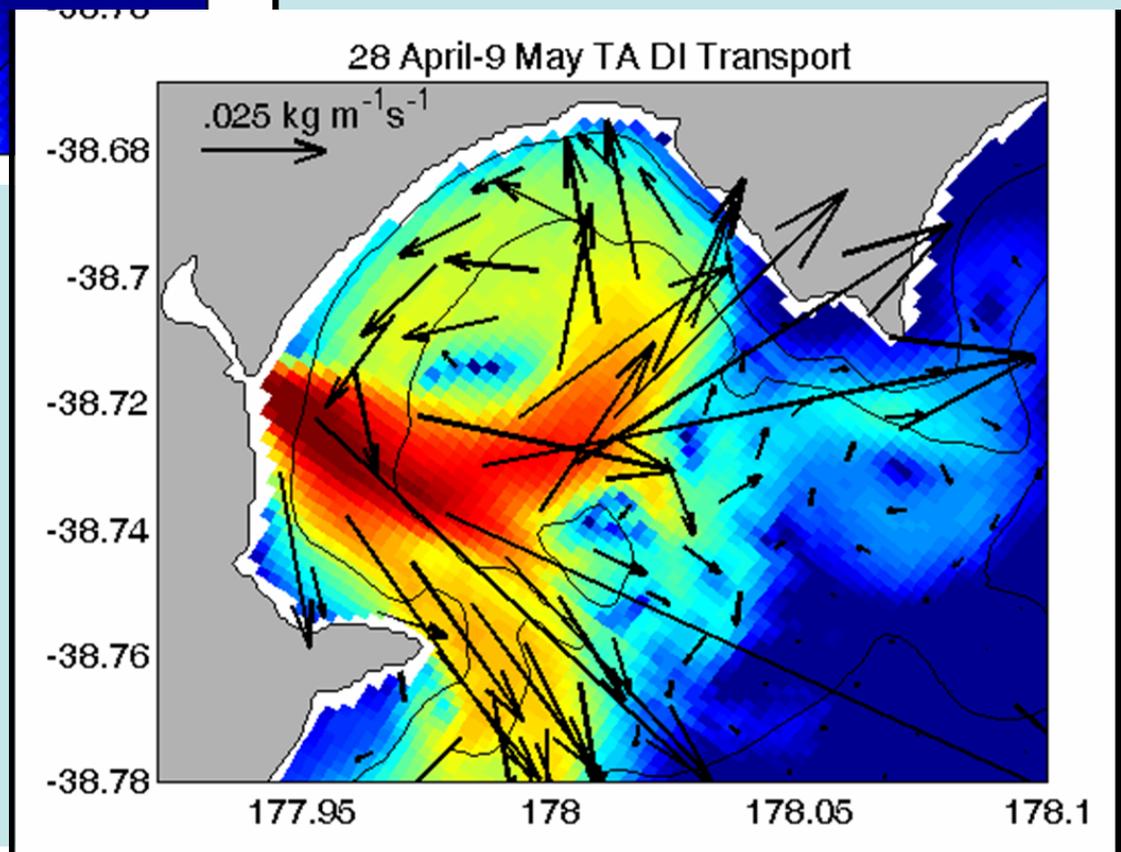
SWAN Waves WW3 B.C.







Depth-integrated and time-averaged sediment transport rates



Model Animations: don't want to play on this computer...

Other potential features

- Biology: phytoplankton growth, nutrient uptake, burial in seabed, etc.
- Sea ice: ???
- Data assimilation
- Carbonates: ???