

An aerial photograph of a complex bay system. The water bodies are colored in shades of blue, green, and brown, indicating different water qualities or depths. The land parcels are shown in various colors, including brown, green, and tan, representing different types of land use or vegetation. The bay system is irregularly shaped and has several smaller inlets and channels.

Bay Circulation in Texas

Dharhas Pothina, TWDB

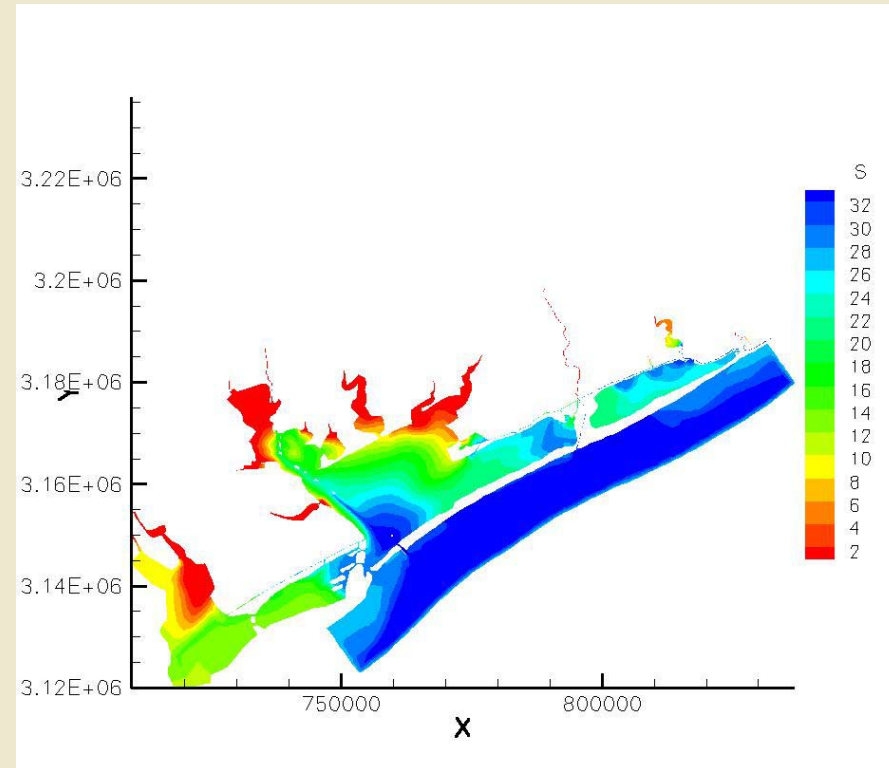
Jordan Furnans, TWDB

Junji Matsumoto, TWDB

Freshwater Inflow Needs

"a salinity, nutrient, and sediment loading regime adequate to maintain an ecologically sound environment in the receiving bay and estuary system that is necessary for the maintenance of productivity of economically important and ecologically characteristic sport or commercial fish and shellfish species and estuarine life upon which such fish and shellfish are dependent."

An accurate model of bay circulation and salinity transport is required.

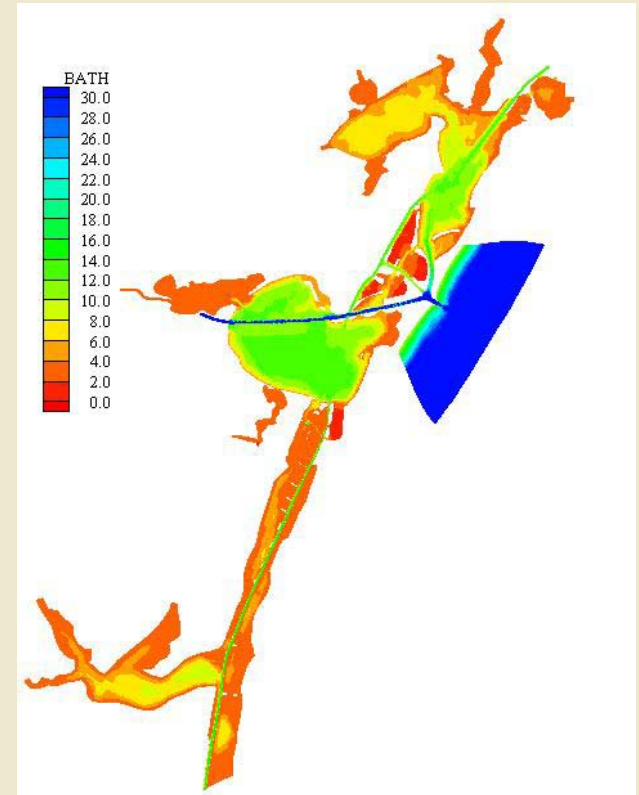


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Characteristics of Texas Bay

- Very Shallow Bays
- Presence of Deep Navigational Channels
- Presence of Barrier islands
- Tidal Range not Large (<3ft)
- Tides are Diurnal & Semi-Diurnal
- Hyper Saline conditions possible



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TxBLEND : Finite Element Model based on GWCE Formulation. Dr. Junji Matsumoto, TWDB

ELCIRC : Finite-volume/Finite-difference Eulerian-Lagrangian Formulation. Dr. Antonio Baptista *et al*, OHSU

UTBEST : Discontinuous Galerkin Formulation. Clint Dawson, University of Texas.

We are in the early stages of testing UTBEST & ELCIRC

A wide, shallow bay with a sandy beach and a cloudy sky at sunset or sunrise. The water is calm, and the sky is filled with soft, colorful clouds. The text is overlaid on the center of the image.

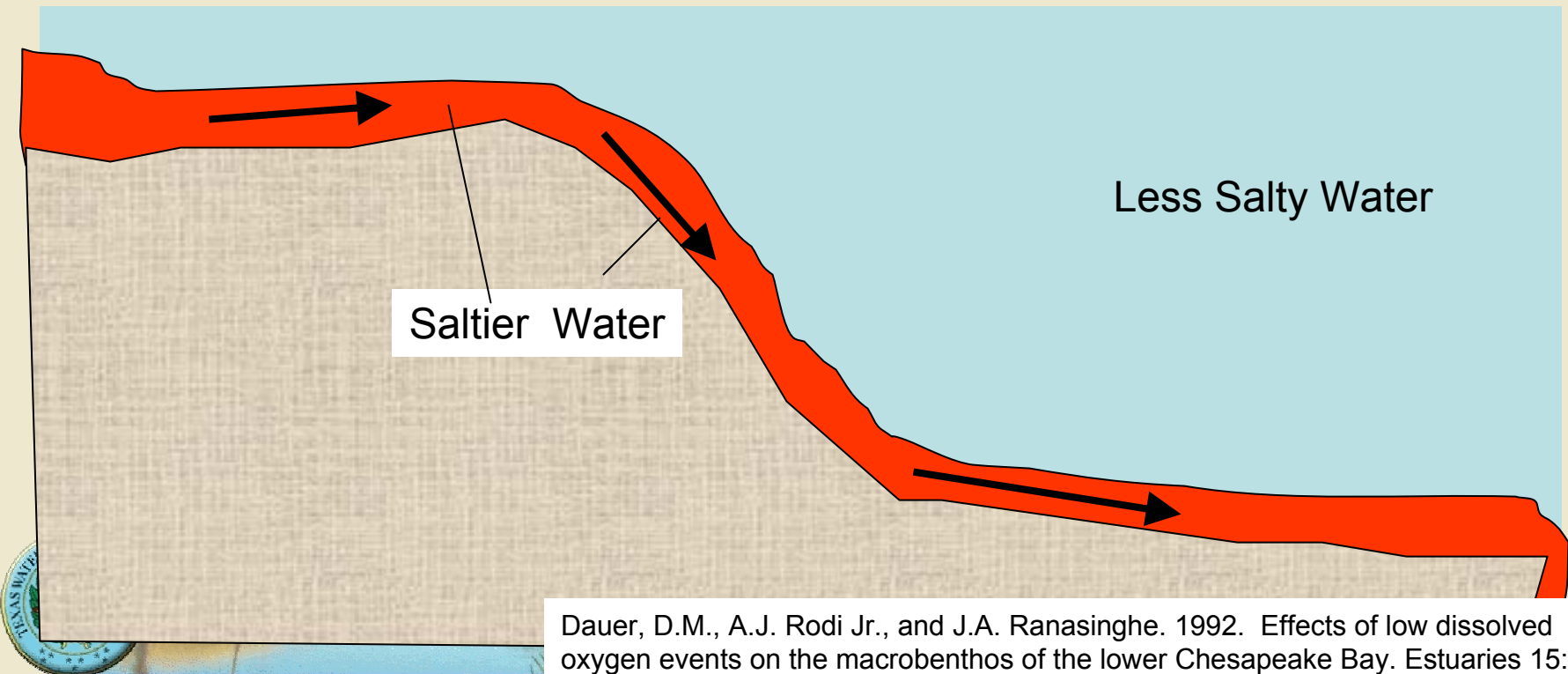
Hypoxia & High-Salinity
Underflows
In
Corpus Christi Bay, TX

Jordan Furnans, TWDB

?What?

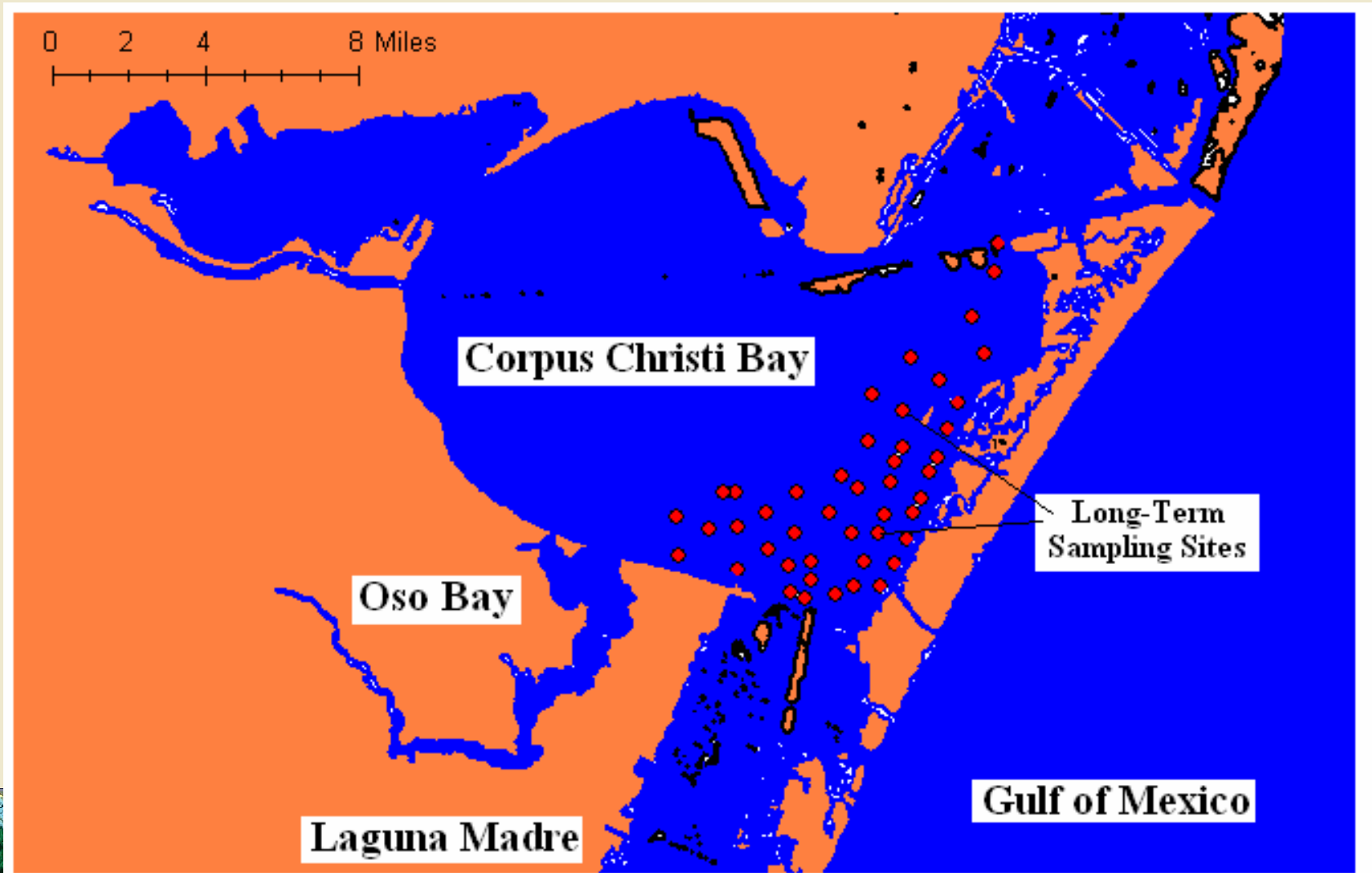
- Hypoxia = Dissolved Oxygen < 2.0 mg/L
- High Salinity Underflow:

1

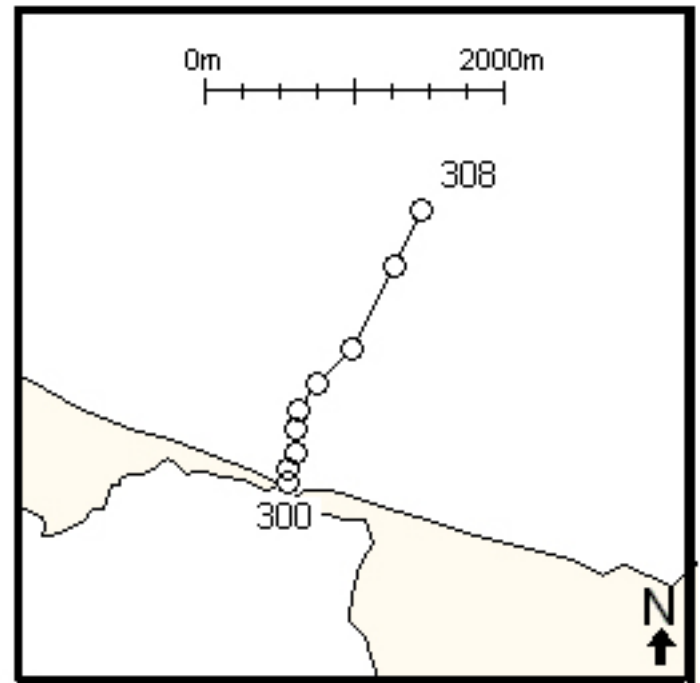
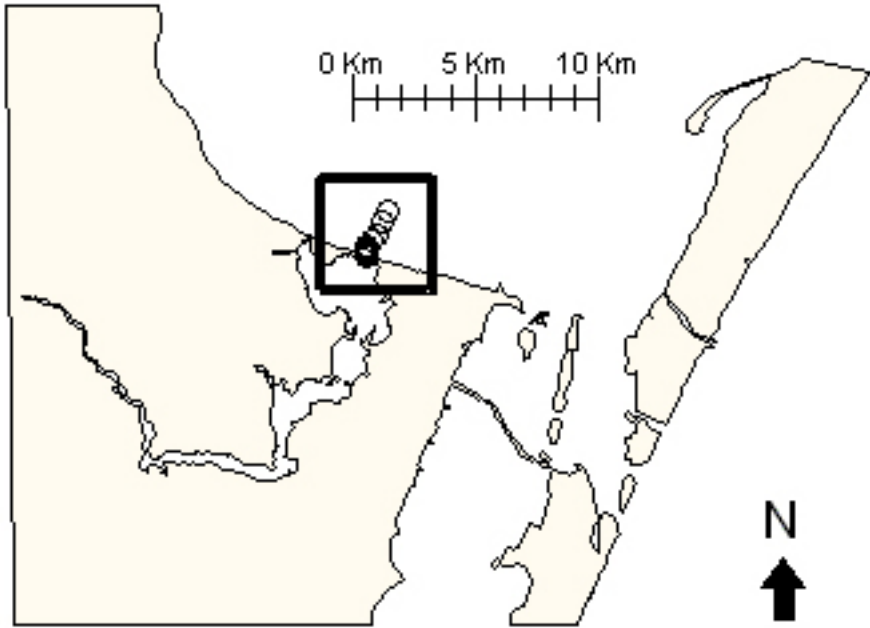


Dauer, D.M., A.J. Rodi Jr., and J.A. Ranasinghe. 1992. Effects of low dissolved oxygen events on the macrobenthos of the lower Chesapeake Bay. *Estuaries* 15:384-391

Area Map



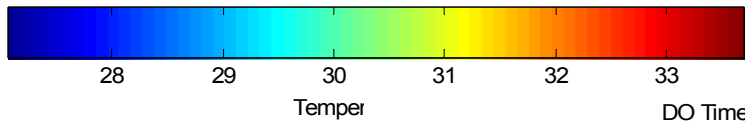
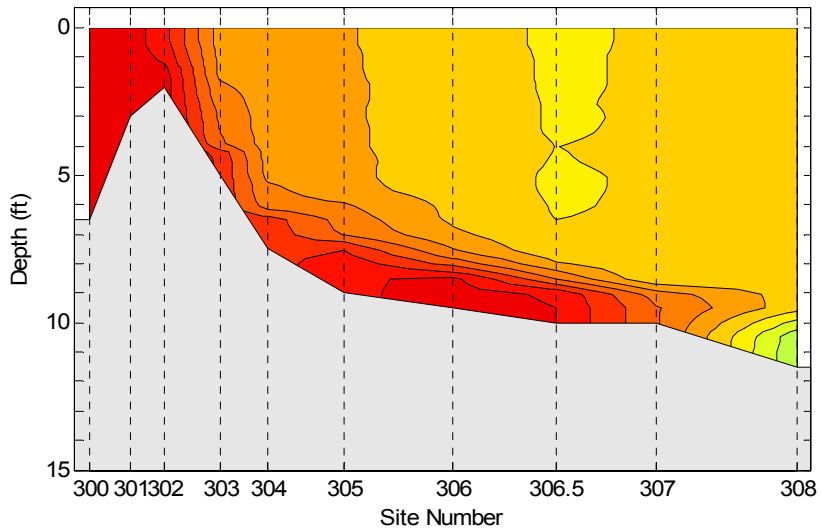
Underflow Sampling Locations



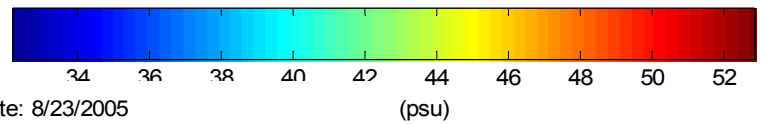
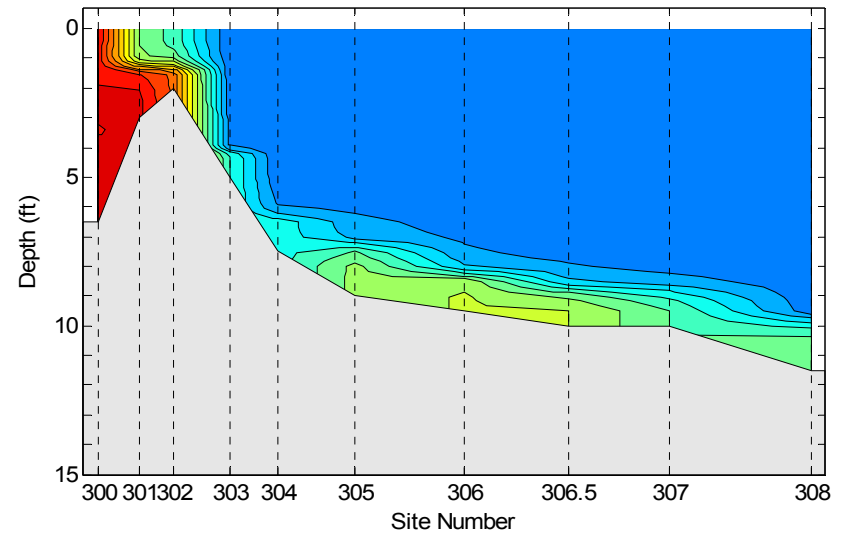
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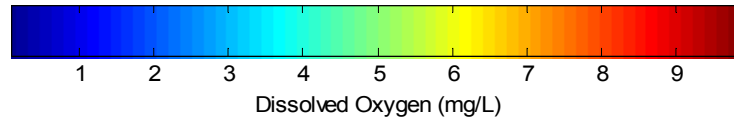
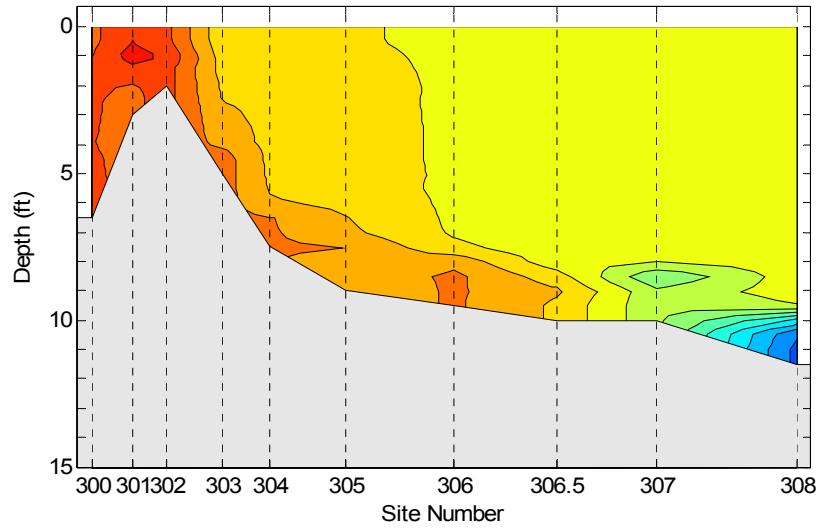
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SALINITY Time: 17:42-19:40 Date: 8/23/2005



DO Time: 17:42-19:40 Date: 8/23/2005



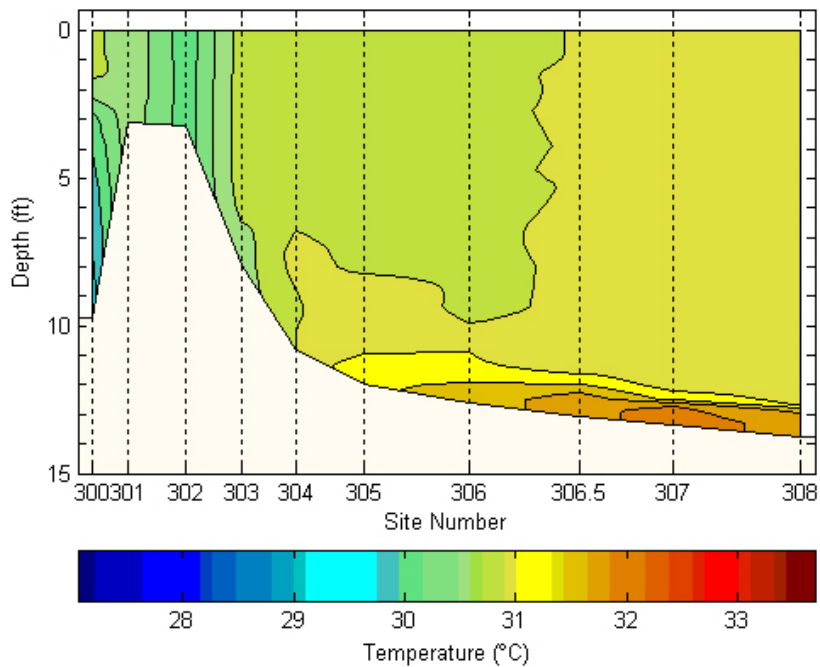
17:42-19:40
8/23/05



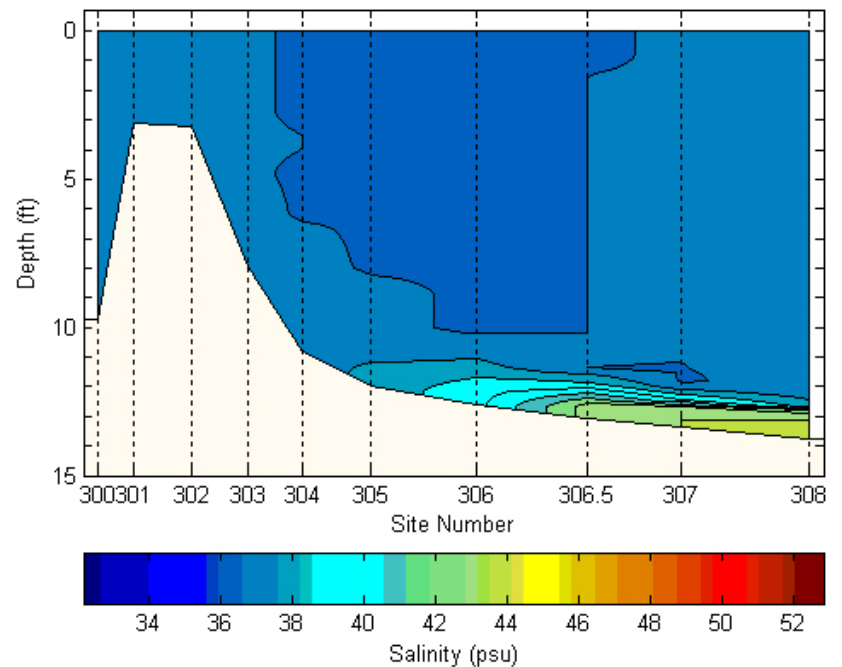
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TEMPERATURE Time: 5:01-6:45 Date: 8/24/2005

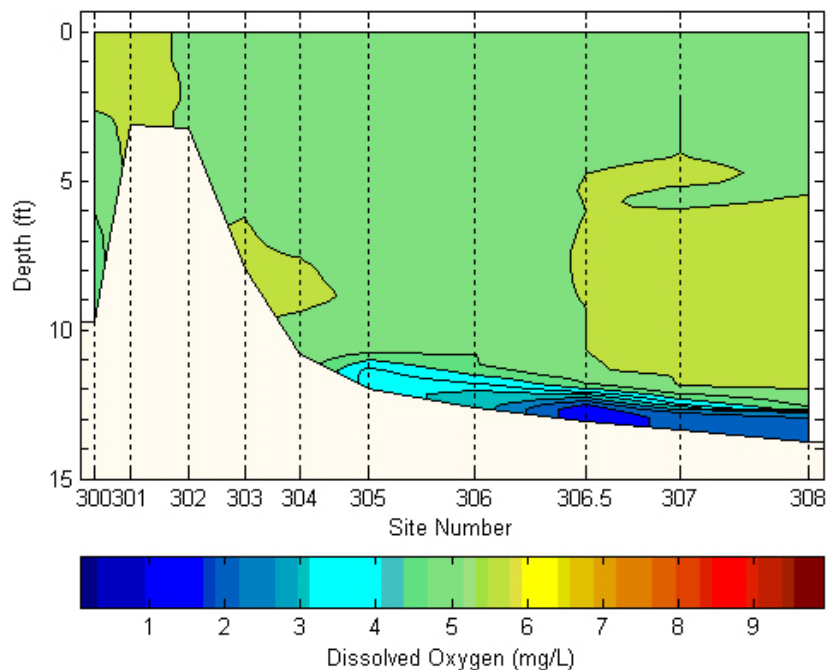


SALINITY Time: 5:01-6:45 Date: 8/24/2005



5:01-6:45
8/24/05

DO Time: 5:01-6:45 Date: 8/24/2005



What's Next?

- Hydrodynamic Modeling
 - Can the model reproduce field observations?
 - More salt added to Oso Bay?
- Couple CC Bay model & Underflow model
 - Using ELCIRC for CC Bay
 - Using modified EFDC for Underflow
- Modify ELCIRC Hydrodynamic Model
 - Operate in Windows
 - Spatially Variable winds
 - Flexible Input/Output formats

ELCIRC Modifications

- Modular Format
- Dynamic Allocation of variables
 - No fixed array sizes
 - Compiles in Windows
 - Lahey Fujitsu Fortran Compiler v. 5.7
- User-specified file names
 - “param.in” and “gr3” not required
 - File format unchanged

IMPLEMENTED



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ELCIRC Modifications

- Output to NetCDF format, ASCII
 - Exported to Matlab, TecPlot
- Selective Data Output per layer
 - Layers, Sheets, Curtains, Averages, full domain
- Semi-Lagrangian Particle Tracking Capability
- Updated Surface Turbulence Dynamics
 - HDF data format required (although allowed)

Under Development



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Questions

