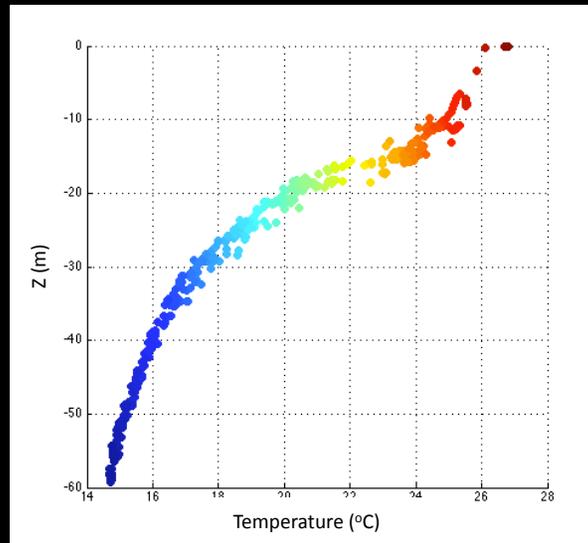


iMseas

A MOOS Interface to MSEAS Dynamic Ocean Models



Stephanie Petillo & Toby Schneider

MIT/WHOI Joint Program

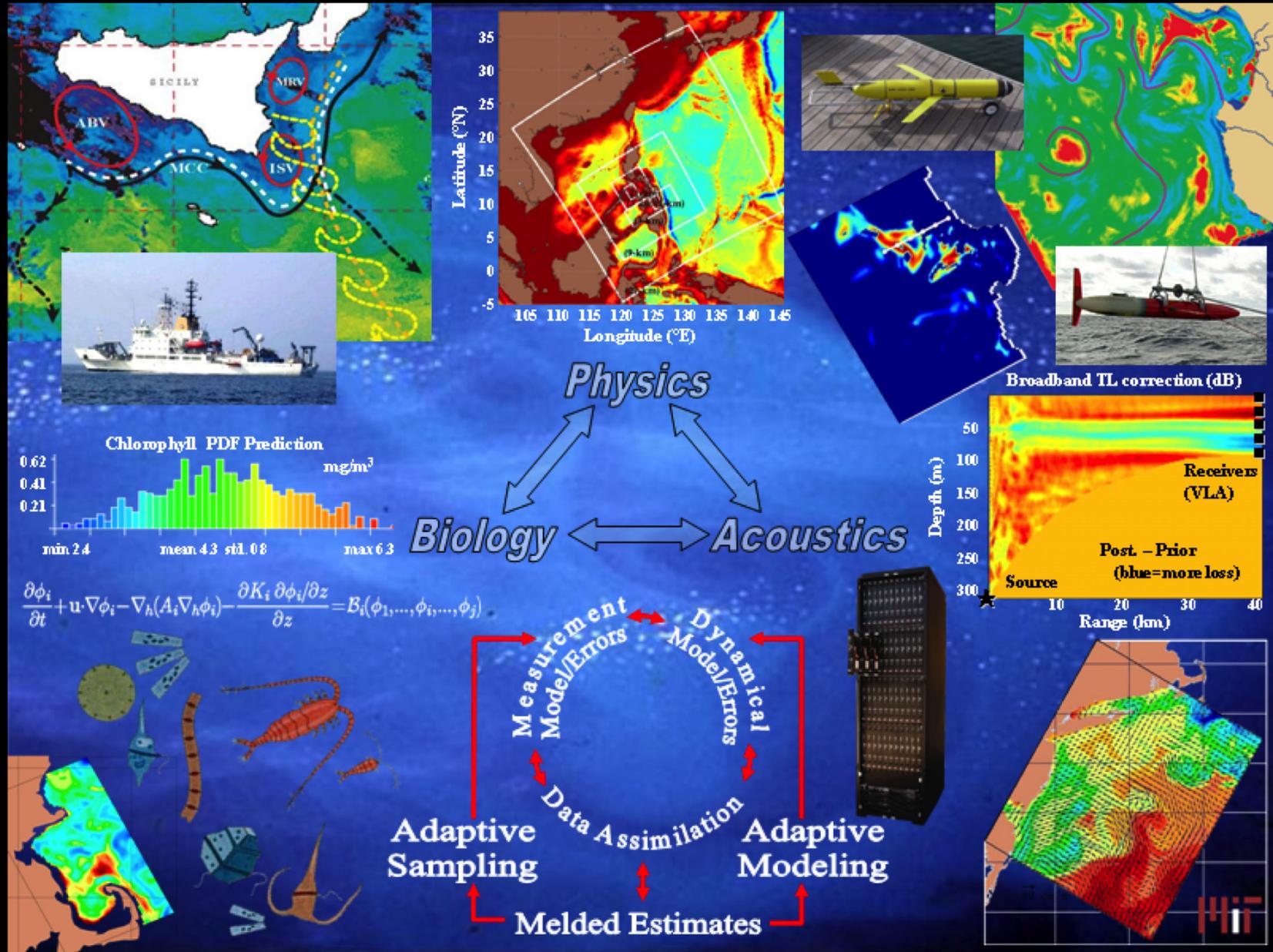
MIT Laboratory for Autonomous Marine Sensing Systems



MSEAS

Multidisciplinary Simulation, Estimation, and Assimilation Systems

< <http://mseas.mit.edu> >

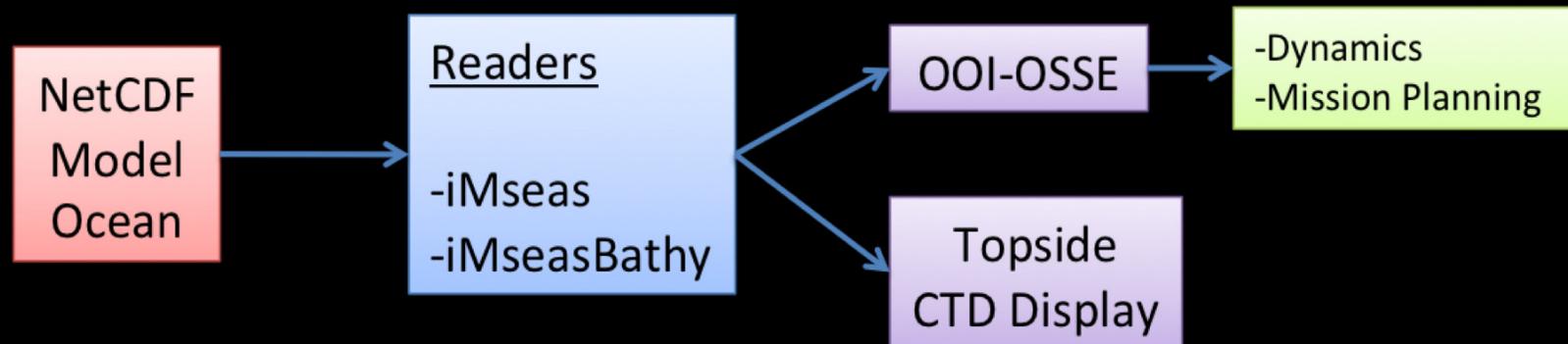


MSEAS Info

- Prof. Pierre Lermusiaux's group at MIT
- Dynamic ocean model in space and time
(branched from the HOPS ocean models)
- Gridded data
- NetCDF format
- MATLAB file reader: `readhopspe.m`
- MOOS wrapper: `iMseas`

Developments with MOOS to Enable Environmental Monitoring

- Topside CTD display
- iMseas – MOOS interface for MSEAS model ocean reader (readhopspe.m)
- iMseasBathy – gets local bathymetry from MSEAS model ocean NetCDF file



- pEnvtGrad + Adaptive Yoyo behavior – tracks gradients through the water column (last year's talk)

What is necessary for a simulation environment?

- CTD values (iMseas)
 - Temperature, salinity, pressure/depth, sound speed
- Bathymetry (iMseasBathy)
- Also available through iMseas
 - zonal & meridional currents
 - density contours

If realistic values are not available from a dynamic ocean model for simulation, it is default to use a smattering of sparse CTD and bathymetry data points instead (historic and static in time) from uSimCTD and uSimBathy.

iMseas

- It provides the AUV with an interface to a realistic, dynamic ocean environment to operate in when
 - an instrument (eg. altimeter) malfunctions and typical values (eg. of altitude) for that region are required by the autonomy system to function properly.
 - a complete dynamic ocean environment is needed for testing.
- It may be used identically for both a simulation and runtime environment.

iMseasBathy

- Necessary when the AUV needs to know the bathymetry between gridded data points.
- Interpolates bathymetry at any given position from the plane formed by the 3 closest grid points.

CTD Display

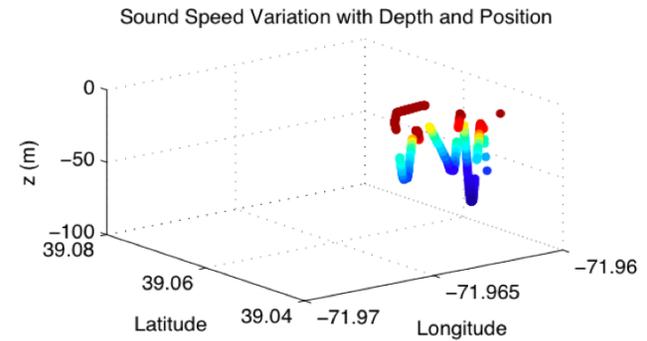
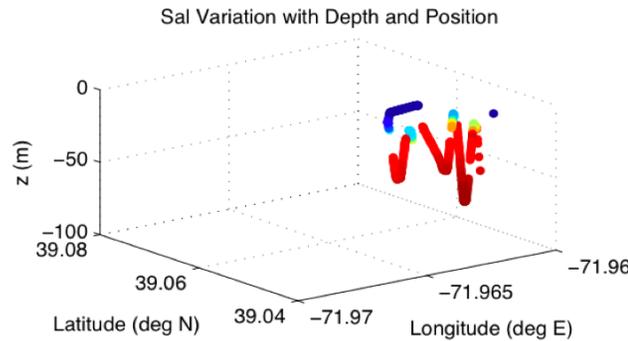
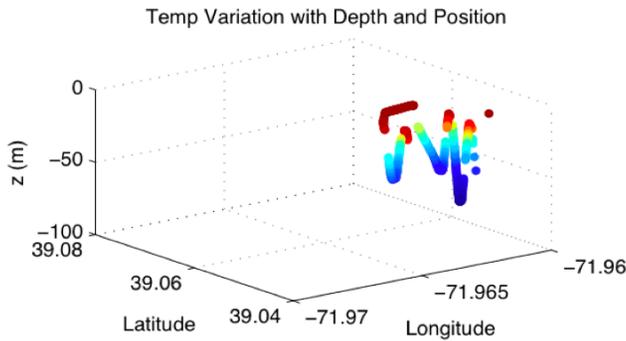
Simulated AUV in MSEAS Environment

- Temperature -

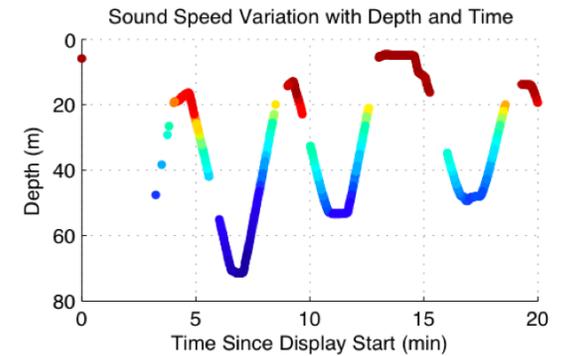
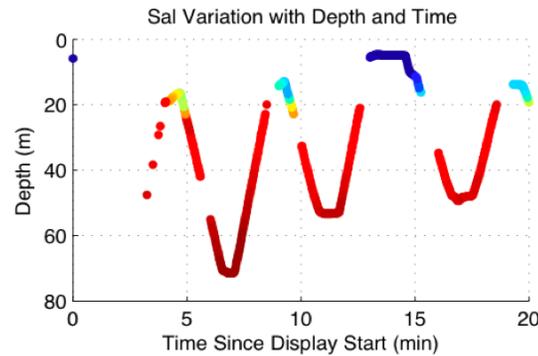
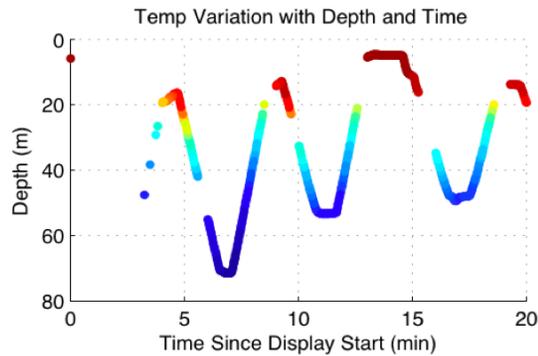
- Salinity -

- Sound Speed -

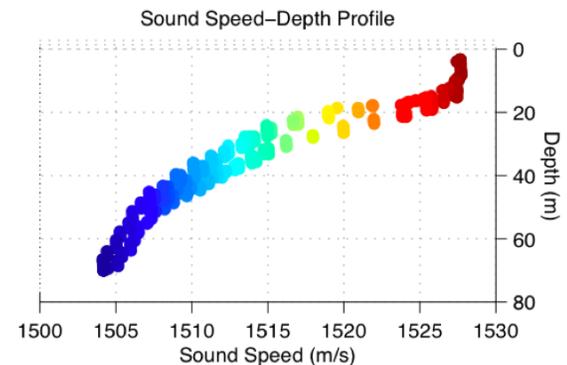
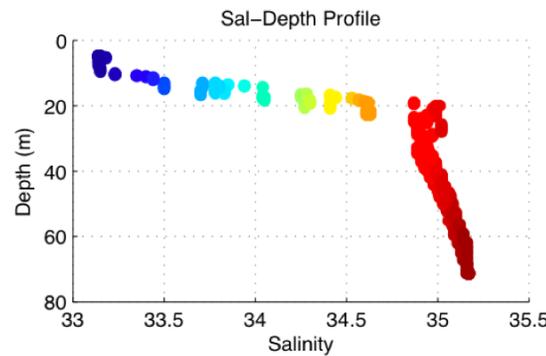
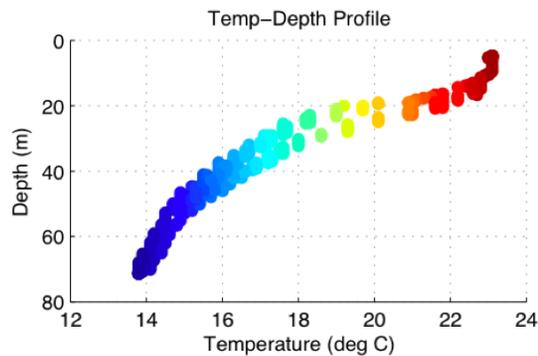
3D Space



Depth v. Time



Depth v. Env't.



Mid Atlantic Bight – Aug.-Sep. 2006

Real-Time CTD Display

GLINT '10

-Temperature-

-Salinity-

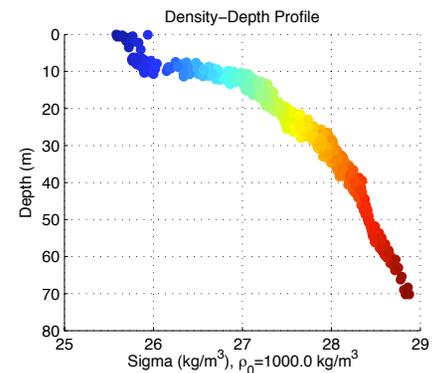
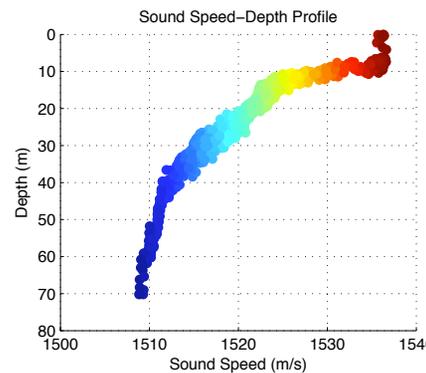
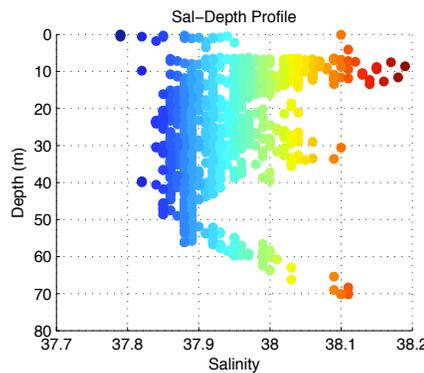
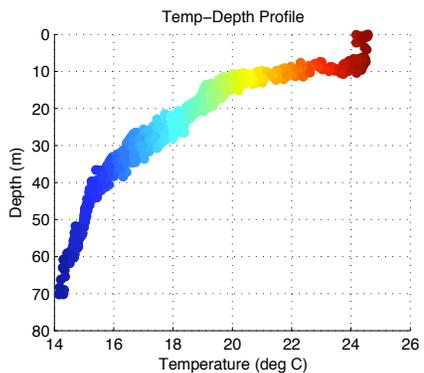
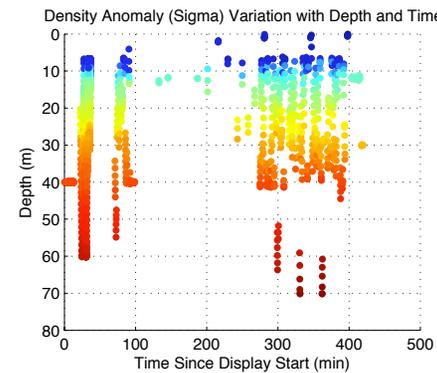
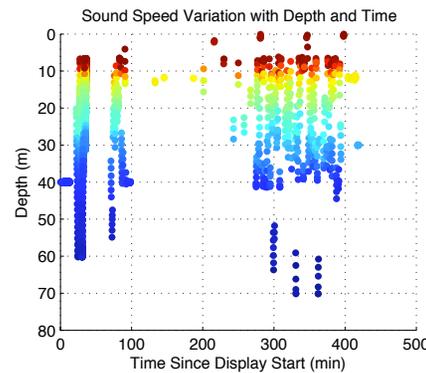
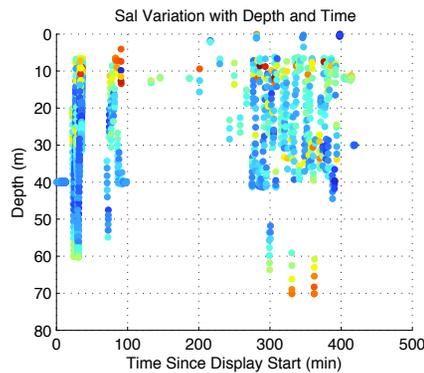
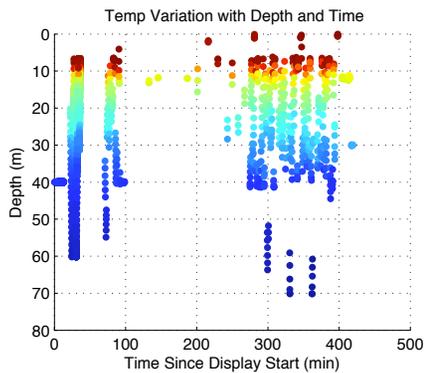
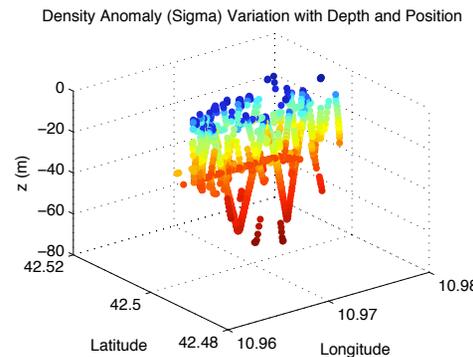
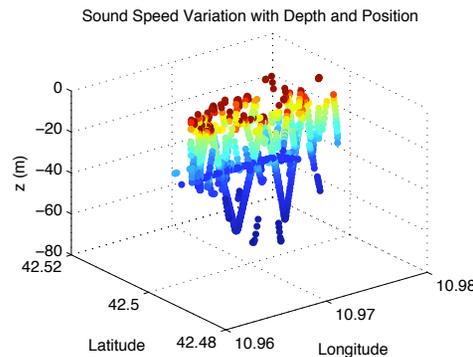
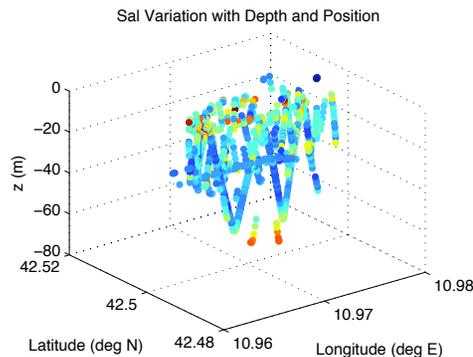
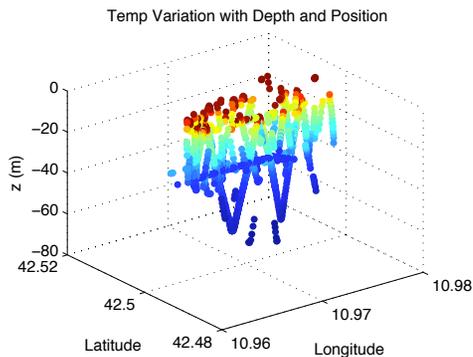
-Sound Speed-

-Density-

3D Space

Depth v. Time

Depth v. Env't.



Future Use

- Use forecast MSEAS (or similar) dynamic ocean models to analyze and predict AUV dynamics and environmental effects, before going to sea!

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- MOOS & IvP Helm
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Questions / comments?

Stephanie Petillo
spetillo@mit.edu