# INDO – US collaborative Project ASIRI-OMM

## Air-Sea Interactions in the Northern Indian Ocean – Regional Initiative (ASIRI)
## Ocean Mixing and Monsoons (OMM)

MINISTRY OF EARTH SCIENCES
GOVERNMENT OF INDIA

**Collaborating on establishing a legacy of ocean observations, models, human and technological capacity for improved cyclone and intraseasonal monsoon forecasts**



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## A multi-faceted approach for multi-scale processes
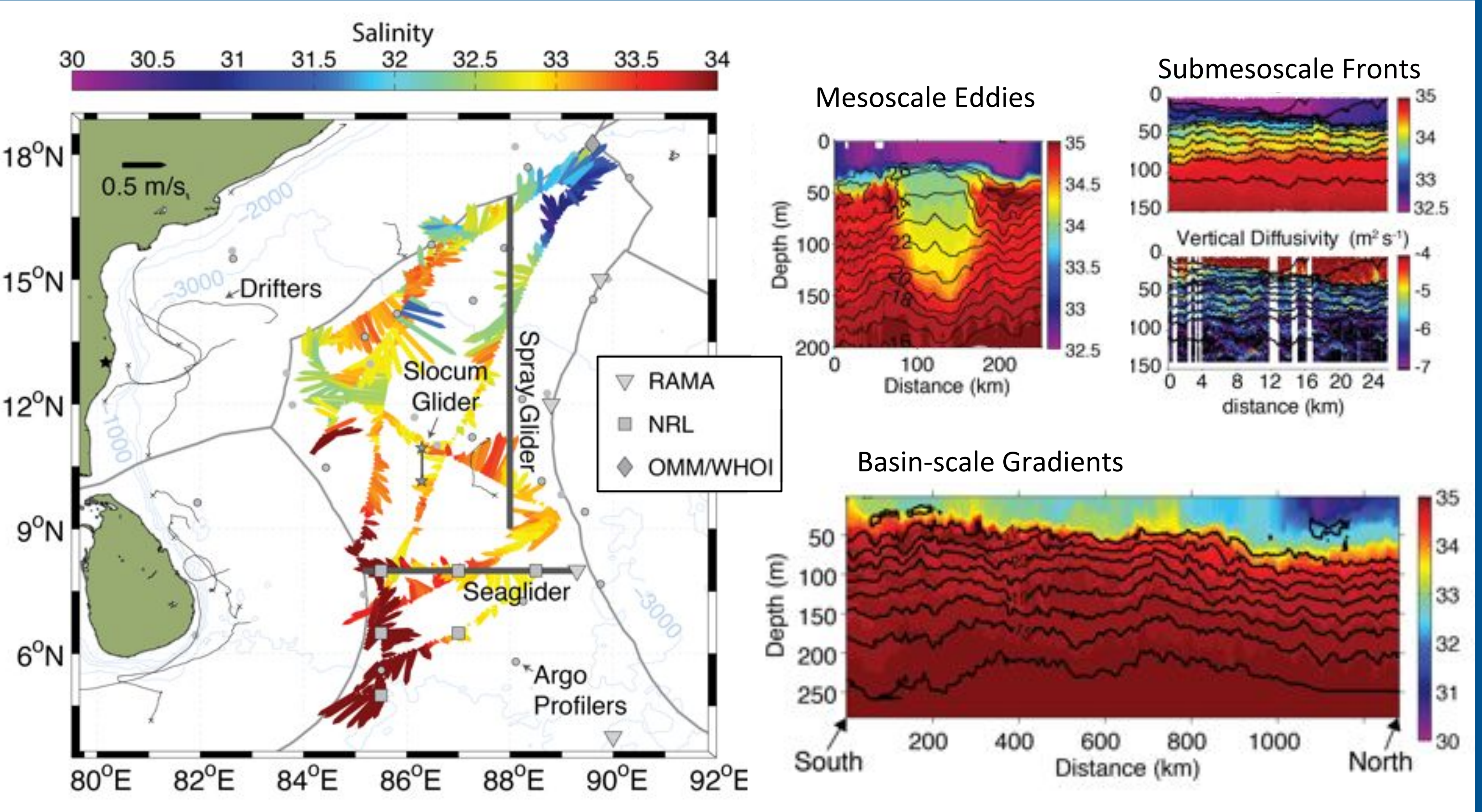


Far left: Salinity and velocity data collected during the 2013 Pilot. Map shows ship track and observational assets, many highlighted below. Subpanels: Salinity sections at different scales highlighting some of the physical features of the Bay of Bengal.

## Observational Tools



Lagrangian float follows density or pressure levels while taking measurements and is remotely programmable.

Long term endurance gliders Spray (left) and Seaglider (right) measure subsurface temperature and salinity structure.

Turbulent motions are being measured from moorings, CTD rosettes, and autonomous profilers using chipods.

Lagrangian drifters measure near-surface ocean currents, atmospheric pressure, sea surface temperature and sea surface salinity

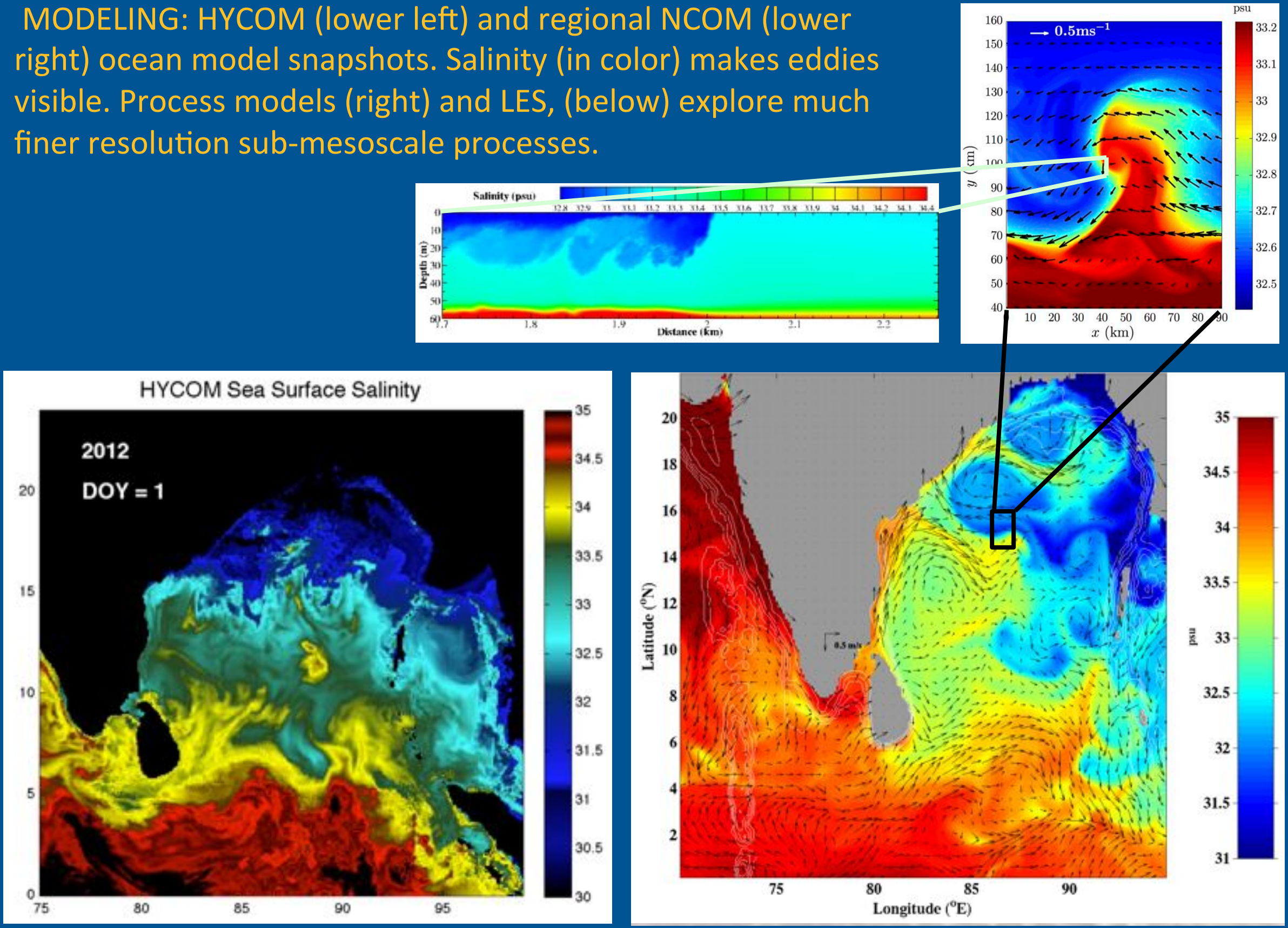## Training and capacity building



Shipboard training and research on joint cruises: Nov-Dec 2013, June 2014, August 2014 and November 2014



Bay of Bengal Upper Ocean Physics Workshop IISc Bengaluru July 9-21, 2014
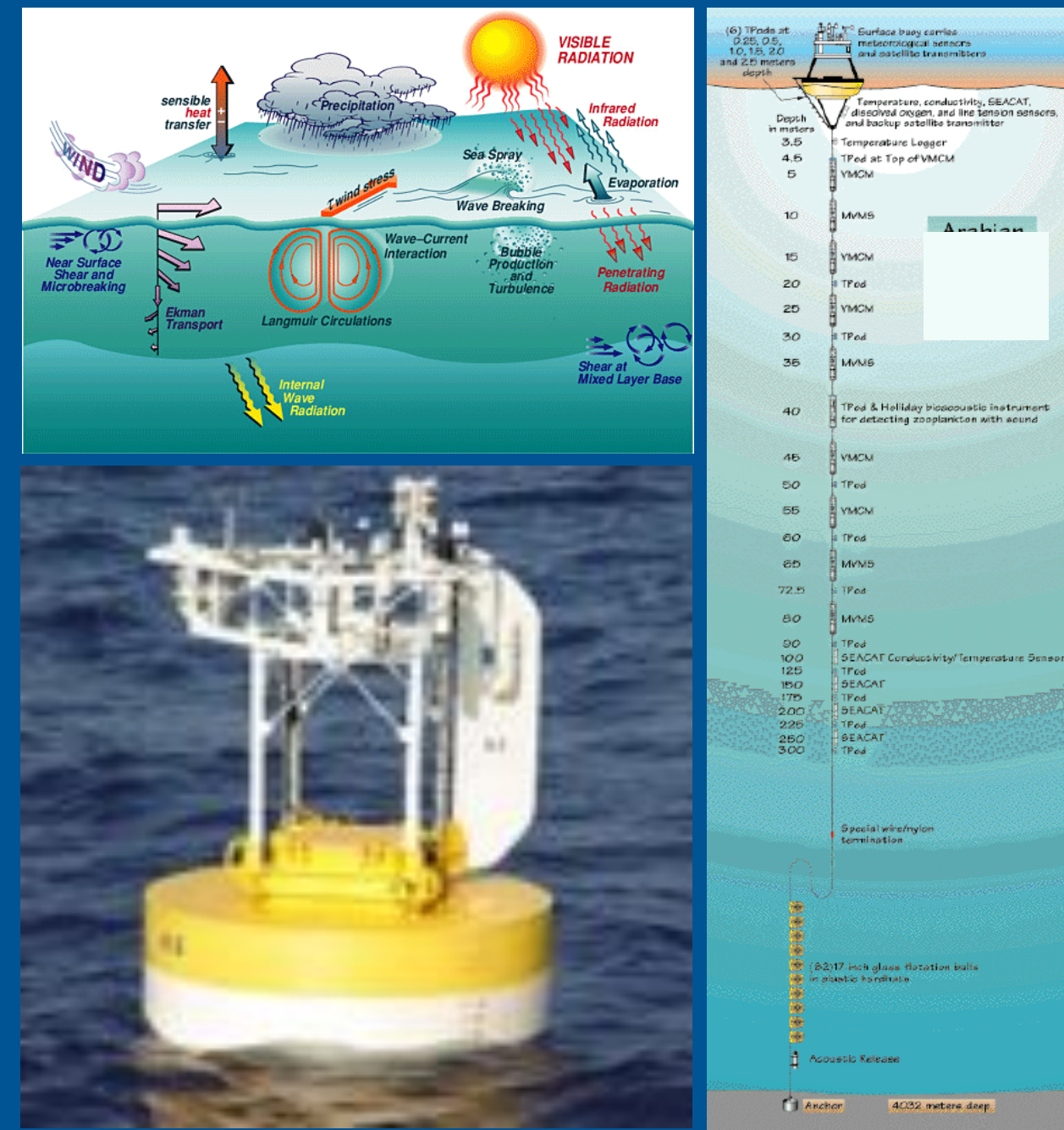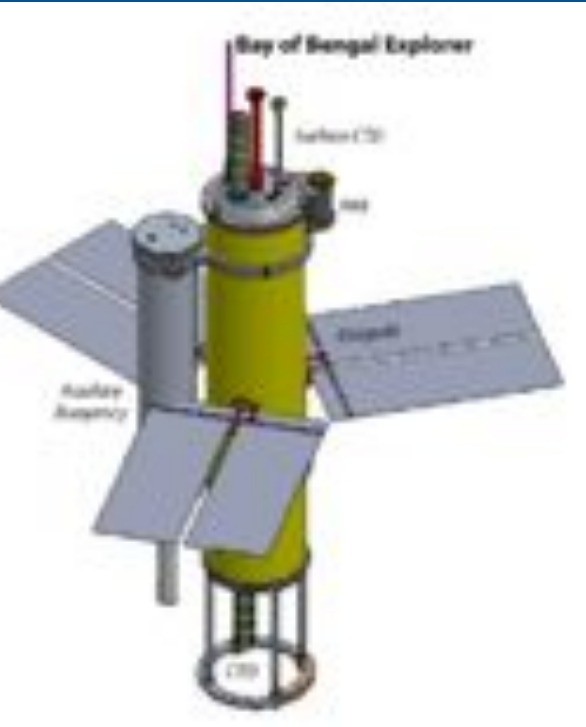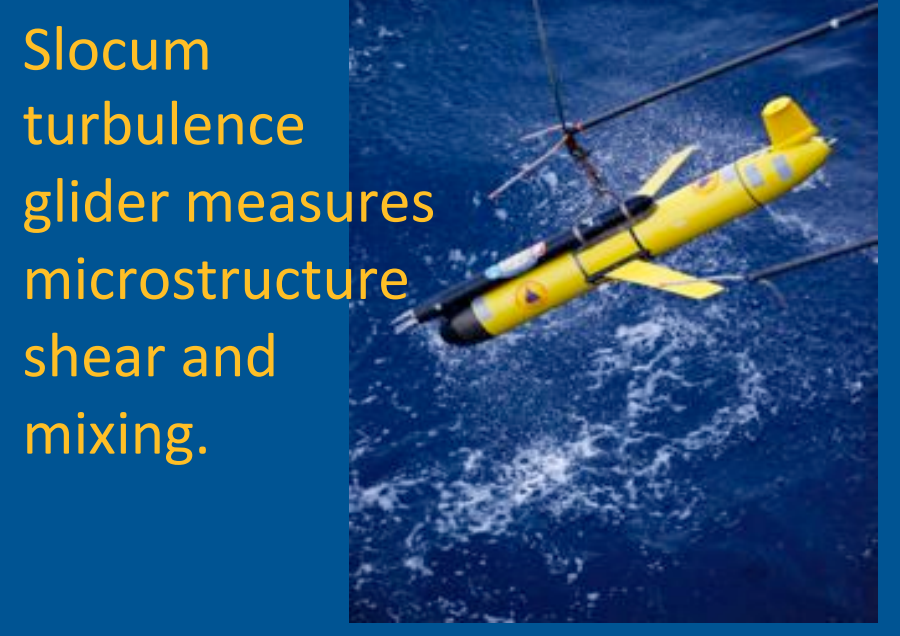
## Multi-scale Ocean Modeling

MODELING: HYCOM (lower left) and regional NCOM (lower right) ocean model snapshots. Salinity (in color) makes eddies visible. Process models (right) and LES, (below) explore much finer resolution sub-mesoscale processes.



Air-sea flux mooring measures air-sea exchange of heat, momentum, and freshwater and temperature, salinity, and velocity in the ocean.

Slocum turbulence glider measures microstructure shear and mixing.

Surface wave-driven wirewalker measures temperature, salinity, currents and optical variables at cm scale resolution

## Indian Institutions

Indian Institute of Science, Indian National Centre for Ocean Information Services, National Institute of Ocean Technology, National Institute of Oceanography, Indian Institute of Tropical Meteorology, Space Applications Centre, Tata Institute of Fundamental Research, Indian Institute of Technology Madras, Indian Institute of Technology Bhubaneswar

## United States Institutions

Scripps Institution of Oceanography, Woods Hole Oceanographic Institution, University of Massachusetts Dartmouth, Oregon State University, University of Washington, University of Notre Dame, Colorado State University, Columbia University, University of Miami, University of Alaska, US Naval Research Laboratory