Validation of a HYCOM model for the Indian Ocean

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Global Ocean Studies - Operational Oceanography

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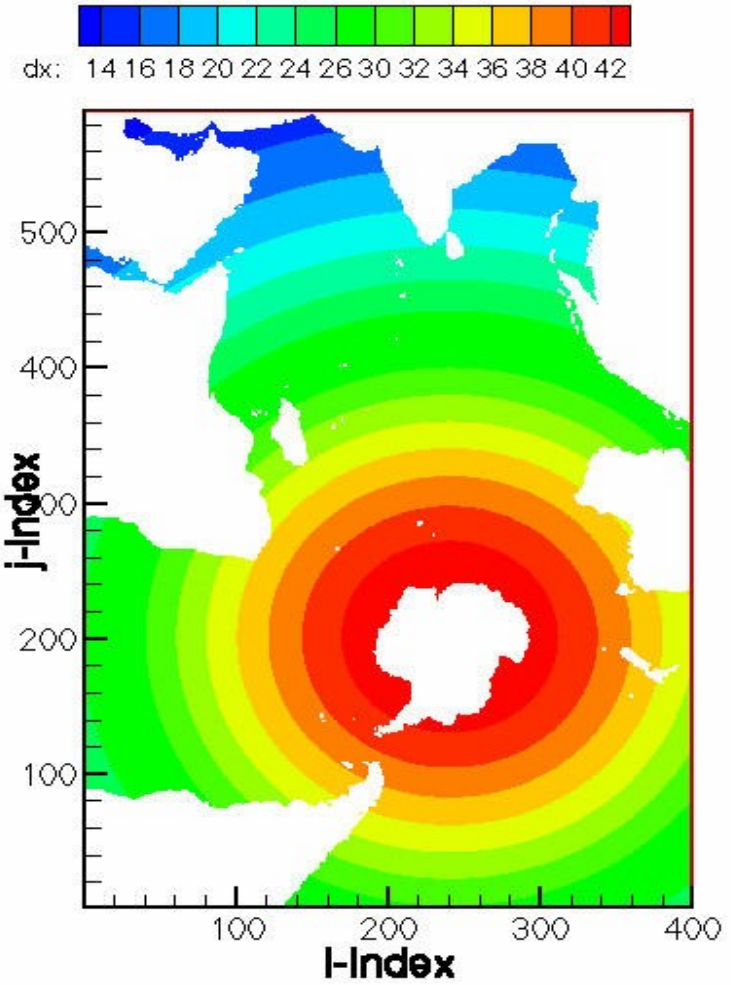
Outline of the talk:

- Introduction
- Model Runs & Validation Methods
- Validation Results
- Future Work Plans

HYCOM – NERSC

- HYCOM v2.1.03
- Grid distance – 14 to 42 km
- 30 hybrid layers
- Initialized using GDEM (Generalized Digital Environmental Model)
- Spun up for 8 years- climatological monthly means of atmospheric data
- Net transport b/w Australia & Indonesia
  – The Indonesian Through Flow - 10 Sv
- Fresh water fluxes from rivers included – monthly av. from UNESCO



Model domain with resolution in km

Model runs & Validation

- **Model run from 1992-2005.**

  Weekly averages from 1992-2001

  Daily averages from 2002-2005

- **Surface circulation.**

  For the region 35°E – 110°E ; 15°S – 30°N

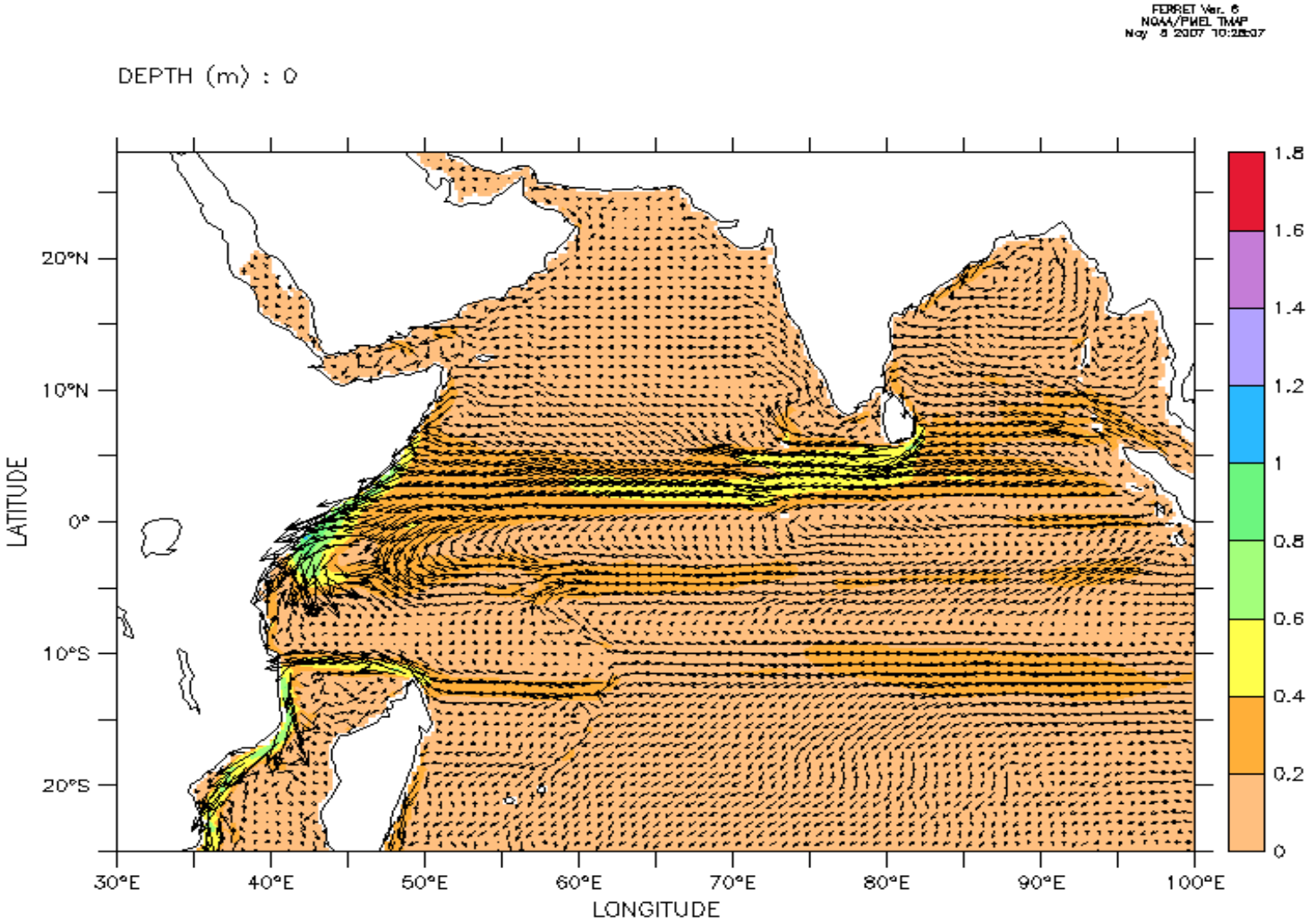
  Mainly for the monsoon circulation

- **Sea Surface Temperatures.**

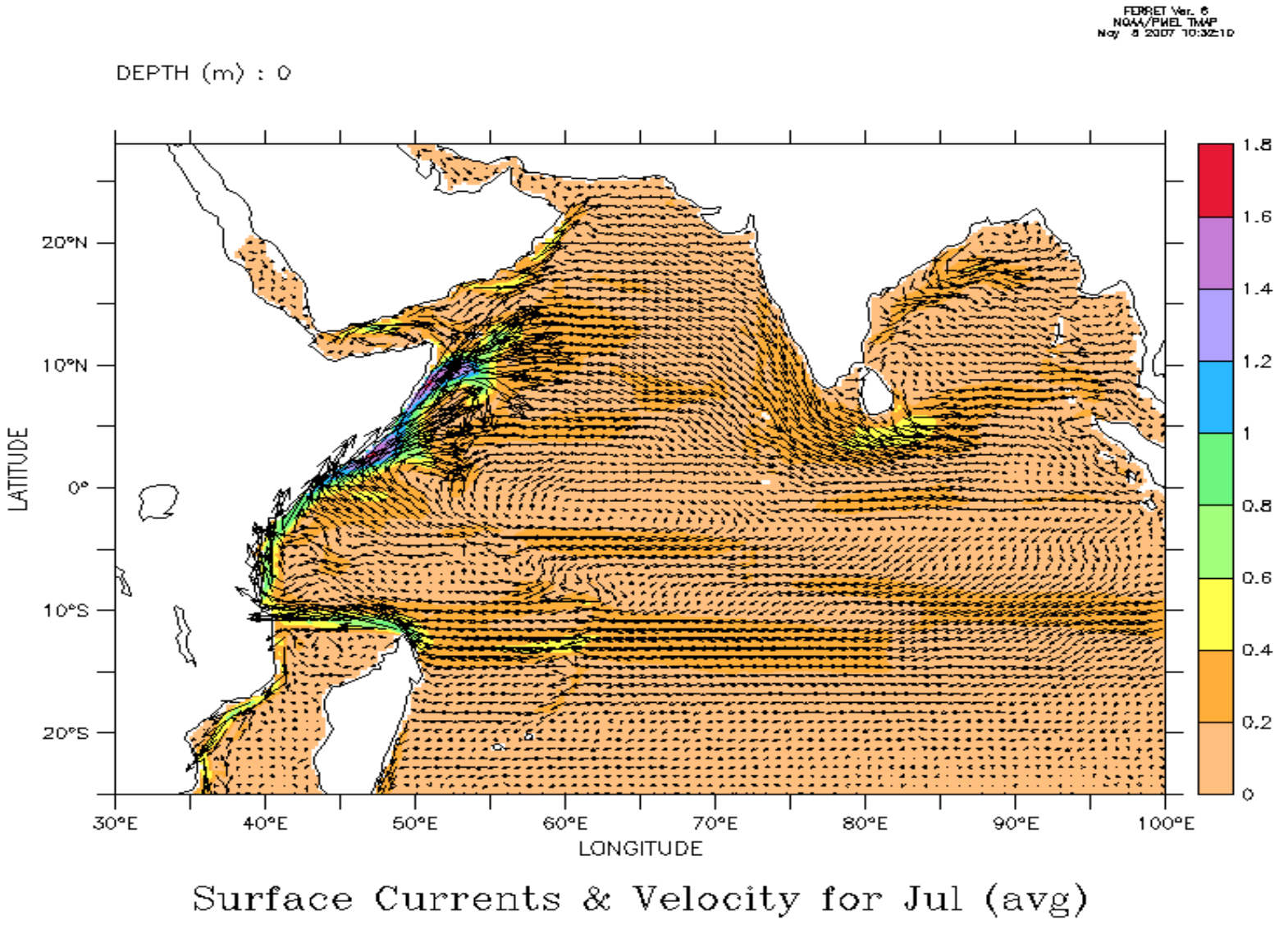
  Compared with NOAA Optimum Interpolation SST Analysis.

- **Comparison with ARGO**

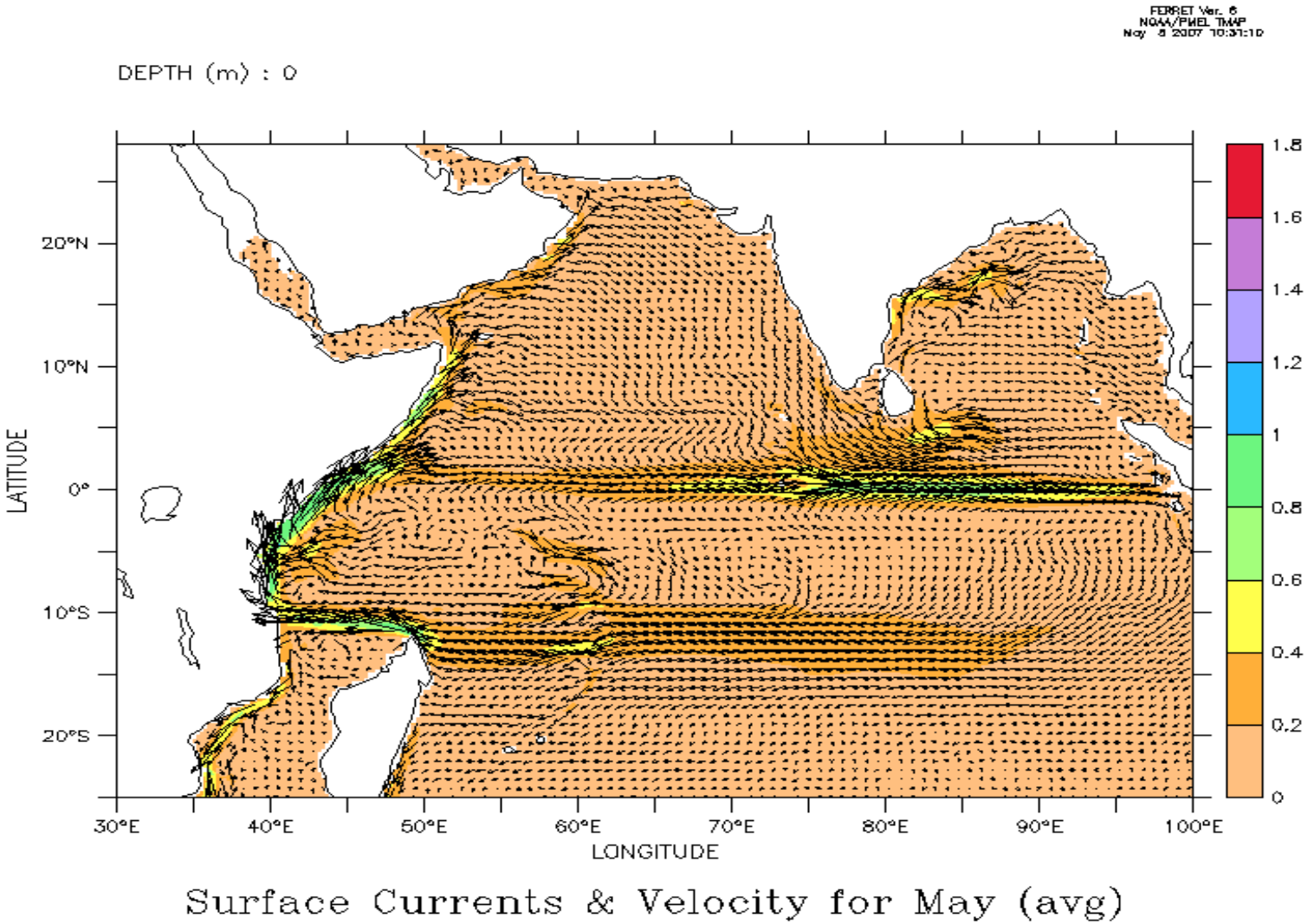
  Global array of profiling floats which measure temperature and salinity in the upper 2000 m. Active number of ARGO floats in the Indian Ocean is around 500 (according to INCOIS, India)



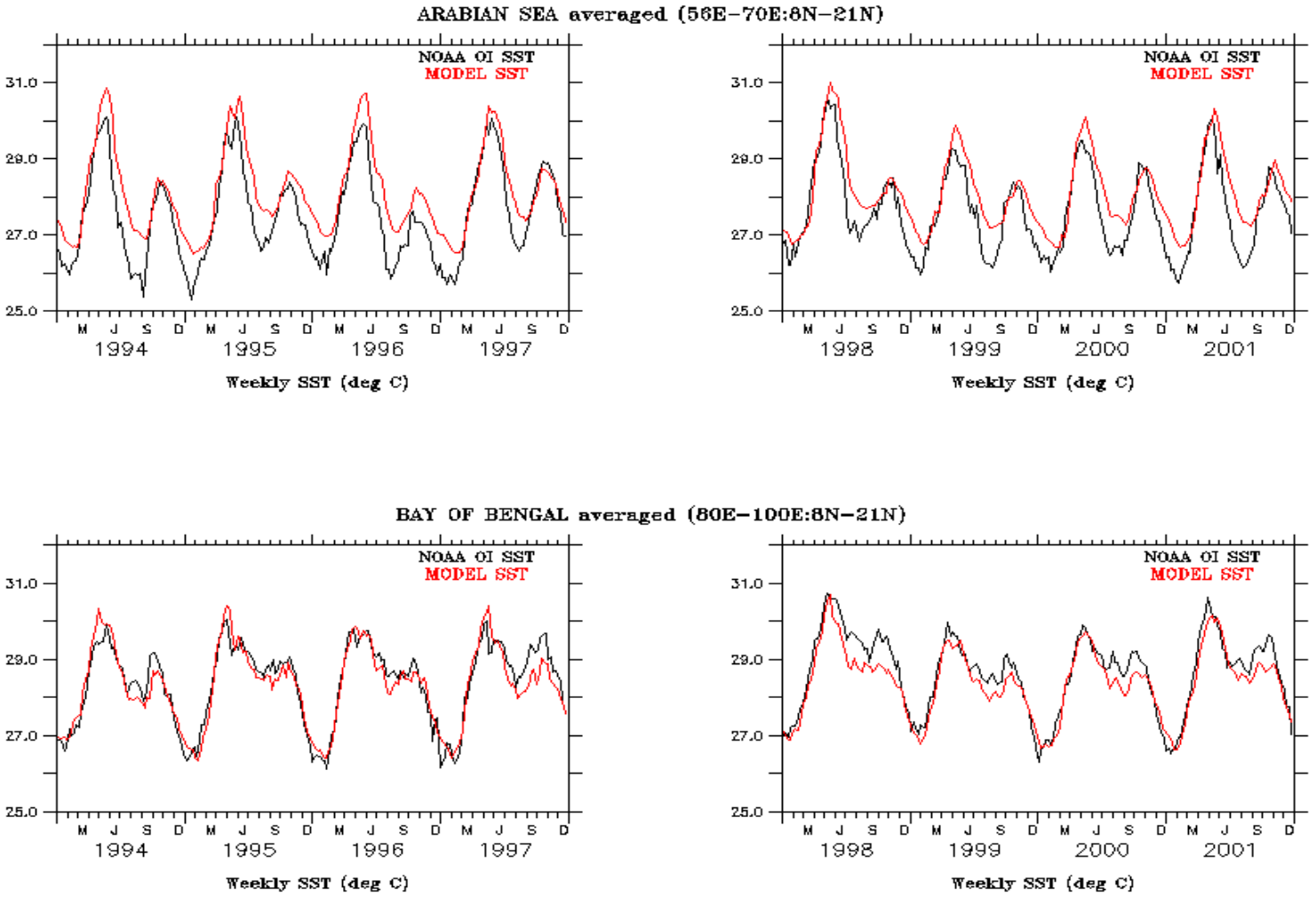
Monthly averaged surface currents for January



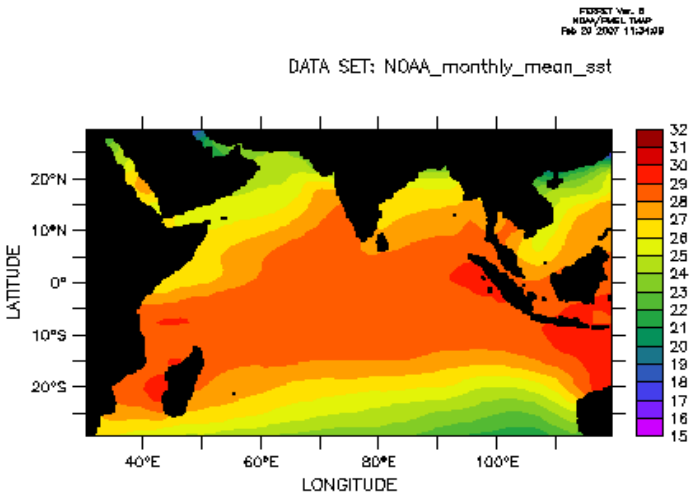
Monthly averaged surface currents for July



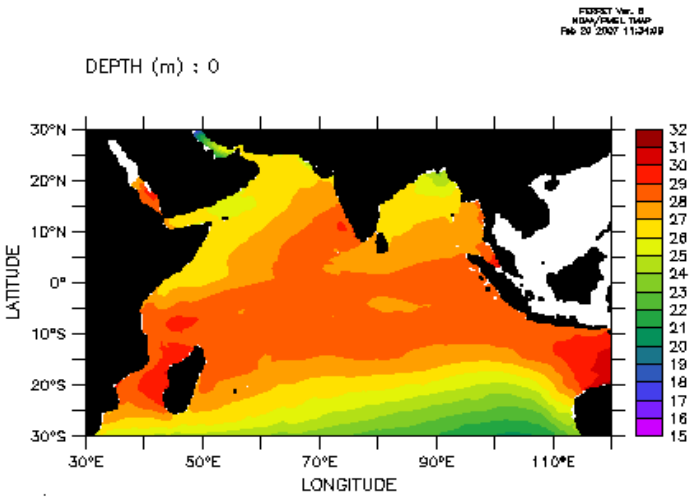
Monthly averaged surface currents for May



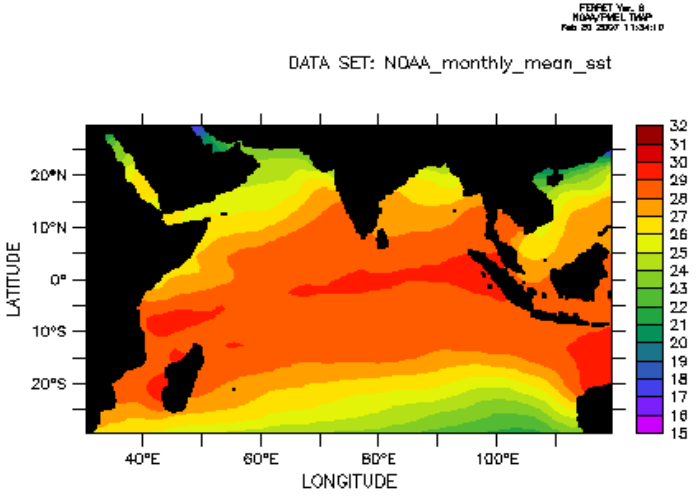
SST averaged over the Arabian Sea & Bay of Bengal



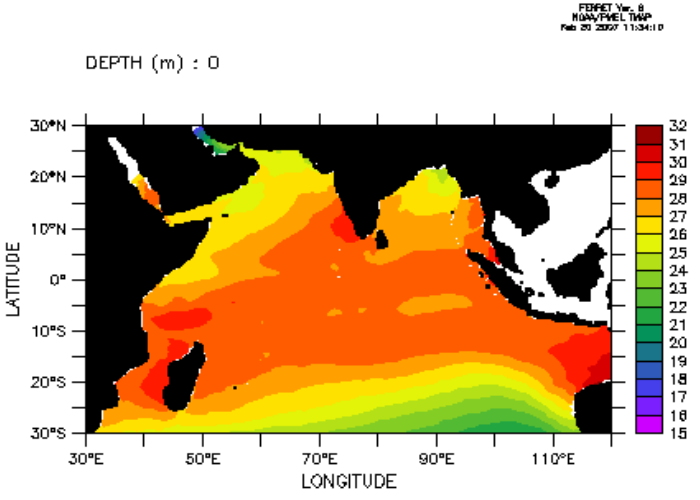
Avg_Jan_NOAA_SST



Avg_Jan_HYCOM_SST

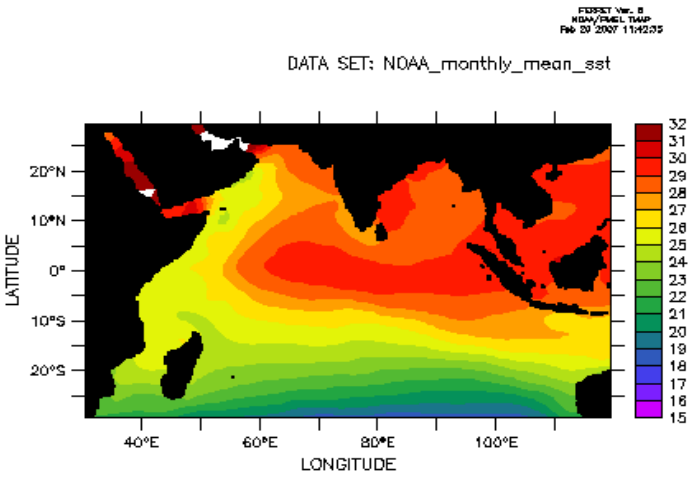


Avg_Feb_NOAA_SST

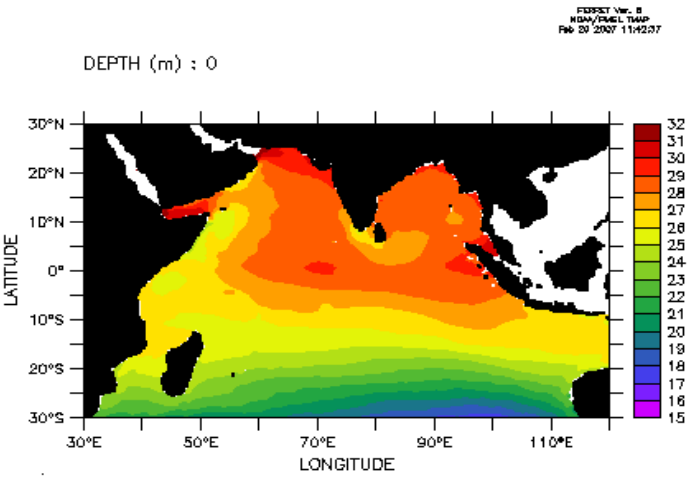


Avg_Feb_HYCOM_SST

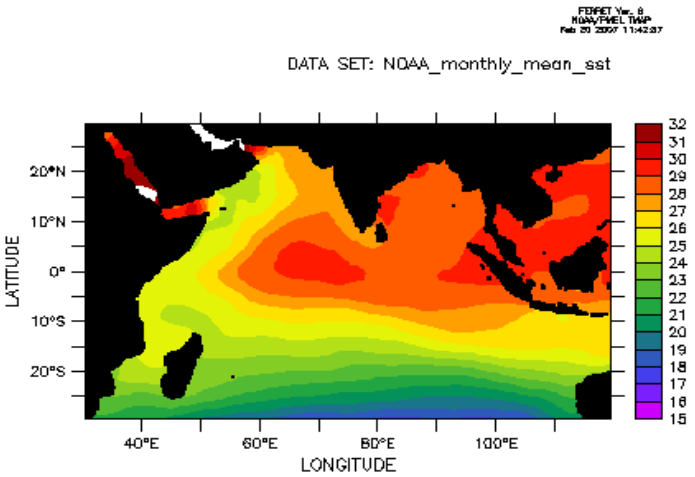
NOAA SST & HYCOM SST (1994-2001 averaged) for January & February



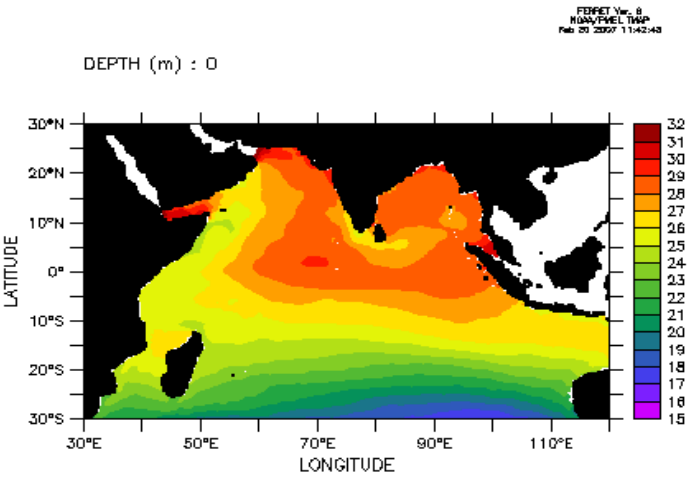
Avg_Jul_NOAA_SST



Avg_Jul_HYCOM_SST

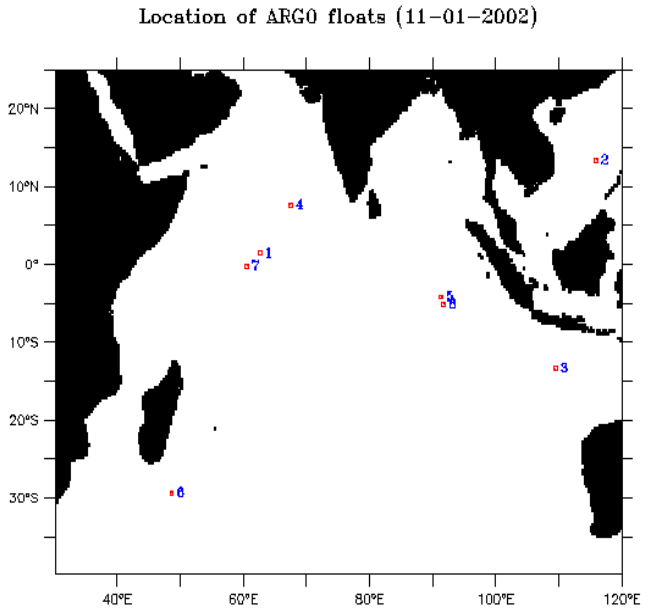


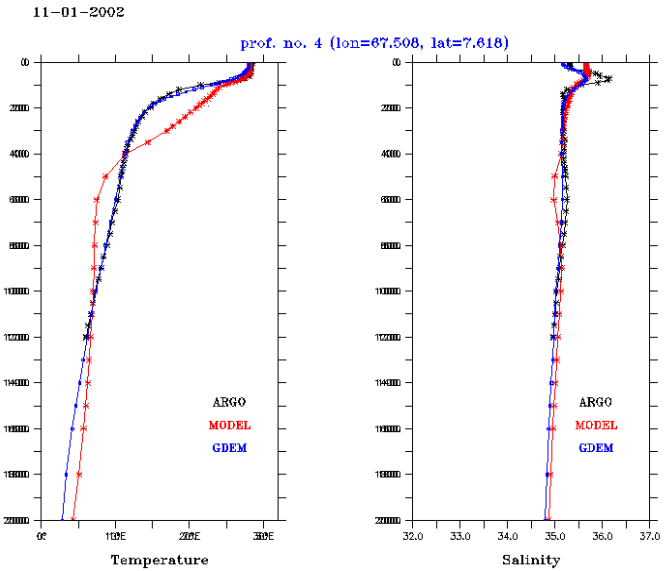
Avg_Aug_NOAA_SST

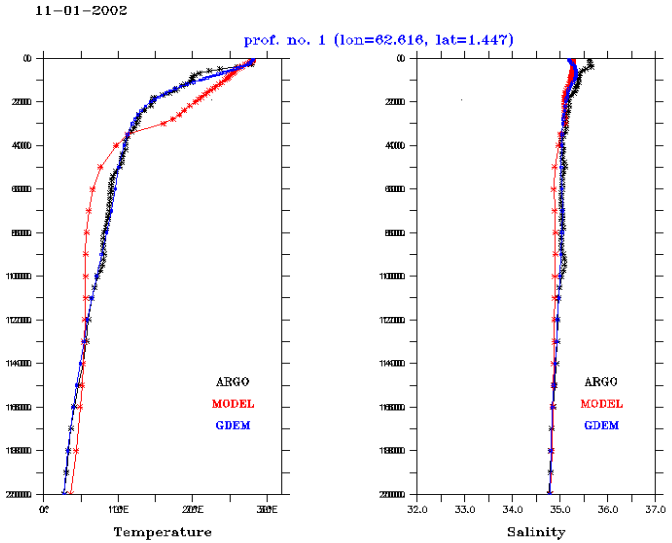


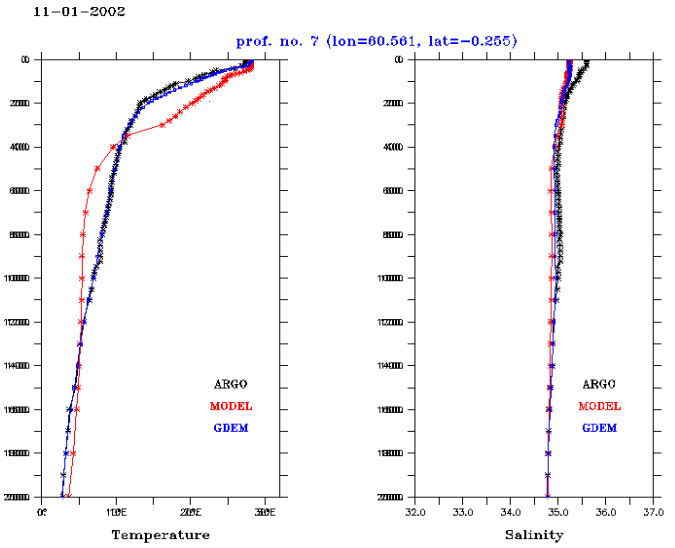
Avg_Aug_HYCOM_SST

NOAA SST & HYCOM SST (1994-2001 averaged) for July & August

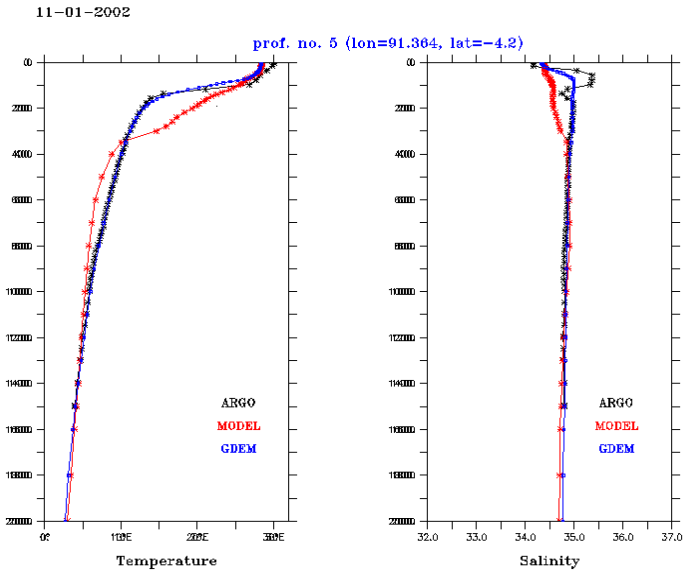


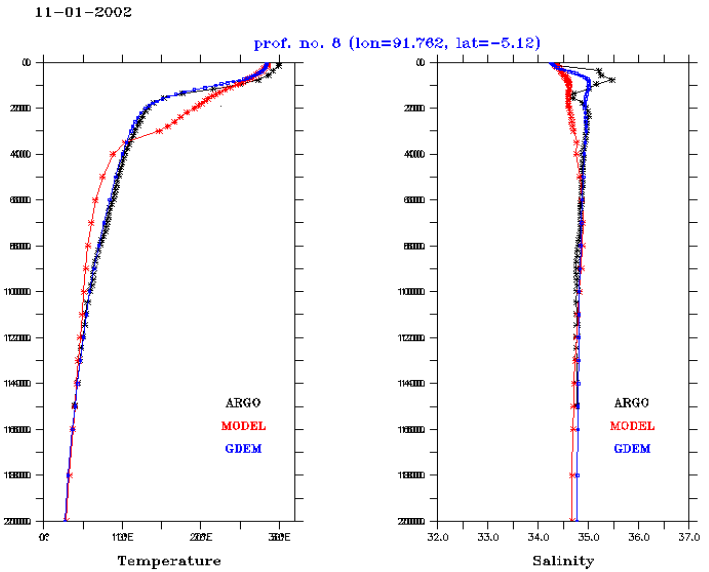


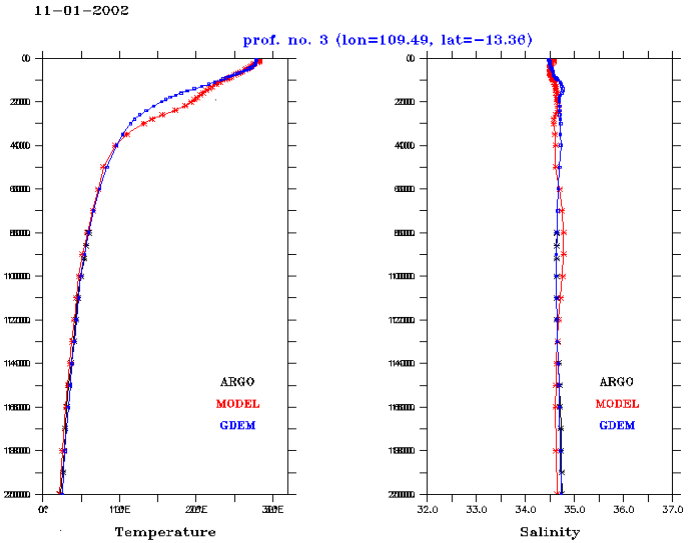


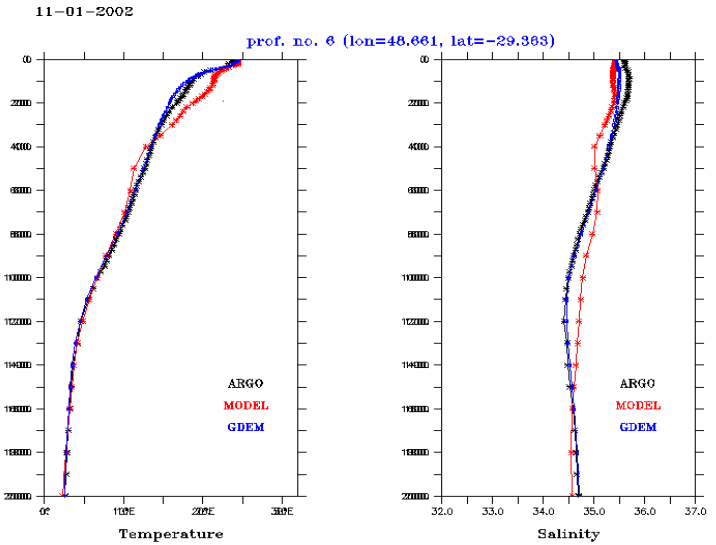


Comparisons with ARGO profiles (11-jan-2002)









Comparisons with ARGO profiles (11-jan-2002)

Validation Results so far...

- The model is able to simulate the major surface currents with their speeds comparable with that of observations, for both the monsoon periods as well as the transition periods.
- The model is able to simulate the major water masses for the selected regions.
- Comparisons with SST shows model SSTs is in good comparison with that of the satellite + in situ SSTs.
- Comparisons with ARGO float profiles & GDEM climatology shows that the model simulates too diffuse thermocline in the subsurface waters, specially in the northern parts.

In Future...

- Upgrade to latest version of HYCOM
- The validation scheme will further be improved and implemented. The validation will use the in situ data, cruise data and satellite derived data - mainly the data from the ARGO floats database.
- For further mesoscale studies a finer resolution nested model will be implemented for the northern part of the Indian Ocean.
- Assimilation with EnKF

Thank you