

The 1/12° global HYCOM real-time nowcast/forecast system

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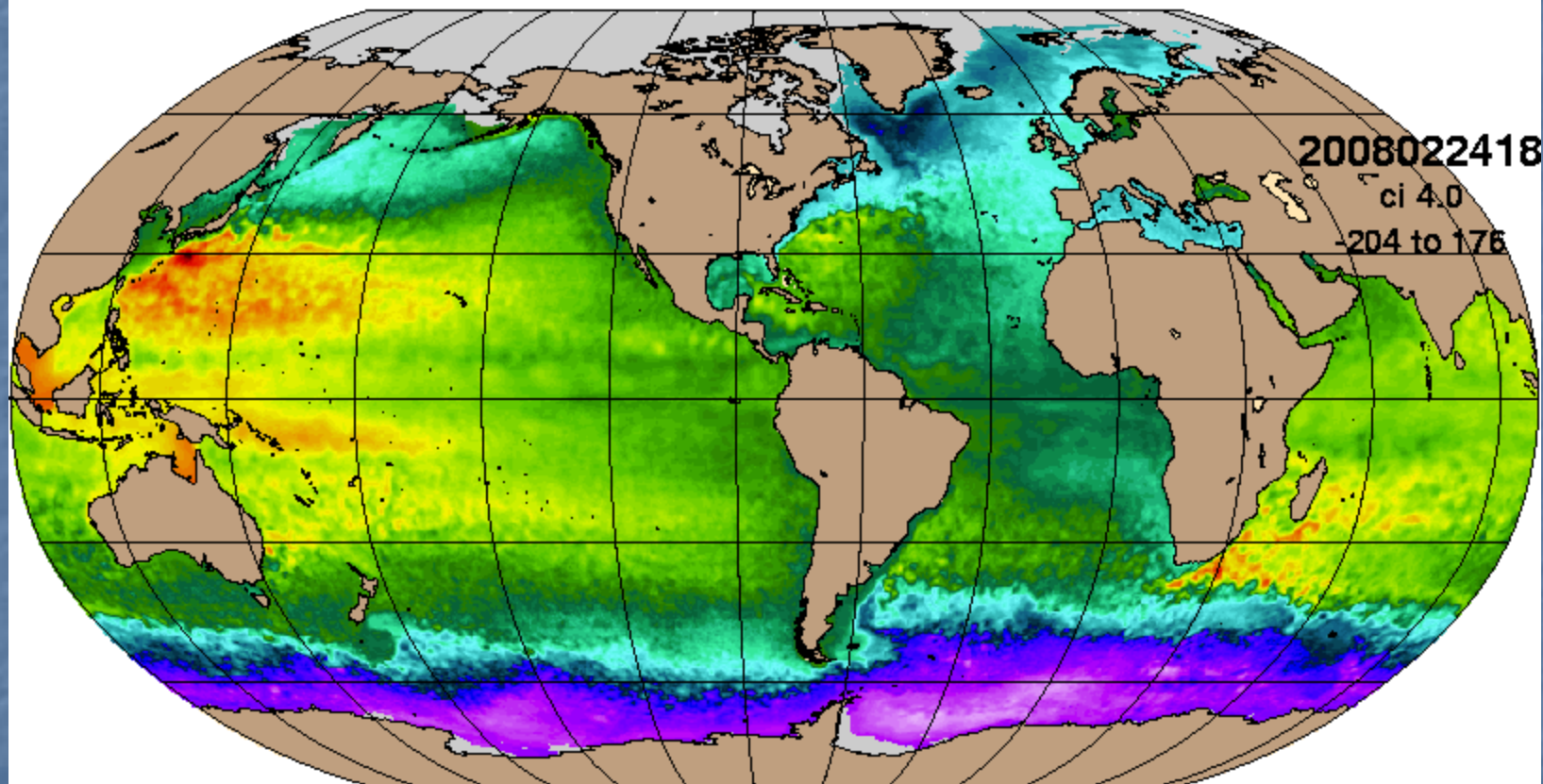
1/12° Global HYCOM Configuration

- Horizontal grid: 1/12° equatorial resolution
 - 4500 x 3298 grid points, ~6.5 km spacing on average, ~3.5 km at pole
- Mercator 79°S to 47°N, then Arctic dipole patch
- Vertical coordinate surfaces: 32 for σ_2^*
- KPP mixed layer model
- Thermodynamic (energy loan) sea-ice model
- Surface forcing: **FNMOG NOGAPS 0.5°** wind stress, wind speed, thermal forcing, and **NOGAPS 1.0°** precipitation
- Monthly river runoff (986 rivers)
- Initialize from January climatology (GDEM3) T and S, then SSS relaxation from PHC 3.0
 - No subsurface relaxation to climatology

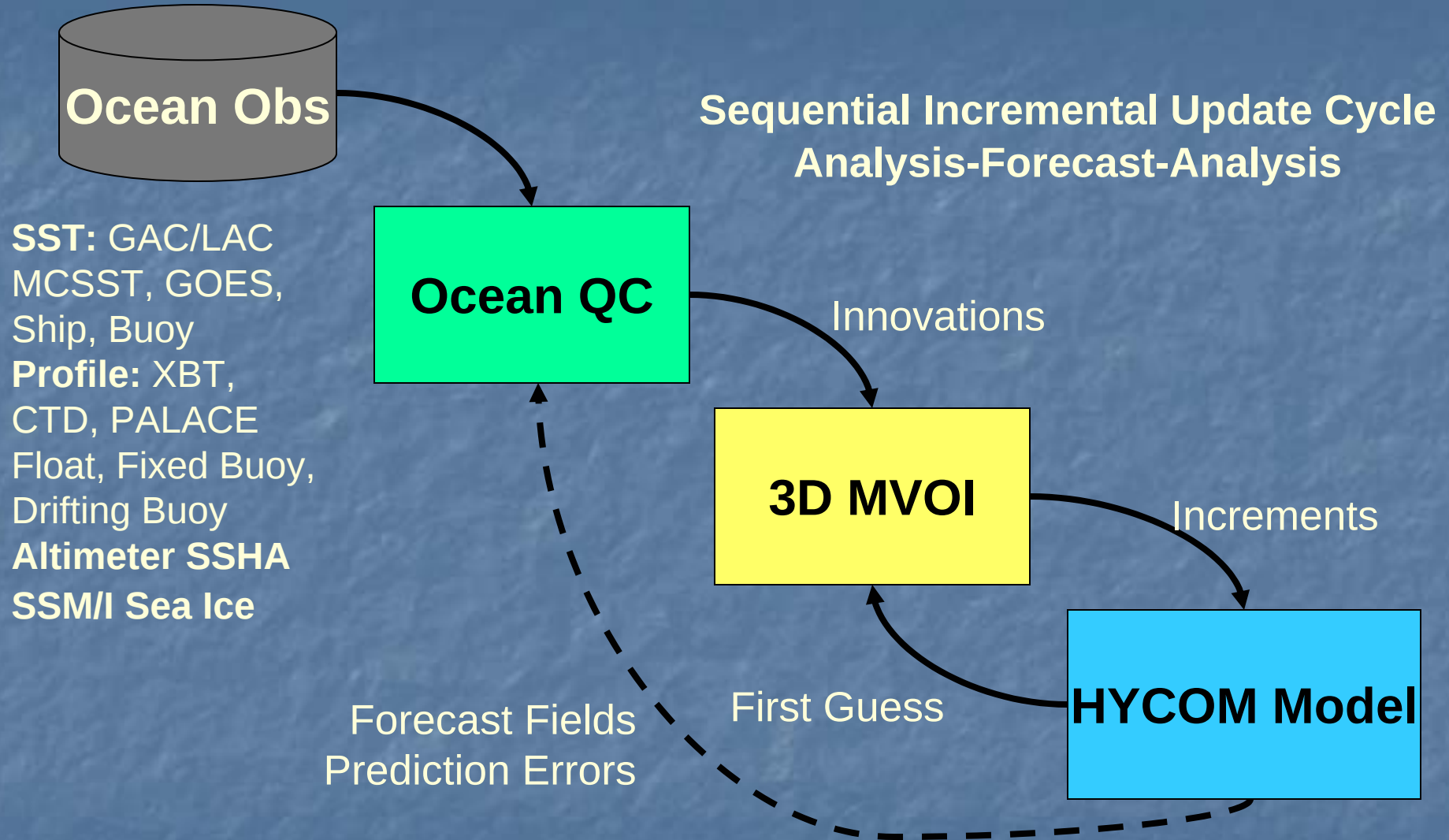
1/12° Global HYCOM

Real time run started 22 December 2006

SSH date: Feb 20, 2008 90.4



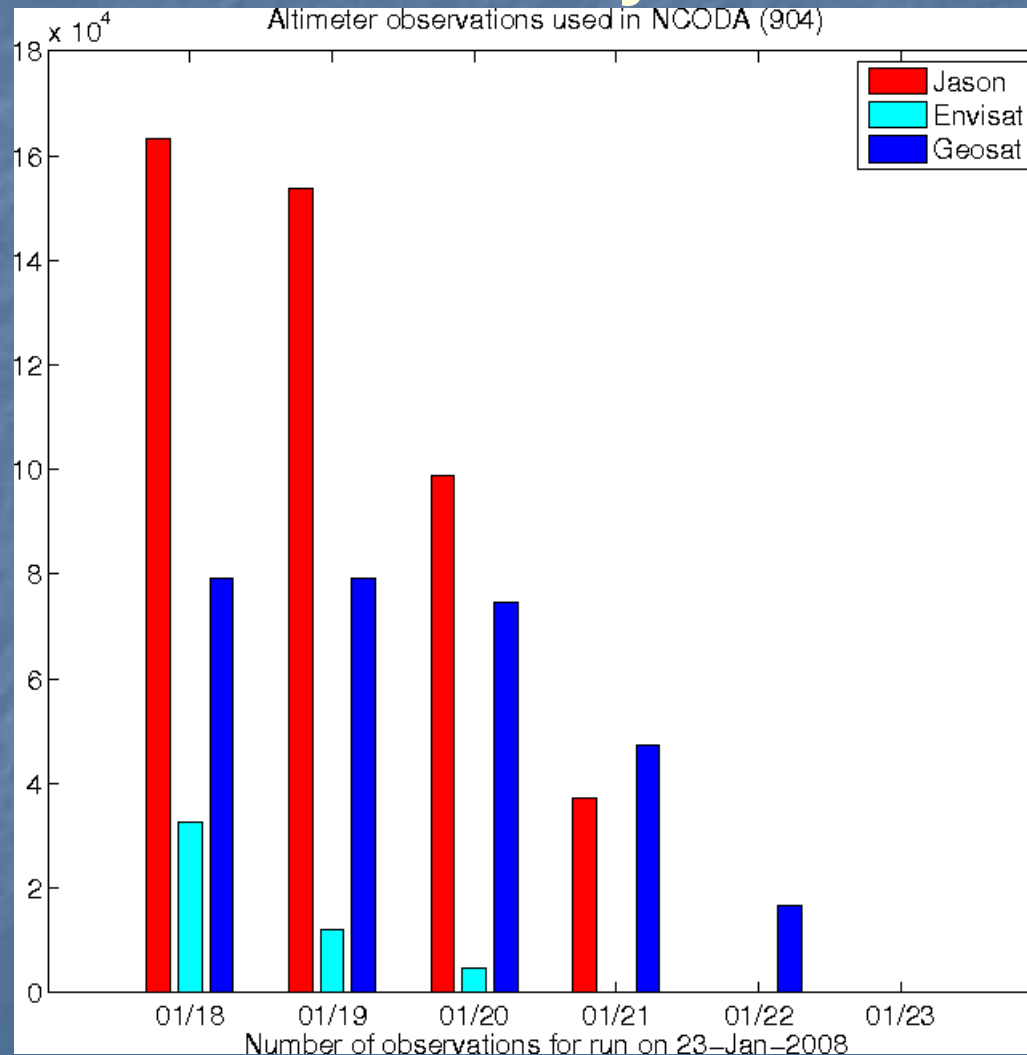
Navy Coupled Ocean Data Assimilation (NCODA)



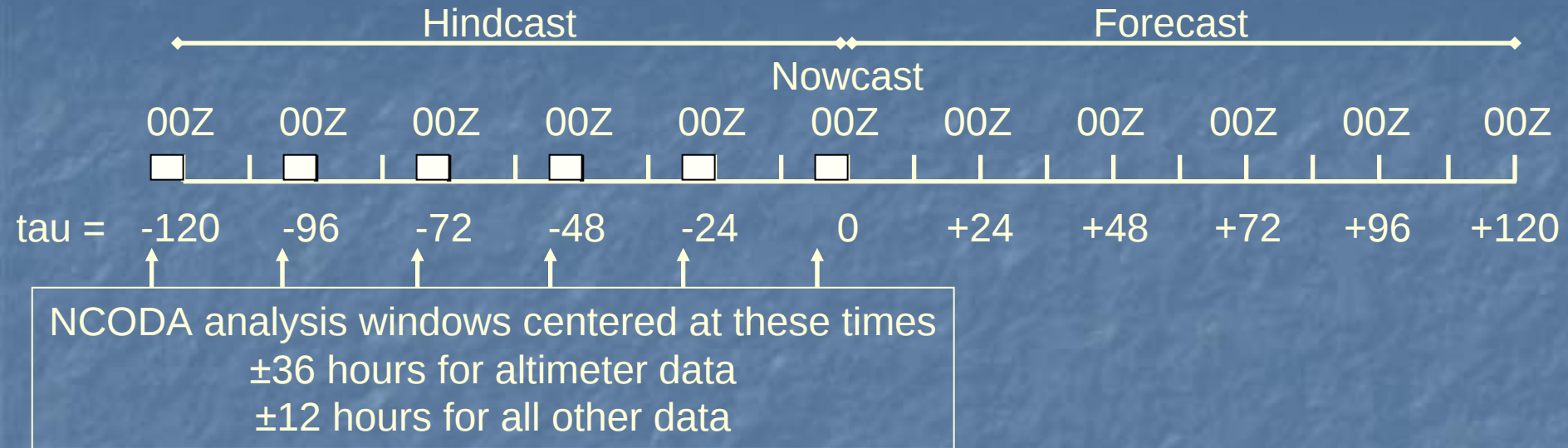
MVOI - simultaneous analysis 6 ocean variables temperature, salinity, geopotential, layer pressure, velocity (u,v)

Available altimeter data

23 January 2008



HYCOM/NCODA Runstream



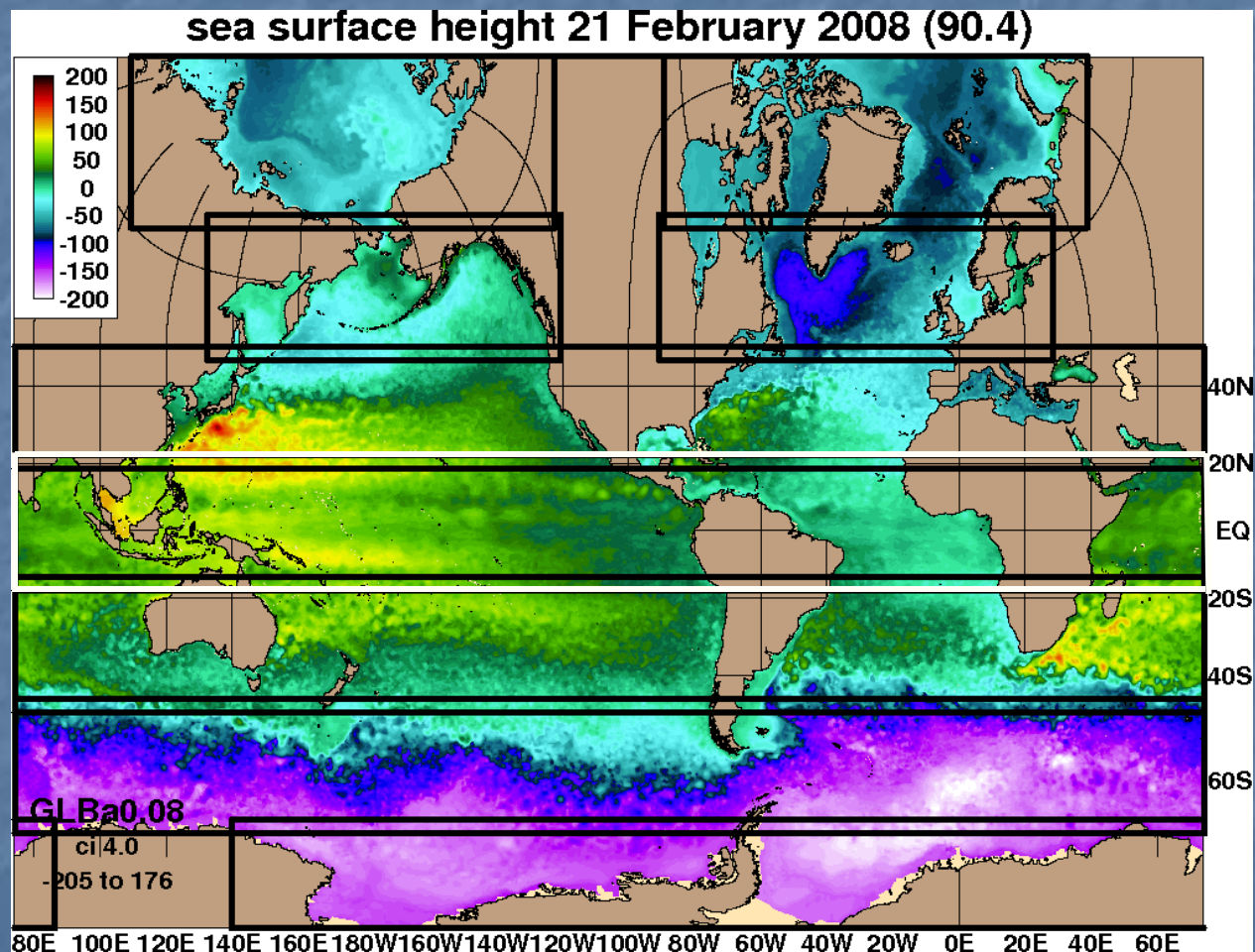
- 1) Perform first NCODA analysis centered on tau = -126
- 2) Run HYCOM for 24 hours using incremental updating (■) over the first 6 hrs
- 3) Repeat steps 1) and 2) until the nowcast time
- 4) Run HYCOM in forecast mode out to tau = 120

Approximate run times* (using 379 IBM Power 5+ processors):

- 1) Six NCODA analyses: 1.1 hrs/analysis = 6.6 hrs
- 2) Five HYCOM hindcast days @ 240 sec Δt : 0.8 hrs/day = 4.0 hrs
- 3) Five HYCOM forecast days @ 240 sec Δt : 0.8 hrs/day = 4.0 hrs
- 4) Total: 14.6 hrs

* Timings do not include PIPS coupling

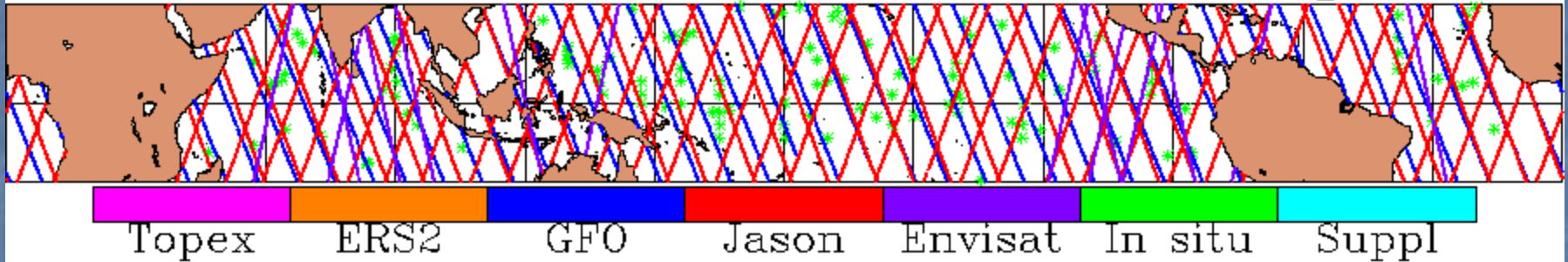
Data Assimilation Subregions Overlaid on SSH valid on 21 February 2008



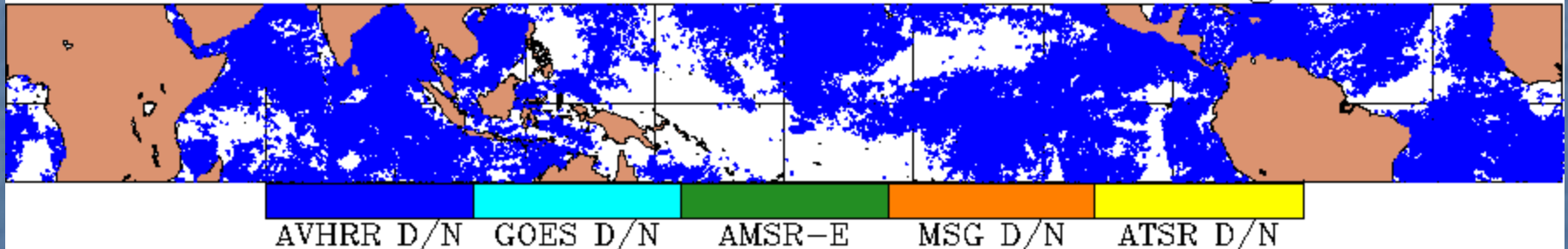
NCODA Observation Locations

19 January 2008

SSH Observations 19 Jan 08 18Z 9 km grid

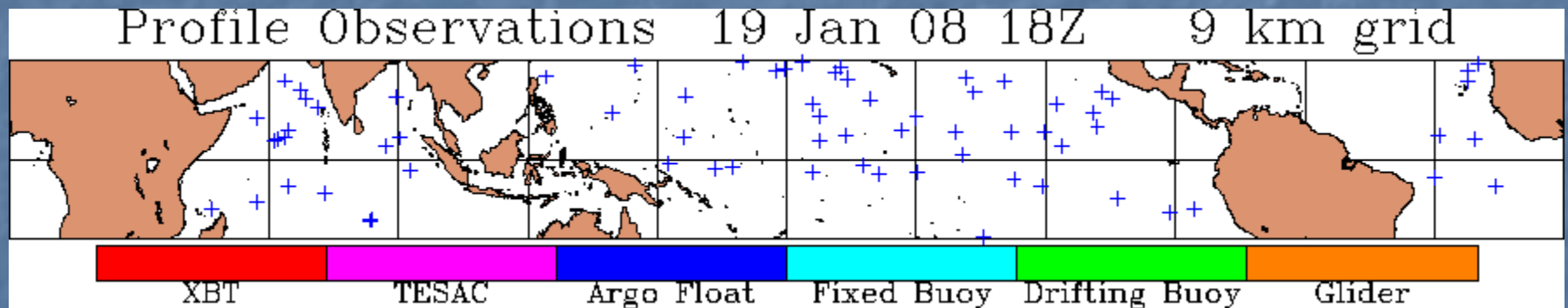
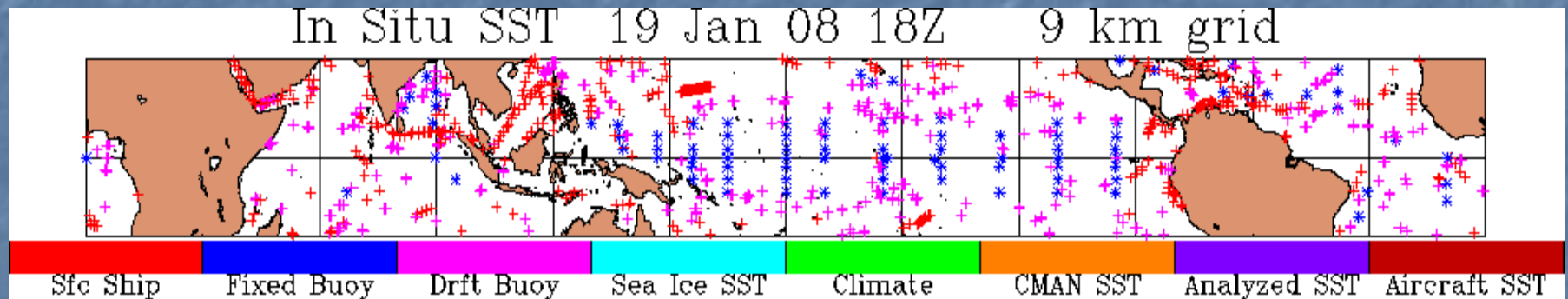


Satellite SST 19 Jan 08 18Z 9 km grid



NCODA Observation Locations

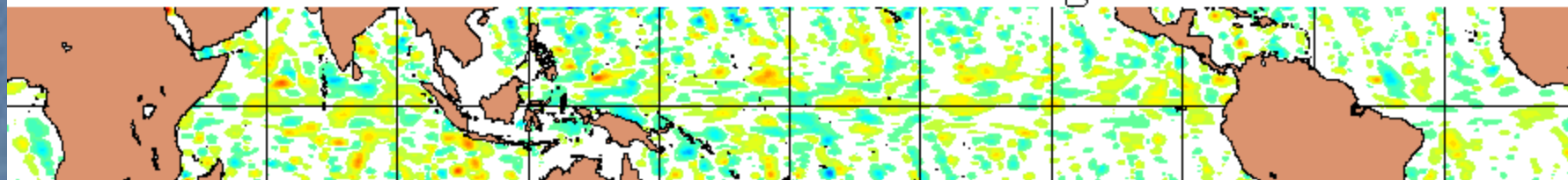
19 January 2008



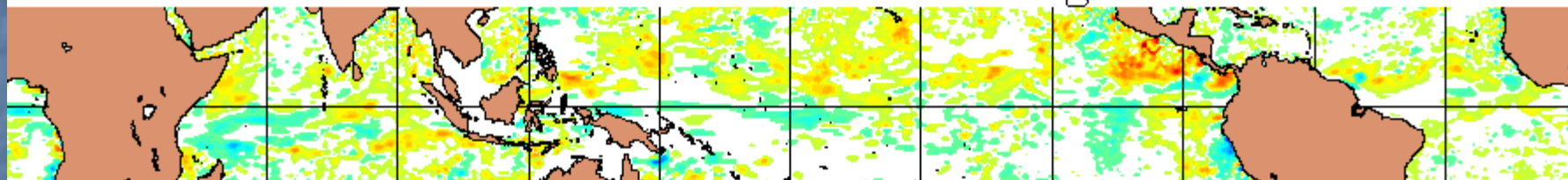
Sea Surface Height and Sea Surface Temperature Increments

19 January 2008

SSH Analyzed Increment (M)
19 Jan 08 18Z 9 km grid



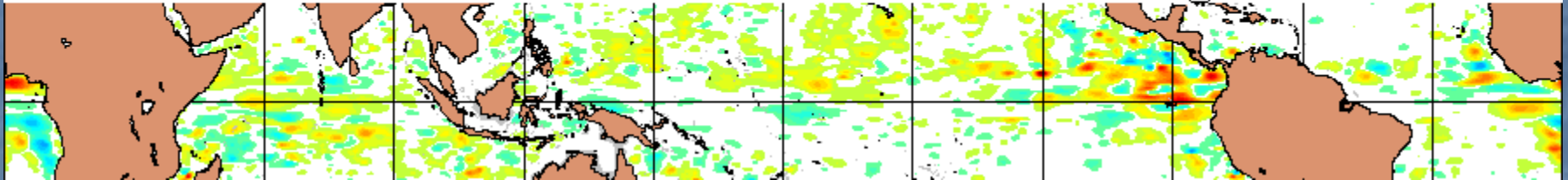
SST Analyzed Increment (C)
19 Jan 08 18Z 9 km grid



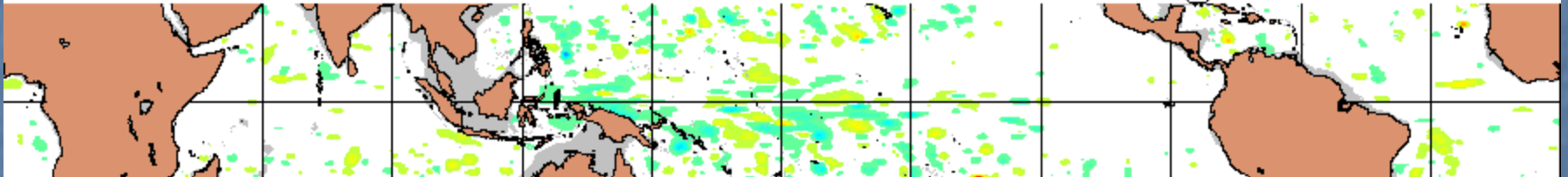
Temperature Increments

19 January 2008

Temperature Analyzed Increment (C) 36 M Depth
19 Jan 08 18Z Tau 000 9 km grid

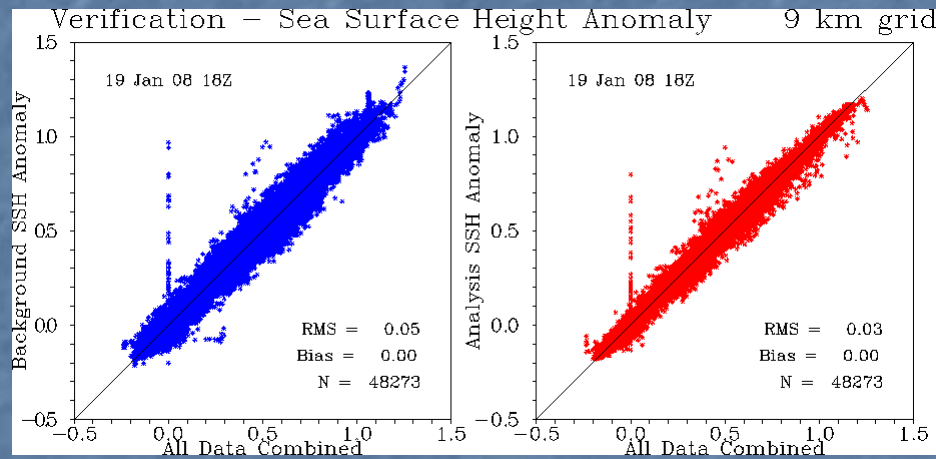


Temperature Analyzed Increment (C) 300 M Depth
19 Jan 08 18Z Tau 000 9 km grid

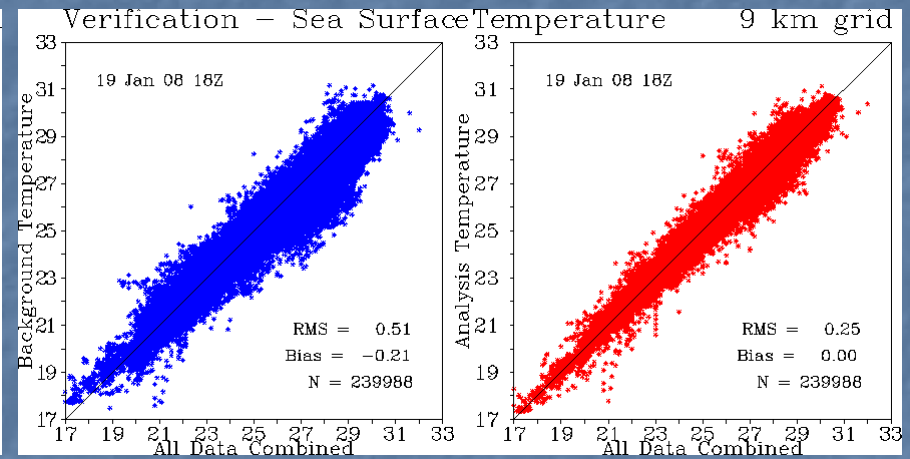


NCODA verification

SSH verification



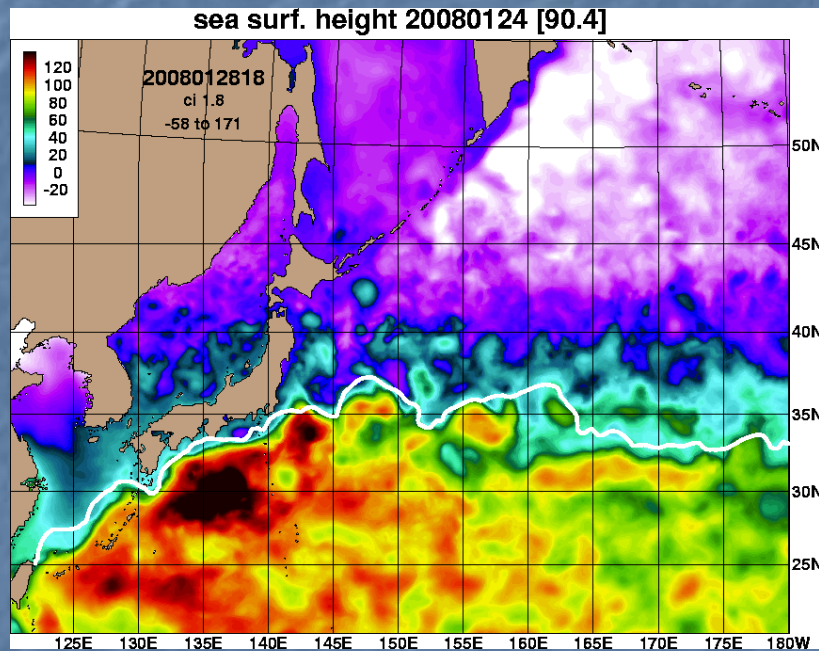
SST verification



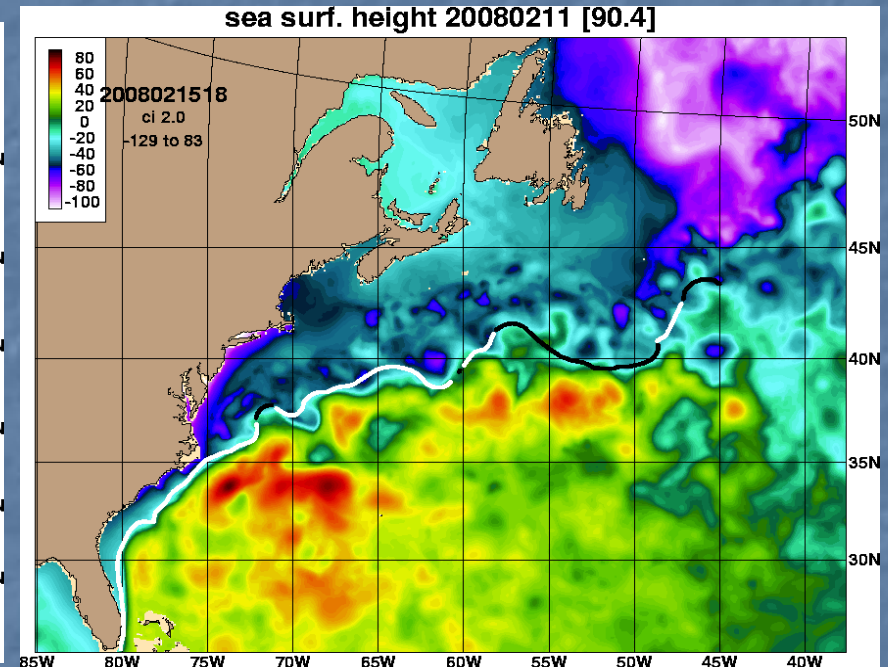
Data Assimilation in Global HYCOM

Gulf Stream and Kuroshio SSH with SST-based frontal analysis overlaid

24 January 2008



2 February 2008

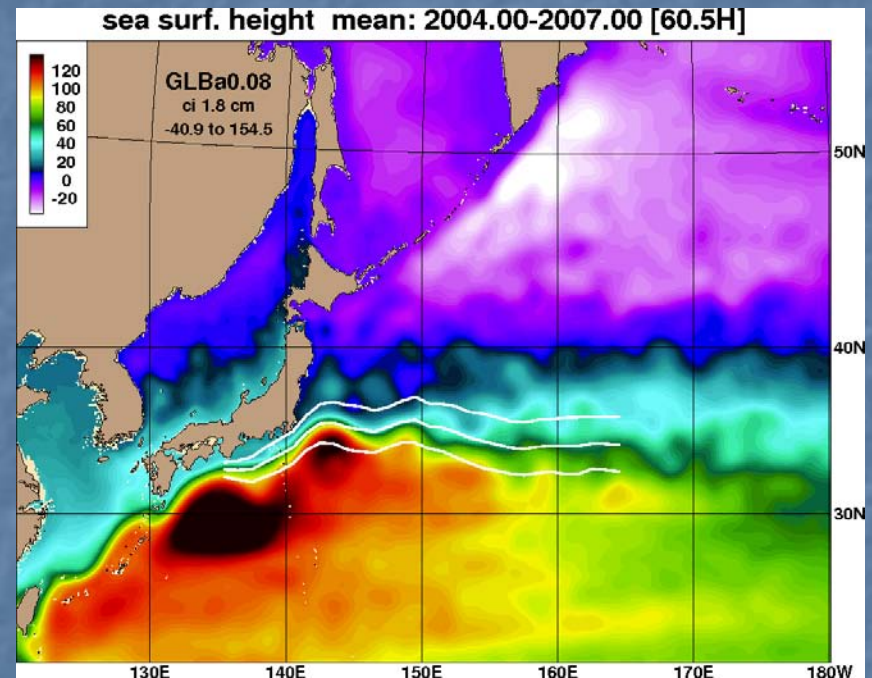
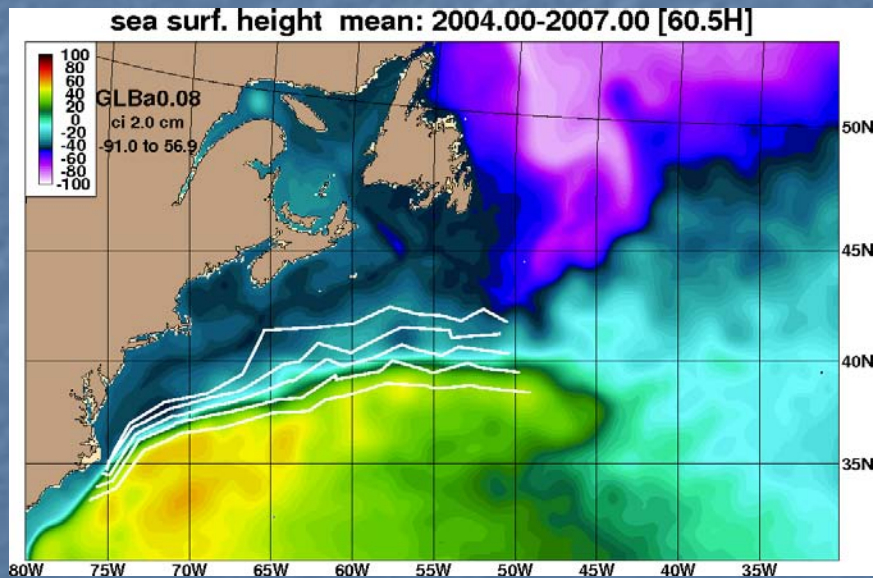


Frontal analysis < 4 days old = white,
analysis $\geq$ 4 days old = black

1/12° Global HYCOM

2004-2006 Mean SSH

Gulf Stream and Kuroshio region

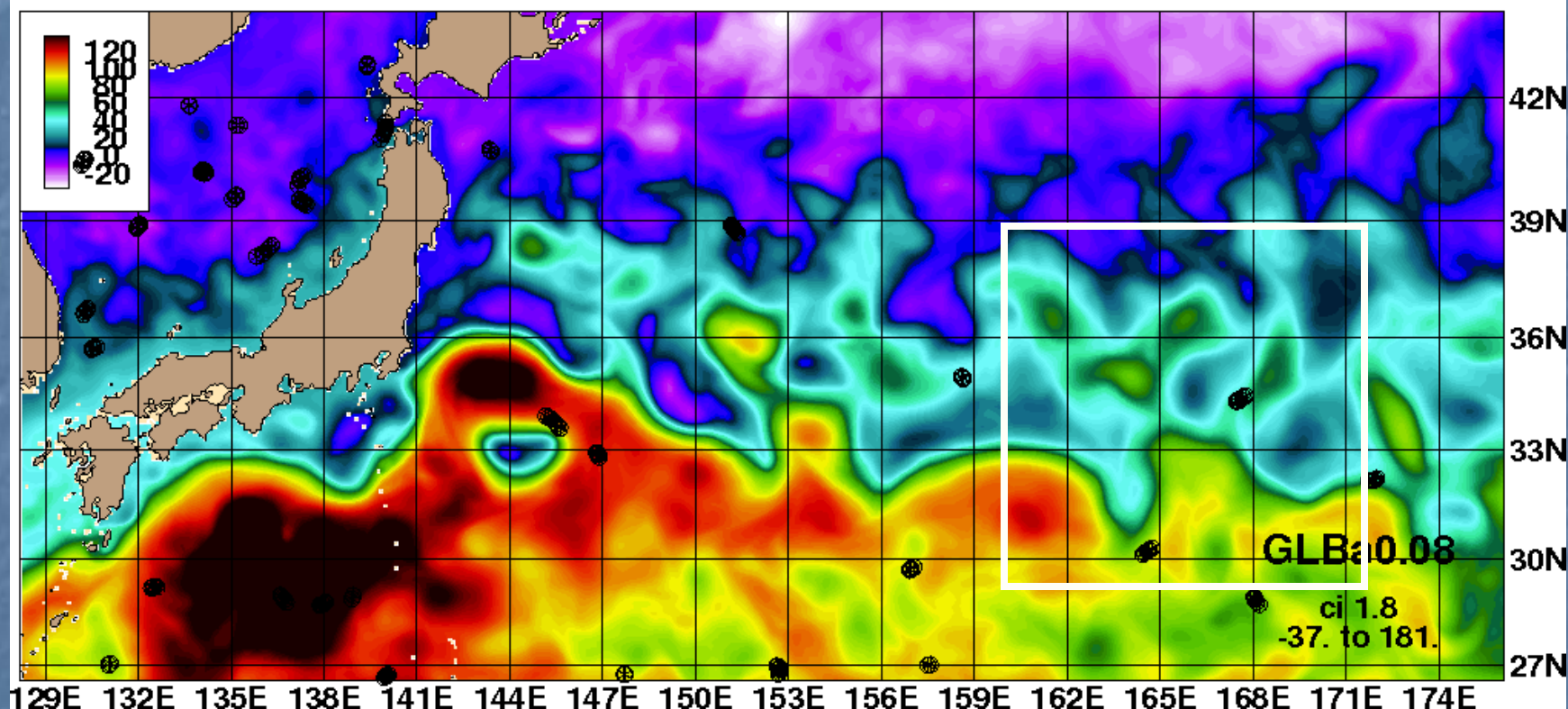


White lines are the mean position and ± 1 stdv

1/12° Global HYCOM

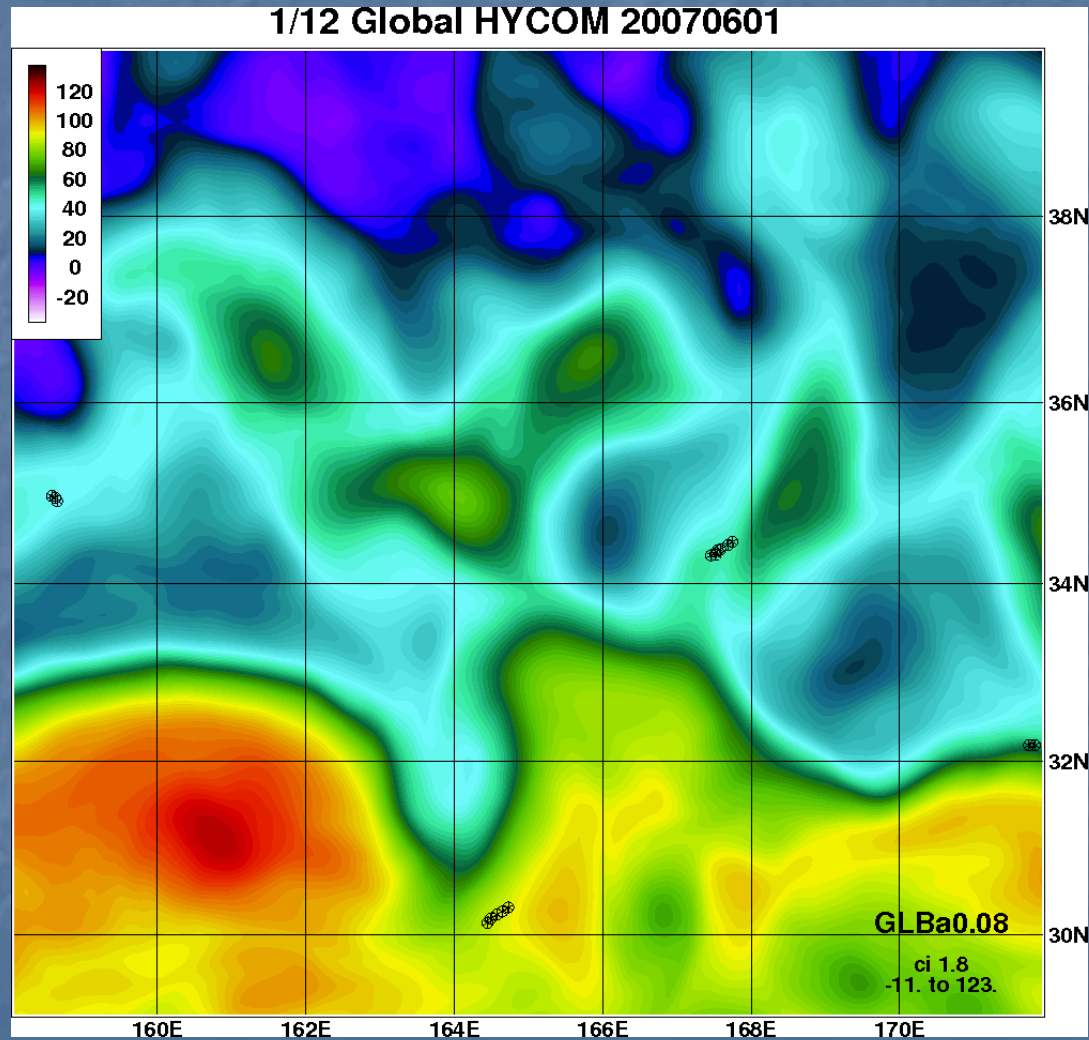
SSH and surface drifters

1/12 Global HYCOM 20070601



1/12° Global HYCOM

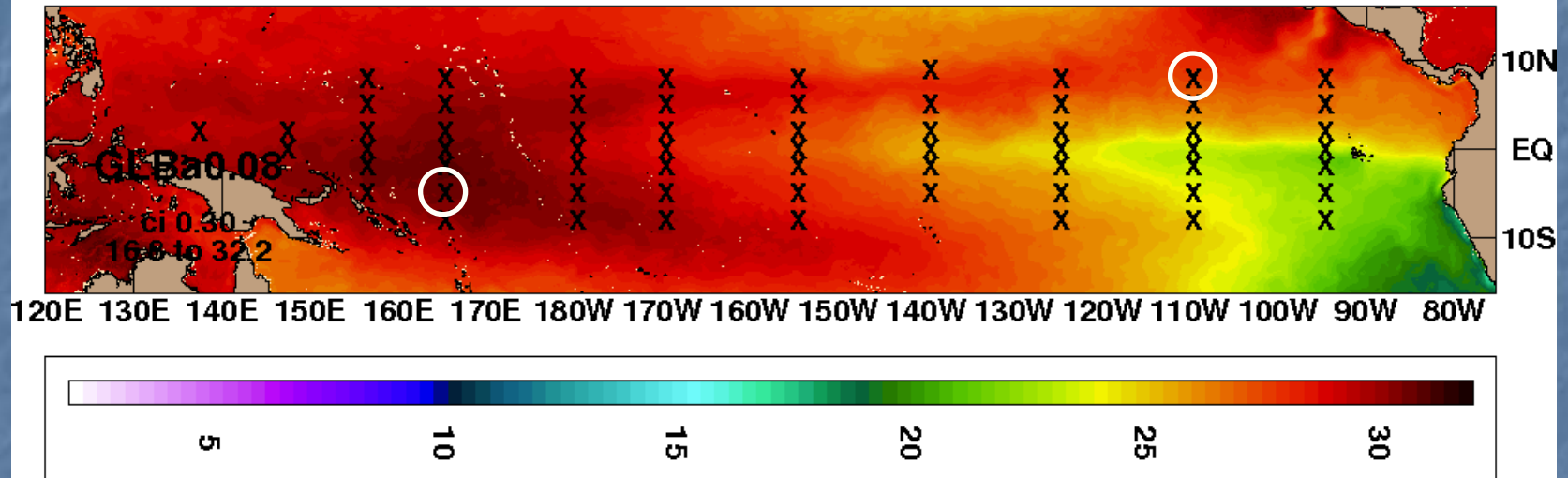
SSH and surface drifters



Vertical Temperature Profiles

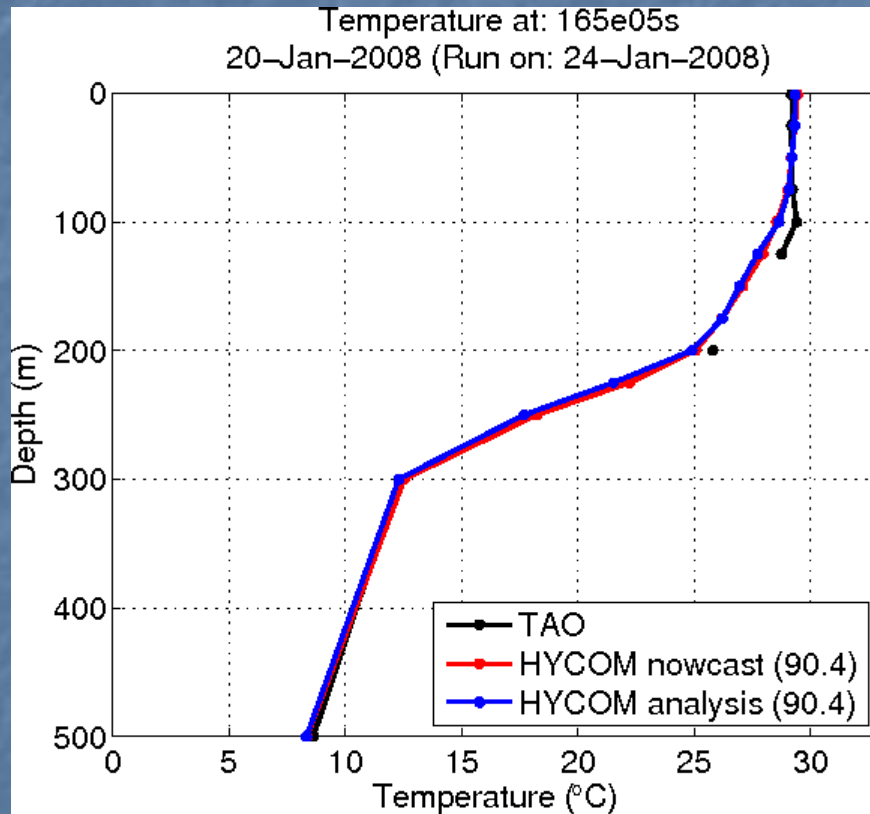
Locations of TAO buoys

Mean sea surface temperature January 2004 (60.5)



Vertical temperature profiles

5°S 165°E



8°N 110°W

