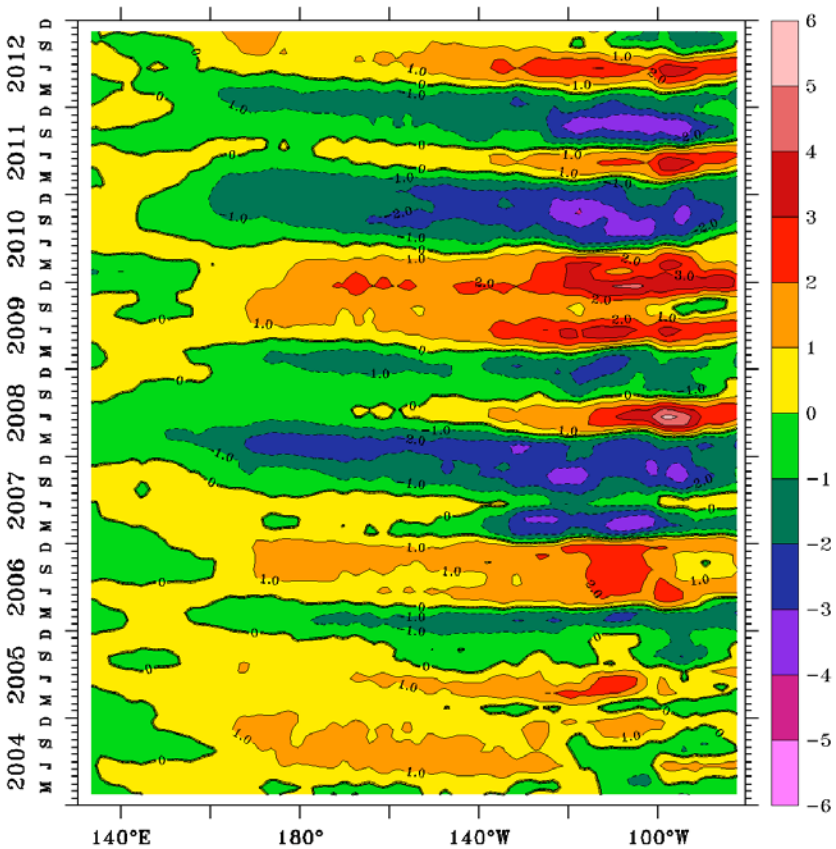
Should Argo resolution be improved in the equatorial oceans?

Observation of the zonal structure and propagation of equatorial intra-seasonal to interannual anomalies are important for understanding and prediction of tropical variability (e.g. ENSO).

Equatorial moorings have poor vertical resolution (e.g. 11 T-sensors from 0-500 m in eastern Pacific, aimed at SST and $Z_{thermocline}$).

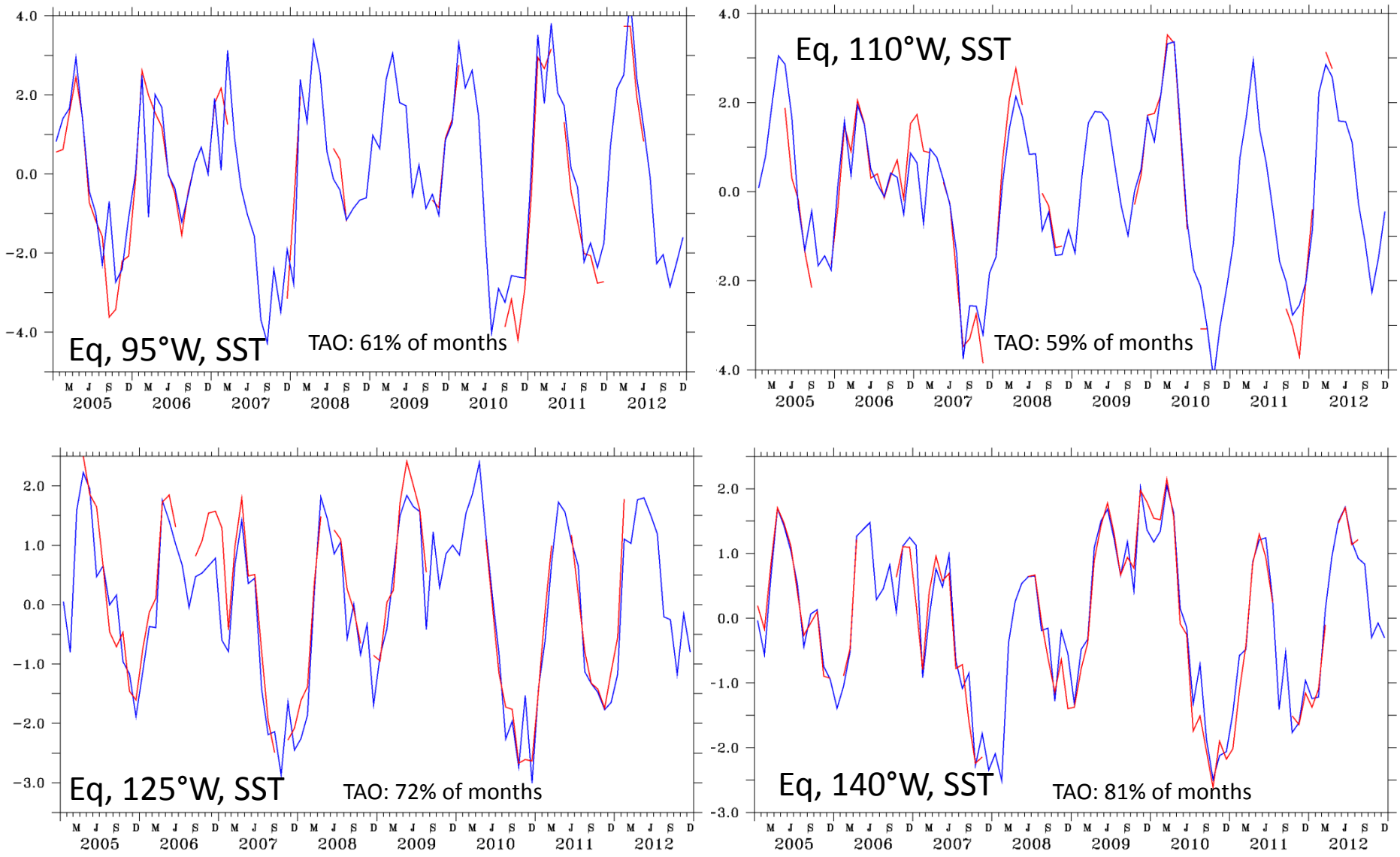
Argo cannot react quickly when problems occur in the moored arrays (e.g. 2012); therefore Argo should maintain *good* resolution in the equatorial waveguide.

Ekman divergence is nearly eliminated in Argo floats with Iridium and short surface times, so floats remain near the equator.



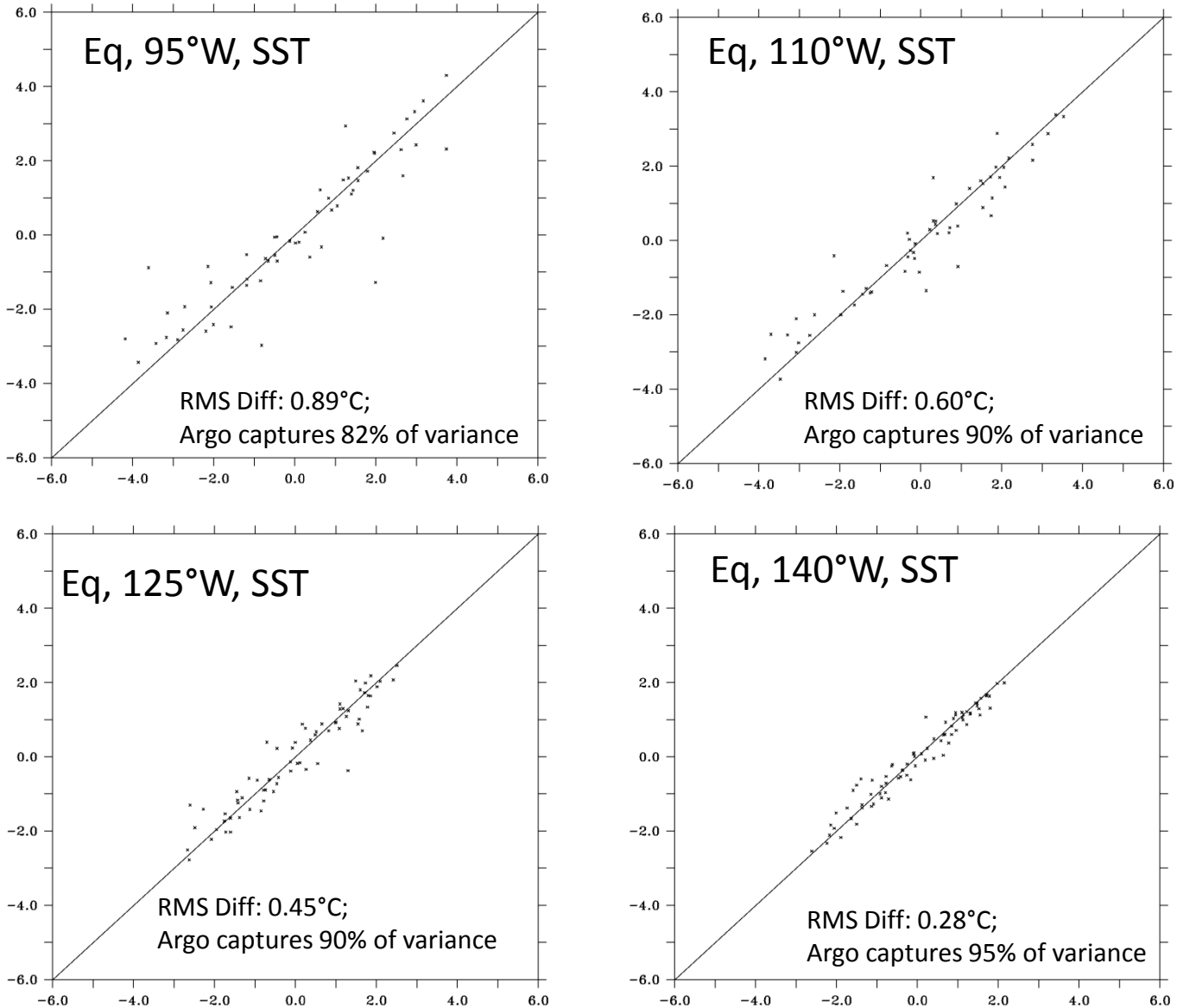
Temperature anomaly at 100 m on the equator (Argo)

Of 5 eastern Pacific equatorial TAO moorings (95W, 110W, 125W, 140W, 155W), only 140W has returned any data since June 2012, and it is missing 50-100m temperature.

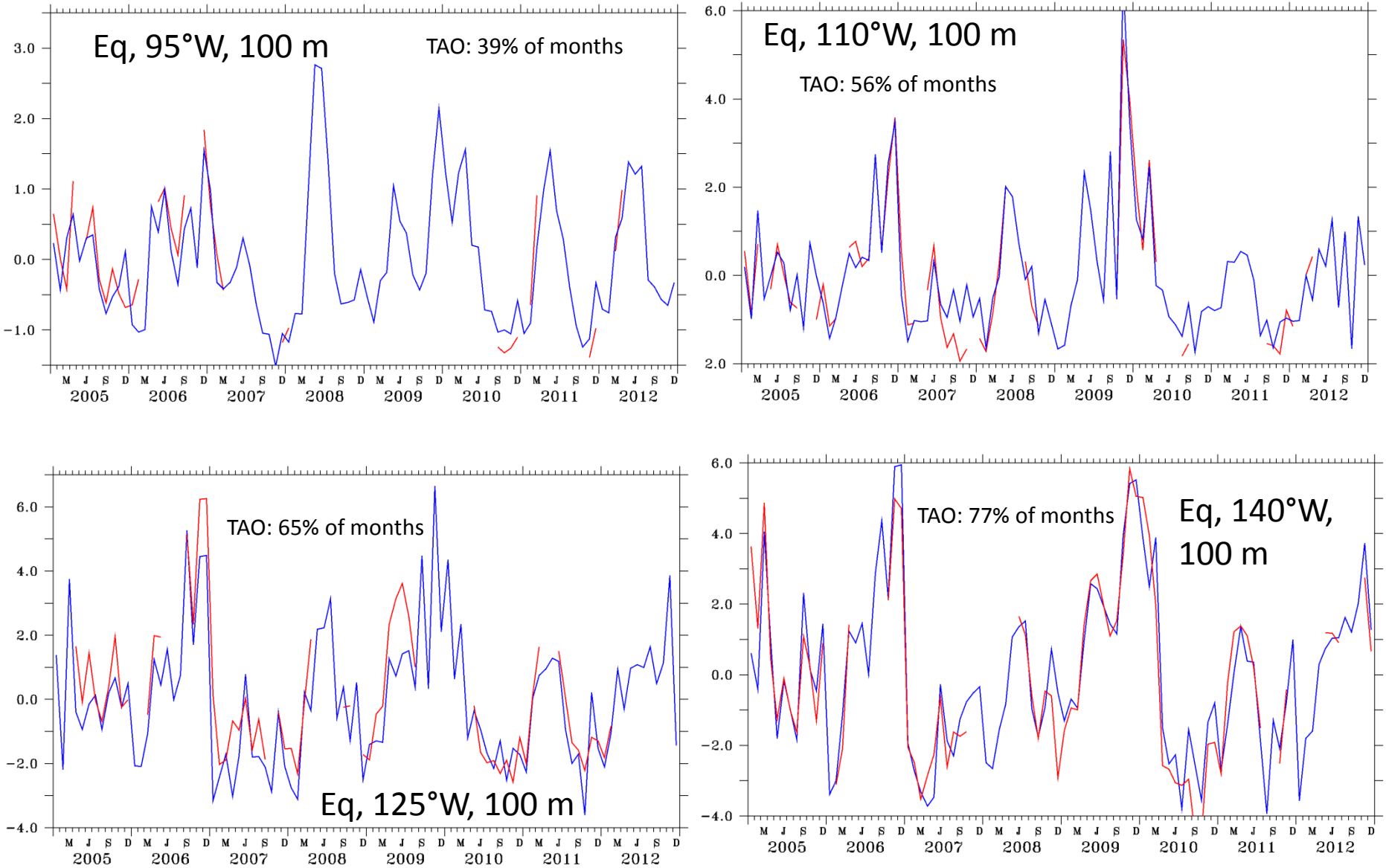


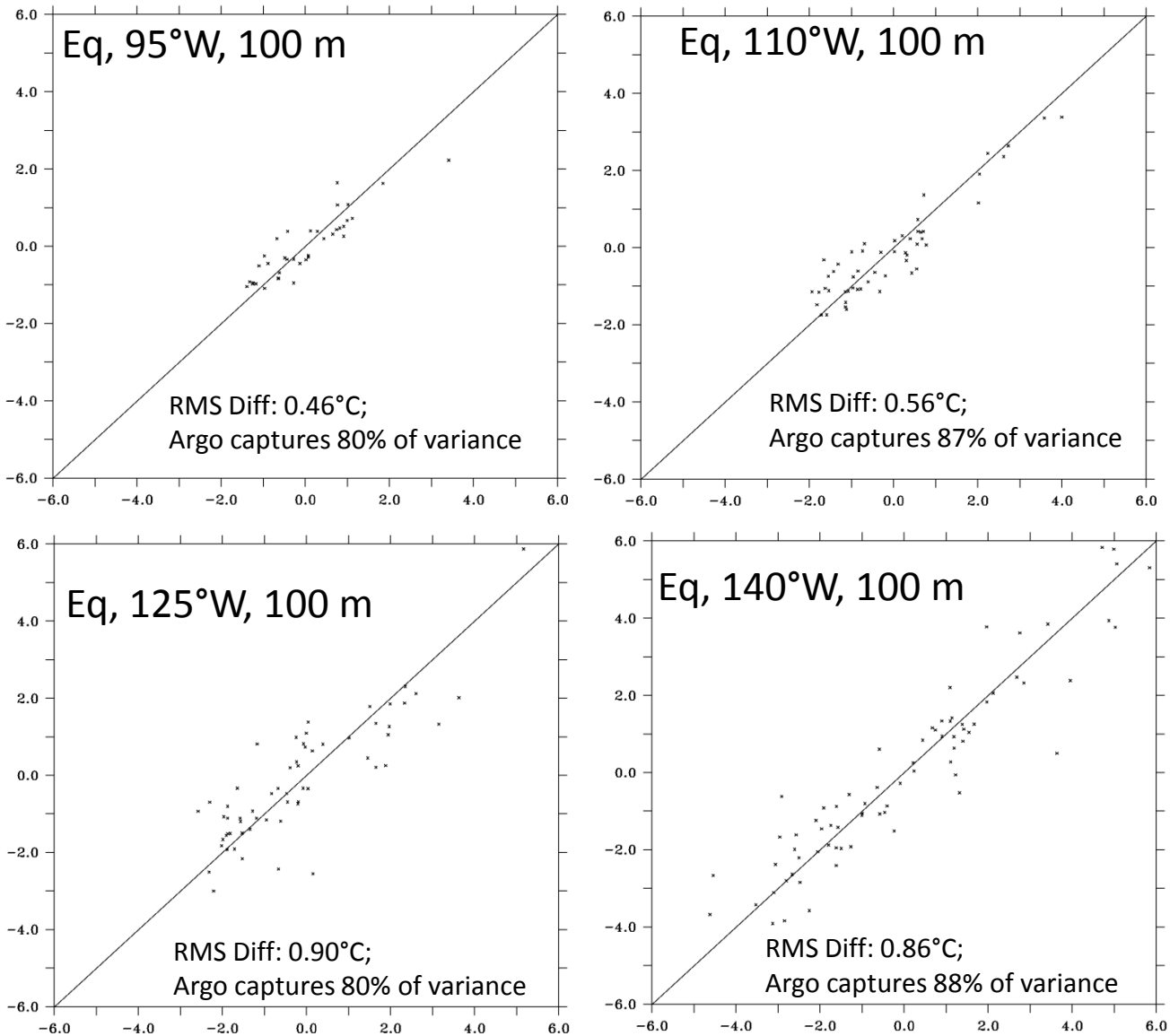
Red: Monthly mean SST anomaly from TAO, 2005-2012 mean removed

Blue: Monthly mean SST anomaly from Argo (SIO grid file, 2005-2012 mean removed)



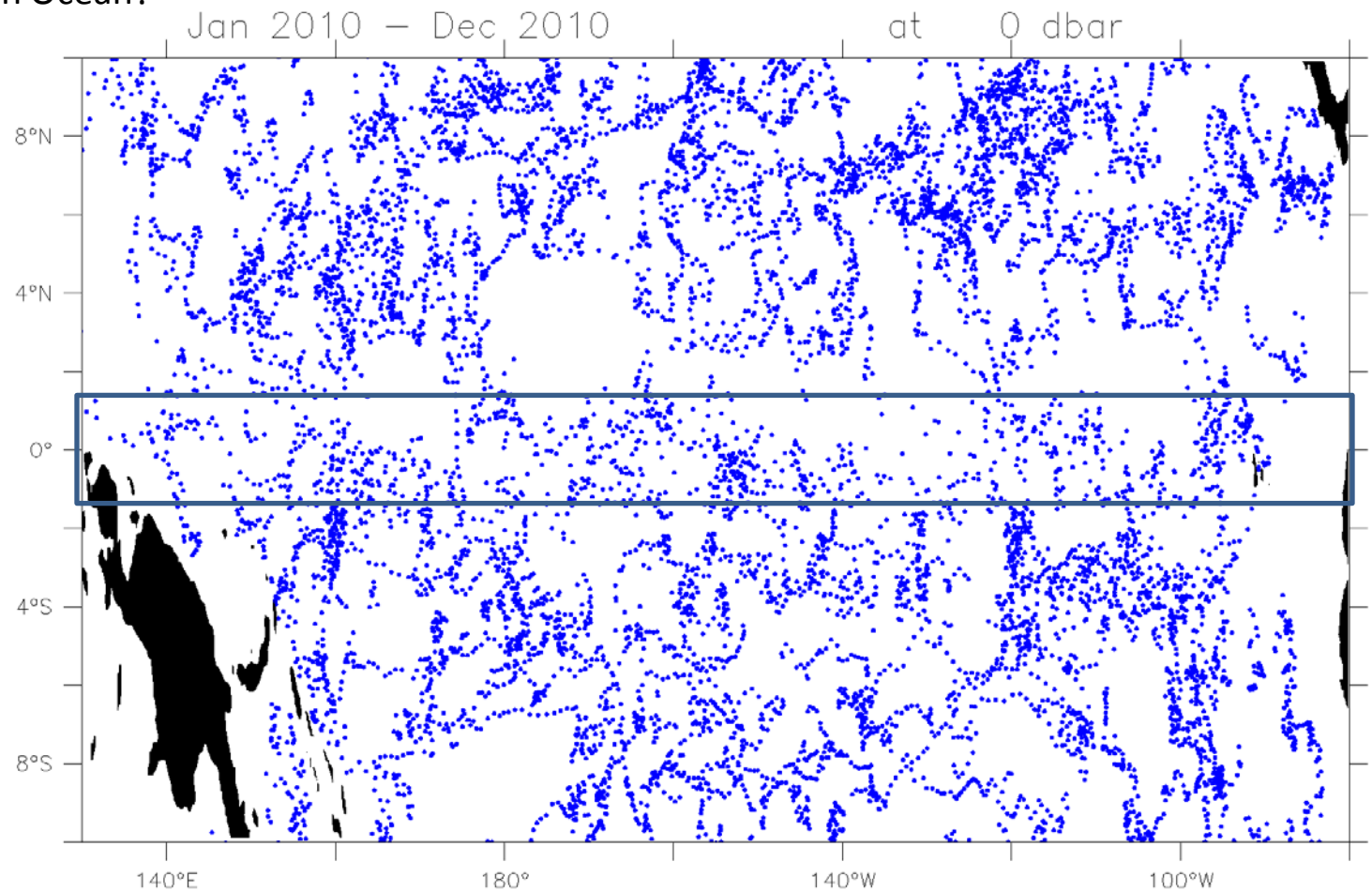
X-Axis: TAO monthly anomaly ; Y-Axis Argo monthly anomaly


Eq, 95°W, 100 m
TAO: 39% of months
Eq, 110°W, 100 m
TAO: 56% of months
TAO: 65% of months
Eq, 125°W, 100 m
TAO: 77% of months
Eq, 140°W, 100 m
M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D M J S D
2005 2006 2007 2008 2009 2010 2011 2012


Eq, 95°W, 100 m
RMS Diff: 0.46°C;
Argo captures 80% of variance
Eq, 110°W, 100 m
RMS Diff: 0.56°C;
Argo captures 87% of variance
Eq, 125°W, 100 m
RMS Diff: 0.90°C;
Argo captures 80% of variance
Eq, 140°W, 100 m
RMS Diff: 0.86°C;
Argo captures 88% of variance
6.0
4.0
2.0
0.0
−2.0
−4.0
−6.0

At present there are 45 active floats between 1.5S – 1.5N, 130E - 280E (90% of Argo design)

Proposal: Increase the number of floats to 100 (2 x Argo). Use long-life (300 cycle) floats and decrease the cycle time to 7 days. (5200 cycles per year instead of 1825 cycles per year). This should be coordinated with the equatorial mooring programs (e.g. via JCOMMOPS Observations Coordination Group.)

Same in the Indian Ocean?

Argo 2010 profiles 10S to 10N