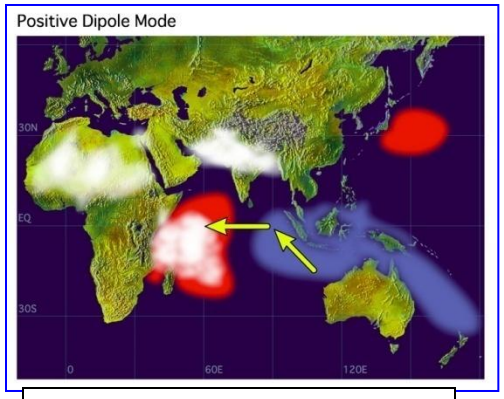
Report from IOP

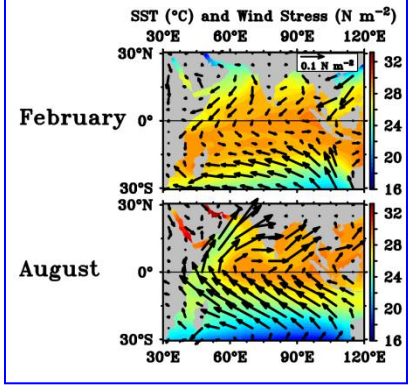
Weidong Yu and M. Ravichandran
(Co-Chairs, IOP)
&
Members, IOP

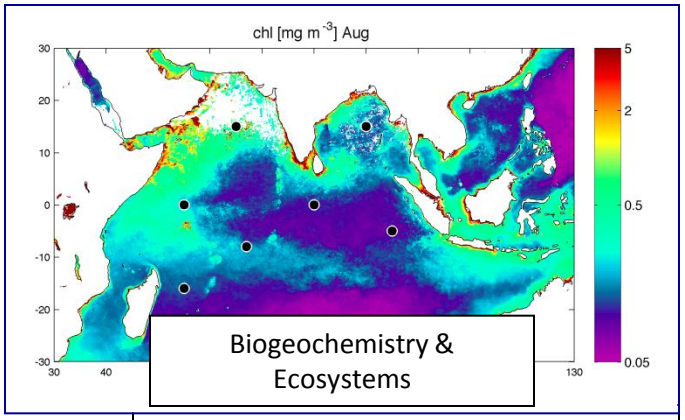
Interacting Variations in Time and Space



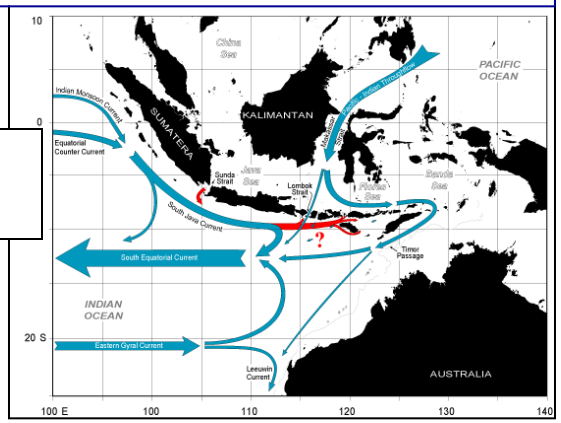
Indian Ocean Dipole

Monsoons

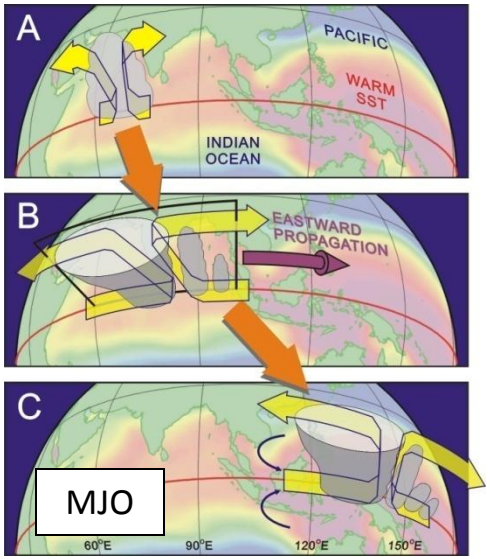




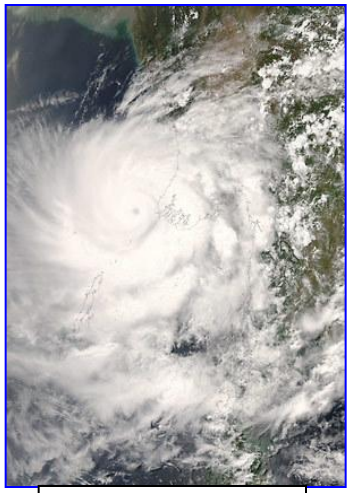
Biogeochemistry & Ecosystems



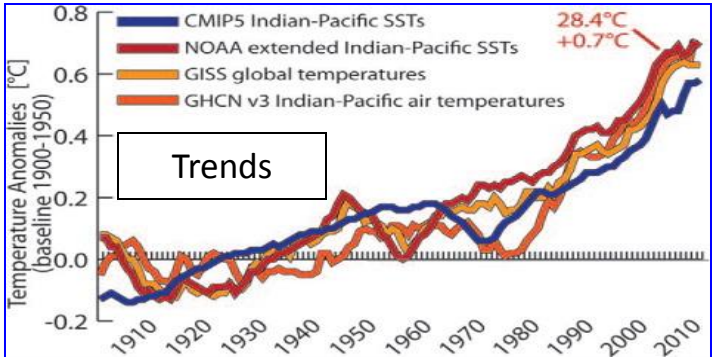
Ocean Circulation



MJO

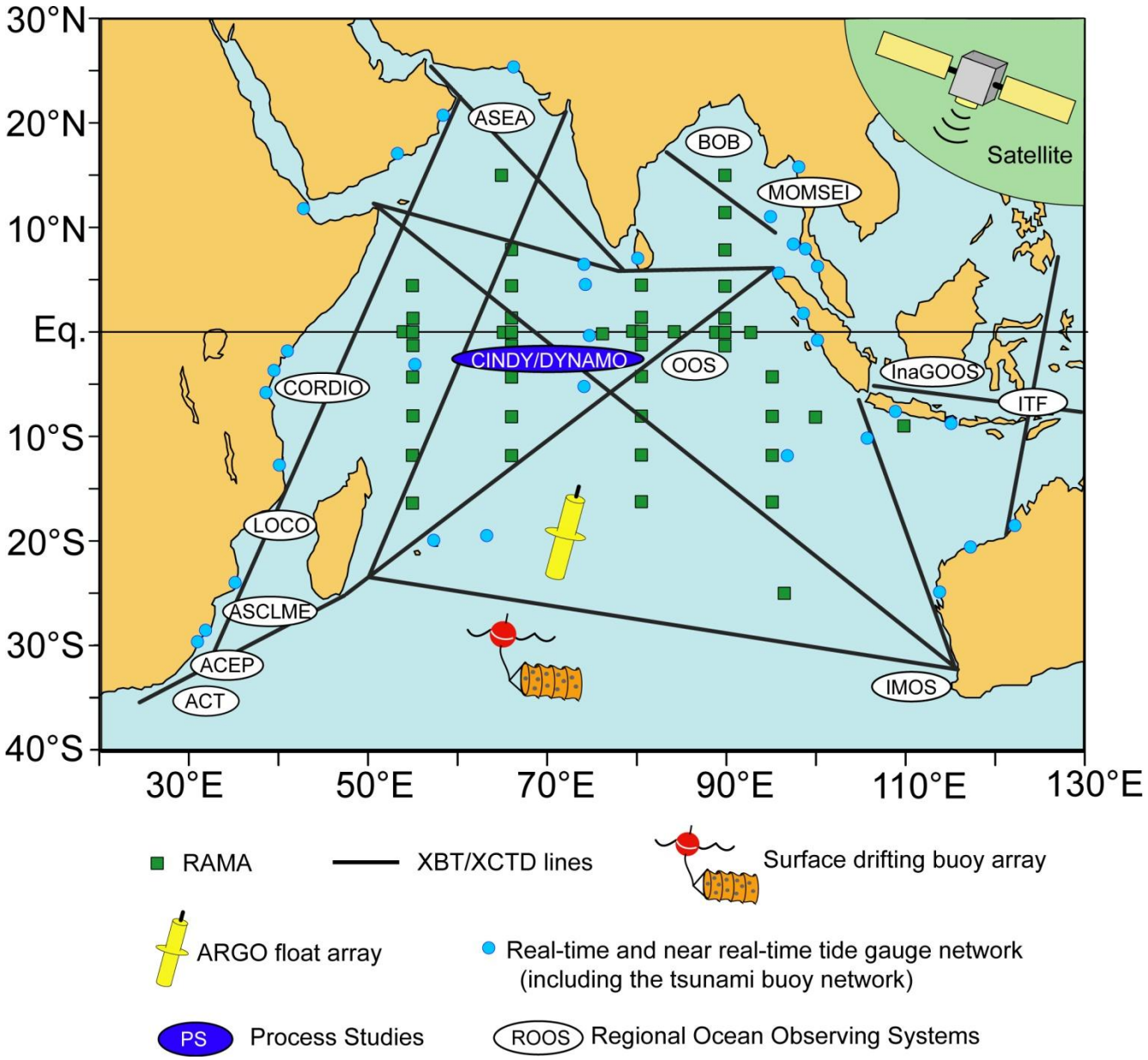


Cyclones



Trends

Indian Ocean Observing System (IndOOS)



- Planned by CLIVAR/GOOS Indian Ocean Panel in 2004
- Basin scale with regional elements
- Supports short term process studies
- Design supported by numerical model observing system simulation studies

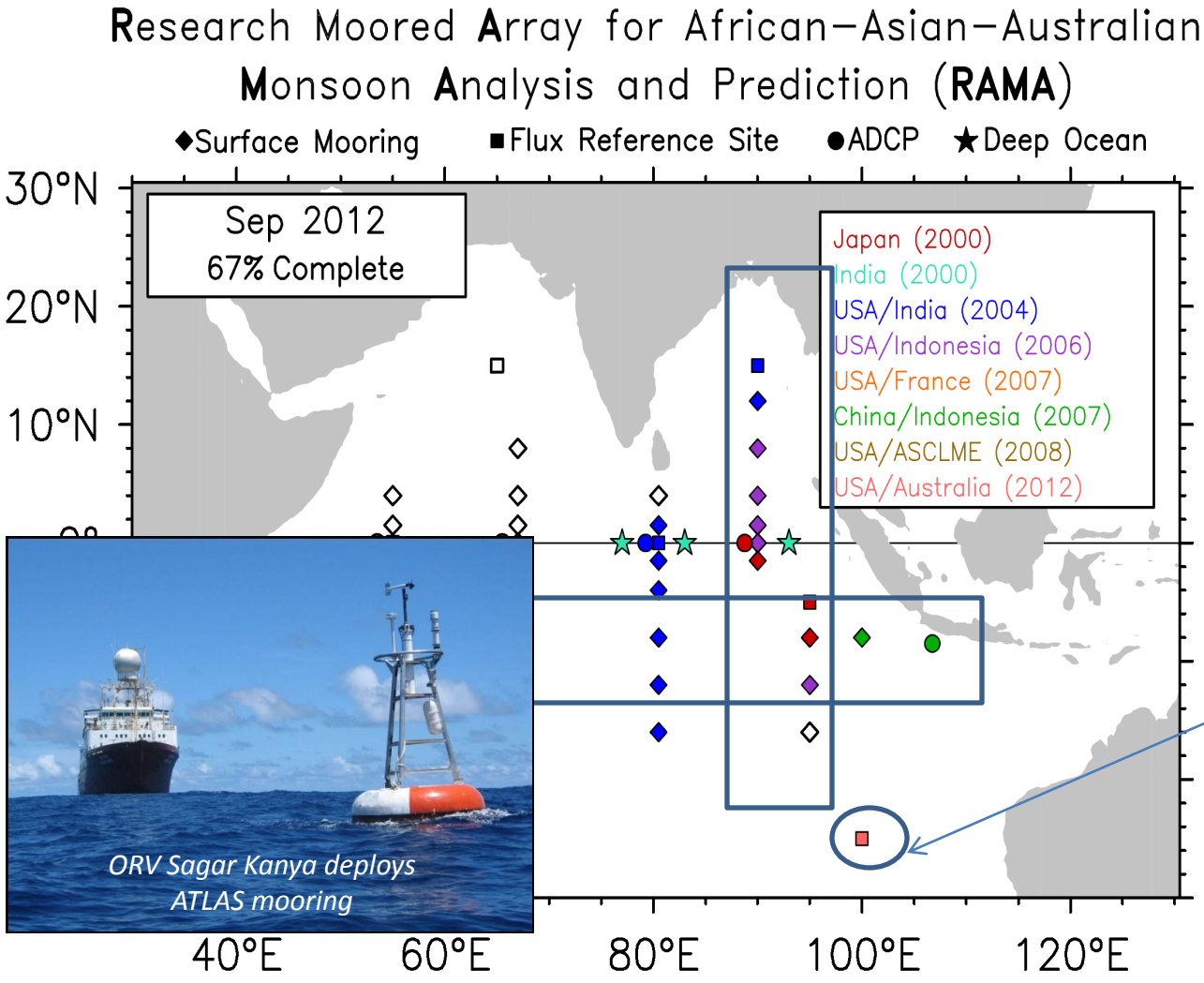
Multi-platform

Long-term

Observation

Network

RAMA



- 67 % complete

(31 out of 46 Sites;

5 Flux Reference Sites)

- All the moorings were serviced

- Recent deployments

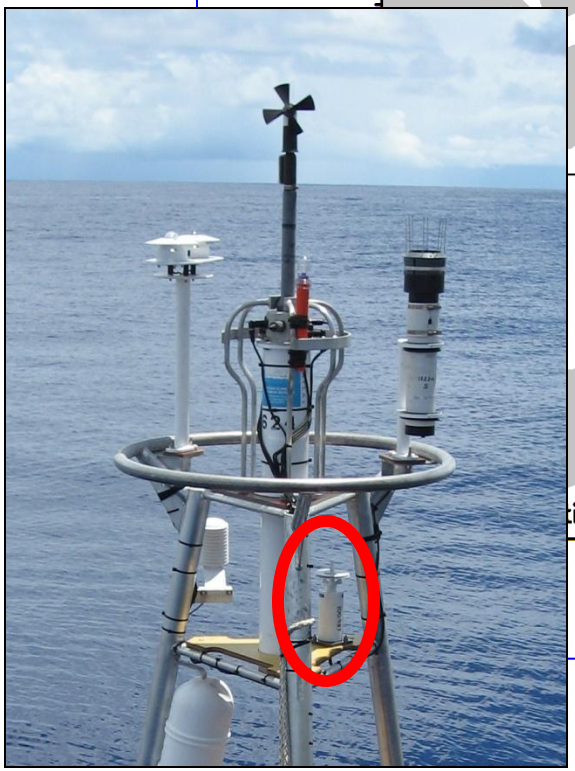
ATLAS: 25° S, 100° E,

- IndOOS Resources Forum (IRF) is important function for this ac

Resource Formula:

- ✓ NOAA provides most equipment (+JAMSTEC, NIO, FIO)
- ✓ Regional partners provide ship time (INCOIS, KKP/BPPT, ASCLME, CSIRO,…)

Meteo-France Pressure Sensors



RAMA Biogeochemical Measurements:
In Collaboration with SIBER*

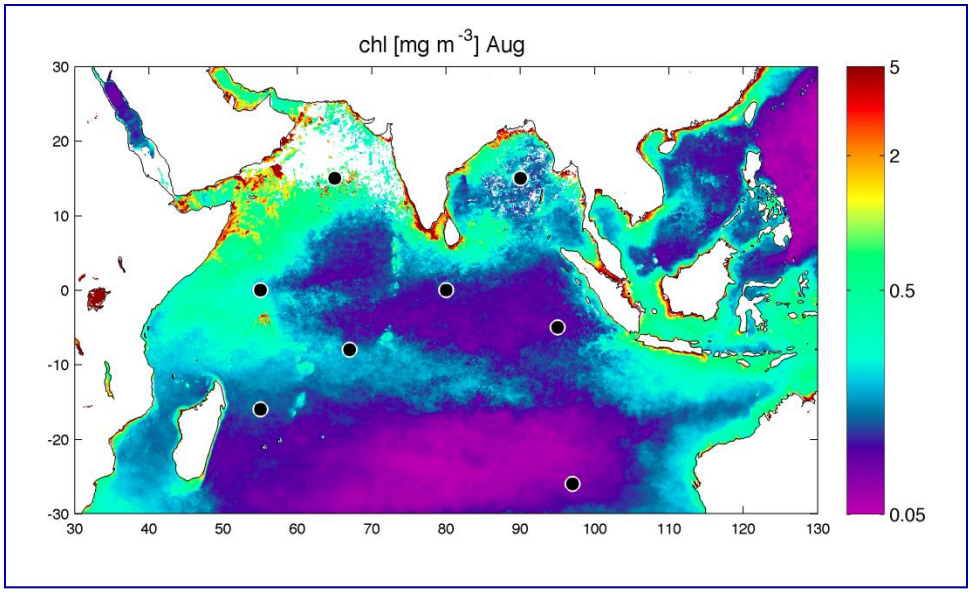
Objectives:

A) Define & understand biogeochemical variability;

B) Develop models of ocean-atmosphere-biosphere interactions;

C) Assess the impacts of climate change on ocean primary productivity and air-sea CO_2 exchange.

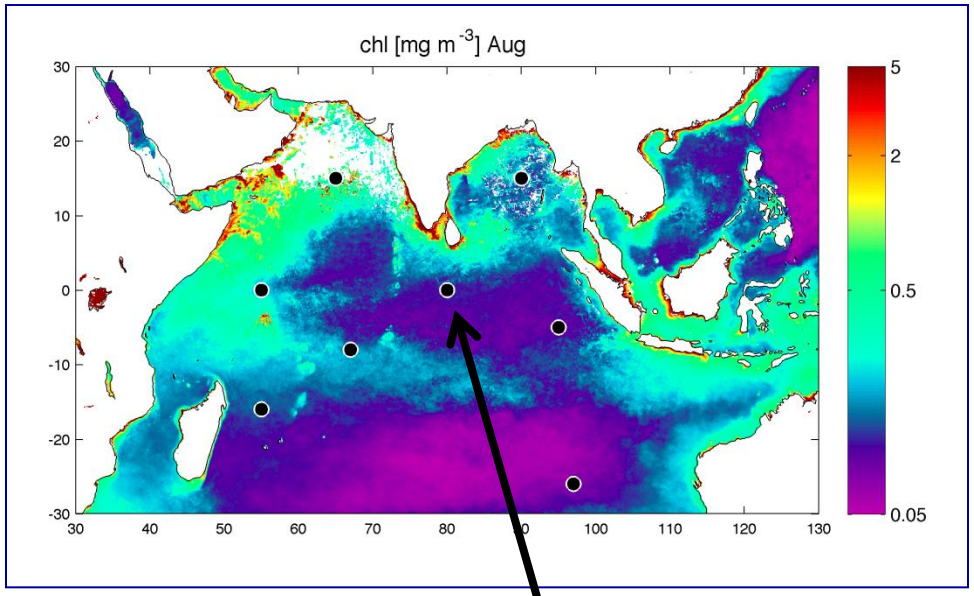
Monthly SeaWiFS Chl-a Concentrations (Solid Dots are RAMA Flux Reference Sites)

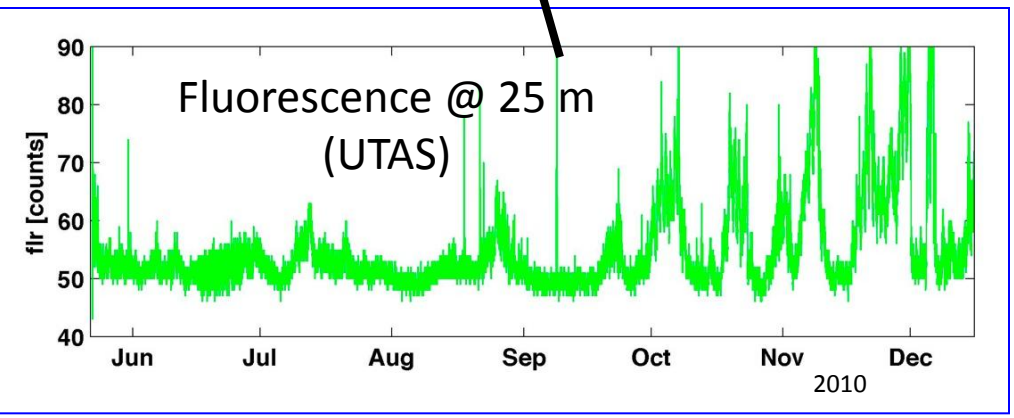


Key Measurements: CO_2, pH, Fluorescence, Particle Backscatter, O_2

SIBER=Sustained Indian Ocean Biogeochemical and Ecosystem Research Program

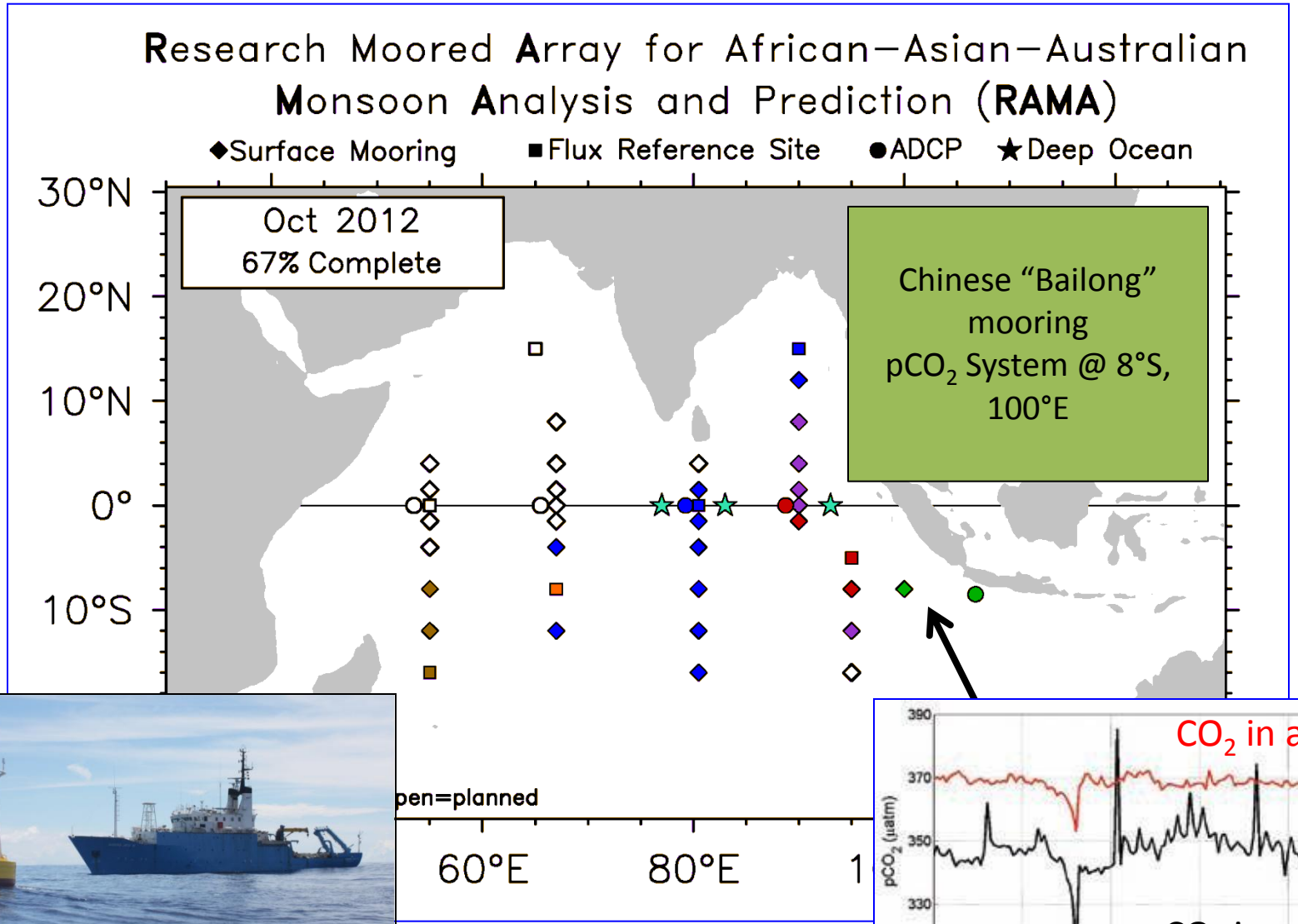
First Biogeochemical Measurements in RAMA



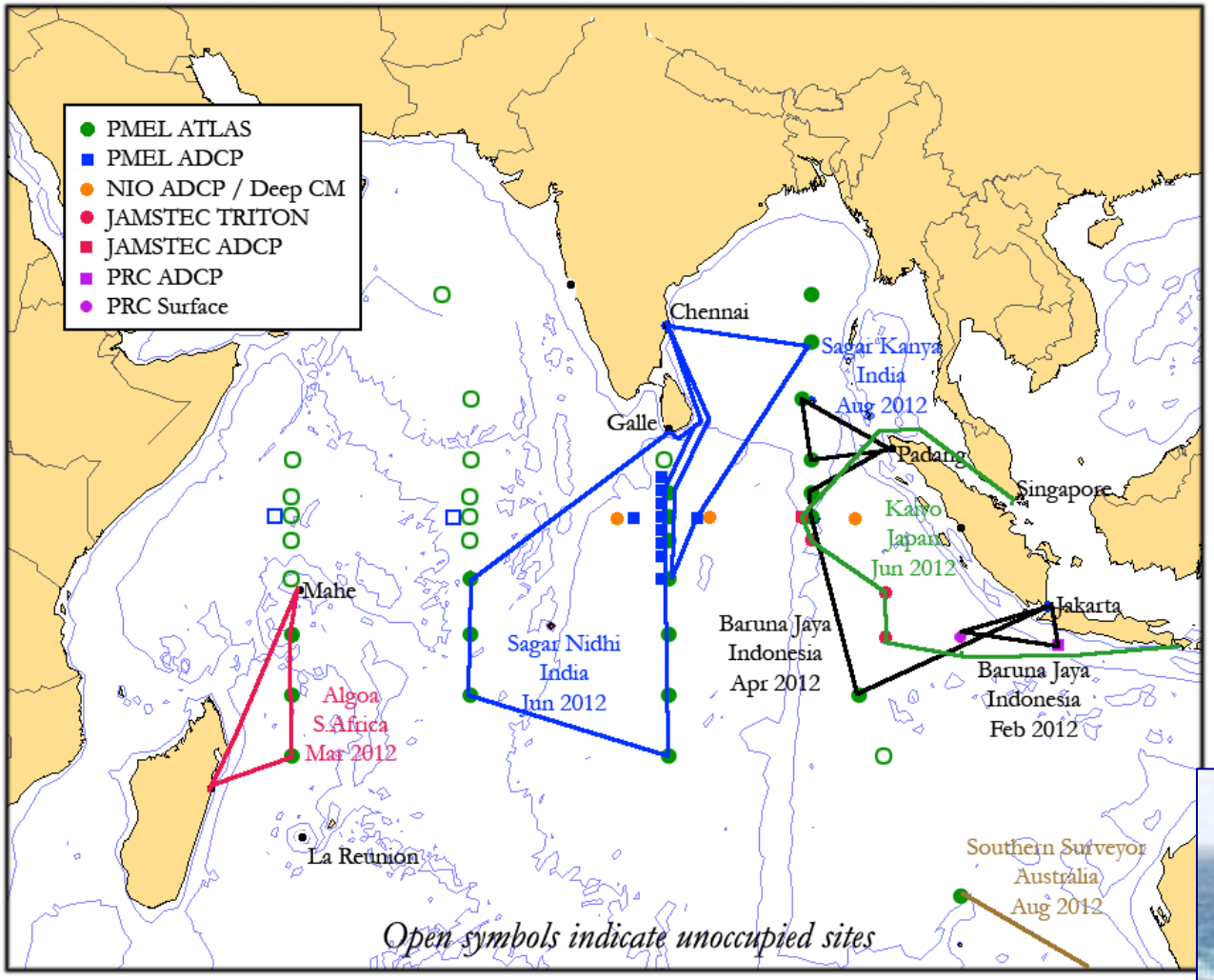


Deployment of a similar system on an ATLAS mooring in the Pacific from a NOAA ship

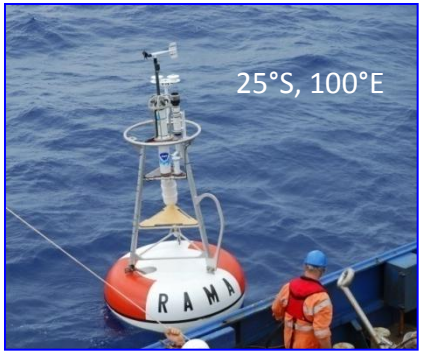
First CO_2 Measurements in RAMA



RAMA Cruises Oct 2011 - Sept 2012

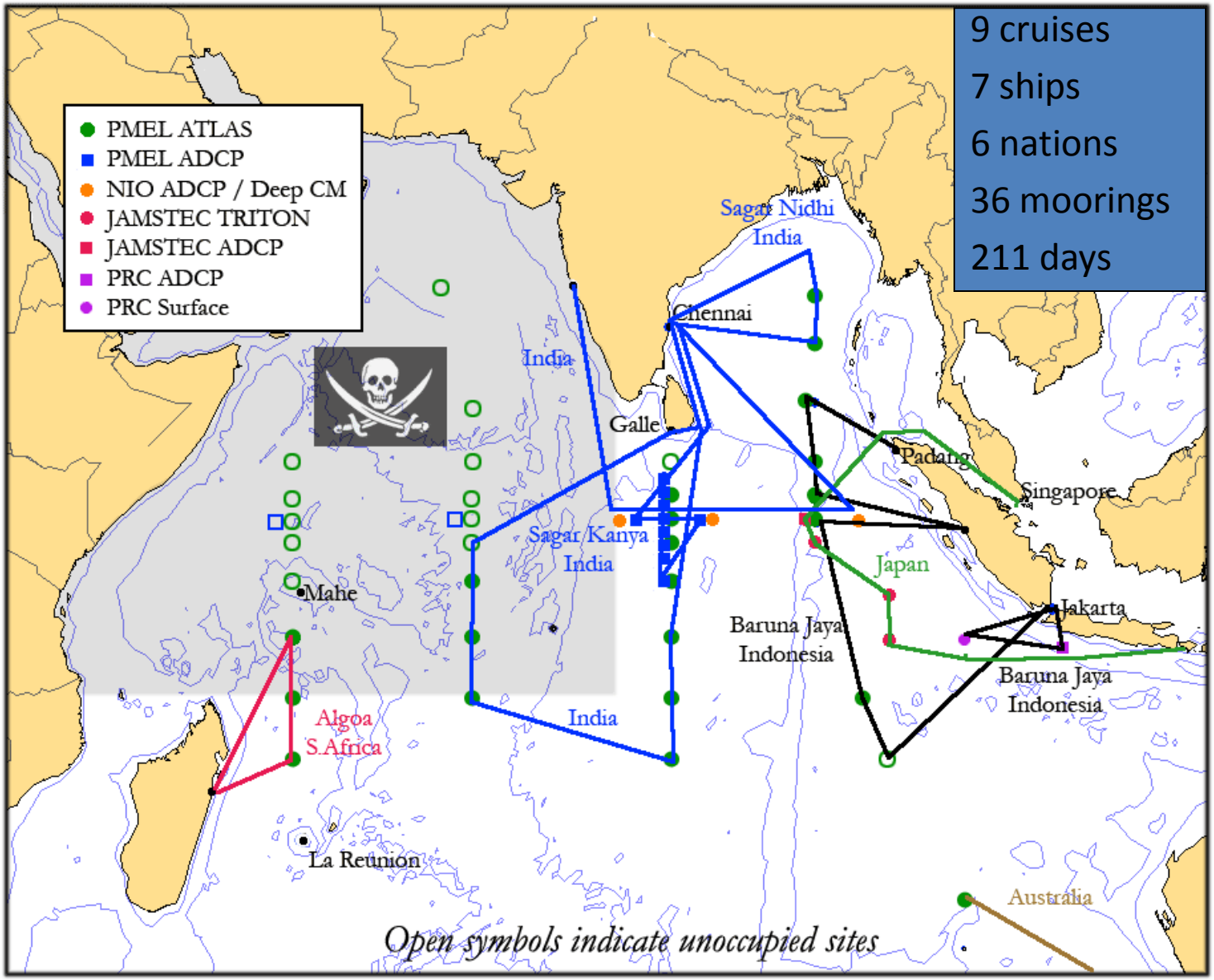


- 7 cruises
- 6 ships
- 7 nations
- 27 moorings
- 153 days



RV Southern Surveyor

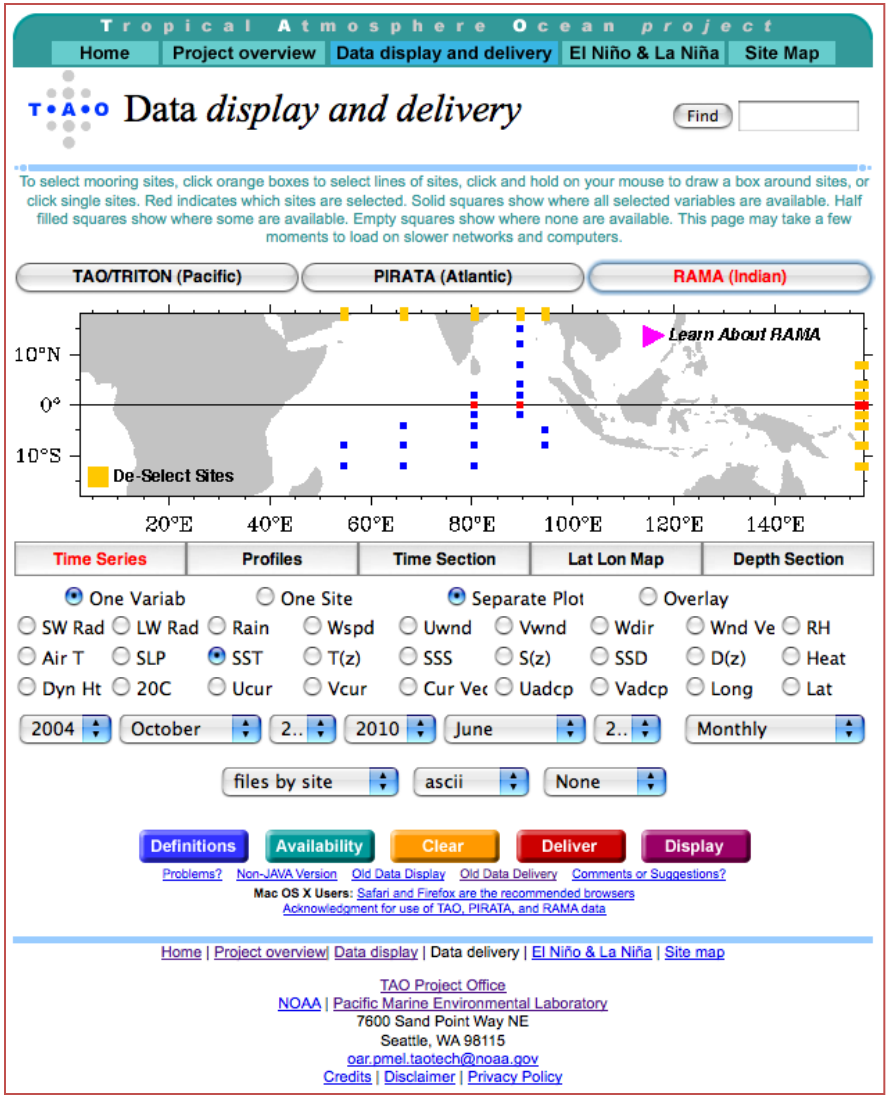
Planned RAMA Cruises Oct 2012 - Sept 2013

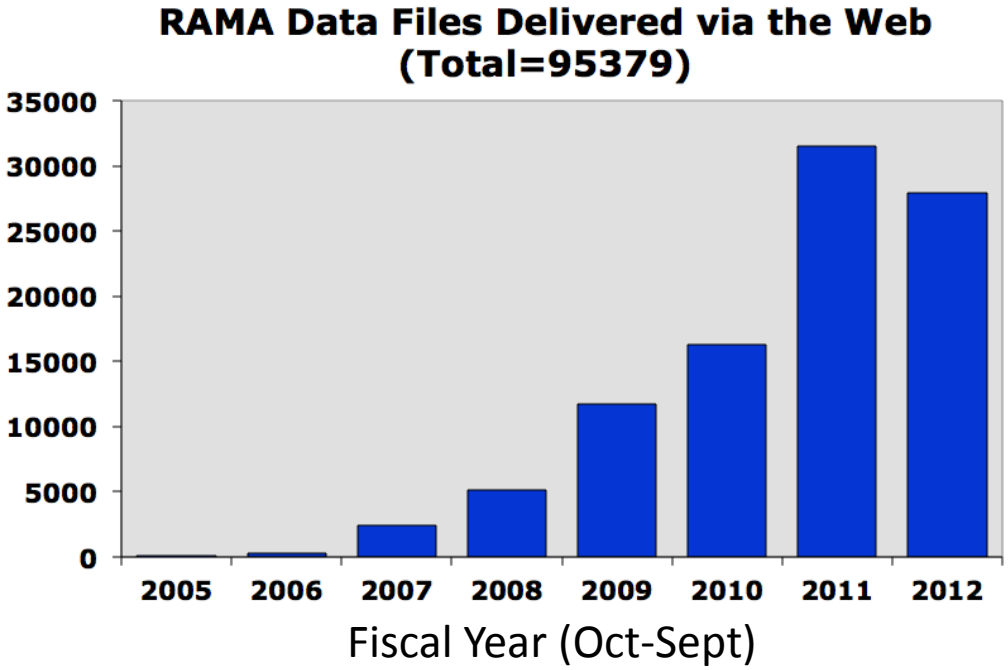


Challenges

- *Increasing data return (64% now)*
  - *Securing and coordinating ship time*
  - *Mitigating vandalism*
  - *Piracy*
- *Implementing biogeochemical measurements*

RAMA Data Access





+ FTP/WEB: 458,386

Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA)

Journal Publications

Jump to year: 2012, 2011, 2010, 2009, 2008, 2007, 2005, 2004

2012

Blockley, E. W., M. J. Martin, and P. Hyder, 2012: Validation of FOAM near-surface ocean current forecasts using Lagrangian drifting buoys, *Ocean Sci., 8,* 551-565, doi:10.5194/os-8-551-2012.

Cronin, M.F., R.A. Weller, R.S. Lampitt, and U. Send, 2012: Ocean reference stations. In *Earth Observation*, R.B. Rustamov and S.E. Salahova (eds.), InTech, ISBN: 978-953-307-973-8.

Drushka, K., J. Sprintall, S. T. Gille, and S. Wijffels, 2012: In situ observations of Madden-Julian Oscillation mixed layer dynamics in the Indian and Western Pacific Oceans. *J. Climate, 25,* 2306-2328. doi:10.1175/JCLI-D-11-00203.1.

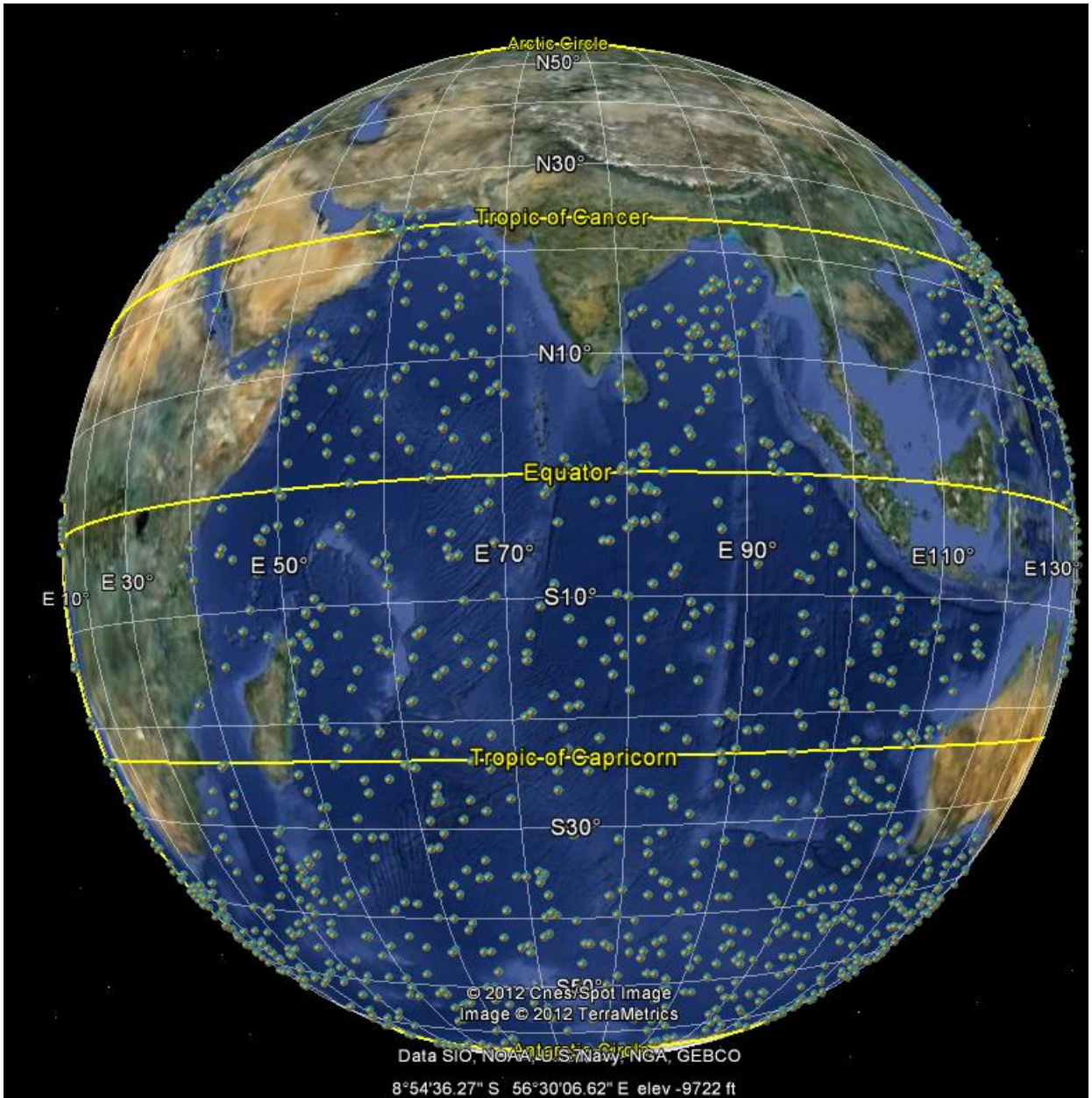
Gnanaseelan, C., A. Deshpande, and M. J. McPhaden, 2012: Impact of Indian Ocean Dipole and El Niño/Southern Oscillation forcing on the Wyrtki jets. *J. Geophys. Res.,117,* C08005, doi:10.1029/2012JC007918.

Joseph, S., A. J. Wallcraft, T. G. Jensen, M. Ravichandran, S. S. C. Shenoi, and S. Nayak, 2012: Weakening of spring Wyrtki jets in the Indian Ocean during 2006-2011, *J. Geophys. Res., 117,* C04012, doi:10.1029/2011JC007581.

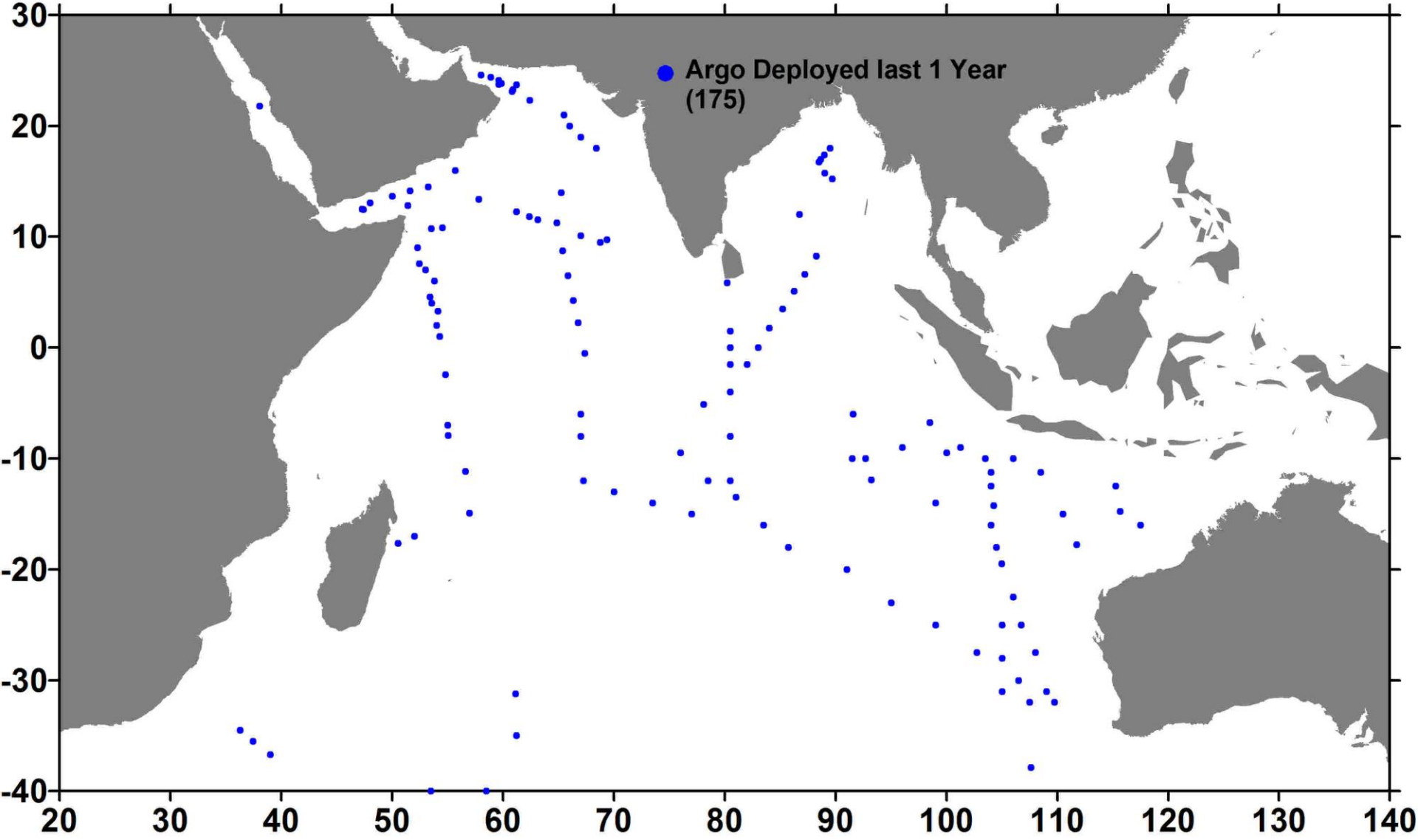
Keerthi, M. G., M. Lengaigne, J. Vialard, C. de Boyer Montégut, and P. M. Muraleedharan, 2012: Interannual variability of the Tropical Indian Ocean mixed layer depth, *Clim. Dyn.*, doi:10.1007/s00382-012-1295-2.

Maneesha, K., V. S. N. Murty, M. Ravichandran, T. Lee, Weidong Yu, and M. J. McPhaden, 2012: Upper ocean variability in the Bay of

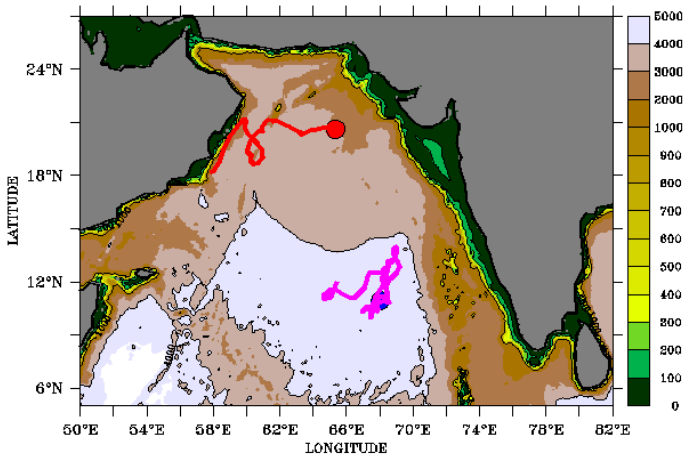
Status of Active floats in the Indian Ocean



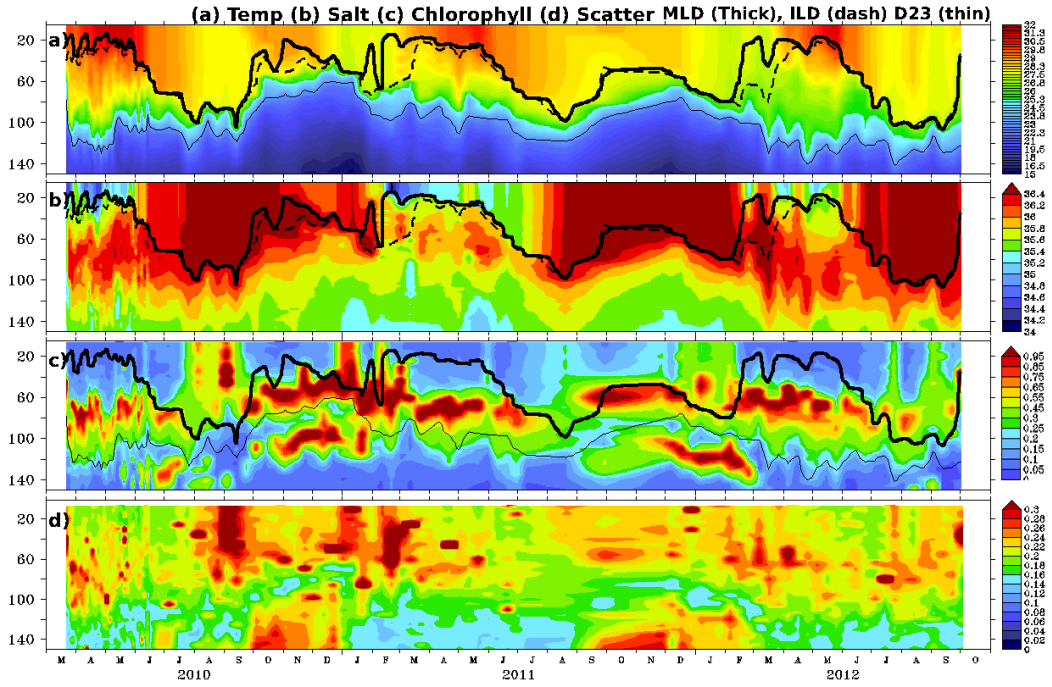
- 769 floats are active in the Indian Ocean (about 491 floats north of 40 S)
- 68% profiles subjected to DMQC
- New deployments during past one year: 175

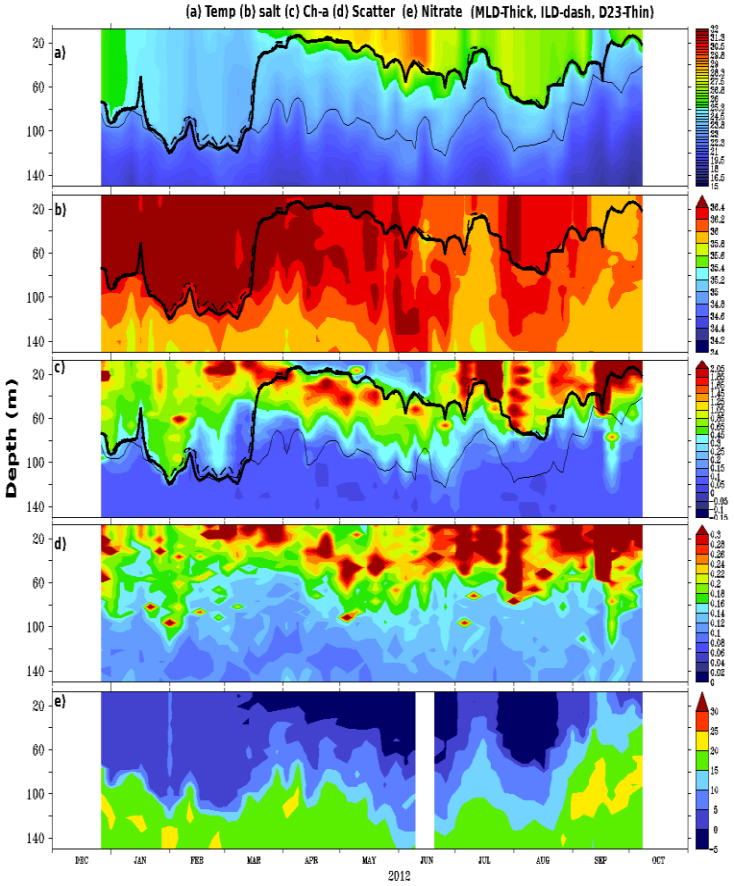

Argo Deployed last 1 Year
(175)
30
20
10
0
-10
-20
-30
-40
20
30
40
50
60
70
80
90
100
110
120
130
140

Bio-Argo



Temperature
Salinity
Oxygen
Chlorophyll-a
Backscatter @ 700 nm
Nitrate





Photos
▼ Documents
Argo bibliography
Complete float bibliography
Argo research in press
Newsletter: Argonautics
Argo user group reports
Argo brochures
Argo design papers
News archive
▼ Argo Steering Team
Argo Steering Team
Members
Meeting reports
▶ Meetings
▶ Links
▶ FAQ
▶ Contact
▶ Site Map

2012 (144)

Alory, G., C. Maes, T. Delcroix, N. Reul, and S. Illig, 2012: Seasonal dynamics of sea surface salinity off Panama: The far Eastern Pacific Fresh Pool. *J. Geophys. Res.*, **117,** C04028, **http://dx.doi.org/10.1029/2011JC007802**

Baird, M. E. and K. R. Ridgway, 2012: The southward transport of sub-mesoscale lenses of Bass Strait Water in the centre of anti-cyclonic mesoscale eddies. *Geophysical Research Letters*, **39,** L02603, **http://dx.doi.org/10.1029/2011GL050643**

Banks, C. J., C. P. Gommenginger, M. A. Srokosz, and H. M. Snaith, 2012: Validating SMOS Ocean Surface Salinity in the Atlantic With Argo and Operational Ocean Model Data. *Geoscience and Remote Sensing, IEEE Transactions on*, **50,** 1688-1702, **http://dx.doi.org/10.1109/tgrs.2011.2167340**

Bhaskar, T. V. S. U., C. Jayaram, and E. P. Rama Rao, 2012: Comparison between Argo-derived sea surface temperature and microwave sea surface temperature in tropical Indian Ocean. *Remote Sensing Letters*, 1-10, **http://dx.doi.org/10.1080/2150704X.2012.711955**

Boutin, J., N. Martin, Y. Xiaobin, J. Font, N. Reul, and P. Spurgeon, 2012: First Assessment of SMOS Data Over Open Ocean: Part II-Sea Surface Salinity. *Geoscience and Remote Sensing, IEEE Transactions on*, **50,** 1662-1675, **http://dx.doi.org/10.1109/TGRS.2012.2184546**

Boyer, T., S. Levitus, J. Antonov, J. R. Reagan, C. Schmid, and R. A. Locarnini, 2012: Subsurface salinity. *In State of the Climate 2011*, J. Blunden and D. S. Arndt, Eds., Bulletin of the American Meteorological Society, S72-S75.

Calafat, F. M., G. Jordá, M. Marcos, and D. Gomis, 2012: Comparison of Mediterranean sea level variability as given by three baroclinic models. *J. Geophys. Res.*, **117,** C02009, **http://dx.doi.org/10.1029/2011JC007277**

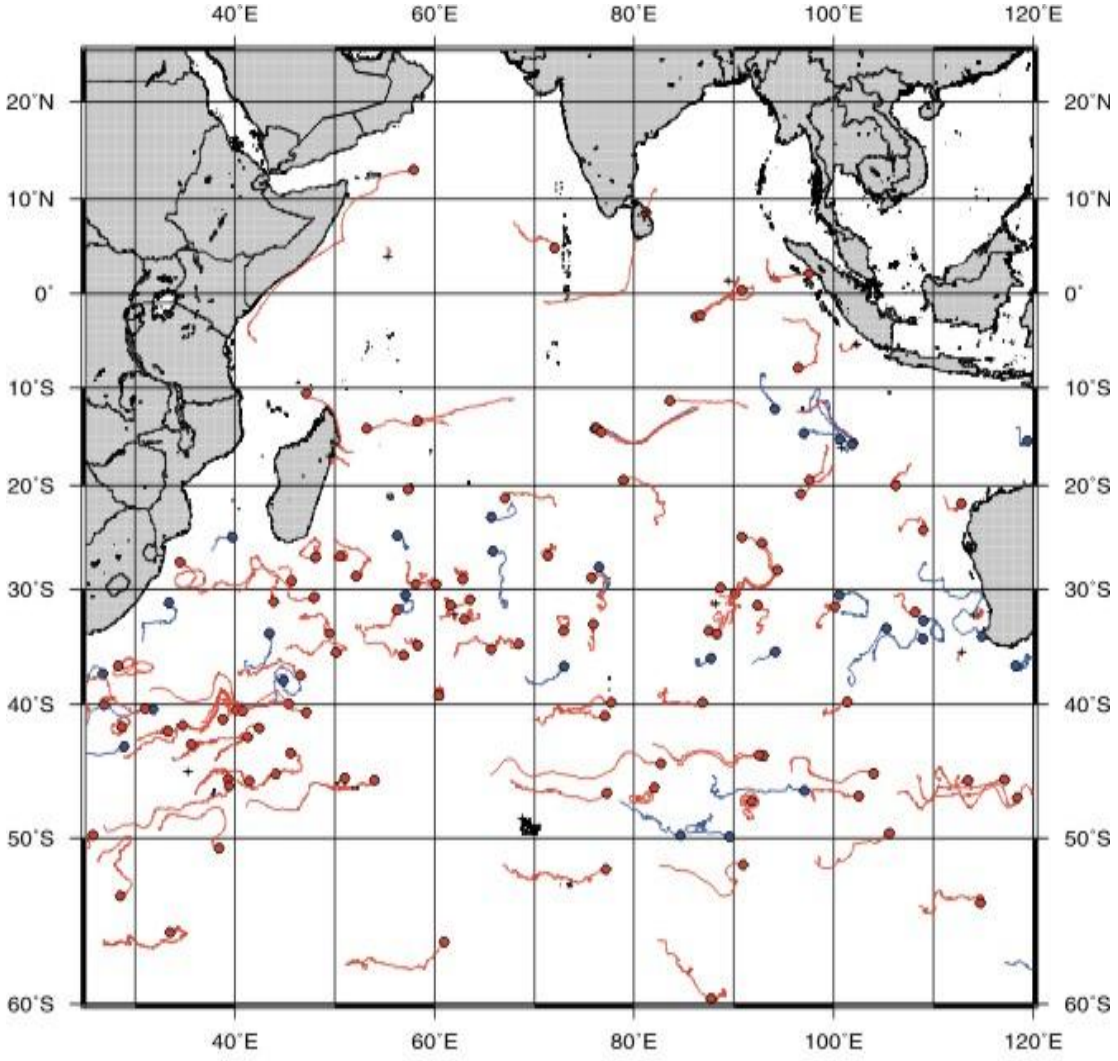
Carton, J. A., H. F. Seidel, and B. S. Giese, 2012: Detecting historical ocean climate variability. *J. Geophys. Res.*, **117,** C02023, **http://dx.doi.org/10.1029/2011JC007401**

Carton, X., P. L'Hegaret, and R. Baraille, 2012: Mesoscale variability of water masses in the Arabian Sea as revealed by ARGO floats. *Ocean Science*, **8,** 227-248, **http://www.ocean-sci.net/8/227/2012/**

Castro-Morales, K. and J. Kaiser, 2012: Using dissolved oxygen concentrations to determine mixed layer depths in the Bellingshausen Sea. *Ocean Science*, **8**, **http://dx.doi.org/10.5194/os-8-1-2012**

Chacko, N., M. Ravichandran, R. Rao, and S. Shenoi, 2012: An anomalous cooling event observed in the Bay of Bengal during June 2009. *Ocean Dynamics*, **62,** 671-681, **http://dx.doi.org/10.1007/s10236-012-0525-9**

Drifters: Trajectories in June 2012



SST only
Air pressure

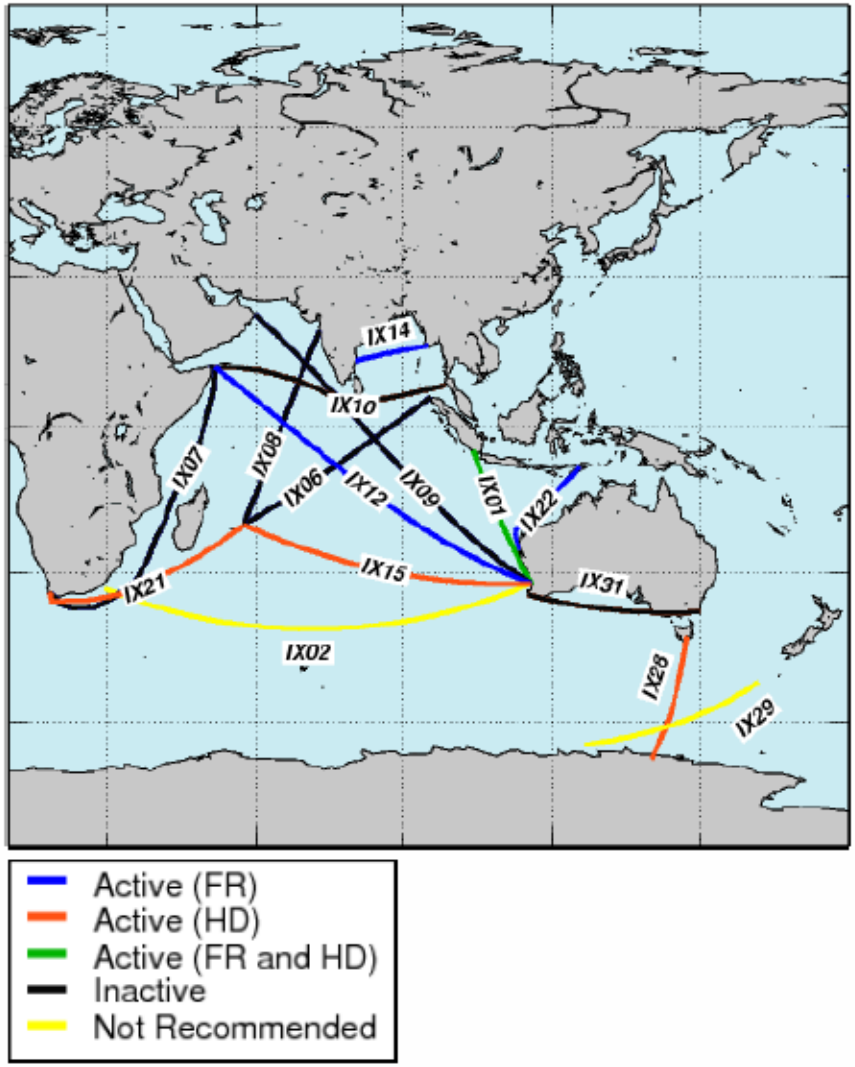
233 drifters deployed during last one year

Indian Ocean XBT Transects

Transect	Agency	Mode (Target)	Status	Year
IX01	9, 1	FR (37)	Active	1987
IX06	6, 2		Suspended	2007
IX07			Inactive	
IX08	12		Inactive	1992
IX09			Inactive	
IX10			Inactive	
IX12	9, 2	FR (14)	Active	1986
IX14	12	FR (1)	Active	1990
IX15	2, 4, 6	HD (3)	Active	1994
IX21	2, 4, 6	HD (3)	Active	1994
IX22	9	FR (7)	Active	1986
IX28	4, 2	HD (5)	Active	1993
IX31	2		Suspended	2006
IX02	2	HD (1)	Targeted	
IX29	4	HD (1)	Active	

1 USA-NOAA/AOML
2 USA-SIO
4 AUS-CSIRO
6 ZAF-UCT
9 AUS-BOM
12 IND-NIO

Indian Ocean XBT transects (2010)



Source: **Francis Bringas**

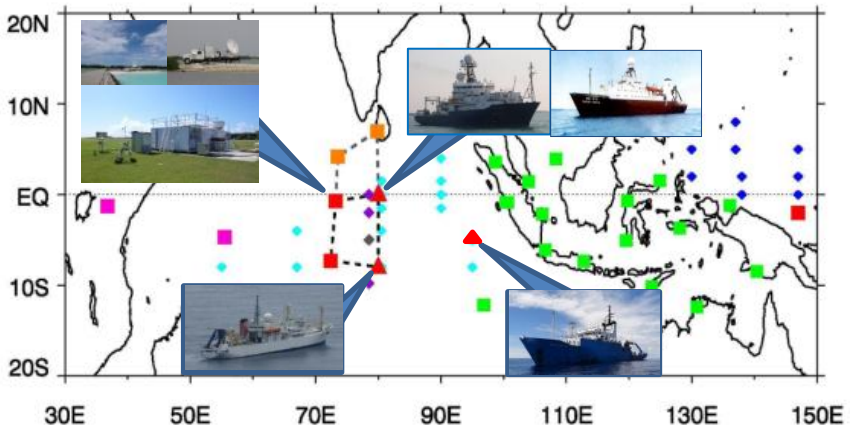
Tide gauge locations

67 Tide gauges are active in the Indian Ocean

Process studies (CINDY2011 / DYNAMO)

Purpose:

To collect in-situ observations to advance our understanding of the MJO initiation process and to improve the MJO simulation and prediction.



Periods:

Special Observing Period	Oct 1, 2011 – Nov 28, 2011
Intensive Observing Period	Oct 1, 2011 – Jan 15, 2012
Extended Observing Period	Oct 1, 2011 – Mar 31, 2012

Participants :

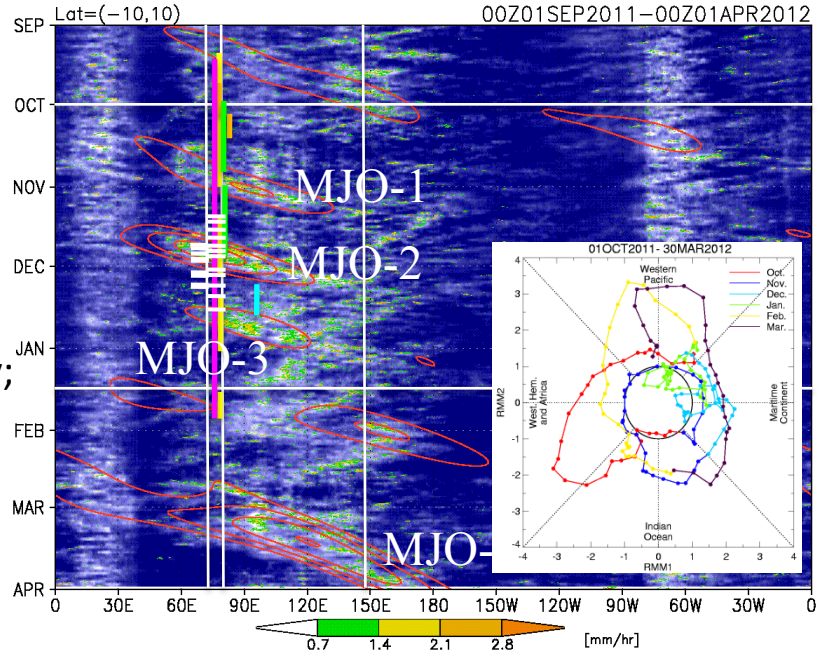
Over 60 institutes/universities/agencies from

US, Japan, India, Indonesia, France,

Kenya, Seychelles, Maldives, Sri Lanka, Singapore,

Papua New Guinea,

UK, Taiwan, Korea, Poland, and Australia



Early results :

Captured 3 MJOs during IOP, but Dec case is controversial.

Preliminary analyses suggest the following factors may key;

- Behavior of dry air during moistening process
- Interaction between ITCZ and MJO
- Influences on moisture from the maritime continent

Other interesting findings;

- Unseasonal Wyrtki jet,
- Meander of SCTR, etc.

Thank you for your attention