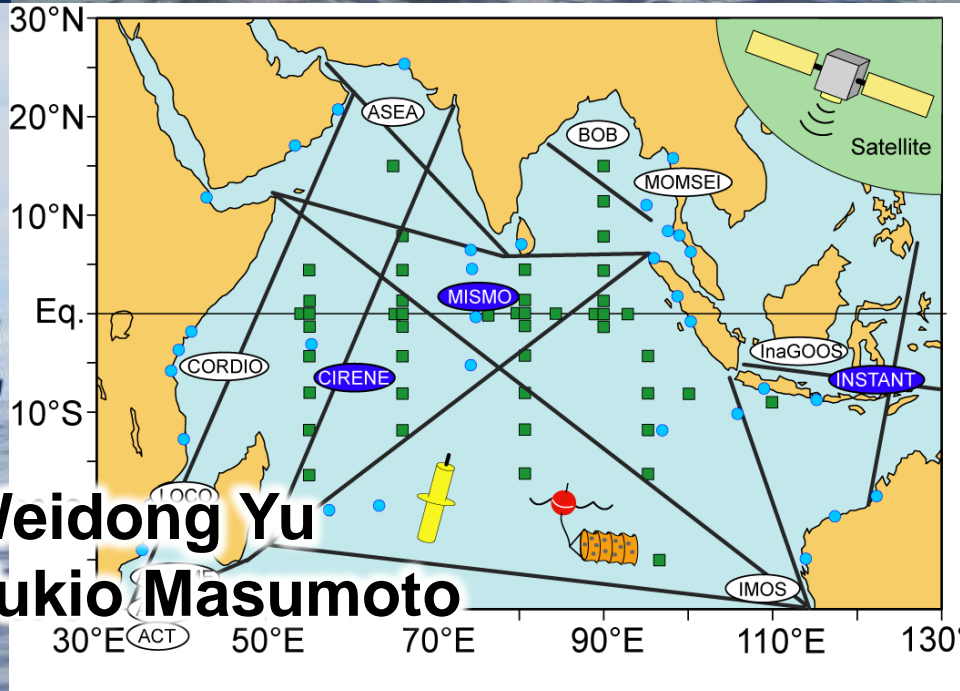
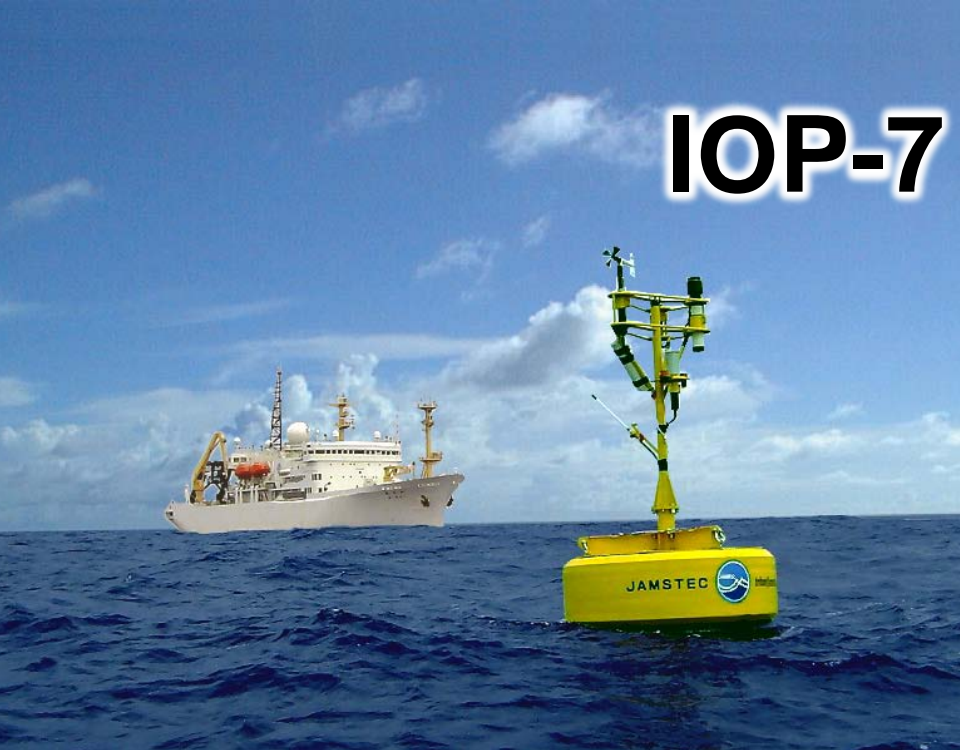
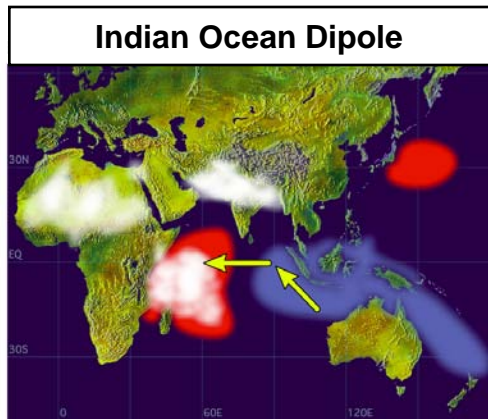


IOP-7 Report

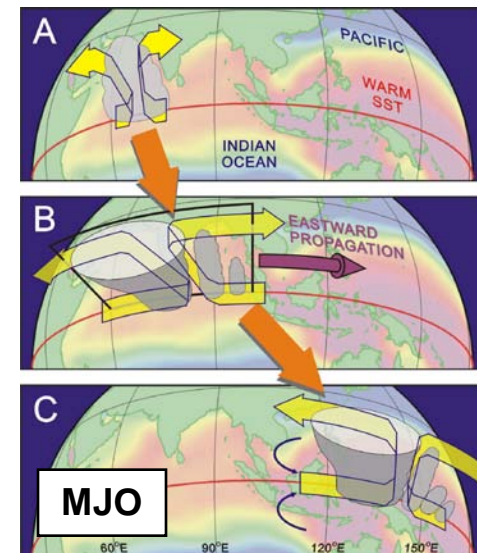
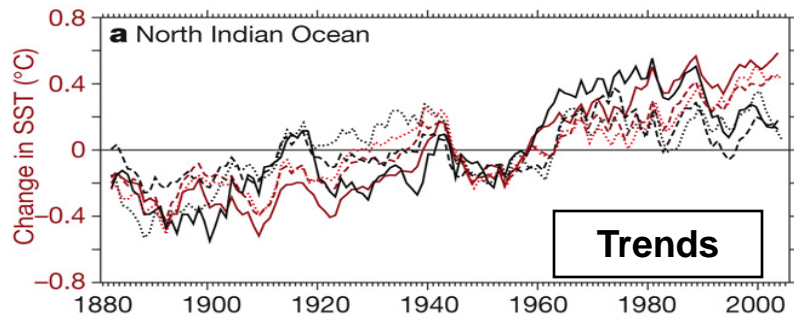
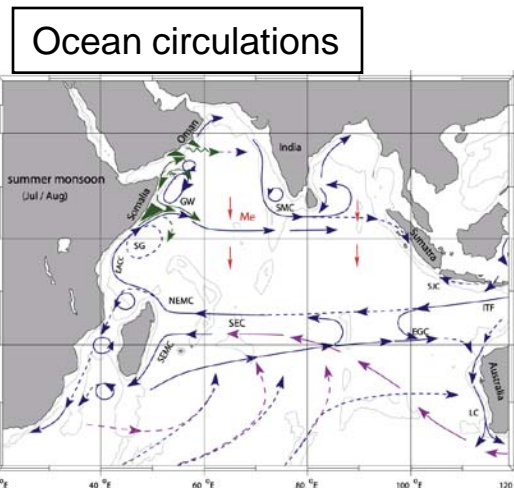
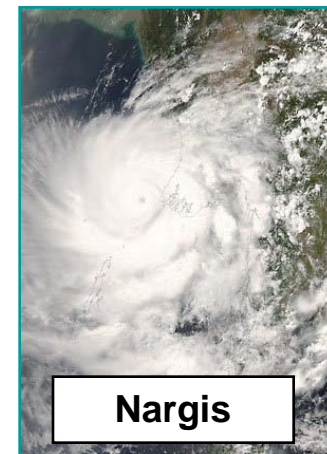


Co-chairs: Weidong Yu
Yukio Masumoto

Indian Ocean Science Drivers

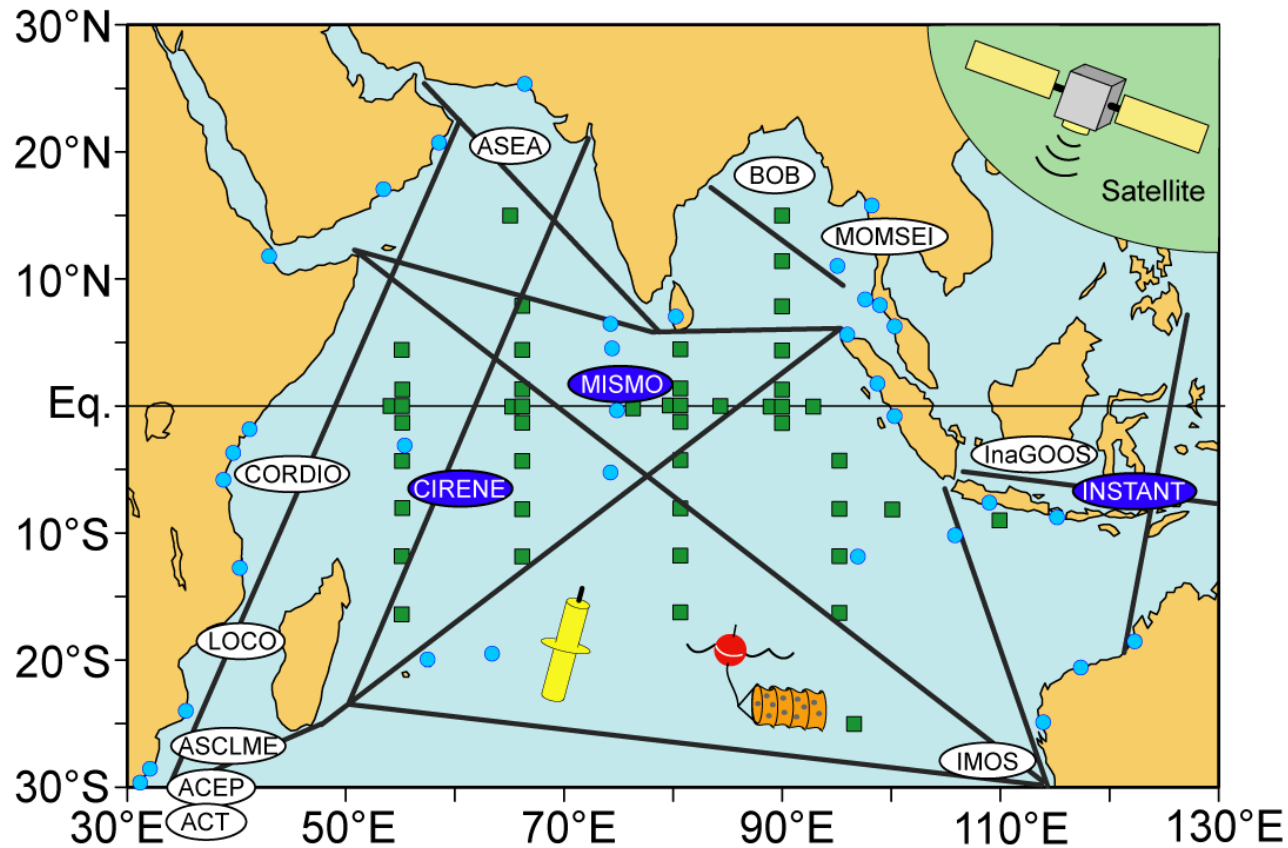


- Seasonal monsoons
- Severe weather events & cyclones
- Intraseasonal (30-60 day) variations, Madden Julian Oscillation
- Interannual variations: the Indian Ocean Dipole, Influence of ENSO
- Decadal variability and warming trends
- Ocean circulations and biogeochemistry



Indian Ocean is the most poorly sampled region of the tropics

Indian Ocean Observing System (IndOOS)

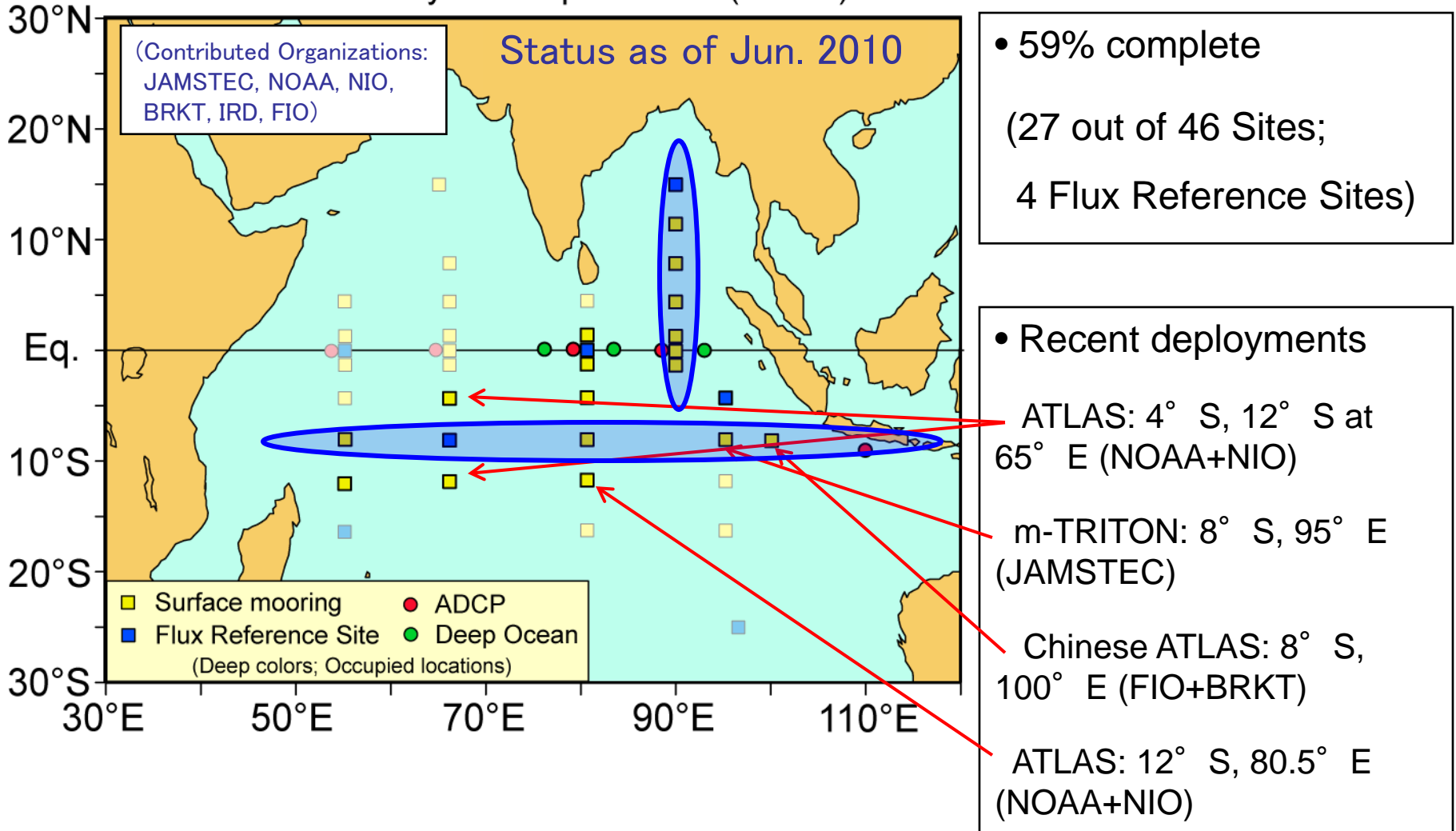


Multi-platform
Long-term
Observation
Network

- RAMA
- XBT/XCTD lines
- Surface drifting buoy array
- ARGO float array
- Real-time and near real-time tide gauge network (including the tsunami buoy network)
- PS Process Studies
- ROOS Regional Ocean Observing Systems

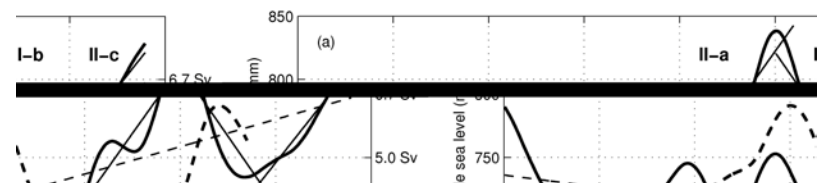
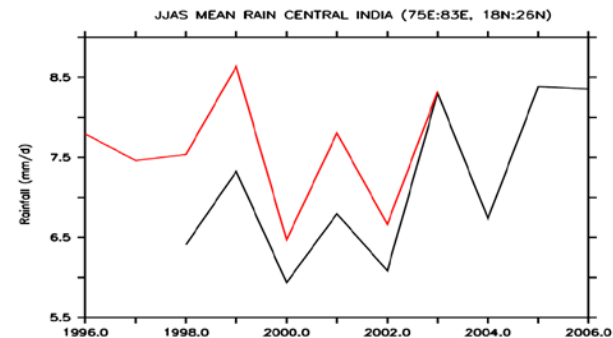
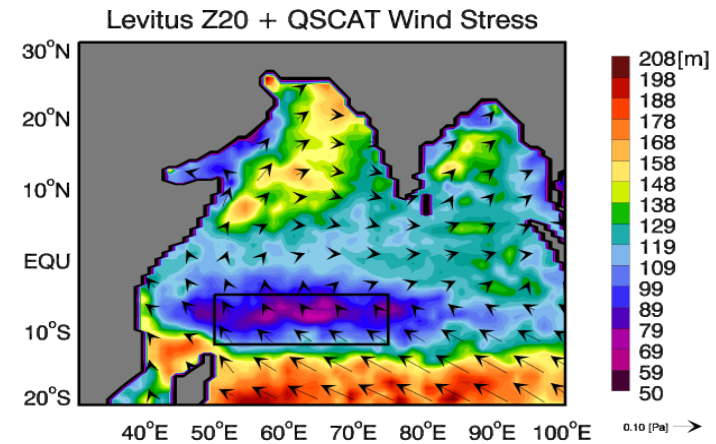
Mooring Array: Present Status

Research moored Array for African-Asian-Australian Monsoon Analysis and prediction (RAMA)



The more the data come in, the more the science issues come up.

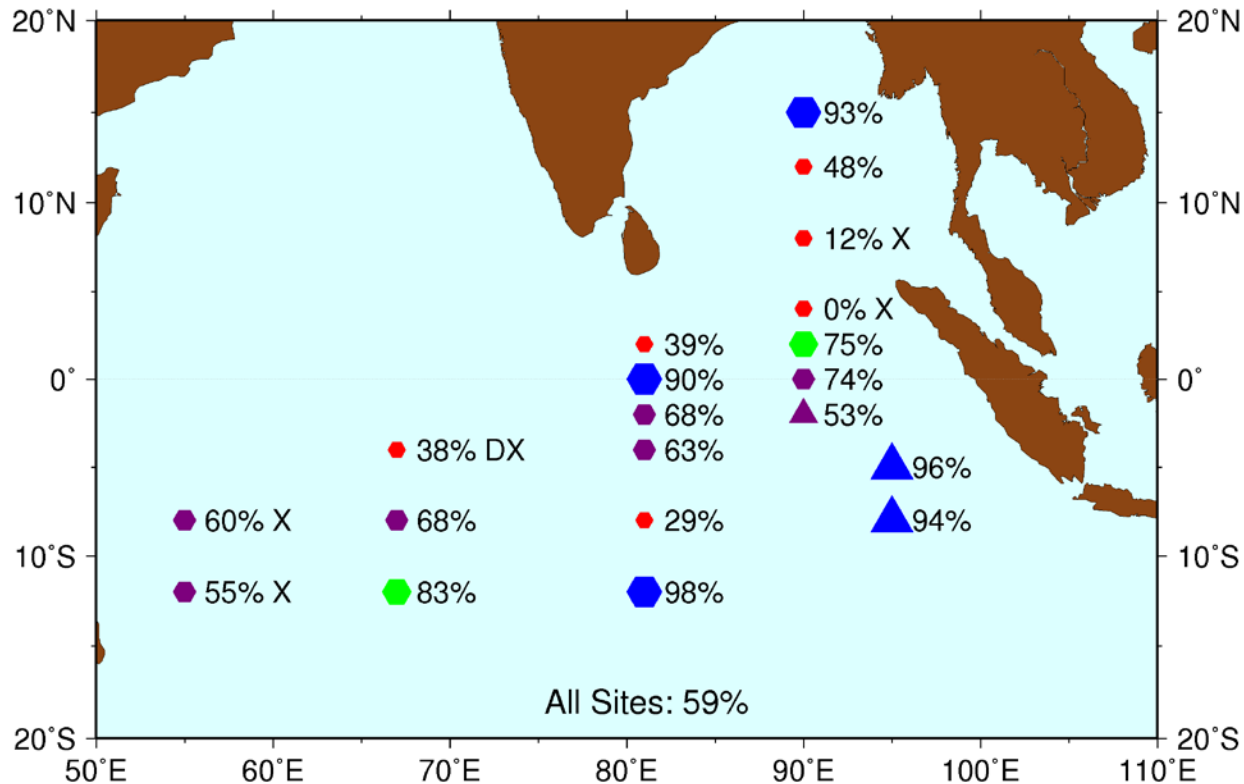
- Heat and salinity budgets in the thermocline ridge region in the southwestern tropical Indian Ocean and their relations to the climate variability
- Biennial oscillations in air-sea-land system in the Indo-Pacific sector
- Decadal and multi-decadal variations in the Indian Ocean and their relation to the Pacific Ocean



- ◆ IOP recognized that there are some opportunities to enhance IndOOS with new efforts and new technology.
 - In particular, cooperation with SIBER to add biogeochemical sensors on RAMA is in progress.
(There was a SIBER-IOP joint session in the afternoon of July 13th.)
 - Coordination between Regional observing systems and IndOOS is another important step toward further advancement in their respective and common activities.
(One successful example is the ASCLME-NOAA collaboration)
- ✓ According to such progresses in RAMA implementation, IOP expects to occupy all the RAMA sites by 2012.

RAMA Data Return

June 2009 - May 2010



All Sensors

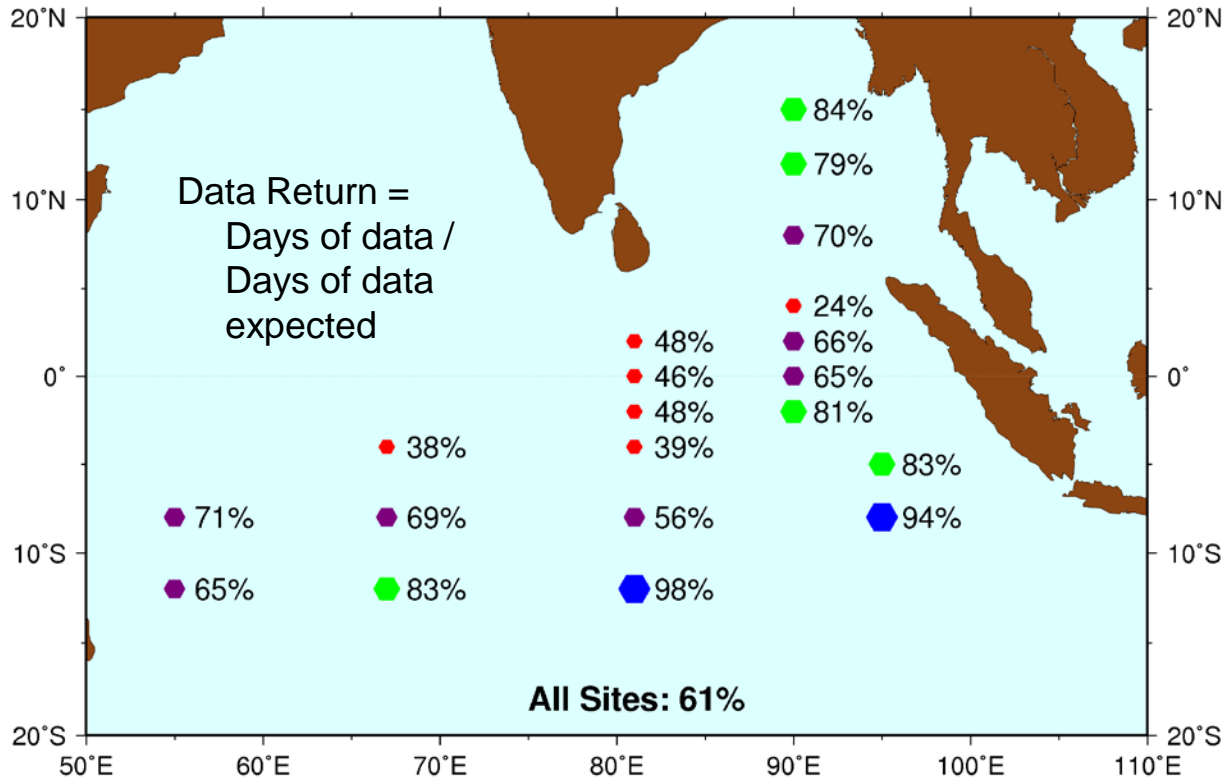
● ATLAS Mooring (USA/India/Indonesia/France)
 ▲ TRITON Mooring (Japan)

Data Return:
0% - 50%
50% - 75%
75% - 90%
90% - 100%

D: Buoy Adrift **X:** Buoy Not Transmitting **N:** No Valid Transmissions

RAMA Data Return

October 2004 - May 2010

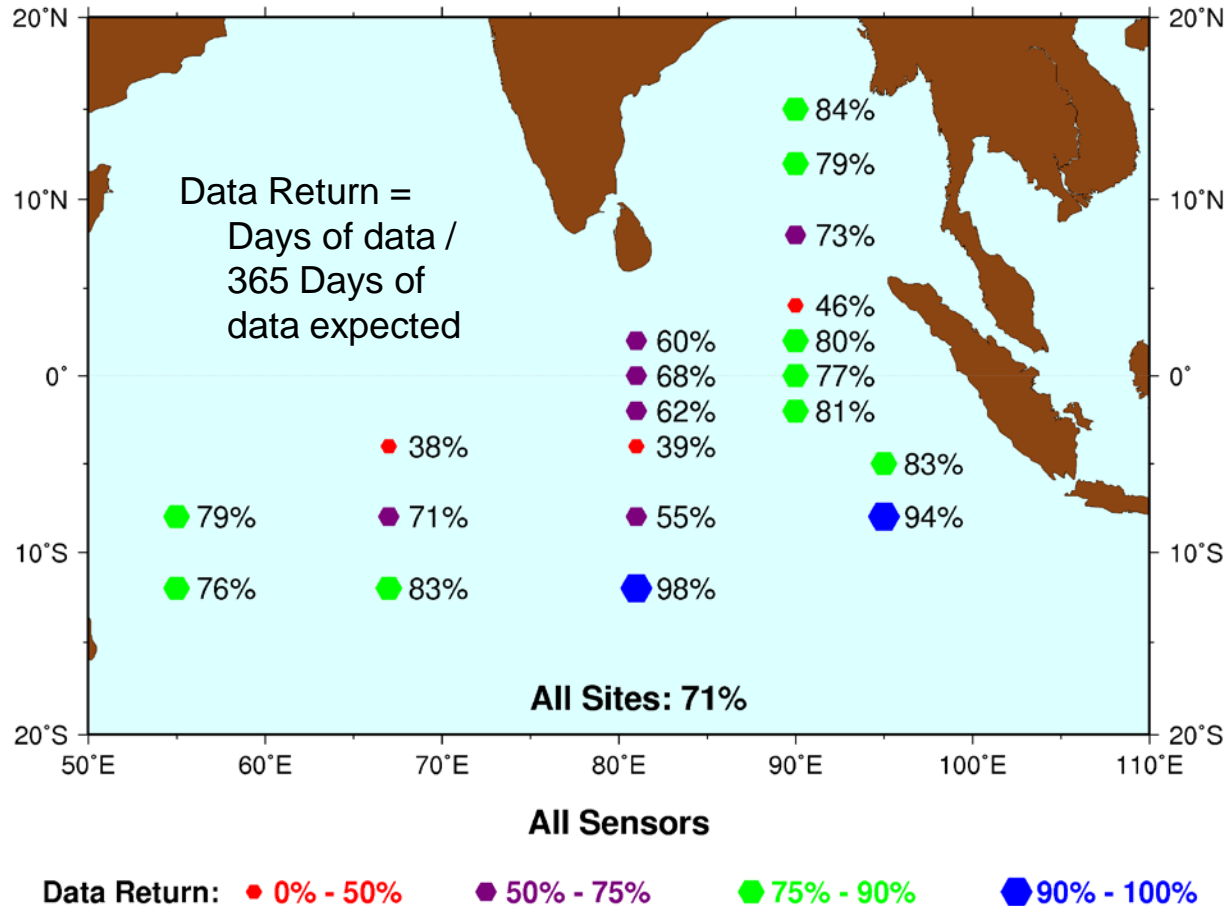


All Sensors

Data Return: ● 0% - 50% ● 50% - 75% ● 75% - 90% ● 90% - 100%

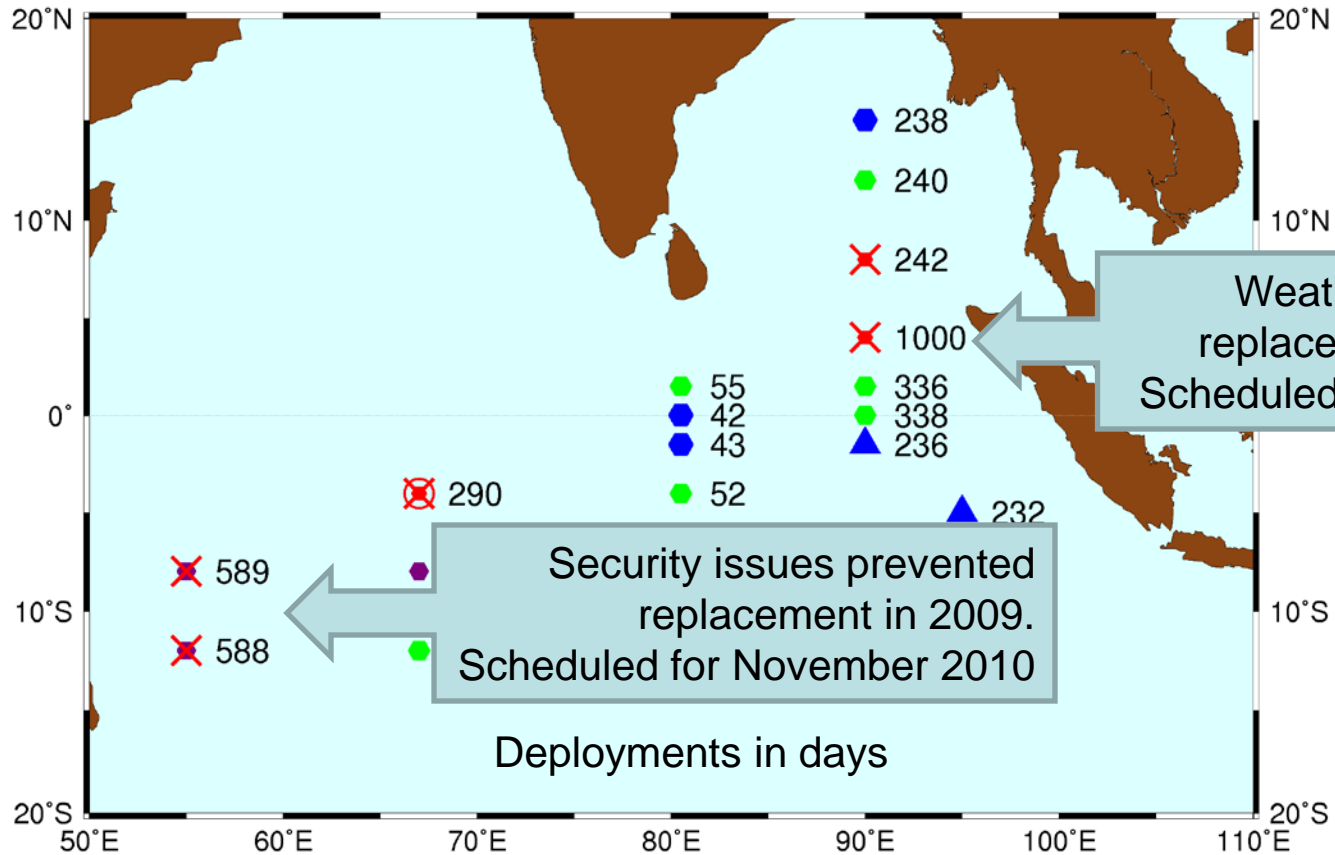
Hypothetical RAMA Data Return

October 2004 - May 2010



RAMA Mooring Deployment Status

Indian Ocean Mooring Status Update: July 03, 2010

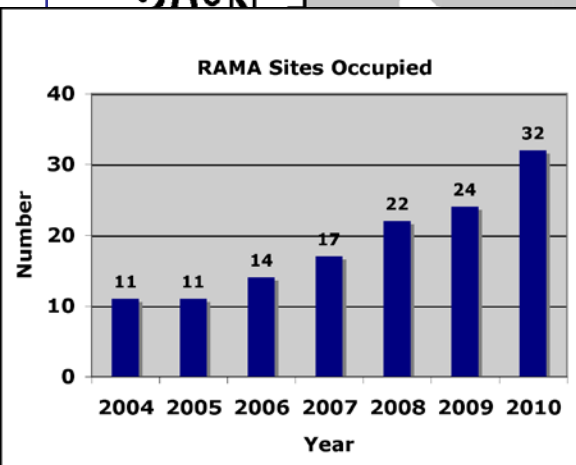
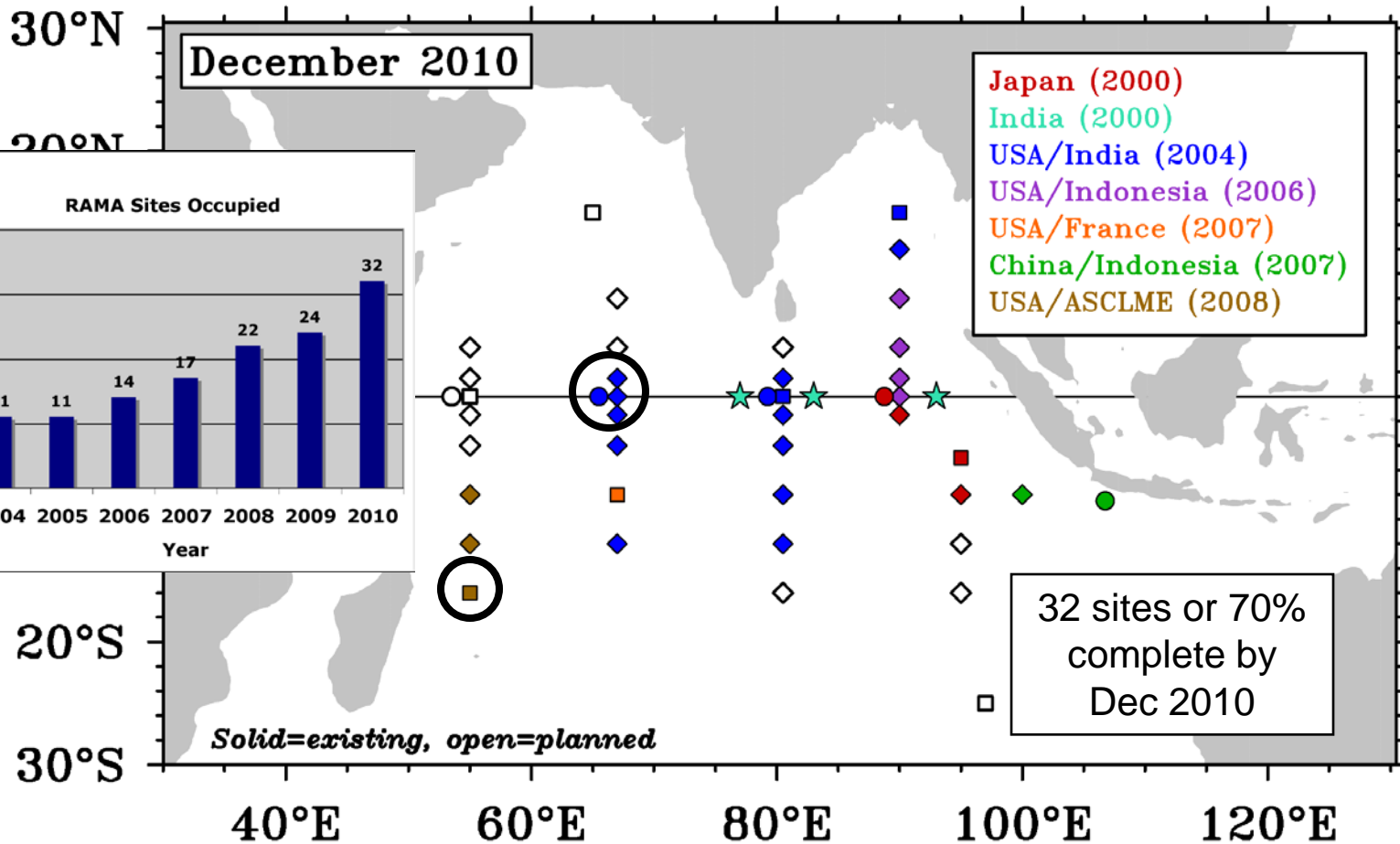


- Atlas Mooring (PMEL)
- ### Days Deployed
- ▲ TRITON Mooring (JAMSTEC)
- ✕ Buoy Not Transmitting
- Buoy Moved or Adrift (Outside Nominal Grid Position)
- Deployment Data Return: 0% - 50% 50% - 75% 75% - 90% 90% - 100%

Planned Array Status: December 2010

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

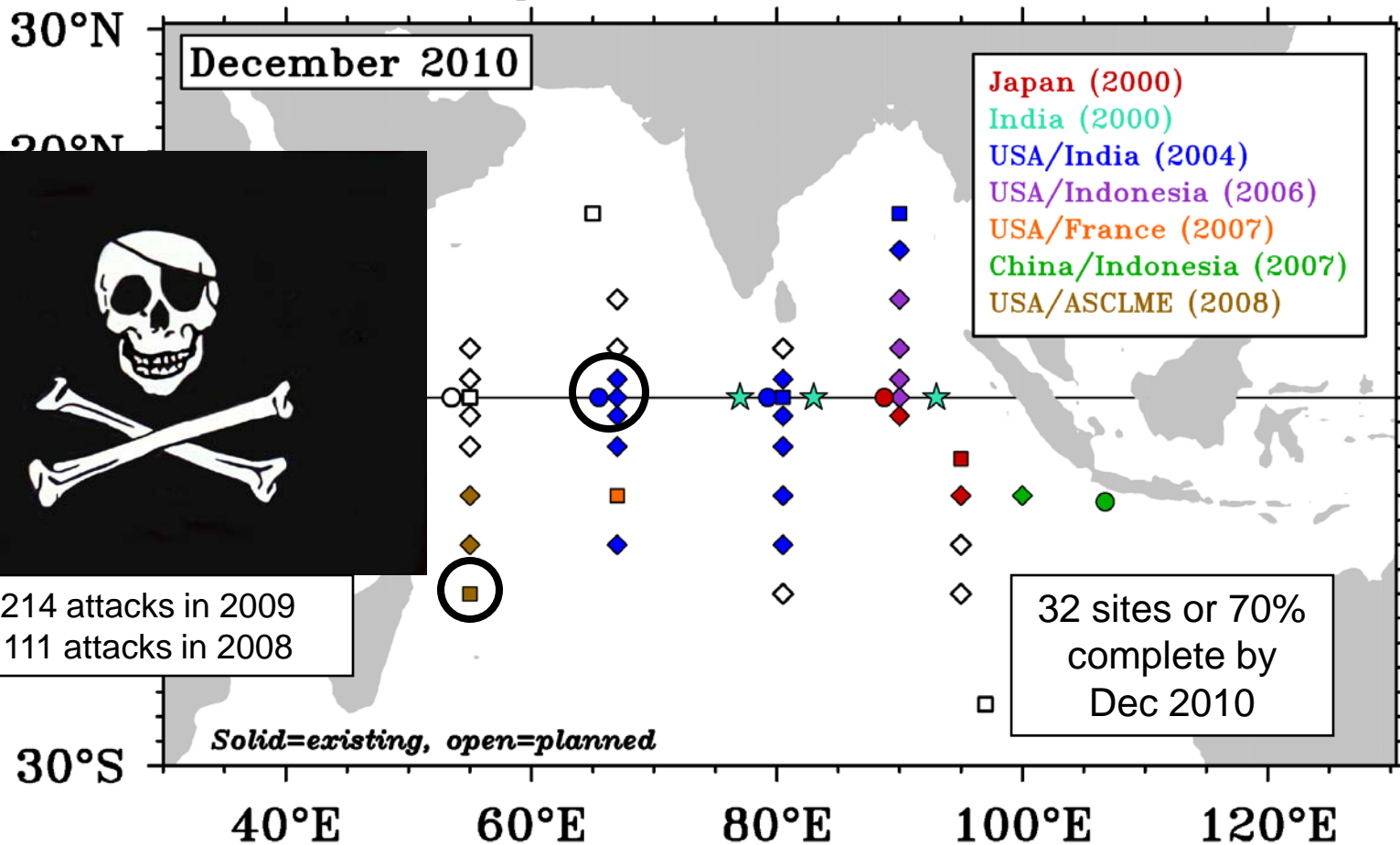
◆ Surface Mooring ■ Flux Reference Site ● ADCP ★ Deep Ocean



Planned Array Status: December 2010

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

◆ Surface Mooring ■ Flux Reference Site ● ADCP ★ Deep Ocean



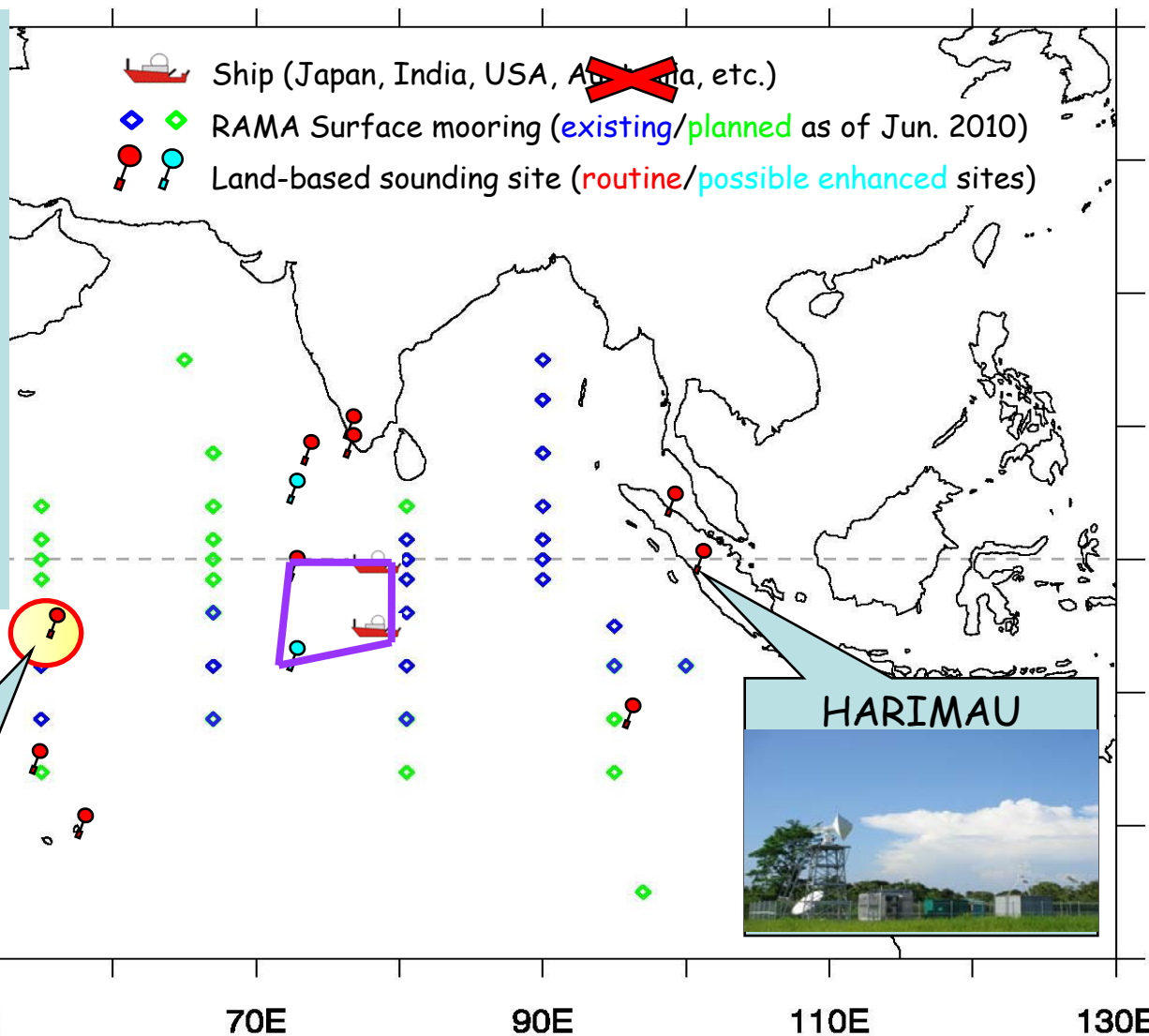
Coordination of process studies (CINDY/DYNAMO)

CINDY is a multi-national field and modeling study of the oceanic and atmospheric processes responsible for the initiation of the intraseasonal Madden-Julian Oscillation (MJO)

DYNAMO: the U.S. contribution to CINDY

Field phase scheduled for late 2011-early 2012

RAMA provides broad scale/long term context and platforms for enhanced measurements of ocean turbulence



Issues recognized at IOP-7

- Most of the RAMA implementation has been done under bilateral activities. There is, however, a limitation for securing the necessary resources only through the bilateral coordinations.
- Data return ratio should be improved.
- Vandalism requires additional cruises to fix the moorings/sensors.
- Piracy affects implementation of IndOOS.
- Enhancement of RAMA with biogeochemical sensors requires more resources.
- Coordinated process studies are significantly susceptible to conditions of resources available for participating groups.

Issues for IRF

- More stable and flexible resource management under multi-national coordination is strongly required.
- More support to IndOOS from national/institutional activities is highly appreciated.