Report of the

Tropical Moored Buoy Implementation Panel

to the

24ʳᵈ Session of the
Data Buoy Cooperation Panel

October 13-16, 2008
Cape Town, South Africa

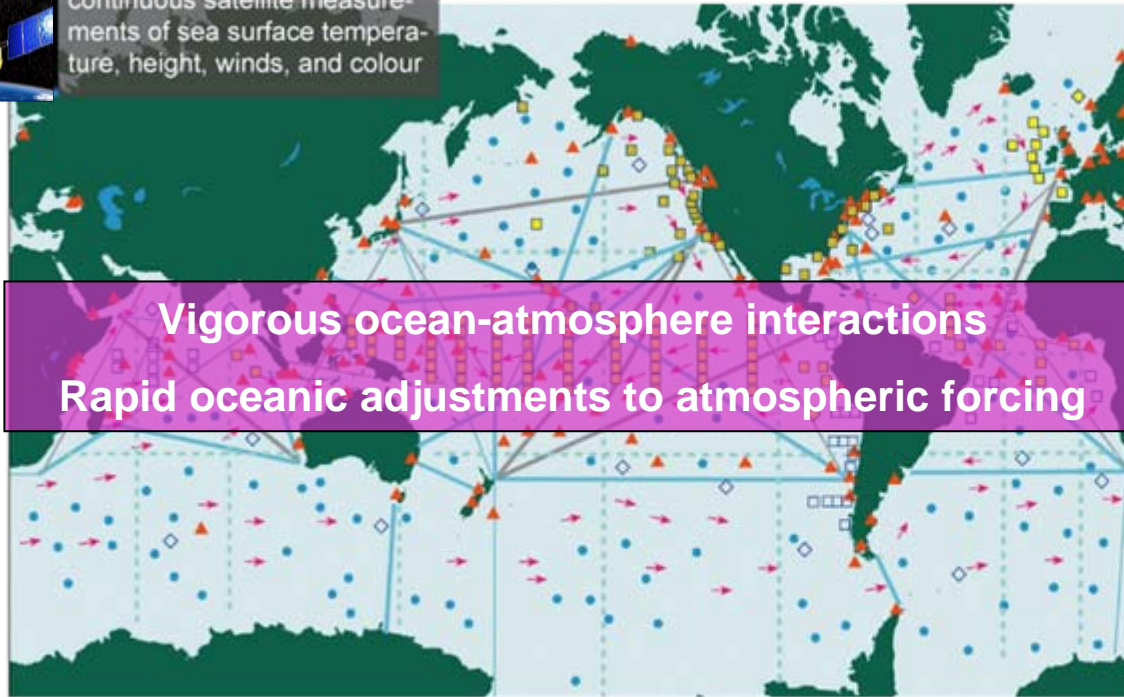# Initial Global Ocean Observing System for Climate
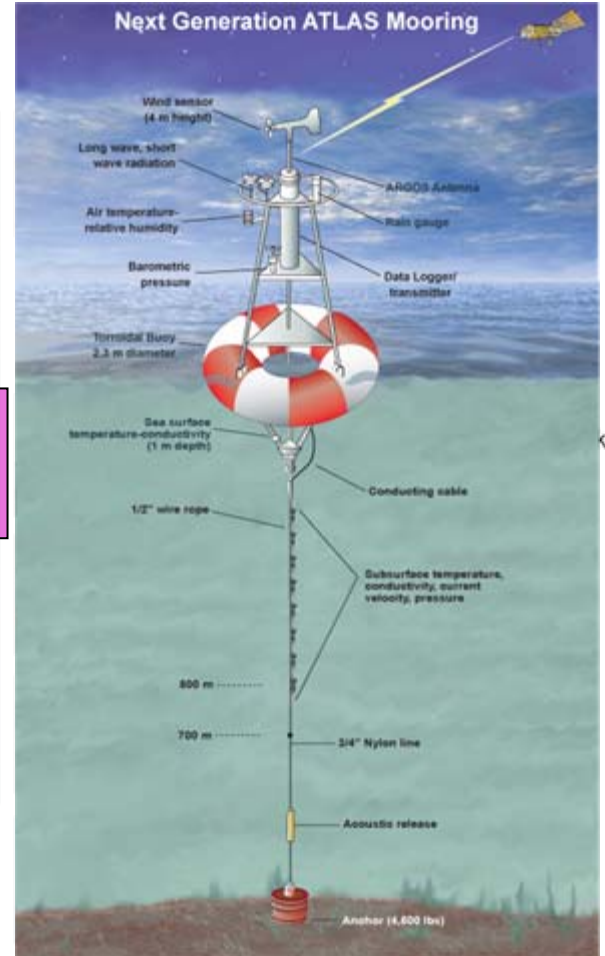## Status against the GCOS Implementation Plan and JCOMM targets

Total *in situ* networks **60%**

continuous satellite measure-ments of sea surface tempera-ture, height, winds, and colour

Vigorous ocean-atmosphere interactions

Rapid oceanic adjustments to atmospheric forcing

Next Generation ATLAS Mooring

Reference time series   24%   48% Global **reference** mooring network   79% Global tropical **moored** buoy network

58 sites   29 moorings planned   119 moorings planned
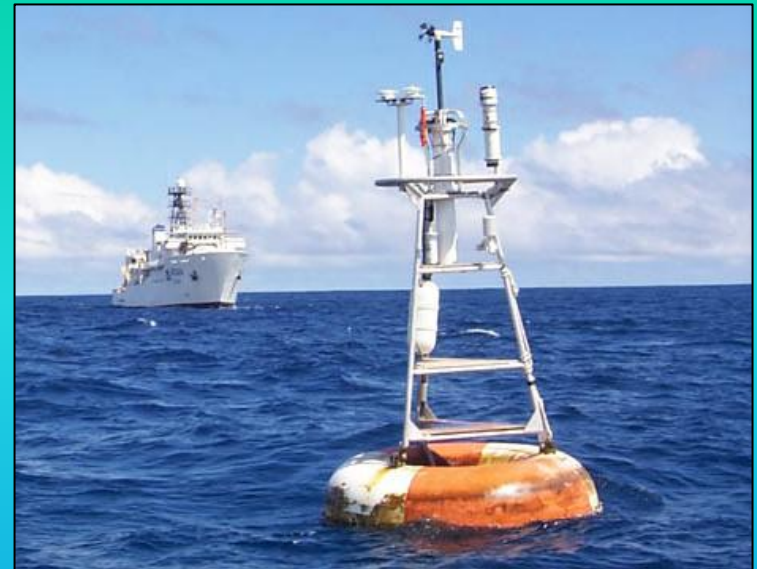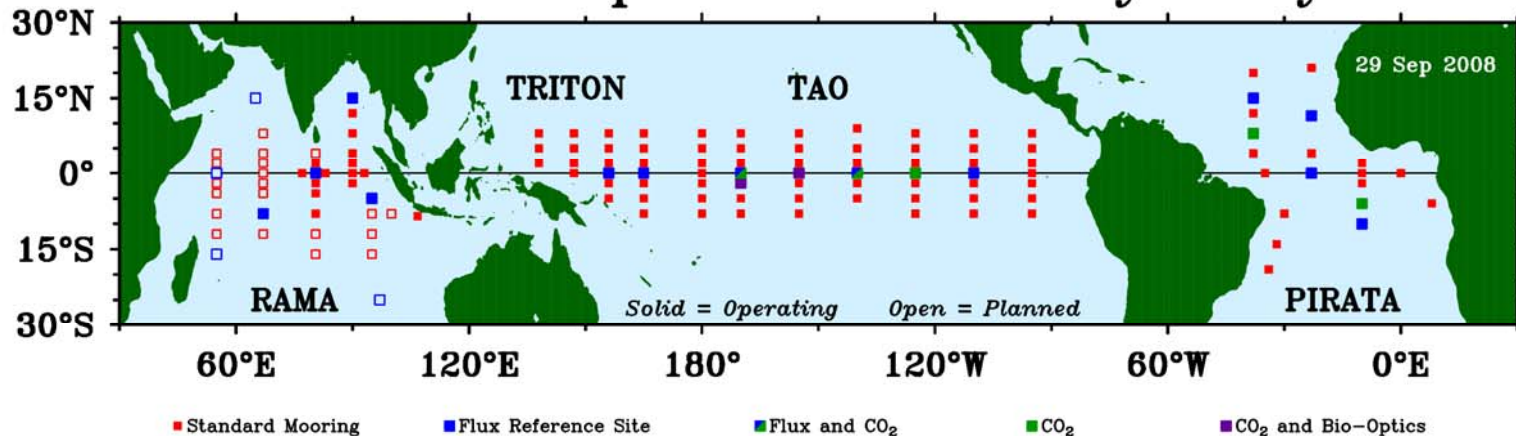
GCOS   GCOS   jcomm OCEANOGRAPHY & MARINE METEOROLOGY

Global Tropical Moored Buoy Array:
A coordinated, sustained, multi-national effort to develop and implement moored buoy observing systems for climate research and forecasting throughout the global tropics


Global Tropical Moored Buoy Array

29 Sep 2008

TRITON   TAO

RAMA   *Solid = Operating*   *Open = Planned*   PIRATA

■ Standard Mooring   ■ Flux Reference Site   ■ Flux and CO_2 ■ CO_2 ■ CO_2 and Bio−Optics

TAO Project Office, NOAA/PMEL

A contribution to GOOS, GCOS, and GEOSS

RAMA

Indian Ocean Observing System (IndOOS)

Research Moored **A**rray for African–Asian–Australian **M**onsoon **A**nalysis and Prediction (**RAMA**)

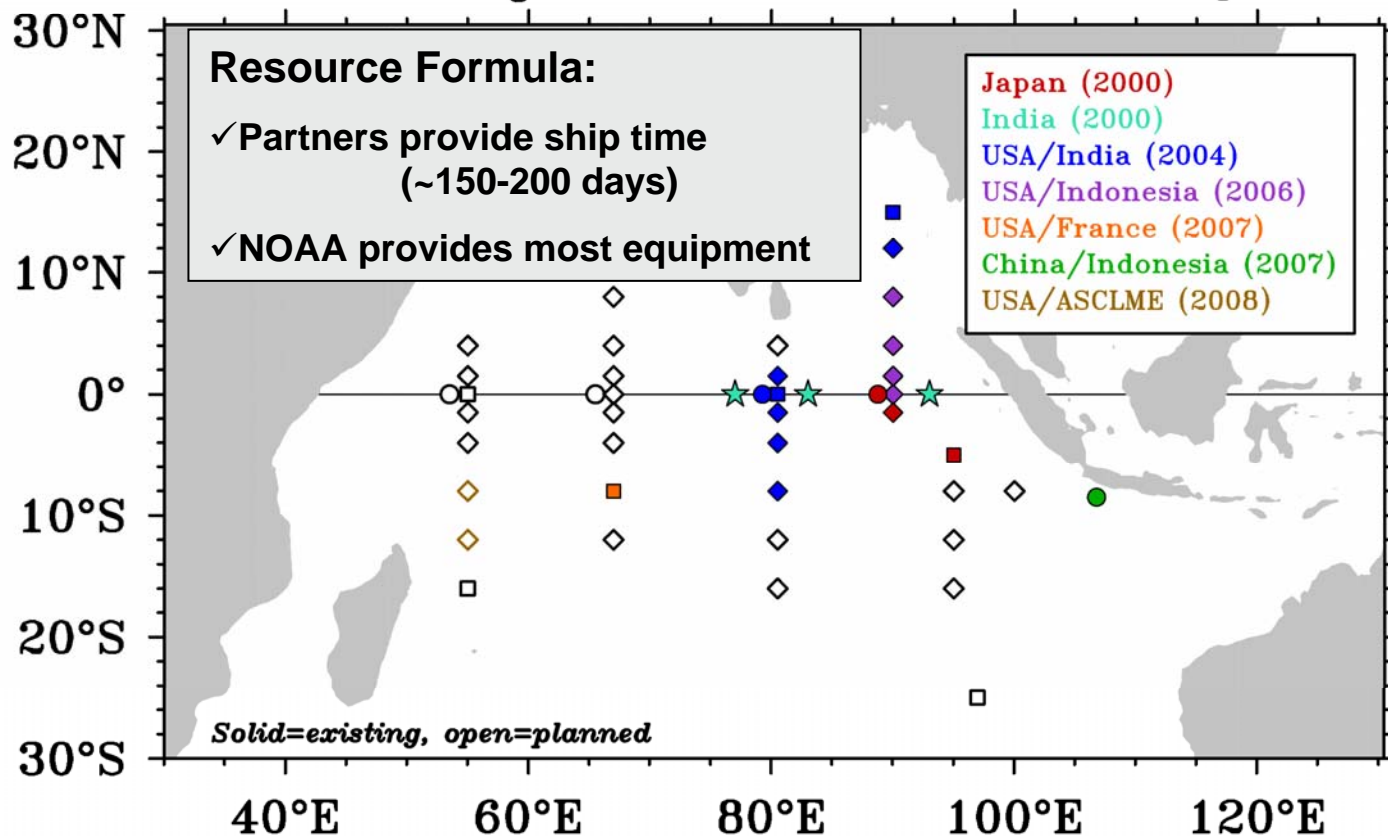□ **Surface Mooring**   ■ **Flux Reference Site**   ■ **ADCP**   □ **Deep Ocean**
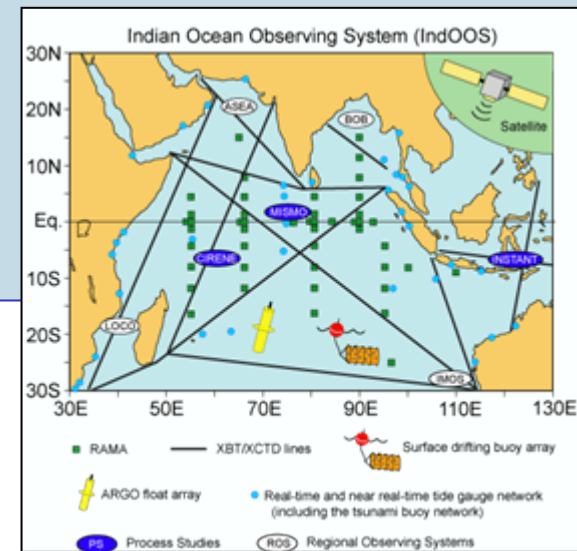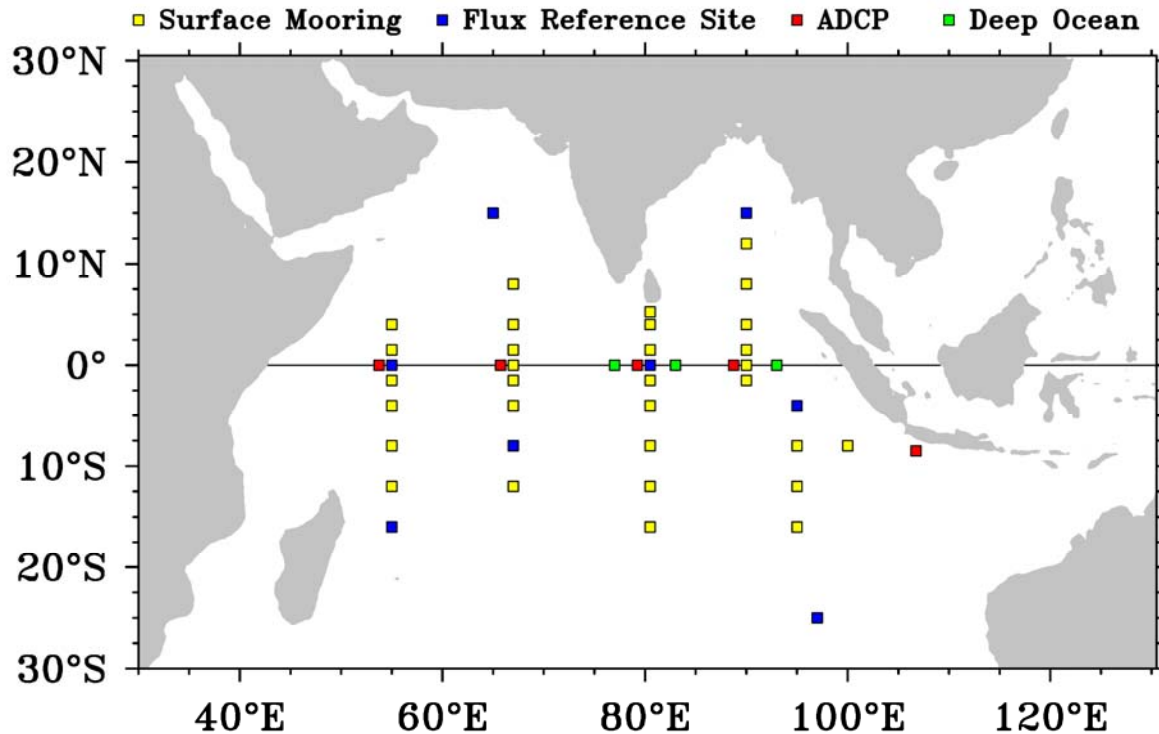
- **Plan developed by the International CLIVAR/GOOS Indian Ocean Panel in 2004 as part of "IndOOS"**

- **Basin scale, upper ocean (~500 m) focus.**

- **Design supported by numerical model observing system simulation studies.**

Manuscript on RAMA in press in the Bull. Am. Met. Soc.

RAMA: Present Status

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

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

Resource Formula:

✓**Partners provide ship time (~150-200 days)**

✓**NOAA provides most equipment**

Japan (2000)
India (2000)
USA/India (2004)
USA/Indonesia (2006)
USA/France (2007)
China/Indonesia (2007)
USA/ASCLME (2008)

Solid=existing, open=planned

47% of sites occupied by end of 2008 (22 of 46)

RAMA Field Work
October 2007 – September 2008
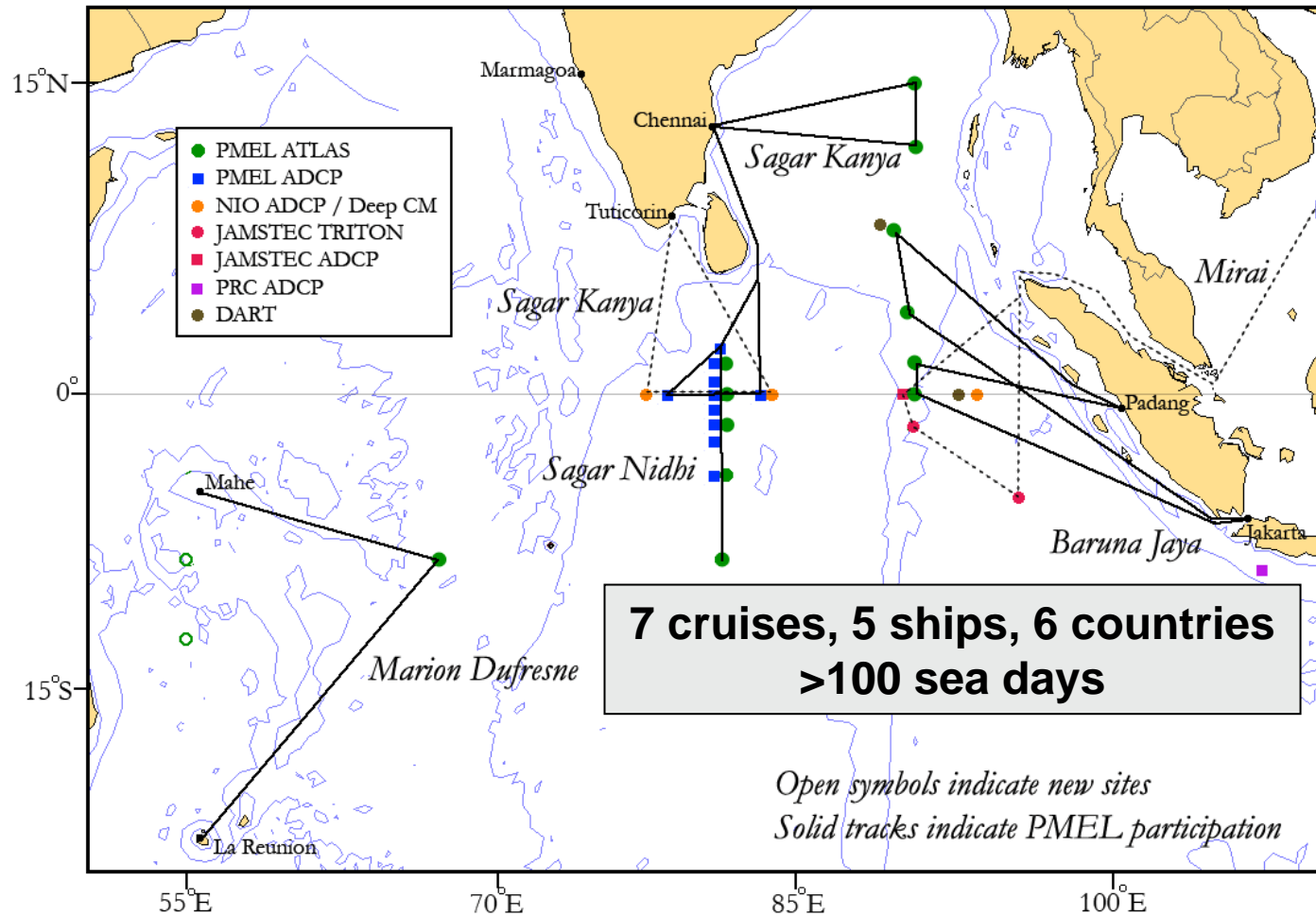
RV Sagar Nidhi
August 2-29, 2008
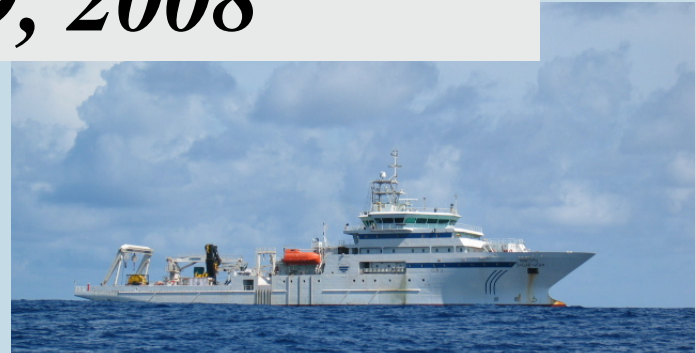
Deployed 5 ATLAS and 10 ADCP moorings

RV Sagar Nidhi
August 2-29, 2008

Recovered moorings heavily fouled with fishing line. Surface instrumentation stripped

RV Sagar Nidhi
August 2-29, 2008

Two prototype "vandal resistant" moorings deployed

Sample RAMA Timeseries

8ºS 67ºE

1.5ºN 80.5ºE

1.5ºS 80.5ºE
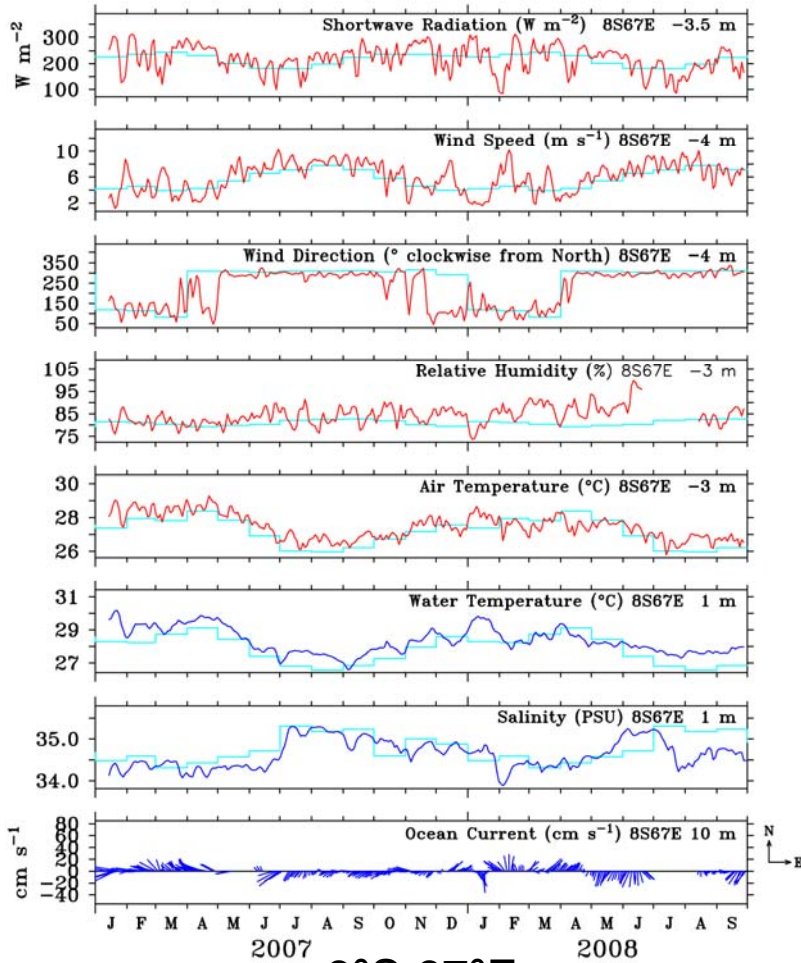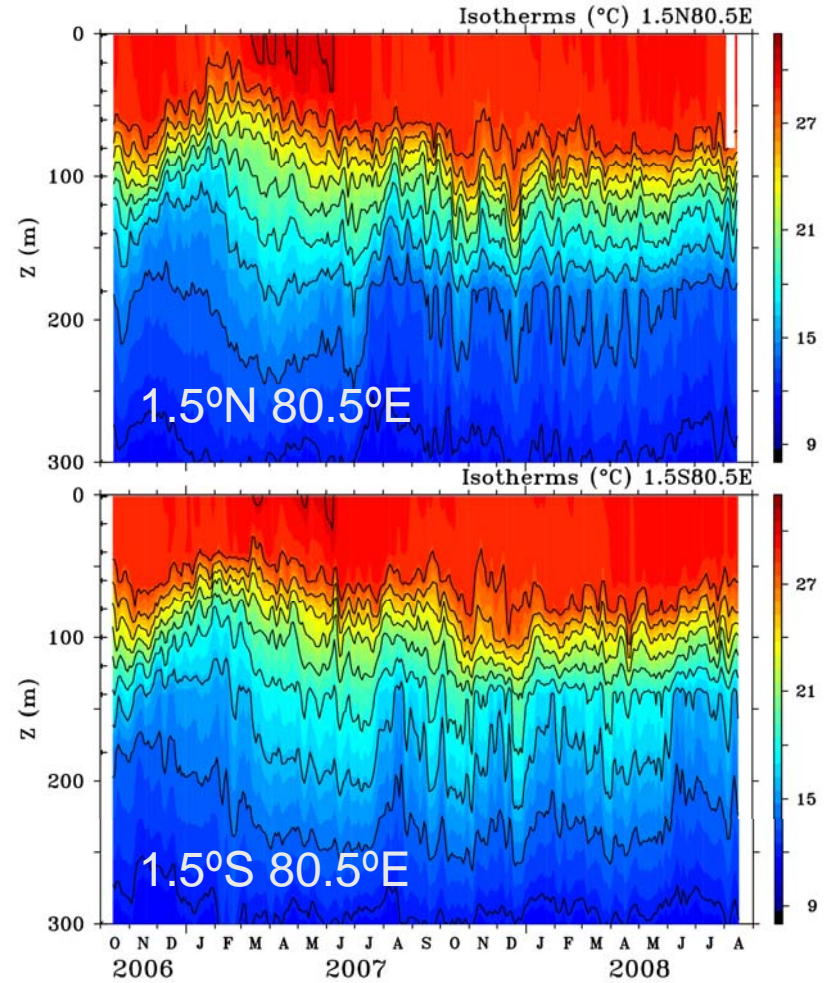
2006 Indian Ocean Dipole
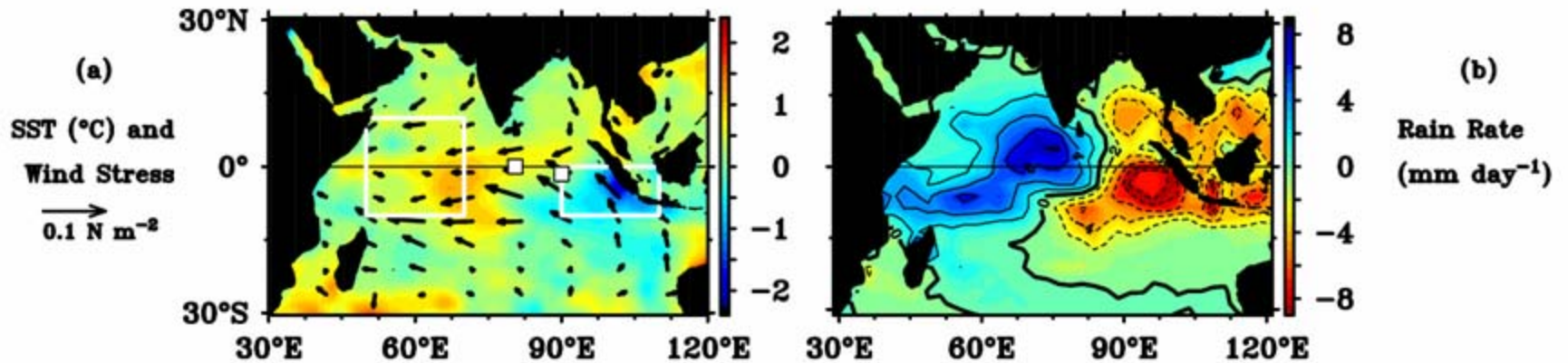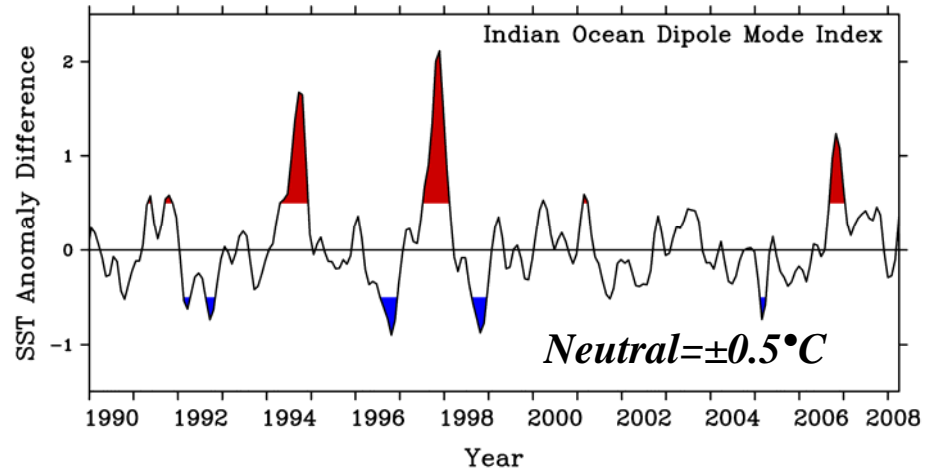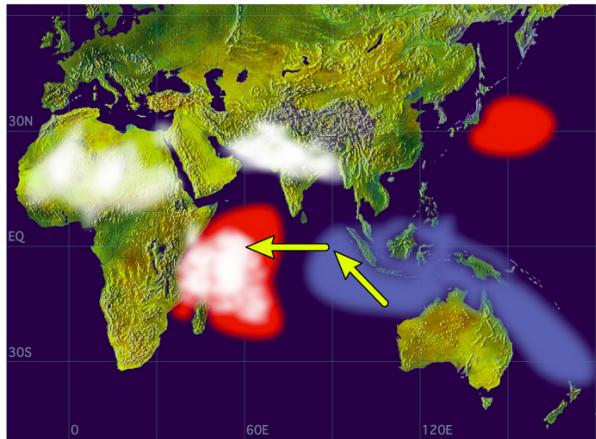
Comparison of Oct-Nov 2004 (Normal) & Oct-Nov 2006 (Dipole)
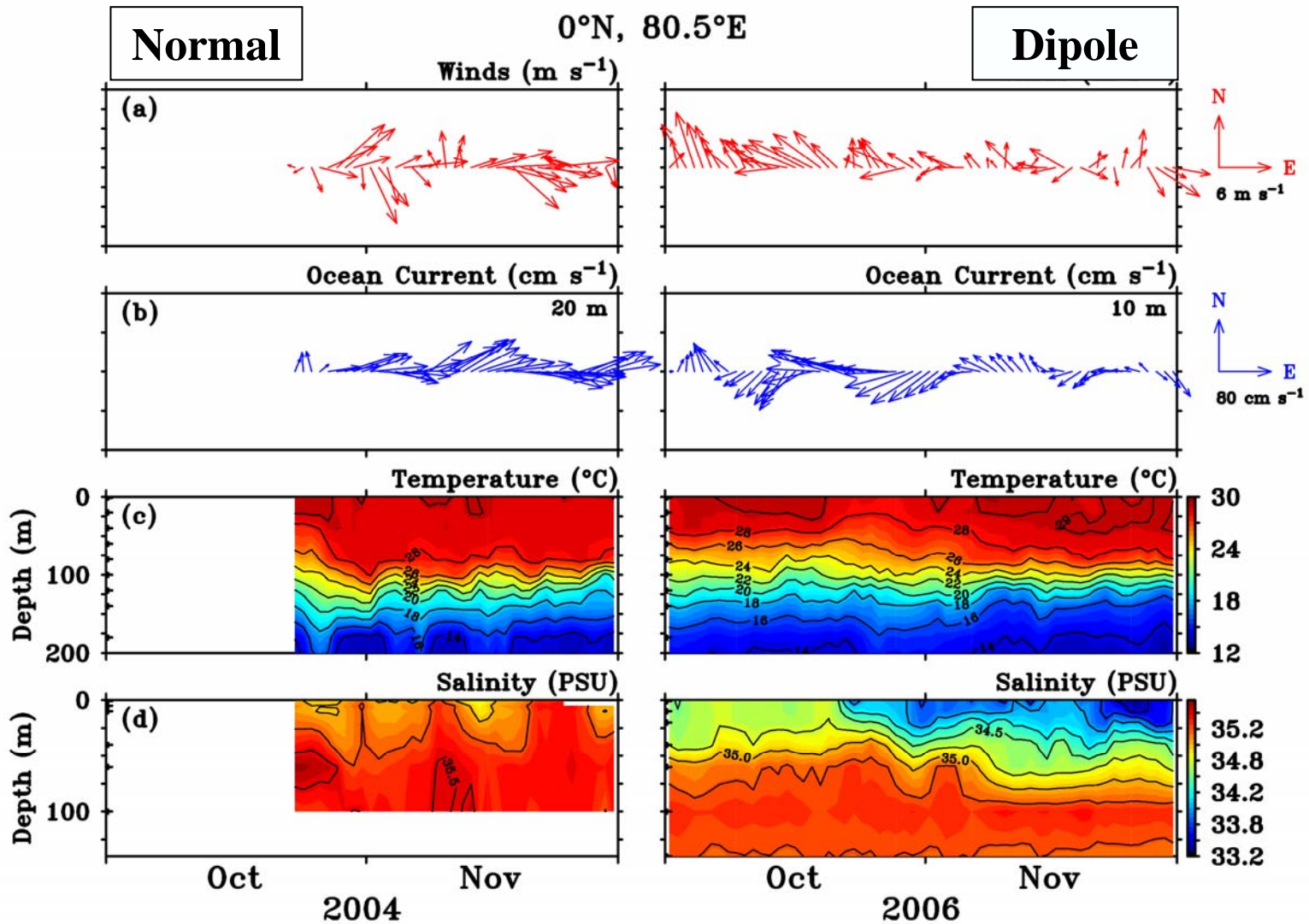
Cyclone Nargis
April-May 2008

Landfall on 2 May 2008
Category 3-4
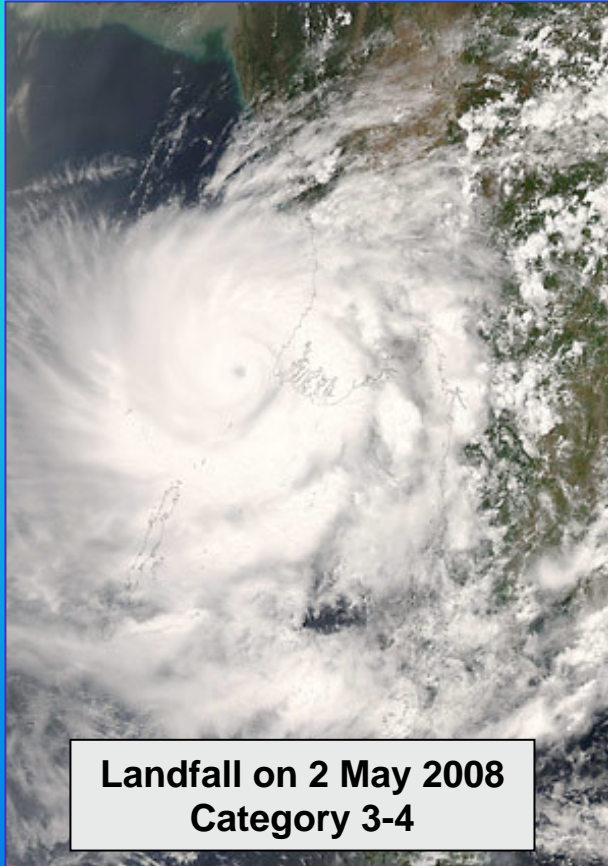
- \> 130,000 dead or missing
- \> US $10B in economic losses

Cyclone Nargis

15° N, 90° E

Spot Hourly Data (~ 8 per day)

TMI/AMSR SST
2 May 2008
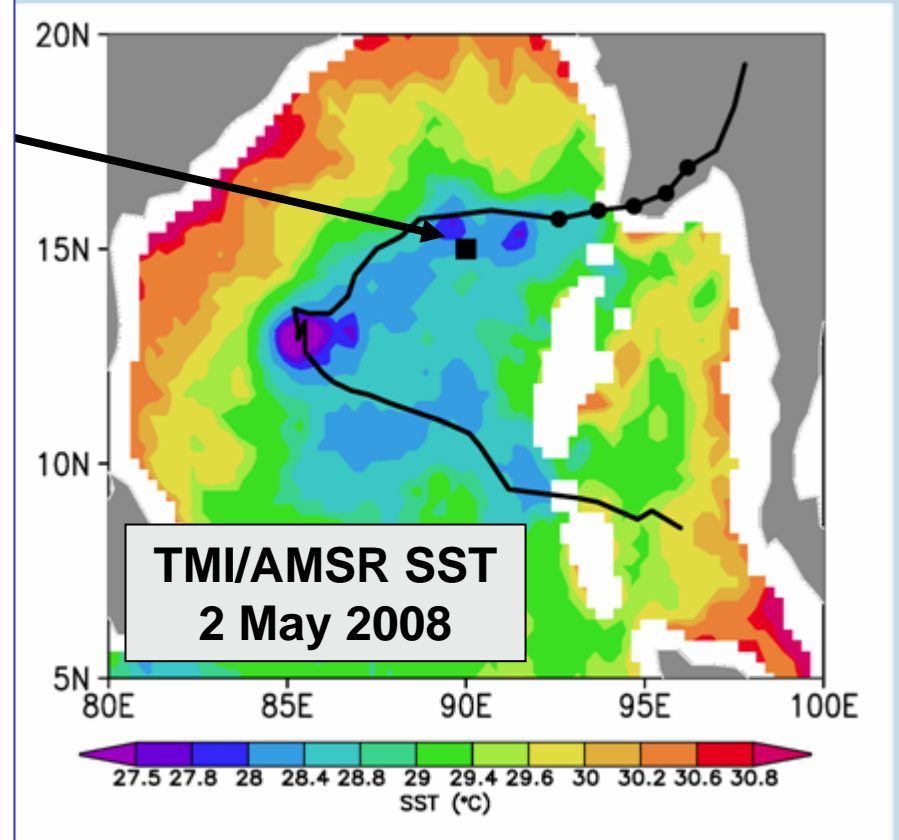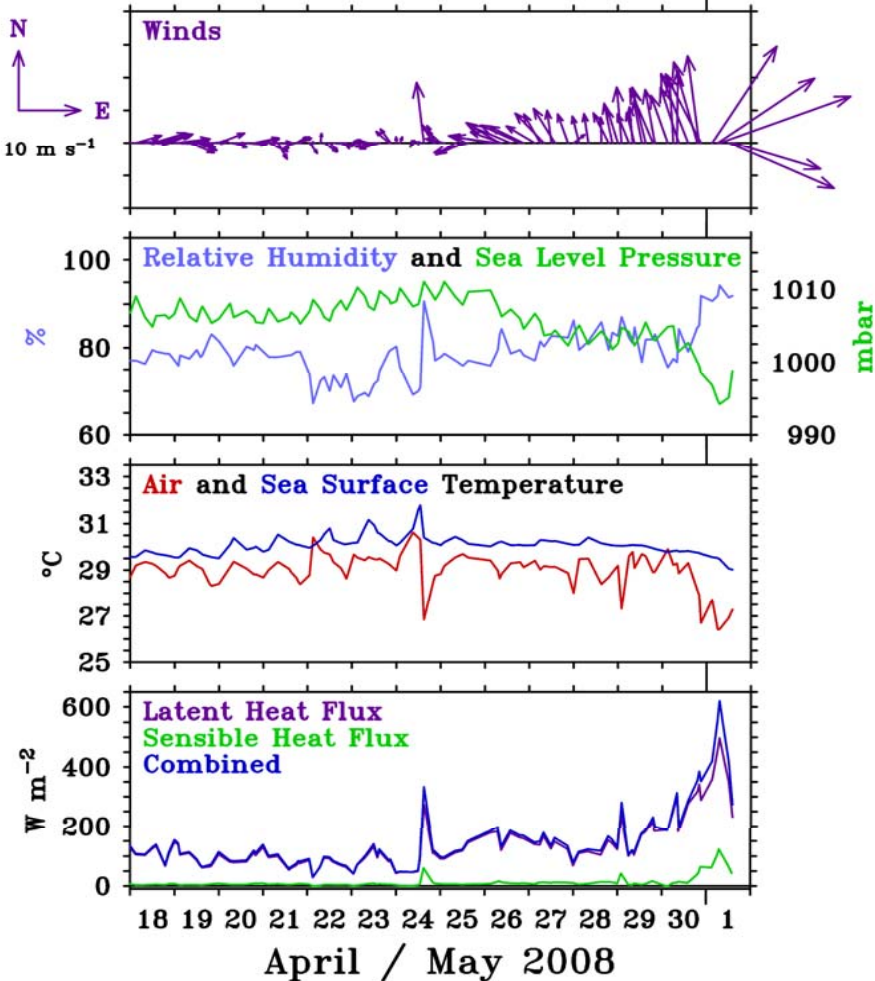
International Cooperation

ORV Sagar Kanya
deploys RAMA mooring
August 2004
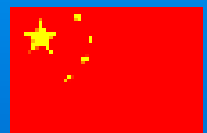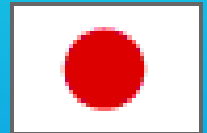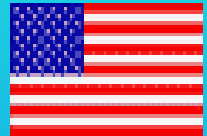
- *USA (NOAA) and India (MoES) sign MOU in 2008*

- USA (NOAA) and Japan (JAMSTEC) sign MOU in 2008

- USA (NOAA) and Indonesia (DKP and BPPT) sign MOU in 2007

- China (SOA) and Indonesia (DKP) sign MOU in 2007

- U. Paris and ASCLME are committing ship time to expand RAMA into SW Indian Ocean/MOU's under discussion

Proposed RAMA Field Work October 2008 – September 2009
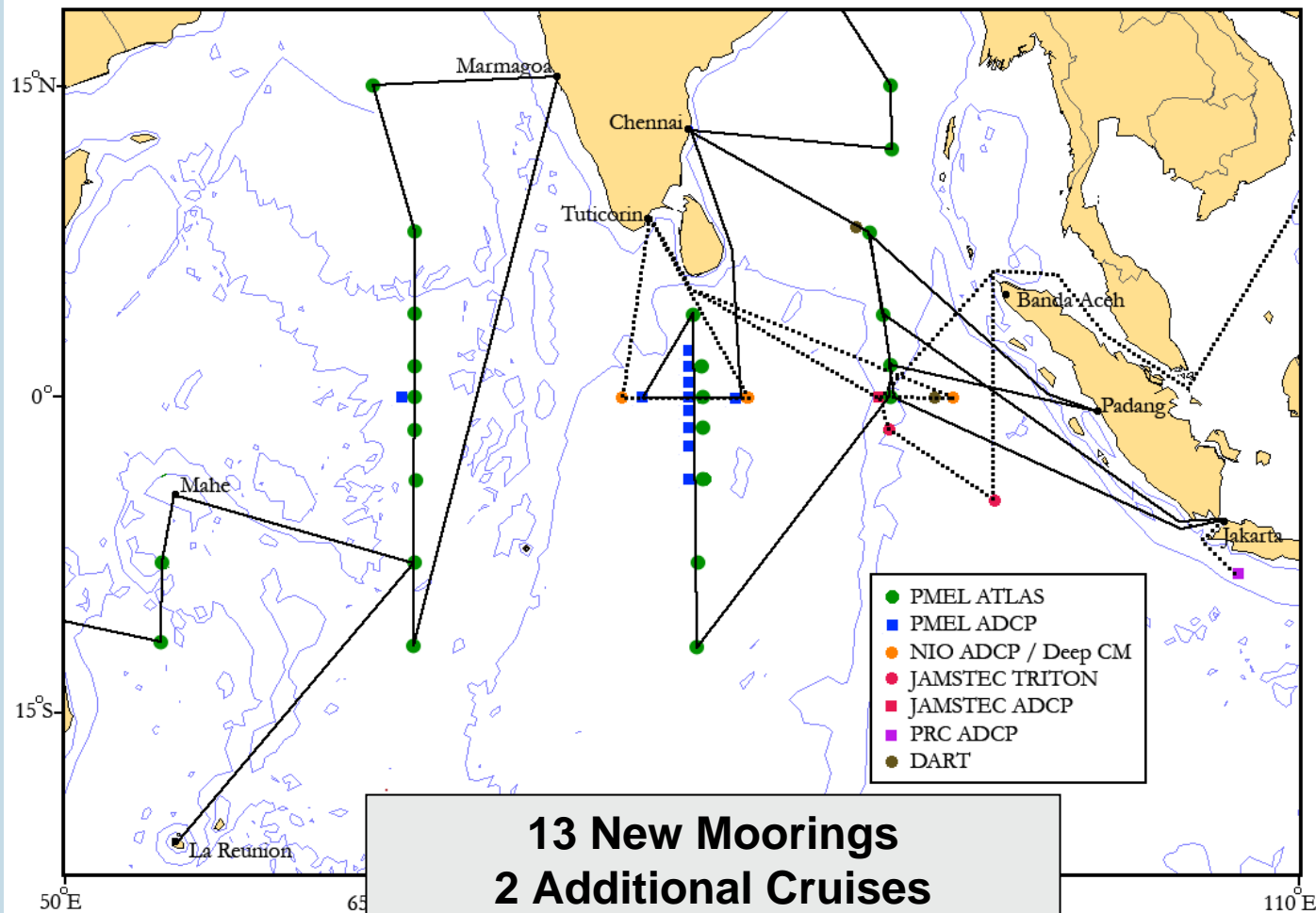
13 New Moorings
2 Additional Cruises
New collaboration - ASCLME

RAMA/ASCLME Collaboration

Dr Fridtjof Nansen
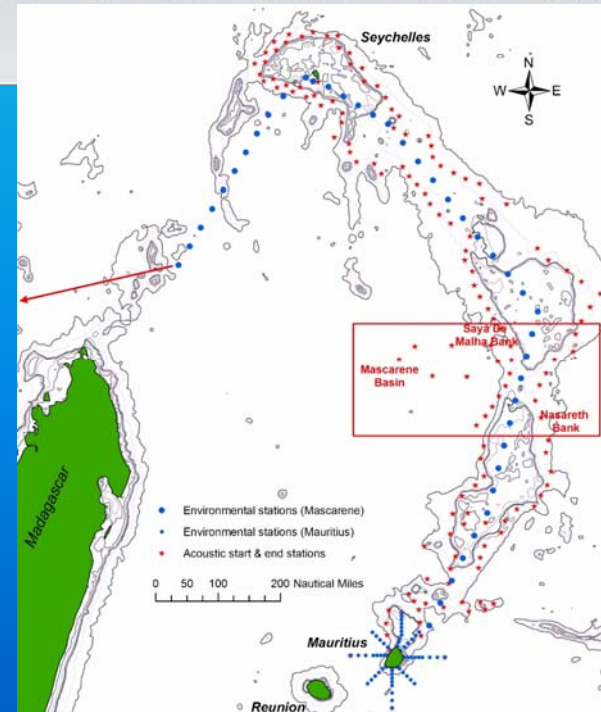
TAO STATUS

TAO/TRITON Mooring Real-Time Data Return

October 2007 - September 2008
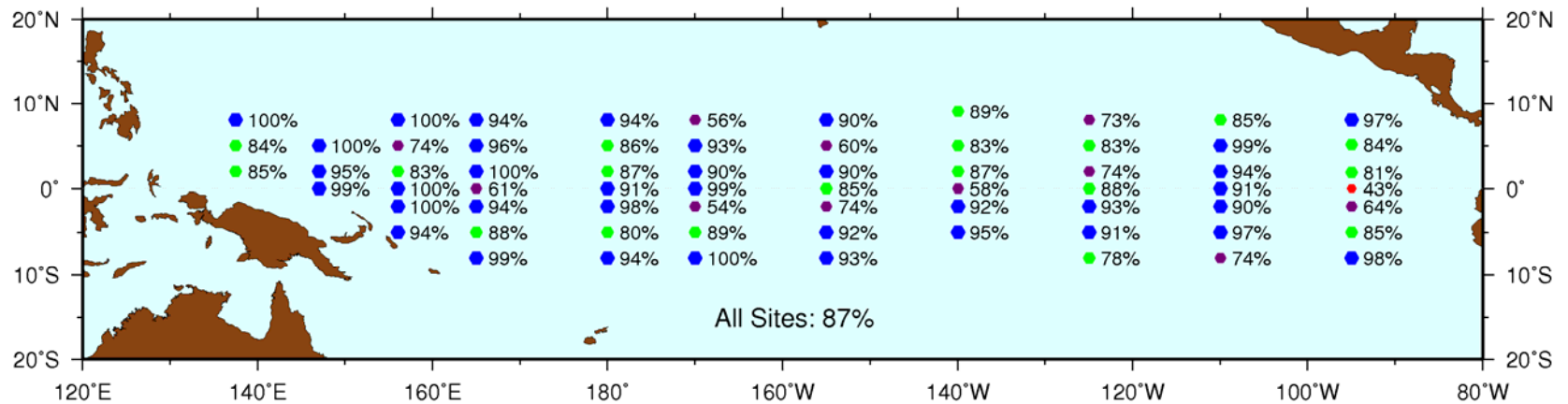
Primary Sensors

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

Current ENSO Conditions

ENSO-neutral conditions are expected to continue through the end of 2008.
**ELNIÑO/SOUTHERN OSCILLATION (ENSO) DIAGNOSTIC DISCUSSION
CLIMATE PREDICTION CENTER/NCEP/NWS**
11 September 2008

PIRATA STATUS

PIRATA Mooring Real-Time Data Return

October 2007 - September 2008

North Atlantic SSTs in 2006

JJA Differences, 2006-2005

Wind & SST
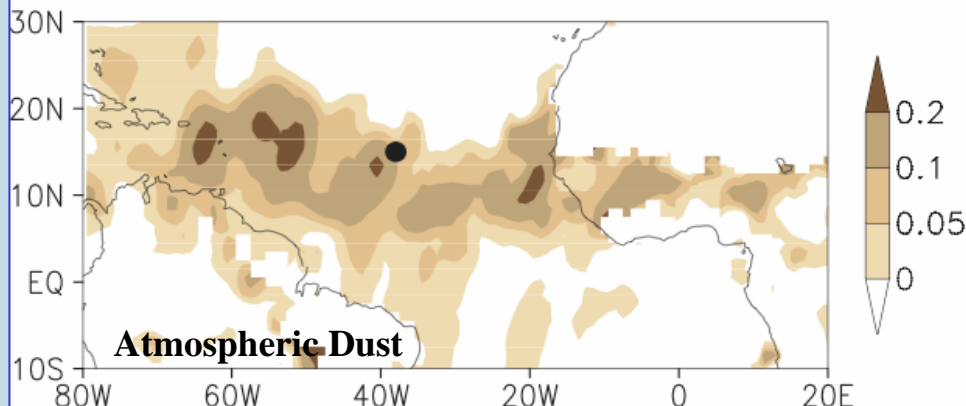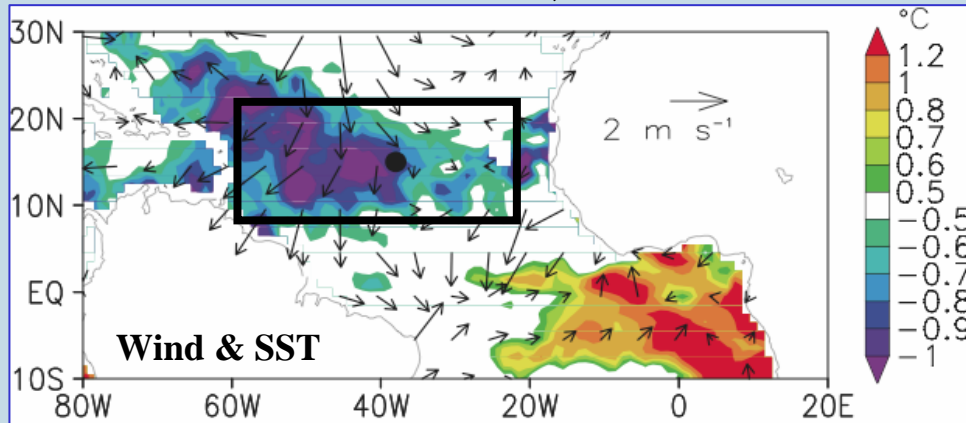
Atmospheric Dust

"**Increased atmospheric loading of Saharan dust over the North Atlantic during the 2006 hurricane season…initiated rapid cooling and suppressed tropical storm and hurricane activity…**"

Lau & Kim: How Nature Foiled the 2006 Hurricane Forecast. EOS, 2007.
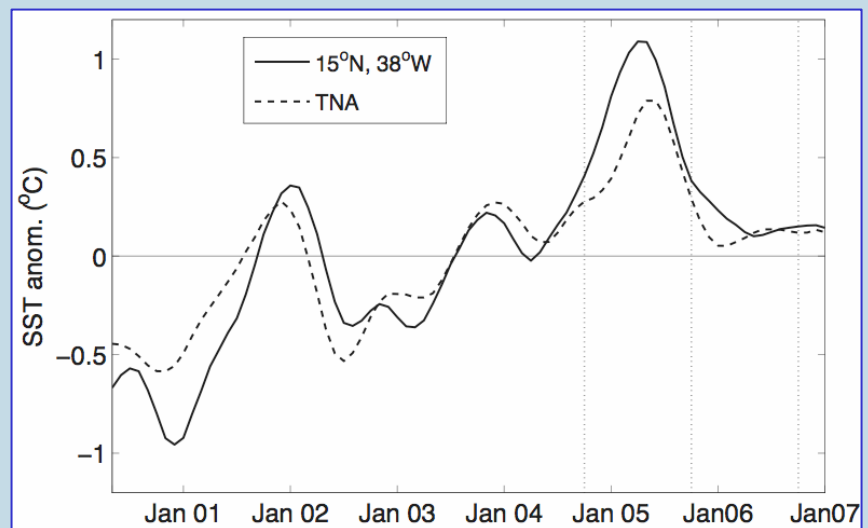
Mixed Layer Heat Balance
15 °N, 38 °W
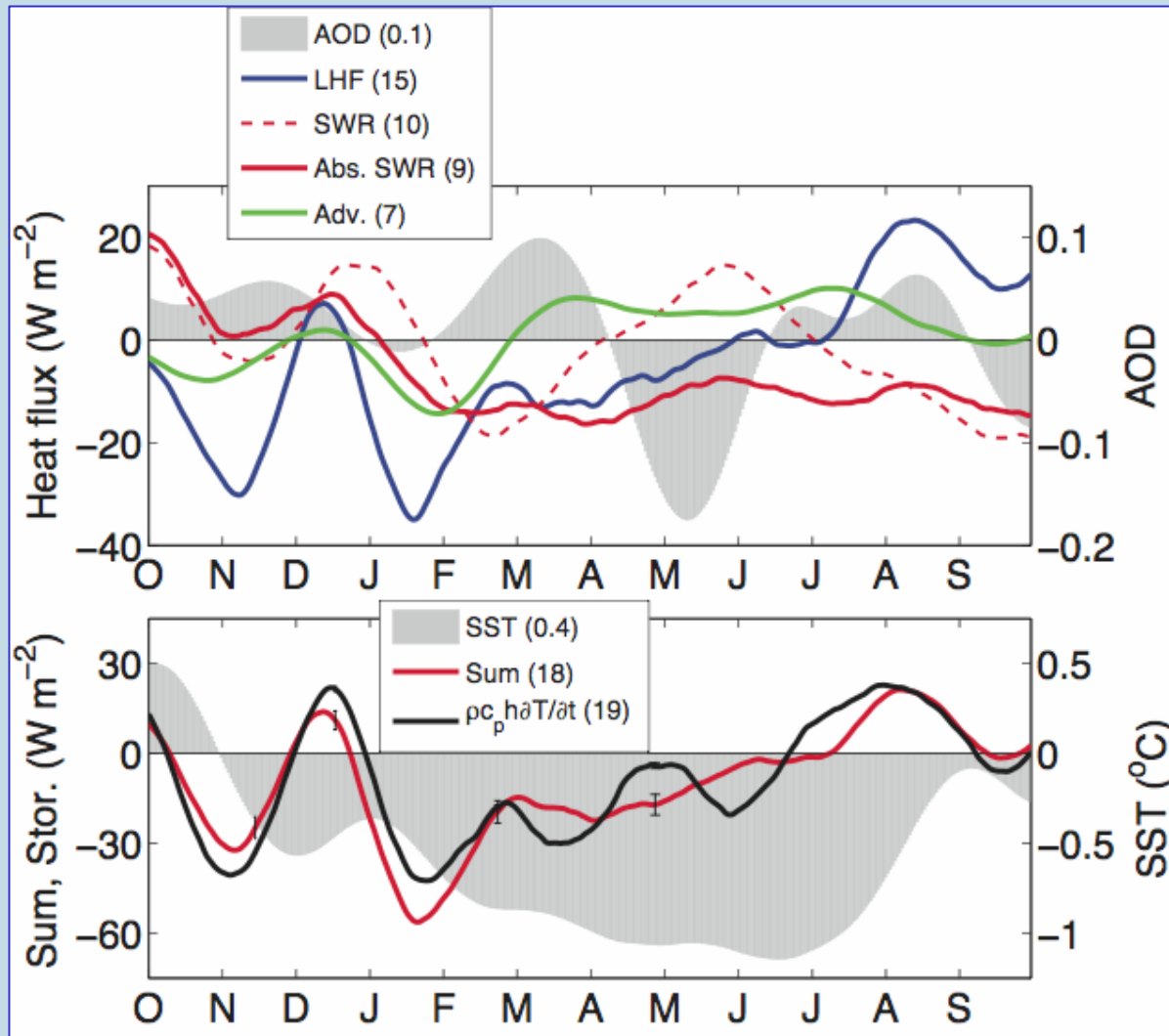
"…most of the anomalous cooling occurred prior to the period of enhanced dustiness and was driven primarily by wind-induced latent heat loss…dust-induced changes in short wave radiation did not play a major direct role in the cooling that led up to the 2006 Atlantic hurricane season."

Foltz, G.R., and M.J. McPhaden, 2008: Impact of Saharan dust on tropical North Atlantic SST. J. Climate, in press.

Tropical Moored Buoy Web Pages

Summary

- Progress towards RAMA implementation:

  October 2007 – 15 sites (33%)

  October 2008 – 20 sites (43%)

  October 2009 – 33 sites (72%)

- International partnerships

- Engineering development

- Open access data policy

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