

Report of the

**Tropical Moored Buoy
Implementation Panel**

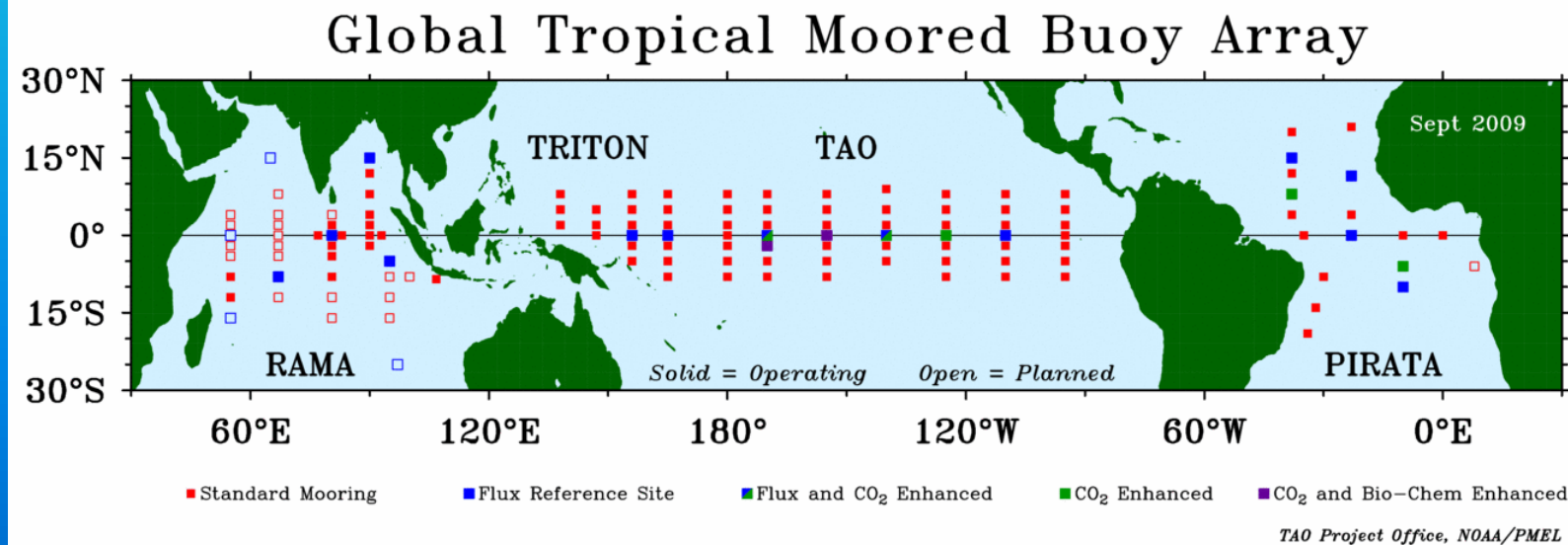
to the

**25th Session of the
Data Buoy Cooperation Panel**

September 28 – October 1, 2009
Paris, France

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

McPhaden, *et al.*, review paper presented at OceanObs09. Draft manuscript available at <http://www.oceanobs09.net/>



A contribution to GOOS, GCOS, and GEOSS

RAMA Present Status

52% of sites occupied

Research **M**oored **A**rray for African-Asian-Australian
Monsoon **A**nalysis and Prediction (**RAMA**)

Flux Reference Site ● ADCP ★ Deep Ocean

Up to 8 additional sites proposed. By October 2010 the array could reach 80% implementation.

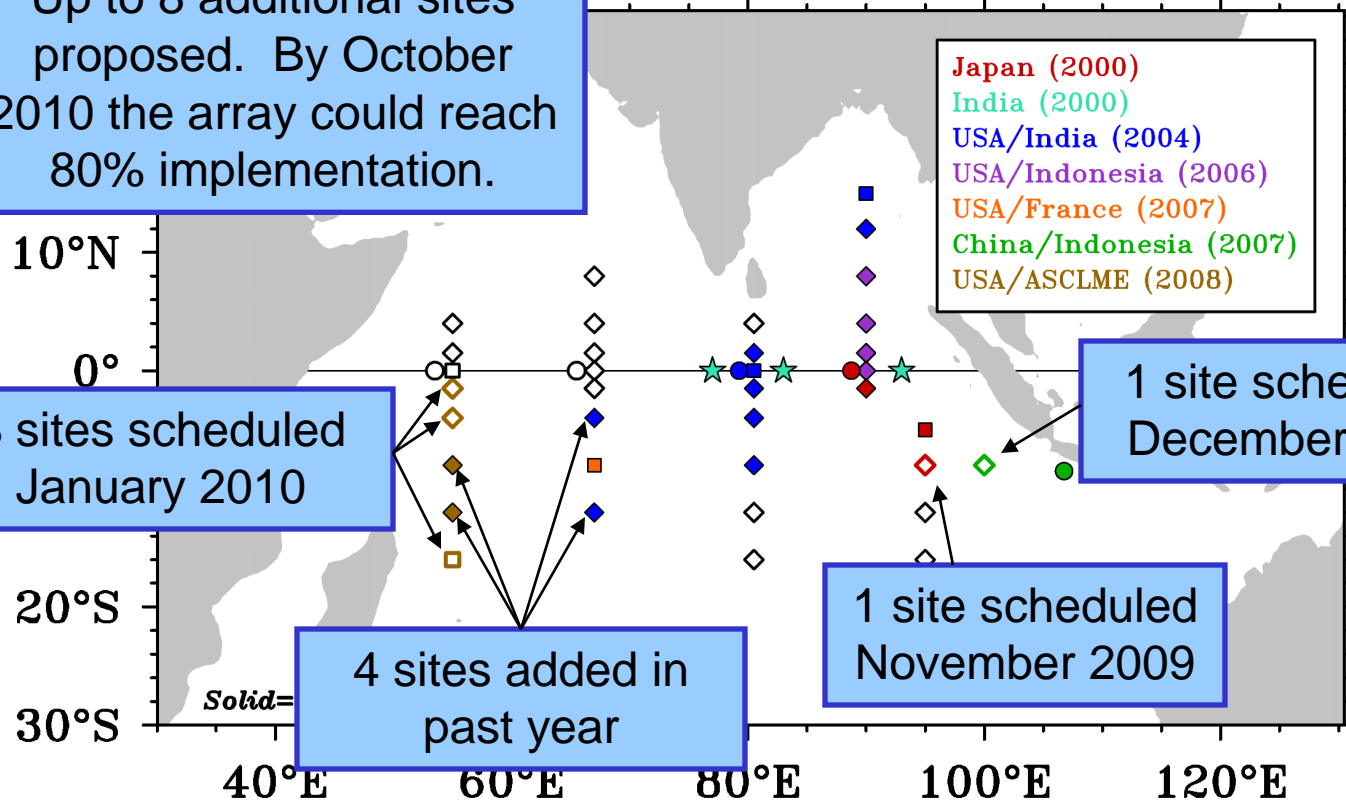
3 sites scheduled
January 2010

4 sites added in
past year

1 site scheduled
November 2009

1 site scheduled
December 2009

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



RAMA Resource Formula

Regional partners provide ship time

October 2008 - September 2009

India - 88 days

Indonesia - 25 days

Japan - 20 days

ASCLME - 10 days

NOAA provides most equipment

Though September 2009

US - 17 sites

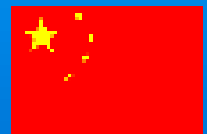
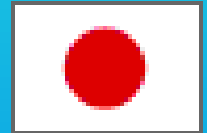
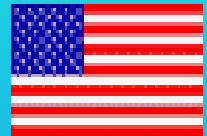
Japan - 3 sites

India - 3 sites

China - 1 site

France – SLP at 2 additional sites

RAMA International Cooperation

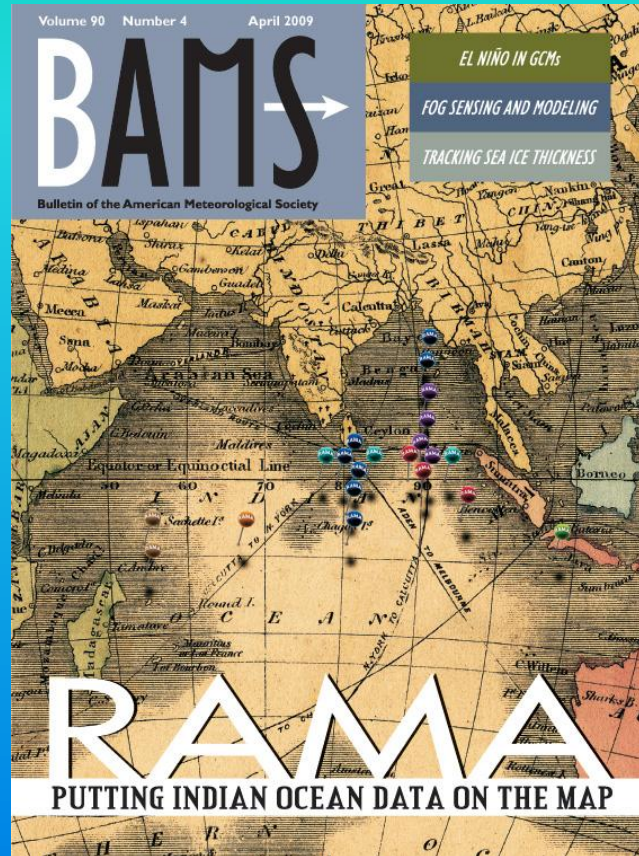


Recent developments:

- **USA (NOAA) and India (MoES) sign IA in 2008**
- **USA (NOAA) and Japan (JAMSTEC) sign IA in 2009**
- **USA (NOAA) and Indonesia (DKP and BPPT) sign IA in 2009**
- **USA (NOAA) and ASCLME IA being drafted**

RAMA Notes

- Meteo France is supporting additional surface pressure measurements from ATLAS moorings in the southern portion of the array. Two have been deployed and another 2 are planned.
- Addition of CO₂ measurement is under discussion.
- Vandalism results in loss of equipment and data. Technical solutions are being developed and tested. Prototype conehead buoys have provided more subsurface data and recently were enhanced with surface met sensors.
- The threat of piracy has prohibited implementation in the western basin and Arabian Sea. Seychelles Coast Guard personnel will provide security and air surveillance for upcoming cruise.
- Sri Lankan clearance has been problematic.
- Customs complications result in delay of equipment delivery and return, which impacts cruise schedules and resource inventory.



Array described in detail in Bull. Am. Meteorol. Soc., 90.


TAO/TRITON Notes

- Present weak El Niño conditions are expected to strengthen and last through the Northern Hemisphere 2009-2010 winter.
- TAO/TRITON data return is relatively low: 81% over past year from primary sensors.
- Real time data return in eastern basin is especially low at present. Presumably due to vandalism. Cruise is underway to restore the data flow.
- Ship time provided for TAO in last year was lower than normal. Scheduled to increase in coming year, but will remain below previous norm.
- JAMSTEC has developed and tested a smaller version of the TRITON mooring. Named M-TRITON. Decrease in size allows deployment from smaller ships.

PIRATA Notes

- Maintained in 17 ATLAS, 1 ADCP
- Data return 85% over past year.
- Ship support adequate to service each site ~annually.
- Array is providing platforms for collaborative CO₂ and biochemical measurements.
- Meteo France to support additional SLP at one PIRATA site.


Tropical Moored Buoy Array Web Pages



Pacific Marine Environmental Laboratory

Tropical Atmosphere Ocean project

Michael J. McPhaden, Director

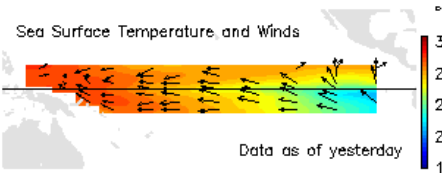


Home
Project overview
Data display
Data delivery
El Niño & La Niña
Site map

Find


Tuesday August 5, 2008 (PDT)

Real-time data from moored ocean buoys for improved detection, understanding and prediction of El Niño and La Niña.



Sea Surface Temperature and Winds

Data as of yesterday




[The TAO Story](#)

NEW! [The Global Tropical Moored Buoy Array](#)

Try our combined [Display and Delivery Page](#) which includes more comprehensive data and features, like the ability to download what you view

Learn about [Warm Water Volume and ENSO](#)



U.S. Department of Commerce Gold Medal in 1997 "For...bringing on line an unparalleled oceanographic and atmospheric observing system of global importance"

Home
[Project overview](#)
[Data display](#)
[Data delivery](#)
[El Niño & La Niña](#)
[Site map](#)

TAO Project Office

NOAA | [Pacific Marine Environmental Laboratory](#)

7600 Sand Point Way NE

Seattle, WA 98115

atlasrt@noaa.gov

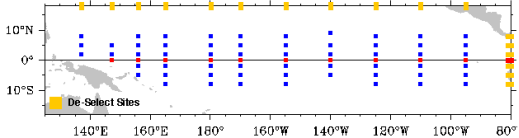
[Credits](#) | [Disclaimer](#) | [Privacy Policy](#)

Tropical Atmosphere Ocean project
Home
Project overview
Data display and delivery
El Niño & La Niña
Site map

T.A.O. Data display and delivery

Find

To select mooring sites, click orange boxes to select lines of sites, click and hold on your mouse to draw a box around sites, or click single sites. Red indicates which sites are selected. Solid squares show where all selected variables are available. Half filled squares show where some are available. Empty squares show where none are available. This page may take a few moments to load on slower networks and computers.



Time Series
Time Section
Lat Lon Map
Depth Section

One Variab
 One Site
 Separate Plot
 Overlay

SW Rad
 LW Rad
 Rain
 Wspd
 Uwnd
 Vwnd
 Wdir
 Wind Ve
 RH

Air T
 SLP
 SST
 T(z)
 SSS
 S(z)
 SSD
 D(z)
 Heat

Dyn Ht
 20C
 Ucur
 Vcur
 Cur Vec
 Uadcp
 Vadcp
 Long
 Lat

TAO/TRITON (Pacific) Monthly

1979 January 20 2008 August 14

files by site: ascii None

Definitions
Availability
Clear
Deliver
Display

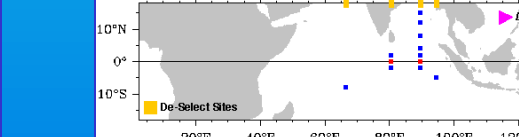
Non-JAVA Version: [Old Data Display](#) [Old Data Delivery](#) [Trouble-shooting](#) [Comments or Suggestions?](#)
 New OS X Users: [Safari](#) and [Firefox](#) are the recommended browsers.
[Acknowledgment for use of TAO, PIRATA, and RAMA data](#)

Tropical Atmosphere Ocean project
Home
Project overview
Data display and delivery
El Niño & La Niña
Site map

T.A.O. Data display and delivery

Find

To select mooring sites, click orange boxes to select lines of sites, click and hold on your mouse to draw a box around sites, or click single sites. Red indicates which sites are selected. Solid squares show where all selected variables are available. Half filled squares show where some are available. Empty squares show where none are available. This page may take a few moments to load on slower networks and computers.



Time Series
Time Section
Lat Lon Map
Depth Section

One Variab
 One Site
 Separate Plot
 Overlay

Uwnd
 Vwnd
 Wdir
 Wind Ve
 RH

SSS
 S(z)
 SSD
 D(z)
 Heat

Cur Vec
 Uadcp
 Vadcp
 Long
 Lat

RAMA (Indian) Monthly

2004 October 23 2008 August 6

files by site: ascii None

Definitions
Availability
Clear
Deliver
Display

Non-JAVA Version: [Old Data Display](#) [Old Data Delivery](#) [Trouble-shooting](#) [Comments or Suggestions?](#)
 Mac OS X Users: [Safari](#) and [Firefox](#) are the recommended browsers.
[Acknowledgment for use of TAO, PIRATA, and RAMA data](#)