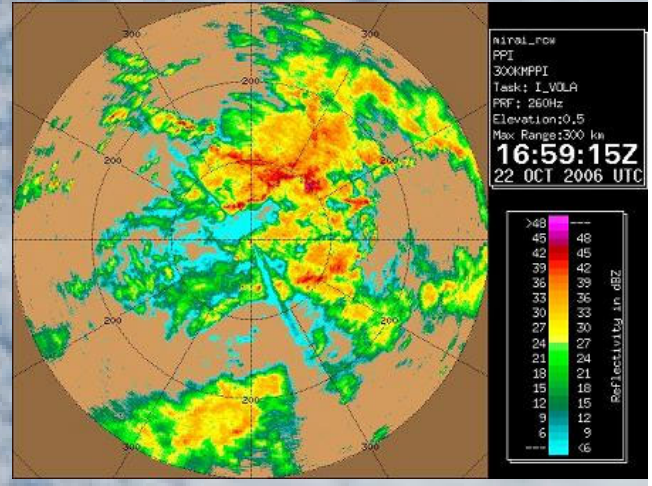


Air-Sea Interaction Study in the Tropics by JAMSTEC

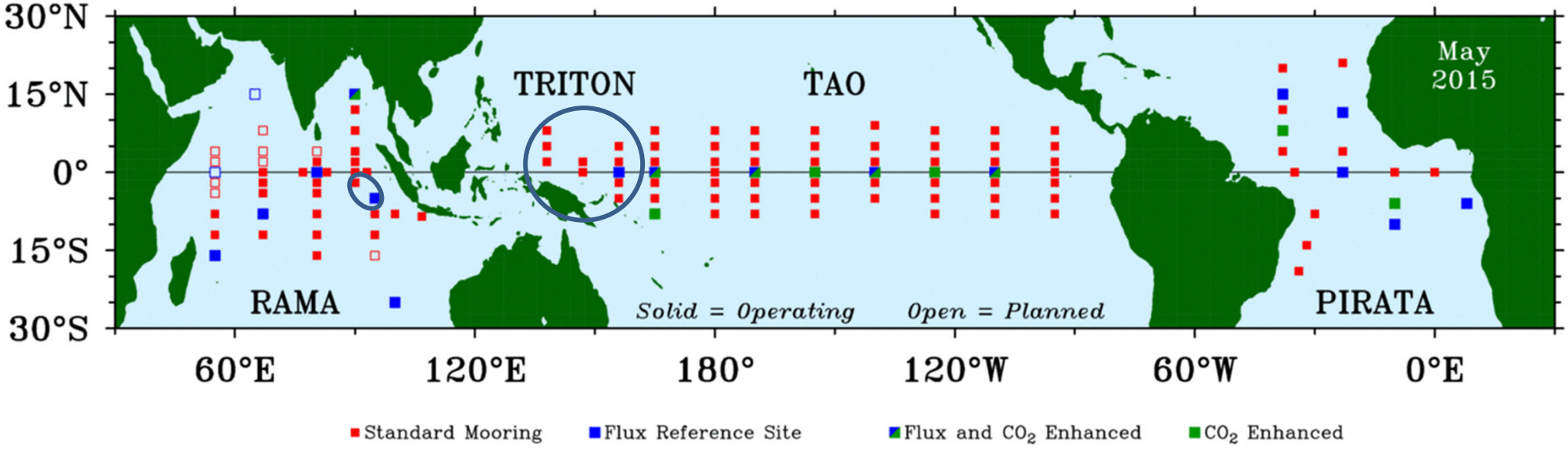
History : Major Activities related to Air-Sea Interaction Study

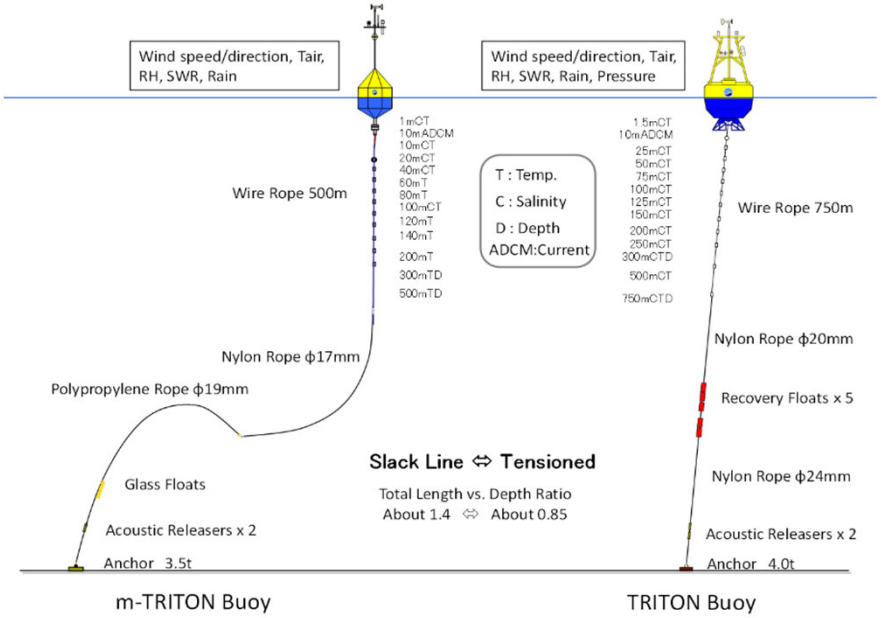
1987	JENEX-87 (Japanese El Niño Experiment - 87)
	* … This was the first trial for El Niño study using a research vessel
1988-1992	JAPACS (Japanese Pacific Climate Study) Project
	* … JAMSTEC joined International campaign TOGA-COARE (1992-93)
1993-	TOCS (Tropical Ocean Climate Study) Project
	* … This project was designed to develop and deploy TRITON Buoys
1998	First deployment of TRITON Buoy
1998-2004	Air-Sea Interaction Study in the Tropical Western Pacific Project
1999	International Field Campaign “Nauru99”
2000-2014	PALAU Project
2002	Completion of originally planned TRITON Buoy Network
2005-2010	JEPP-HARIMAU Project including IOMICS (Indian Ocean Moored buoy network Initiative for Climate Studies)
2006	International Field Campaign “MISMO”
2010-2014	SATREPS-MCCOE Project
2010-2012	VPREX Project
2011	International Field Campaign “CINDY2011”
2017-	International Field Campaign “YMC”
2020-	Contribution to Tropical Pacific Observing System (TPOS)

Methods: 1) Intensive Field Campaign
2) Long-term Monitoring by ships, oceanic moorings, and Land-based sites
3) Combination above 1) and 2)

TOCS (Tropical Ocean Climate Study) Project : 1993 - current

One of major activities of TOCS project is to develop and deploy TRITON buoys for a better understanding of El Niño, Indian Ocean Dipole, and other tropical phenomena as part of international tropical buoy array. Its first buoy was deployed in March 1998 and its network was completed in August 2002. Currently, only buoys in the Indian Ocean have been maintained.

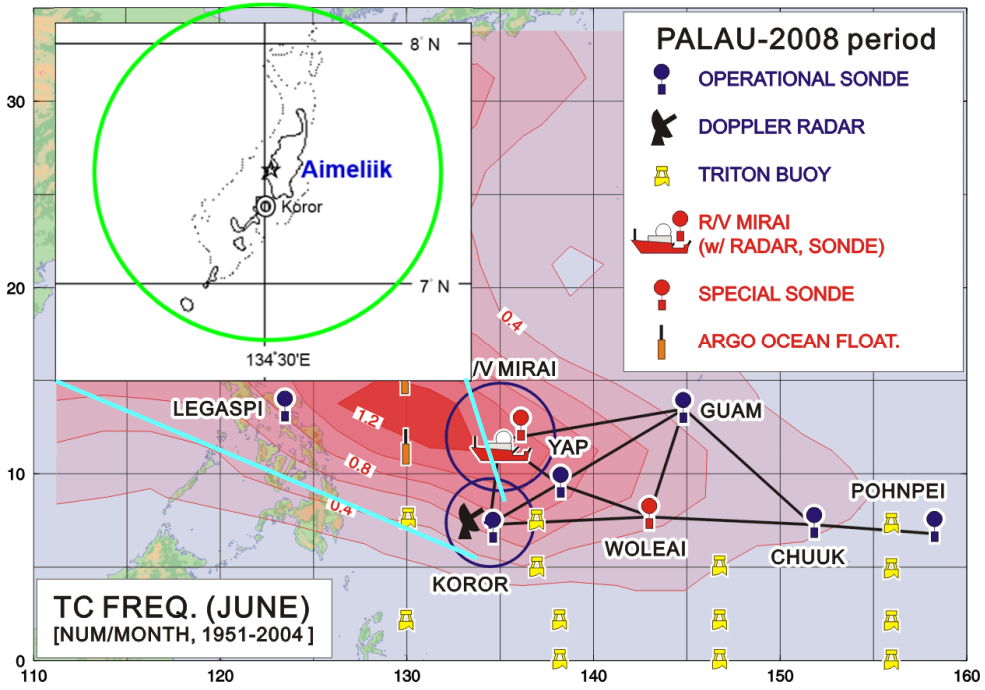




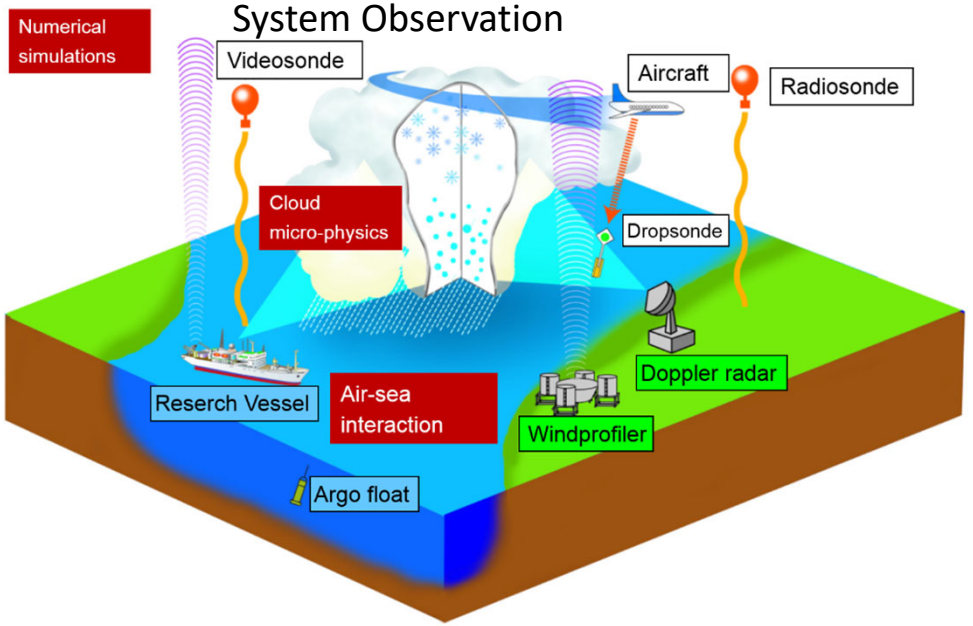
PALAU (Pacific Area Long-term Atmospheric observation for Understanding of climate change) Project

Tropical Western Pacific is a key area to understand the air-sea interaction and the tropical-extratropical interactions. In particular, precipitation processes are key to be studied. By considering this fact, observational site is deployed at Palau Islands, and we have conducted long-term observations as well as intensive observations for specific science topics such as tropical cyclone, northward propagating intra-seasonal variability.

Intensive Observations: May-June of 2004, 2008, 2010, and 2013.



Conceptual Image for Meso-scale Convective System Observation



VPREX (Vietnam Philippine Rainfall Experiment)

Purpose:

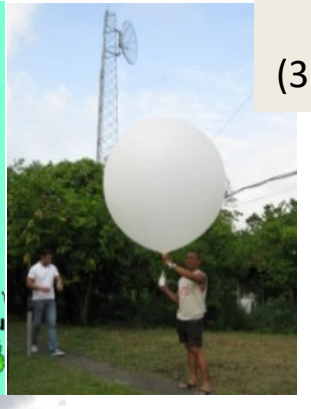
To understand the mechanism of the heavy rainfall along the east coast of Vietnam and Philippines and the air-sea interaction associated with cold surges.

Intensive Observing Periods:

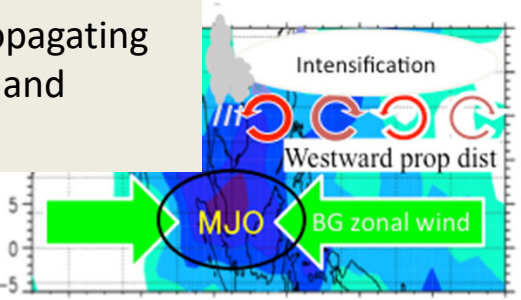
1) October 2010 - January 2011
2) October 2012 - December 2012

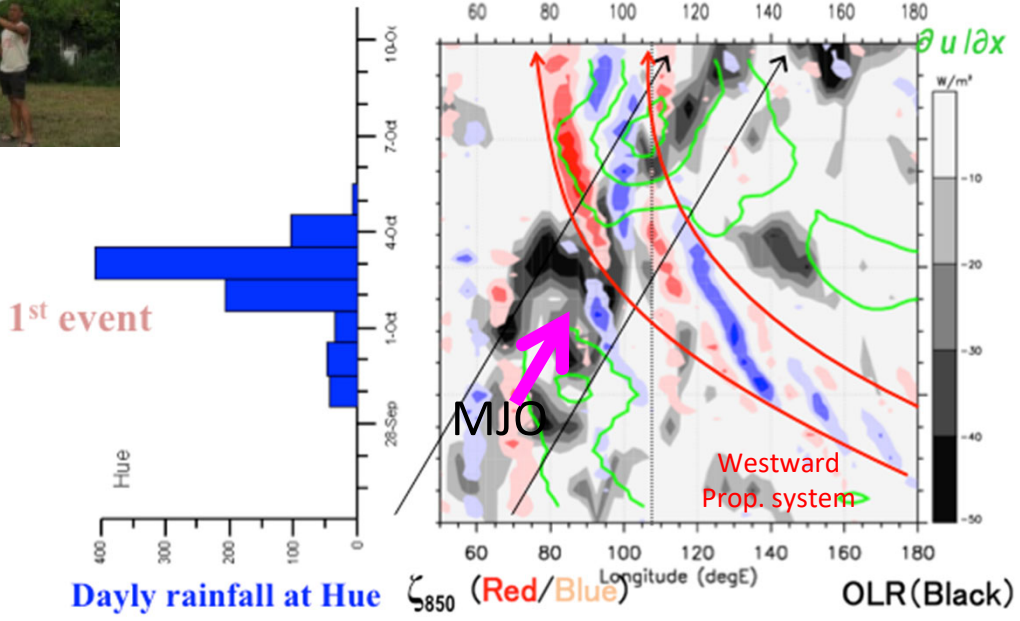
Heavy rainfall was caused by combination of;

(1) Cold surges,
(2) Westward propagating disturbances, and
(3) MJO.



Collaboration with
National Hydro-Meteorological Service (Vietnam) and
PAGASA (Philippines)





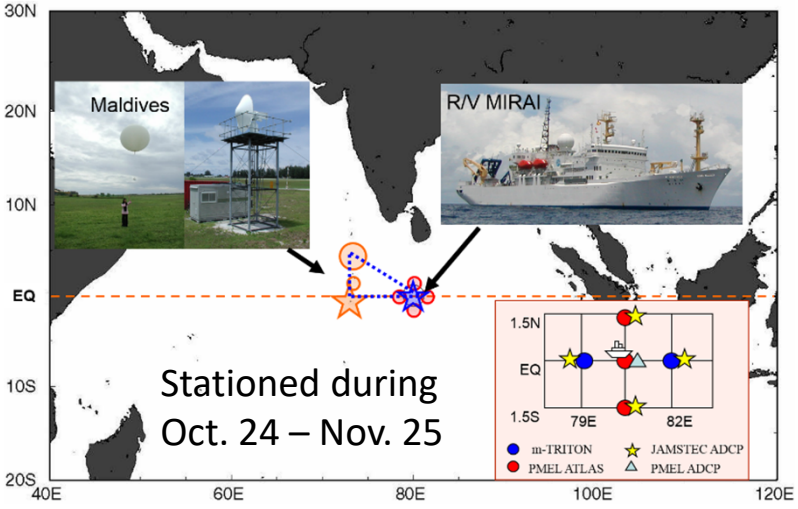
MISMO : Mirai Indian Ocean cruise for the Study of the MJO Convection Onset

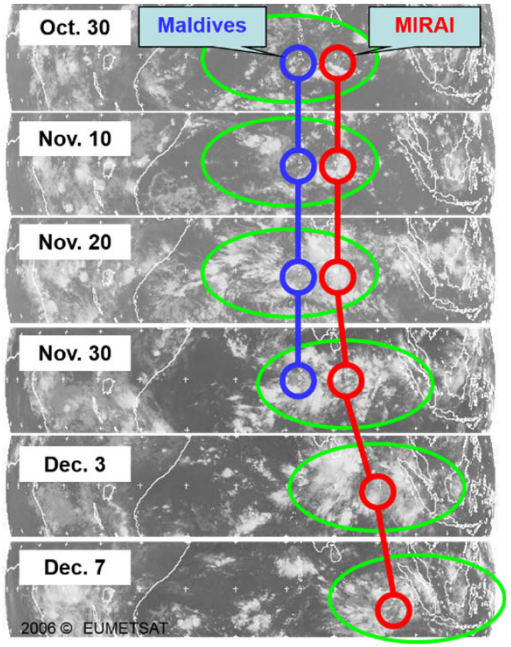
Purpose : To capture the characteristics of atmospheric and oceanic conditions in the onset region / season of the MJO-convections

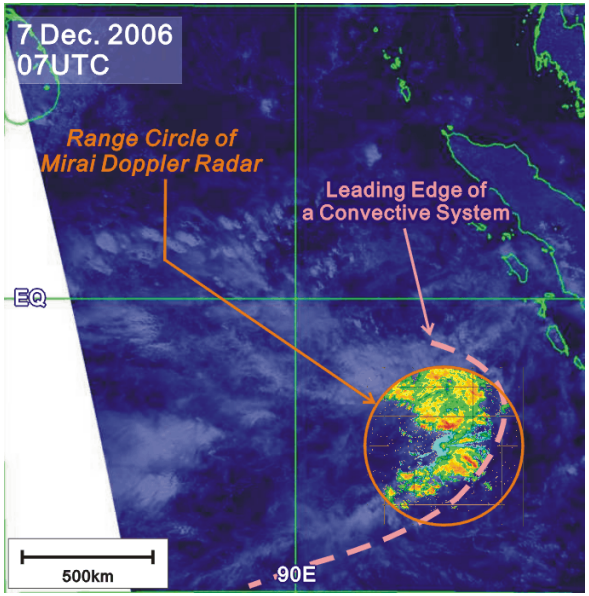
Period : October - December 2006

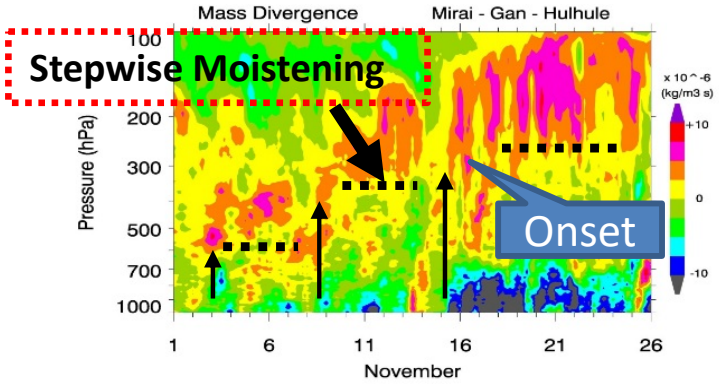
Main Results : MISMO captured the onset of the MJO-convection first ever as in-situ. Sounding array revealed the stepwise moistening prior to the onset.

Web site : http://www.jamstec.go.jp/iorgc/mismo/

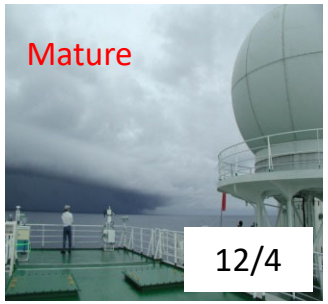








Time-height section of mass divergence (Yoneyama et al. 2008)



CINDY2011 / DYNAMO & AMIE

Purpose:

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

Intensive Observing Period:

October 2011 – January 2012

* Extended Observing Period continued until March.

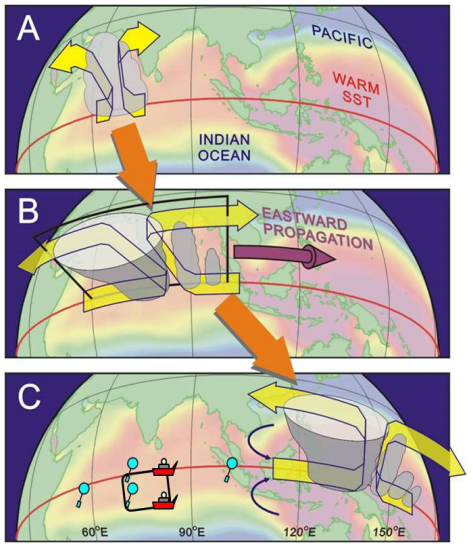
Participants :

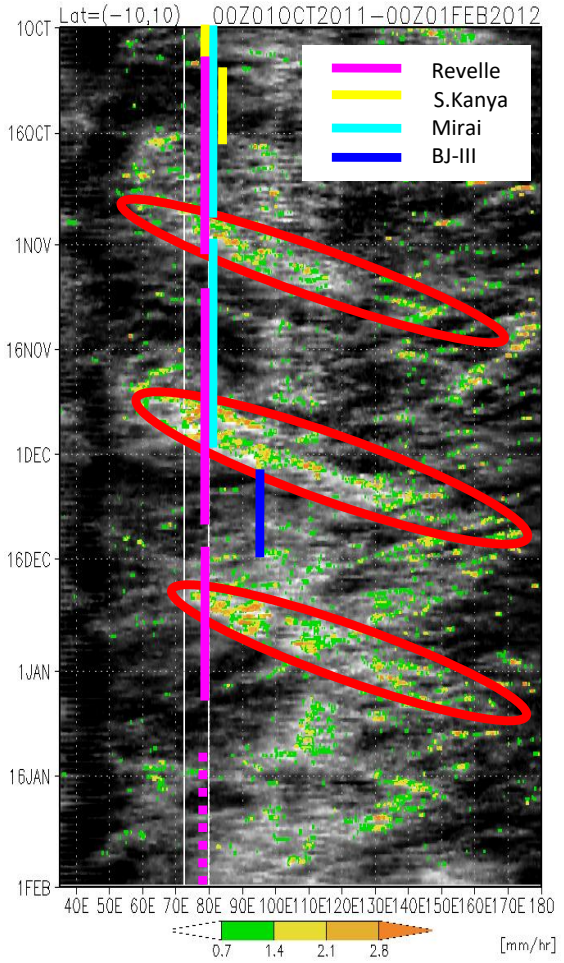
Over 60 institutes/universities/agencies from US, Japan, India, France, Kenya, Seychelles, Maldives, Sri Lanka, Indonesia, Singapore, Papua New Guinea, UK, Taiwan, Korea, and Australia

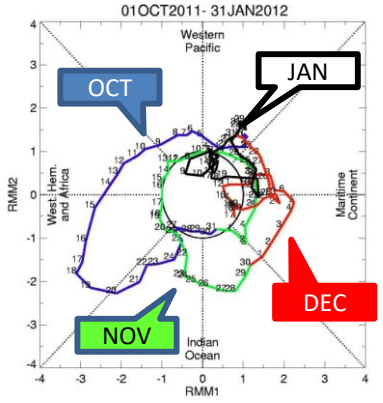
Remarks:

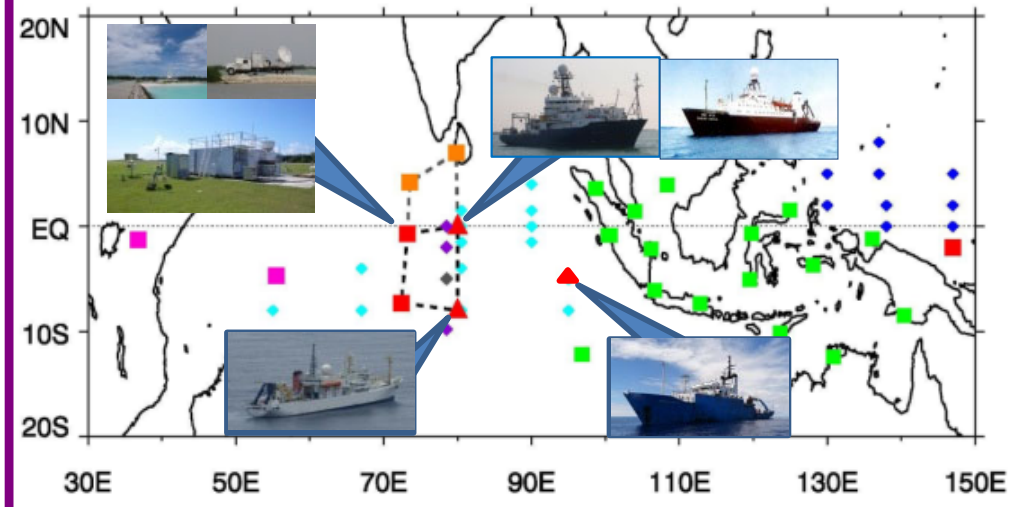
CINDY/DYNAMO have been endorsed by WCRP/CLIVAR.

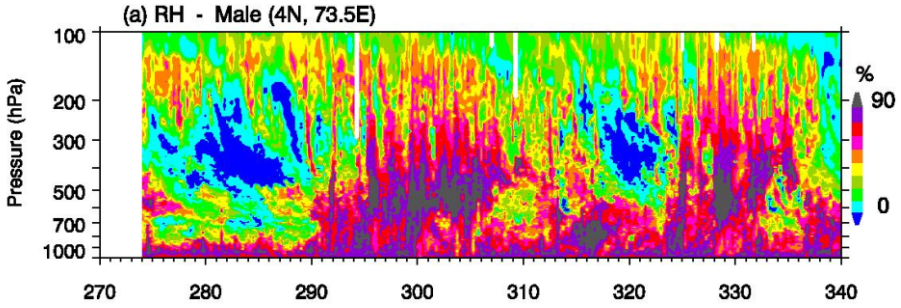
http://www.jamstec.go.jp/iorgc/cindy/







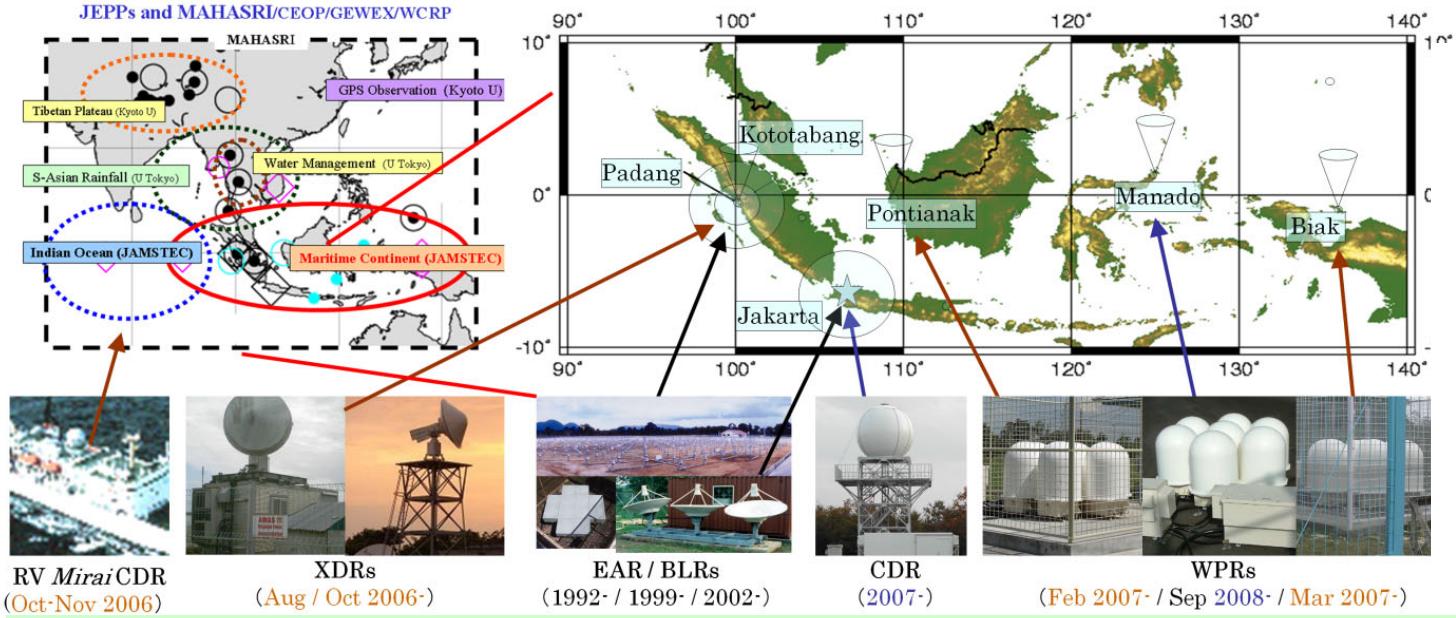


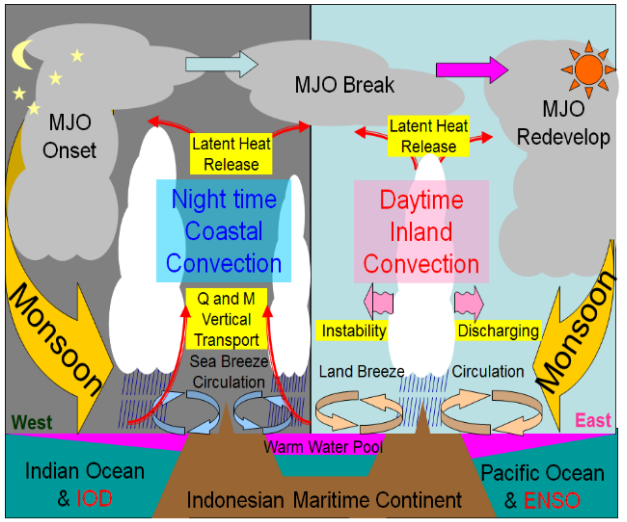


CINDY2011 Cooperative Indian Ocean experiment on intraseasonal variability in the Year 2011
DYNAMO Dynamics of the Madden-Julian Oscillation
AMIE Atmospheric Radiation Measurement program - Madden-Julian Oscillation Investigation Experiment

JEPP-HARIMAU Project (2005.04-2010.03)

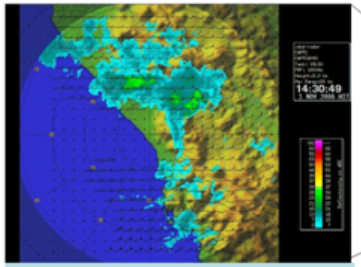
(Japan EOS [Earth Observation System] Promotion Program-
Hydrometeorological ARray for ISV-Monsoon AUtomonitoring)





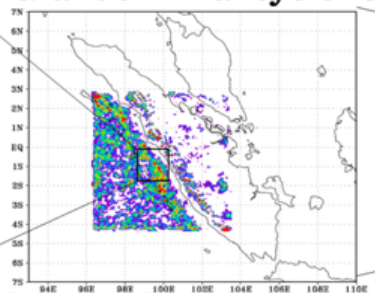
+ Construction of Radar-Profiler Network over Indonesian Maritime Continent (IMC)
+ Observation of Intra-Seasonal Variations (ISV) for predicting local weather/global climate
+ Real-time Data release
+ High potential abilities to prevent hydrometeorological/climatological disasters

Radar installation

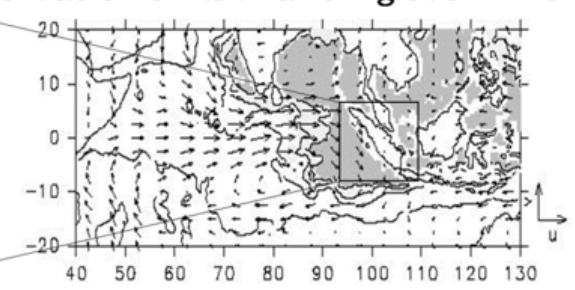


Real time display on the internet !

Giant diurnal cycle



Observation of ISV landing over IMC



Multi-scale structures of rainfall/cloud systems are studied.
ISVs are modified by local (diurnal) variations over islands.

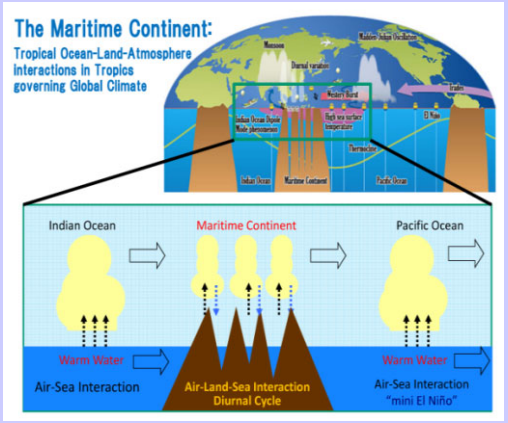
For more details …
http://www.jamstec.go.jp/iorgc/harimau/

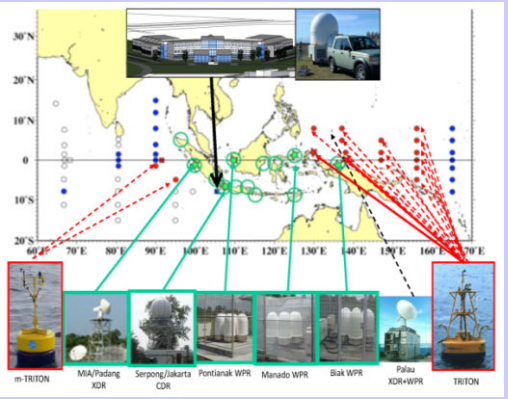
SATREPS-MCCOE Project (2010.02-2014.03)

(Scientific & Technology REsearch Partnership for Sustainable Development-Maritime Continent Center Of Excellence [MCCOE])

An international research center for tropical meteorology, hydrology, oceanography, and climatology was established initially under Japanese JICA-JST funds, and has been fully operated by Indonesia.

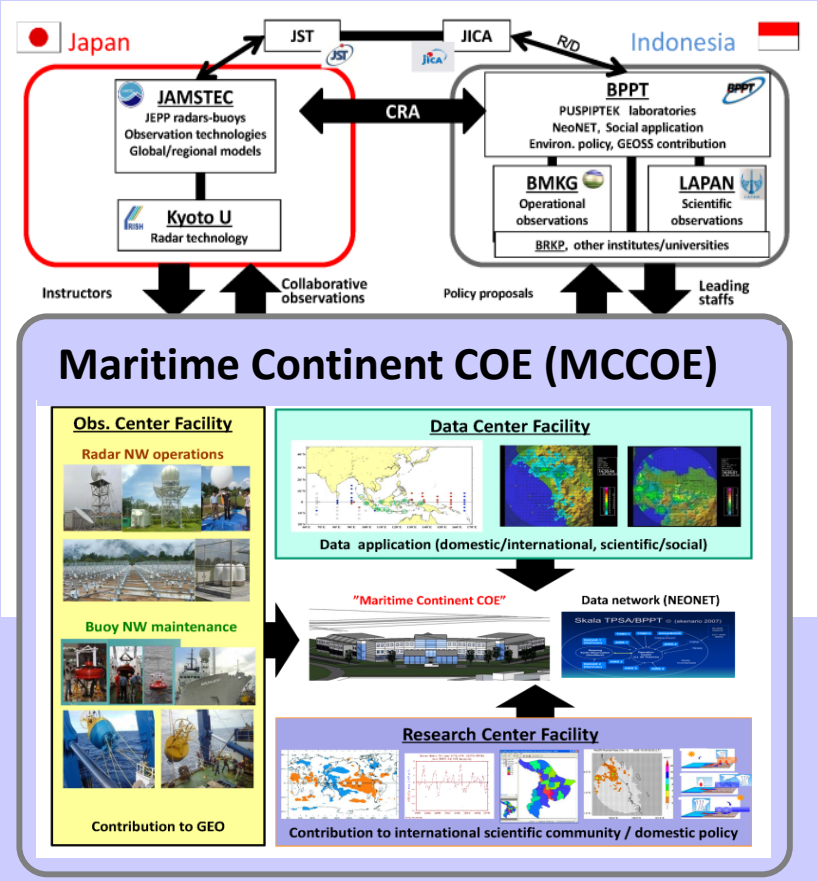
Background





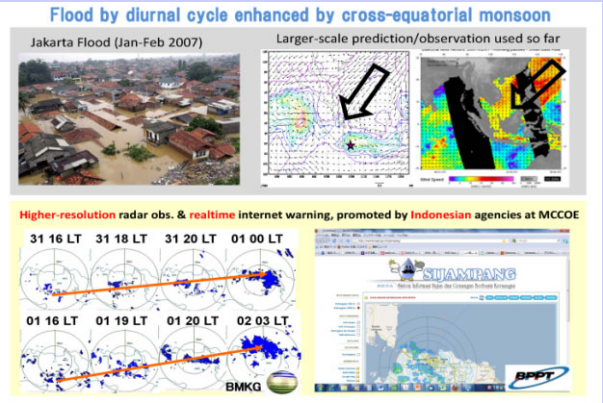
In around Indonesian maritime continent (IMC) diurnal cycle, interseasonal variations (ISVs), monsoon and interannual variations (ENSO, IOD) are generated , and have been observed by radar and buoy networks.

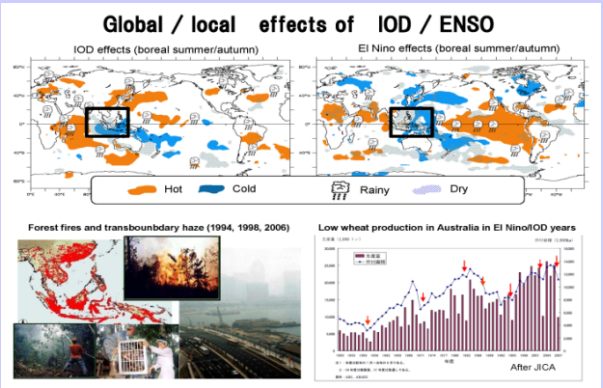
Structure and facilities



Japan-Indonesia record of discussions (R/D) and JAMSTEC-BPPT collaborative research agreement (CRA) were signed in 2010. A building is constructed in Serpong near Jakarta during 2011. Observation, data, and research facilities are completed in 2014.

Social benefits and contribution to GEOSS





Both local and global climatic variabilites are monitored, studied, and socially applied by scientists/engineers at MCCOE, and results will contribute to domestic, regional and international strategy/policy as aimed by GEOSS.

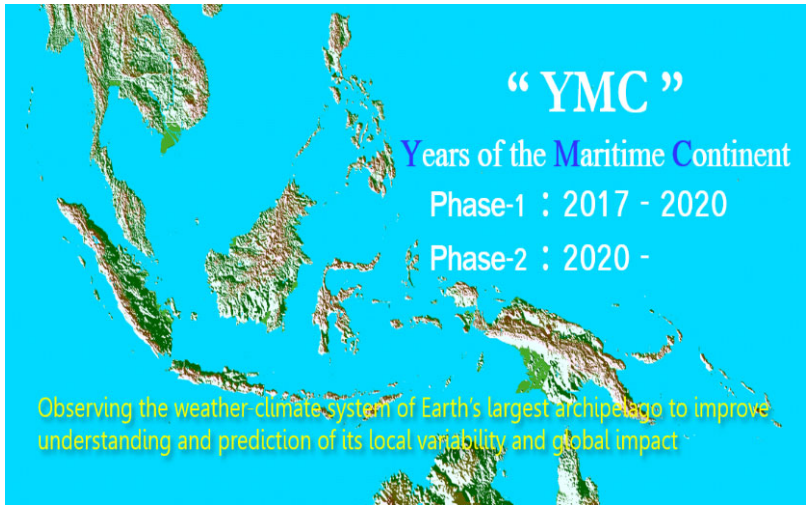
Years of the Maritime Continent (YMC)

< Purpose >

The goal of the "Years of the Maritime Continent (YMC)" is to expedite progress of improving understanding and prediction of local multi-scale variability of the MC weather-climate systems and its global impact through observations and modeling exercises. YMC itself provides a framework for the international collaboration under this umbrella. During the campaign, several coordinated intensive observations will be carried out to study key processes over and around the MC.

< Period >

Phase-1: mid-2017 ~ early 2020
Phase-2: early 2020 ~



< Key Five Science Themes >

1) Atmospheric Convection
   - Multi-scale variability (ex. diurnal cycle, MJO, monsoon)
     vs. Complex land-sea distribution & topography
2) Upper Ocean Processes & Air-sea interaction
   - Indonesian Through Flow, Coastal Upwelling, IOD, etc.
3) Stratosphere-Troposphere Interaction
   - Dynamical coupling & their mass exchanges
4) Aerosols
   - Interaction with clouds, Role of Biomass burning aerosol, etc.
5) Prediction Improvement
   - Representation of key processes mentioned above and their prediction

< Five Main Activities >

1) Data sharing … Archive & share 2-year in-situ/satellite observations and NWP products
2) Field Campaign … Coordination of several intensive observations as well as long monitoring
3) Modeling … Quantification of biases/errors of numerical models
4) Prediction & Applications … Demonstrate skill improvement & Study optimization of prediction products
5) Outreach & Capacity Building … Share the new knowledge & Train for the next generation

< Web site >

https://www.jamstec.go.jp/ymc/