

# Current Status of MAHASRI and AMY



<http://mahasri.cr.chiba-u.ac.jp/>

<http://www.wcrp-amy.org/>



**Jun Matsumoto**

**JAMSTEC/ IORGC**

**Department of Geography,  
Tokyo Metropolitan University**




**The International MAHASRI/HyARC Workshop  
on Asian Monsoon and Water Cycle,  
March 5, 2009 at Danang, Vietnam**

# Objective

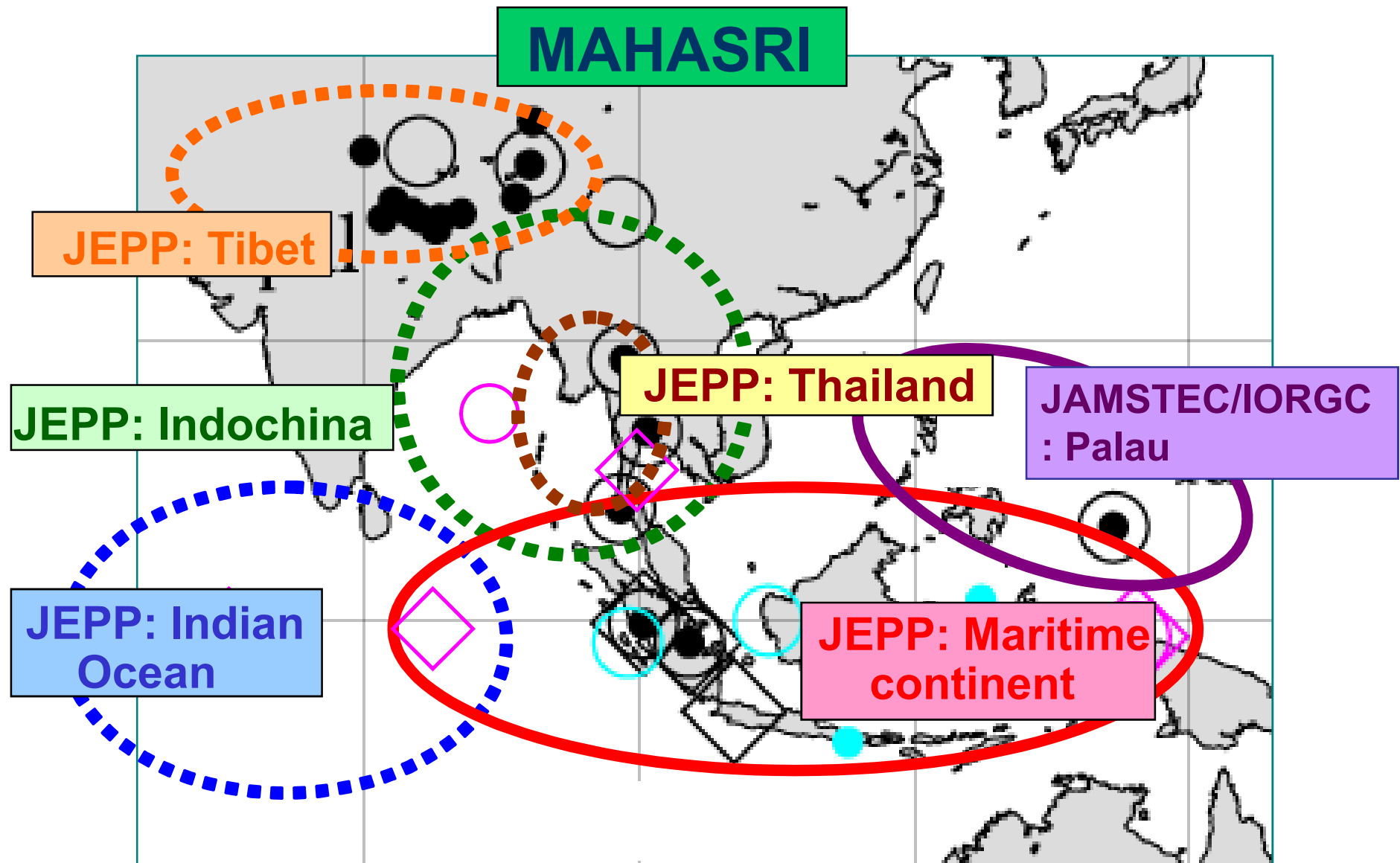
"To establish hydro-meteorological prediction system, particularly up to seasonal time-scale, through better scientific understanding of Asian monsoon variability".



# Key Science Issues

- How atmosphere-ocean-land interacts in the Asian monsoon system?
  - What scale-interactions exist among diurnal, synoptic, intraseasonal and seasonal variability of Asian monsoon rainfall?
  - What is the effect of various-scale orography on monsoon rainfall?
  - How on hydro-meteorological variations in Asian monsoon regions are affected by human influences (i.e., aerosols, land-use change, and greenhouse-gas increase)?
- 

# MAHASRI and related Japanese Projects (JEPP)



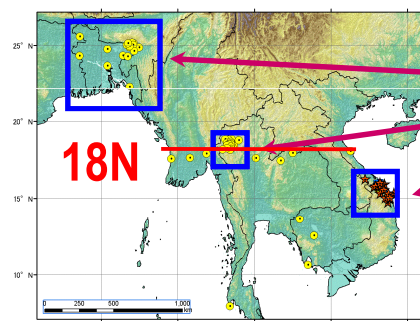
# Japan EOS Promotion Program (JEPP) Theme 2-2 by Prof. Matsumoto, U-Tokyo

## Development of rainfall observation system in Southeast Asia

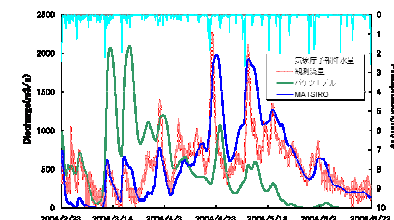
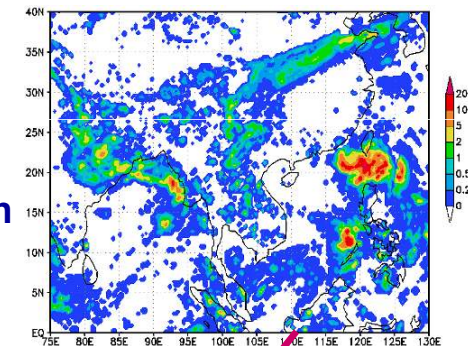
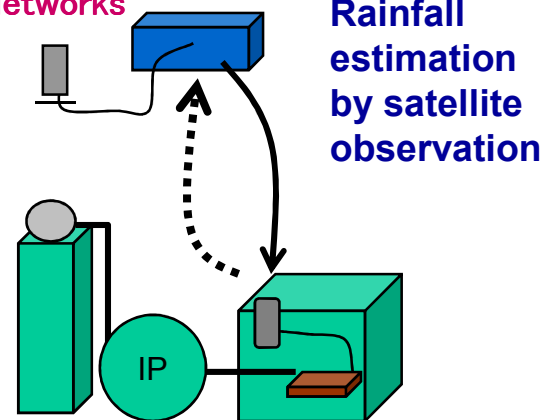
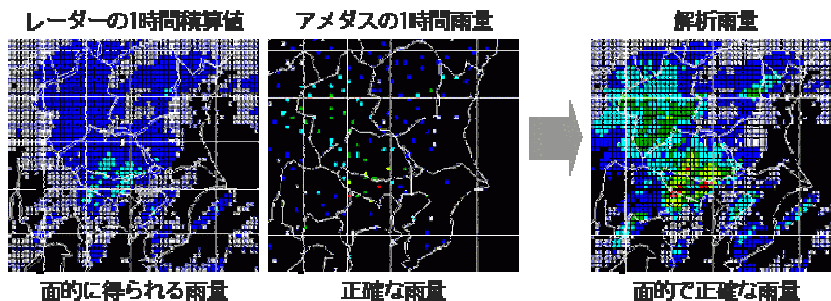
**Objective:** Develop rainfall observation system in order to understand water cycle and its variability by climatic changes in tropical Asian monsoon region over Indochina

(1) Research on rainfall distribution  
Rainfall observation by automatic rain gauges and development of real-time data transmission system

(2) Research on flood prediction  
Rainfall estimation using radar and satellite observation and its application to flood prediction



Automatic rain gauge Networks  
India, Bangladesh 36  
Thailand 18  
Vietnam 33



Radar data + Raingauge data → Composite rainfall data

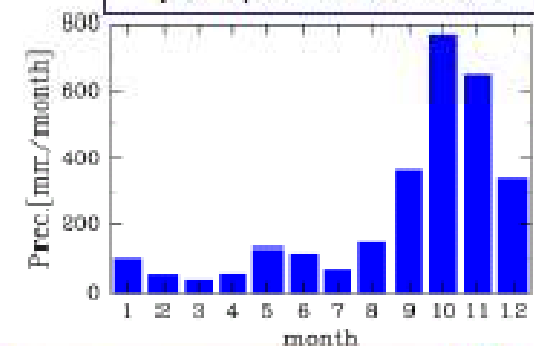
Similar to Radar-AMeDAS system in Japan

Flood prediction

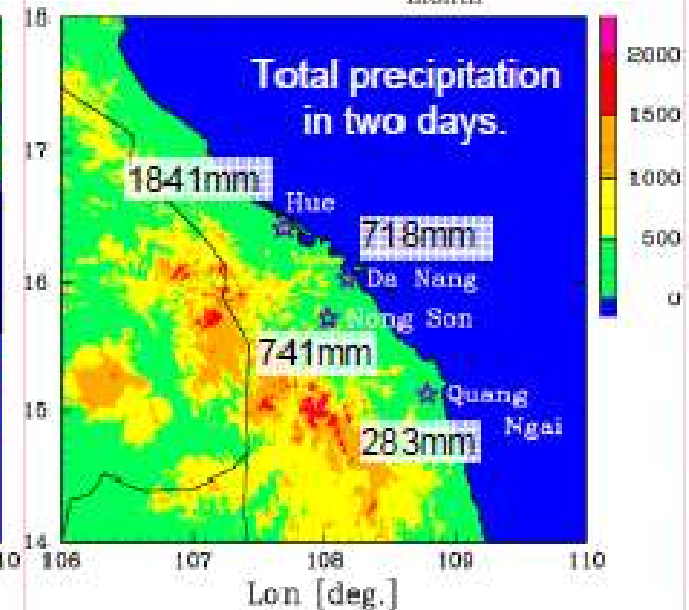
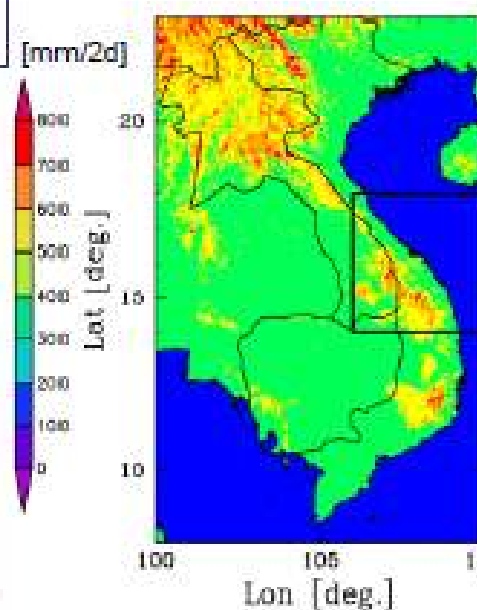
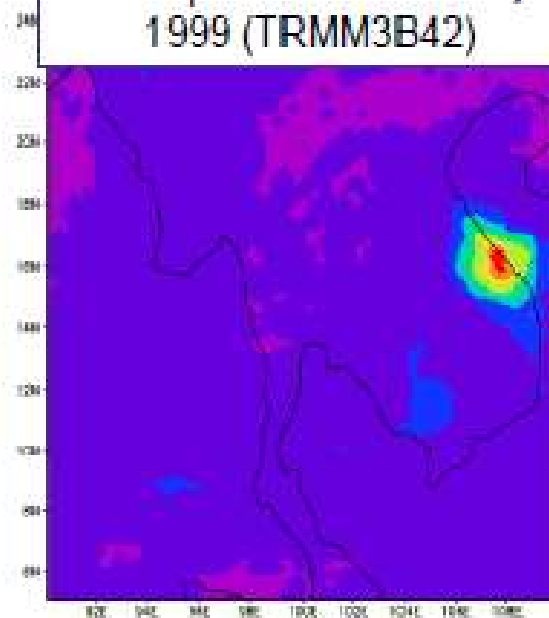
## A heavy rainfall event in central Vietnam in November 2-3, 1999

- Precipitation on Nov. 2 and 3, 1999 in Hue (16.4N, 107.7E) is more than 800 mm/day.
  - the maximum precipitation event since 1951.
- Heavy rainfall concentrates in central Vietnam east of the Annam range.

Climatological monthly precipitation at Hue



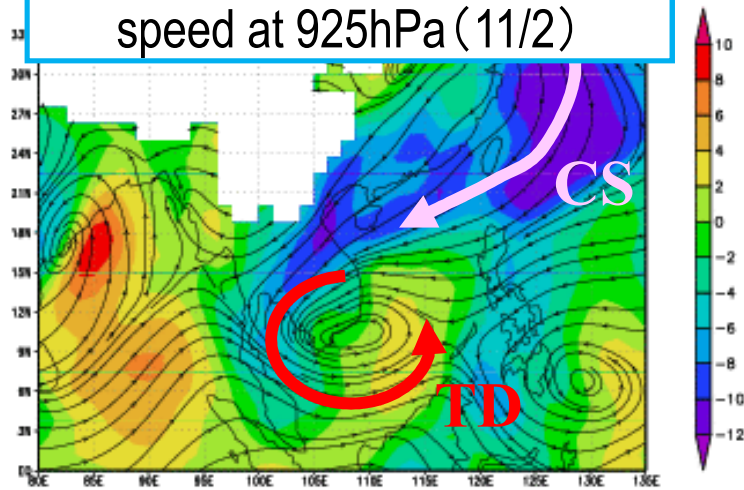
Precipitation in Nov. 2-3, 1999 (TRMM3B42)



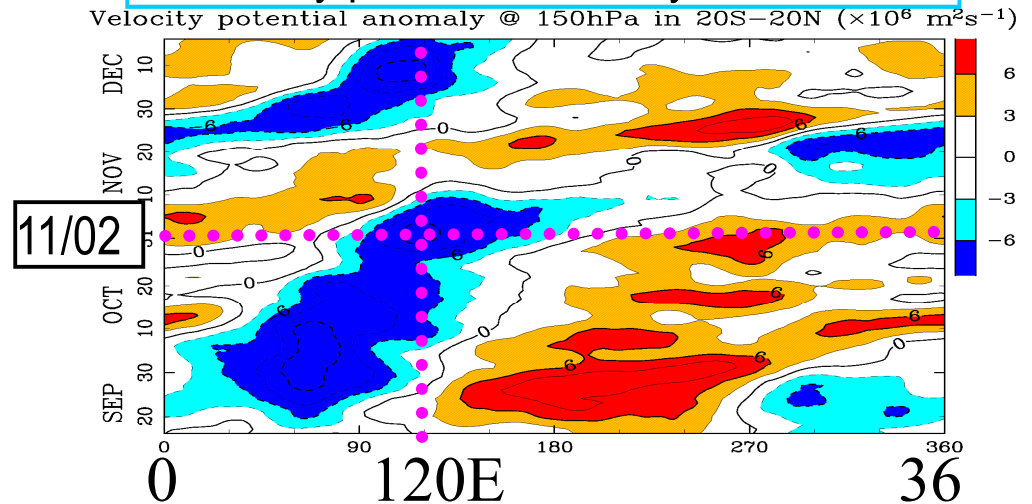


# Synoptic-scale processes

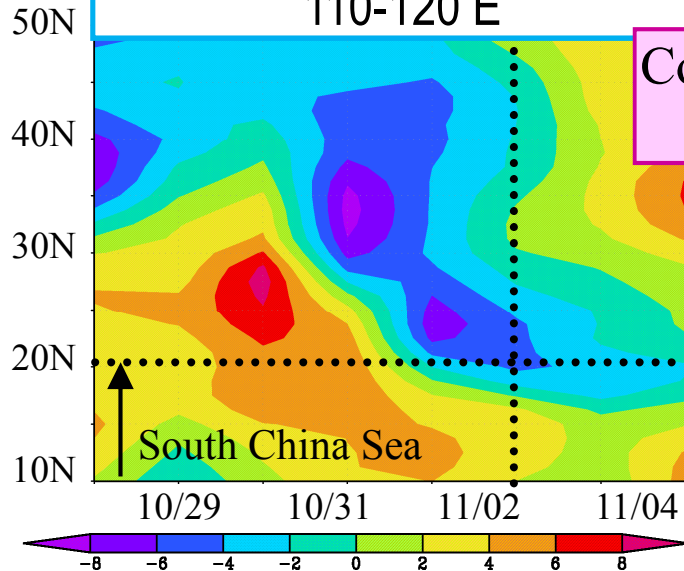
Stream line and meridional wind speed at 925hPa (11/2)



Velocity potential anomaly at 150hPa



Time- lat. Section of v-wind in 110-120 E



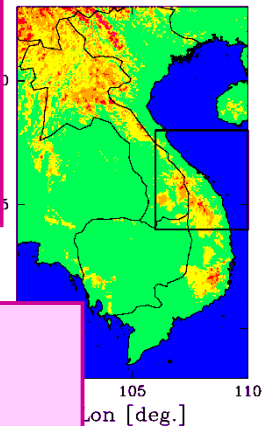
Cold surge (CS)

TD in SCS

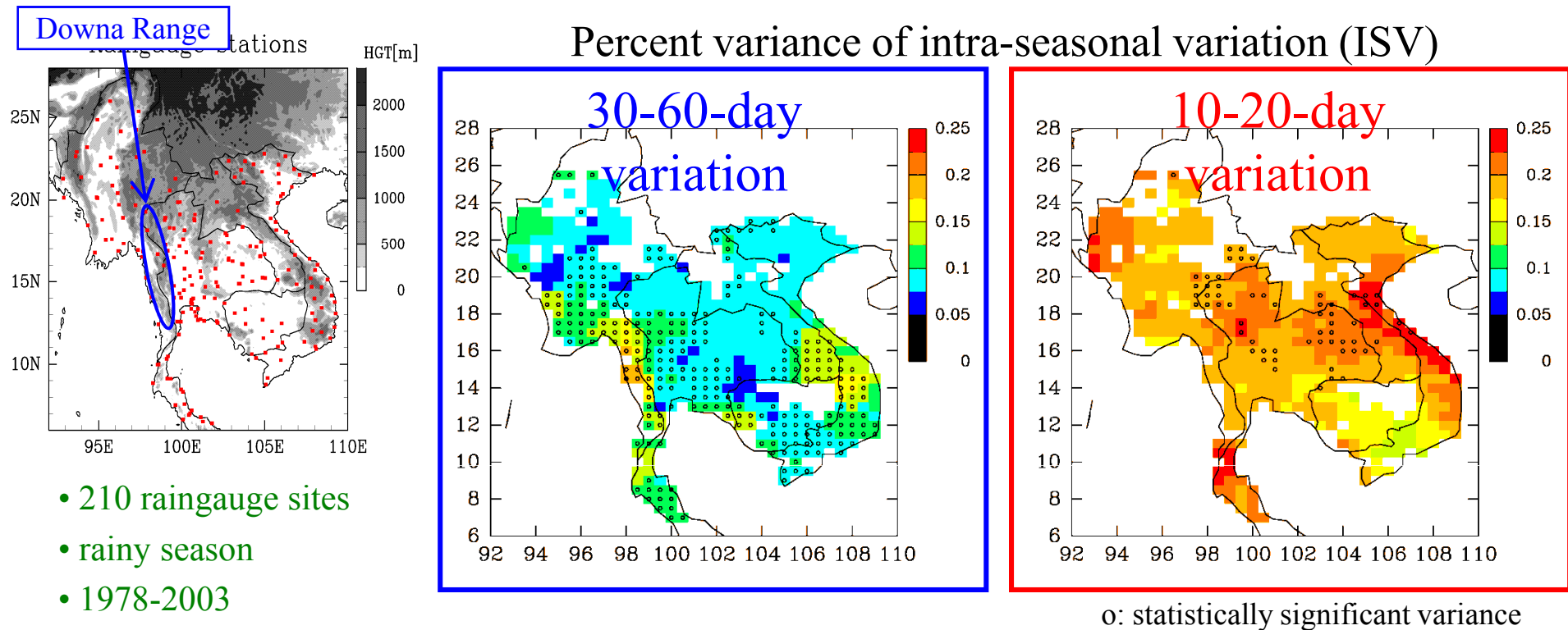
Active MJO

- Orography
- Low level convergence

Persistent orographically enhanced rainfall



# ISV variance of precipitation over Indochina Peninsula



- 210 raingauge sites
- rainy season
- 1978-2003

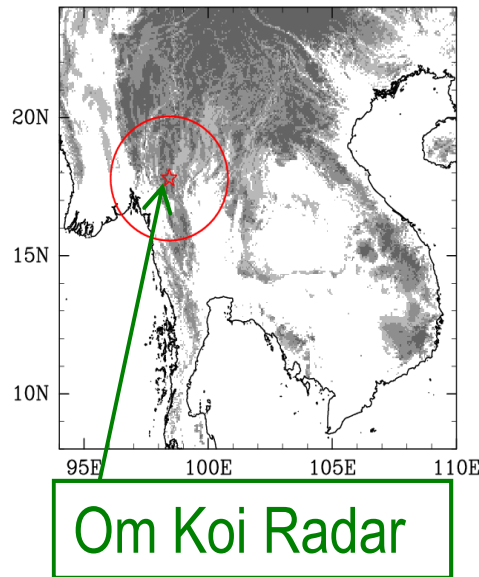
- High variance area:
  - 30-60-day variation: WEST (windward side) of major mountain ranges (coastal area of Myanmar, southern Laos & central Vietnam)
  - 10-20-day variation: coastal area of Vietnam & inland areas
- Sharp contrast across the Downa Range (especially, for the 30-60-day variation)

Yokoi, Satomura & Matsumoto, 2007: Climatological characteristics of the intraseasonal variation of precipitation over the Indochina Peninsula. *J. Climate*, **20**, 5301-5315.

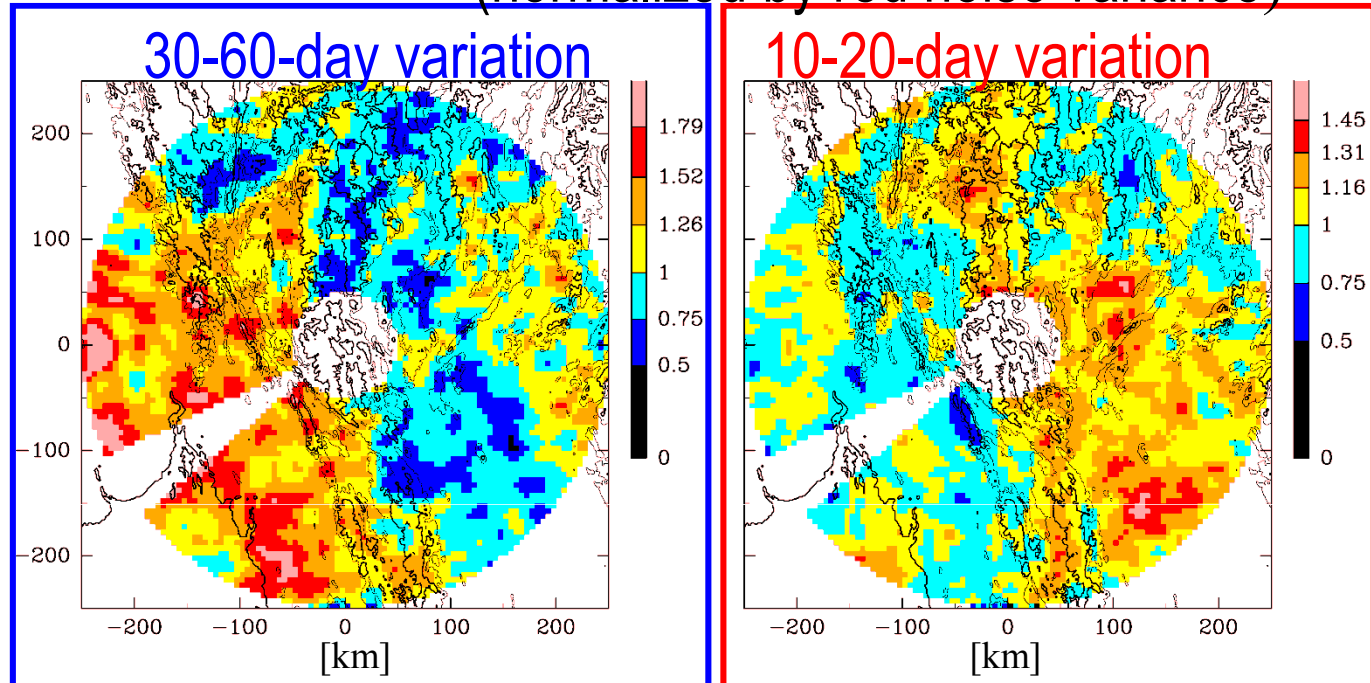


# ISV variance of radar reflectivity over western ICP

(normalized by red noise variance)



- 3km CAPPI
- May-Sep, 1998-2000



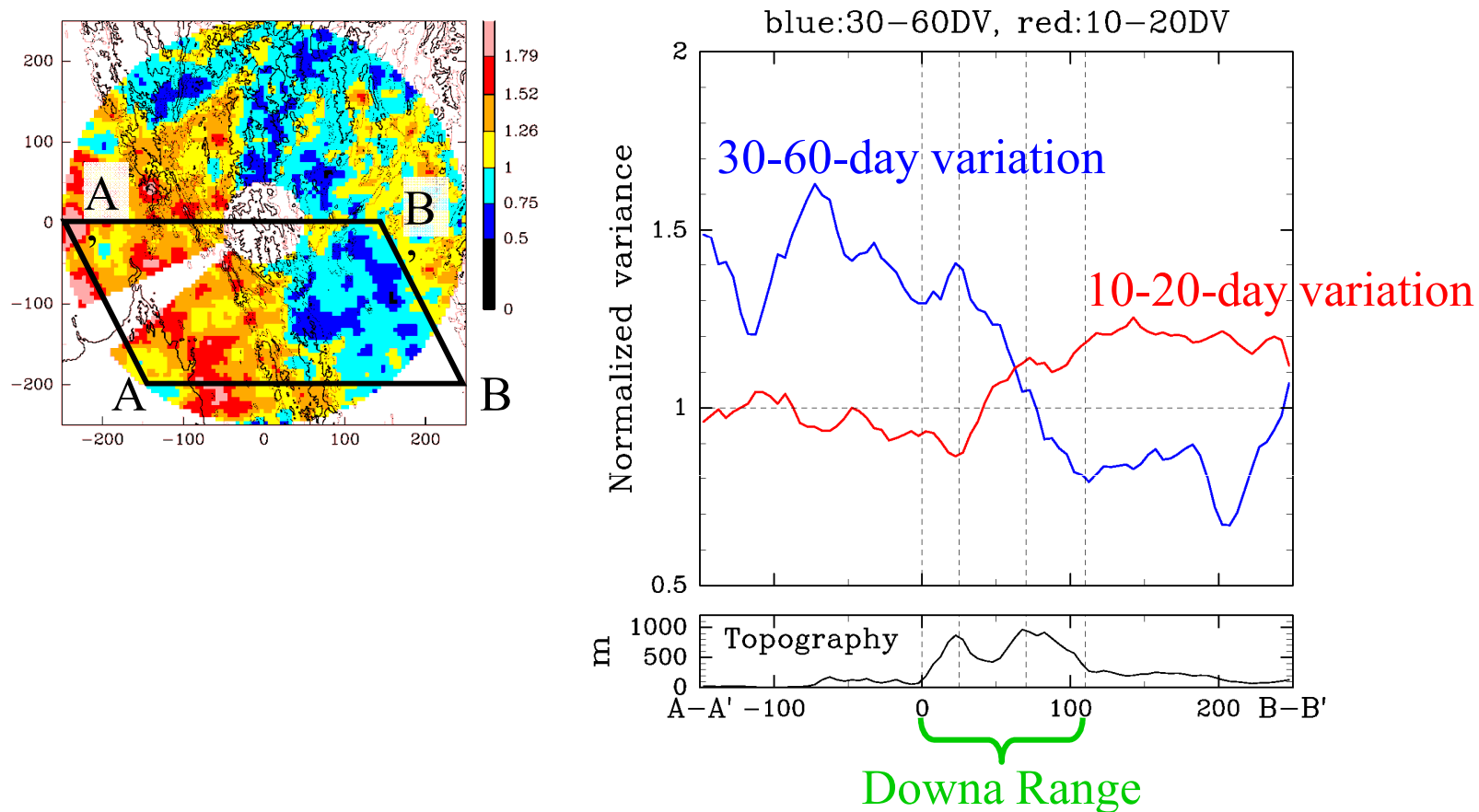
Red & pink shadings indicate statistically significant variance at **95%** & **99%** confidence levels, respectively.

+ High variance area:

- 30-60-day variation: coastal areas WEST of the Downa Range.
- 10-20-day variation: inland areas EAST of the Downa Range.

Yokoi & Satomura, 2008: Geographical distribution of variance of intraseasonal variations in western Indochina as revealed from radar reflectivity data. *J. Climate*, in press.

# Relationship with topography

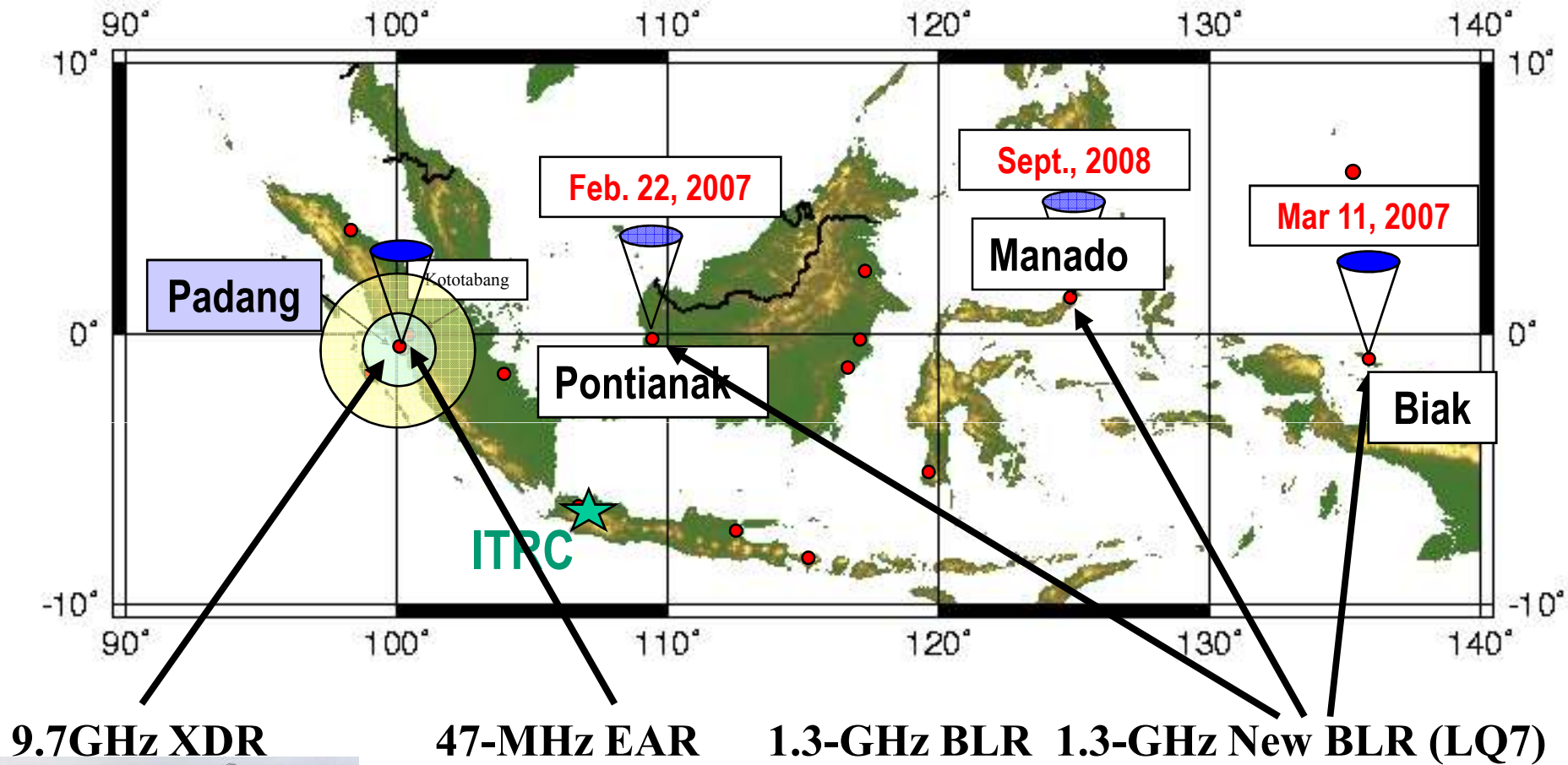


- Both variance varies sharply over the Downa Range.

Yokoi & Satomura, 2008: Geographical distribution of variance of intraseasonal variations in western Indochina as revealed from radar reflectivity data. *J. Climate*, in press.

# HARIMAU (Hydrometeorological ARray for ISV-Monsoon AUtomonitoring)

## Japanese EOS Promoting Program (JEPP)





# The Feb 2007 Jakarta flood



**Duration :** 2 February–12 February 2007

**Damages :** \$400 million

**Fatalities :** 54

**Areas affected :** Jakarta, West Java, Banten

(Wikipedia)

2/2/07 (lautjenny.blogspot.com)

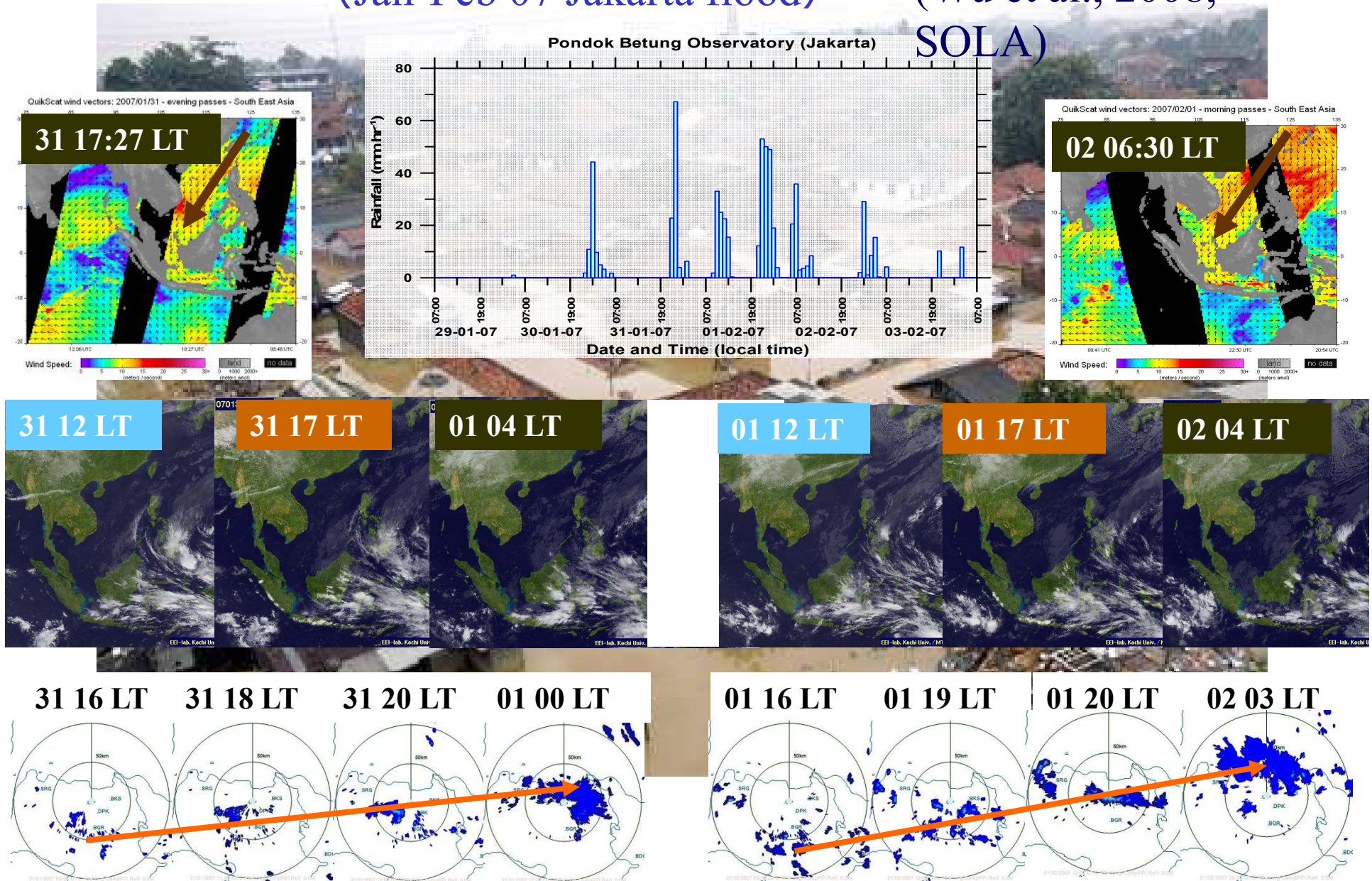


News pictures





# Diurnal cycle enhanced by monsoon beyond equator (Jan-Feb 07 Jakarta flood) (Wu et al., 2008, SOLA)



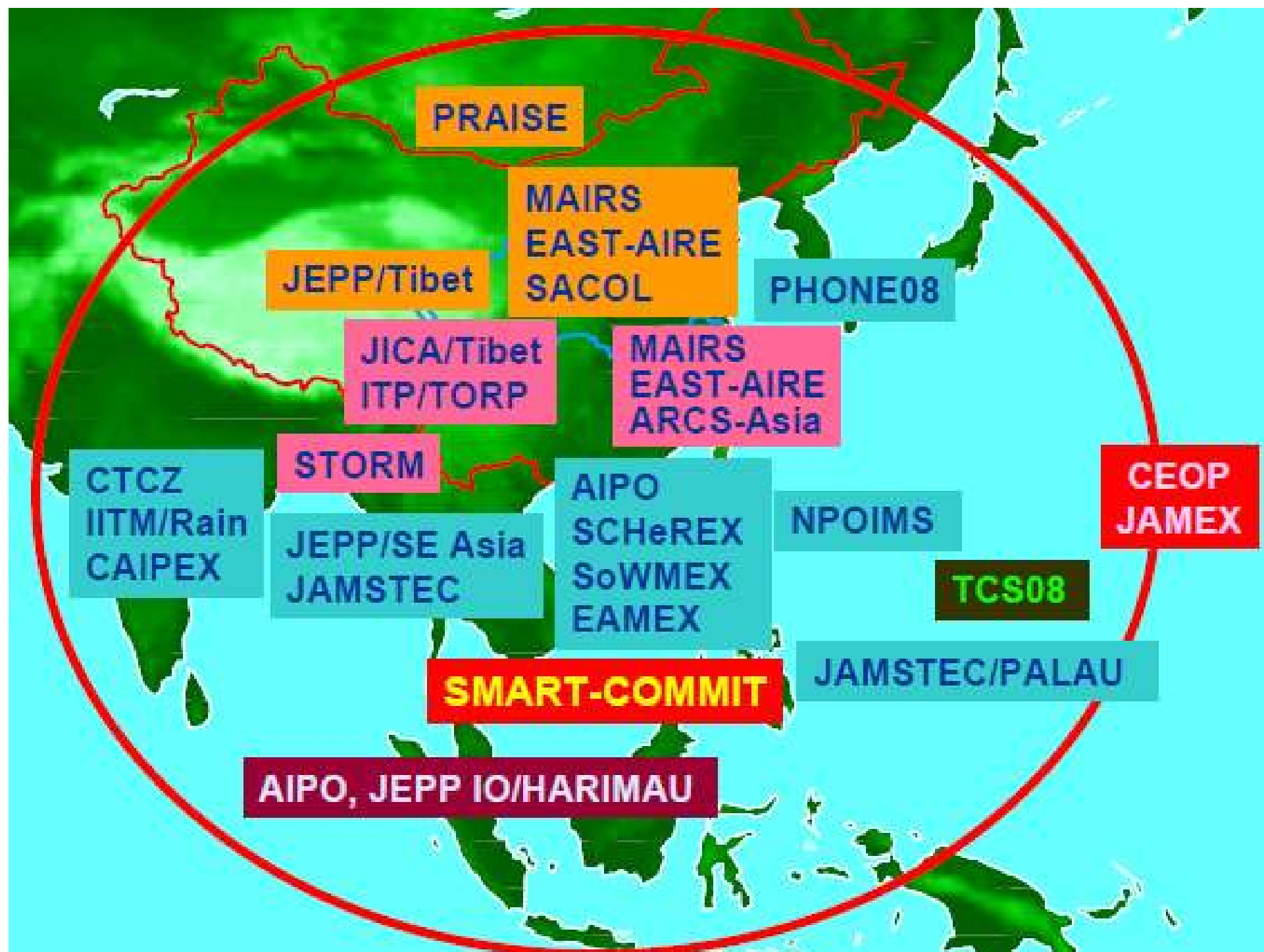


# AMY (Asian Monsoon Years) 2007-2012

<http://www.wcrp-amy.org/>



The goal of AMY 2007-2012 is to significantly advance our understanding of the physical processes determining the Asian monsoon variability and predictability, to improve Asian monsoon predictions on intraseasonal and seasonal time scales for societal benefits as well as for additional benefit of each participating projects, and to promote applications in order to support strategies for sustainable development.



# Classification of AMY Projects

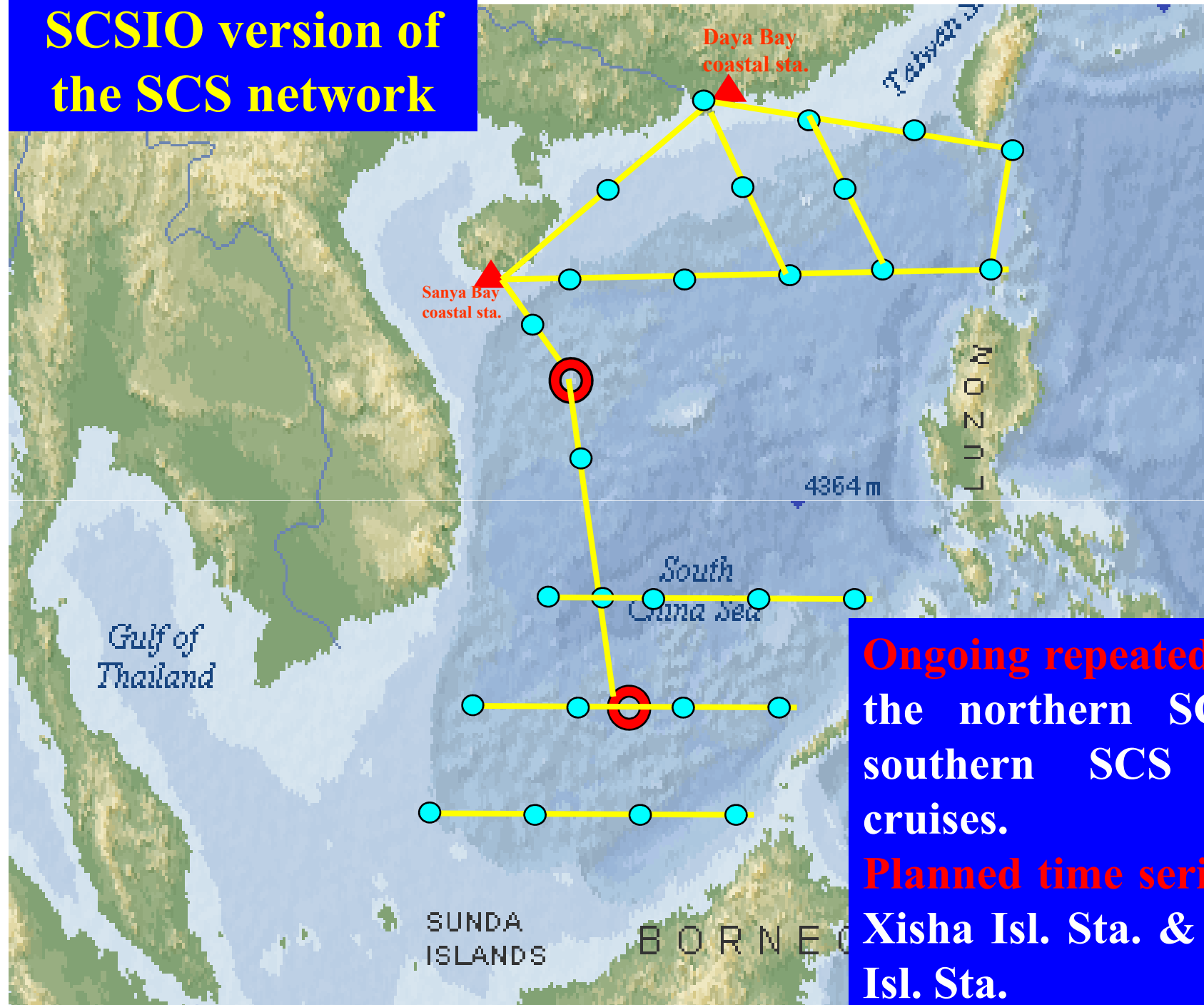
Hydroclimatology, weather	CEOP, SACOL, PRAISE, <b>SChEREX</b> , <b>SoWMEX/TiMREX</b> , <b>IITM/rain</b> , CTCZ, <b>STORM</b> , MAHASRI/JEPP
Tibetan Plateau	ITP/TORP <b>JICA/Tibet</b>
Aerosols	CEOP, SACOL, IITM/CAIPEX, JAMEX, EAST-AIRE & AMF, SMART-COMMIT, ARCS-ASia
Ocean interactions	AIPO, CTCZ, JEPP/IO, PALAU2008, TCS08
Monsoon prediction	AAMP, APEC, CEOP, ...
Human interactions	MAIRS

**Plus other National & International contributions**

**Table 1 List of planned AMY intensive ocean observations**

<b>Project Name</b>	<b>Intensive observation period</b>	<b>Observation region</b>
JEPP/IO	2008-2009	Eastern equatorial Indian Ocean
AIPO/IO	2008-2009	Karimata Strait and Java coast
CTCZ/IO	2009-2010	Bay of Bengal
AIPO/SCS-PS	Nov. 2007- Nov. 2008 (Kalimata strait & Java coast)	East Luzon Island, Karimata strait, Off Java coast, Xi-Sha Island, Northern SCS, Off Luzon
JAMSTEC/ PALAU	June-Aug. 2008	Western Tropical Pacific
SoWMEX/ TiMREX	May 15-June 25, 2008	Northern South China Sea and southern Taiwan
NPOIMS	2008-2009	Luzon Strait, West of the Luzon Island (18N), East China Sea, and North-East SCS, Western Pacific and East China Sea Cruises
EAMEX	May 15- June 30, 2008 (Summer), Oct. 2008 to Feb. 2009 (Winter)	Northern SCS (Summer), East China Sea east of Taiwan (Winter)

## SCSIO version of the SCS network



**Ongoing repeated cruises:**  
the northern SCS and  
southern SCS annual  
cruises.

**Planned time series sites:**  
Xisha Isl. Sta. & Nansha  
Isl. Sta.



**Table 2 List of planned AMY intensive land observations (1)**

<b>Project Name</b>	<b>Intensive observation period</b>	<b>Observation region</b>
TORP	2008-2009	Tibetan Plateau
JICA-TIBET	Feb.-Jul., 2008	Tibetan Plateau
JEPP-TIBET	Jan.-Mar. 2008	Tibetan Plateau
MAIRS	Mar-Sep, 2008	Semi arid Northern China.
SACOL	2008-2009	Lanzhou, central China
PRAISE	2008-2009	Mongolia
SCHeREX	May-July, 2008 (maybe in 2009)	South China
SoWMEX/ TiMREX	May 15-June 25, 2008	Southern Taiwan, Northern South China Sea
EAMEX	May 15-June 30 2008 (Summer), Dec 2008 to February 2009 (Winter)	Northern SCS (Summer) East China Sea east of Taiwan (Winter)

**Table 2 List of planned AMY intensive land observations (2)**

<b>Project Name</b>	<b>Intensive observation period</b>	<b>Observation region</b>
JEPP-SEA	Jan.-Mar. 2008	Indochina, Bangladesh, NE India
JEPP-Thailand (GaME-T)	Jan.-Mar. 2008	Central and northern Thailand
CREST-SEA	Jan.-Sept. 2008	Indochina and Borneo, Malaysia
JEPP-HARIMAU	2008-2009	Indonesia
JAMSTEC/IORG C	Dec. 2008- Jan. 2009	Kalimantan, Indonesia, Indochina along SCS
CTCZ	2009 (Pilot) 2010	North India
STORM	April-May 2009-2010	East and NE India

**Table 3 List of planned AMY intensive meso-scale observations**

<b>Project Name</b>	<b>Intensive observation period</b>	<b>Observation region</b>
IITM/rain	2009-2010 (?)	Pune, west/east-coast of India
CAIPEX	May-Oct., 2008-2009	
MAIRS	Mar.-Sep., 2008	Semi arid Northern China.
STORM	Apr.-May 2009-2010	Easteran and NE India
SCHeREX	May-Jul., 2008 (maybe in 2009)	South China
SoWMEX/ TiMREX	May.15-Jun. 25, 2008	Northern South China Sea and southern Taiwan
PHONE08-09	Jun. –Jul., 2008	East China Sea
TCS08	Aug.-Sept., 2008	Tropical western North Pacific
T-PARC	TC season in 2008 (Aug.-Sept.)	East Asia, East China Sea
DOTSTAR	TC season in 2008 (Aug.-Sept.)	Western North Pacific between about 15-30N and 118-133E

**Table 4 List of planned AMY intensive aerosol and other material observations**

<b>Project Name</b>	<b>Intensive observation period</b>	<b>Observation region</b>
JAMEX	EOP-1: Apr.-Dec. 2008	China, India and Indo-China, Himalaya
EAST-AIRE	Mar.-Dec., 2008	Tahu, Xianghe (China)
AAF/SMART-COMMIT	Feb.-Nov. 2008	Vicinity of Lanzhou and Beijing area (China)
SACOL	2008-2009	Lanzhou, central China
ARCS-Asia	2008-2009	Beijing, PRD (near Hong Kong), Bangkok, Mt. Happono (1850m asl, central Japan)
TIGERZ	2008-2009	Indo-Gangetic Plain
Rajo-Megha	2009	Central India
CTCZ	2008 (Pilot) 2009	Northern India
IITM/rain	2009-2010 (?)	Pune, west/east-coast of India
CAIPEX	May-Oct., 2008-2009	?
MAIRS	Mar.-Sep., 2008	Semi arid North China.
STORM	Apr.-May 2009-2010	East and NE India

- **Observations**

- Make a catalogue of scientific observations (in progress)

- Request operational agencies for the necessary data through WCRP-JSC (not yet done)

- **Data Management and Policy**

- Basically agreed

- Data: Open within participating community within 1 year, open to public within 2 years

- Management: Distributed data centers (?)

- **Coordination with Modeling**

- Coordinated experiments for 2008-2009

- AMY Reanalysis (not yet decided)



## Meeting Schedule in 2009

- March 5-7, 2009: The International MAHASRI /HyARC Workshop, at Danang, Vietnam
  - May 26-28, 2009: JCK Met. Societies Joint Meeting, at Tsukuba, Japan
  - July 19-29, 2009: IAMAS at Montreal, Canada
  - August 11-15, 2009 AOGS 2009 6th Annual General Meeting, at Singapore (Deat line: March 15!)
- AS08 AMY - a coordinated Asian Monsoon Experiment**  
**The 6th AMY Workshop (Planned)**
- August 24-28, 2009: The 6th International Scientific Conference on the Global Energy and Water Cycle Experiment and 2nd iLEAPS Science Conference, at Melbourne, Australia (Deat line: March 15!)





# The END

# Thank you!

# Cảm ơn!

Photo: Bach Dang Hotel, Danang March 4, 2009