# Progress and prospects of AMY


**Jun Matsumoto**

**Department of Geography, Tokyo Metropolitan University**

**JAMSTEC/ RIGC**

**YOTC International Science Symposium & AMY 8th Workshop**

**at Beijing, China May 18, 2011**

# Programmatic Development

- **AMY stems from grass-root scientific and societal imperatives**
  Initiated in August 2006, Xining meeting.
- **Strongly supported by GEWEX and CLIVAR**
  GEWEX/MAHASRI workshop, Jan. 8 2007, Tokyo
  GEWEX SSG, Jan. 22/25 2007, Honolulu <Co-Chair: Prof. Jun Matsumoto>
  CLIVAR/AAMP, Feb 19/21 2007, Honolulu <Co-Chair: Prof. Bin Wang>
- **Endorsed by WCRP/JSC on 28th JSC meeting**
  **Mar. 26-30 2007 Zanzibar, Tanzania**
  **Identified as a cross-cutting weather and climate activity by WMO/WWRP/Monsoon panel.**
- **1st AMY Workshop, Apr. 23-25 2007, Beijing, China**
- **2nd AMY Workshop, Sept. 3-4 2007, Bali, Indonesia**
- **3rd AMY Workshop, Jan. 20-21 2008, Yokohama, Japan**
- **4th AMY Workshop, Jun. 18 2008, Busan, Korea**

# Programmatic Development

- 5th AMY Workshop, Oct. 24-25 2008, Beijing, China
- WCRP/WWRP-THORPEX YOTC Implementation Planning Meeting, Jul, 13-15, 2009 , Honolulu, HI, USA
- 6th AMY Workshop, Nov. 30-Dec. 2 2009, Kunming, China
- 1st AMY DATA Workshop, Jun. 9-11, 2010, Tokyo, Japan
- Workshop on Modelling Monsoon Intraseasonal Variability & CLIVAR/AMMP, Jun. 15-19, 2010, Busan, Korea
- 7th AMY Workshop, Jul. 10 2010, Pune, India

# Overarching Goal

**To improve Asian Monsoon prediction for societal benefits through improving understanding of the variability and predictability of the Asian-Australian monsoon system**

**It is believed that coordination and cooperation of individual participating and partner projects will greatly facilitate the efforts to reach this goal.**

# Cross-Cutting Science Themes for understanding Asian Monsoon

- Multi-scale interactions from diurnal to intraseasonal
- Atmosphere-Ocean-Land-Cryosphere-Biosphere interactions
- Aerosol-Cloud-Monsoon interactions and Human-environmental interactions


PRAISE
MAIRS
EAST-AIRE
SACOL
JEPP/Tibet
PHONE08
JICA/Tibet
ITP/TORP
MAIRS
EAST-AIRE
ARCS-Asia
STORM
CTCZ
IITM/Rain
CAIPEX
JEPP/SE Asia
JAMSTEC
AIPO
SCHeREX
SoWMEX
EAMEX
NPOIMS
CEOP
JAMEX
TCS08
SMART-COMMIT
JAMSTEC/PALAU
AIPO, JEPP IO/HARIMAU

# Classification of Projects

| | |
|---|---|
| **Hydroclimatology, weather** | **CEOP, SACOL, PRAISE, SCHeREX, SoWMEX/TiMREX, IITM/rain, CTCZ, STORM, MAHASRI/JEPP, ITP/TORP, JICA/Tibet** |
| **Aerosols** | **CEOP, SACOL, IITM/CAIPEX, JAMEX, EAST-AIRE & AMF, SMART-COMMIT, ARCS-Asia, CTCZ** |
| **Ocean interactions** | **AIPO, CTCZ, JEPP/IO, PALAU2008, TCS08** |
| **Monsoon prediction** | **AAMP, APEC, CEOP, CTCZ…** |
| **Human interactions** | **MAIRS; others link across** |

**Plus other National & International contributions**

# Highlights

- **AMY-IOP (2008-2009, partly 2010, 2011) was successfully conducted.**
- **MJO/MISO Hindcast Experiment has been conducted as a joint effort by CLIVAR/AAMP, APCC, YOTC and AMY.**

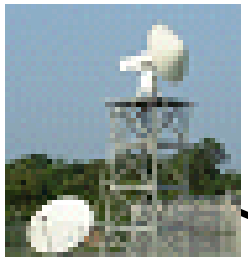
  **(→Bin Wang)**
- **Central Data Archiving System has been launched in the Univ. Tokyo, Japan and SCSIO, China. (→ Toshio Koike)**
- **JMSJ Special Issue on MAHASRI will be issued in Feb. 2011.**
- **AMY Re-analysis will be conducted by MRI/JMA, Japan.**

Japan EOS Promotion Program (JEPP) + Indonesian Research/Technology Grant

(Manabu Yamanaka ,JAMSTEC/RIGC)

# Hydrometeorological Array for ISV-Monsoon Automonitoring (HARIMAU)

Kototabang EAR,BLR,XDR KU + LAPAN



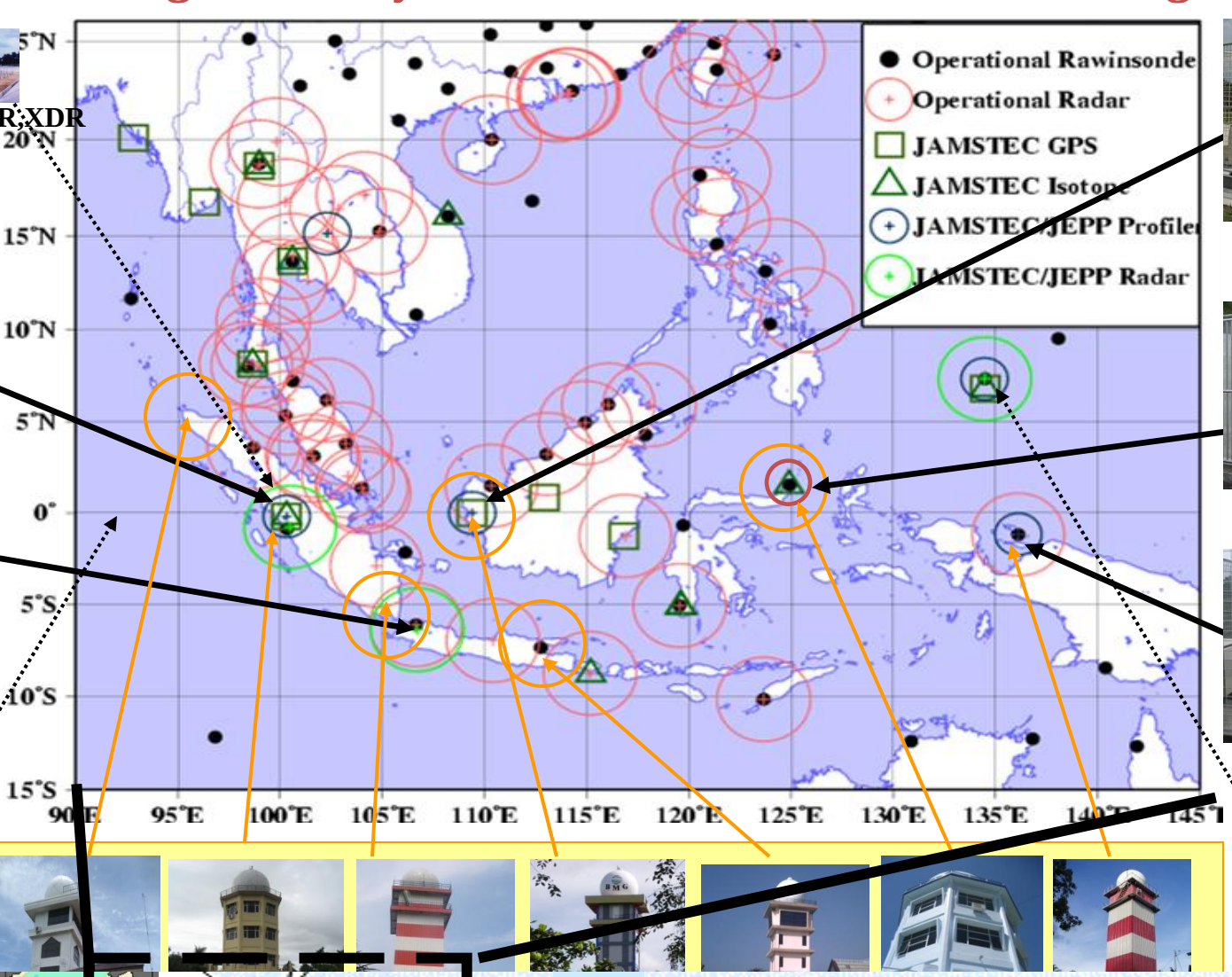
MIA XDR

Serpong CDR

Mirai CDR

JAMSTEC

BMG

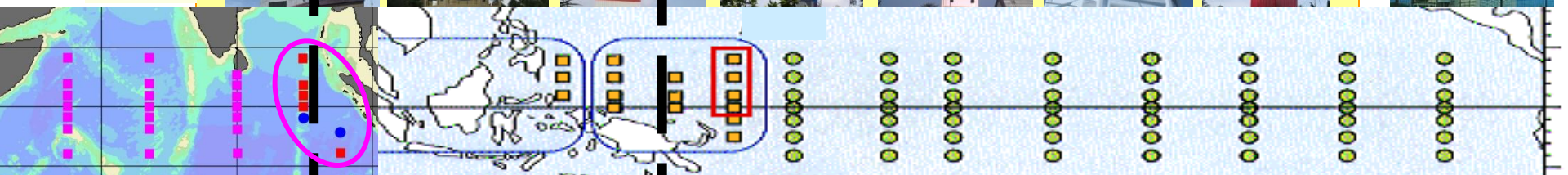



Pontianak WPR

Manado WPR

Biak WPR



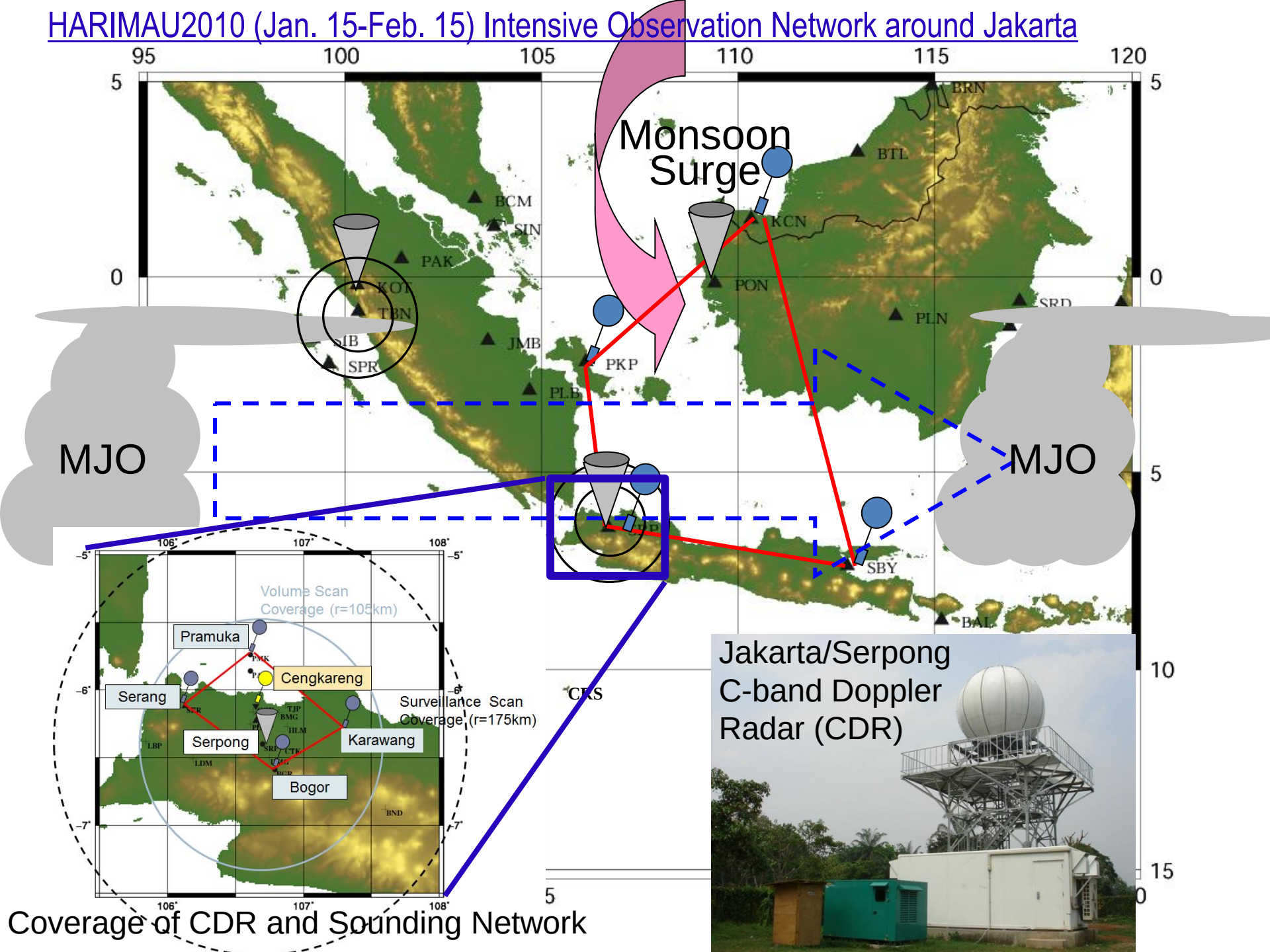


# AMY (Asian Monsoon Years)/HARIMAU IOP (Jan 20-Feb 7, 2009)



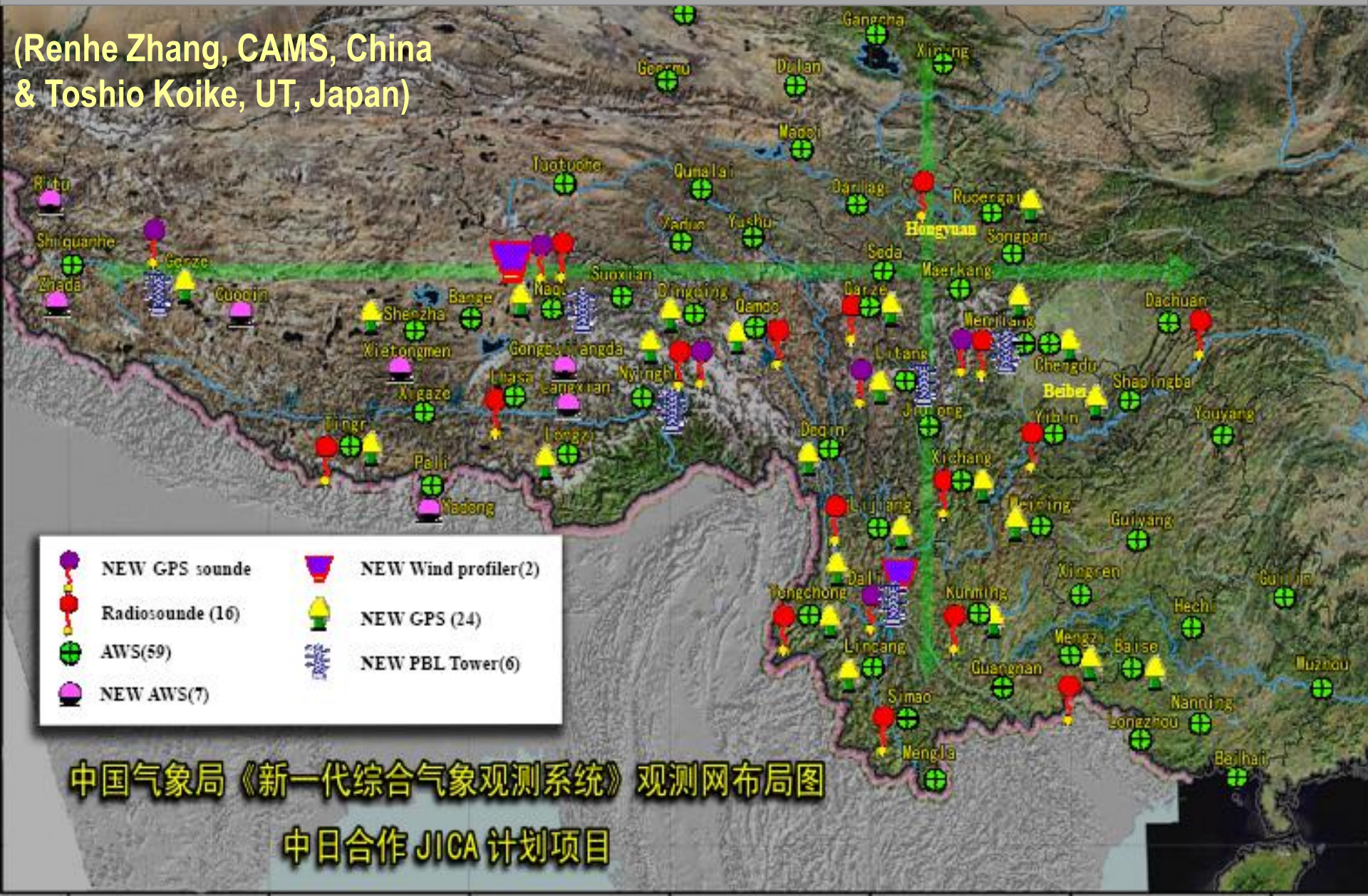
**Members**: Wu Peiming (JAMSTEC), Hamada Jun-Ichi (JAMSTEC); Fadli Syamsudin (BBPT), Reni Sulistyowati (BBPT); Rino (BPPT); Timbul Manik (LAPAN), Iskandar (LAPAN), Dedi (LAPAN), Hadi Rasidi(LAPAN), Vaisal Tino(LAPAN), Suherudin (LAPAN); Ade Chandra (LAPAN), Suparman (LAPAN), Hari (BMG), Firdaus (BMG). (in total **15**)

# HARIMAU2010 (Jan. 15-Feb. 15) Intensive Observation Network around Jakarta

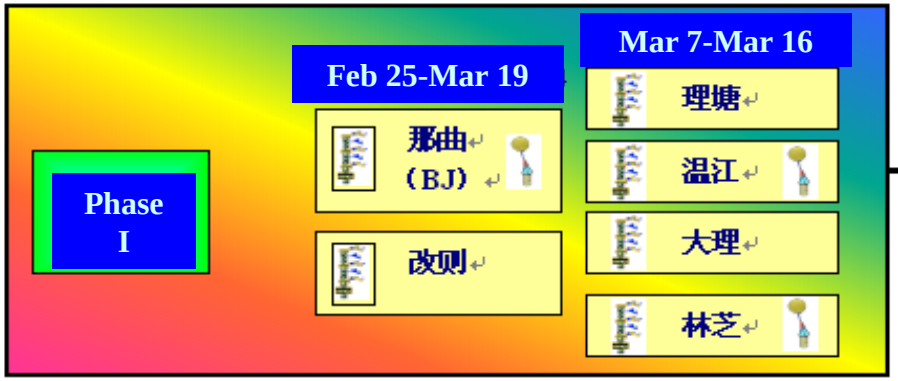


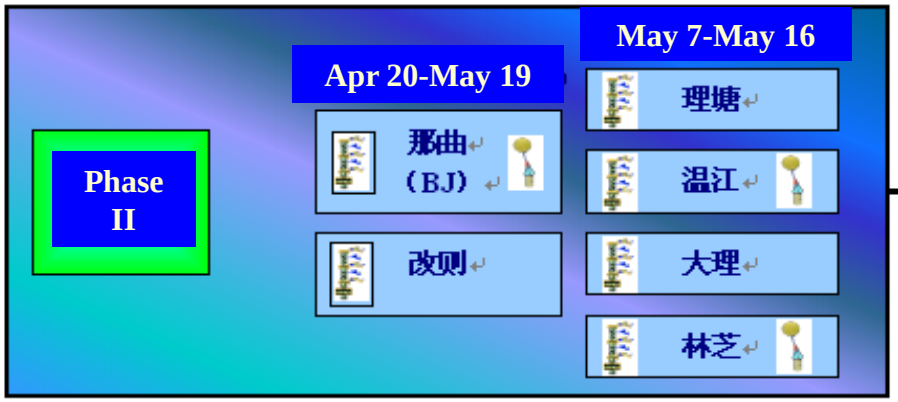

Coverage of CDR and Sounding Network

# All new systems installed by JICA are correctly operated. More than 90% data are obtained and used operationally.

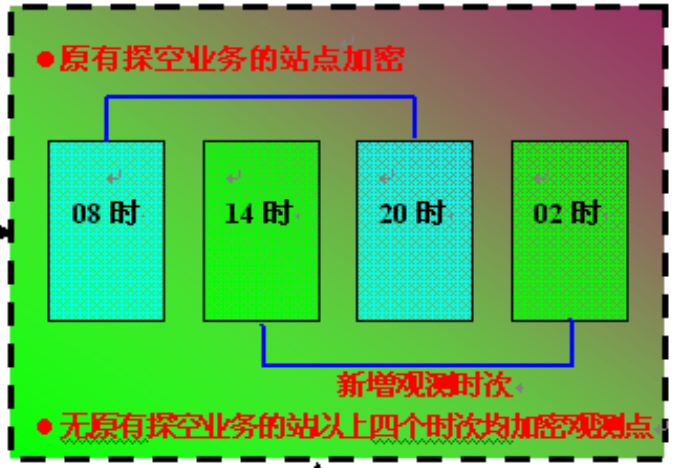


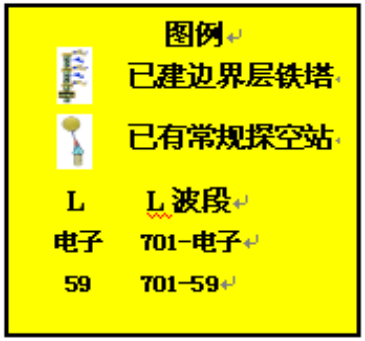
# Intensive Upper-air Sonde Observations in 2008



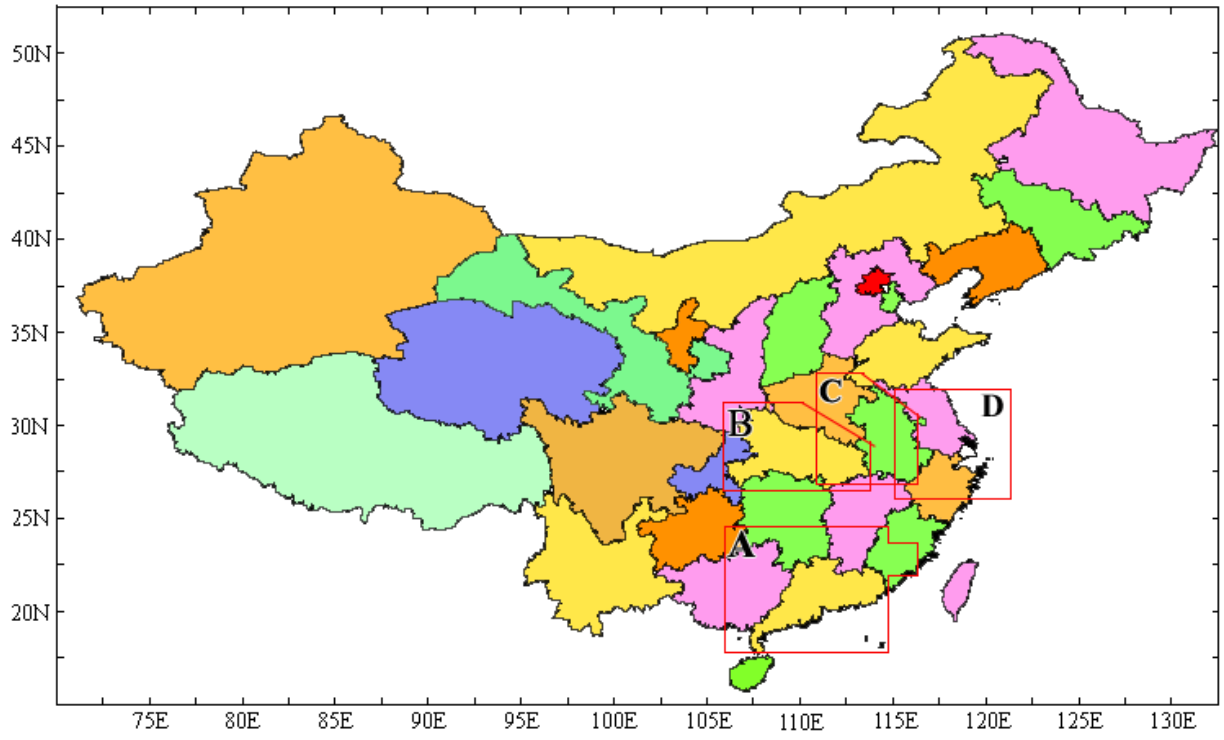







# South China Heavy Rainfall Experiments (SCHeREX) (PI: Zhang & Ni, CAMS, China)

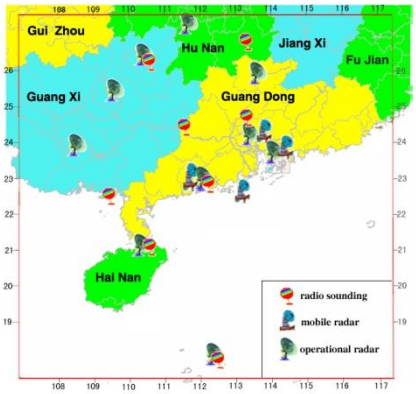



2008, 2009

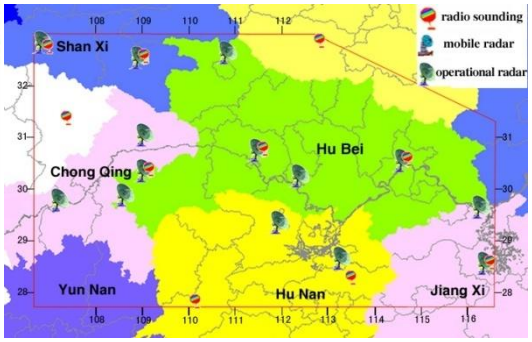
Phase I (May 1 – Jun.10): Zone A

Phase II (Jun. 10 – Jul. 20): Zone B, C, D

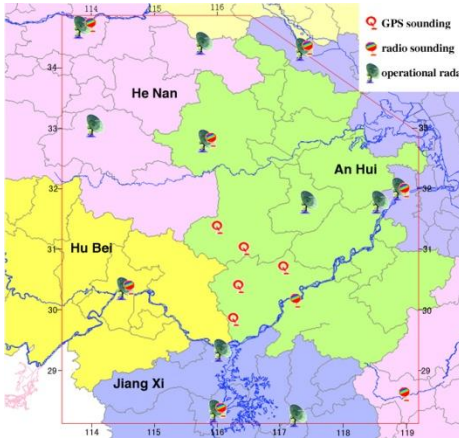
Zone A



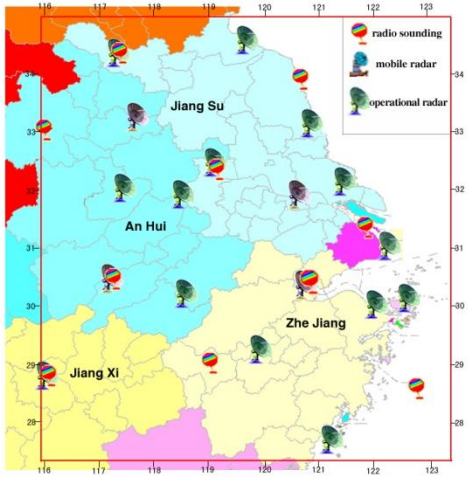

Zone B




Zone C

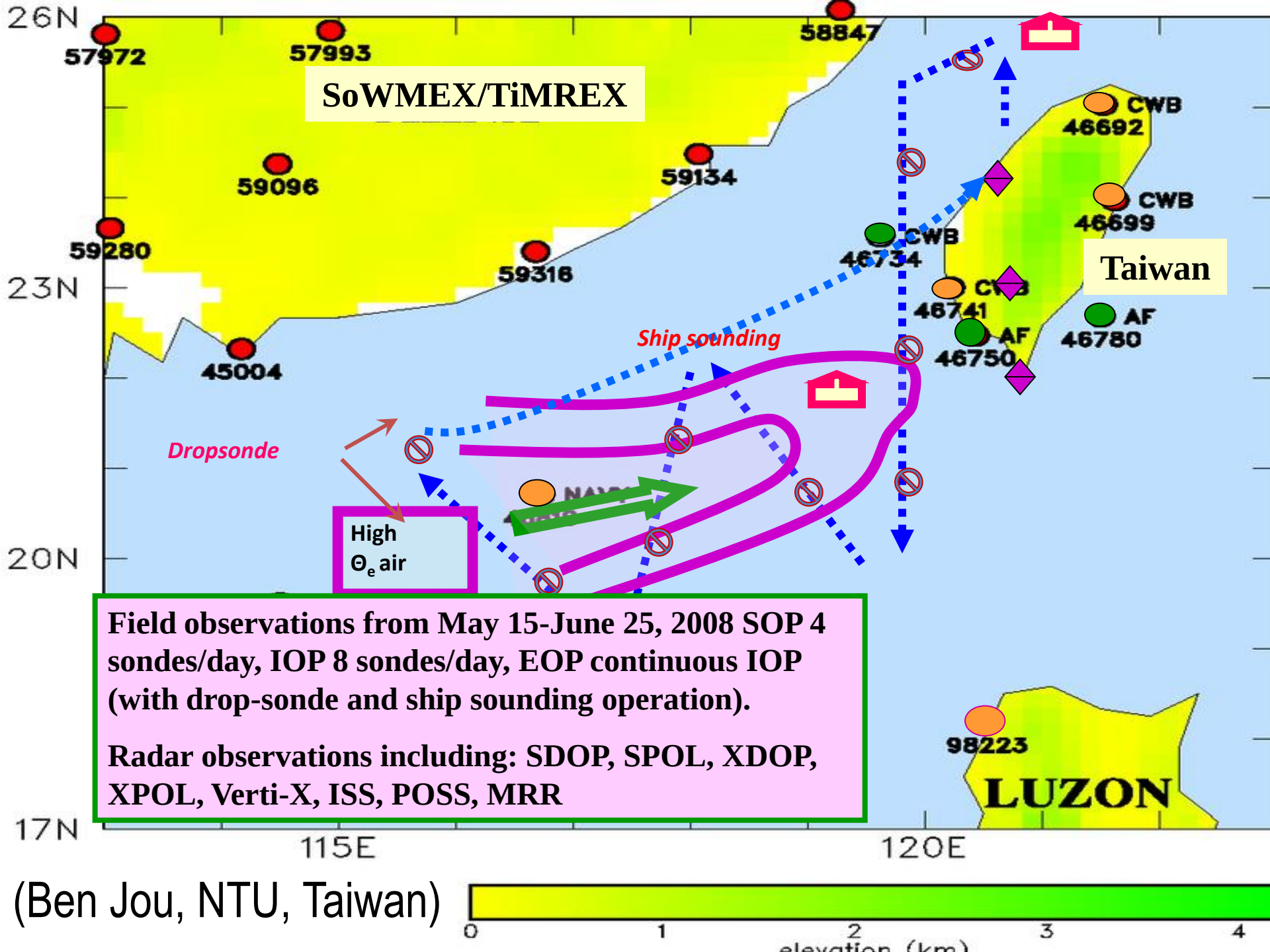



Zone D



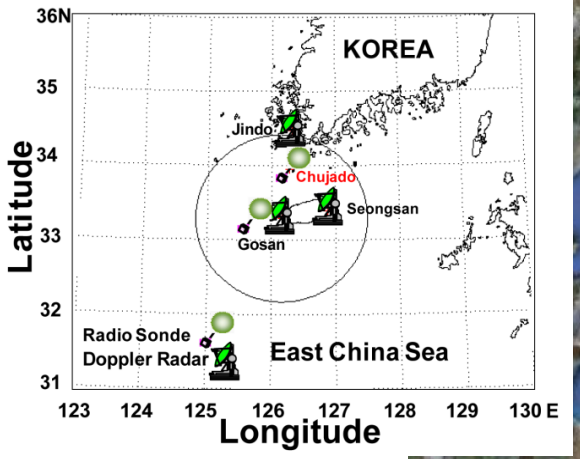
## South China Heavy Rainfall Experiments (SCHeREX) (PI: Zhang & Ni, CAMS, China)

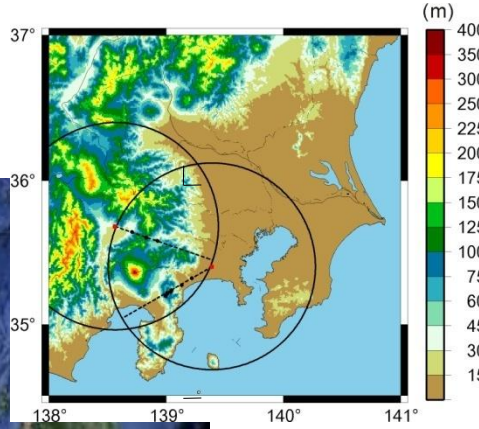
| Experiment Zone | | A | B | C | D | Total |
|---|---|---|---|---|---|---|
| Equipments | Doppler Radar | 15 | 14 | 12 | 13 | 54 |
| | Radio Sounding Station | 13 | 11 | 13 | 10 | 47 |
| | Mobil Radar | 4 | 1 | 1 | 1 | 7 |
| | Meteorological Station | 226 | 368 | 239 | 247 | 1080 |
| | Automatic Weather Station (AWS) | 1576 | 1687 | 2060 | 1460 | 6783 |
| | Boundary Layer Observation | 16 | | | | 16 |
| | Wind Profiler | 3 | | | 5 | 8 |
| | Drop Sounding Aircraft | 1 | | | | 1 |




(Ben Jou, NTU, Taiwan)

# GRL (Global Research Laboratory), PKNU (Dong-In Lee)
# Korea-Japan-Taiwan collaborative obs.



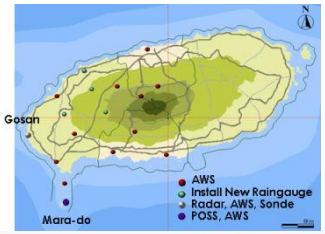




**KEOP**
: 2003/7/12 ~ 7/17
: 2004/7/3 ~ 7/8
: 2005/7/5 ~ 7/12
: 2009/6/5 ~ 8/12

**Kanto**
: 2010/10 ~ 2011/11

**Jeju & Marado**
: 2006/6/22 ~ 7/12

**Chujado**
: 2007/6/21 ~ 7/10
: 2009/6/24 ~ 7/18

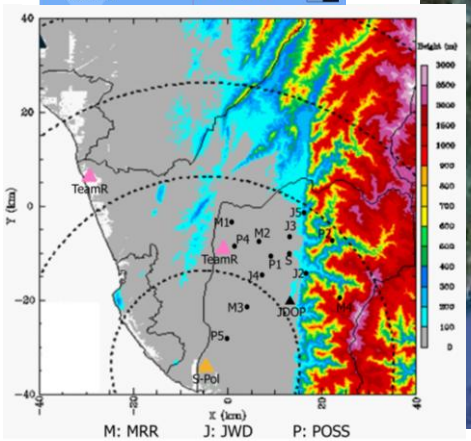


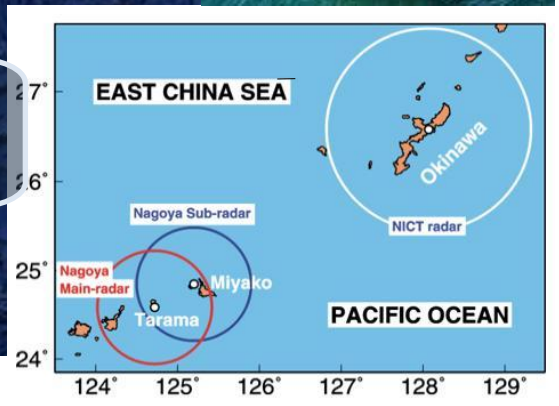

**Ieodo**
: 2007/6/8 ~ 6/14
: 2008/6/22 ~ 7/8
: 2009/6/7 ~ 6/24
: 2010/6/29~7/8
: 2011/6/15~7/8

**Taiwan**
: 2008/5/15 ~ 6/30
: 2010/5/20 ~ 6/16

**Okinawa**
: 2010/5/31 ~ 6/21
: 2010/6/22 ~ 12/30
2011/5/23 ~ 6/17

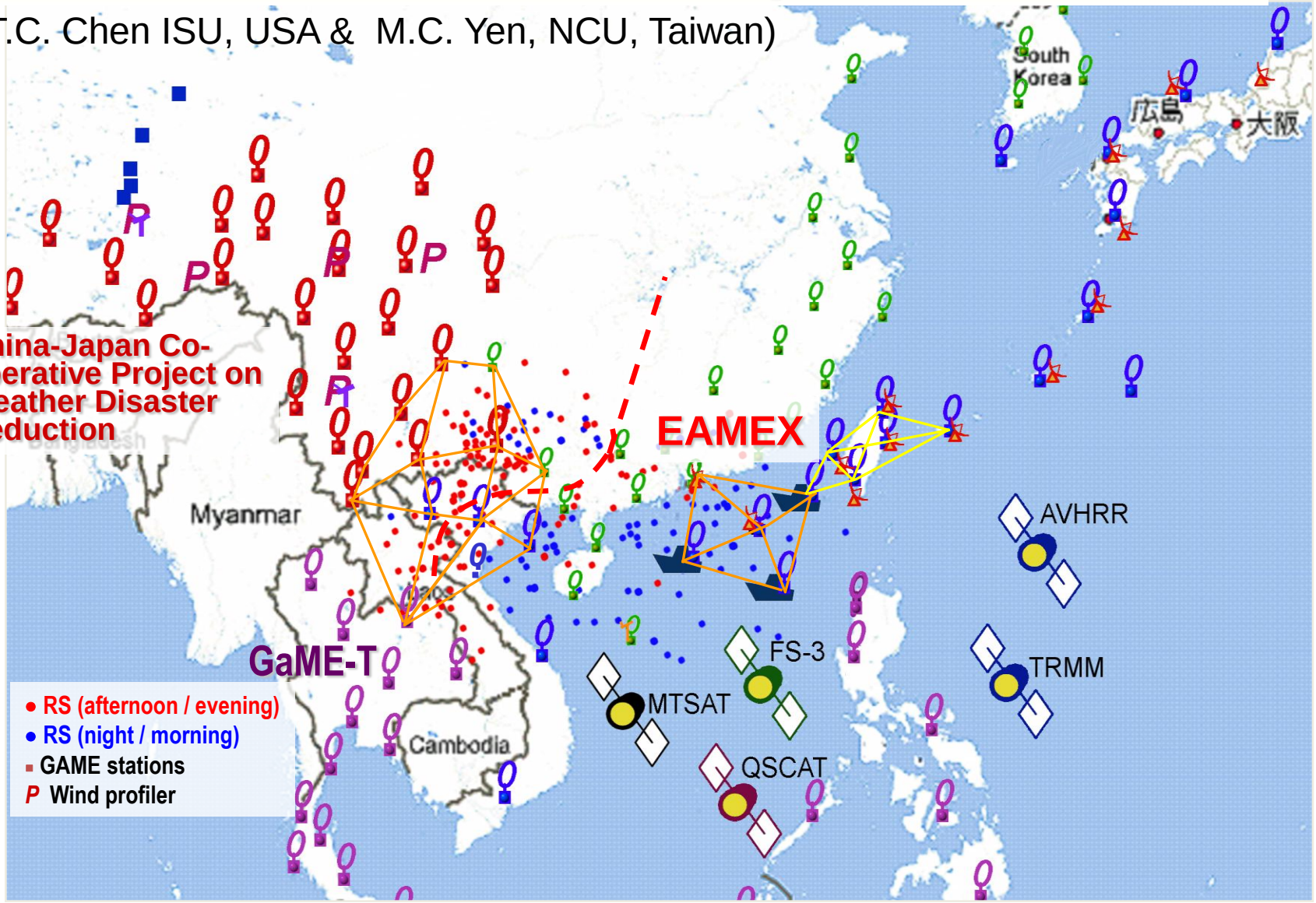
**Taramajima**
: 2007/6/2 ~ 6/17



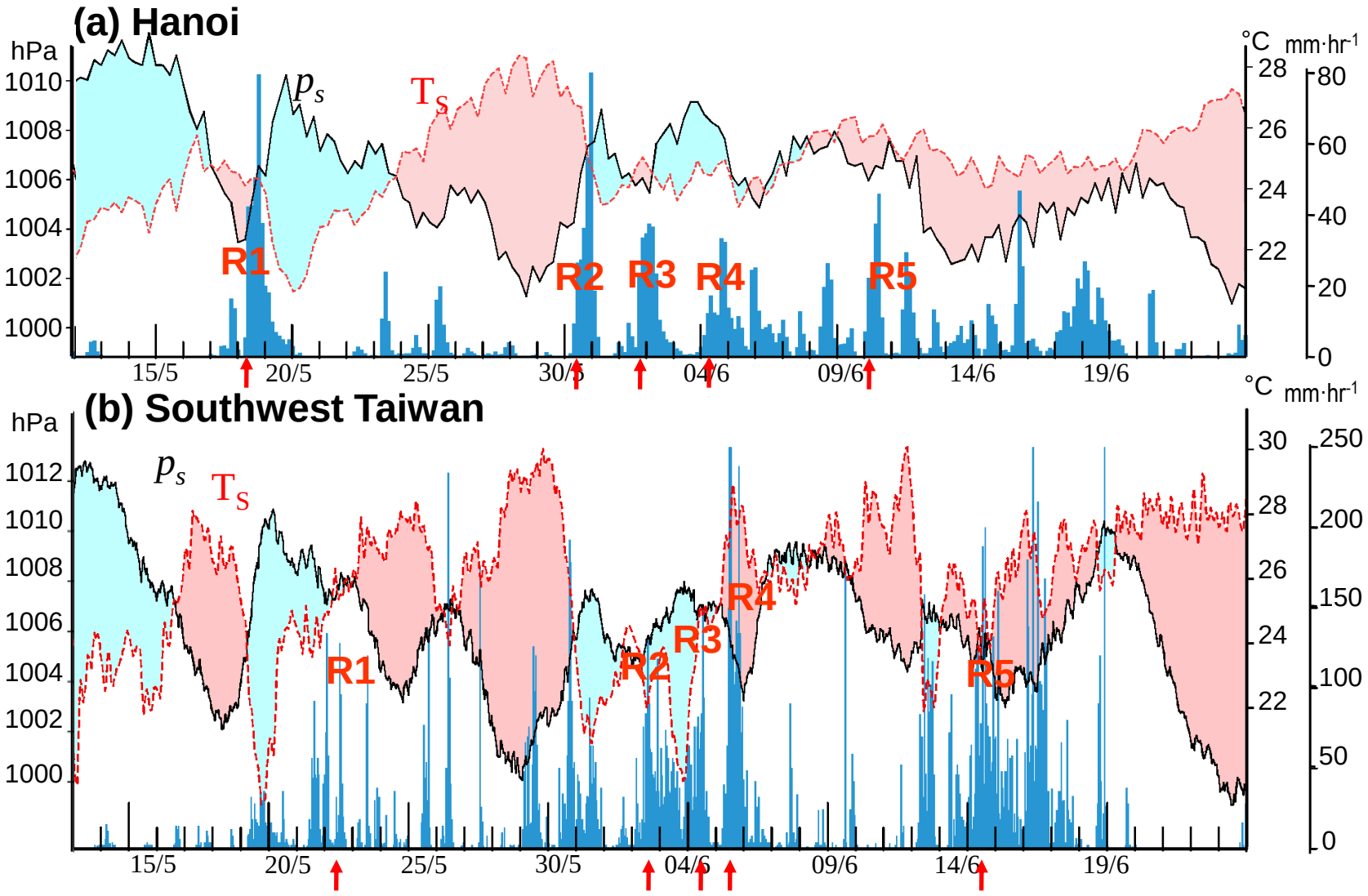
# Summer Rainstorm Experiment 2008

(T.C. Chen ISU, USA & M.C. Yen, NCU, Taiwan)




May-June, 2008

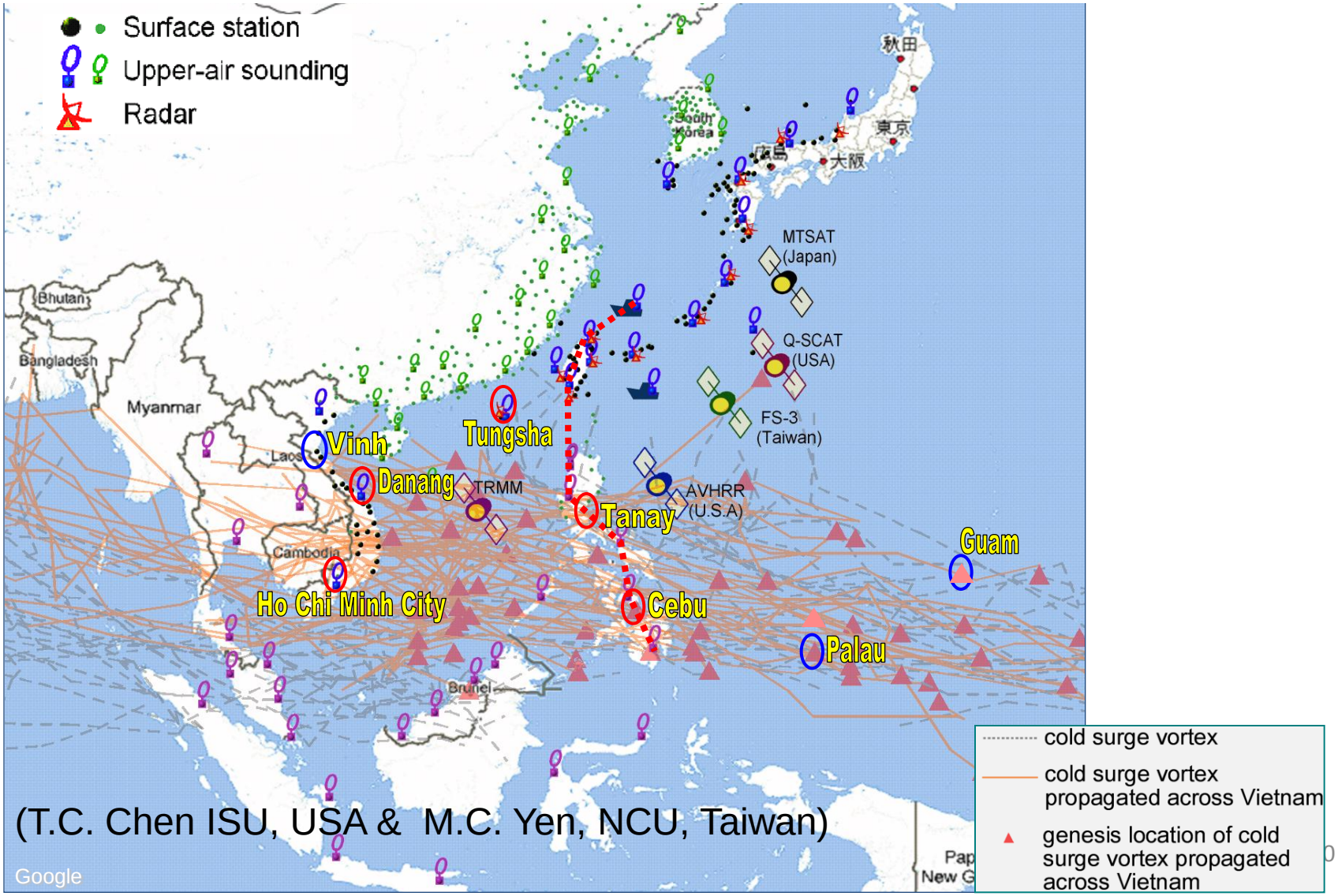
# 1. Identification of rainstorm (2008)



# Winter Rainfall Field Experiment

## (1) October-November, 2008:Central Vietnam Heavy Rain Events

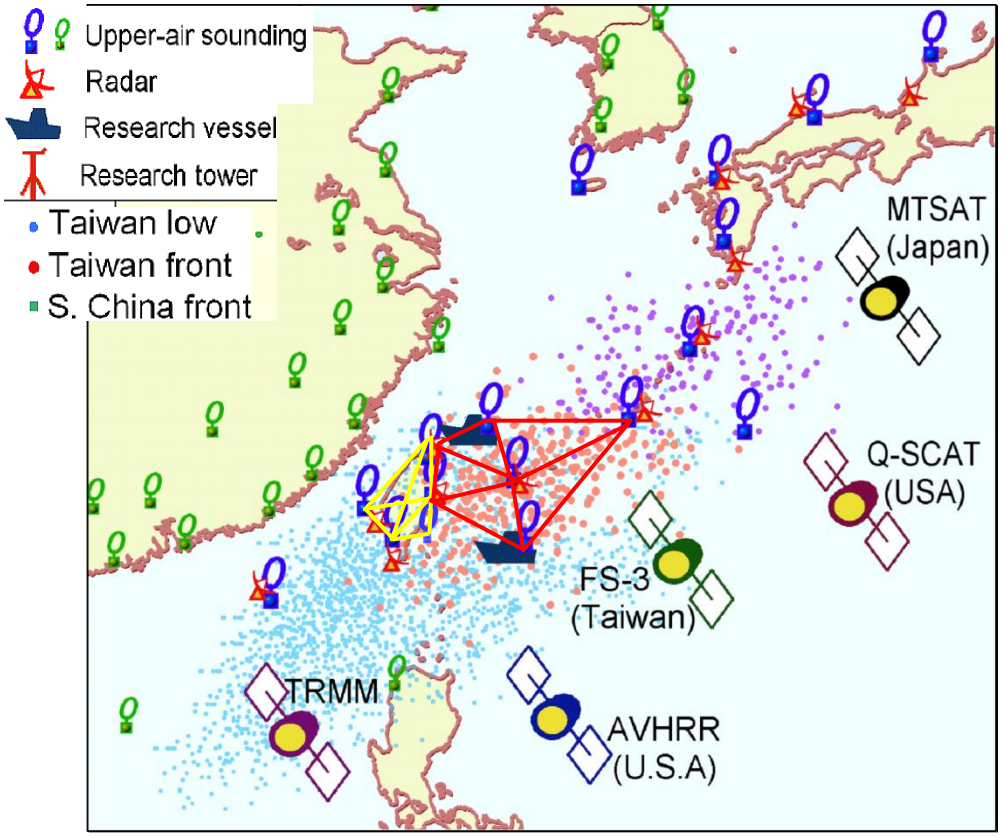
### Cold Surge Vortex / Heavy Rainfall Events in Late Fall

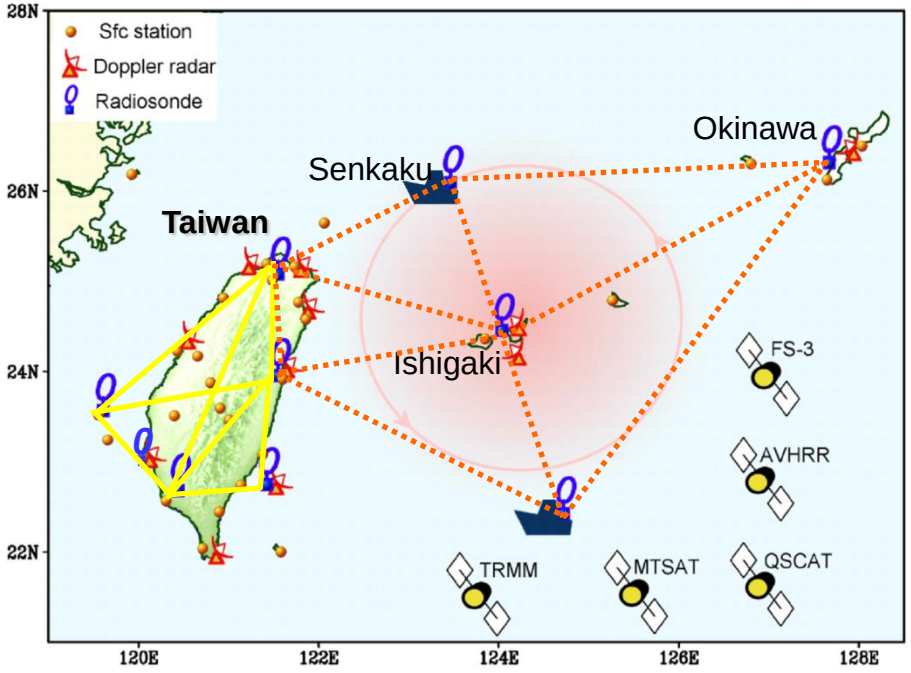



(T.C. Chen ISU, USA & M.C. Yen, NCU, Taiwan)

# Winter Rainfall Field Experiment

## (2) December 08-Feburary09: East Asian Rainfall Center



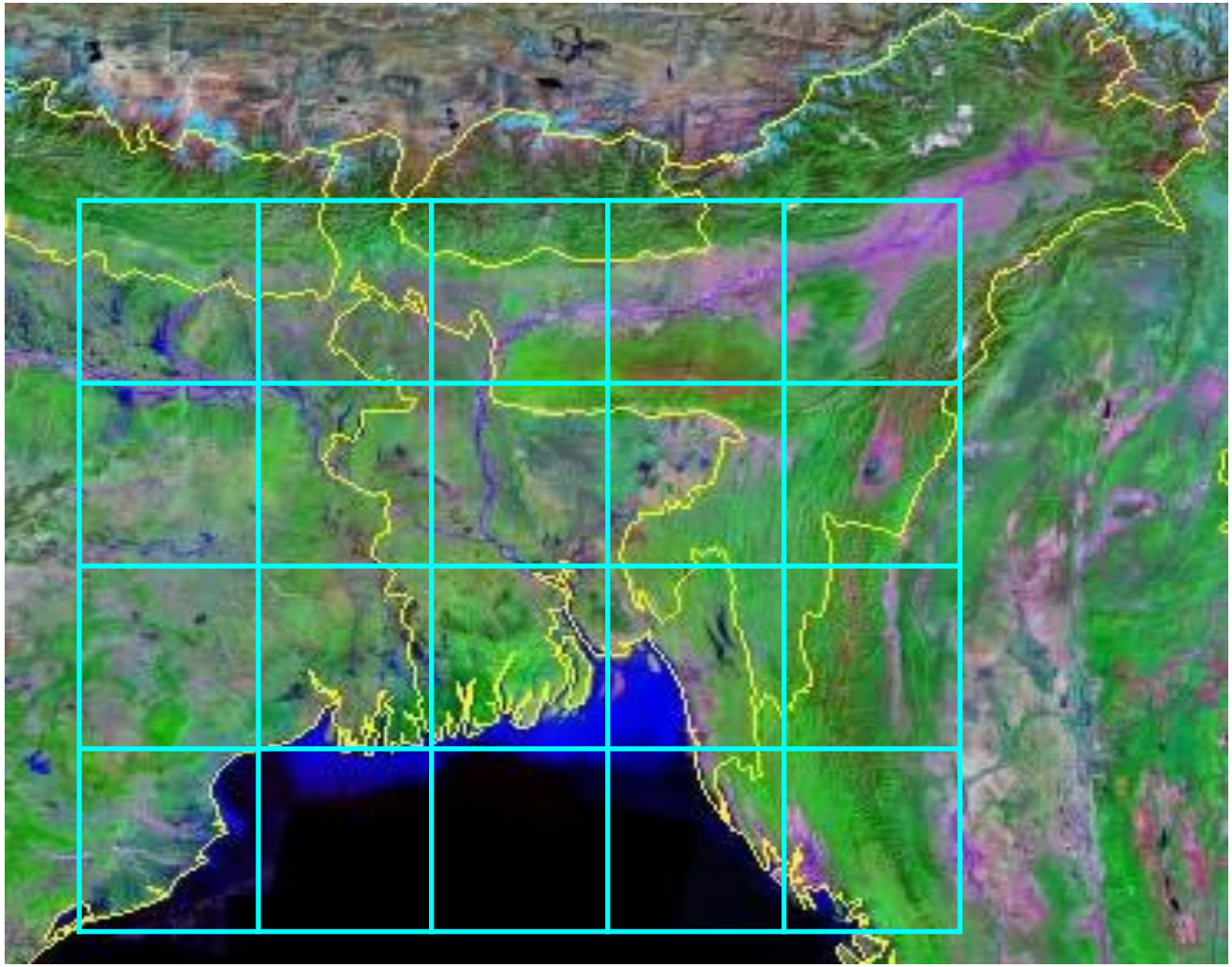
# SAARC STORM

**It is a Coordinated Field Experiment on Severe Thunderstorm Observations and Regional Modeling over the SAARC Region**

## Objectives:

1. **To understand: genesis, development and propagation of severe thunderstorms**
2. **To enhance the knowledge: Dynamical and thermodynamical structure role of microphysical processes for intensification**
3. **To study behavior of atmospheric electrification during intensification process and interaction with cloud microphysical processes**
4. **Development of meso-scale prediction system with improved forecast skill**

# SARRC STORM Coordinated Joint Field Experiment



Bangladesh:
- Surface obs: 35
- Pilot Balloon: 10
- RS/ RW : 3
- DWR : 3

Bhutan:
- Surface (Class-1): 21
- AWS :

India
- Surface obs: 559
- Pilot Balloon: 62
- RS/ RW : 39
- DWR : 5

Nepal
- Surface (Class-1): 27
- AWS : 15

**4 Pilot Field Experiments are conducted so far (2006-2007 in India and 2009-2010 Jointly with India, Bangladesh, Bhutan and Nepal). (Someshwar Das, NCMWF, India)**

# Mile Stones

1. STORM programme originated in India in 2005

2. April-May 2006: 1st Pilot Field Experiment conducted in west Bengal

3. April-May 2007: 2nd Pilot Field Experiment conducted in west Bengal & North-East India

4. Nov 2008 : The 14th Governing Board of SMRC approved the STORM programme.

5. April 2009 : The 1st International Programme Committee (IPC) meeting held at IMD, Delhi. The IPC renamed the programme as SAARC STORM

6. April-May 2009 & 2010: 2 Pilot field experiments conducted jointly with India, Bangladesh, Bhutan, and Nepal focusing Nor'westers.

7. April-May 2011: 3rd Joint field experiment is in progress

# MAHASRI / NE India Observation Network (Taiichi Hayashi, Kyoto U., Japan)

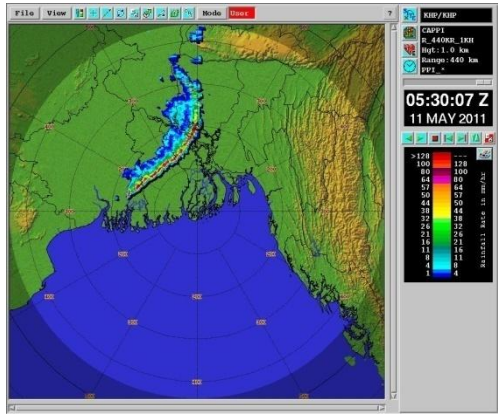
AWS




Raingauge : from 2006

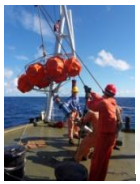
# Recent Activities

- Special Radiosonde observation during pre-monsoon season at Sylhet
  - 29 April – 13 May 2011 (06Z and 12Z)
- New AWS installation at Sayedpur
- GPS precipitable water observation
  - April – August 2011 at Dhaka and Sylhet

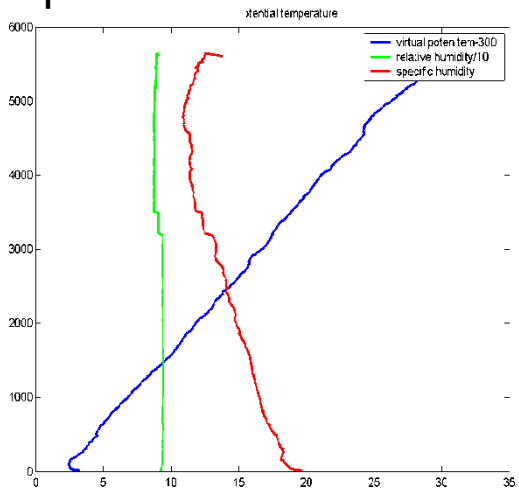


# AIPO SCSIO, China
# Dongxiao Wang

| Cruises | Sum of GPS casts |
|---|---|
| Northern SCS, Sep., 2006 | 43 |
| Western SCS, Dec., 2006 | 33 |
| Southern SCS, May 2007 | 82 |
| Northern SCS, Aug., 2007 | 23 |
| Northern SCS, Sep., 2007 | 16 |
| Northern SCS, Feb., 2008 | 15 |
| Northern SCS, May, 2008 | 62 |
| Southern SCS, May 2009 | ~ 70 |
| Central SCS, Jun., 2009 | ~ 50 |
| Northern SCS, Jul., 2009 | ~ 50 |



Virtual potential temperature




## Observation at 18°N section

18°N section is located in the mid of the SCS. Plenty of hydrological data are collected during open cruises since 2004.


## Contact Information

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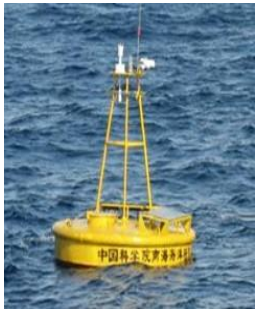
164 West Xingang Rd., Haizhu District, Guangzhou, China

Tel:+86-20-8902-3204

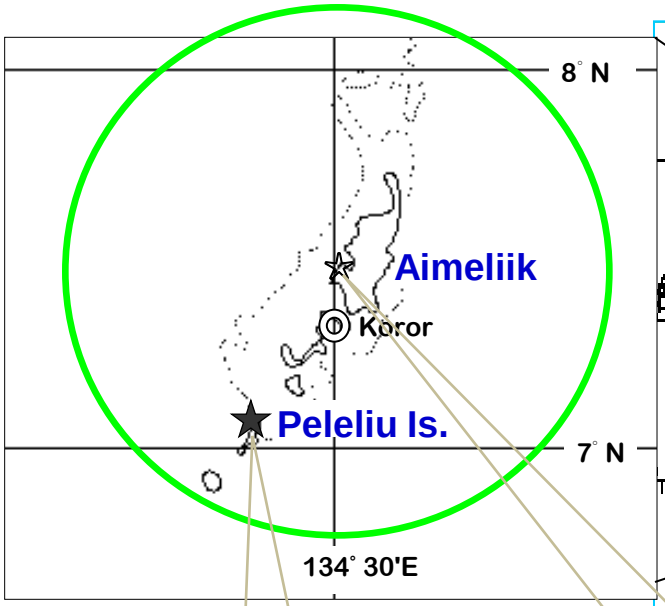
Website:http://ledweb.scsio.ac.cn/eng/index.asp

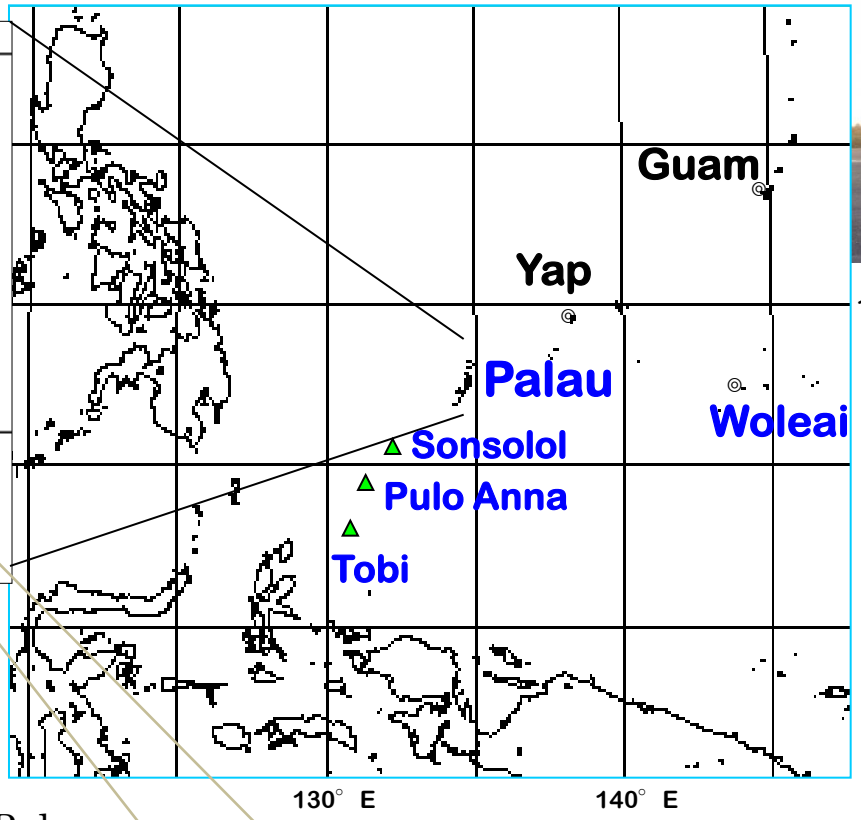

SOUTH CHINA SEA INSTITUTE OF OCEANOLOGY
CHINESE ACADEMY OF SCIENCES




Asian Monsoon Years (AMY 2007-2012)
Observational Coordinate Working Group

# PALAU Observation network (Dr. Ryuichi Shirooka, JAMSTEC/RIGC)




Aircraft

Doppler radar ☆ : Aimeliik
Radio sonde (NOAA) ◎ : Koror
AWS site ★ : Peleliu
Raingauge ▲ : Sonsolol

Pulo Anna

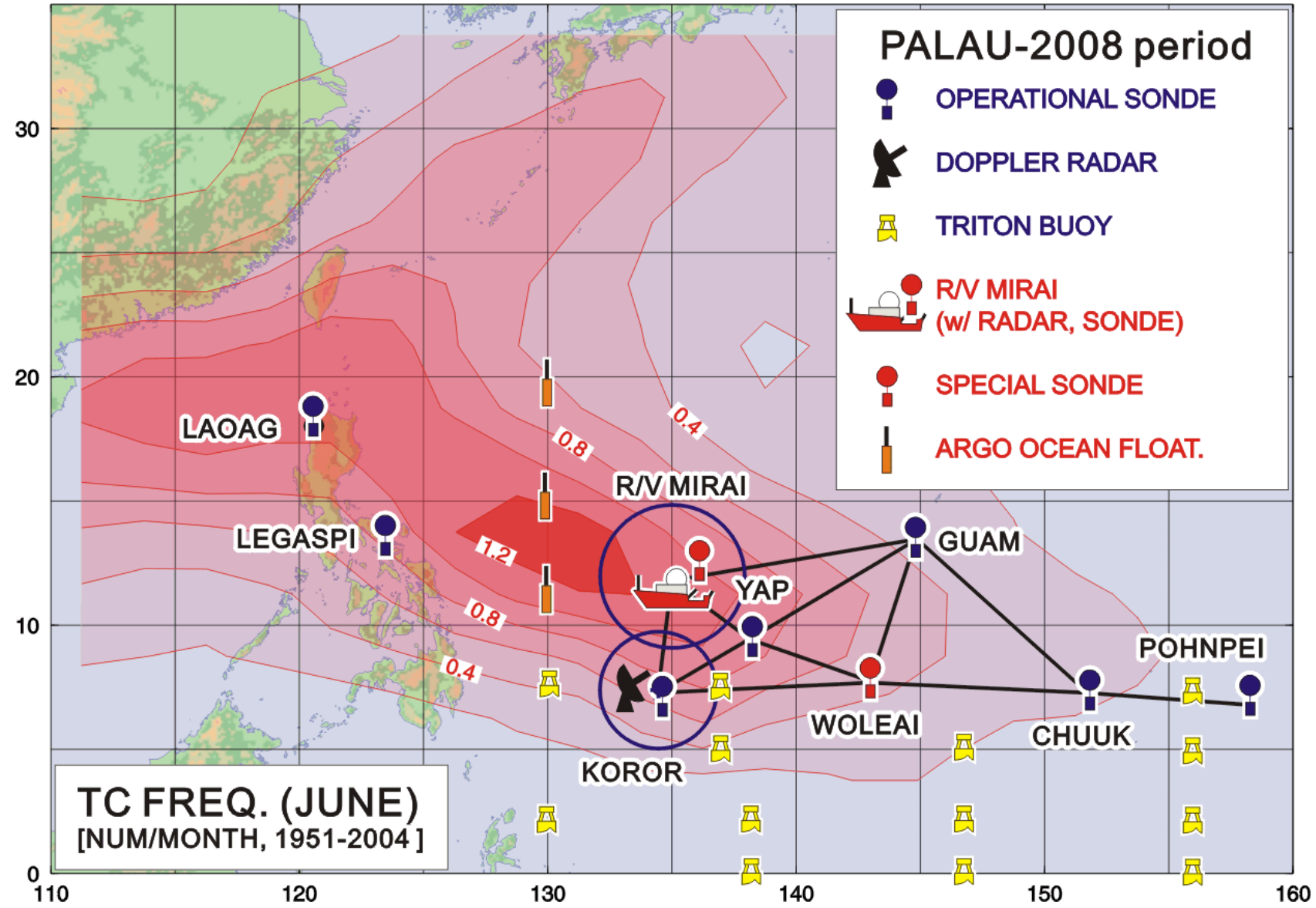

Peleliu site

Tobi

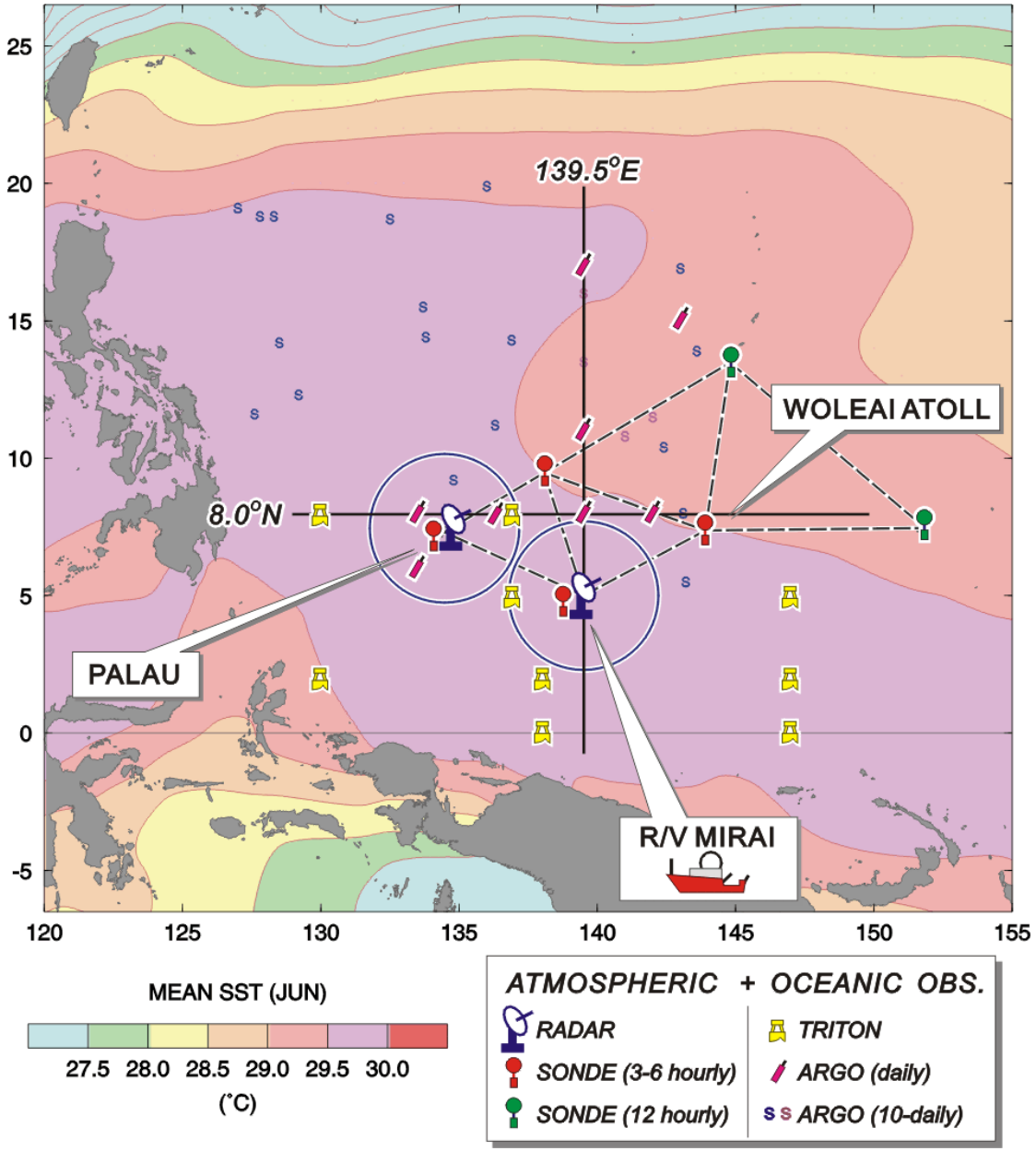

Aimeliik Suginohara site

R/V Mirai

# PALAU2008 Observation network



# PALAU2010 Observational network




PALAU project:

Pacific Area Long-Term Atmospheric Observation for Understanding Climate Change

PALAU 2010 :

May to June 2010

# US-China Joint Studies on Aerosol-Climate

1.East Asian Study of Tropospheric Aerosols: An International Regional Experiment (EAST-AIRe): 2004-2007

2.East Asian Study of Tropospheric Aerosols and Impact on Regional Climate (EAST-AIRc): 2008-present

## PI Zhanqing Li

### Participating Institutions:

**University of Maryland**
**NASA/GSFC**
**Dept of Energy Nat. Labs**

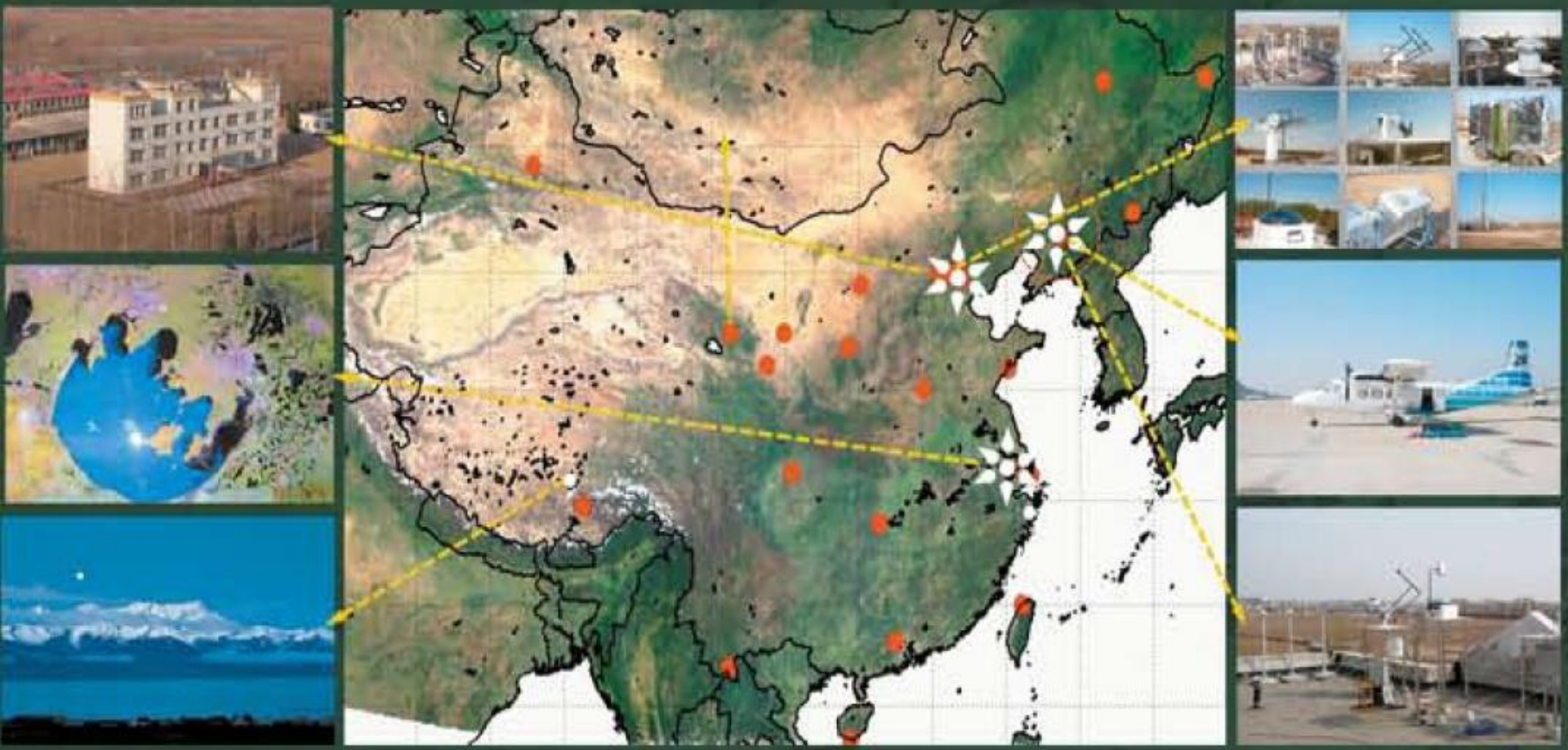
**Chinese Academy of Sciences,**
**China Meteor. Admin.**
**Nanjing Univ of Info. Sci. & Tech.**

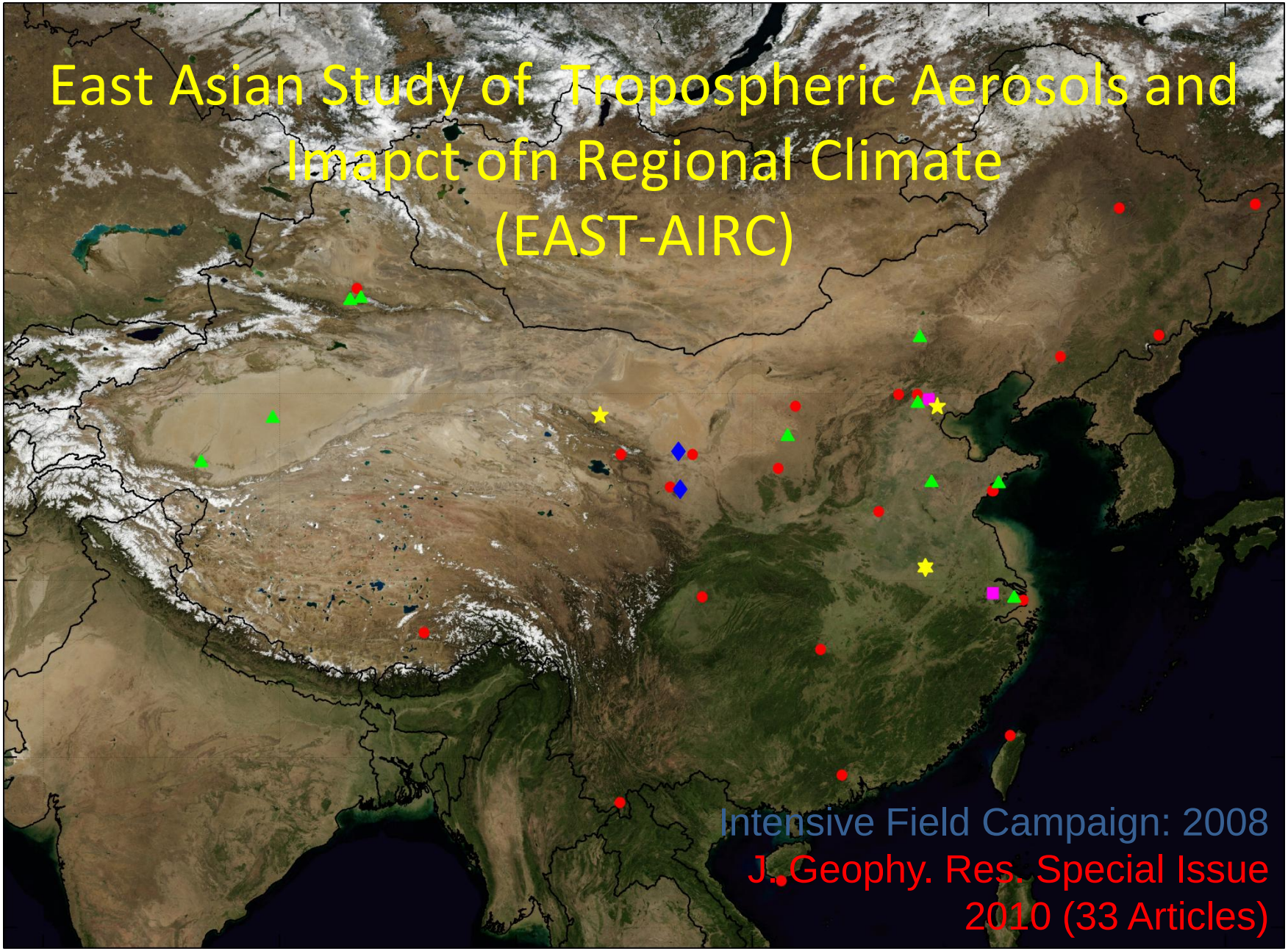
# East Asian Study of Tropospheric Aerosols:

## An International Regional Experiment (EAST-AIRE)

Intensive field campaign: 2005

J. Geophy. Res. Special Issue 2007 (20 articles)




East Asian Study of Tropospheric Aerosols and Imapct ofn Regional Climate (EAST-AIRC)
Intensive Field Campaign: 2008
J. Geophy. Res. Special Issue 2010 (33 Articles)

# Super Stations during 2008 IOC


*Anchored by the AMF in Shouxian, additional instrumented sites to the east and north provided a comprehensive atmospheric data set for studying aerosol effects in the region.*

- **JMSJ Special Issue on MAHASRI was published in Feb. 2011. 25 scientific papers will be included.**

**Editors of the Special Issue:**

- **Chief Editor, Jun Matsumoto**
- **Vice Chief Editor, Takehiko Satomura**
- **Editors : Yasumasa Kodama, Ichiro Tamagawa, Jun Asanuma, Hirohiko Ishikawa, Shinjiro Kanae, Ryuichi Kawamura, Tetsuo Nakazawa, Atsushi Higuchi, Manabu D. Yamanaka, Jianping Li, Bin Wang, Tsing-Chang Chen, Ming-Cheng Yen, Fadli Syamsudin, Nazrul Islam, Hansa Vathananukij**

# JMSJ Special Issue on MAHASRI (published in late February)
# Available on JMSJ Web page: http://www.jstage.jst.go.jp/browse/jmsj

CONTENTS

Articles



Note and Correspondence




Journal of the Meteorological Society of Japan February 2011 Vol. 89, No. 1A Pages 1 - 364




ISSN 0026-116


# Journal of the Meteorological Society of Japan

Special Issue on MAHASRI
–Monsoon Asian Hydro-Atmosphere Scienific Research and Prediction Initiative–




Volume 89A February 2011

*Journal of the Meteorological Society of Japan*, Vol. 89A, pp. 317–330, 2011.
DOI:10.2151/jmsj.2011-A22

## NOTES AND CORRESPONDENCE

# Diurnal Convection Peaks over the Eastern Indian Ocean off Sumatra during Different MJO Phases

**Mikiko FUJITA, Kunio YONEYAMA, Shuichi MORI, Tomoe NASUNO**

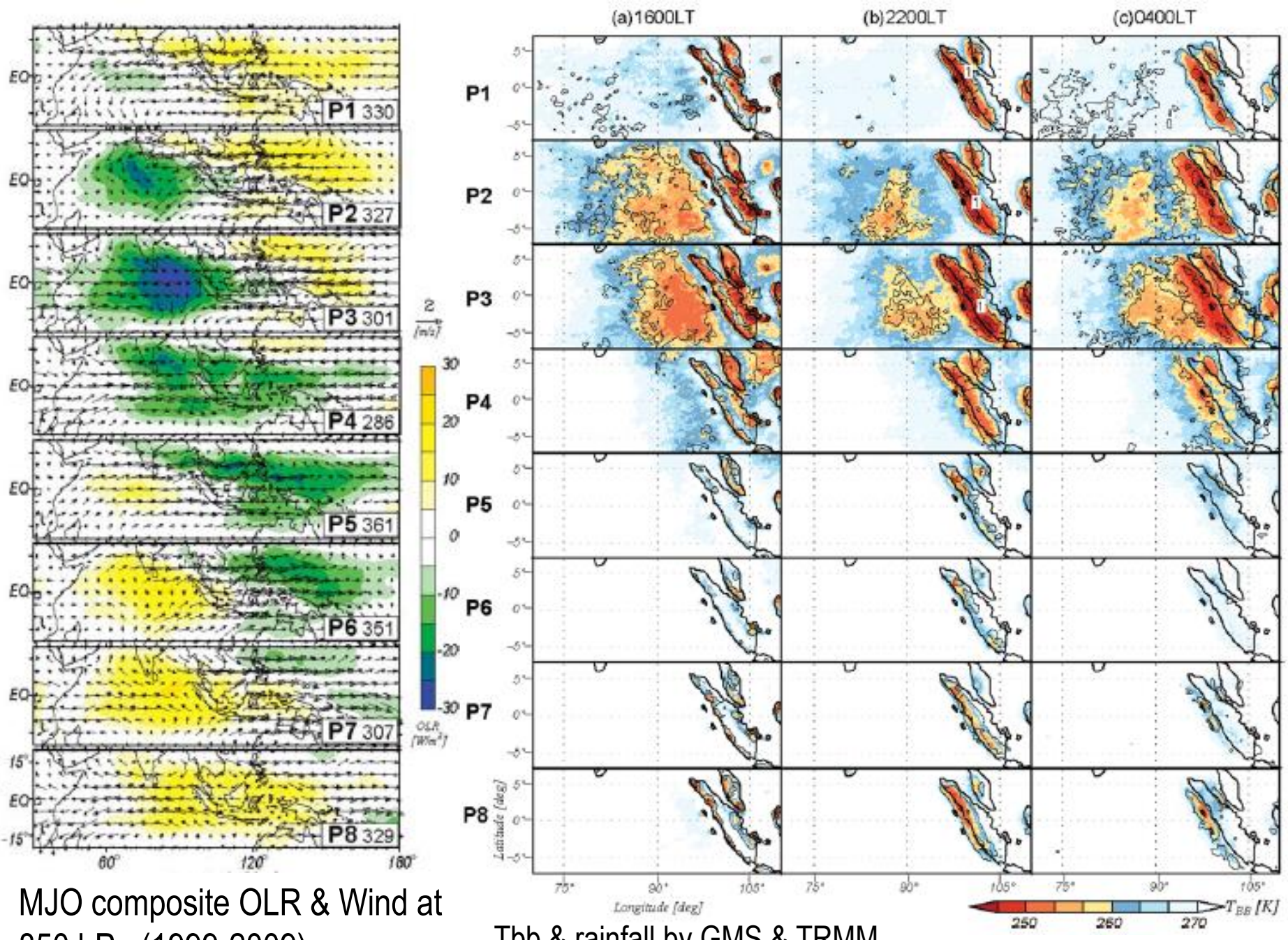
*Research Institute for Global Change (RIGC),*
*Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Kanagawa, Japan*

**and**

**Masaki SATOH**

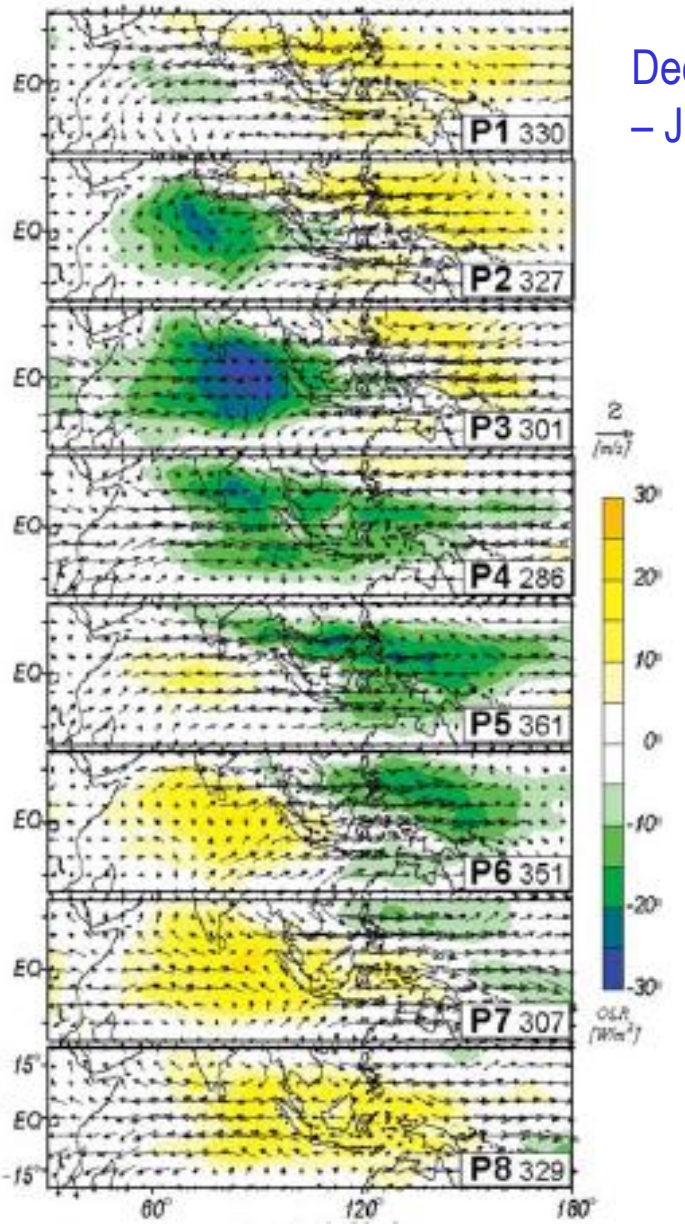
*Research Institute for Global Change (RIGC),*
*Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Kanagawa, Japan*
*Center for Climate System Research, The University of Tokyo*

*(Manuscript received 31 May 2010, in final form 4 November 2010)*



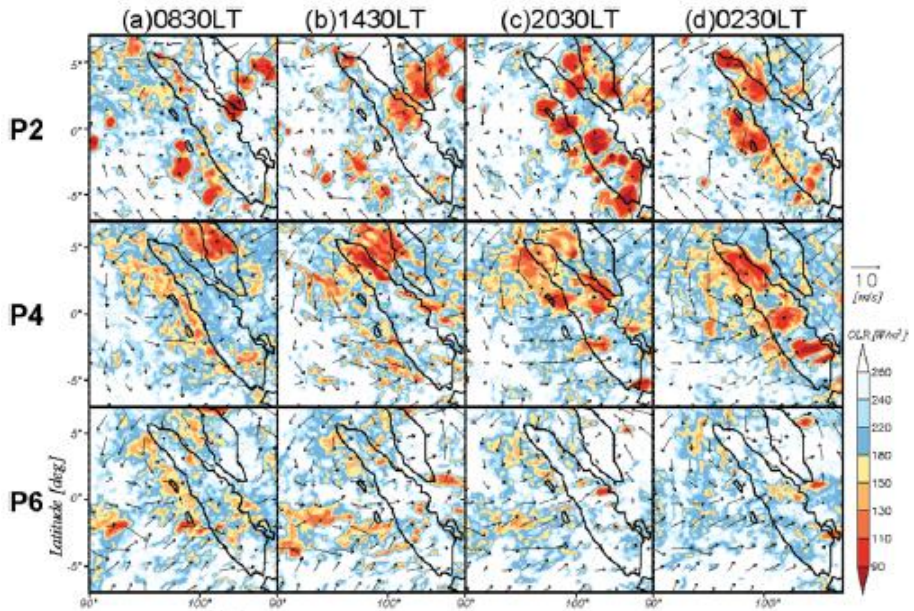

MJO composite OLR & Wind at 850 hPa (1999-2009)

Tbb & rainfall by GMS & TRMM

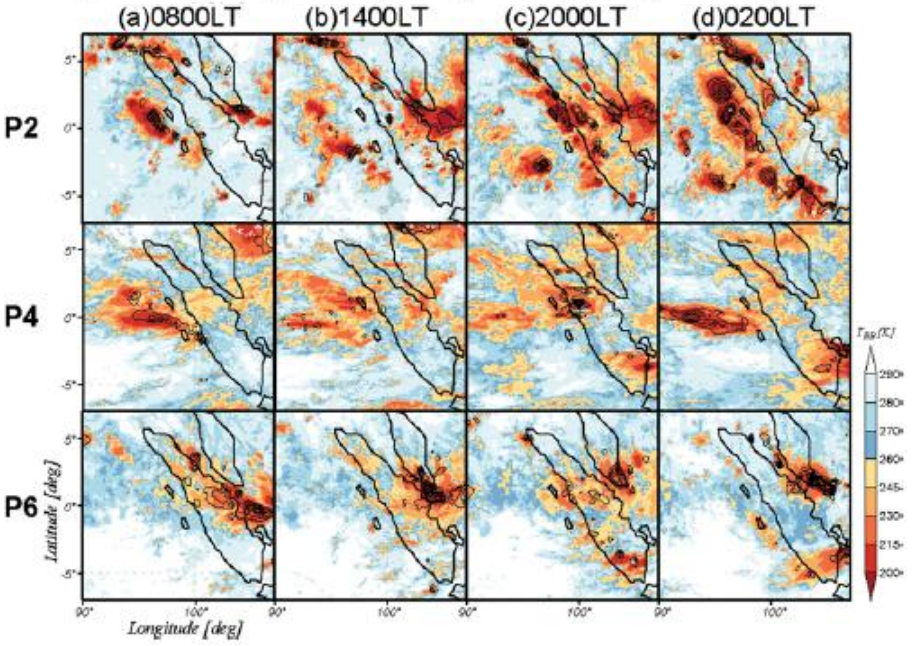



Dec. 16, 2006
– Jan. 16, 2007

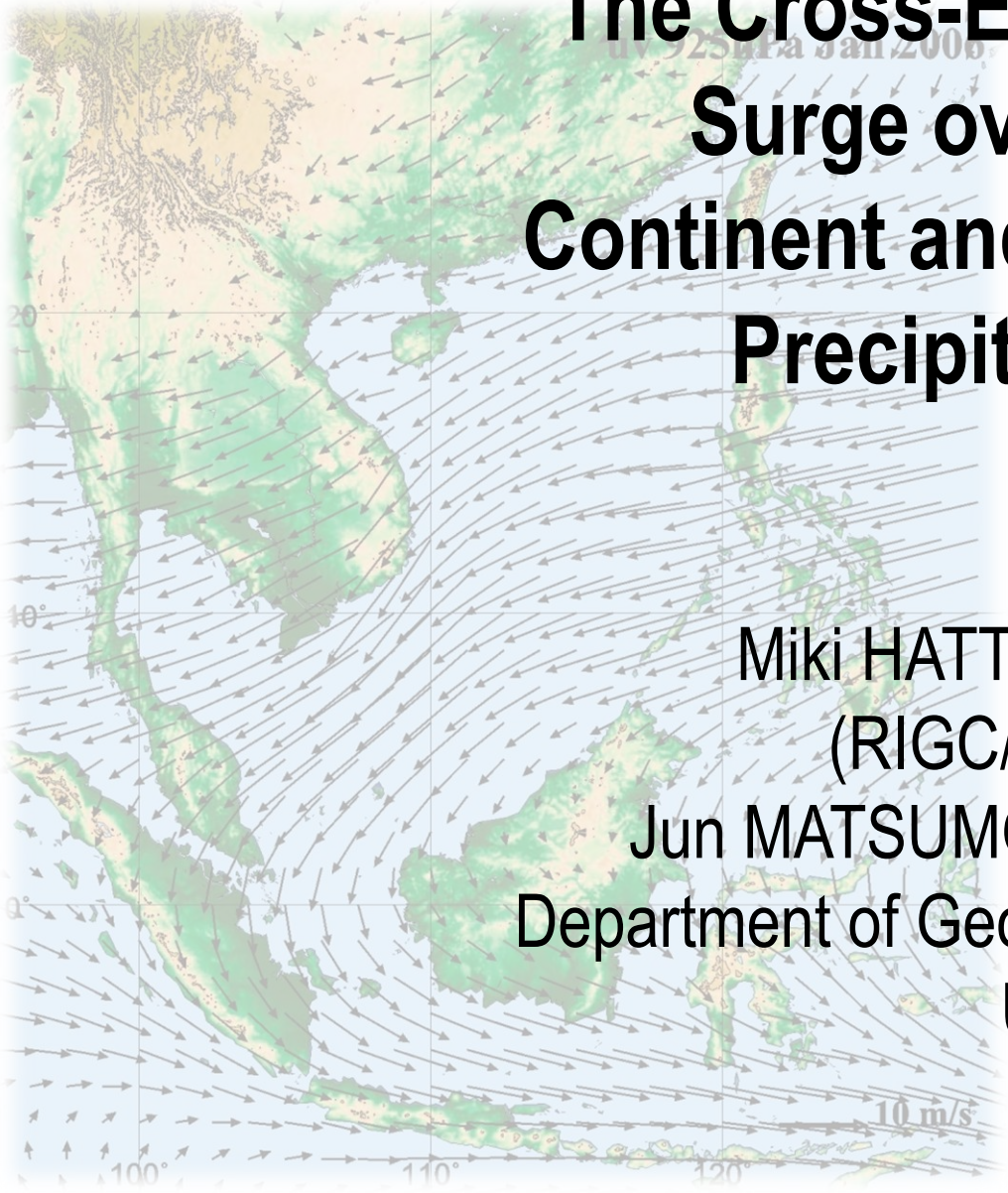
OLR & Wind at
850 hPa
by NICAM




Tbb & Rainfall
by GMS & TRMM




MJO composite OLR & Wind at
850 hPa (1999-2009)

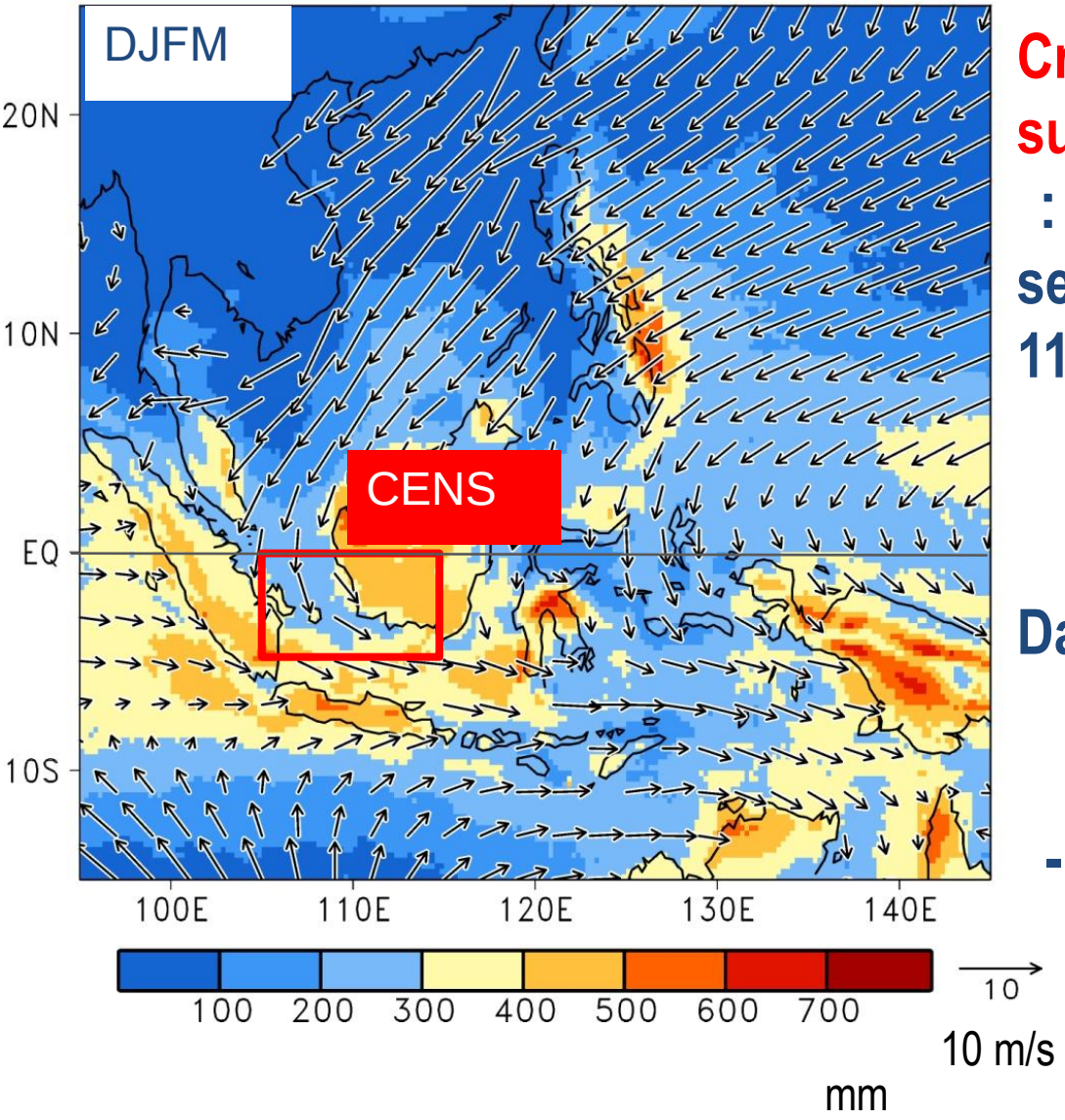



# The Cross-Equatorial Northerly Surge over the Maritime Continent and Its Relationship to Precipitation Patterns

Miki HATTORI, Shuichi MORI
(RIGC/JAMSTEC) and
Jun MATSUMOTO (RIGC/JAMSTEC,
Department of Geography, Tokyo Metropolitan University

# Cross-equatorial northerly surge (CENS)

## Sea surface wind & precipitation




**Cross-equatorial northerly surge(CENS)**

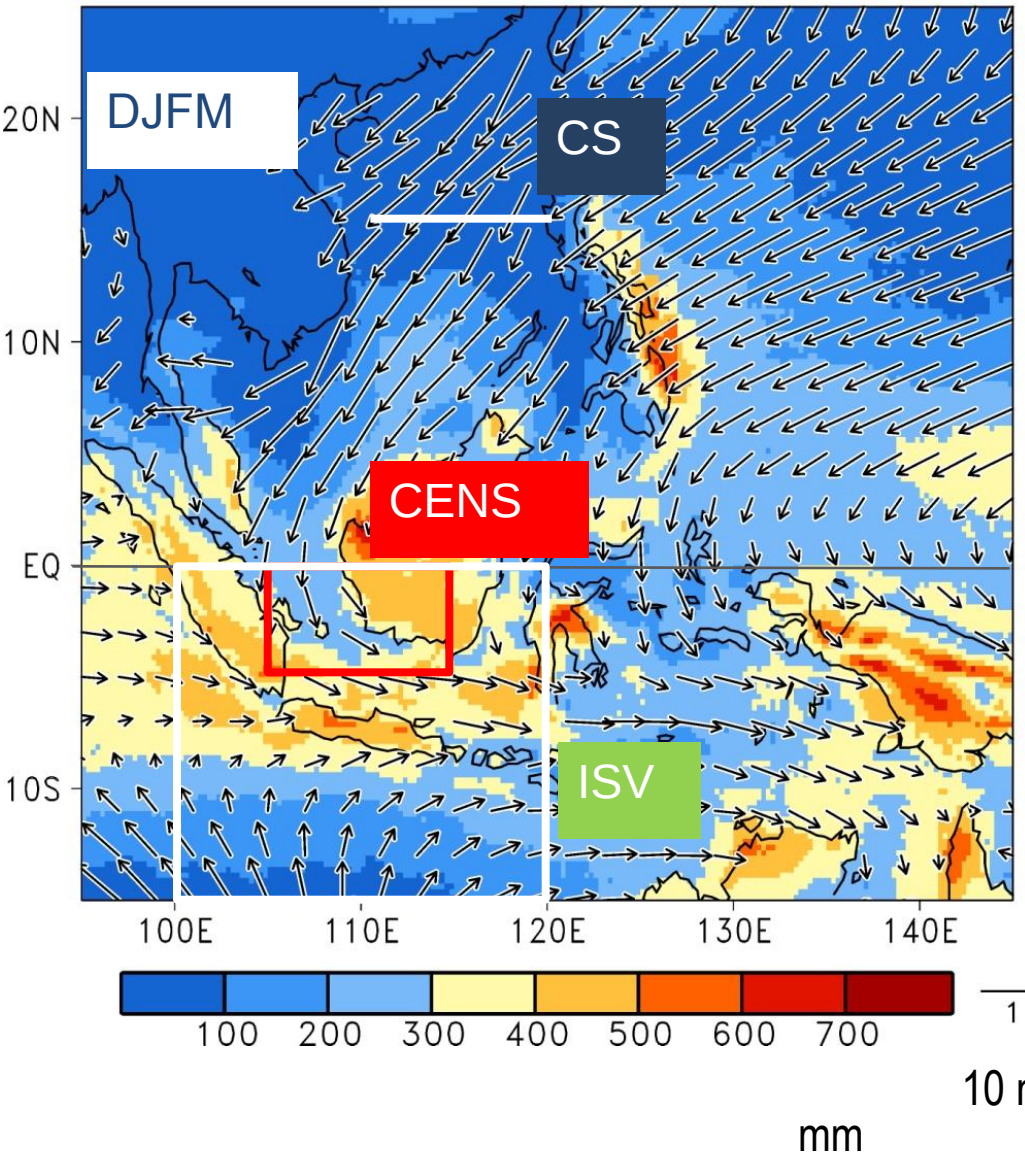
: Northerly component of mean sea surface wind in (5S-EQ, 105-115E) ≧ 5m/s

**Data: 1999-2009**

- QuikSCAT sea surface wind
- NOAA interpolated OLR
- TRMM 3B42 precipitation

# Cross-equatorial northerly surge (CENS)

## Sea surface wind & precipitation




**Cross-equatorial northerly surge(CENS)**

**:Northerly component of mean sea surface wind in (5S-EQ, 105-115E) ≧ 5m/s**

**Cold surge (Chang et al., 2005)**

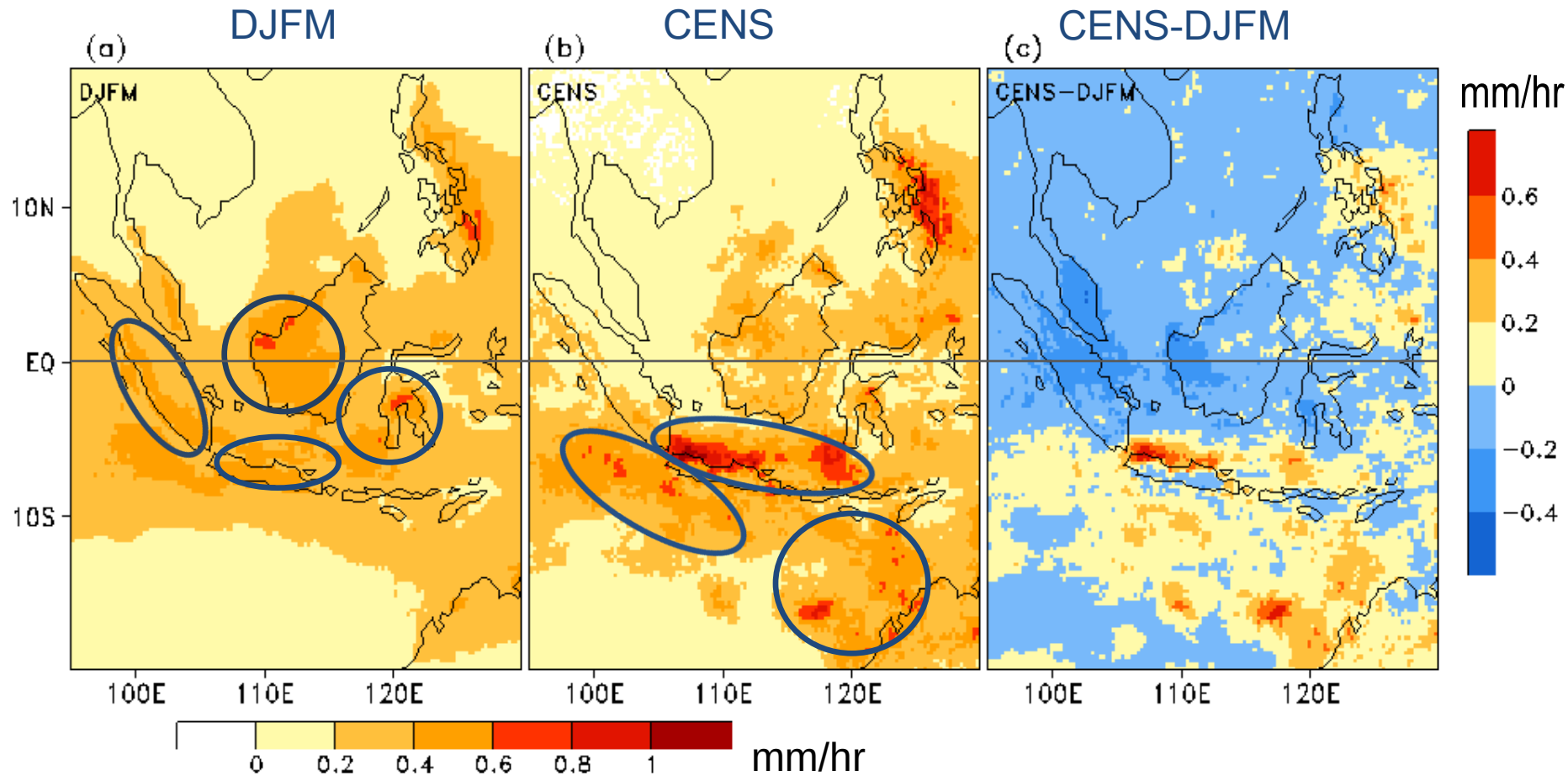
**: N-ly sea surface wind in (15N, 110-117.5E) ≧ 8 m/s**

**Equatorial ISV**

**: 15S-EQ, 100-120E**

**30 day moving averaged OLR < 210 W/m$^2$**

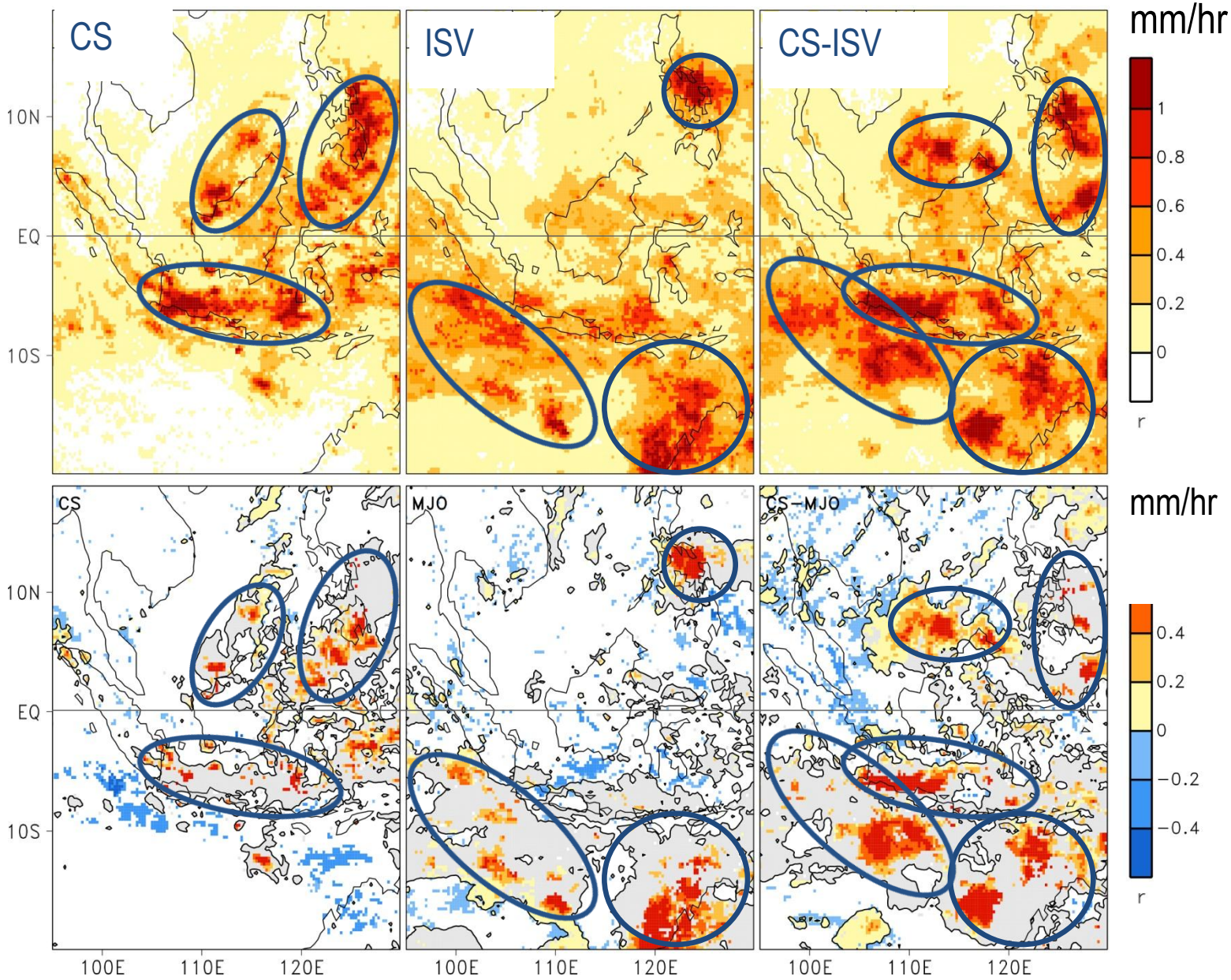
# Precipitation distribution in CS pettern




Precipitation is enhanced in the south of the equator.

# Precipitation distribution in each pattern

day0




CS: N-Java, Java Sea, ISV: E-IO, CS-ISV: Both

# Outline of AMY-RA

- Reanalysis calculation by MRI/JMA
- Target Period : Jan2008~Dec2009

  (Detail is flexible depending on requests)
- Coverage : Global

  Horizontal resolution ~ 60km

  Temporal resolution ~ 3hour
- Distribution : By internet

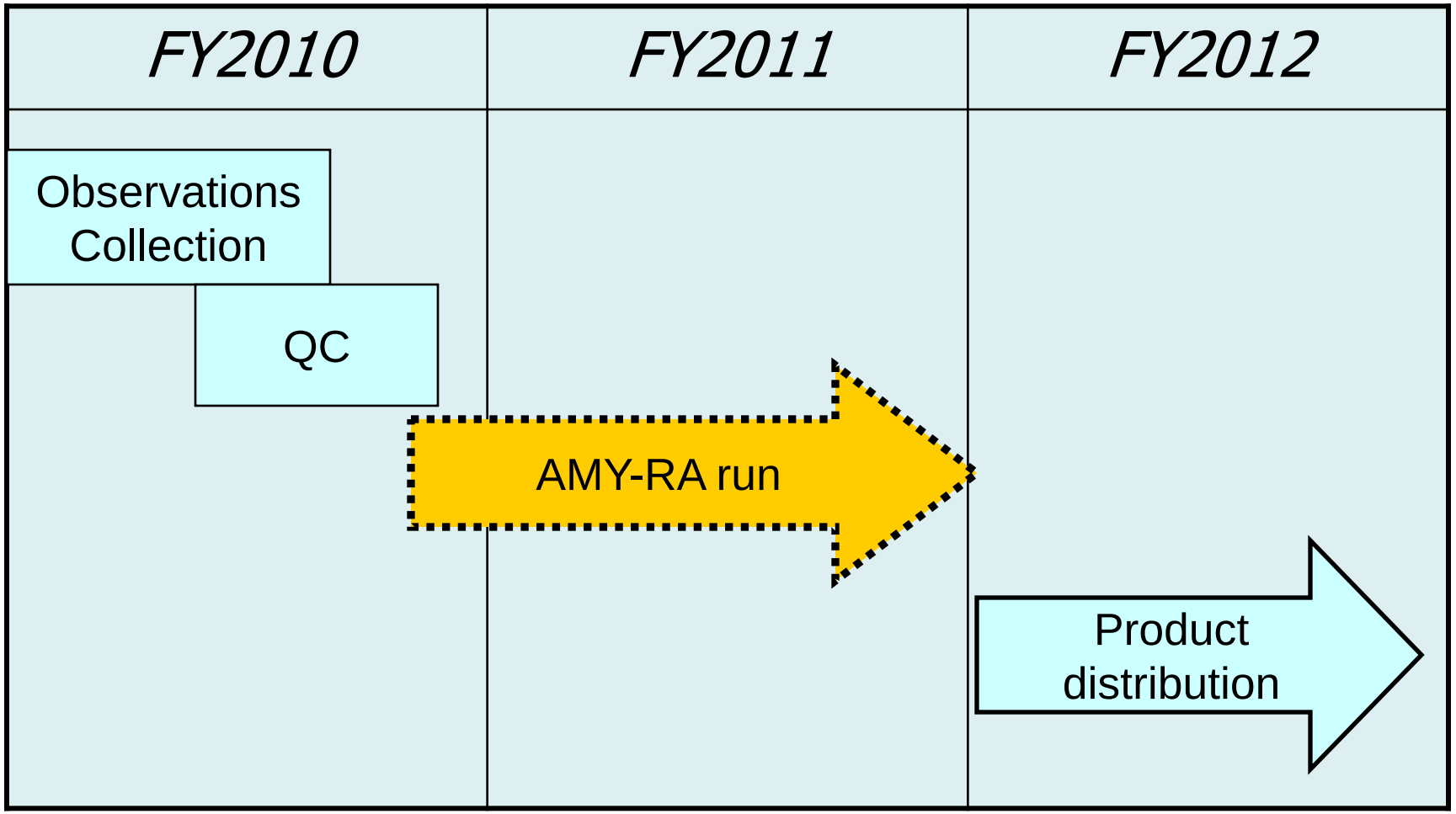
# Input observations and output products

- Input observations
  Surface (Ps, T, Q, U, V)
  Upper (Z, T, Q, U, V)
  Ship and buoy (Ps/Z, T, Q, U, V)
  Aircraft (Z, T, Q, U, V)
  Satellite ( AMV, NOAAs, DMSPs,,, )
  Wind profiler (U,V),  etc.
- Products
  Analyses on model grids (640x320 : 0.5625deg) ~ 60Km
  Analyses on P-levels (288x145 : 1.25deg) ~ 140Km
  Physical monitor (Flux, Radiation, Heating rate, …)

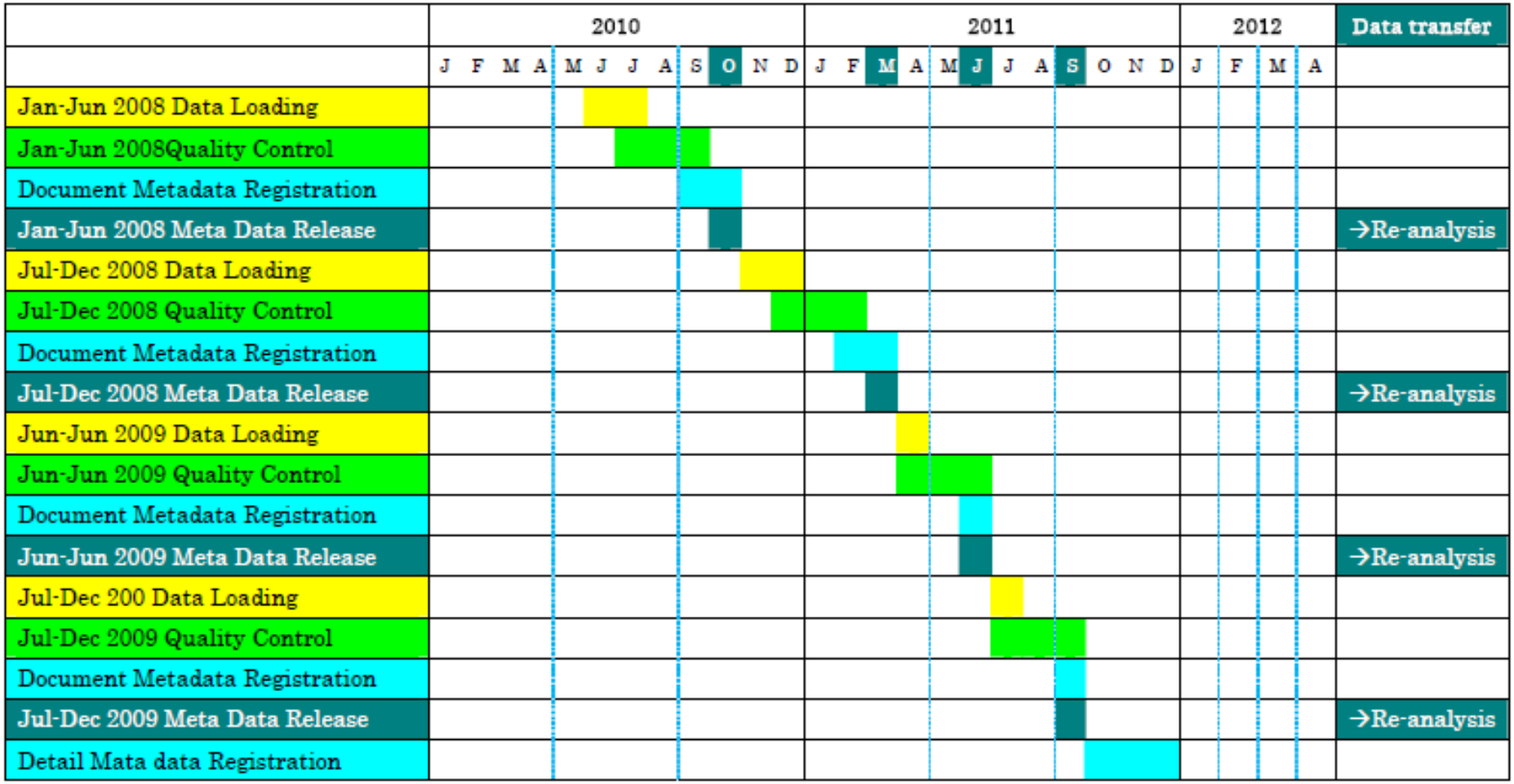
# Global Data Assimilation System

- ✓ Forecast model
  - resolution：TL319L60（top:0.1 h Pa） ~ 60km
  - cumulus：Arakawa-Schubert
  - SST：COBE by JMA
  - PBL：Mellor-Yamada level-2
- ✓ Assimilation system
  - algorithms： 4 D-VAR (4-Dimensional Variational method)
  - resolution：T106L60 (inclimental) ~ 120km
    (interpolating to 60km grids)
  - land：snow analysis（by Surface snow + SAT snow cover）

# Time Table


FY2010
FY2011
FY2012
Observations Collection
QC
AMY-RA run
Product distribution

# Schedule, Action items



# AMY data Management status (as of 2011/05/17)

| | Project Name | Site Manager / Data Manager | | | # of Sta. | Basic Info. | Raw Data Uploading | | | Quality Controlling | | Document Metadata Registration | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Status | Ready | Data Period | Status | Ready | Status | Ready | Status | |
| 1 | JICA-Tibet | Prof. | Toshio | KOIKE | 82 | ○ | ○ | | | | | | | |
| 2 | SACOL | Prof. | Wu | ZHANG | 1 | ○ | ○ | 2006/12 - 2007/12 | ○ | ○ | △ | | | 2007 (1 Year Dataset) (Same site as CEOP) |
| 3 | TRITON buoy | Dr | Kentaro | Ando | 18 | ○ | ○ | | | | | | | |
| 4 | MAHASRI-Vietnam | Mr.<br>Mr. | Minh Toan<br>Hideyuki | HOANG<br>KAMIMERA | 33 | ○ | ○ | 2008/09 - 2008/09 | △ | | | | | Sample Data Uploaded |
| 5 | COSAS | Prof.<br>Dr. | Gensuo<br>Likun | JIA<br>AI | 19 | ○ | ○ | | | | | | | |
| 6 | PRAISE | Dr. | Jun | ASANUMA | 1 | ○ | ○ | 2007/06 - 2007/07 | △ | | | | | Sample Data Uploaded |
| 7 | SCHeREX | Prof. | Mei | GAO | | | | | | | | | | |
| 9 | AIPO | Prof.<br>Dr. | Jianping<br>Dongxiao | LI<br>WANG | 5 | ○ | ○ | 2008/04 - 2008/09 | △ | | | | | Sample Data Uploaded |
| 10 | EAMEX | Prof.<br>Prof. | Tsing-Chang<br>Ming-Cheng | CHEN<br>YEN | 35 | ○ | ○ | 2008/01 - 2008/06 | △ | | | | | Sample Data Uploaded |
| 11 | TORP | Prof. | Yaoming | MA | 3 | ○ | ○ | | | | | | | |
| 12 | JEPP-Thai | Dr. | Daisuke | KOMORI | 16 | ○ | ○ | 2007/11 - 2008/12 | △ | | | | | Sample Data Uploaded |
| 13 | JEPP-Tibet | Prof. | Hirohiko | ISHIKAWA | 15 | ○ | ○ | 2001/12 - 2002/02 | △ | | | | | Sample Data Uploaded |
| 14 | HARIMAU | Dr. | Jun-Ichi | HAMADA | 5 | ○ | ○ | 2009/02 - 2009/02 | △ | | | | | Sample Data Uploaded |
| 15 | MAHASRI-AMY | Dr. | Wu | Peiming | 1 | ○ | ○ | | | | | | | |
| 16 | CAIPEEX | Dr. | Jivanprakash Ramchandra | KULKARNI | | | | | | | | | | |
| 17 | JEPP-NEIndia-Bangladesh | Dr. | Taiichi | Hayashi | 30 | ○ | ○ | 2009/03 - 2009/12 | △ | | | | | Sample Data Uploaded |
| 18 | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | |

# Meetings in 2011

- IUGG XXV JM-10 Monsoons, Tropical Cyclones and Tropical Dynamics Jun. 30-Jul. 5, 2011 at Melbourne, Australia

- The 2nd HyARC/MAHASRI Workshop on Asian Monsoon and Water Cycle (tentative) Aug. 22-24, 2011 at Nha Trang, Vietnam

- WCRP OSC Asian Monsoon Years (2007-2012) Poster clusters
  A3. Observation and Analysis of the Climate System
  C16. Land Surface Processes and Observations
  A6. Regional Climate Variability and Change in Service to Society
  C1: Climate variability and change in the Australian-Asian Region

# Future issue

- Science Conference? When and where?
- Special Issue/publication(s)
- Planning of new AM program after 2013

# Summary

- AMY conducted a number of field experiments in Asian monsoon region during the YOTC period. These data will be precious also for YOTC.
- YOTC global data set will be useful for AMY analysis
- AMY Re-analysis will also contribute to YOTC
- In modeling, YOTC and AMY have already been collaborating.
- Data archiving is a key issue for further collaborations.