International Monsoon Studies (IMS) under WCRP cross-cut studies

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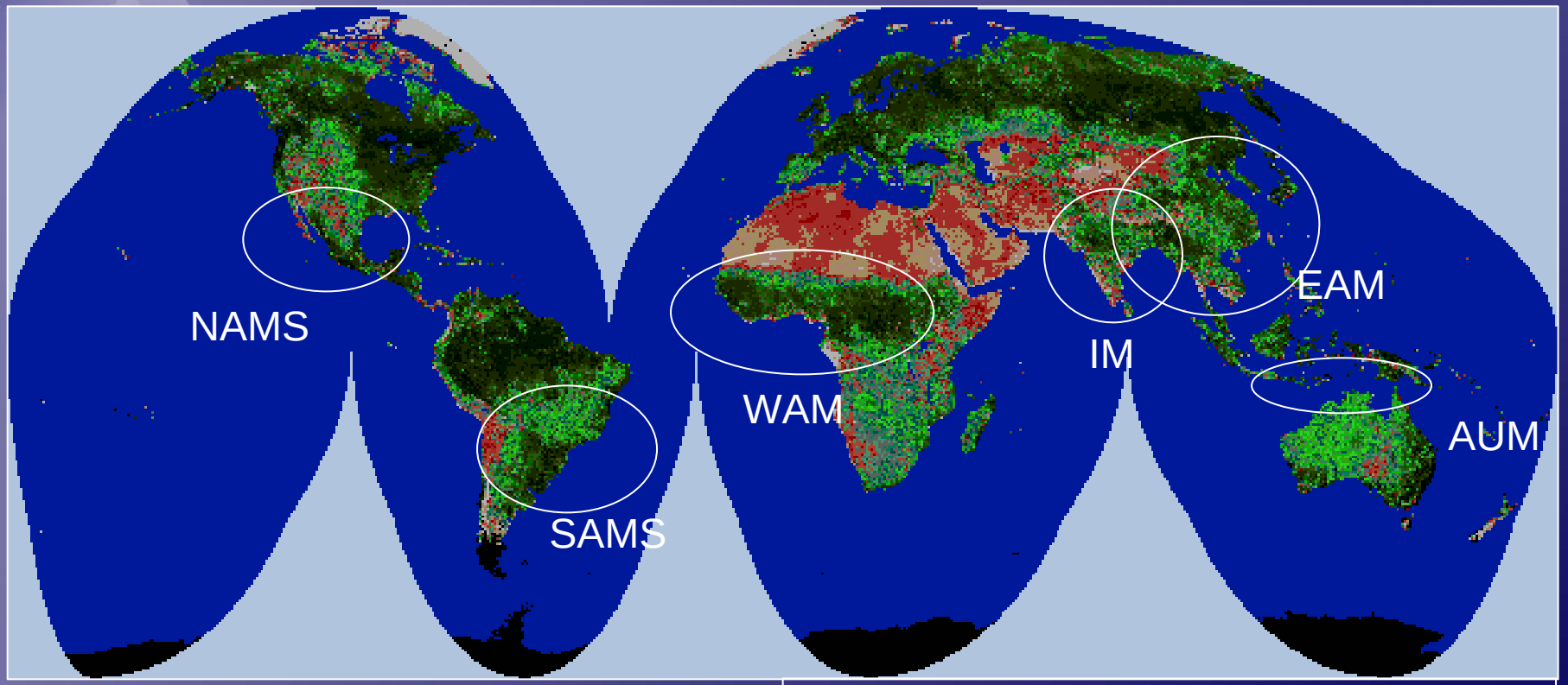
- **Background**
- **Summary & recommendation of**
  1st Pan-WCRP Monsoon WS in June 2005, Irvine,CA
- **JSC recommendation, March 2007, Zanzibar**
- **1st IMS planning WS in September 2007, Bali, Indonesia**

Major Monsoons Systems of the World



NDVI image for 21-31 August 2000, from Pathfinder AVHRR

NDVI surface vegetation

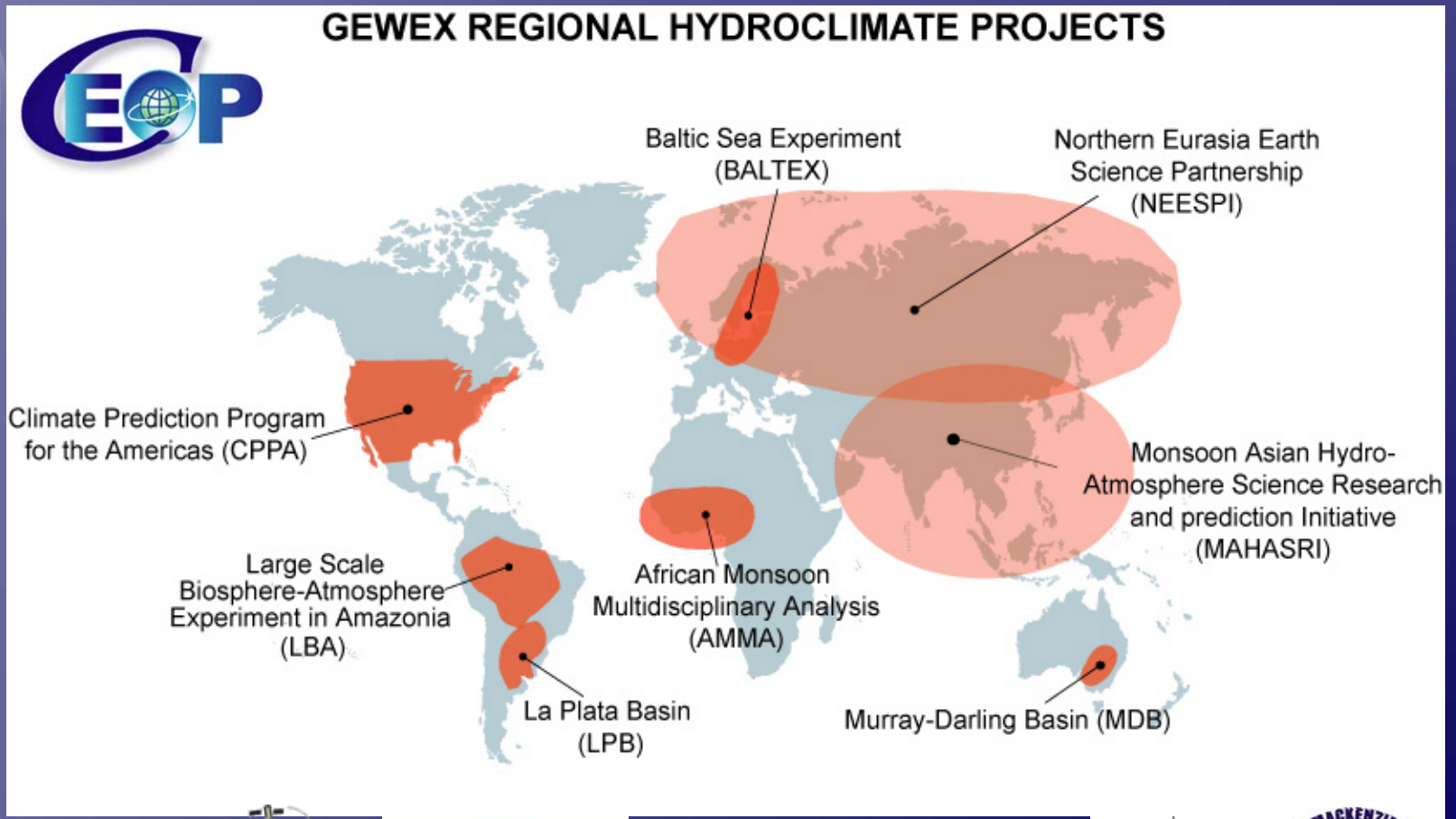
Societal needs for IMS

• More than 60% of the world population live under monsoon climate, and receive benefits as well as damages from monsoon precipitation and hydrological processes.

• Most of the countries under monsoon climates are developing or semi-developed countries, where coordination for monsoon prediction is highly required, including common or integrated capacity buildings (observation systems, modeling & prediction sytems, training seminars, WSs,etc.) through WMO and WCRP framework. (WMO-WCRP coordination is very essential.)

•. Large uncertainities exist in predicting (or projecting) all the regional monsoon climates associated with the ongoing and future anthropogenic changes (GHGs increase, aerosol increase, and LCLU changes) due to lack of understanding hydro-climate processes of monsoons. (e.g., refer to IPCC-AR4 2007).

GEWEX Global View –Regional Focus: RHP's

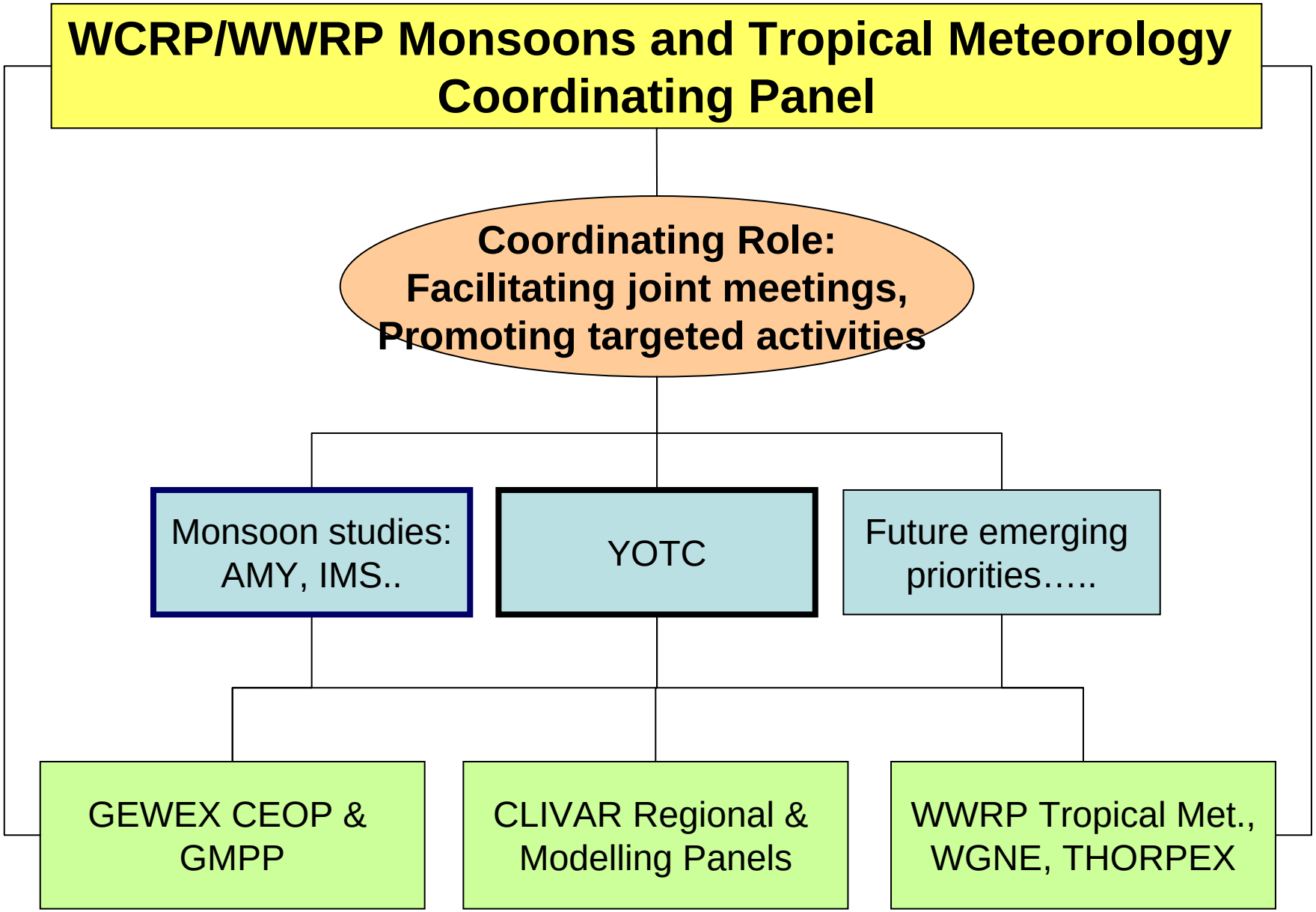


CLIVAR Global View – Regional Focus

Objectives of International Monsoon Studies (IMS)

(results of discussion in Bali, Sep.2007)

- **Improve forecasts from intra-seasonal to inter-annual time-scales in monsoon regions**
- **Improve our understanding of the relative role of land and oceans on diurnal to interannual (decadal) time scales.**
- **Improve our understanding of (natural & anthropogenic) climate change on monsoons**
- **Enhance the observational networks and data utilization**
- **Enhance the collaboration among regional monsoon research communities**
- **Facilitate the use of knowledge on monsoon climate in societal impact studies**


WCRP/WWRP Monsoons and Tropical Meteorology Coordinating Panel
Coordinating Role: Facilitating joint meetings, Promoting targeted activities
Monsoon studies: AMY, IMS..
YOTC
Future emerging priorities…..
GEWEX CEOP & GMPP
CLIVAR Regional & Modelling Panels
WWRP Tropical Met., WGNE, THORPEX

Asian Monsoon Years (AMY 2007-2012)

The AMY (2007-2012) is a cross-cutting initiative as part of the near-term International Monsoon Study (IMS), a coordinated observation and modeling effort under the leadership of WCRP.

Flood Disastrous impact many places in monsoon Asia

1. Taiwan

The Flood of 2006

2. The Feb 2007 Jakarta flood

Duration : 2 February–12 February 2007

Damages : $400 million

Fatalities : 54

Areas affected : Jakarta, West Java, Banten

(Wikipedia)

News pictures

3. Flood events in Middle Region of Vietnam (Oct – Nov. 2007)

Scientific rationales for near-term IMS with AMY08-09/YOTC

- **Multi-scale interactions from meso-scale to planetary-scale are essential for dynamics and prediction of ISV and seasonal march of monsoons, which include time scales from DC to ISV and SC.**
- **Global-scale simultaneous satellite observations with high-resolution (with space & time) are essential for resolving these interactions, through 30m. to 1hr obs. of the geostationary met. satellites.**
- **In-situ regional observations relevant to various international/national projects should be optimized in conjunction with the intensive satellite observations (mentioned above). ⇒ AMY08-09/YOTC**
- **Reanalyses(including DC resolution) based on the data of these IOPs (for boreal summer and winter monsoon) and cloud-resolving GCM (e.g., NICAM in the Earth Simulator) experiment will provide invaluable data for improving daily to seasonal predictions.**

Need to understand Multi-Scale Interrelation In Monsoon ISO

Hakazawa 1988

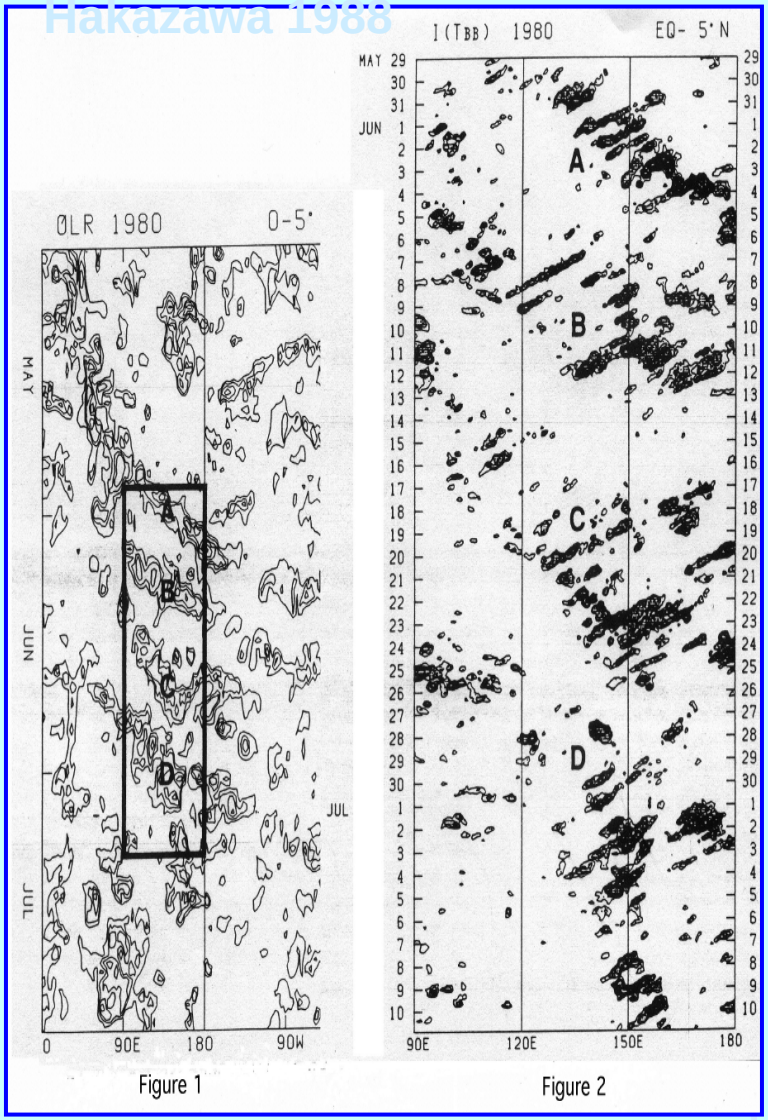
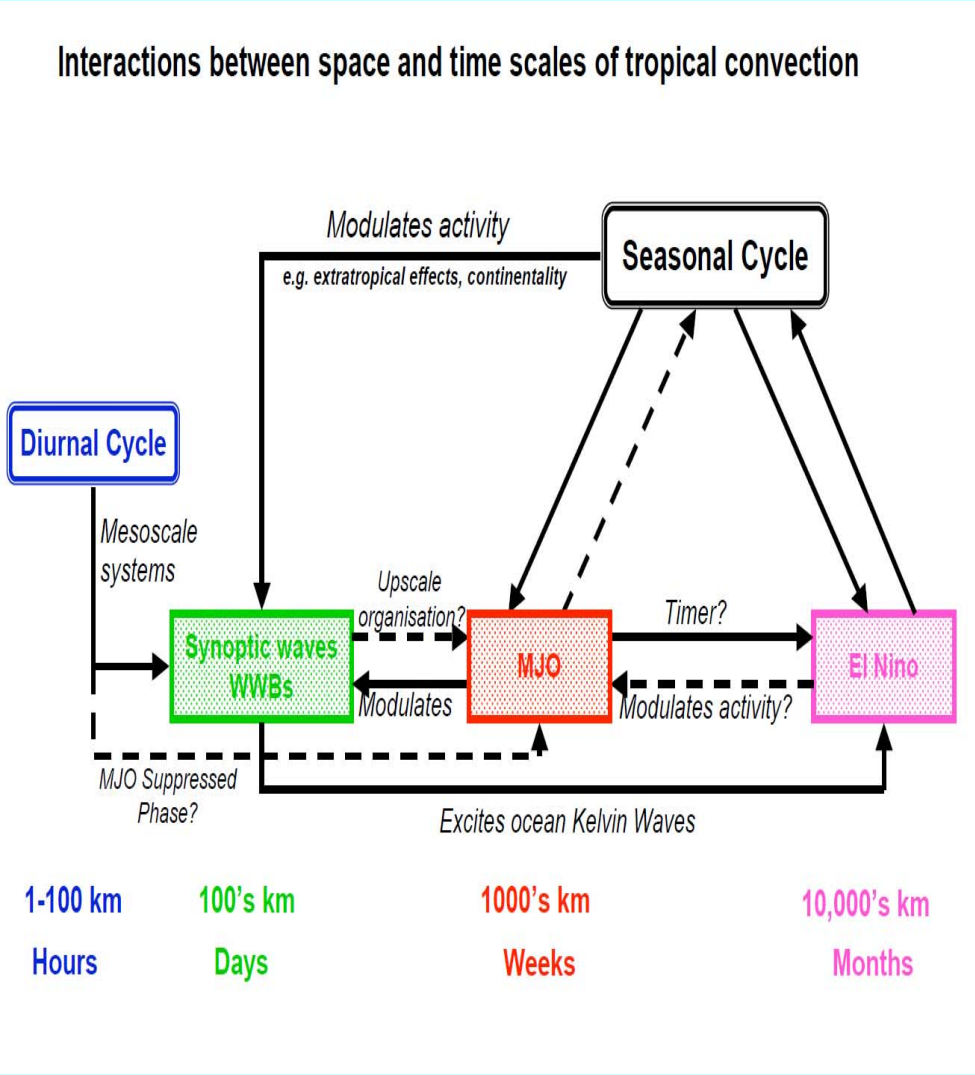


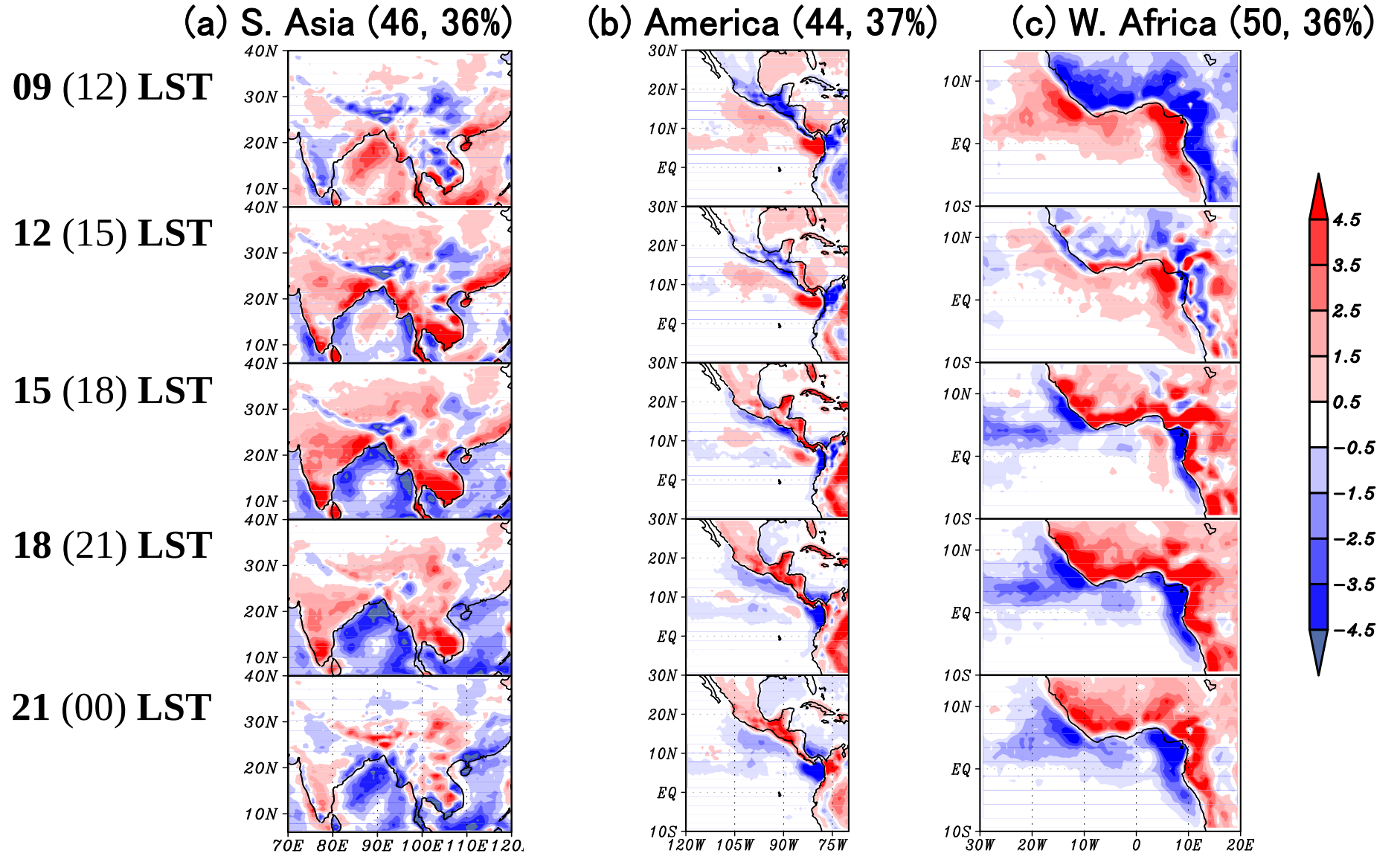
Figure 1 Figure 2



Slingo 2006: THORPEX/WCRP Workshop report

【 Phase propagation in the coastal regime (1) 】

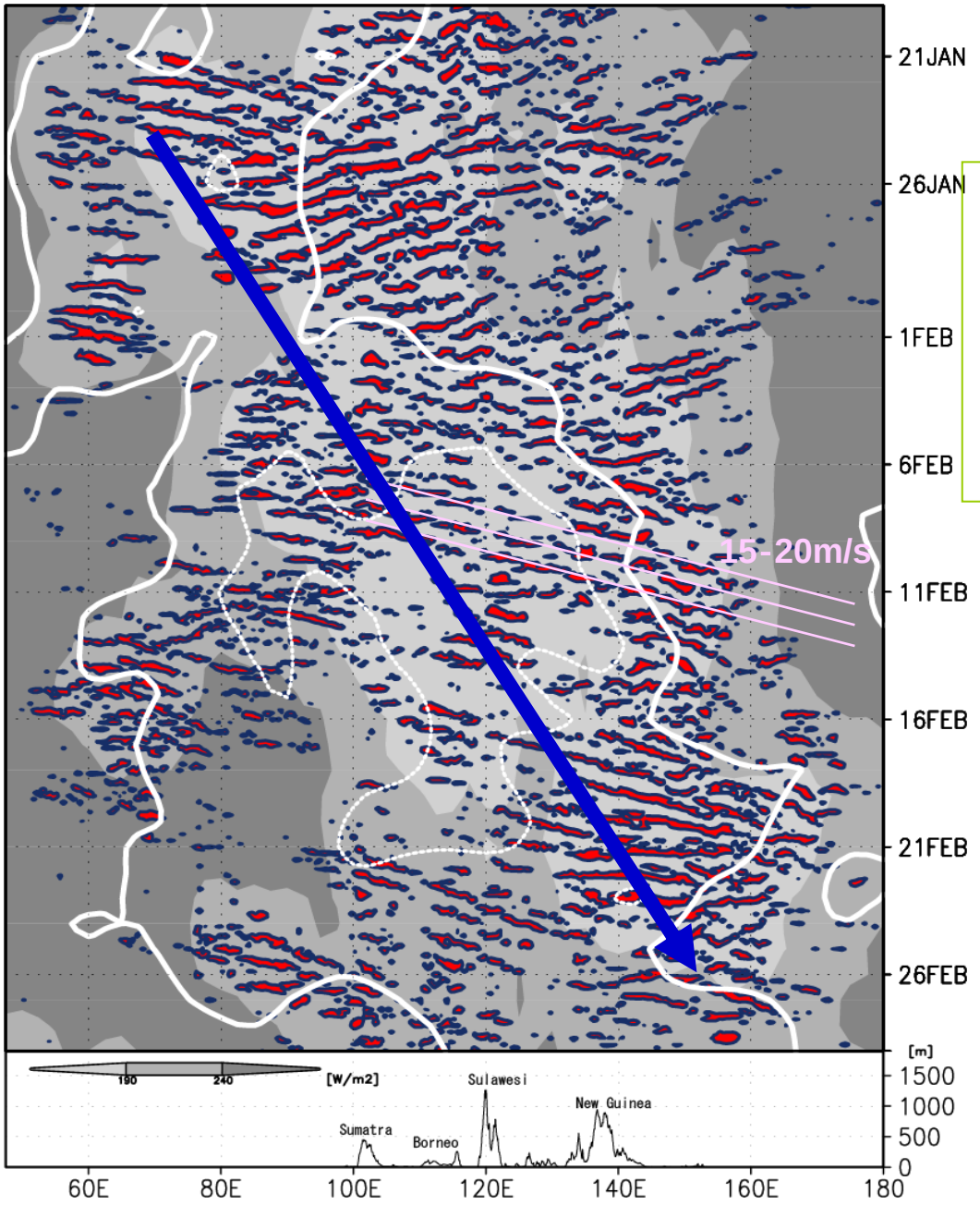
EEOF analysis (1)



Fine structure of MJO

shaded･･･OLR(－190－240－ [W/m2])
white･･･zonal wind at 600hPa(solid:2,dash:10[m/s])
color･･･diurnal cycle filtered rainfall 0.2, 0.4 [mm/h]

Time-longitude section of rainfall between Eq-5S



Propagating rainfall activity associated with the diurnal cycle over and around the island

↓ ↓

Propagating diurnal disturbance (**PDD**)

(Ichikawa and Yasunari, 2007 GRL, in press)

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
  CLIVAR/AAMP, Feb 19/21 2007, Honolulu
- 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 meeting, Apr. 23-25 2007, Beijing
  Established SSC, working group, IPO
- 2nd AMY meeting, Sept. 3-4 2007, Bali, Indonesia
  Science plan drafting
- 3rd AMY meeting, January 20-21 2008, Yokohama, Japan
  Implementation plan, coordination of field observation 2008

AMY Organization

Scientific Steering Committee:

Co-Chair: B Wang, J Matsumoto

Members: GX Wu, T Yasunari, T Koike, D.R. Sikka, S. Gadgil, TD Yao, CB Fu, RH Zhang, YH Ding W KM Lau, CP Chang, J Shukla,

International Program Office: JP Li

Working groups:

Observation : MD Yamanaka, DX Wang

Data management: K Masuda, GQ Zhou

Modeling and prediction: HH Hendon, T. Satomura

Participating organizations & projects in AMY/YOTC

WCRP CLIVAR AAMP, IOP and POP
WCRP GEWEX CEOP/MAHASRI
WWRP/THORPEX/ YOTC/T-PARC
WWRP/TMR (SCHeREX, SoWMEX, TiMREX, TCS08)
ESSP /START/MAIRS
APCC and other regional climate centers
JAMEX (SHARE-Asia, Italy; ABC, US;
PACDEX, US; EAST-AIRE, US; AMF
China-US; TIGERZ, India-US; 7
Southeast Asian Studies (7-SEAS).

Participating national projects & countries

23 National/Regional Projects/13 countries

Japan- JEPP (Tibet, SEA, Thailand, IO, HARIMAU), CREST, JAMSTEC/IORGC, FRCGC, ARCS-Asia, PRAISE

China- AIPO, SCHeREX, TORP, SACOL, NPOIMS

India- STORM, CTCZ, IIMX/Rain, CAIPEX

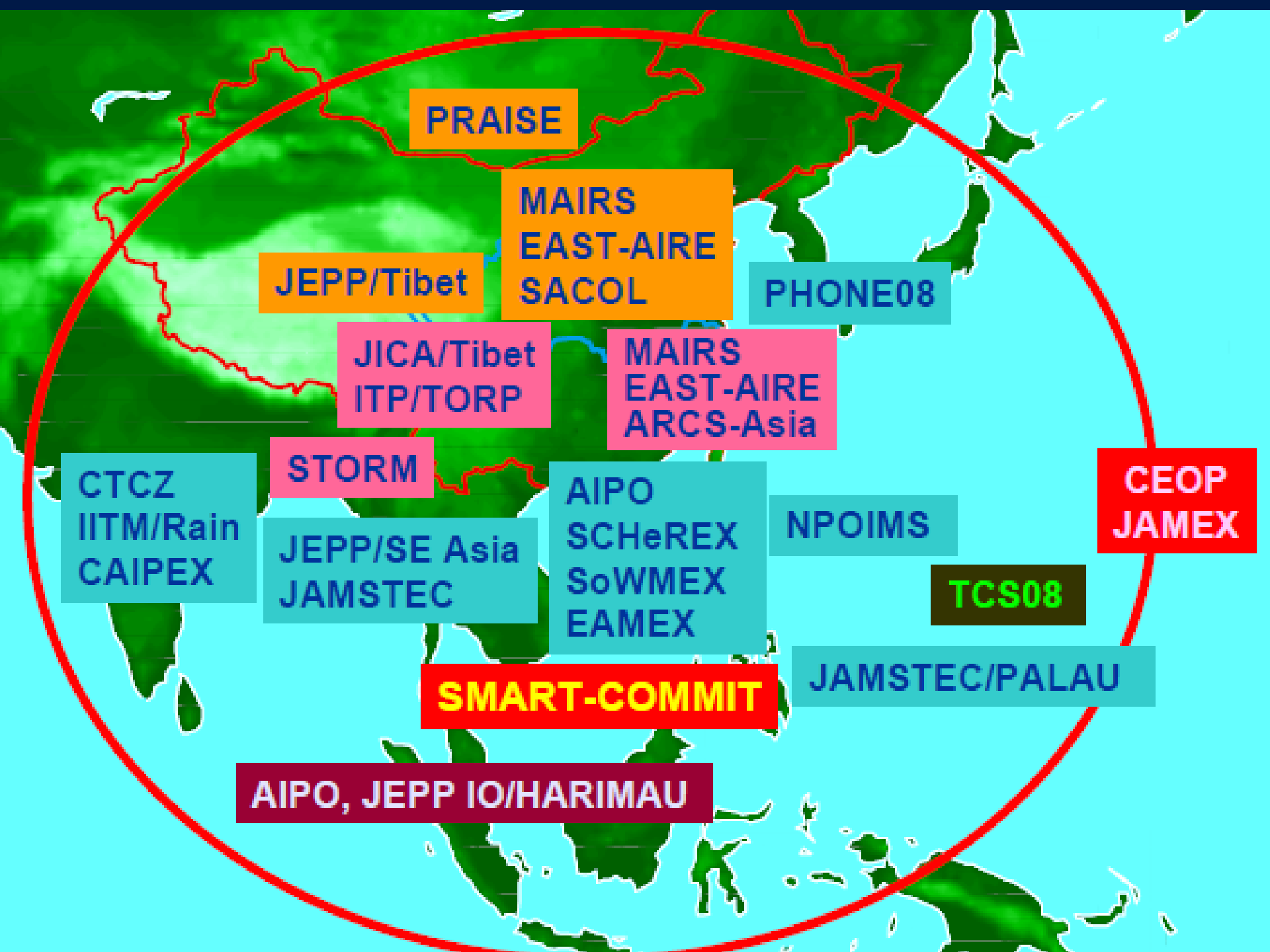
Korea-Japan- PHONE08

USA- JAMEX, SMART-COMMIT, TIGERZ

Chinese Taipei- SoWMEX, TiMREX, EAMEX

China-Japan JICA/Tibet Project

Thailand; Malaysia; Vietnam; Indonesia; Philippines; Bangladesh; Nepal; Mongolia


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
JAMSTEC/PALAU
SMART-COMMIT
AIPO, JEPP IO/HARIMAU

Overarching Goal

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

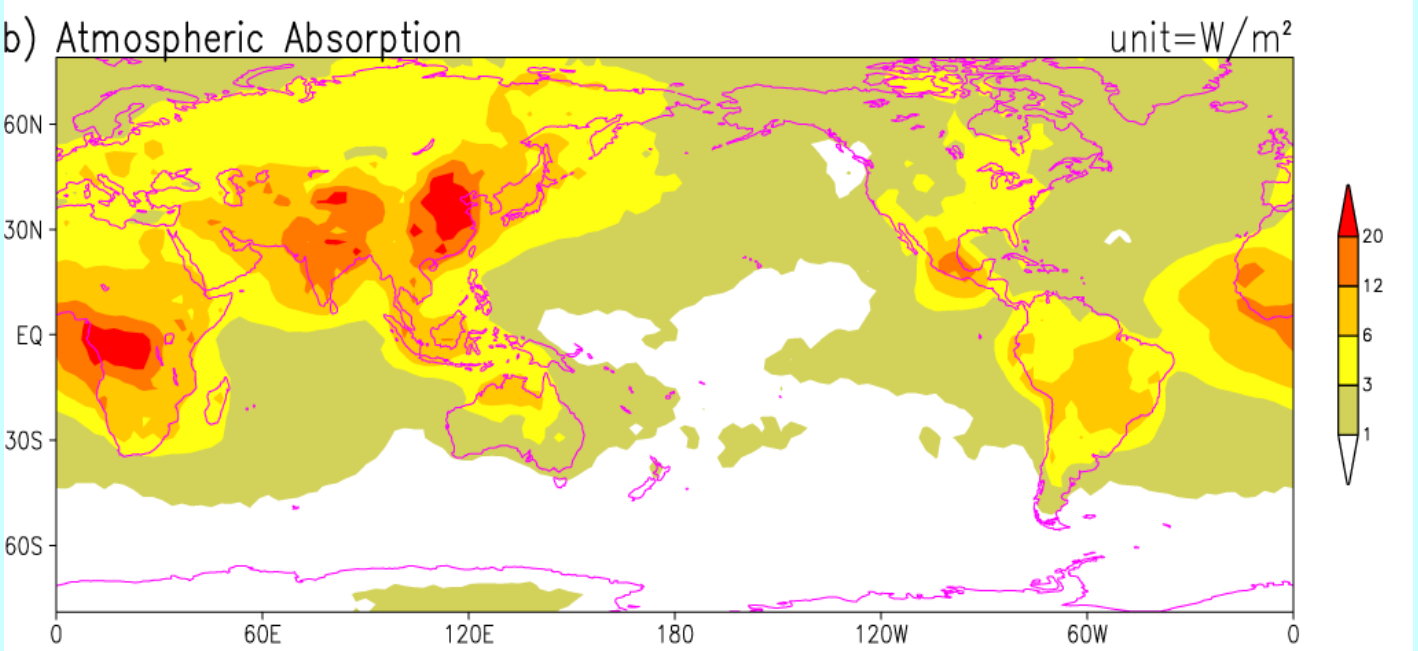
It is believed that coordination and cooperation of individual participating and partner projects will greatly facilitate the efforts to reach this goal.

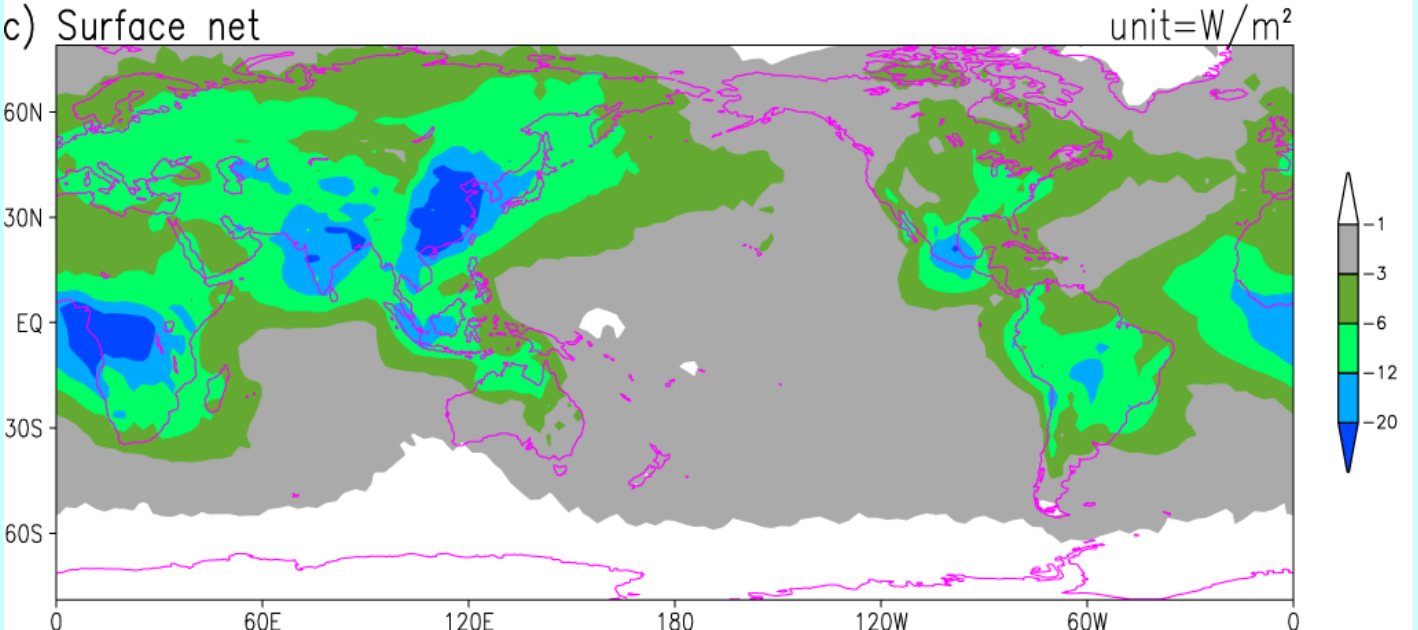
Cross-Cutting Science Themes for understanding AM

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

Aerosol Induced heating/cooling: 2002

{A Synthesis of ground and satellite observations}



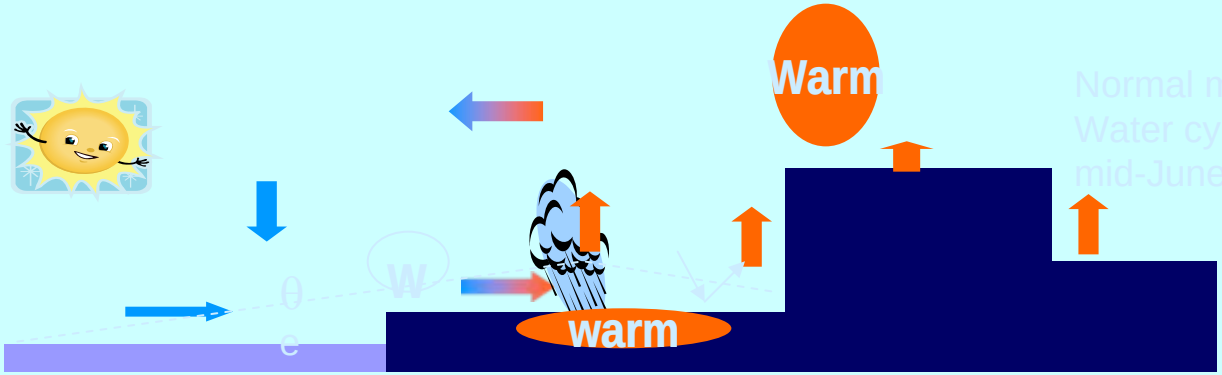


Integration of MODIS/CERES/ISCCP/ TOMS; Ace-Asia; INDOEX; AERONET/ ABC/GEBA/ GOCART/ MACR

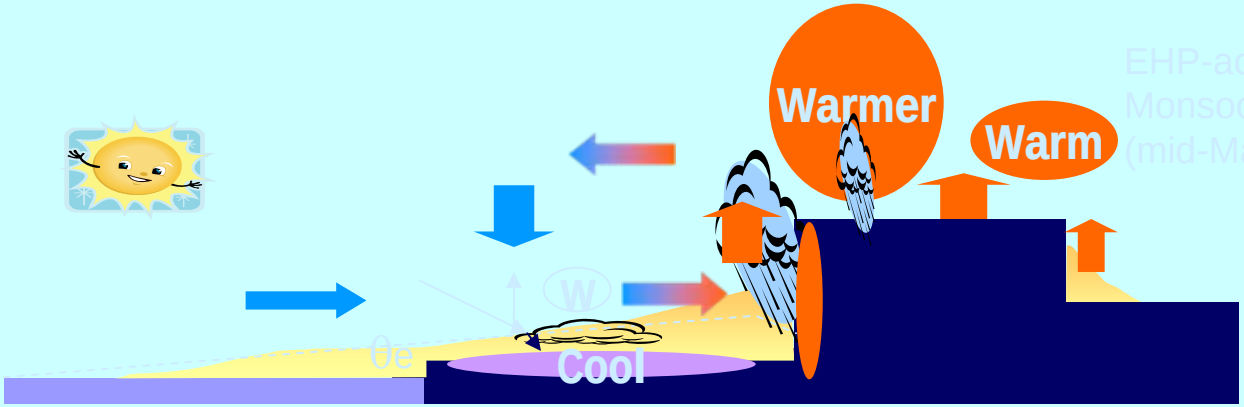
Chung, Ramanathan, Kim, Podgorny,2005

The Elevated Heat Pump (EHP) hypothesis

(Lau et al. 2006, Lau and Kim 2006)



Normal monsoon
Water cycle (mid-May to mid-June)



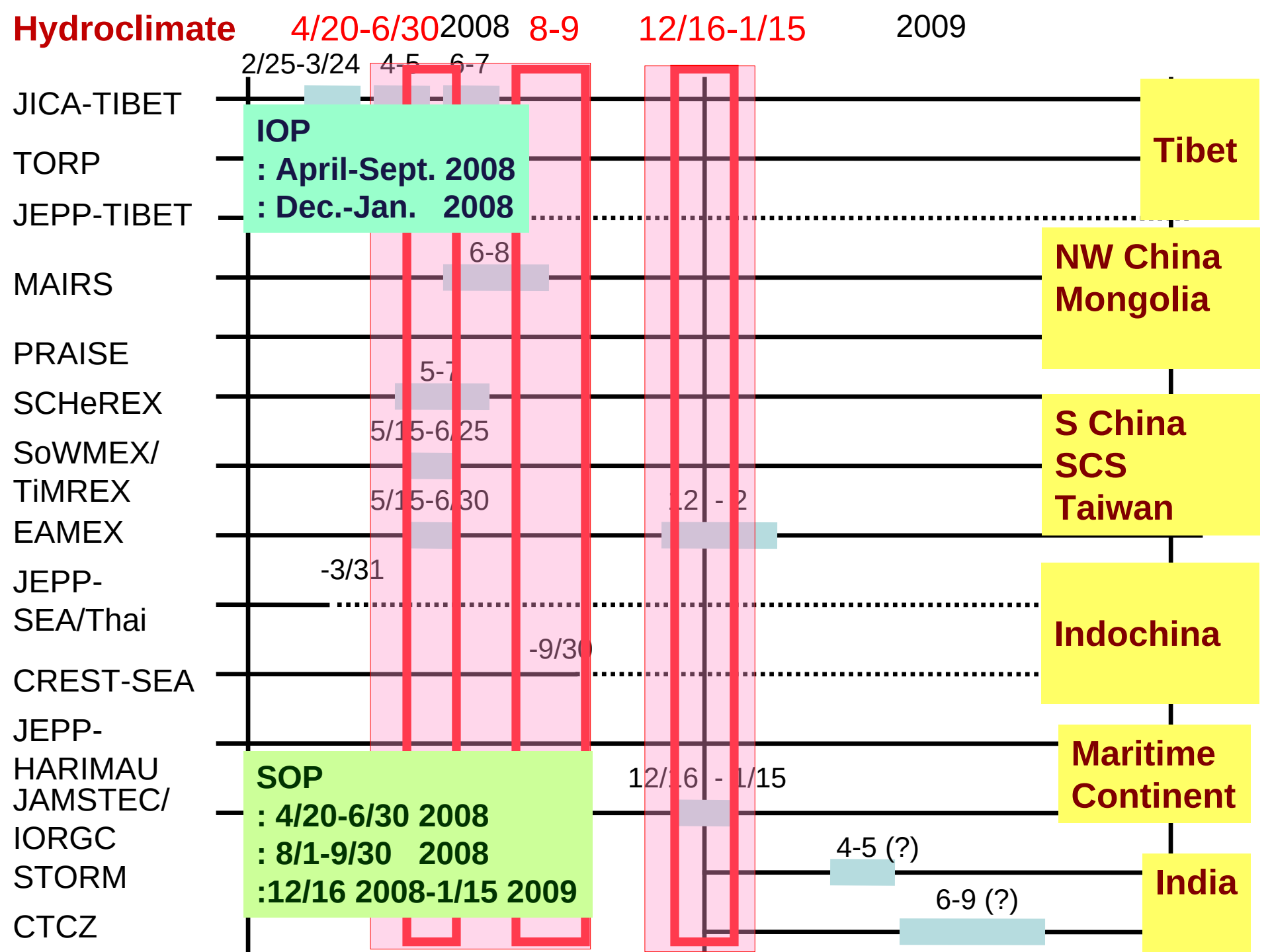
EHP-accelerated
Monsoon water cycle
(mid-May –June)

EHP postulates:

a) warming and moistening of the upper troposphere over the Tibetan Plateau

b) an advance of the rainy season in northern India/Napal region in May-June

c) In June-July, the increased convection spreads from the foothills of the Himalayas to central India, resulting in an intensification of the Indian monsoon.


Hydroclimate
4/20-6/30
2008
8-9
12/16-1/15
2009
2/25-3/24
4-5
6-7
JICA-TIBET
TORP
JEPP-TIBET
MAIRS
PRAISE
SCHeREX
SoWMEX/
TiMREX
EAMEX
JEPP-
SEA/Thai
CREST-SEA
JEPP-
HARIMAU
JAMSTEC/
IORGC
STORM
CTCZ
IOP
: April-Sept. 2008
: Dec.-Jan. 2008
6-8
5-7
5/15-6/25
5/15-6/30
12 - 2
-3/31
-9/30
12/16 - 1/15
4-5 (?)
6-9 (?)
SOP
: 4/20-6/30 2008
: 8/1-9/30 2008
:12/16 2008-1/15 2009
Tibet
NW China
Mongolia
S China
SCS
Taiwan
Indochina
Maritime
Continent
India

Thank you very much for your attention!