GEOSS-WCRP Collaboration in

MAHASRI (Monsoon Asian Hydro-Atmosphere Scientific Research and prediction Initiative, **a subprogram of CEOP/GEWEX/WCRP, also joining in Asian Monsoon Years: 2007-2012)**

http://mahasri.cr.chiba-u.ac.jp/ http://www.wcrp-amy.org

and **HARIMAU** (Hydrometeorological ARray for Interseasonal variattion-Monsoon Automonitoring, **a project of Japanese EOS** Promotion Program: FY 2005-09)

http://www.jamstec.go.jp/iorgc/harimau/HARIMAU.html

Manabu D. Yamanaka and Jun Matsumoto

*IORGC/**JAMSTEC***

Scientific + Social benefits

Science promotion as a social benefit / Social needs as a science motivation

"Program of programs"

An example: seasonal (monsoon) and diurnal (sea wind) **coastal rain**

GEWEX/WCRP

Global Energy and Water Cycle Experiment

GEWEX WCRP

RHP

NEESPI

CEOP

Baltic Sea Experiment (BALTEX)

NE Asia

AHASRI

East Asia

Tibet/ Himalaya

Tropics

Americas ...ject (GAPP)

CPPA

Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)

LBA

Multidisciplinary Analysis (AMMA)

La Plata Basin (LPB)

PLATIN

Murray-Darling Basi... (MDB)

MDB

- Data Management
- Water and Energy Budget Studies
- Worldwide ...tegrated Study ... Extremes
- Stable Water Isotope Intercomparison Group
- Transferability
- Water Resource Applications Project

GLOBAL PRECIPITATION CLIMATOLOGY CENTRE

GRDC

iSLSCP

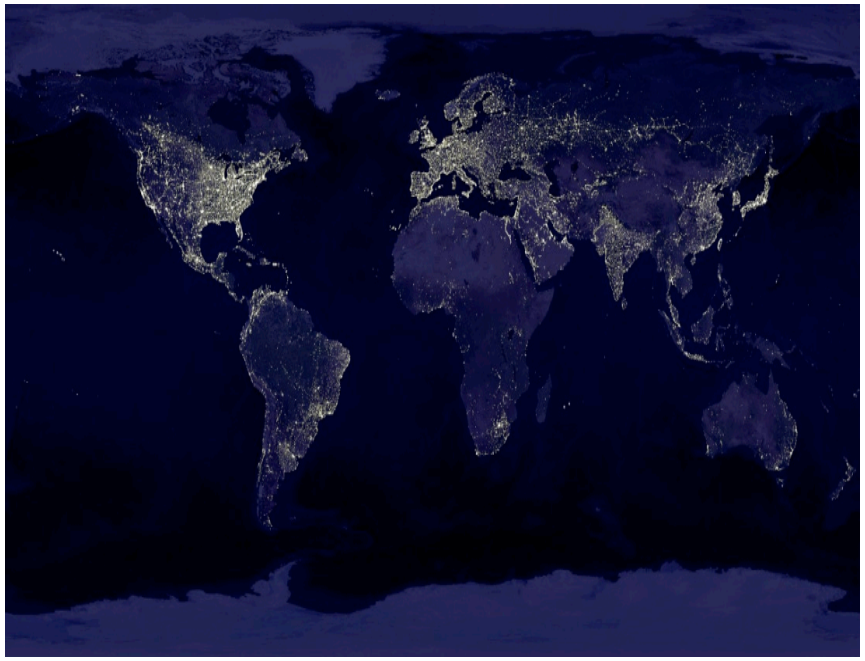
CEOP

IAHS AISH

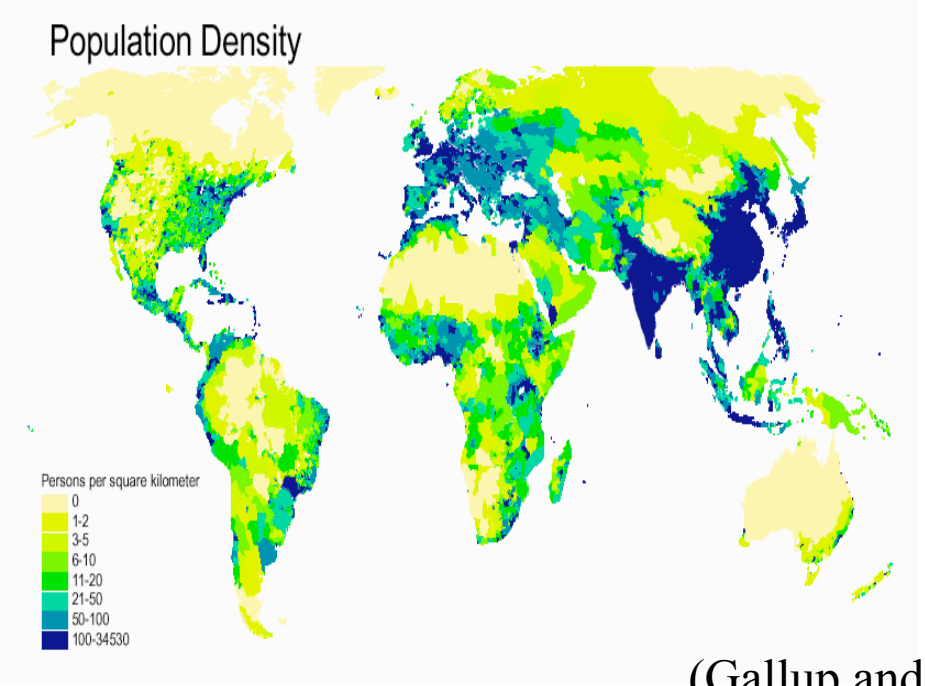
IAEA

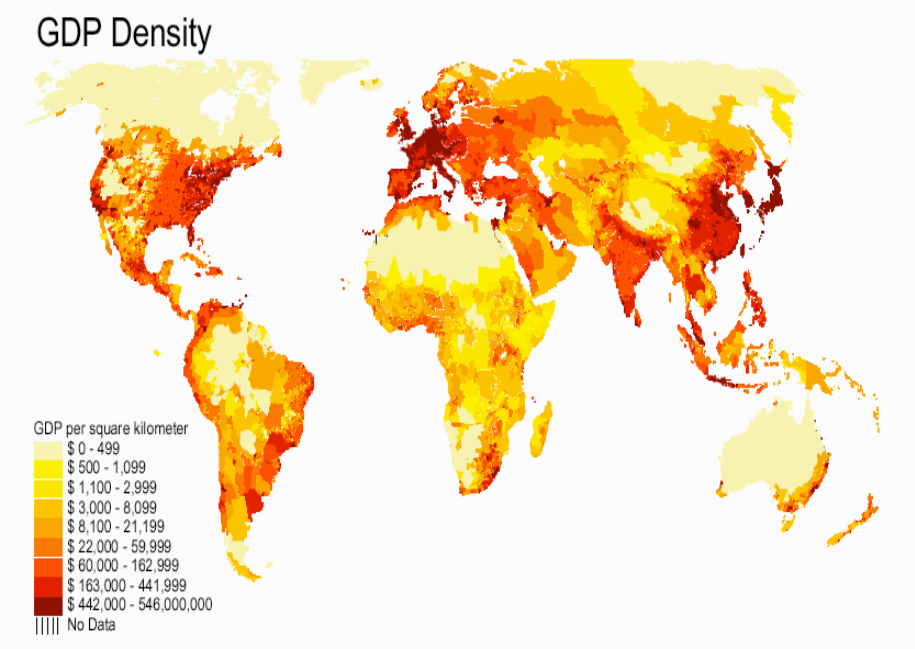
WCRP/MAHASRI & Asia Monsoon Years (2007-12)

Societal importance of coastal regions



(GSFC/NASA, 2000)

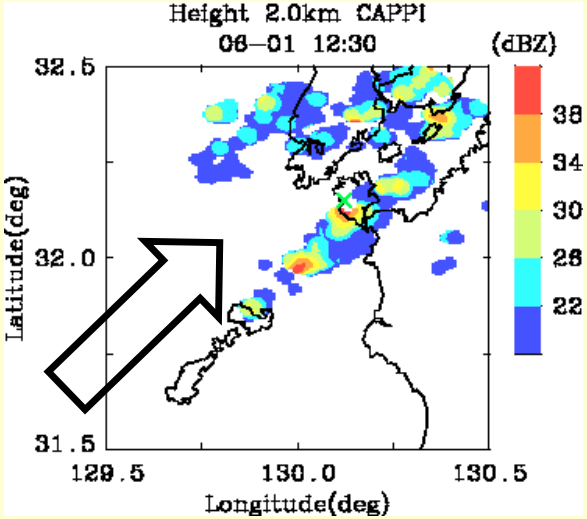




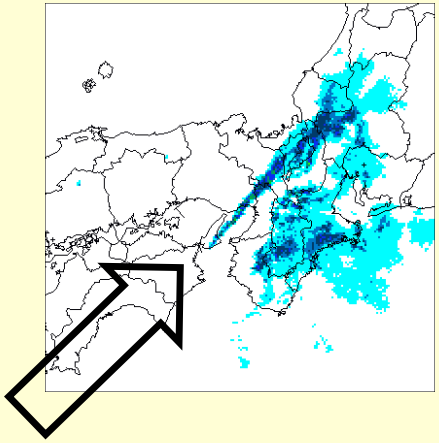
(Gallup and Sachs, 1999)

Heavy precipitation in Japan by “landing” monsoon

Orographic rainbands in early summer (“Baiu”)

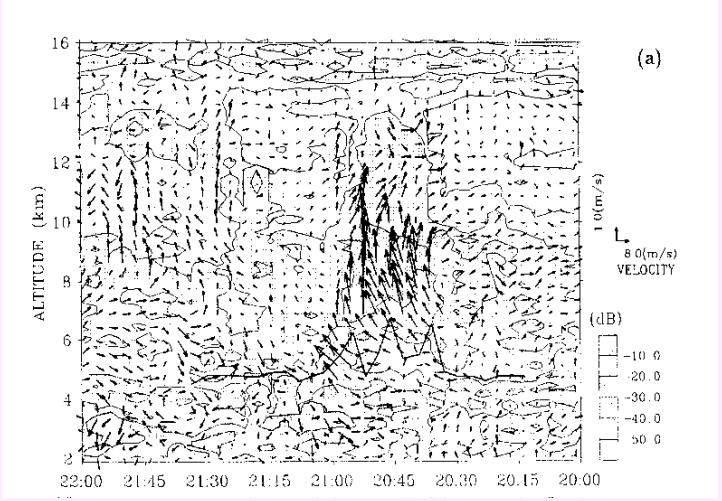


(Umemoto et al., 2004)



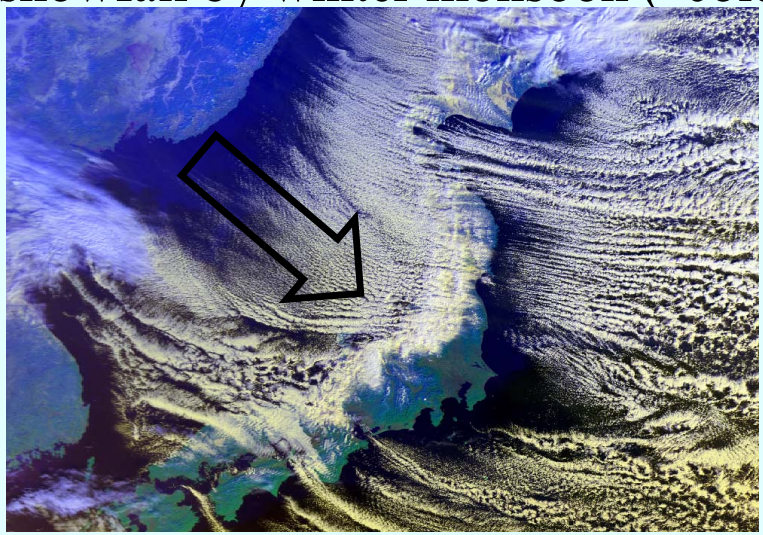
(Higashi et al., 2009)

Baiu-frontal cloud convection observed with the MU radar (a VHF-band wind profiler)



(Shibagaki et al., 2000)

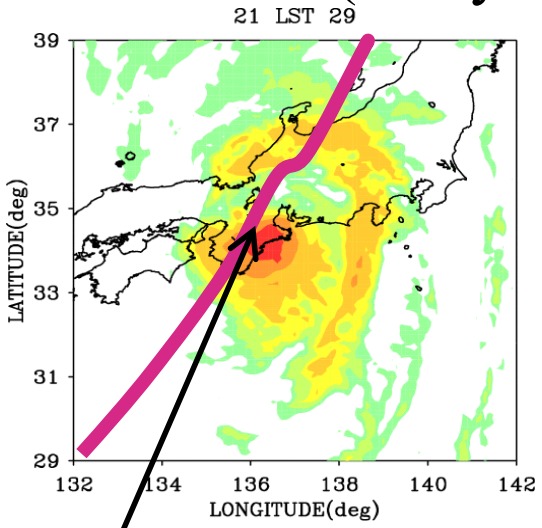
Heavy snowfall by winter monsoon (“cold surge”)



(Kajikawa, private comm., 1 JAN 2009, NOAA18, Ch1,2,4)

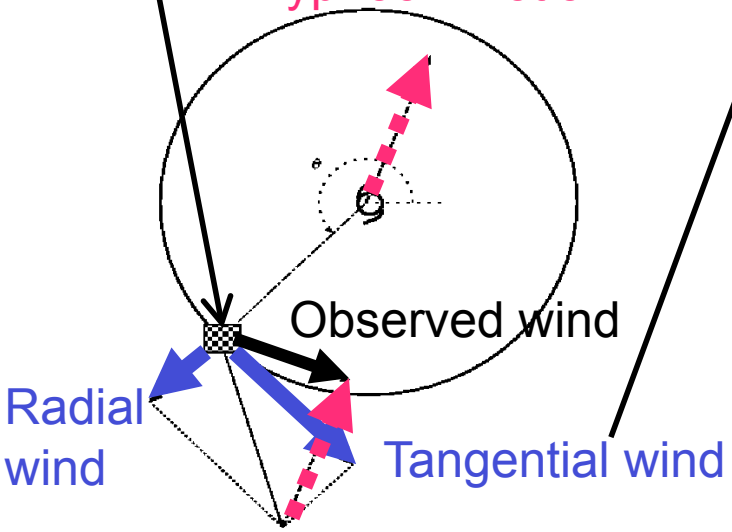
Heavy rain & violent wind by landing Typhoon

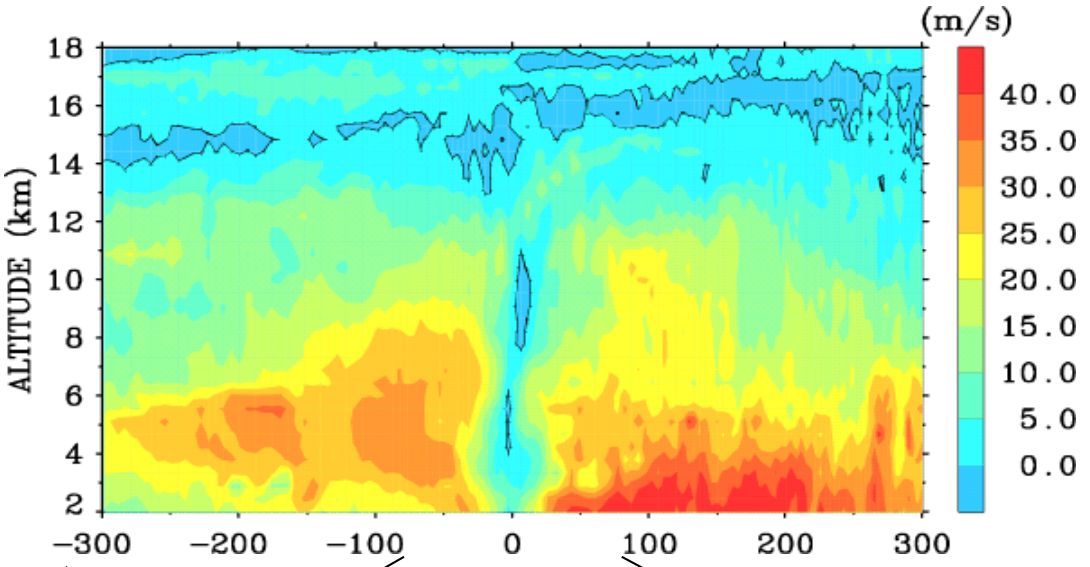
GMS Cloud (every 1 h)

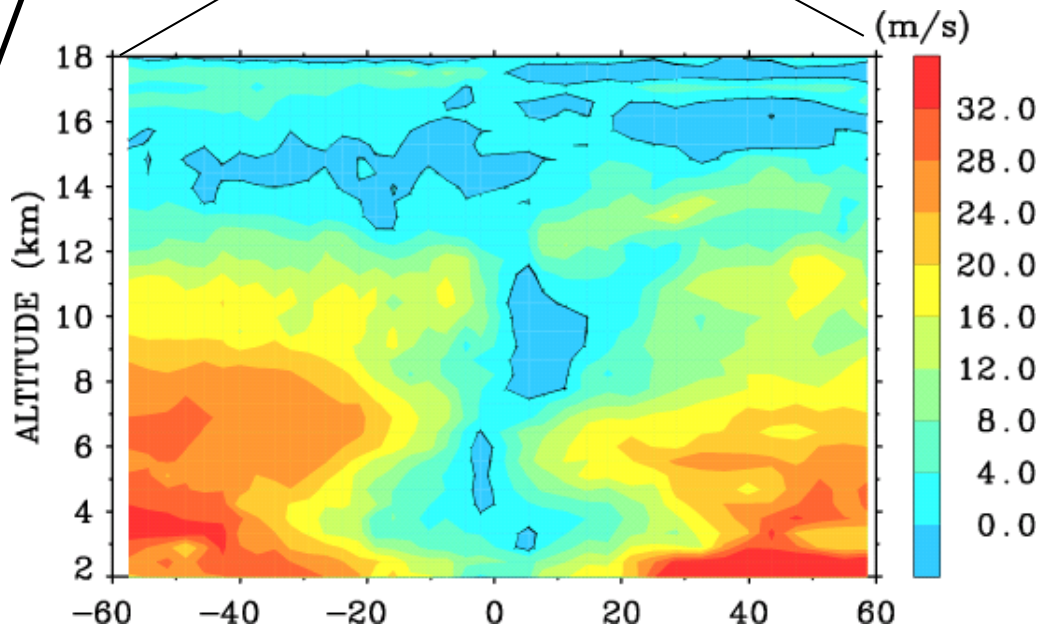


MU Radar (a wind profiler)
(every 1 min)

Typhoon Motion

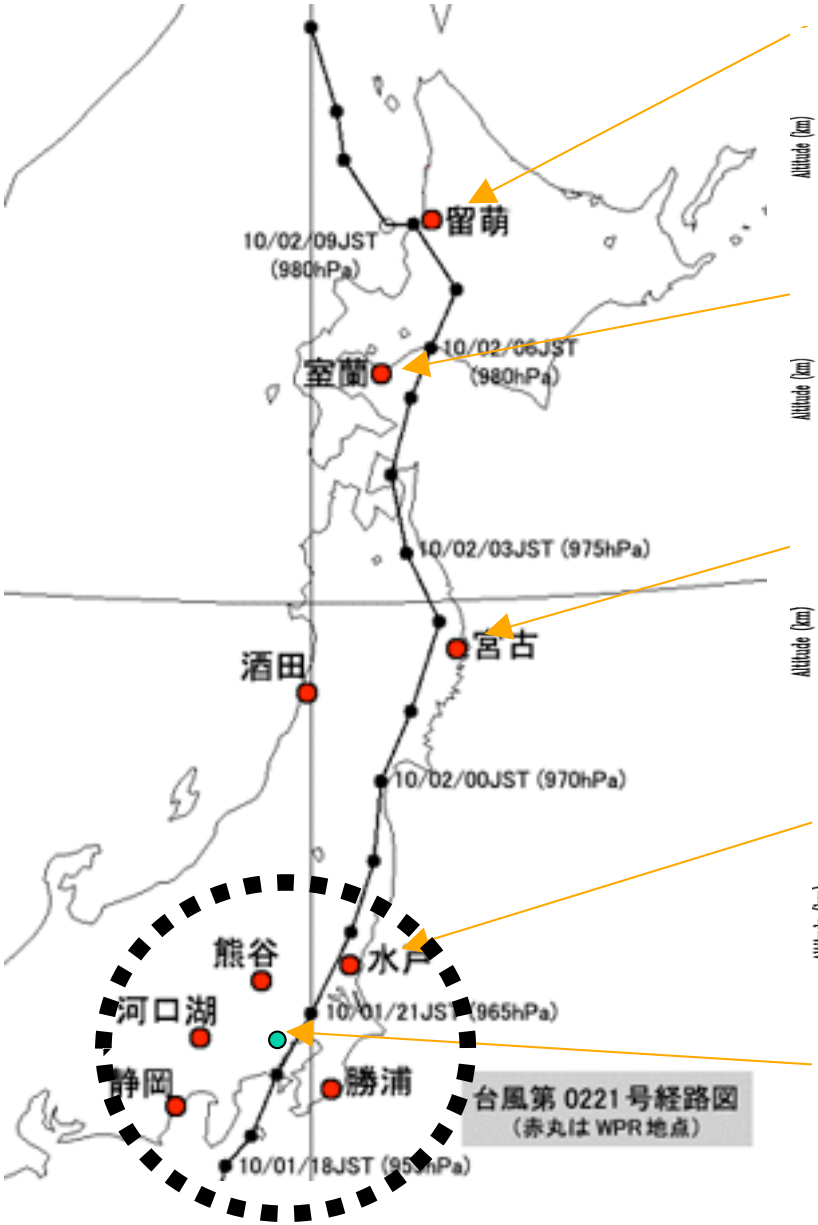


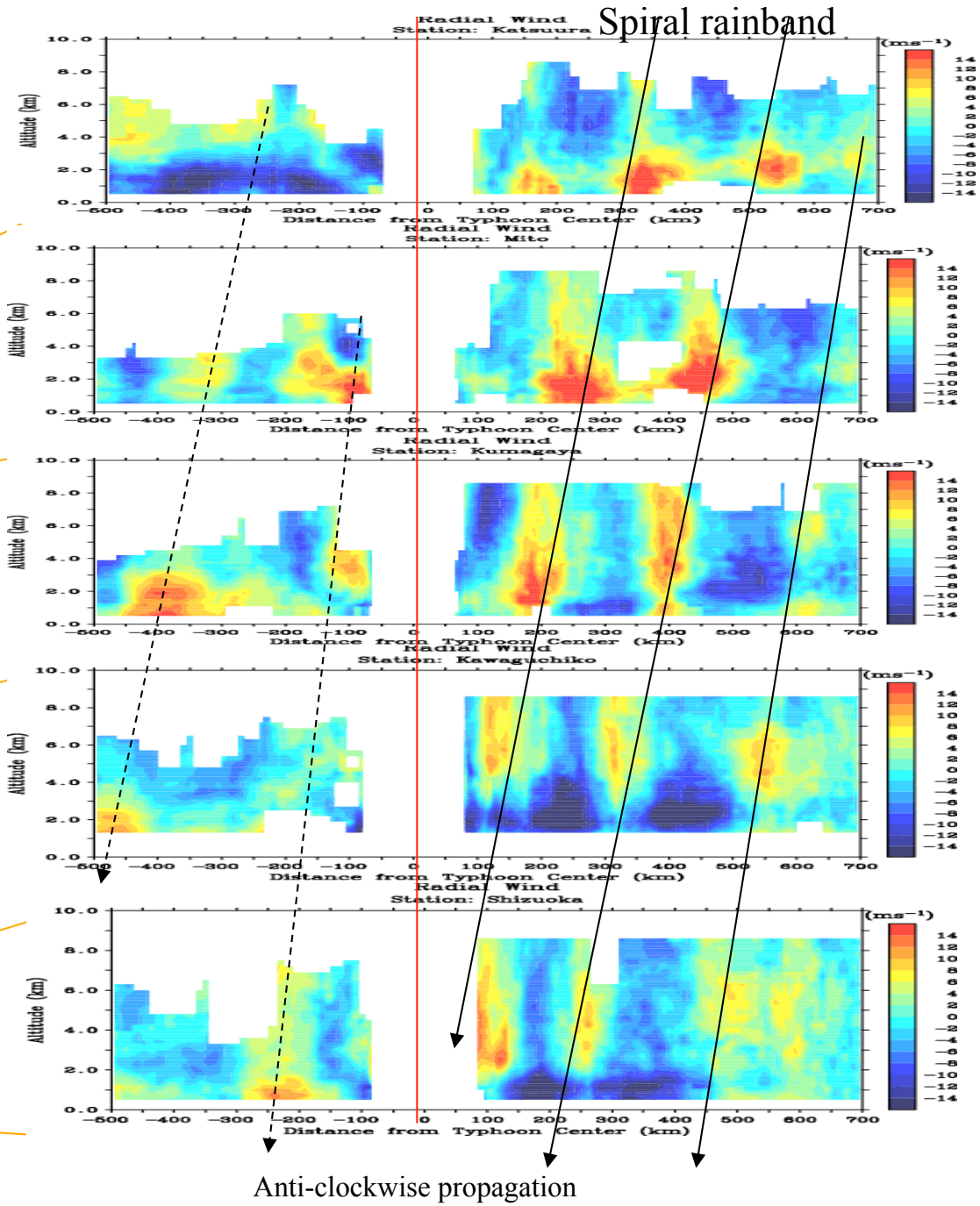




(T9426 Orchid; Shibagaki et al., 2003)

Wind-Profiler Network obs. of Typhoon

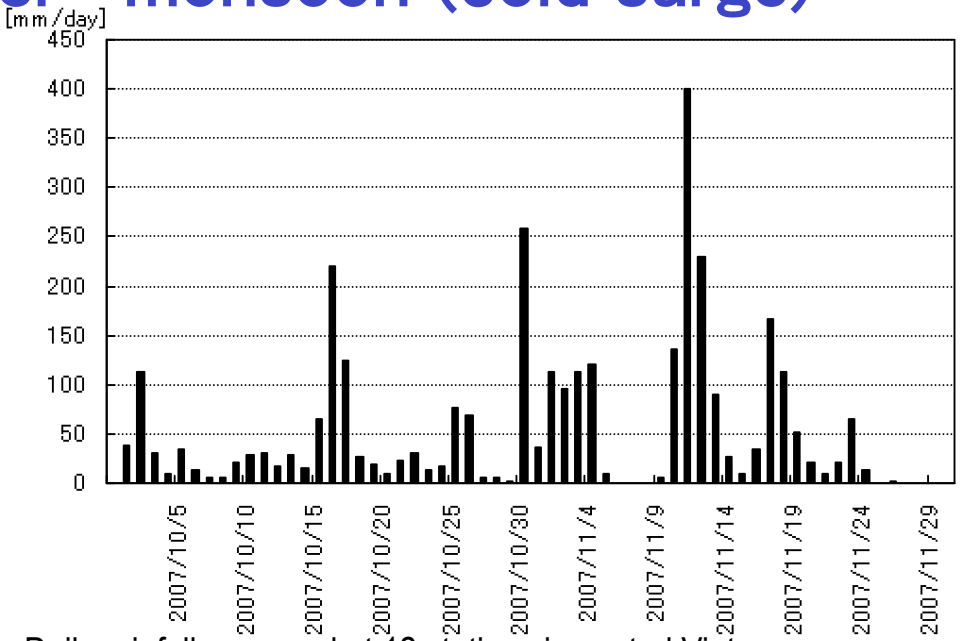




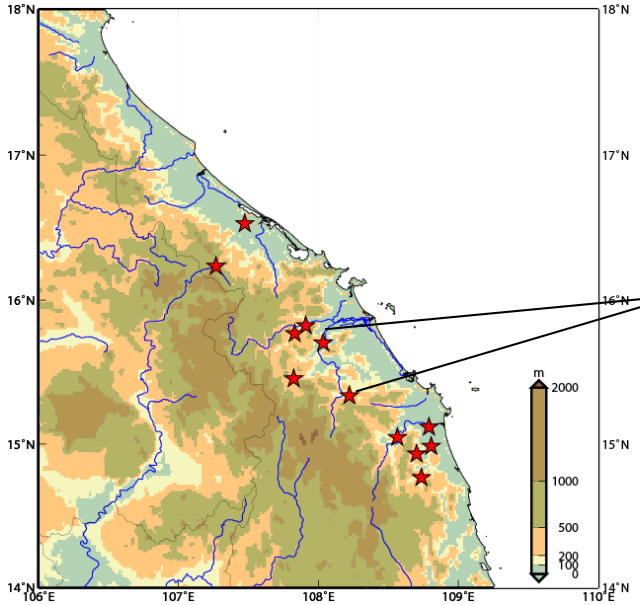
(T0221 Higos; Teshiba et al., 2004)

Vietnam Flood by “winter” monsoon (cold surge)

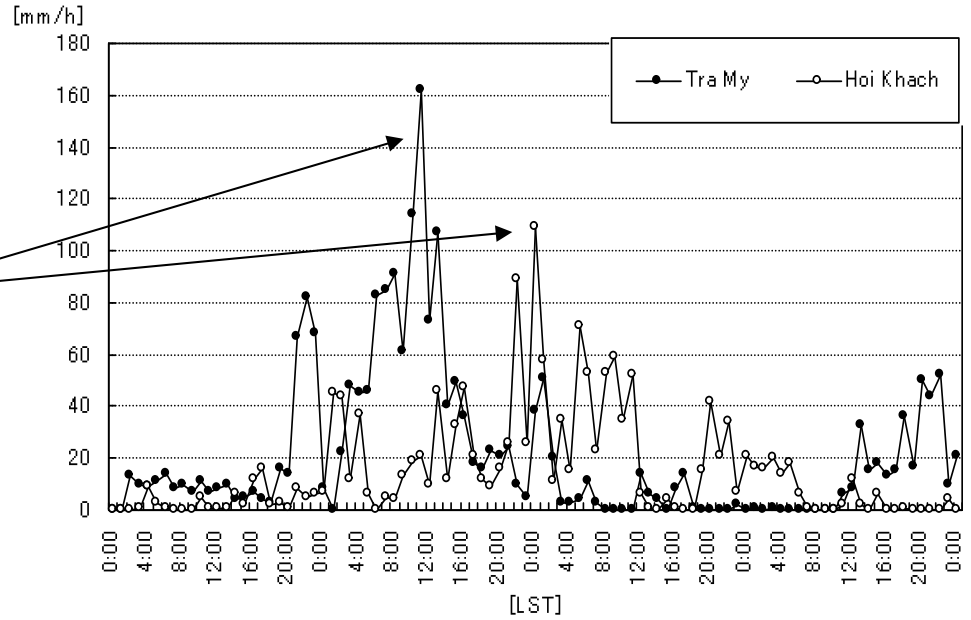
(by Nguyen Thi Tan Thanh/NHMS/Vietnam)



Daily rainfall averaged at 12 stations in central Vietnam
October-November, 2007

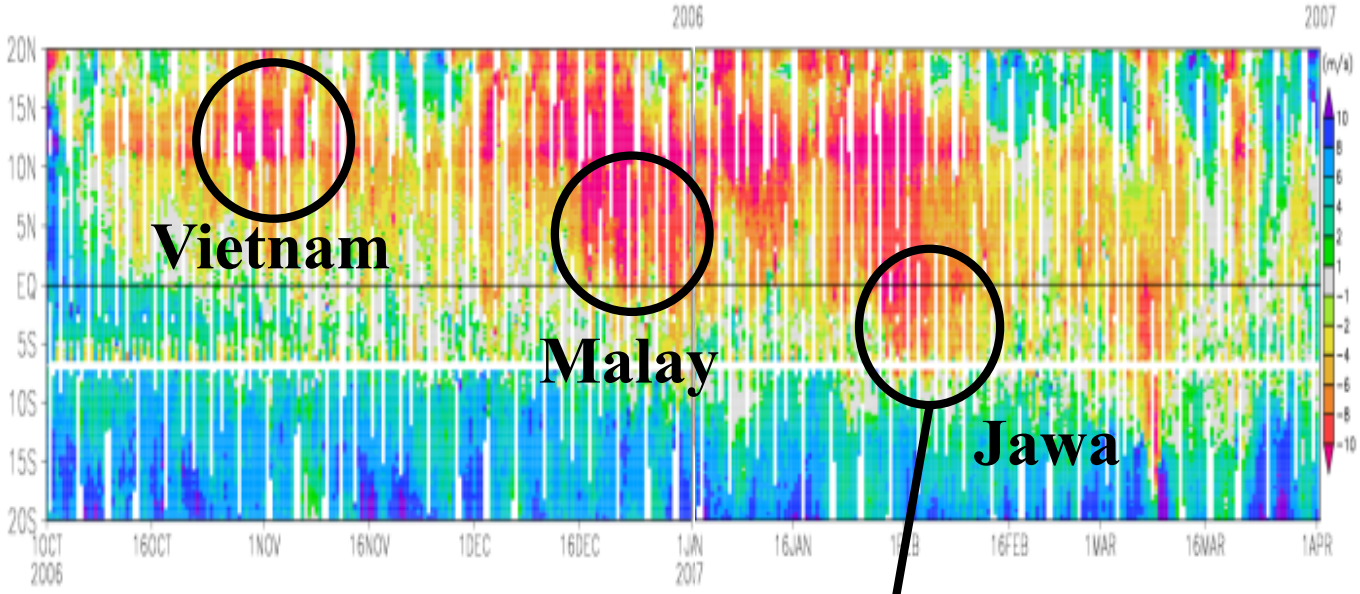


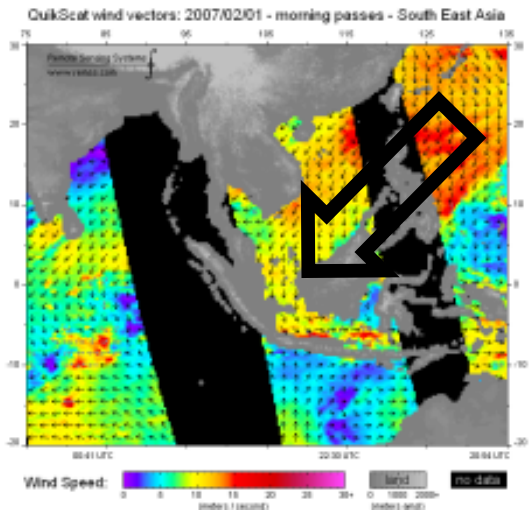
Location of automatic rainfall stations



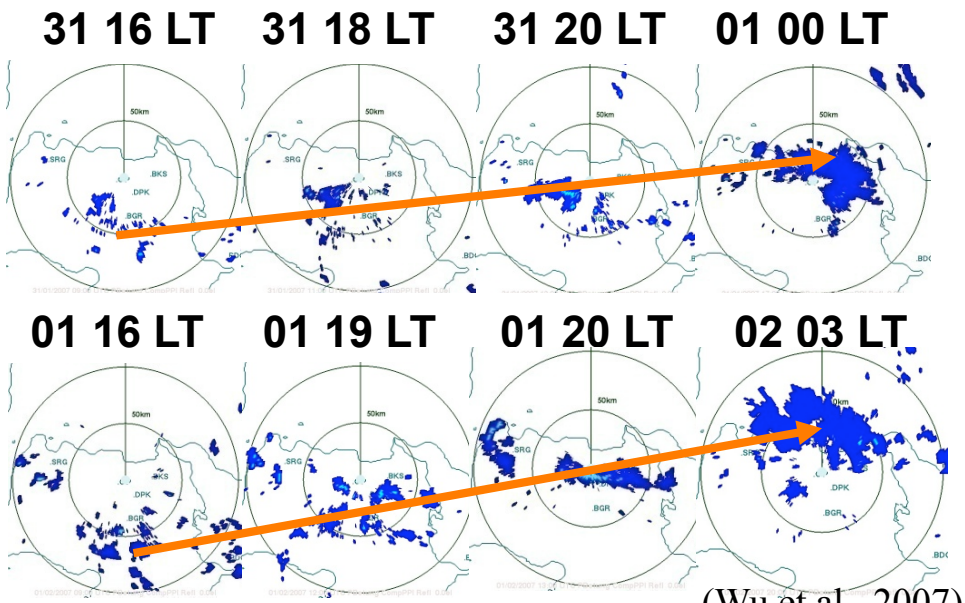
Hourly precipitation at Tra My and Hoi Khach November 10-13, 2007

Jakarta flood by “cross-equatorial” cold surge



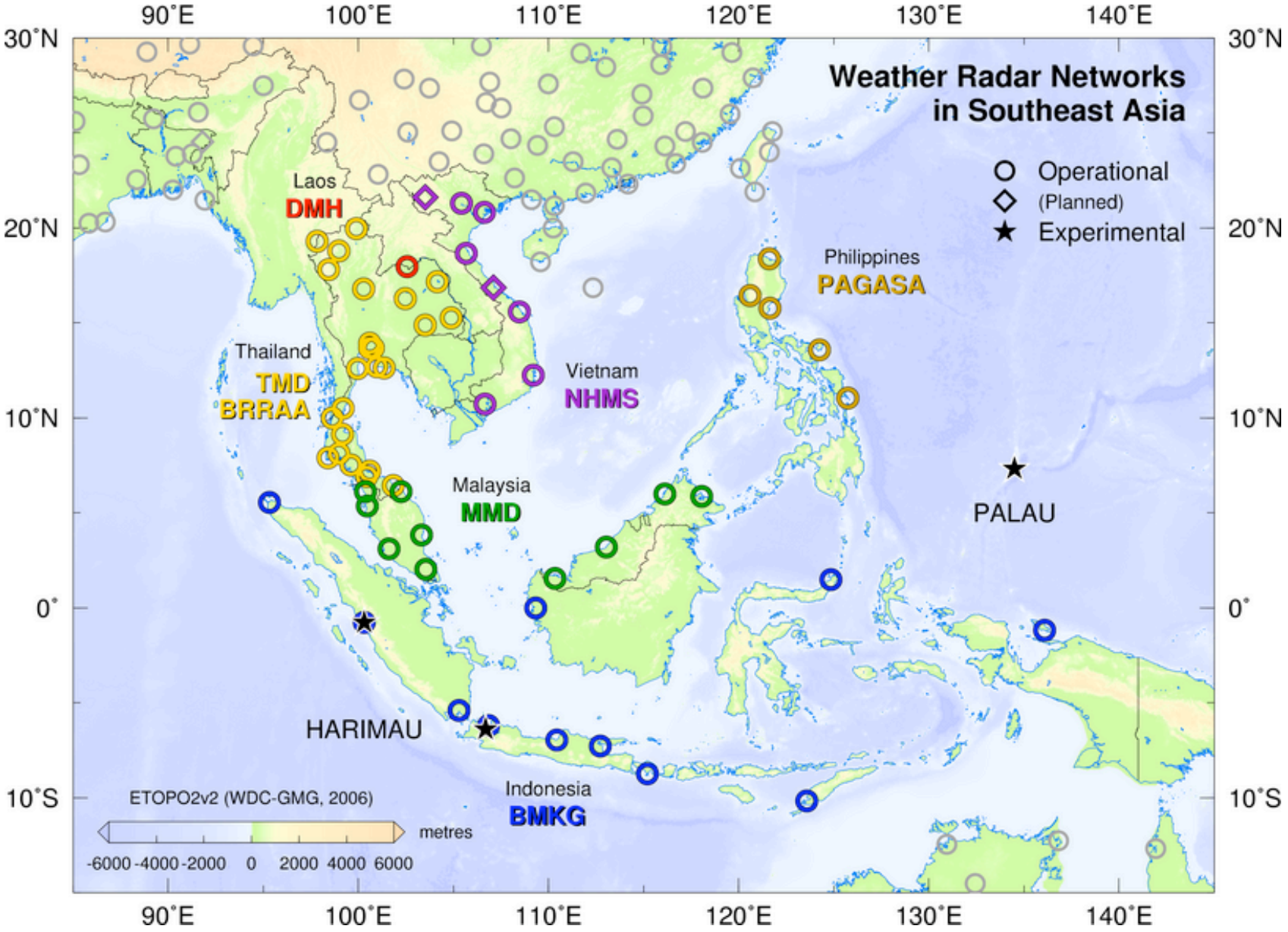


Jakarta Flood (Jan-Feb 2007)



(Wu et al., 2007)

Meteorological radar network in SE Asia



(drawn by H. Kamimera/DIAS/JAMSTEC)

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

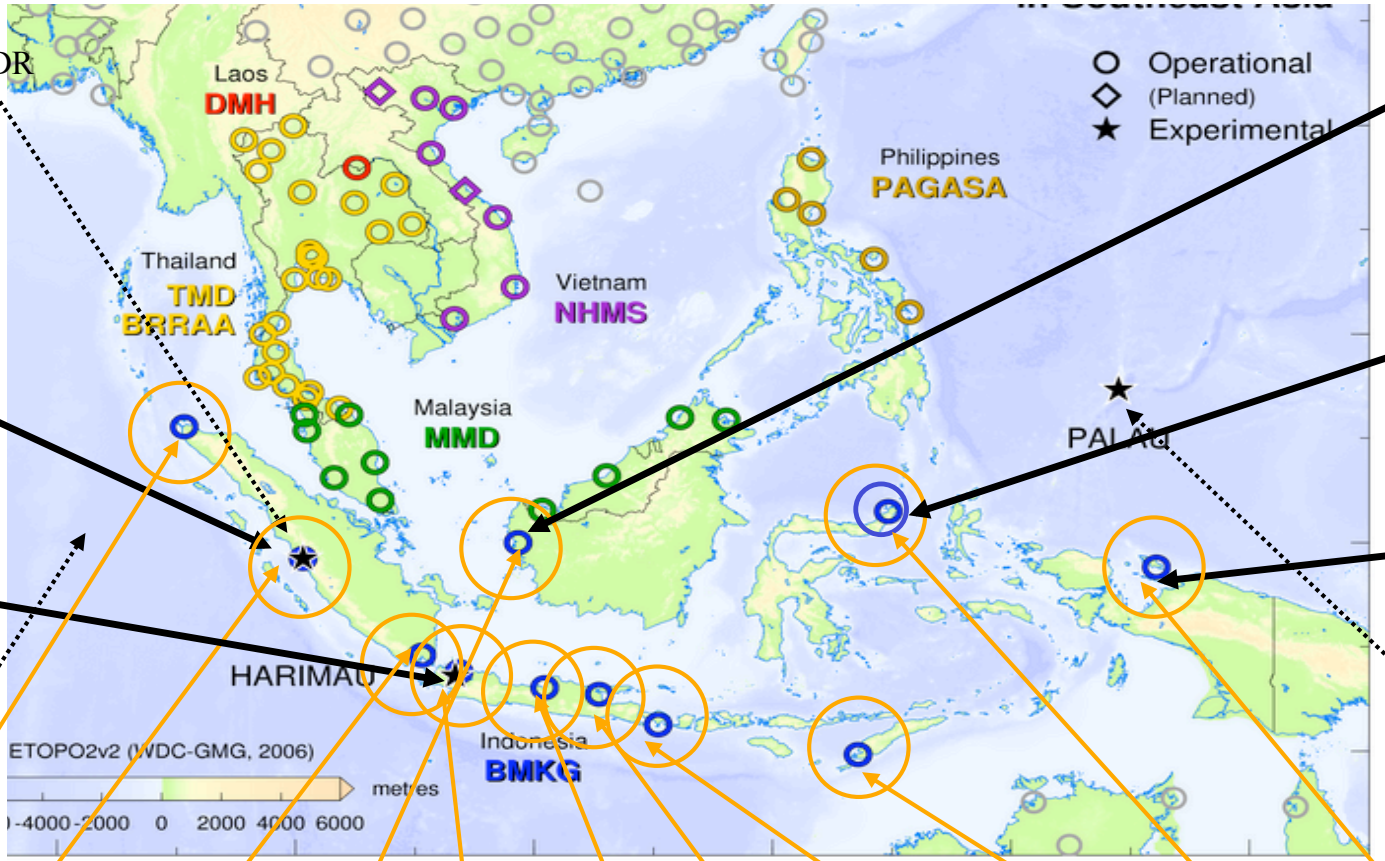
Hydrometeorological Array for ISV-Monsoon Automonitoring (HARIMAU)

Kototabang EAR,BLR,XDR
KU + LAPAN

MIA XDR

Serpong CDR

Mirai CDR
JAMSTEC

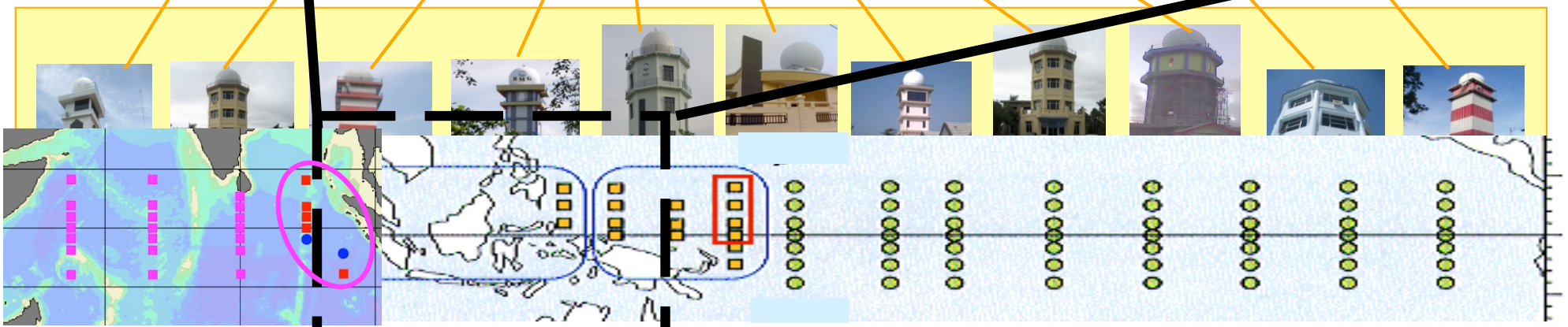


Pontianak WPR

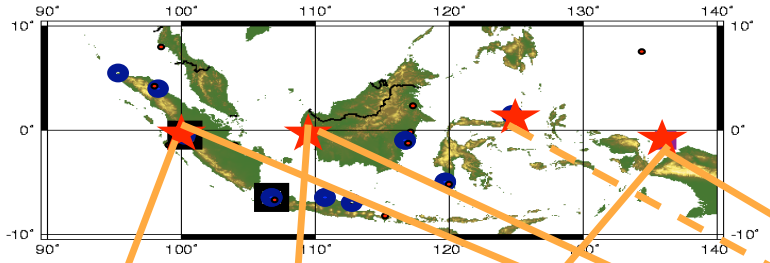
Manado WPR

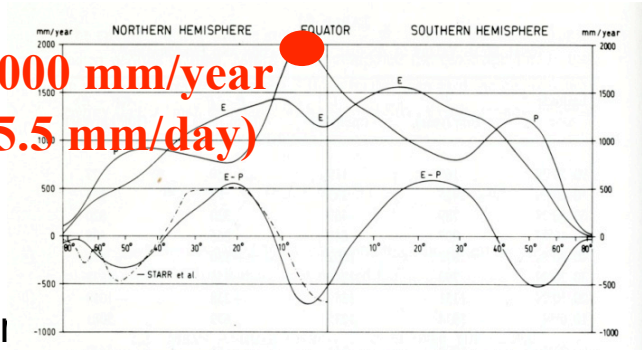
Biak WPR

Palau XDR+WPR
JAMSTEC

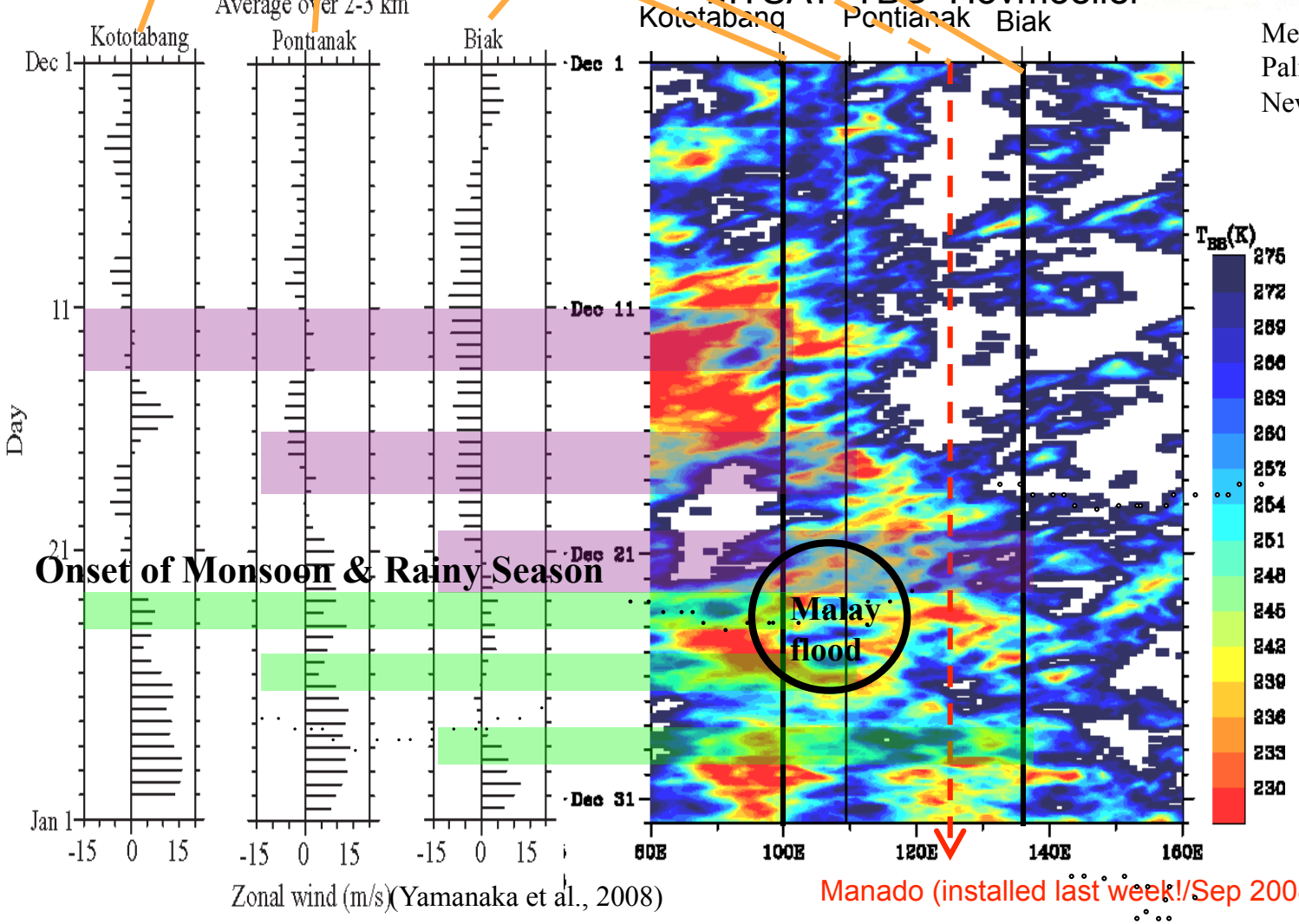


WPR tracking of ISV (the "aqua planet" solution)

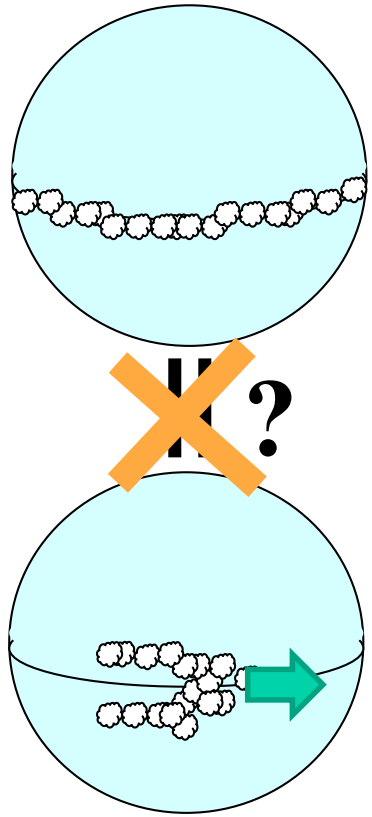




Meinardus (1934), Sellers (1965),
Palmen & Newton (1969)
Newton (1972)

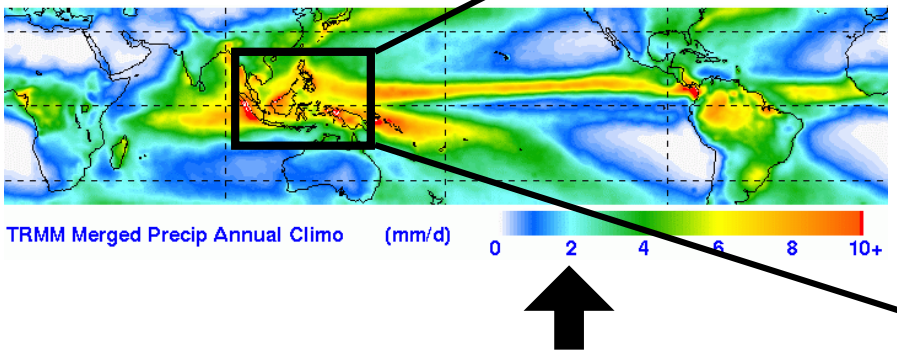


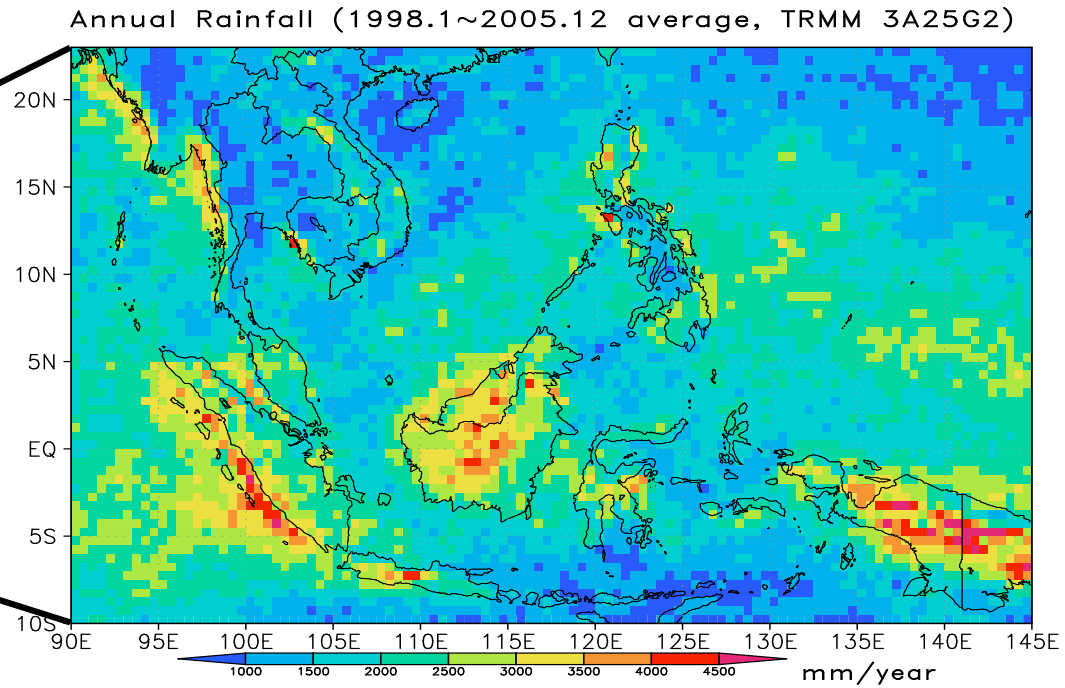
(Yamanaka et al., 2008)



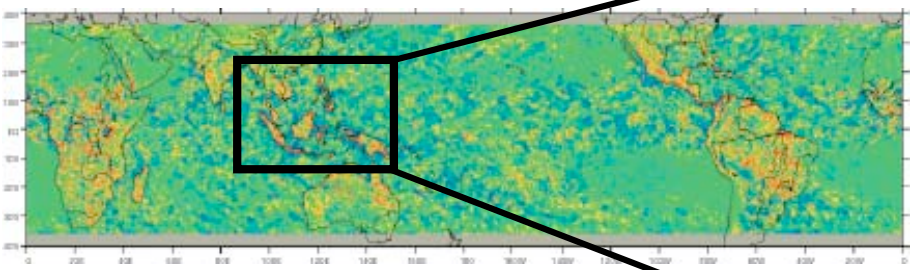
Manado (installed last week!/Sep 2008)

Climatological Importance of Coastal Regions

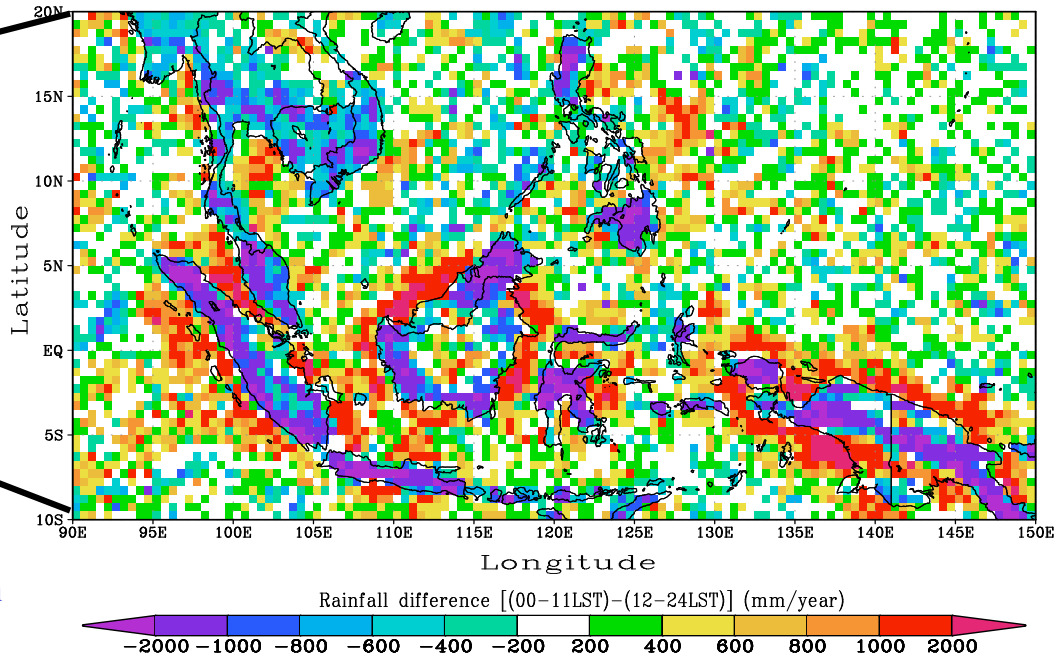




Correlation between **annual rainfall** and **diurnal cycle** dominancy of rainfall



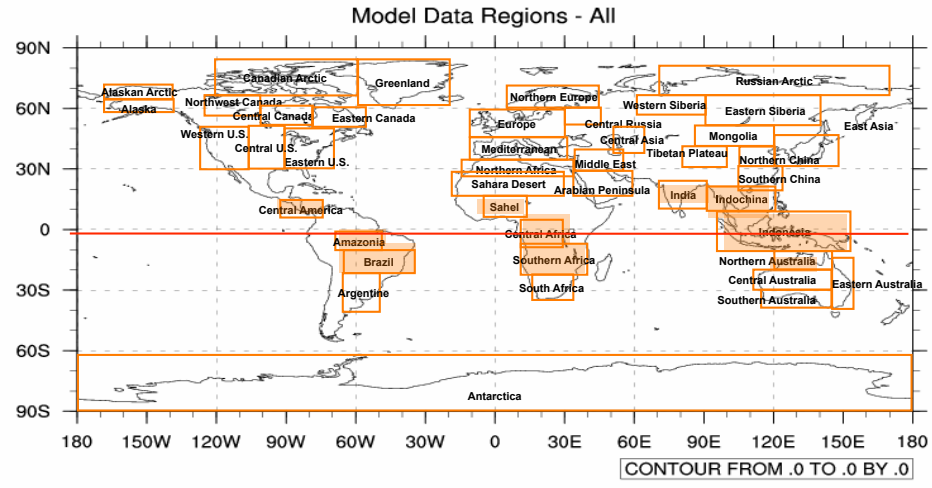
(Hirose & Nakamura, 2004, *J. Appl. Meteor.*)



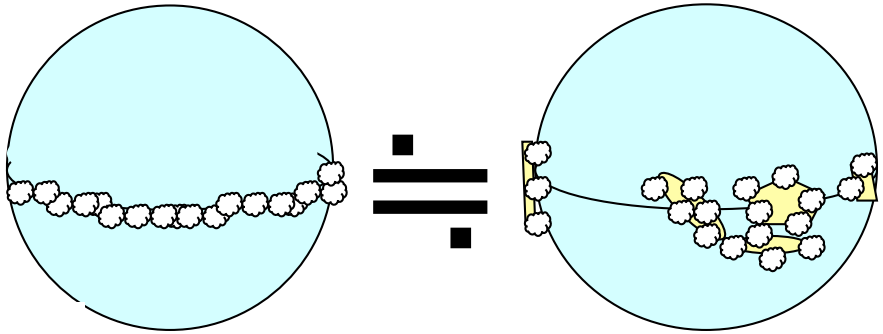
Harimau

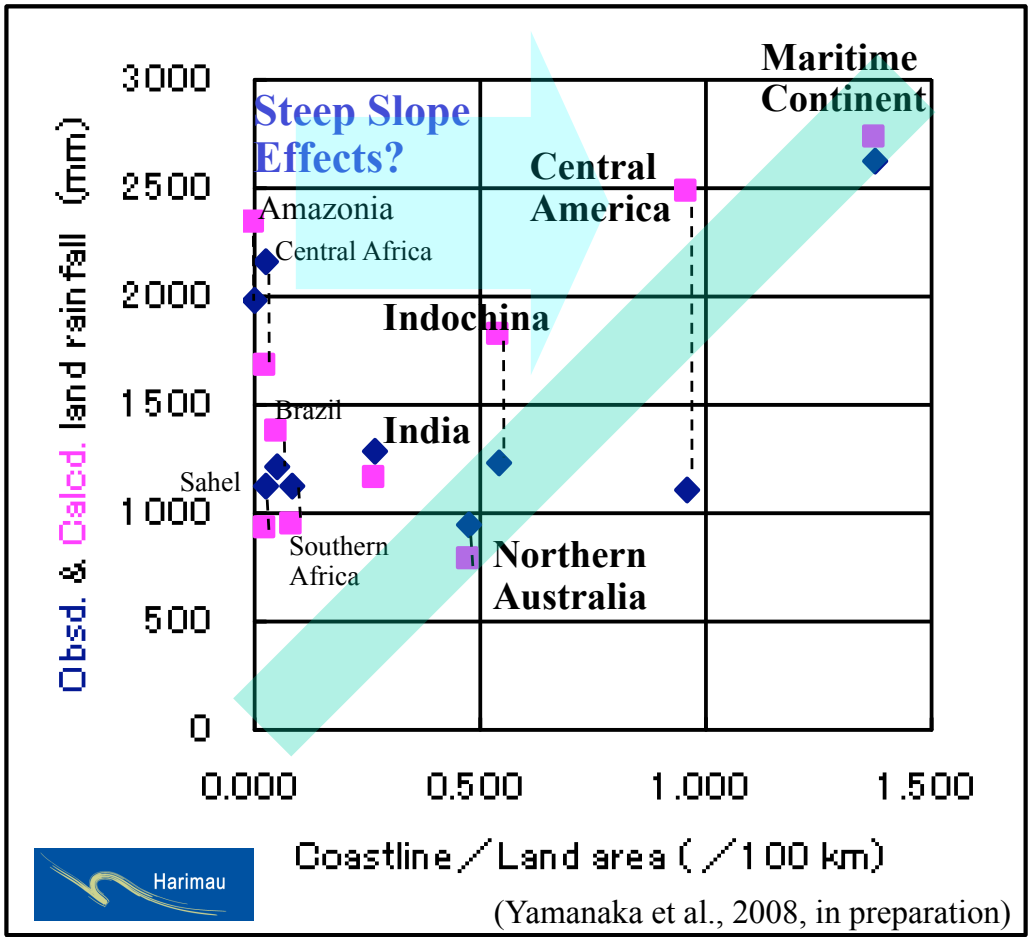
Morning Rain – **Evening Rain**

(Mori et al., 2004, *Mon. Wea. Rev.*)



43 regions for local climate examination using 600-year (1870-2450) run of NCAR-CCSM3 on Earth Simulator. (Maruyama et al., 2000; Yoshida et al., 2005)





(Yamanaka et al., 2008, in preparation)

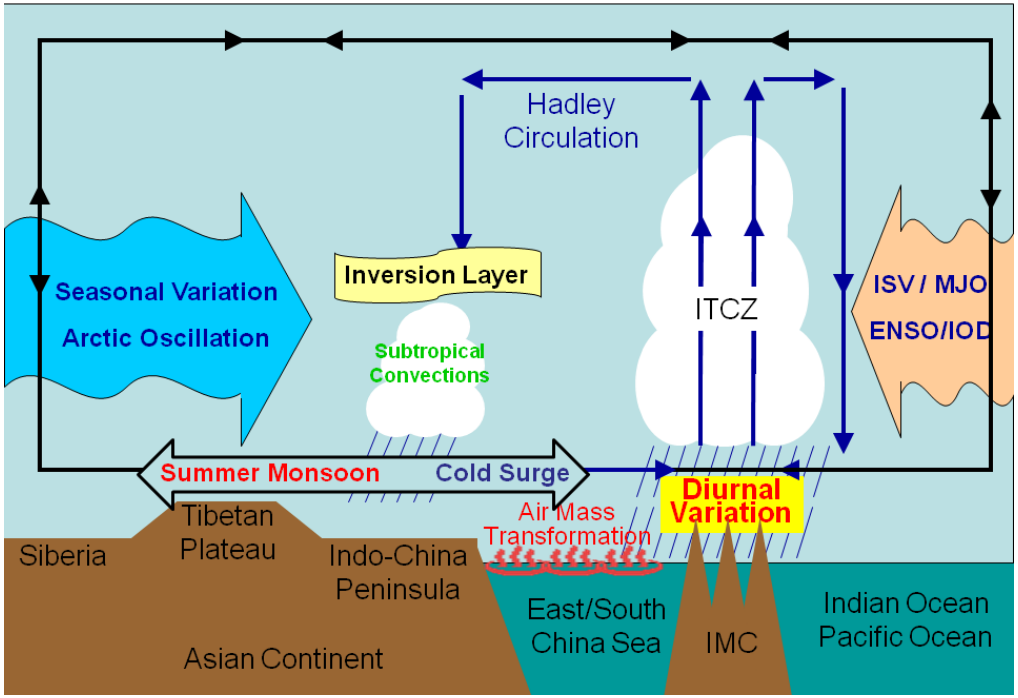
Regional (land) rainfall (mm/year) ＝2000 (mm/year•10^2 km) ×[Coastline (10^2 km)/Land area (10^4km^2)

→ Total rain water amount on land (Gt/year) ＝2000 (mm/year•10^2 km) ×Coastline (10^2 km)

- **The maritime continent with the longest coastlines has the largest rainfall.**
- Numerical models must resolve coastlines with 100 km or higher resolution.
- Radar-AMeDAS-like observations must cover all the coastlines/mountain slopes.

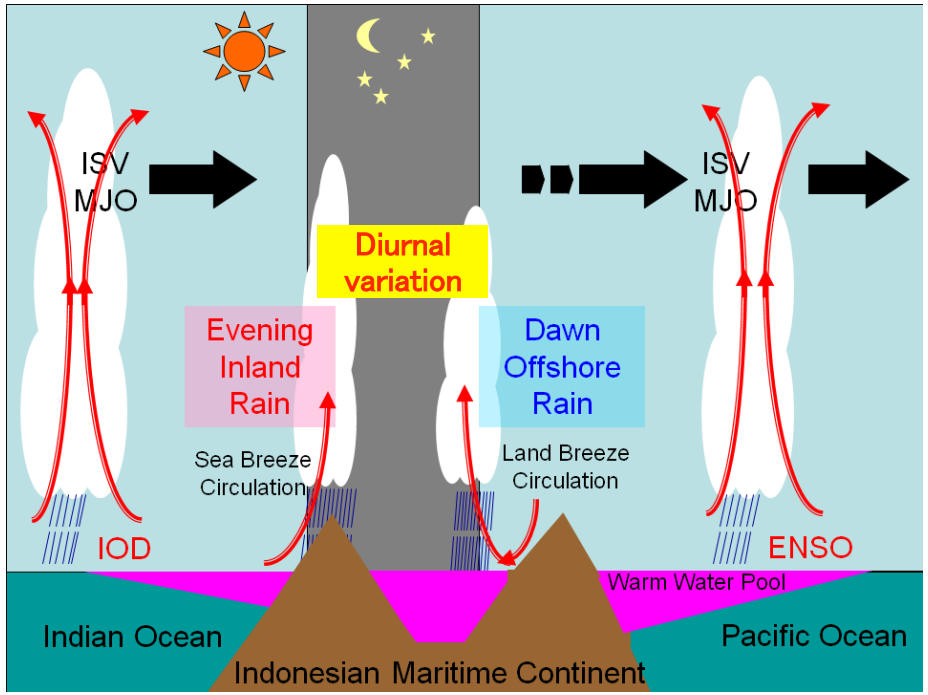
Summary of scientific targets

MAHASRI

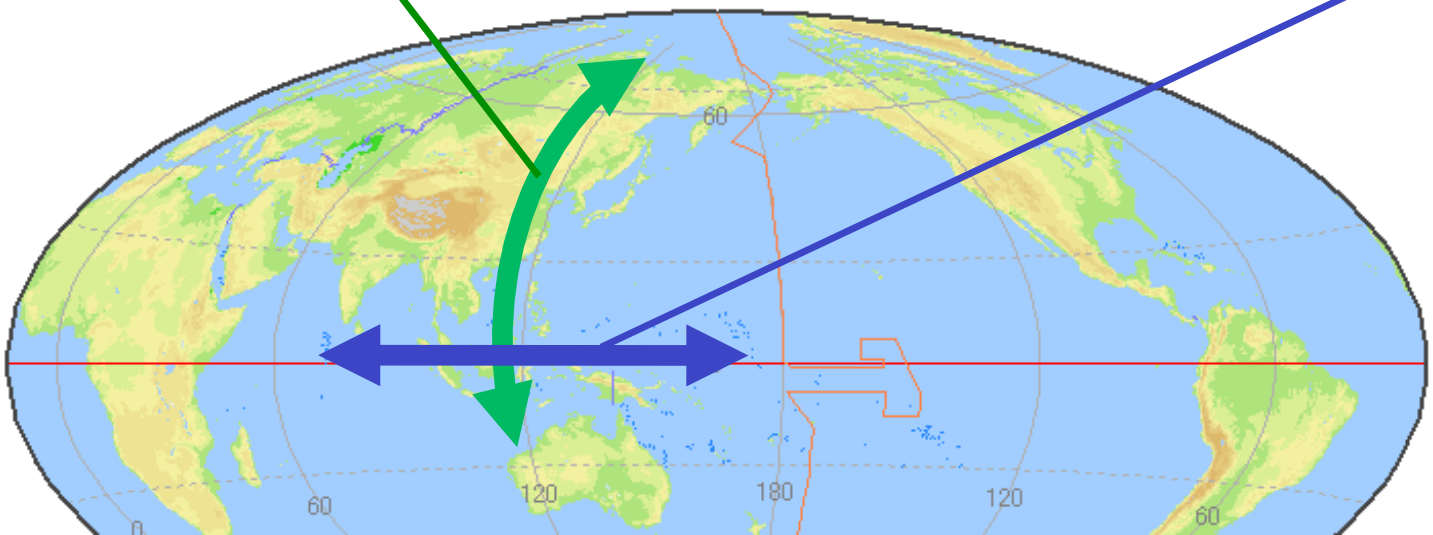


North ⟷ South

HARIMAU



West ⟷ East



(originally by Matsumoto, Mori & Ogino)

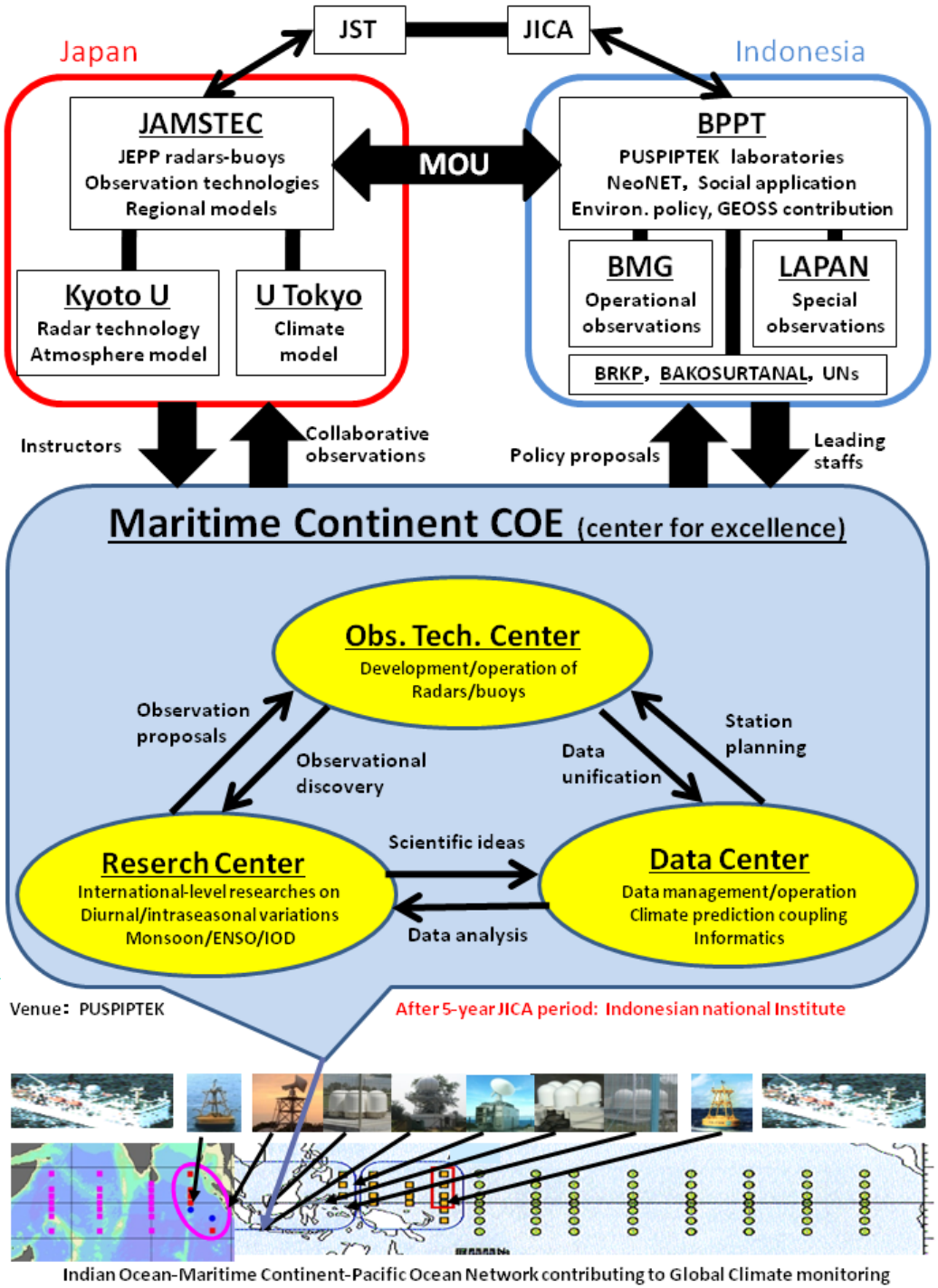
Post-HARIMAU plan

Already done until FY2008

- 2006: PUSPIPTEK lab. building
  HARIMAU Workshop
- 2007: GEOSS EA selected at
  Cape Town GEOS
- 2008: IOMICS Workshop
  NeoNET comm. office

FY2009 and after

- HARIMAU-NeoNET coupled
- JST-JICA proposal
- GEOSS-AP 2010
- HARIMAU Symposium



Indian Ocean-Maritime Continent-Pacific Ocean Network contributing to Global Climate monitoring