

The Years of the Maritime Continent (YMC) Field Campaign (2017-2019)

Chidong Zhang, RSMAS, University of Miami



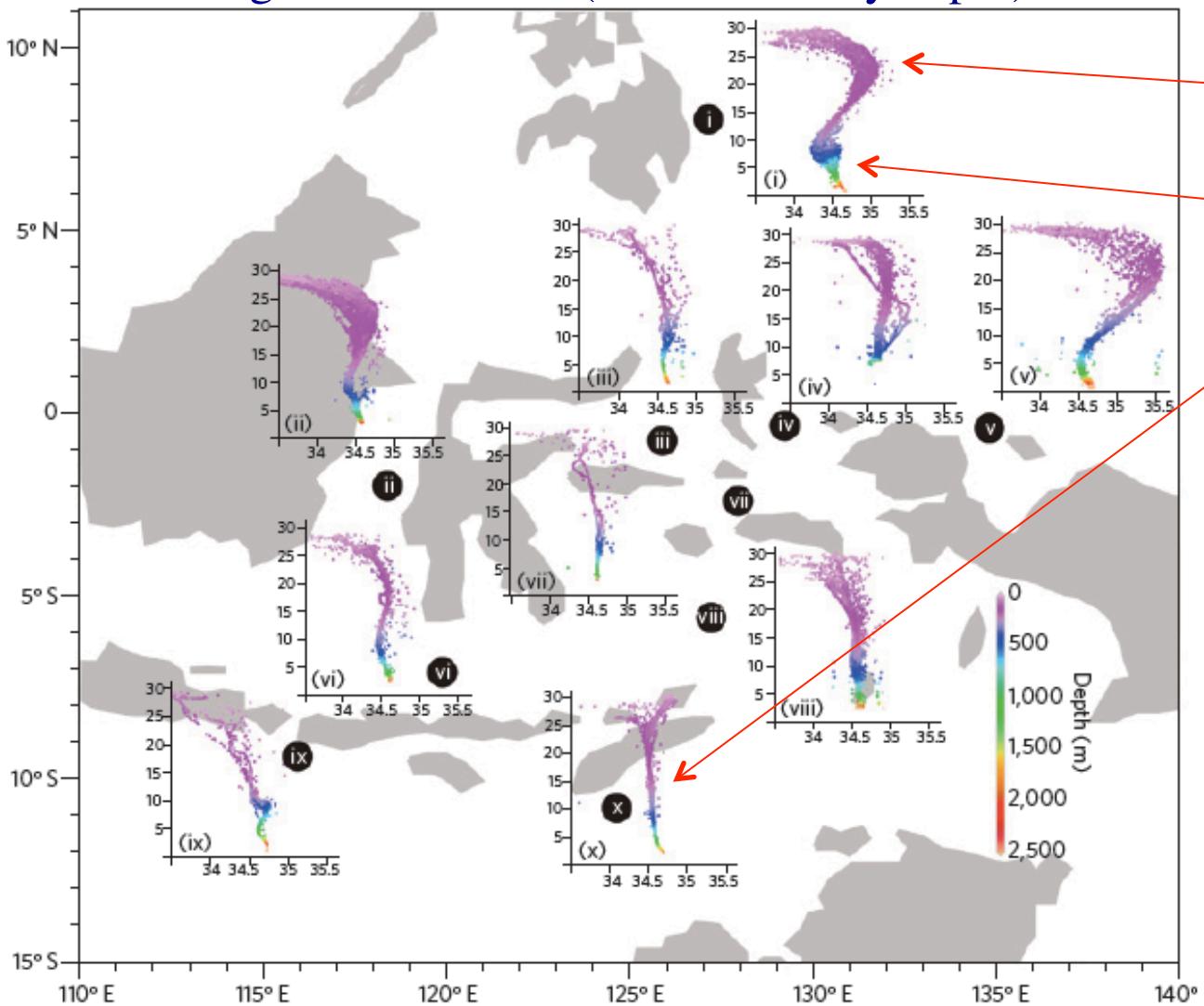
YMC: Why?

- **Its Global Importance:** Connections between the Indian and Pacific Oceans, between the tropics and higher latitudes, and between the troposphere and stratosphere
- **Persistent biases in global models:** Diurnal cycle, MJO, mean precipitation, SST, TTL
- **Large data and knowledge gaps in a unique geographic setting:** Complex air-sea-land geometry



Evidence of Strong Mixing in Indonesian Seas

Regional T-S Plots (color coded by depth)



Signatures of **Smax** in the thermocline and **Smin** in the Intermediate layer **disappear** quickly in the Indonesian seas through vigorous mixing

- Air-sea interactions
- Near-f shear
- Tides

Koch-Larrouy et al. (2007)

Sprintall et al., (Nature Geosci. 2014)

MJO in the MC

Possible reasons for the MJO (prediction) barrier:

- Topographic interference with wind
- Blockage of surface fluxes
- Diurnal cycle energy drain
- Air-sea interaction

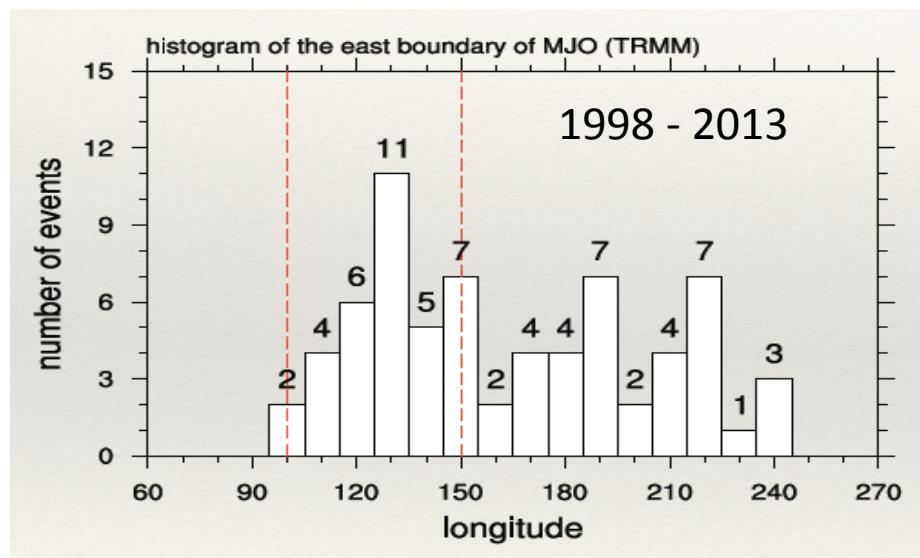
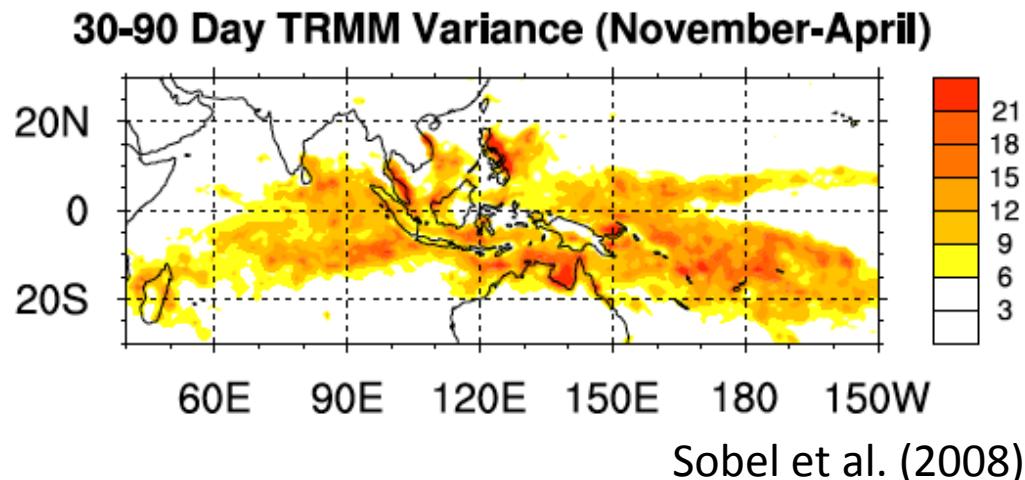
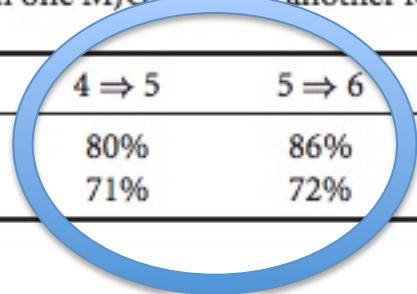


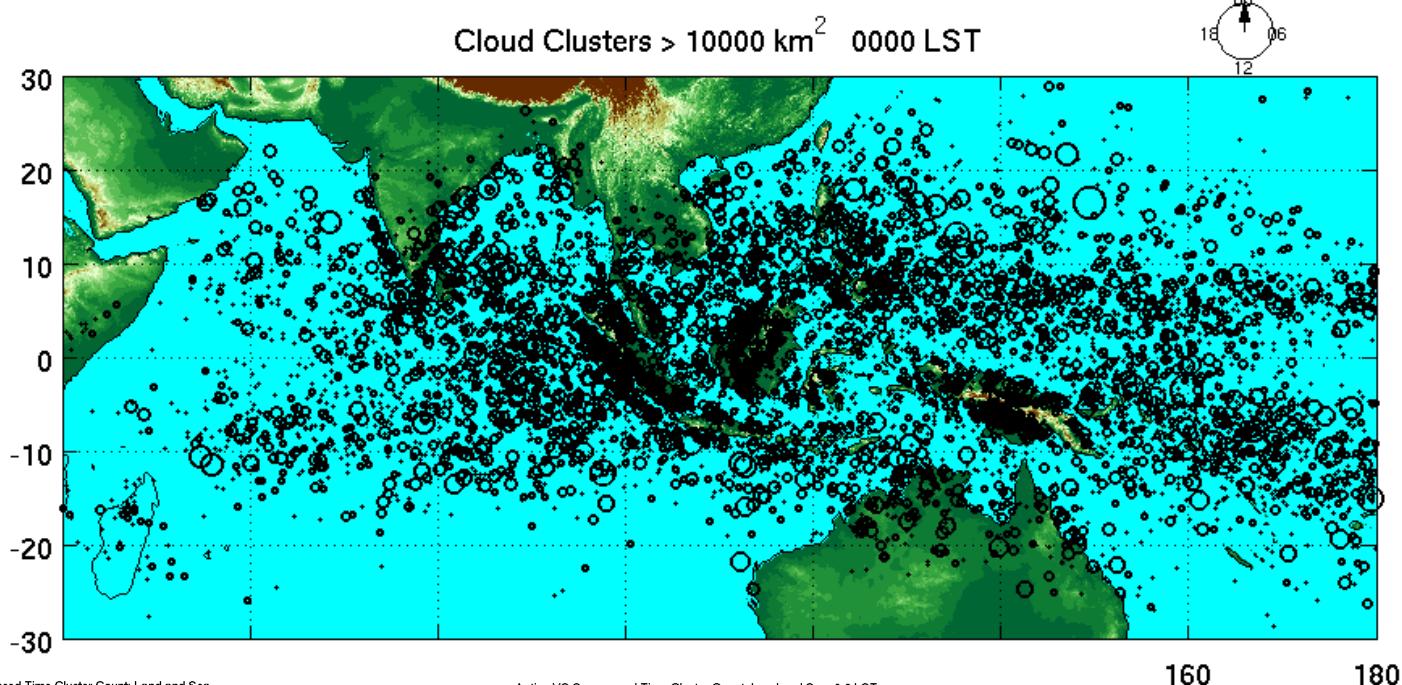
Table I. Percentage of MJO events moving from one MJO phase to another for reanalysis and model hindcasts.

Phase	$1 \Rightarrow 2$	$2 \Rightarrow 3$	$3 \Rightarrow 4$	$4 \Rightarrow 5$	$5 \Rightarrow 6$	$6 \Rightarrow 7$	$7 \Rightarrow 8$	$8 \Rightarrow 1$
Reana	71%	81%	81%	80%	86%	79%	68%	55%
Model	71%	81%	80%	71%	72%	78%	65%	87%

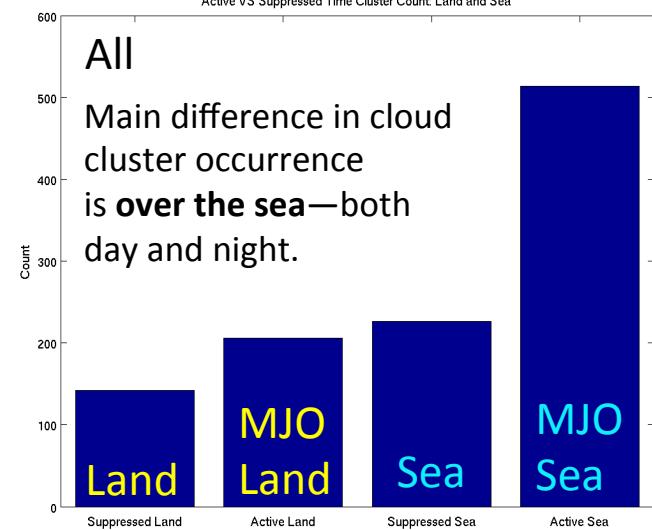


Diurnal Cycle of Convective Systems and MJO

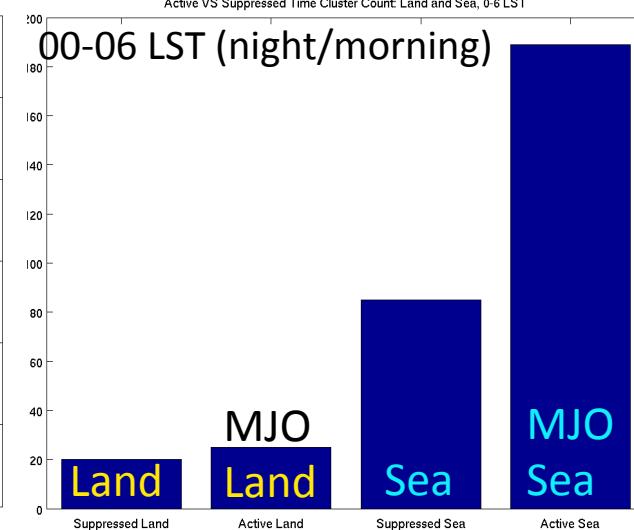
MeteoSat7 & MDSat Cloud Clusters (IR < 208 K, hourly, Oct-Dec 2010-12)



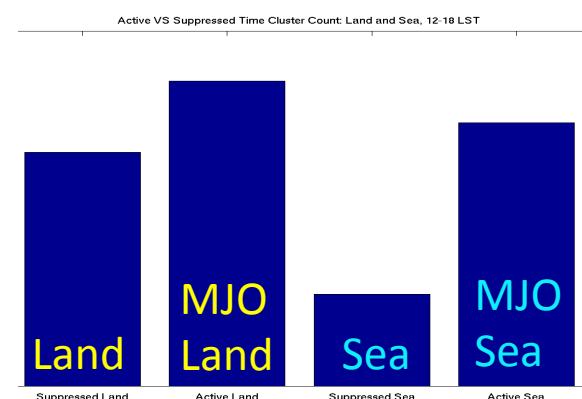
Active VS Suppressed Time Cluster Count: Land and Sea

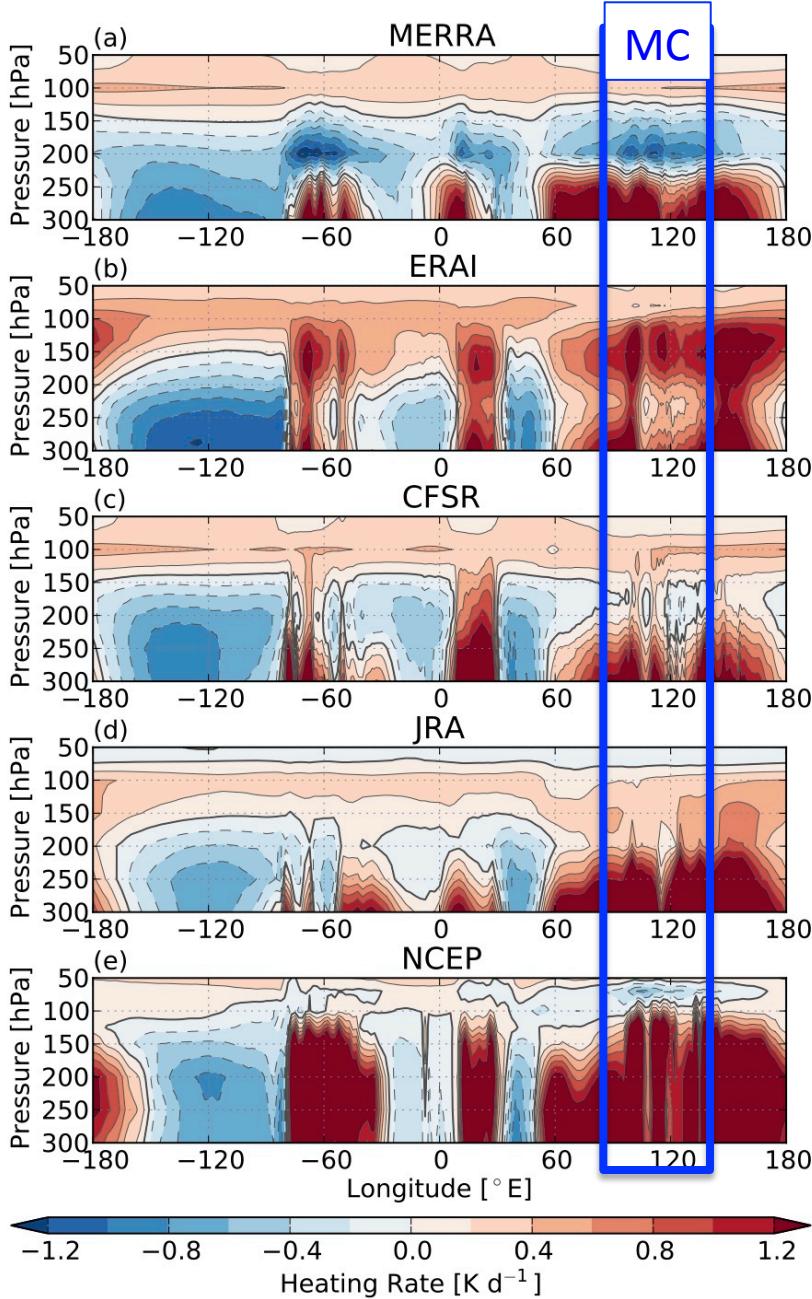


Active VS Suppressed Time Cluster Count: Land and Sea, 0-6 LST



12-18 LST (afternoon)





- reanalyses do not agree on UTLS diabatic heating rates
 - upper troposphere: latent heating
 - TTL and lower strat: radiation dominates in zonal mean, but mixing and convection response play significant role

YMC: What?

Goal: Observing the weather-climate system of the Earth's largest archipelago to improve understanding and prediction of its local variability and global impact

Science Themes: Atmospheric Convection, Stratosphere-Troposphere Interaction, Upper-Ocean Processes and Air-Sea Interaction, Aerosol, Prediction Improvement

Main Activities: Two-Year Data Sharing, *Field Campaigns*, Modeling, Prediction and Application, Outreach and Capacity Building

International Participation: Scientists and forecasters from 46 institutes of 13 countries and regions.

Planning Activities: Workshops (Singapore, January 2015; Jakarta, November 2015); websites (BMKG, JAMSTEC), Science Plan

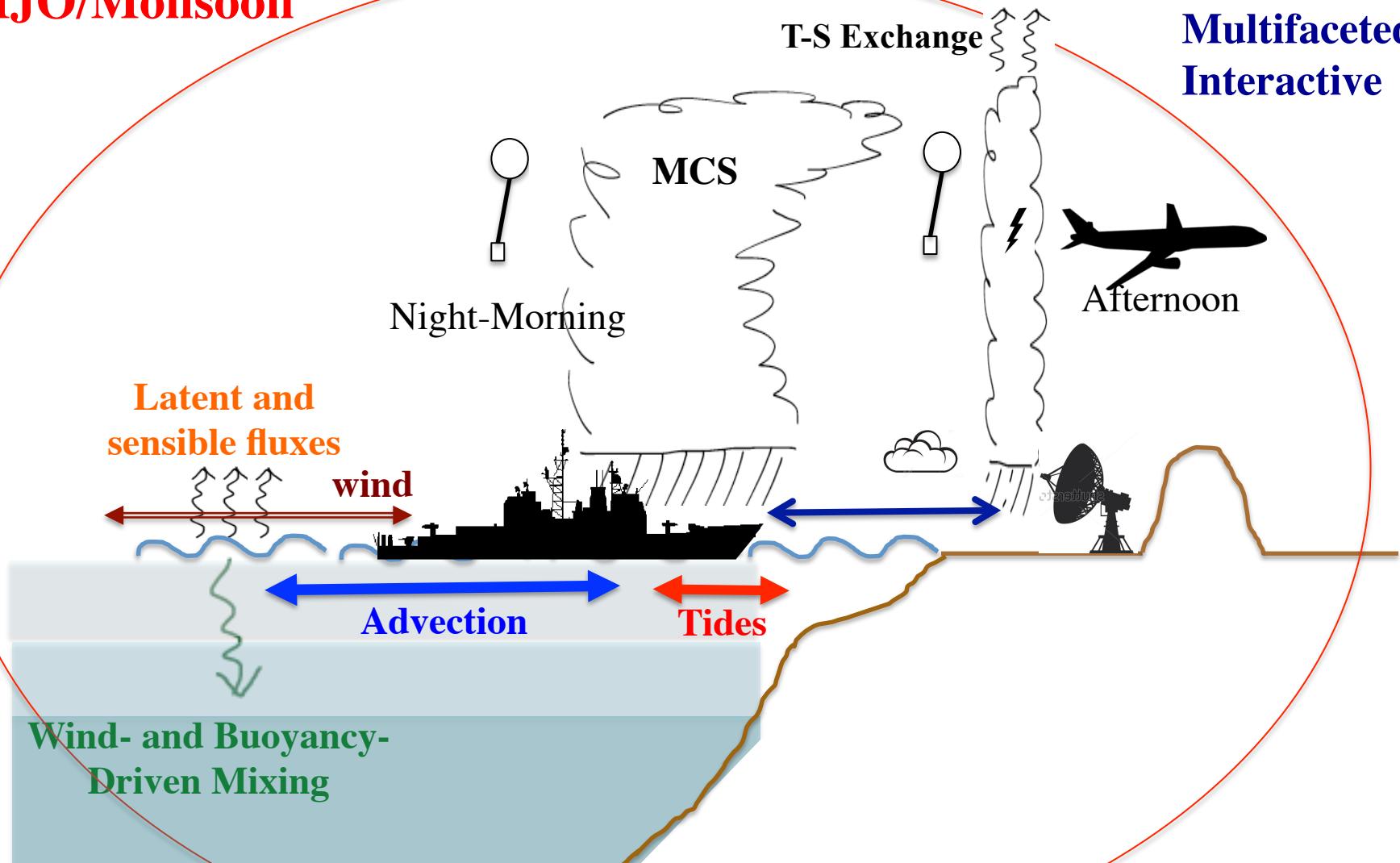
Field Facilities: research vessels (7 – 9), airplanes (7), ground observation sites (5 – 7), scanning radars (12), soundings, drifting balloons (2), UAVs (6), surface towers (≥ 5), profilers, lidars, oceanic autonomous devices and moorings, etc.

Websites: <http://www.bmkg.go.id/ymc/>; <http://www.jamstec.go.jp/ymc/>

YMC: How?

MJO/Monsoon

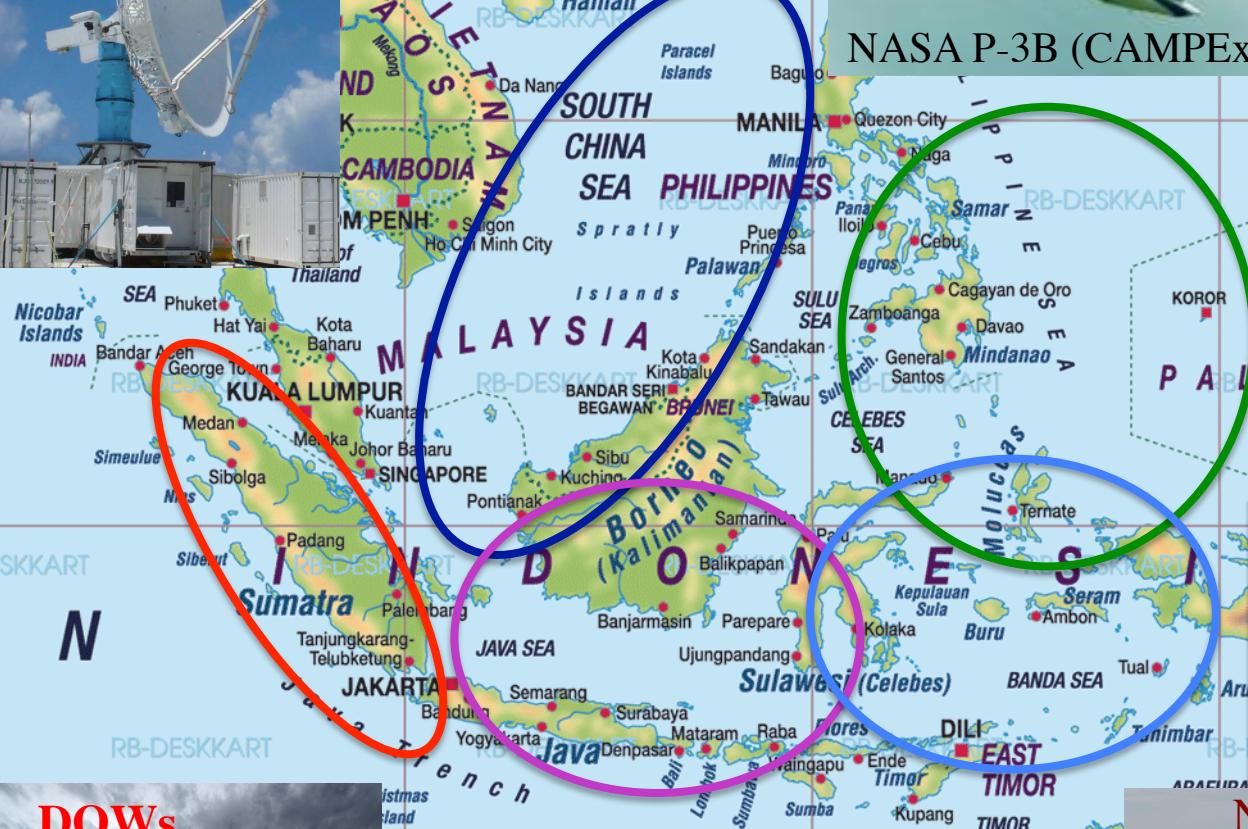
Multi-scale
Multifaceted
Interactive



YMC: Where?

YMC Focused Observing Areas

S-Polka



DOWs



105°

SIO UAS



NCAR C-130



GLOBAL AVIATION

DRAG SCREEN
ALTIMETER

MODULAR MICROSTRUCTURE PROFILER (MMP)

GREGG/MILLER - APL/UW



Chameleon

