

## **US YMC Workshop**

**May 27-29, NCAR/EOL, Boulder, CO**

### **Summary**

The workshop was held for the following purposes:

- (1) Introduce the international YMC Science Plan and potential field observations,
- (2) Discuss YMC science foci for US participations,
- (3) Discuss collaboration and coordination among US YMC participants and other collaborative opportunities,
- (4) Discuss international collaboration and coordination,
- (5) Introduce procedures of applications for permits of conducting research in Indonesia,
- (6) Plan for future actions.

There were 41 registered participants (Appendix A) plus several others who called in and sat in. The workshop included 26 presentations and discussions (see Appendix B for the agenda). The main outcomes of the workshop are:

#### **A. Science Issues**

The workshop participants expressed interest in the following YMC science issues:

##### *1. Atmospheric convection*

- (a) Diurnal cycle and its interaction with the MJO and Kelvin waves
- (b) Island and orographic effects on deep convection of the MJO
- (c) MCS initiation, growth, and propagation over land and the ocean
- (d) Cloud microphysics of land and the ocean convection
- (e) Turbulence and entrainment

##### *2. Troposphere-stratosphere interaction*

- (a) Different effects on TTL/UTLS humidity and cirrus cloud by land vs. ocean convection
- (b) Wave and turbulence effects on cold-point temperature
- (c) Gravity wave generation and parameterization
- (d) subseasonal multiscale interaction

##### *3. Aerosol-cloud interaction*

- (a) Basic multi-scale (diurnal, synoptic, intraseasonal and seasonal) fluctuations in aerosol near the surface
- (b) Possible different roles of marine vs. land aerosol as CCN and IN

##### *4. Air-sea-land interaction*

- (a) Contrast between the heat content and surface energy fluxes of land and the ocean
- (b) Local vs. remote (propagating) processes affecting the upper-ocean heat content and SST
- (c) Different basin responses to the MJO
- (d) Atmospherically forced vs. internal oceanic processes affecting the ocean mixed layer and SST
- (e) MJO effect on ITF water properties
- (f) Effect of river runoff on upper-ocean processes
- (g) Soil moisture
- (h) Role of the land/sea breeze

*5. Oceanic processes*

- (a) Mixed-layer properties and processes of the Indonesian Seas
- (b) Processes in deep vs. shallow waters
- (c) Near-surface inertial waves vs. internal tides

*6. Modeling*

- (a) Numerical isolation of effects of the diurnal cycle and islands
- (b) Coordinated numerical simulations by regional cloud-permitting models and global climate and NWP models
- (c) High-resolution data assimilation
- (d) Idealized process models
- (e) Validation datasets for cloud-resolving models

**B. Planned/desirable US participation in the YMC field campaign**

Table 1 lists YMC field observations proposed or to be proposed by the workshop participants.

Table 1 Planned/desirable US field observations during YMC\*

Objective	Instruments	Lead PI (Institute)	Funding Agency	Time and Location
Multi-scale convective interaction	AMF-1, ARM mobile C-band scanning radar, NOAA S-band Doppler profiler	Chidong Zhang (U Miami)	DOE	August 2018- July 2019; Indonesia
Convective diurnal cycle, troposphere-stratosphere interaction	S-Polka, ISS, DOWs, ISFS	Courtney Schumacher (TAMU)	NSF	Two months in October 2018 – February 2019; Indonesia
Cloud microphysics, air-sea	C-130	Shuyi Chen (U Miami) and Andrew	NSF	Six weeks in October 2018 – February 2019;

interaction		Heymsfield (NCAR)		Location TBD
Upper-ocean mixing	Autonomous devices, moorings, and ships	Ren-Chieh Lien (U Wash), James Moum (OSU), Matthew Alford (SIO), Janet Sprintall (ISO); Arnold Gordon (Columbia U)	NSF	2017 – 2019, Java Sea, Banda Sea
Boundary layer – troposphere – stratosphere interaction	flux towers, microwave radiometers, rain gauges, Doppler lidars, Sodar/ RASS systems, ceilometers, surface met, radiosondes	Harindra Fernando (U Notre Dame)	NSF, ONR	TBD (current contacts: Seychelles, Sri Lanka, Singapore, Maldives, Malaysia and Thailand)
Transition of MJO convection across Sumatra	SeaGliders, MPL lidar, radiosondes	Piotr Flatau (SIO)	TBD	Sumatra, Karlmata Strait
Cloud evolution	microwave profiler, laser disdrometer, all-sky camera, rain gauge, ceilometer	Jerome Schmidt (NRL)	ONR	TBD

\*Contributions from ONR PISTON DRI, NASA AERONET, MPLNET, and the NASA CAMPEX field campaign are not included.

### C. Other Issues

1. Workshop participants noticed the following upcoming events related to YMC:

- 2<sup>nd</sup> US CLIVAR YMC briefing, July 6, 2015
- Possible briefing of US participation in YMC to NSF and other US funding agencies (e.g. ONR, DOE, NOAA, NASA), early August 2015
- PISTON (ONR) PI meeting, late 2015
- International YMC Implementation Plan Workshop, 24-27 Nov 2015, Jakarta Indonesia
- NSF/NCAR facility request, LOI due November 2015; proposal due January 2016

2. A US YMC Science Committee: It was recommended that such a committee might be formed once its need is clearly identified. Meanwhile, a US YMC Science Team,

consisting of current PIs of YMC proposals to US funding agencies, will be formed to coordinate among US YMC activities and with the international YMC community.

3. A US YMC website. There are currently two YMC websites: the BMKG YMC website (<http://www.bmkg.go.id/ymc/>), which is the designated official YMC website, and the JAMSTEC YMC website (<http://www.jamstec.go.jp/ymc/>). NCAR EOL will explore the feasibility of hosting a US YMC website as a venue to facilitate communication among US YMC participants, funding agencies, and other interested parties, and to make YMC visible to the general public.

4. A US YMC white paper. The international YMC Science Plan (available from the BMKG YMC website) covers scientific issues related to the Maritime Continent. These issues are broader than those to be studied by US YMC participants. It was decided that a white paper is needed to summarize YMC science issues to be addressed by US YMC participants through field observations and modeling activities. It is desirable to have such a white paper written before the July 6 YMC briefing to US CLIVAR. A group of people were identified who will draft the white paper.

The white paper should be kept short (<5 pages plus appendices) and content should address the following questions:

- What are you trying to learn?
- Define the scope of the project
- Rough order of magnitude on costs for the project facilities deployment and science research
- Why do this research now?
- Overview of international collaboration

5. Shipborne observations. The workshop participants welcome opportunities of using Indonesian research vessels to conduct oceanographic observations in the Indonesian Seas and were encouraged by the possibility of also using foreign ships in the Indonesian region (e.g., NOAA R/V *Okeanos Explorer* in the first joint Indonesia-USA ocean exploration expedition in the Sangihe Talaud region, June – August 2010; Schmidt Ocean Institute R/V *Falkor* in the Mentawai Gap-Tsunami Earthquake Risk Assessment of the Sumatra-Andaman subduction zone from late May to late June, 2015; JAMSTEC R/V *Mirai* in a pilot study of YMC in the Indonesian territory water in November 2015). The workshop participants are interested in the processes of research permit applications and the outcome of these expeditions.

6. The Year of Polar Prediction (YOPP). This international program will overlap in time with YMC. The two projects may share the same real-time analysis data from ECMWF. Identifying scientific issues that connect the tropics and polar regions would benefit both projects.

7. Regional data: In addition to regional observing networks of weather radars, radiosondes, rain gauges, surface meteorological observations, the following data are desirable:

- lightning
- high-resolution operational sounding data
- stream flow and river discharge
- soil moisture and temperature
- ocean and land surface fluxes
- validation datasets from cloud resolving models

Sources for these data have yet to be identified.

8. The workshop presentations will be posted at the International YMC website (<http://www.bmkg.go.id/ymc/>) and are temporarily available from <https://www.dropbox.com/sh/dfs0zrp2r516xfp/AACUfG3zfB7jgNphof704rjua?dl=0>

9. YMC timeline. A diagram illustrating the time and locations of the multiple international field projects would facilitate collaborations within YMC.

10. YMC soundings. A regional sounding network needs to be designed to include WMO and national operational sites, long-term observatories and research stations. Uniform data quality control is needed to produce research quality sounding data.

11. US YMC Project Office and Data Archive. Considering the complex logistics for facility deployment in the Maritime Continent region and the desire of the Indonesian YMC consortium to have a single contact point to international YMC participations, it is necessary to establish a US YMC Project Office that represents US participations in the YMC field campaign to the regional governments. Its membership and source of support should be decided once the funded US field projects become known. Meanwhile, a US YMC Data Archive Center is needed to collect, store, and distribute field and other YMC data, and ensure YMC field observations will be available in real time to operational centers. Post-field data analysis will heavily depend upon the success of this Data Archive Center.

## **Appendix A Registered Participants**

Matthew Alford (SIO)  
Joan Alexander (NWRA)  
Darek Baranowski (JPL)  
James Benedict (LBL)  
Bill Brown (NCAR)  
Shuyi Chen (U Miami)  
Sue Chen (NRL)  
Paul Ciesielski (CSU)  
Scott Collis (ANL)  
Charlotte DeMott (SCU)  
Kyla Drushka (U Wash)  
Tim Dunkerton (NWRA)  
James Edson (U Conn)  
Scott Ellis (NCAR)  
Chris Fairall (ESRL)  
Harindra Fernando (U Notre Dame)  
Piotr Flatau (SIO)  
Scott Harper (ONR)  
Andrew Heymsfield (NCAR)  
Ji-Eun Kim (NWRA)  
Richard Lataitis (ESRL)  
Ren-Chieh Lien (U Wash)  
Mitch Moncrieff (NCAR)  
Jim Moore (NCAR)  
Jim Moum (OSU)  
Asmi Napitu (Columbia U)  
Kandaga Pujiana (OSU)  
Julie Pullen (Stevens Inst)  
Emily Riley (CSU)  
Steve Rutledge (CSU)  
Courtney Schumacher (TAMU)  
Hyodae Seo (WHOI)  
Adam Sobel (Columbia U)  
Hui Su (JPL)  
Violeta Toma (George Tech)  
Aaron Wang (ESRL)  
Peter Webster (Georgia Tech)  
Steve Williams (NCAR/EOL)  
Satoru Yokoi (JAMSTEC)  
Kunio Yoneyama (JAMSTEC)  
Chidong Zhang (U Miami)

## **Appendix B Agenda**

### **Wednesday, May 27**

#### Morning: Background Briefing (08:30-12:30)

Jim Moore: Greeting, workshop logistics

Vanda Grubisic: EOL Director Welcome

Chidong Zhang: YMC Overview

#### Break 10:30 – 11:00

Peter Webster: A New Monsoon Paradigm and Thoughts on the Years of the Maritime Continent (YMC)

Mitch Moncrieff: Virtual Global Field Campaigns

Steve Rutledge: Previous MC Campaigns

#### Lunch: 12:30 – 13:30

#### Afternoon: Atmospheric Convection, Aerosol, Troposphere – Stratosphere Interaction (13:30 -17:45)

Adam Sobel: MJO, Diurnal Cycle, and Orographic Rain in the MC

Julie Pullen: Multi-Scale Influences on Extreme Winter Rainfall in the Philippines

Dariusz Baranowski: Interaction of Kelvin waves with Maritime Continent convection

Courtney Schumacher (for Chuntao Liu): Climatology of Cloud and Precipitation over the Maritime Continent Region

#### Break: 15:30 – 16:00

Sue Chen: Interaction of the Diurnal and Intraseasonal Variability over the Maritime Continent

Joan Alexander: Troposphere-Stratosphere Wave Coupling Issues in the Maritime Continent and the STRATEOLE-2 Field Campaign

Chidong Zhang: Aerosol issues

Chidong Zhang (for Samson Hagos): Role of the Diurnal Cycle in Maritime Continent Rainfall and the MJO

#### Reception: 18:00 – 19:30

### **Thursday, May 28**

Morning: Planned and Proposed US and Japan Land and Airborne Observations (08:30-12:30)

Shuyi Chen: YMC-NCAR Aircraft Mission Objectives

Andy Heymsfield: Thoughts on Cloud Physics Observations and Goals

Courtney Schumacher: YMC NSF\_ground

*Break: 10:30 – 11:00*

Harindra Fernando: ASIRI- RAWI Remote Sensing of Atmospheric Waves and Instabilities

Satoru Yokoi: YMC Field Campaigns of the Japanese Group

Chidong Zhang: YMC-ARM Proposal

Jim Moore: Possible Activities for a YMC Project Office

*Lunch: 12:30 – 13:30*

Afternoon: Ocean and air-sea interaction (13:30 – 18:00)

Steve Williams: Data Management Considerations for YMC

Kandaga Pujiana: Ocean Processes and Air-Sea Interaction in the Indonesian Seas

Jim Moum: Ocean-induced cooling can control SST - a critical atmospheric boundary condition: equatorial effects and MJO, equatorial cold tongue of the Pacific, MJO in the equatorial Indian Ocean

Matthew Alford: Ocean mixing in the tropics by tidal and near-inertial internal waves: observations and importance

*Break: 15:30 – 16:00*

Ren-Chieh Lien: Proposed YMC Observations in Indonesian Seas and 2015 Pilot Experiment

Hyodae Seo: Diurnal SST and Diurnal Rainfall in the Maritime Continent

Kunio Yoneyama: Possible Additional Contributions to YMC from JAMSTEC Relevant Oceanic Program

**Friday, May 29**

Morning: Discussion (09:00 – 12:00)