SUMMARY

The 3rd International Science and Planning Workshop on YMC
Bangi, Malaysia, March 14-16, 2017

The third international YMC workshop was held in March 14-16, 2017 at the National University of Malaysia (UKM) in Bangi, Malaysia. It was hosted by the UKM and MetMalaysia. The main objectives of this workshop are to coordinate observations and modeling activities based on the review of the current status, and then determine the content to draft a YMC Implementation Plan. About 80 people from 13 countries and regions attended the workshop. The workshop agenda is given in Appendix A, while the participants list is given in Appendix B.

The workshop started with reviews the progress since the second workshop in Jakarta, November 2015, as a plenary session on the first day. They included the actual plans for already funded programs of observations and modeling studies, newly proposed intensive observations and modeling studies, current status of the long-term measurements done by the local operational agencies as well as international science teams. In addition, activities of the relevant projects were also presented to seek for a synergy to leverage resources and to obtain common goals. In the following day, detailed discussions were made as breakout sessions focusing on specific topics with smaller groups. The breakout sessions consist of two regimes; locations (northern, central, and southern MC regions) and methods (observations, modeling, and prediction/data assimilation). In the last day, after we confirmed the YMC data policy and its management procedure, we discussed how to sum up an implementation plan and listed the action items by designating the responsible persons and topics. These are summarized below and basic information about Intensive Observation Periods (IOPs) is listed in Appendix C.

1. Funded and Proposed Projects for Intensive Observations during the YMC

The first intensive observation over the MC region will be conducted by the joint effort of Japanese and Indonesian groups from mid-November 2017 to mid-January 2018, in the western Sumatra Island, Indonesia. This campaign, which will be led by JAMSTEC, BMKG, and BPPT, aims at understanding the diurnal cycle convection, behavior/modulation of large-scale circulation such as the MJO, and their interaction by deploying land-based observational site, ship, buoys, and UAVs. Similar observation is planned in the following year (November - December 2018) by the Australian group using their research vessel Investigator. Their ship-time allocation decision will be known within a month or so. Close relation with the Indonesian agencies is crucial to establish the sounding and radar network with the R/V Investigator and to obtain a research permit. In case it is not allowed to obtain a research permit within the Indonesian EEZ and territorial waters, their observational site will be moved to the north coast of Australia (near Warrumi or Weipa), where weather radars are operated, so that they can study the same target except the location. It is possible for non-Australian scientists to get on-board by contacting the Australian Bureau of Meteorology.

In the boreal summer in 2018, several intensive observations focusing on the monsoon and BSISO will be conducted from the SCS to the western Pacific region. U.S. ONR's PISTON (Propagation of Intra-Seasonal Tropical Oscillations) project will conduct a field campaign in July - September 2018 by deploying a ship and several moorings off the west coast of the Philippines. To understand multi-scale, air-sea-land interactions which regulate BSISO propagation and intensity, radars, enhanced sounding, ocean surface turbulence, and others will

be intensively conducted. They collaborate with other projects such as U.S. NASA's project CAMP^{2}Ex, which will operate aircraft over the SCS, and JAMSTEC-PAGASA collaborative work, which plans to enhance the radiosonde soundings at Laoag in the same period. JAMSTEC also plans to enhance the observations at their land-based site in the Palau Islands. Possible contribution from French colleagues using balloon-borne system "aeroclipper", which measures surface meteorology, was also indicated. PISTON project has several model components. For example, two-way-coupled air-ocean-wave model COAMPS will provide real-time 3-day forecast during the campaign. Dry run in summer 2017 is also planned.

SCSTIMX (SCS Two-Island Monsoon Experiment) is a monsoon study project by the Taiwanese groups, that will conduct the intensive observations using aircraft, ship, moorings, and land-based site in the boreal early summer (May-June 2018) and winter (December 2018 - January 2019) to study the interaction between convection and large-scale flow. At land-based sites, they will conduct observations of surface meteorology, wind profilers, and radiosonde soundings as extended observation period from July 2018 to February 2019. Several pilot studies had been conducted over the SCS since 2016 and succeeded to obtain various data.

Oceanic observations in the eastern Indian Ocean will be conducted using a new research vessel by the FIO, China during December 2017 - February 2018. During this cruise CTD/water sampling as well as buoy recovery/deployment will be conducted as part of IIOE-2 program.

In addition to above-mentioned funded projects, the progresses of two pending projects were reported. First one is from UK. Recently, UK research consortium has decided to resubmit a new project TerraMaris, whose field campaign conducts observations using aircraft, sea-glider, and two land-based sites in the south of Java, Indonesia. Their main target is to elucidate diurnal cycle of convection. They also perform several regional/global models. Their proposal submission due is soon and funding decision will be made in the early 2018. Its IOP will be from November 2019 to February 2020. Second one is from U.S. (NOAA and DOE). There is a plan to launch unmanned aircraft vehicle from a ship for PISTON in July - August 2018 or for the measurement in the Indonesian inland seas in April - May 2018. In addition, a proposal to deploy surface radiation package in Pontianak, Borneo Island has been submitted.

2. Current Observation Network in the MC

Surface meteorology including rain gauge, radiosonde soundings, and scanning weather radars are the fundamental and important observations to capture basic atmospheric conditions. During the WS, the current operational status for these observations was provided by BMKG (Indonesia), PAGASA (Philippines), and MetMalaysia (Malaysia).

BMKG, who hosts the official YMC web site and will take a responsibility of one of data archive centers, has formed the secretariat office. Currently they operate 120 synoptic stations, 3 GAW stations, 178 AWSs, 21 agromet stations, 22 radiosonde sounding stations, 36/4 C-/X-band Doppler radars, and so on. Those data will be available through the YMC data archive sites. BMKG has developed a centralized system and have paid a special attention to the data stream from collection, archiving, quality control, analysis, to dissemination. In particular quality control for weather radars is one of reinforced components since 2015. To improve the current system, collaborative effort through the YMC is highly expected.

As for the Philippines, PAGASA is a responsible agency for operational weather data. For example, they have 59 synoptic stations, 25 agromet stations, 9 radiosonde sounding stations, 158 AWSs, 187 ARGs, and 11 Doppler radars in operation. In addition, they deploy two meteorological buoys within inland seas and operate four high frequency coastal Doppler radar along the west coast. In addition to these routine observations by PAGASA, University of

Philippines has recently initiated the new project SALICA (Sea-Air-Land Interactions in the Context of Archipelago) to improve rainfall prediction based on collaborative observations and modeling studies. Their targeting period will be the boreal summer of 2018 in conjunction with PISTON, and there might be possible to use local research vessels.

MetMalaysia also maintains a huge observational network which covers both Malay Peninsula and Borneo Island. They have 42 principal weather stations, 394 auxiliary weather stations, 12 weather radars, 10 radiosonde stations, and 4 marine (ADCPs) observation stations. Data taken by these systems are centralized and archived.

From this WS, a new contribution from Thailand was added to the YMC. Weather stations over the Thailand are maintained by several agencies (NARIT, Thai Meteorological Department, Pollution Control Department, etc.). It is possible to develop a new collaboration through the YMC. For example, NARIT's mobile lidar can be a tool for collaborative work under the framework of the YMC by focusing on the specific topic.

In addition to above-mentioned observation network operated by the MC local agencies, U.S. NASA has been conducting measurement over the MC region over 15 years and provides the YMC community with useful data sets as well as knowledge on collaboration with MC countries. AERONET (AErosol RObotic NETwork; http://aeronet.gsfc.nasa.gov/) is a ground-based remote sensing aerosol network, and MPLNET (Micro-Pulse Lidar NETwork; http://mplnet.gsfc.nasa.gov/) is designed to measure aerosol, cloud vertical structure, and boundary layer heights. Both provide data via their web sites, and their new data products (ver. 3) are released for AERONET and will be released for MPLNET soon. NASA also introduced their mobile platforms SMARTLabs (Surface-based Mobile Atmospheric Research and Testbed Laboratories; http://smartlabs.gsfc.nasa.gov/).

3. Newly Proposed Contributions to the YMC

Several new projects that had not been reported at the second WS have been introduced.

Rutgers University has been conducting glider/model validation mission in the Indian Ocean as their Challenger project and internationally as IIOE-2 (Second International Indian Ocean Expedition), and their data is available through IMOS (Integrated Marine Observing System), IOOS (Integrated Ocean Observing System), and GTS (Global Telecommunication System). They measure ocean temperature and salinity from the surface to 1000-m depth. In addition, Rutgers University offers the opportunity for education about oceanic observations including data quality control, as well as modeling knowledge.

Korean contributions to the YMC were also introduced by KIOST and Pusan National University. KIOST will start 5-year project using a ship, moorings, and drifters to study ocean currents (Mindanao current, North Equatorial Current, etc.) and air-sea interaction in the western Pacific. On the one hand, PNU plans to study the MJO using cloud-permitting regional model. In particular, their interests are to understand the role of aerosol-cloud interaction in the MJO development and propagation mechanism, and to elucidate the mechanism of teleconnection in response to the MJO.

Two new projects whose target area contains Malaysia were introduced. Under the umbrella of China-Malaysia cooperation on marine research, their joint committee approved research projects which will be jointly funded by MOSTI (Malaysia) and SOA (China). In particular, University of Malaya and FIO have already set-up a joint center at Bachok marine research station operated by UM in the northern coast of Malay Peninsula. They have started surface meteorological observation, and have deployed a buoy in the SCS under this framework. Their main targets are extreme weather events associated with the multi-scale climate variability

such as cold surge, MJO, and monsoon, and their impact onto the marine environment and ecosystem in the SCS. Another new one is U.S. NASA's CMC (Convective Heartbeat of weather-climate processes over the MC) project. Its main target is to elucidate the MC barrier effect on the MJO. Since diurnal cycle and its relation to the MJO are key components to be studied, combination of aircraft and land-based observations are crucial to reveal their mechanism. Currently, three successive deployments of aircraft in November - December period in 2018-2020 is planned and their flight path would be from Malay Peninsula to Borneo Island. Discussion about collaboration with Malaysian scientists from universities and MetMalaysia have been initiated through this WS.

4. Modeling studies

During the above-mentioned field campaigns, numerical experiments will be intensively performed. For example, during the campaign at the west coast of Sumatra in November 2017 - January 2018, two types of forecast run (global 7-/14-km mesh for 14-/30-day forecast) using NICAM will be performed by JAMSTEC, and those data sets will be available via YMC web sites with password restriction for YMC researchers. Australian numerical modeling group also plan to support post-analysis for the Sumatra campaign in particular for 2018. To study convective diurnal cycle, convection-permitting simulations (1.5-4 km grid spacing over 60-days) and cloud-resolving simulations (<1km grid spacing for a few days) will be performed using WRF and UK Met Office Unified models. Model intercomparisons for the same specific events will be conducted to evaluate and improve the skill.

Meteo-France plans to conduct several weather and climate model runs for the YMC. For weather prediction, NWP global model (ARPEGE) and cloud resolving model (AROME) will be run. Meteo-France also intends to improve their CNRM climate model through the YMC in collaboration with field campaigns. For this purpose, they are ready to join the coordinated forecasting intercomparison. For example, Meteo-France can visualize their output to compare their result with observations, operational center analyses, and so on.

Meteorological Service Singapore's SINGV (Singapore Variable resolution model) project is designed to develop the NWP and nowcasting capability for Singapore in collaboration with the UK Met Office. SINGV Data Assimilation can assimilate conventional observations, satellite radiances, and radar data. It facilitates for the MC local agencies to perform intercomparison of data assimilation incorporating radar data into each regional models.

5. Relevant Projects

During the WS, the latest information about two tightly relevant projects was updated.

Recently SPARC (Stratosphere-troposphere Processes And their Role in Climate) project approved to initiate an emerging activity SATIO-TCS (Stratospheric and tropospheric influences on tropical convective systems). For example, recent reports that showed the QBO modulates the MJO activity are scientific background for this activity. Kick-off meeting will be held in the coming October 2017 in Kyoto, Japan.

S2S and MJO Task Force conduct a joint research project on the MJO and MC interaction. Their main activities are to understand the processes governing the propagation of the MJO through the MC, to quantify the sub-seasonal predictability, and to evaluate the skill of operational systems. S2S database is also useful for the YMC community.

6. Breakout Sessions

Based on the review of the current status and future possible plans, discussion was made by two approaches; location and method. As for the location (northern, central, and southern MC regions), we discussed about 1) common scientific issues, 2) opportunities of collaboration and coordination, 3) modeling-observation integration, and 4) data availability and gaps. On the other hand, data exchange is also discussed in addition to the same first two topics of location-session at the methodology sessions (observations, modeling, and prediction & data assimilation).

Below indicates only specific topics discussed at each session. In general, while a strong support including data provision from the local operational agencies is expected, a formal documentation is necessary to avoid any risks.

Breakout Session-1

Northern MC: Possible collaboration between SCSTIMX and PISTON.

Central MC: Possibilities of enhanced soundings at Klang Valley during SW and NE monsoon, and at Bachok in a surge event. Possible collaboration of land-based observations along the equator. Necessity of ocean measurement nearby Malaysia.

Southern MC: To conduct observations in the Indonesian region, a formal partnership with MoU is required in advance. Near-real time data provision from BMKG will basically be done via their web site and/or special ftp site.

Breakout Session-2

Observations: A detailed list of observation items is required to consider special analyses and/or observation coordination. While data archive centers will be established at both BMKG and JAMSTEC, some agencies may not be able to provide all data directly in those centers. In such a case, a link with inventory information from these centers should be established. In addition to basic data sets (surface meteorology, radiosonde soundings, and weather radars) from local operational agencies, information about soil condition (temperature, moisture) is a key to study convection over the MC region.

Modeling: Scale interaction is a key to understand weather and climate systems over the MC. Coordination to overlap calculation period is required. Modelers agreed to share their data for intercomparison. Provision of a list of simulations and datasets are inevitable to kick-off this collaboration. For example, it is very helpful to produce a small set of standard plots using the same color scales. Appropriate metrics and variable should be prepared.

Prediction and Data Assimilation: Intercomparison of data assimilation is planned among participants (BMKG, MSS, NRL, MetMalaysia, BOM), and they request attendance from UK Met office and Meteo-France, and others. They need a repository, so that participants can access stored model output.

7. Outline of the YMC Implementation Plan

It was agreed to sum up an implementation plan document based on the discussion results obtained through this workshop as follows.

Summary

1. Introduction (Kunio Yoneyama)
   (Summary of the YMC Science Plan)
2. Regional Observing Networks (Kunio Yoneyama)
   - soundings

- radars
- surface meteorology
- raingauges
- aerosol
- buoys/moorings/marine stations
- river discharge
- land surface data?

3. Intensive Observations Periods (IOPs) (Chidong Zhang, Kunio Yoneyama)
   Summary Table, brief descriptions
   Details in Appendix A
4. Data Assimilation (Hans Huang)
5. Modeling (Todd Lane)
   Summary Table, brief descriptions
   Details in Appendix B
6. Prediction products (Erwin Makmur)
   Summary Table, brief descriptions
   Details in Appendix C
7. Data Management/Archive (Kunio Yoneyama)
8. Outreach, capacity building, education (Fredolin Tangang)
9. Synergy (Chidong Zhang)
   - S2S (Steve Woolnough)
   - MJO Task Force (Steve Woolnough)
   - Strateole (Jean-Philippe Duvel)
   - 7SEAS (Jeff Reid)
   - CORDEX-SEA (Fredolin Tangang)
   - TOPS2020 (Chdong Zhang)
   - IIOE-2 (Chidong Zhang)
   - SPARC (Shigeo Yoden)
   - MSIOP-BoB (Maria Flatau)
   - InaPRIMA (Nelly Florida Riama)
   - OFS (Fredolin Tangang)

Appendix A Details Description of IOPs
   (up to five pages for each group/institute/project/)
   - JAMSTEC (Kunio Yoneyama)
   - BOM (Matthew Wheeler)
   - TerraMaris (Adrian Matthews)
   - FIO/MOMSEI (Weidong Yu)
   - SCSTIMX (Chung-Hsiung Sui)
   - PISTON/SALICA (Sue Chen, Olivia Cabrera)
   - CAMP^{2}Ex (Jeff Reid)
   - SCSIO (Dongxiao Wang)
   - KIOST (Jae Hak Lee)
   - IAP (Jian Ling)
   - EVS-CMC (Shuyi Chen)
   - ELO (Piotr Flatau)

Appendix B Detailed Description of Modeling (Todd Lane)
(up to five pages for each group/institute/project/)
Appendix C Detailed Description of Prediction Products (Erwin Makmur)
(up to five pages for each group/institute/project/)
Appendix D List of Contributors

8. Action Items

At the end of the WS, we confirmed action items as below.

1. Send mailing list of the workshop participants (Fredolin Tangang)
2. Implementation Plan (everyone)
3. Training on radar data processing and application by TWB (Chung Hsiung Sui, Mohd Hisham Mohd Anip, Urip Haryoko)
4. Training workshop at APPC on MC weather-climate prediction and analysis (Chidong Zhang)
5. Contact EC for YMC special analysis data (Chidong Zhang)
6. Confirm GTS data transfer status: format (BURF), WMO ID, etc. (Kunio Yoneyama)
7. Inform operation centers of special GTS data streams (Kunio Yoneyama, Chidong Zhang)
8. Letter to MetMalaysia with specific information of data requirement to support YMC (Kunio Yoneyama, Chidong Zhang)
9. Archive original high-resolution radiosonde data (BMKG, MetMalaysia, PAGASA, MSS)
10. Explore UK funding for international acitvities (Steve Woolnough)
11. Seek possibility of hosting prediction products at BMKG (Urip Haryoko)
12. Modeling group synergy – e.g., standard diagnostic metrics and plots, list of simulations (Todd Lane)
13. Form working groups (upon request): Modeling, prediction evaluation, radar data, GTS transfer, data management, etc.
14. Decide on the next YMC workshop (2018): brief on the first three IOPs (JAMSTEC, SCSTIMX, PISTON), progress in data archive, modeling coordination, GTS data status, field observations, targeted prediction demonstration projects, etc. (Esperanza Cayanan, Olivia Cabrera, Gemma Narisma)
15. Pursue the following topics as possible collaborative projects:
    a. Regional radar mosaic
    b. Prediction improvement demonstration using Singapore model (SINGV): assimilation of radar data from Malay Peninsula and Sumatra
16. Recognize the following data gaps, and seek for solution (everyone).
    a. eastern MC
    b. IOP in Malaysia
    c. Indonesian Seas

Appendix - A

Third International Science and Planning Workshop on Years of the Maritime Continent

Agenda

Date : Tuesday, March 14 - Thursday, March 16, 2017
(Side event : Monday, March 13, 2017)

Venue : The National University of Malaysia (UKM), Bangi, Selangor, MALAYSIA.

International Organizing Committee :

Fredolin Tangang (UKM, Malaysia) ... Chair
Kunio Yoneyama (JAMSTEC, Japan) ... Co-Chair
Chidong Zhang (NOAA/PMEL, US)

Local Organizing Committee :

Fredolin Tangang (UKM) ... Chair
Marlia Mohd Hanafiah (UKM) ... Depuy Chair
Ambun Dindang (MetMalaysia)
Mohd Hanafy Gausmian (UKM)
Asamuddin Abu Hassan (UKM)
Nunul Safaniza Che Asri (UKM)

Purposes :

a) Coordination among observations/modeling.
b) Summing up Implemening plan document.
c) Discussion about the interaction between MC countries and others.
d) Determine data management procedures.

Disclaimer :

This workshop was designed to discuss for science purposes only. All toponyms or geographical nomenclature found in the presentation files are soley the view of the authors and do not necessarily represent that of the all workshop participants nor the YMC community.

Program :

Day-0: Monday, March 13

09:00 - 12:30 Side event
Special Lectures by
Dr. Chidong Zhang (NOAA/PMEL)
"Maritime Continent: Its importance to global weather-climate and its challenge to regional prediction"
Dr. Fredolin Tangang (UKM)
"From floods to droughts in Malaysia and Maritime Continent: Roles of intra-seasonal to inter-annual modes of variability and complex regional ocean-atmosphere interactions"
Dr. Sue Chen (NRL)
"Prediction barrier of Maritime Continent"

Dr. Mohd Hisham Mohd Anip (MetMalaysia)
"MetMalaysia operation in weather and climate monitoring and forecasting: Progress, gaps and challenges"

Day-1: Tuesday, March 14

08:30 - 09:00 Registration
09:00 - 09:30 Opening Remarks
09:30 - 09:50 Photo Session & Coffee Break
09:50 - 11:20 Session-1 Review of Progress since the 2nd WS
- Funded or previously proposed Intensive Observations -
11:20 - 12:20 Session-2 Review of Progress since the 2nd WS
- National Reports & Modeling Activities -
12:20 - 13:50 Lunch
13:50 - 15:20 Session-3 Review of Current Observations in the MC Region
15:20 - 15:40 Coffee Break
15:40 - 16:40 Session-4 New Proposals of IOs and Modeling Activities
16:40 - 17:10 Session-5 Synergy with Relevant Projects

Day-2: Wednesday, March 15

09:00 - 09:45 Session-6 Self Introduction
09:45 - 10:15 Session-7 Open Q & A (including Day-1 session content)
10:15 - 10:30 Session-8 Discussion on Breakout Session Topics
10:30 - 11:00 Coffee Break
11:00 - 12:30 Session-9 Breakout Session - 1 (Location)
Topic-1 Northern MC
Topic-2 Central MC
Topic-3 Southern MC
12:30 - 13:30 Lunch
13:30 - 14:15 Session-10 Reports from Breakout Session - 1
14:15 - 16:15 Session-11 Breakout Session - 2 (Method)
Topic-1 Observations
Topic-2 Modeling
Topic-3 Prediction & Data Assimilation
16:15 - 17:45 Session-12 Reports from Breakout Session - 2

Day-3: Thursday, March 16

09:00 - 10:00 Session-13 Data Management
10:00 - 11:00 Session-14 Implementation Plan
11:00 - 11:30 Coffee Break
11:30 - 12:30 Session-15 Wrap-up [Action Items]
12:30 - 13:30 Lunch
13:30 - 14:30 Session-16 Free Discussion
14:30 Adjourn

Appendix - B

Participants

Todd Lane (University of Melbourne)
Alain Protat (BoM)
Yue Fang (FIO)
Baochao Liu (FIO)
Lin Liu (FIO)
Guang Yang (FIO)
Hongli Ren (CMA)
Peiqun Zhang (CMA)
Romain Roehrig (Met France)
Abdul Hamid (BMKG)
Dava Amrina (BMKG)
Donaldi Sukma Permana (BMKG)
Erwin Makmur (BMKG)
Nurhayati (BMKG)
Riris Adriyanto (BMKG)
Urip Haryoko (BMKG)
Tomoki Miyakawa (University of Tokyo)
Chia-Rui Ong (University of Tokyo)
Tetsuya Takemi (Kyoto University)
Shigeo Yoden (Kyoto University)
Qoosaku Moteki (JAMSTEC)
Tomoe Nasuno (JAMSTEC)
Satoru Yokoi (JAMSTEC)
Kunio Yoneyama (JAMSTEC)
Jae Hak Lee (KIOST)
Kyong-Hwan Seo (Pusan National University)
Jin-Ho Choi (Pusan National University)
Mohd Hisham Mohd Anip (MetMalaysia)
Lim Ze Hui (MetMalaysia)
Lucia Enggong (MetMalaysia)
Ambun Dindang (MetMalaysia)
Fatimah Zaharah Bt. Saleh (MetMalaysia)
Fadila Jasmin Bt. Fakaruddin (MetMalaysia)
Mimi Adilla Sarmani (MetMalaysia)
Mohammad Arif Adenan (MetMalaysia)
Mohd Azizi bin Mat Taib (MetMalaysia)
Shamshunar Shuhani (MetMalaysia)
Nursyarafina Shafie (MetMalaysia)
Wan Maisarah (MetMalaysia)
Dayang Norazila Awang Bima (MetMalaysia)
Azizan Abu Samah (University of Malaya)
Sheeba Nettukandy Chenoli (University of Malaya)
Fredolin Tangang (UKM)
Marlia Mohd Hanafiah (UKM)

Mohd Hanafy Gausmian (UKM)
Chung Jing Xiang (UKM)
Diong Jeong Yik (UKM)
Supari (UKM)
Ngai Shean Tieh (UKM)
Ahmad Fairudz (UKM)
Ester Salimun (UKM)
Esperanza Cayanan (PAGASA)
Olivia Cabrera (University of Philippines)
Charina Lyn A. Repollo (University of Philippines)
Faye Cruz (Manila Observatory)
Gemma Narisma (Ateneo de Manila University / Manila Observatory)
Hans Huang (MSS/CCRS)
Wei-Ting Chen (NTU)
Po-Hsiung Lin (NTU)
Chung-Hsiung Sui (NTU)
Yu-Hung Hsiao (NARLabs)
Yih Yang (NARLabs)
Ronald Macatanagy (NARIT)
Paul Barrett (UK Met Office)
Steven Woolnough (University of Reading)
Dariusz Baranowski (NASA/JPL)
Shuyi S. Chen (University of Miami)
Sue Chen (NRL-Monterey)
Maria Flatau (NRL-Monterey)
Scott Glenn (Rutgers University)
Josh Kohut (Rutgers University)
Laura Pederson (Rutgers University)
Julie Pullen (Stevens Institute of Technology)
Si-Chee Tsay (NASA)
Ellisworth Judd Welton (NASA)
Chidong Zhang (NOAA/PMEL)

Appendix - C

Proposed and planned Intensive Observation Periods (IOPs). Bold indicates funded projects as of March 16, 2017.

Time	Project	Location	YMC Theme/ Objectives	Platform/ Instruments	Contacting PI
2017.10-11	**KIOST**	**W. Pacific**	**Upper Ocean**	**Ship, buoy/soundings**	**Jae Hak Lee**
2017.11-2018.01	**JAMSTEC/ BMKG/ BPPT**	**W. Sumatra**	**Convection/ MJO-Diurnal cycle**	**Ship, land/ Soundings, C-band radar, etc**	**Kunio Yoneyama**
2017.12-2018.02	**FIO**	**E. Indian Ocean**	**Upper Ocean**	**Ship**	**Weidong Yu**
2018.01-12	**FIO**	**E. Indian Ocean**	**Upper Ocean**	**Buoy**	**Weidong Yu**
2018.05	NOAA	Java and Banda Seas	Convection/ Land-sea breezes	Ship, UAV	Chidong Zhang
2018.05-06	**SCSTIMX IOP-1**	**SCS**	**Convection/ Interaction with L-scale circulation**	**Land, buoy, ship, UAV/ soundings, C-/X-band radar**	**Chung-Hsiung Sui**
2018.07-08	**PISTON**	**W. Philippines**	**Convection, upper ocean-airsea interaction/ BSISO, diurnal cycle**	**Ship, buoys/C-band radar, soundings, air-sea fluxes, upper-ocean mixing**	**Jim Moum**
2018.07-08	JAMSTEC/ PAGASA	N. Philipines, Palau	Convection/ BSISO	Soundings	Kunio Yoneyama
2018.07-08	**CAMP^{2}Ex**	**W. Philippines**	**Aerosol/ interaction with cloud**	**Aircraft**	**Jeff Reid**
2018.07-08	Aeroclipper	W. Pacific	Convection/TC	Aeroclipper	Jean-Philippe Duvel
2018.11-12	Investigator	W. Sumatra	Convection/ MJO-Diurnal cycle	Ship/C-band radar, soundings, etc.	Matthew Wheeler
2018.11-2019.02	**Rutgers**	**E. IO**	**Upper Ocean**	**Glider**	**Scott Glenn**
2018.11-2019.02	US-UK	W. Sumatra - Borneo	Convection/ Kelvin waves, diurnal cycle	Sea glider, land, buoy	Piotr Flateau
2018/19/ 20.11-12	EVS-CMC	SCS, Java Sea	Convection/ MJO-Diurnal cycle	Aircraft/dropsonde, Lidar, etc.	Shuyi Chen
2018.12-2019.01	**SCSTIMX IOP-2**	**SCS**	**Convection/ Interaction with L-scale circulation**	**Land, buoy, ship, UAV/ soundings, C-/X-band radar**	**Chung-Hsiung Sui**
2019.11-2020.02	TerraMaris	SW. Java, Xmas Island	Convection/ MJO-Diurnal cycle	Aircraft, land, sea glider	Adrian Matthews