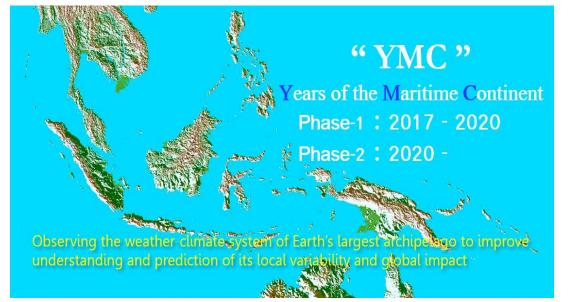
## Some Progress of the YMC during the recent pandemic period

Kunio Yoneyama (JAMSTEC)

#### Outline

- 1) Introduction (background and some notes)
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- 4) Cross-Organization Special Collection
- 5) Concluding Remarks

CHIA x YMC2021, September 1-3, 2021



### What is the YMC?

#### **Purpose**

To expedite progress of improving our understanding and prediction skill of local multi-scale variability of the MC weather-climate systems and its global impact.

### **Participants**

Over 70 institutes/universities from Australia, China, France, Indonesia, Japan, Malaysia, Philippines, Singapore, Taiwan, UK, US, and more.

### Main Activities

- 1) Data sharing
- 2) Field campaign (consists of Intensive Obs & Long-term)
- 3) Modeling
- 4) Prediction and applications
- 5) Outreaching and capacity building

# Updates since 4th Workshop in Feb 2019

- Several Intensive Observations have been postponed to 2022/2023 time frame due to COVID-19. Only a few field campaigns were carried out.
- 2) Following YMC data policy, several QCed datasets have been released, so that anyone can use them now.
- 3) Cross-Organization Special Collection of YMC papers has been started since January 2020.
  21 journals from 7 societies have joined.
- 4) YMC site (https://www.jamstec.go.jp/ymc/) hosted by JAMSTEC has been unavailable to access almost half a year due to the security incident at JAMSTEC. We deeply apologize. Instead, currently BMKG YMC site (https://www.bmkg.go.id/ymc/) offers COSC publication page and so on.

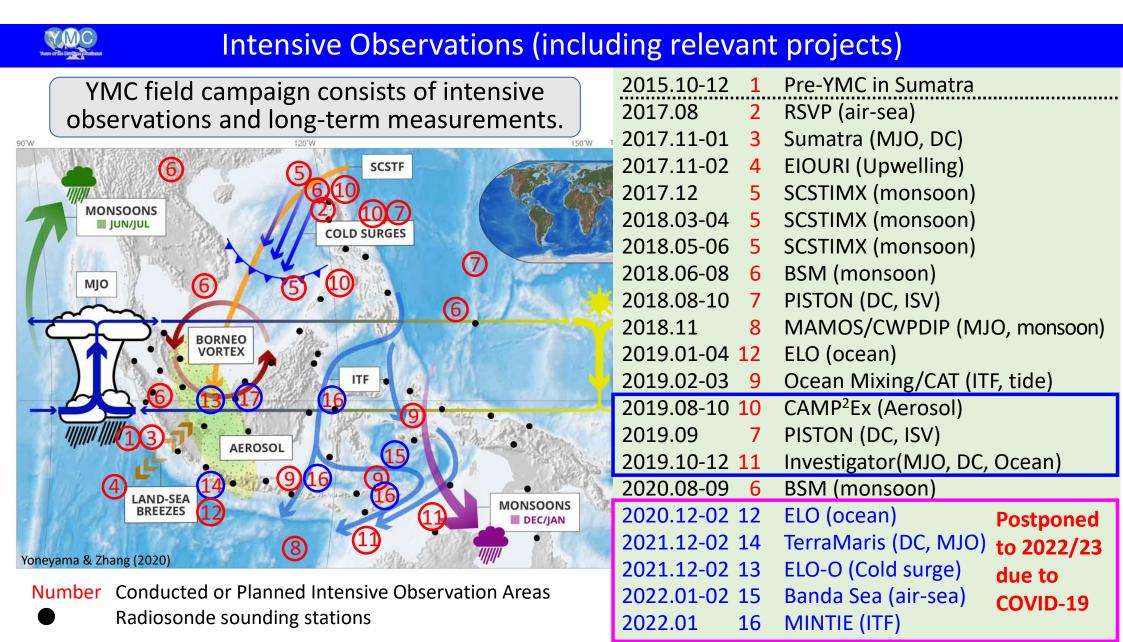
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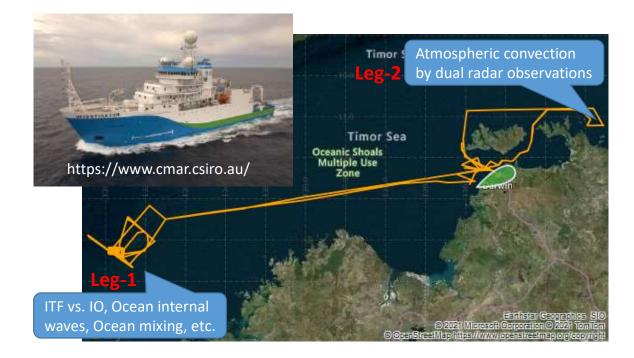




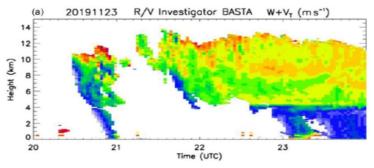
# R/V Investigator Cruise in Oct – Dec 2019

"Tropical Observations of Atmospheric Convection, Biogenic Emissions, Ocean Mixing, and Processes Generating Intraseasonal SST Variability"

Period:	Oct. 19 – Dec. 17, 2019
Region:	Timor Sea, Eastern Indian Ocean, and off the north coast of Australia
Observations:	CTD/LADCP, Microstructure Vertical Profiler, Wire-walker, ADCP, Aerosol, Atmospheric Chemistry,
	Dual Doppler Radar measurements, Radiosonde, Smet, TSG, etc.
Participants:	BoM, CSIRO, U Melbourne, Monash U, Xiamen U Malaysia, BPPT, BMKG, NTU, Deakin U, Queensland U of Tech.
Data site:	https://www.marine.csiro.au/data/trawler/survey_details.cfm?survey=IN2019_V06
Details:	https://mnf.csiro.au/en/Voyages/IN2019_V06



#### Example from RV Investigator radar data analysis



Time-height cross section of retrieved wind sampled by the BASTA cloud radar.

Protat and McRobert (2020, AMT)

Radar & radiosonde data are available from https://doi.org/10.25919/5ef5a70ae2be9



# TerraMaris (some portions are collaborated with ELO)

### **UK's Contributions**

#### **Airborne Measurements**

Dropsonde, turbulent flux, etc.

#### Land-based Super Sites

at Pameungpeuk, SW Java, Indonesia Christmas Island, Australia

#### **Ocean Gliders + Wave-Gliders**

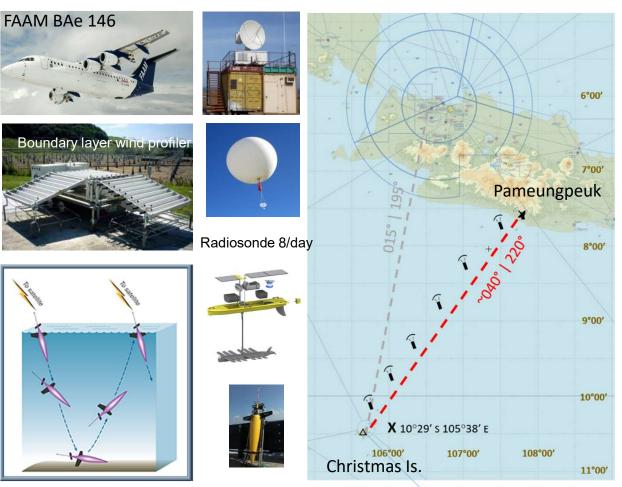
Launch from Christmas Island, then cruise within open seas and A's EEZ

### **Numerical Modeling**

200m CRM/2km Large/90km Global domains

#### Remarks.

It was set to take place in Nov 2019 - Feb 2020. However, due to shortage of helium gases, it was postponed to Jan 2021 before facing COVID-19. Currently, Jan - Mar 2023 is a targeted period.

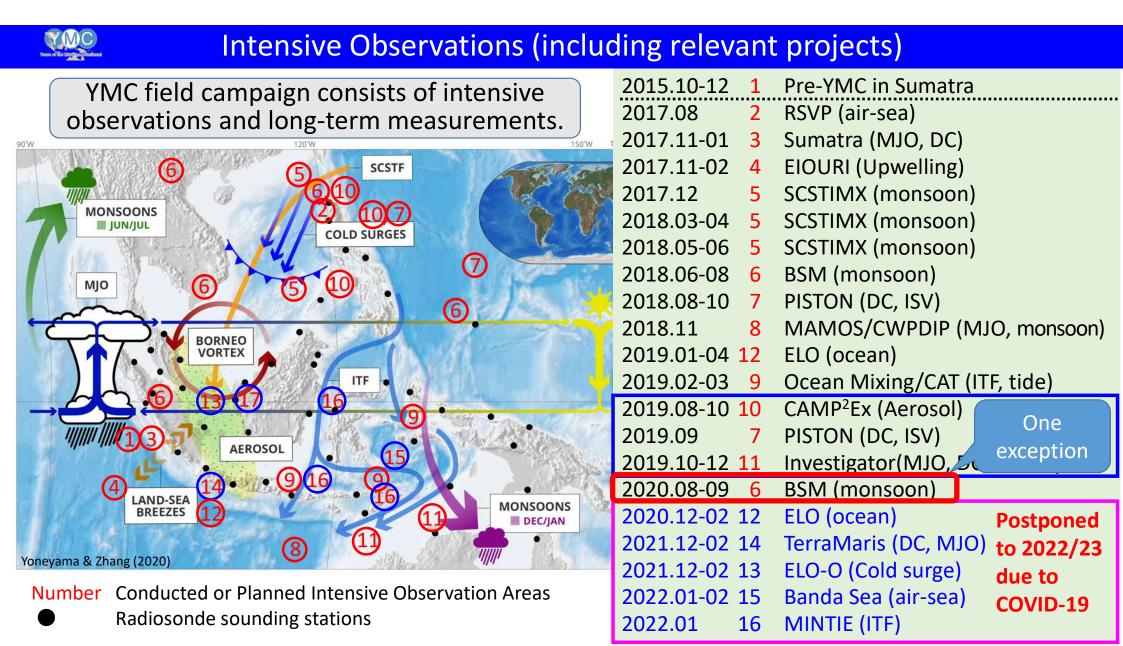


Courtesy: Paul Barret & Nick Klingaman (taken from their YMC 4th Workshop presentation)

National Centre for Atmospheric Science









### Boreal Summer Monsoon Study in 2020

#### << Objectives >>

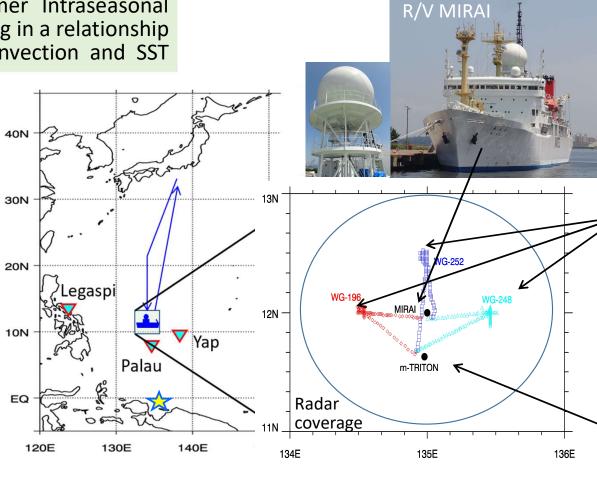
Air-sea interaction over the TWP to better understand Boreal Summer Intraseasonal Oscillation (BSISO) focusing in a relationship between atmospheric convection and SST distribution/gradient.

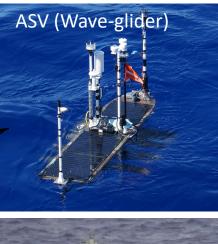
#### << Period >>

Aug. 1 - Sept. 14, 2020 (IOP: Aug. 6 – Sept. 4)

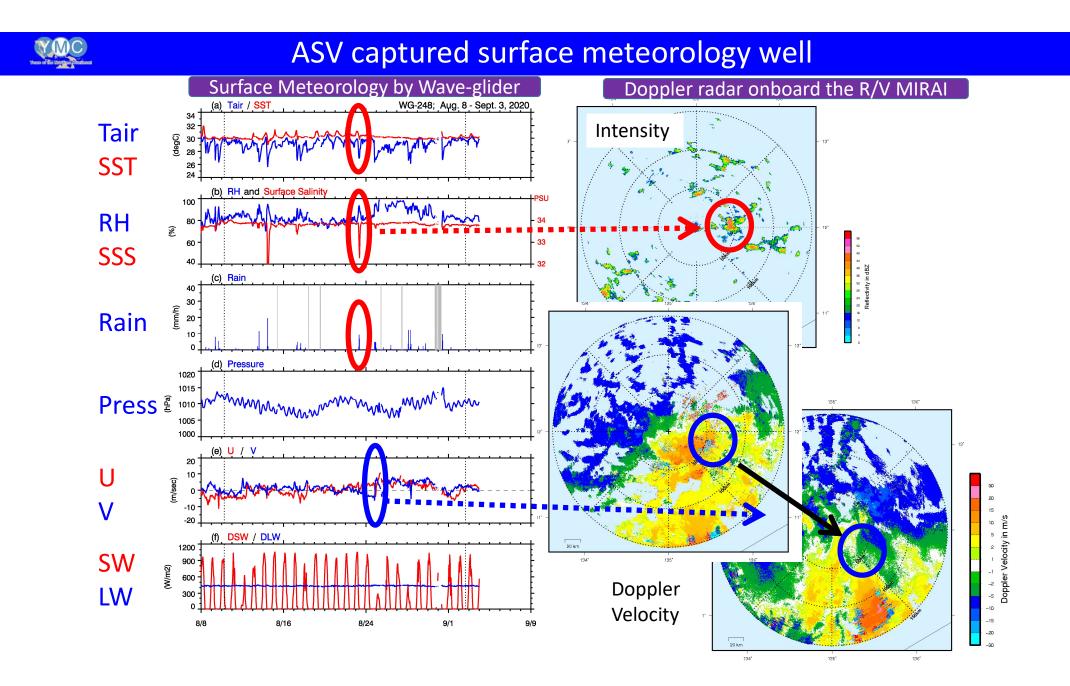
### << Participants >> MIRAI: JAMSTEC, UH/IPRC, LMD, Univs (Tokyo, Nagoya, Toyama, Kyoto)

Land-sites: YWS, PWS (with NOAA), PAGASA



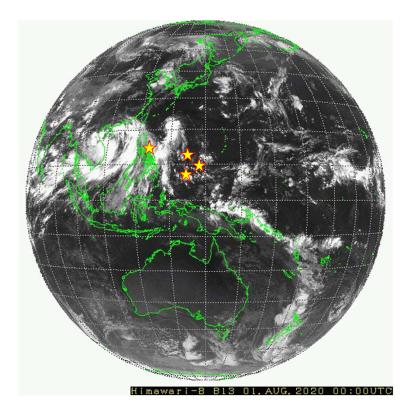




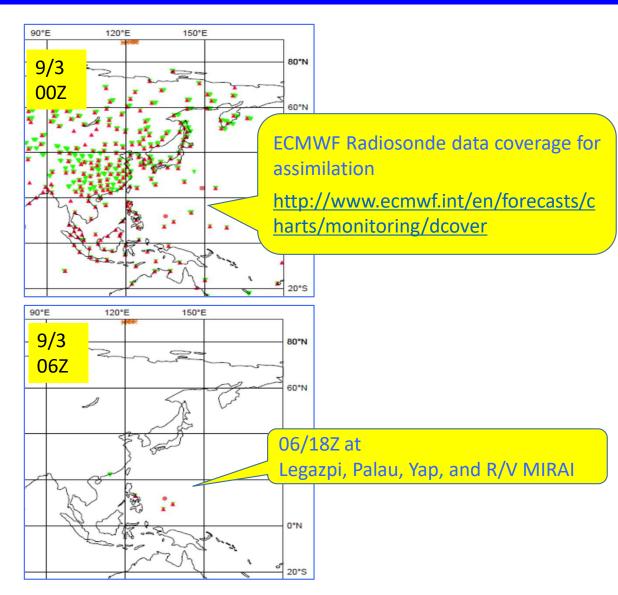


# Enhanced (4 times/day) radiosonde data at 4 sites were used by NWPs

During the campaign period, 2 TCs developed near the R/V MIRAI.



https://www.data.jma.go.jp/mscweb/data/himawari/



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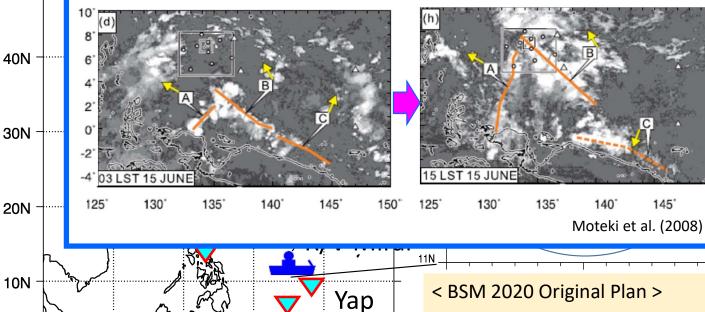
CHIA x YMC2021, September 1-3, 2021

# BSM 2020 $\rightarrow$ Cold Surge Observation 2021

### YMC-CSO 2021 (Jan 8 – Mar 8, 2021)

To capture and study "cold surge", we 40N (BMKG & JAMSTEC) conducted;

- Enhanced (4 /day)\* radiosonde 1) soundings at PGK and CGK
- 2) 0600 UTC sounding at CGK used 600g balloon for UTLS study
- Deployment of GNSS receiver 3)
- **BMKG Radar/AWS network** 4)
- Collaboration with BIG for GNSS 5)



Investigate the impact of convection diurnally developed over the northern coast of New Guinea Island onto the convective activity around R/V Mirai.

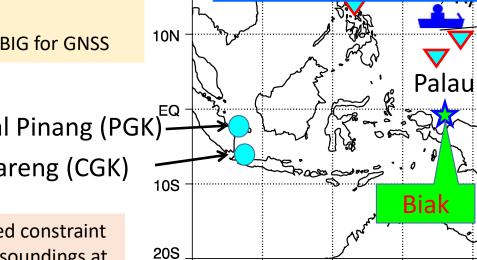
150"

#### Thus,

we intended to conduct 8 /day radiosonde soundings at Biak. JAMSTEC colleagues made a site survey with BMKG colleagues ...

Pangkal Pinang (PGK) Cengkareng (CGK)

\* ... Due to unexpected constraint related to COVID-19, soundings at 12Z were skipped since Feb 8.



100E

110E

120E

130E

140E

150E

50N

20N



# Examples from YMC-CSO 2021 Preliminary Results

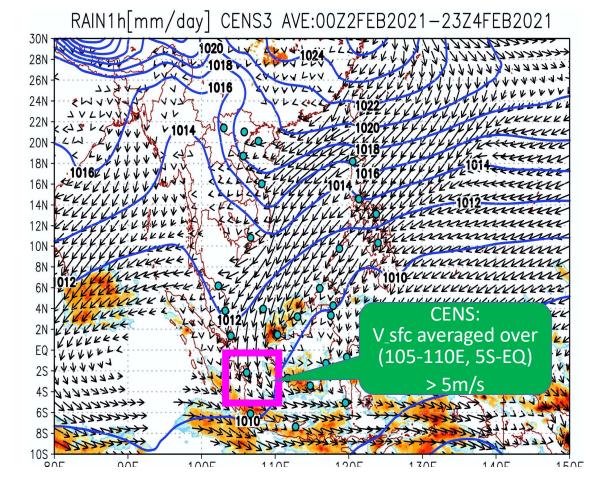




Enhanced radiosonde soundings

GNSS-receiver to measure Precipitable Water Vapor

Seven Cross-Equatorial Northerly Surges were observed during the 2-month campaign period. They are; 1) 17-23 Jan, 2) 28-31 Jan, 3) 2-4 Feb, 4) 6-9 Feb, 5) 12-16 Feb, 6) 18-21 Feb, and 7) 22-27 Feb, 2021.



GSMaP rainfall and JRA wind vectors averaged during CENS3 (2-4 Feb) event.

#### From Moteki et al. (2021, ICTMAS)



### Examples from YMC-CSO 2021 Preliminary Results

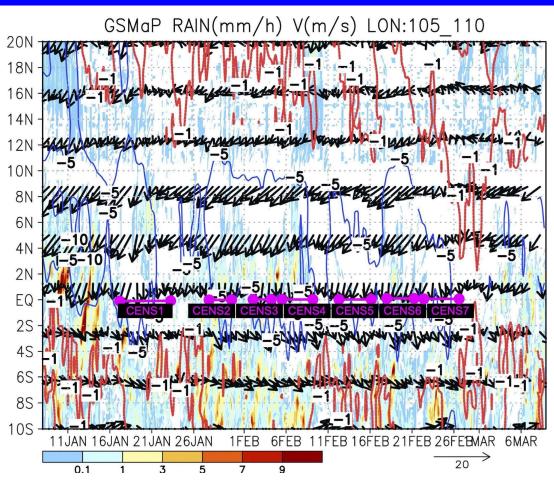




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Time-latitude cross-section of GSMaP rainfall and surface meridional convergence with JRA55 for the period of 8 Jan. - 8 Mar. 2021. Vectors indicate the surface horizontal winds.

From Moteki et al. (2021, ICTMAS)

### What we experienced through YMC-CSO 2021 - From logistic viewpoint

#### 1) Change of scientific target, site, schedule, personnel role, etc.

It was possible because of a) use of established BMKG observation network b) tight relationship (Both PIs know each other, joint site survey, etc.) c) experience of former campaigns (YMC-Sumatra 2015, 2017, etc.)

### 2) Keys

Frequent communication via SNS, Web meeting, email, etc. Sharing scientific knowledge and background (ex. importance of data QC, ... )

#### 3) Concise measurement systems

Almost the same operation procedures (except frequency, big balloon, additional request, etc.) Easy handling and deployment of GNSS receiver

### 4) Possible future style

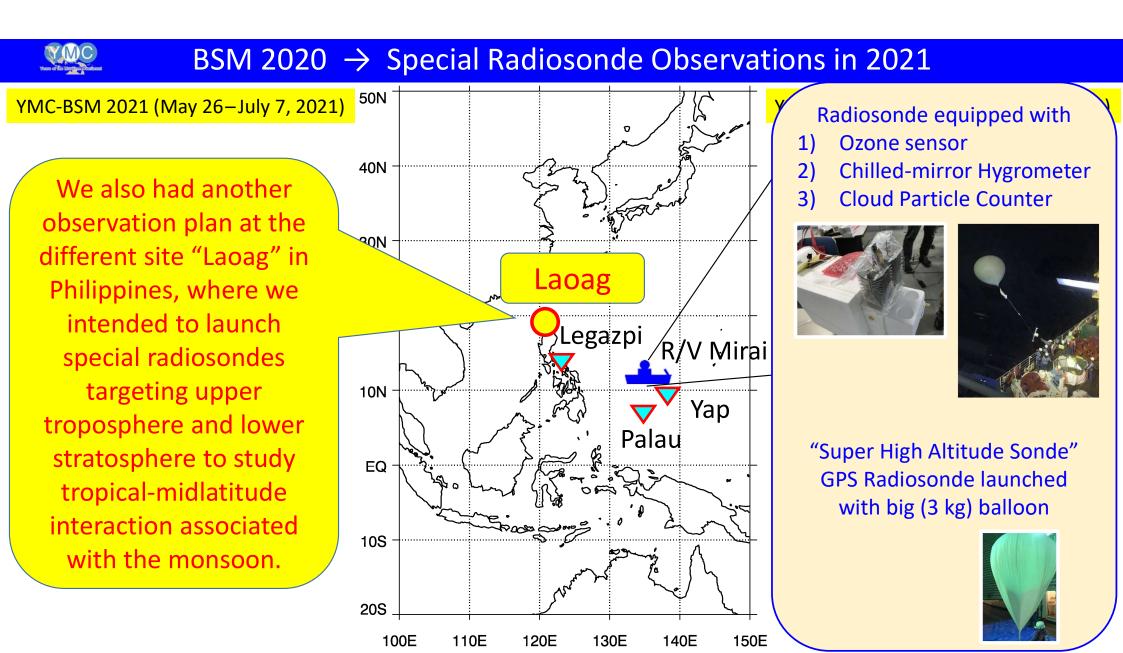
Field projects led by the MC scientists (then, non-MC scientists will join and provide tools ...)

Advantages ...

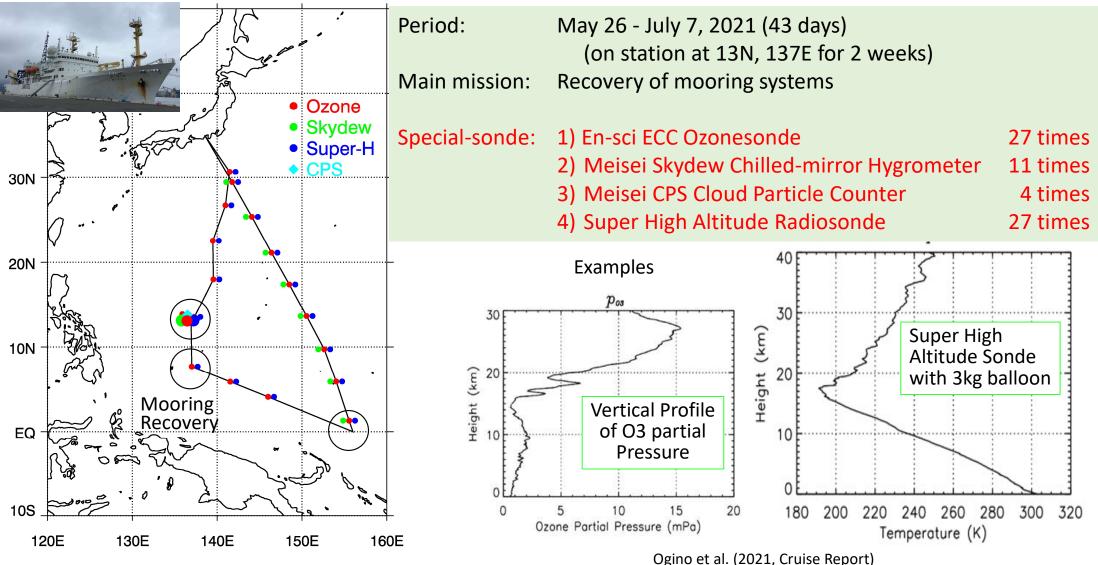
a) Easier to satisfy the local needs

b) Research permit issues (ex. ASV measurement)

c) Expandable to long-term/routine observations



### Special Radiosonde Observations during the R/V Mirai 2021 Cruise



Ogino et al. (2021

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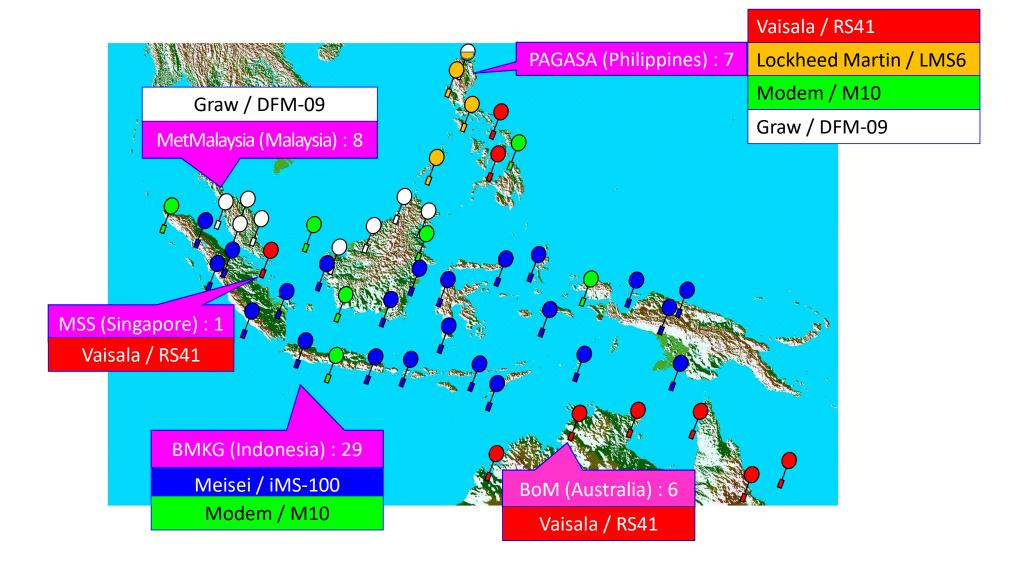
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# Operational Radiosonde by the MC Meteorological Agencies



### **Operational Radiosonde by the MC Meteorological Agencies**

# **Q-1**:

A & Q-2 :

YMC

During BSM2020, we did not conduct any check of data accuracy such as intercomparison of different radiosonde types. How can we confirm their accuracy ?

We obtained such info for another

campaign data (BSM 2018).

Is it possible to apply the same

procedure to BSM 2020 data?

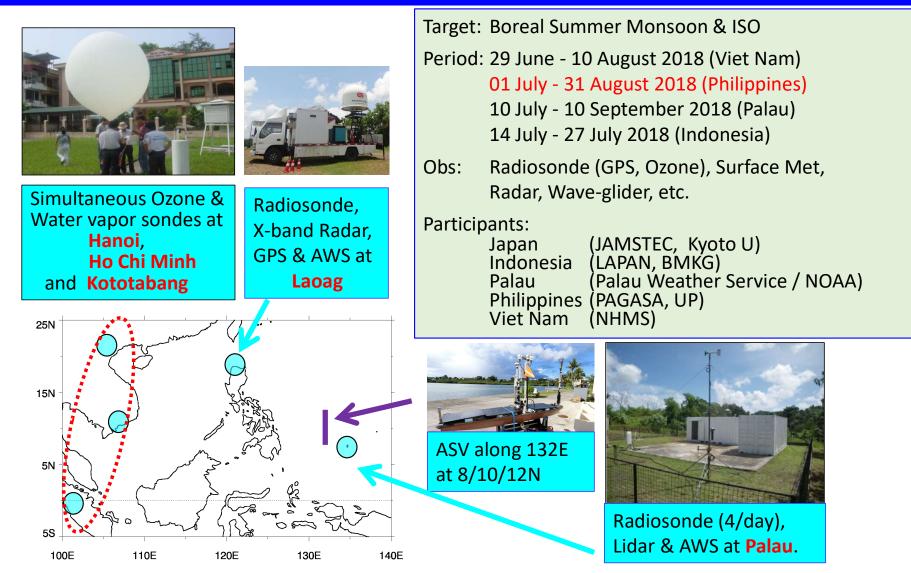
Vaisala / RS41 Lockheed Martin / LMS6 PAGASA (Philippines): 7 Modem / M10 RV Mirai: Vaisala / RS41 Graw / DFM-09 YWS (FSM): 1 Lockheed Martin / LMS6 **BSM 2020** PWS (Palau): 1 Lockheed Martin / LMS6 Sold and a state of a BoM (Australia) : 6 Vaisala / RS41

Modem / M10

Meisei / iMS-100



### **BSM-2018**





# Intercomparison of Different Radiosondes during BSM-2018

Laoag



Period: July 27 - August 2, 2018

Location: Laoag Synop-Airport-Upper Air Station

Remarks: Usually PAGASA conduct twice daily sounding using two types of radiosonde (LMS and Graw). During the IOP, only LMS was adopted and conducted 6-hourly.



Method:

 Simultaneous launch of Vaisala, LMS, and Graw for 20 times. (Note. Two soundings failed to obtain data correctly.)

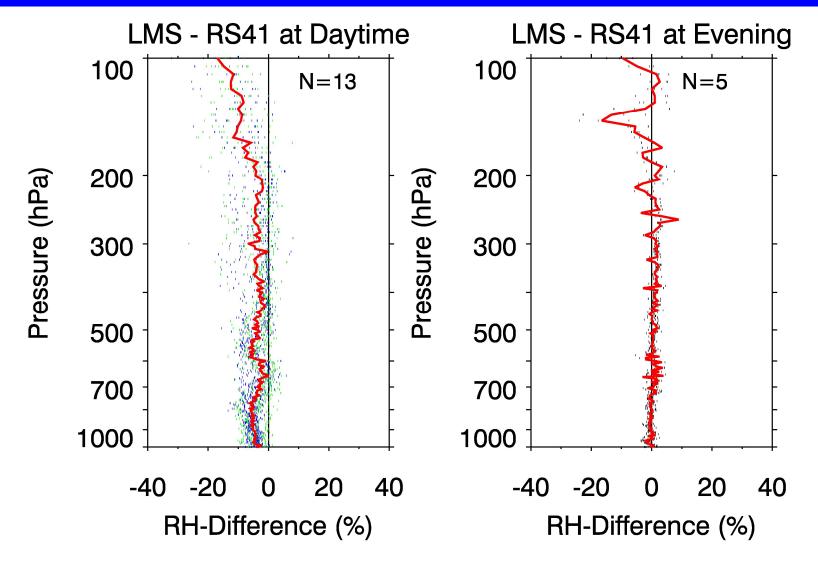
2) Comparison with GNSS-derived PWV (July 27 - Aug 31)





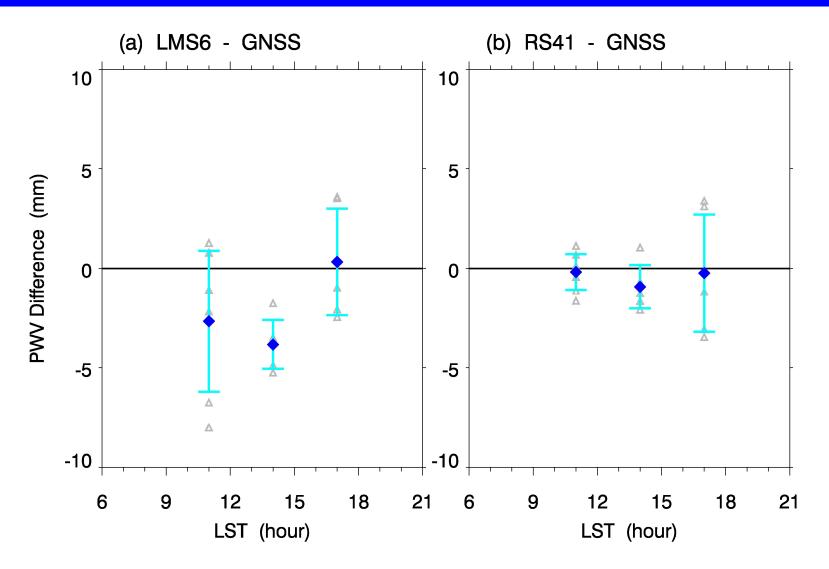


### RH Differences between LMS6 and RS41



Yoneyama et al. (2021, JMSJ)

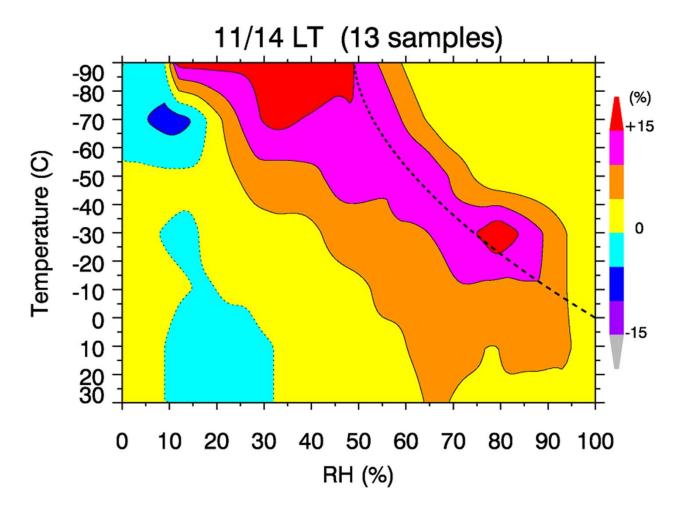
Intercomparison of PWV between Radiosonde and GNSS-derived



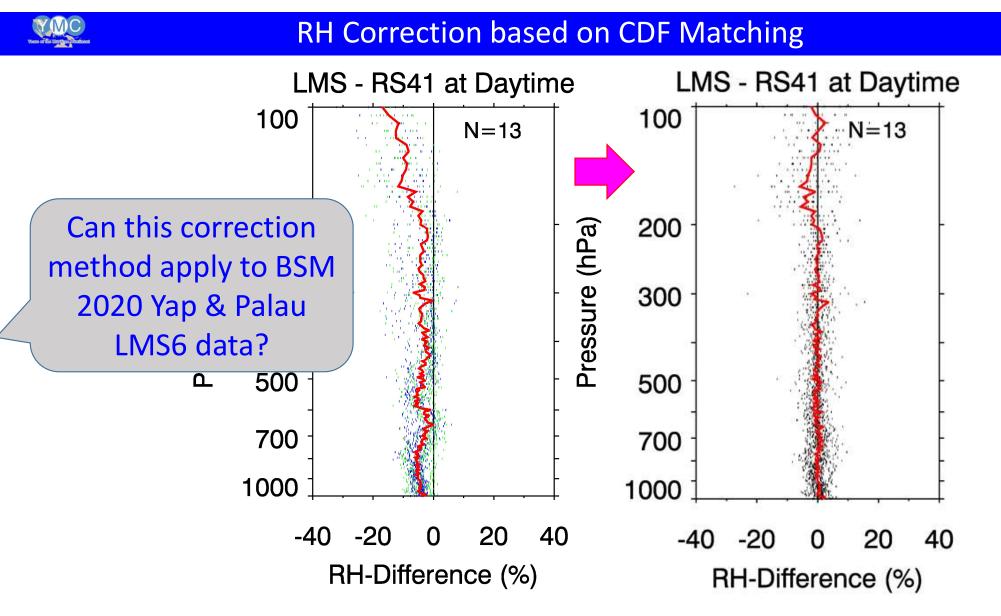
Yoneyama et al. (2021, JMSJ)

RH differences (dRH) can be expressed as a function of measured RH and temperature based on CDF matching method.

RHcor = RHobs + dRH



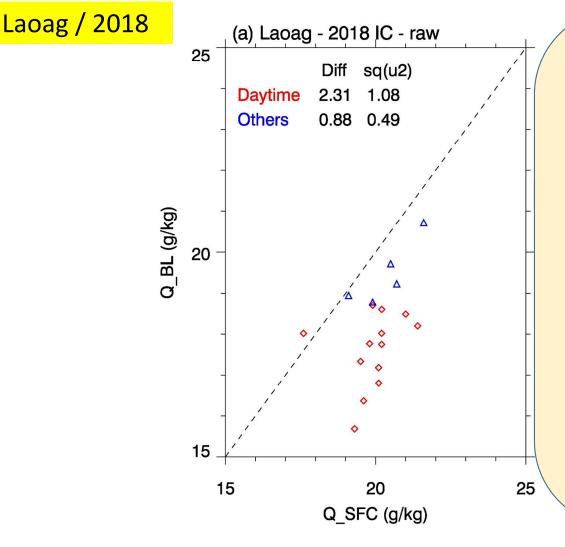
Yoneyama et al. (2021, JMSJ)



Yoneyama et al. (2021, JMSJ)

### **M**C

# Q (Specific Humidity) : BL (300m)-mean vs. SFC



### Assumption:

Specific Humidity Q averaged in the Boundary Layer (here we define 300m above the radiosonde initial point) should be close to that observed at the surface due to turbulent mixing.

### Note.

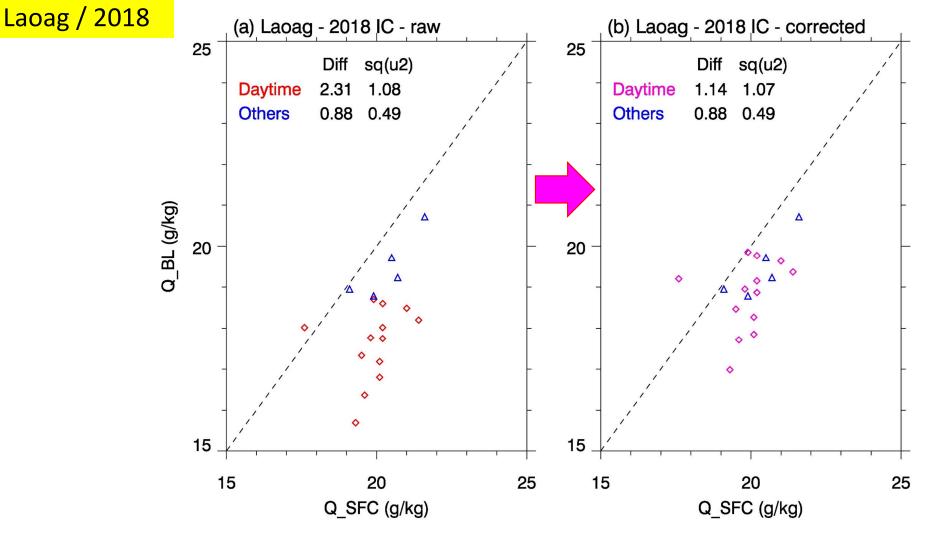
Surface value of radiosonde dataset is taken from the surface met station data which is measured independently from radiosonde for surface data input.

Yoneyama et al. (2021, JMSJ)

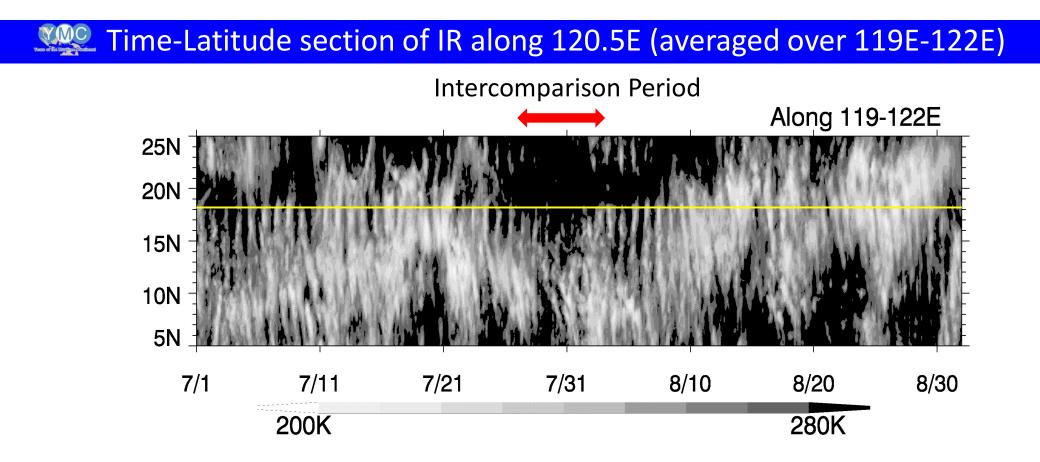
# Q (Specific Humidity) : BL (300m)-mean vs. SFC

YMC

18 samples



Yoneyama et al. (2021, JMSJ)

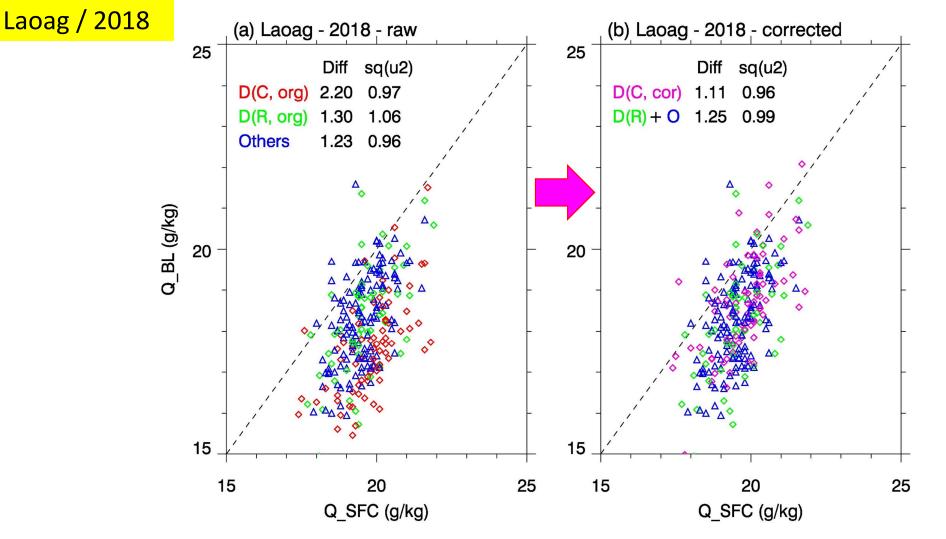


#### Remarks.

It should be noted that RH gap was found only during fine weather daytime. Thus, such correction should be applied only in the same weather condition (=fine daytime).

It is possible to speculate the cloud condition using RH data. We judged cloudy/rainy condition when sounding data shows > 93RH for enough thickness (>30hPa) (cf. Zuidema, 1998).

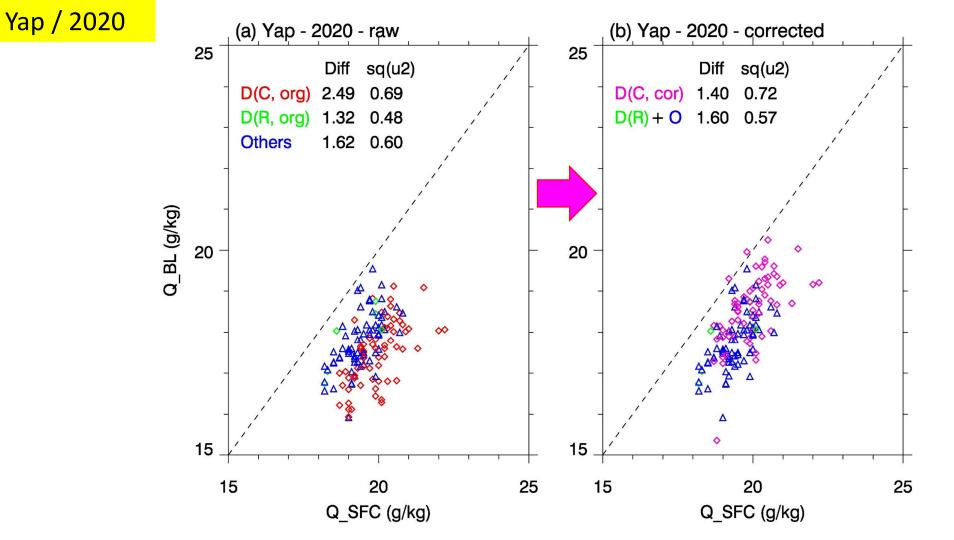
July 1 - Aug 31, 2018



Yoneyama et al. (2021, JMSJ)

YMC

Aug. 6- Sept. 9, 2020



Yoneyama et al. (2021, JMSJ)



### **Suggestions & Comments**

- 1) It is highly recommended to confirm data reliability based on intercomparison or any other methods. However, in the case such data cannot be obtained, it may be possible to adopt a correction scheme developed by another campaign for the same radiosonde type based on the comparison of specific humidity between boundary layer-mean and surface met station data.
- 2) Thus, LMS6 Radiosonde data taken at Yap and Palau during BSM-2020 were corrected using correction scheme, which was developed based on the intercomparison at Laoag in BSM-2018. Those BSM-2020 data will be provided from JAMSTEC YMC data archive site. (currently it is possible upon request.)
- 3) Note. This time we confirmed dry bias in LMS6 data comparing to RS41 only in data observed during fine daytime. We did not see any significant difference at 00/12Z soundings, which are usually taken as a routine observation.

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# Cross-Organization Special Collection of the YMC Publications

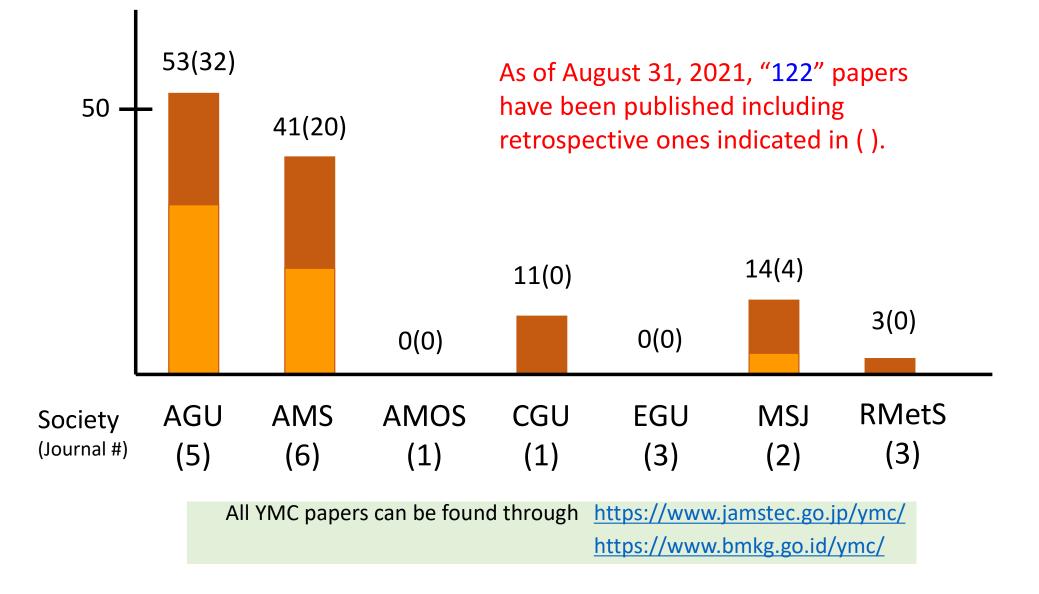
American Geophysical Union	Earth and Space Science					
	Geophysical Research Letters					
	Journal of Advances in Modeling Earth Systems					
	Journal of Geophysical Research - Atmospheres					
	Journal of Geophysical Research - Oceans					
American Meteorological Society	Bulletin of the American Meteorological Society					
	Journal of Climate					
	Journal of Physical Oceanography					
	Journal of the Atmospheric Sciences					
	Monthly Weather Review					
	Weather and Forecasting					
Australian Meteorological & Oceanographic Society						
	Journal of Southern Hemisphere Earth Systems Science					
Chinese Geoscience Union	Terrestrial, Atmospheric and Oceanic Sciences					
European Geosciences Union	Atmospheric Chemistry and Physics					
	Nonlinear Processes in Geophysics					
	Ocean Science					
Meteorological Society of Japan	Journal of the Meteorological Society of Japan					
	Scientific Online Letters on the Atmosphere					
Royal Meteorological Society	Atmospheric Science Letters					
	International Journal of Climatology					
	Quarterly Journal of the Royal Meteorological Society					

#### **Cross-Organization Special Collection of the YMC Publications JGR** Atmospheres Example Link to YMC COSC page JGR: Atmospheres publishes original research articles that advance and improve the understanding of atmospheric properties and processes, including the interaction of the atmosphere with other components of the Earth system, as well as their roles in climate variability and change. 9 HOME BROWSE HIGHLIGHTS COMMENTARIES COLLECTIONS ABOUT Submit an Article Years of the Maritime Continent Get Content Alerts Special Issues | First published: 7 April 2020 | Last updated: 26 August 2021 The Indo-Pacific Maritime Continent plays a pivotal role in global weather-climate. Years of the Recommend to a Librarian Maritime Continent (YMC) is an international program aiming at observing the weather-clima system of this Earth's largest archipelago to improve understanding and prediction of its lo **Browse Sample Issue** variability and global impact. The five themes of YMC are Atmospheric Convection, Upper Lan Processes and Air-Sea Interaction, Stratosphere-Troposphere Interaction, Aerosol, and Prediction improvement. Main activities of YMC include field observations, data sharing Subscribe to this Journal modeling, prediction applications, and capacity building. A special collection of article on topics related to YMC is established that includes publications in journals of seven professional Paper List in **Special Collections: Call for Papers** = organizations in the fields of atmospheric and oceanic sciences, AGU, AMOS, AMS, CGU, SGU, MSJ, RMetS). A master list of this special collection is hosted on the YMC homepage. **AGU Jornals** Resources Export Citation(s) Special Section Proposal Form Table of Contents

Reciprocity in the Indian Ocean: Intraseasonal Oscillation and Ocean Planetary Waves

Subsets

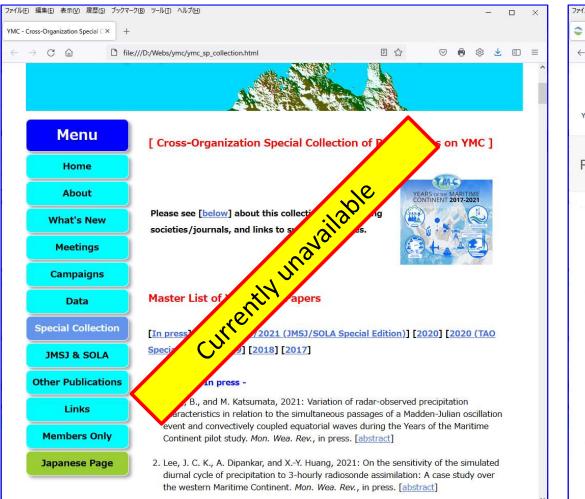
### **Cross-Organization Special Collection of the YMC Publications**





# **Cross-Organization Special Collection of the YMC Publications**

### https://www.jamstec.go.jp/ymc/



### https://www.bmkg.go.id/ymc/

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Ocean. J. Geophys. Res 2. Kang, D., D. Kim, MS. A on the propagation of the 3. Katsumata, M., K. Tanigu water vapor profiles in ma	c. Oceans, , accepted. [abstract] Ahn, and SI. An, 2021: The role of background meridional moisture gradient e MJO over the Maritime Continent. J. Climate, in press. [abstract] uchi, and T. Nishizawa, 2021: Corrigendum: An attempt to retrieve continuous arine lower troposphere using shipboard Raman/Mie lidar system. SOLA, in		R	CE	ŇT	E.
<ul> <li>Ocean. J. Geophys. Res</li> <li>2. Kang, D., D. Kim, MS. A on the propagation of the</li> <li>3. Katsumata, M., K. Tanigu water vapor profiles in ma press. [abstract]</li> <li>4. Yoneyama, K., M. Fujita, Cabrera, 2021: Evaluation</li> </ul>	Ahn, and SI. An, 2021: The role of background meridional moisture gradient e MJO over the Maritime Continent. <i>J. Climate</i> , in press. [abstract] uchi, and T. Nishizawa, 2021: Corrigendum: An attempt to retrieve continuous	D)	Re	CE EVE	NT N	TS.

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# **Concluding Remarks**

- 1) While several intensive observations have been postponed to 2022/23 time frame due to COVID-19 pandemic, a few campaigns have been conducted, although they also experienced some constraints.
- 2) Most of data sets obtained before the pandemic have been evaluated for their reliability, and now must be ready to open. (YMC data policy requires the PIs to open their QCed data within one year after the campaign.) Indeed, the number of papers, which used in-situ YMC field campaign data, is now increasing.
- 3) Cross-Organization Special Collection is a good platform for many researchers to find the latest results easily, as it acts as one-stop information center. So, please consider to submit your paper to the journals which join.
- 4) We understand that the JAMSTEC YMC website suspension causes inconvenient situation for many researchers. While we (hopefully) expect it will resume soon, several solutions have been sought. (e.g., BMKG website offers some ancillary functions such as COSC page.)



# Data Availability (https://www.jamstec.go.jp/ymc/data/)

Menu	[YMC Data Policy]	Со			
Home	Intensive Observationis	CSO 202 ht			
About	Pre-YMC				
What's New	<u>YMC-Sumatra 2017</u> YMC-BSM 2018	ELO <u>ht</u> i			
Meetings	<u>YMC-BSM 2020</u> <u>ELO</u> (See Field Catalog page)	CAT (Co ht			
Campaigns	Seaglider at UEA (Select Mission-54(ELO))  • SCSTIMX				
Data	<ul> <li>Ocean Mixing / <u>CAT (Coastal Acoustic Tomography) Experiment</u></li> <li><u>R/V Investigator Voyage during Oct Dec. 2019</u></li> </ul>	R/V Invo <u>ht</u> t			
Special Collection	Links to Collaborative Projects	<u>tails.cfn</u>			
JMSJ & SOLA	<u>CAMP<sup>2</sup>Ex and PISTON Joint Data Repository</u>	CAMP2			
Other Publications		htt			
Links	Operational Products				
Members Only	<ul> <li>NOAA/CPC CMORPH - Rainfall over the MC [data] [animation]. About <u>CMORPH</u></li> <li>YMC Radiosonde Soundings [data]</li> <li>YMC Surface Meteorology</li> </ul>				
Japanese Page	YMC Weather Radars				

JAMSTEC Campaigns (Sumatra 2015/17, BSM 2018/20) Contact <u>ymc-joffice@jamstec.go.jp</u>

CSO 2021 https://sites.google.com/view/ymc-cso2021

ELO <u>https://elo.ucsd.edu/</u>

CAT (Coastal Acoustic Tomography) Experiment https://ir.lib.hiroshima-u.ac.jp/en/00048059

R/V Investigator 2019 Cruise <u>https://www.marine.csiro.au/data/trawler/survey\_de</u> tails.cfm?survey=IN2019\_V06

CAMP2Ex & PISTON Joint Data Repository https://www-air.larc.nasa.gov/missions/camp2ex/index.html