

YMC-Sumatra 2017 field campaign

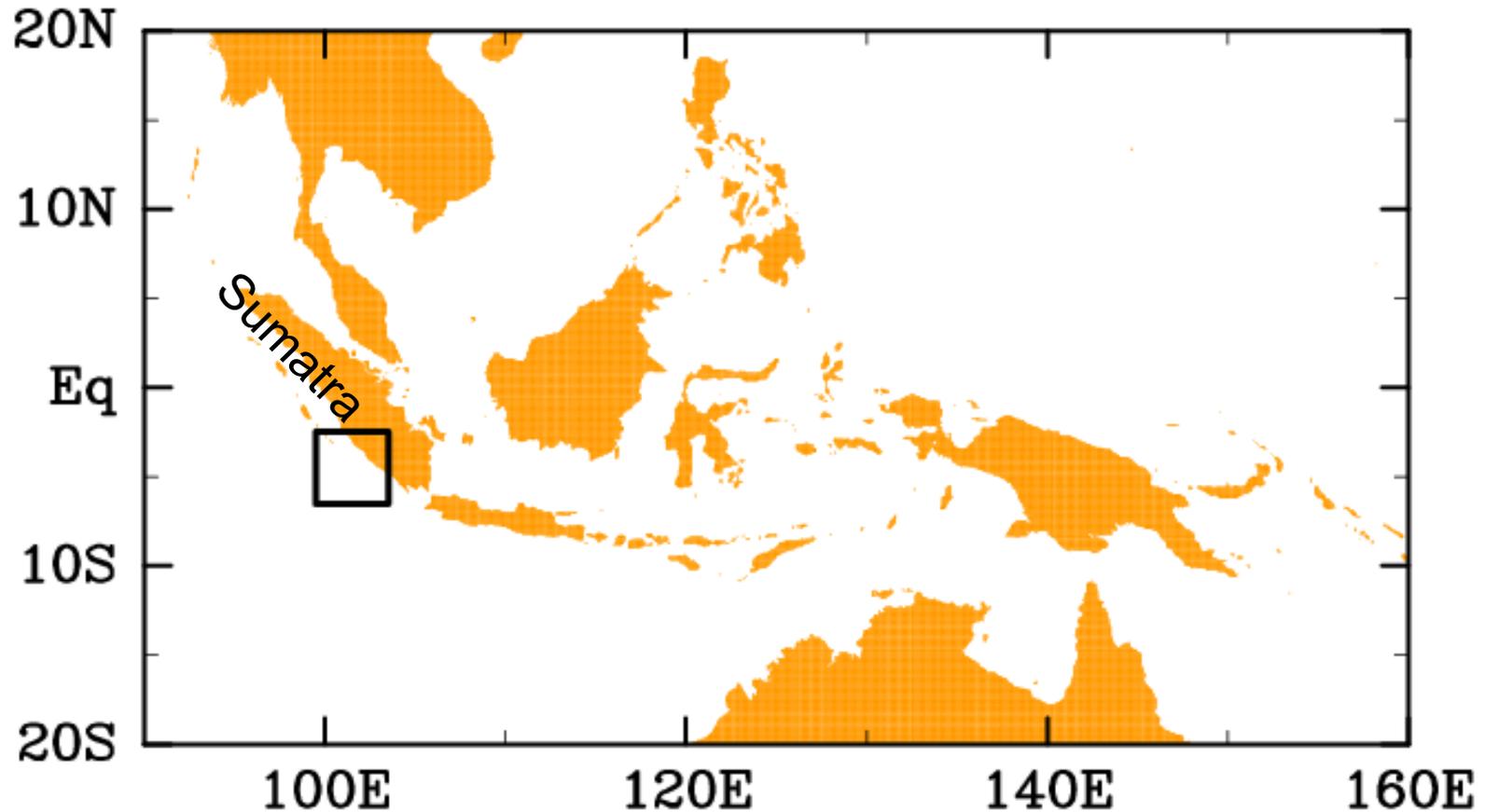
Satoru Yokoi, Shuichi Mori, Junko Suzuki, Tomoe Nasuno,
Kunio Yoneyama (JAMSTEC),
Fadli Syamsudin (BPPT), Urip Haryoko (BMKG)

Other participating organizations:

IPRC/UH, U. Tokyo, U. Toyama, Meisei Electric



Target area: West coast of Sumatra

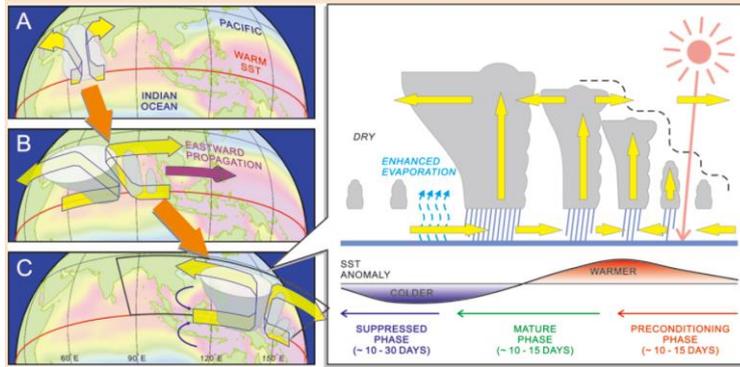


Target season: 2017/18 boreal winter

Target phenomena

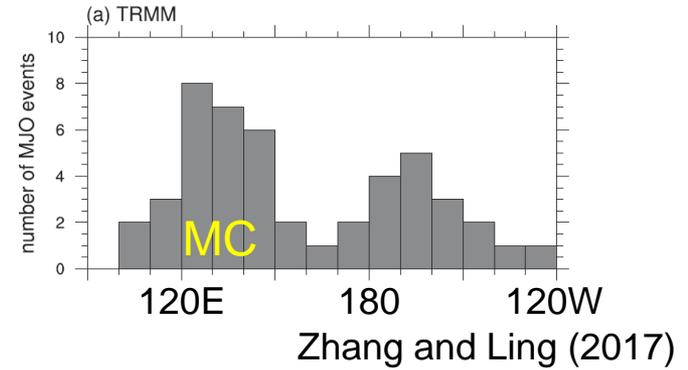
MJO and impact of MC

Schematic of MJO

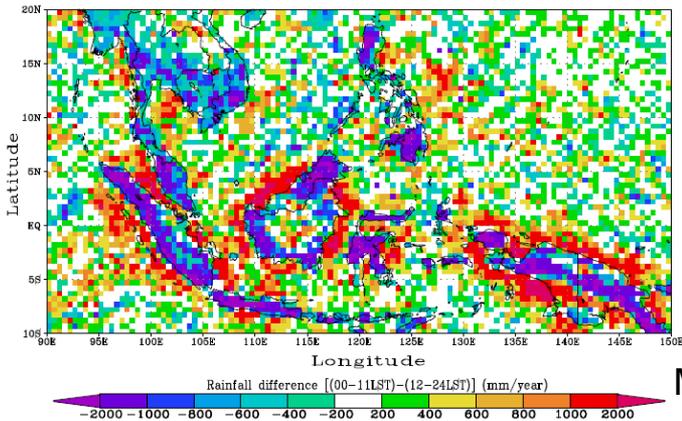


Yoneyama et al. (2013)

Ending longitude of MJO



Diurnal cycle

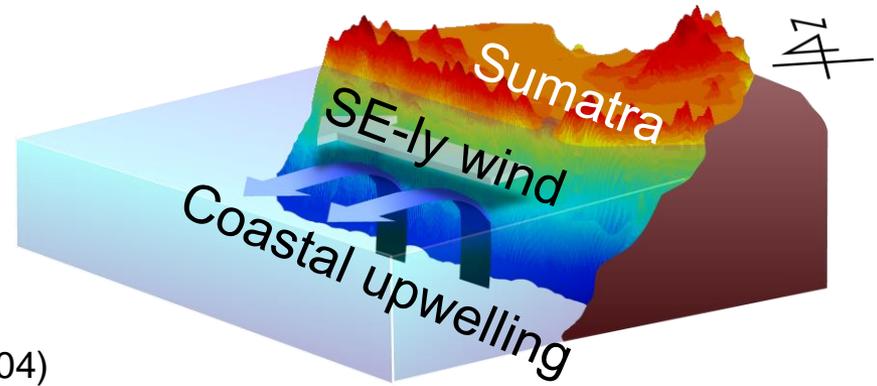


Mori et al. (2004)

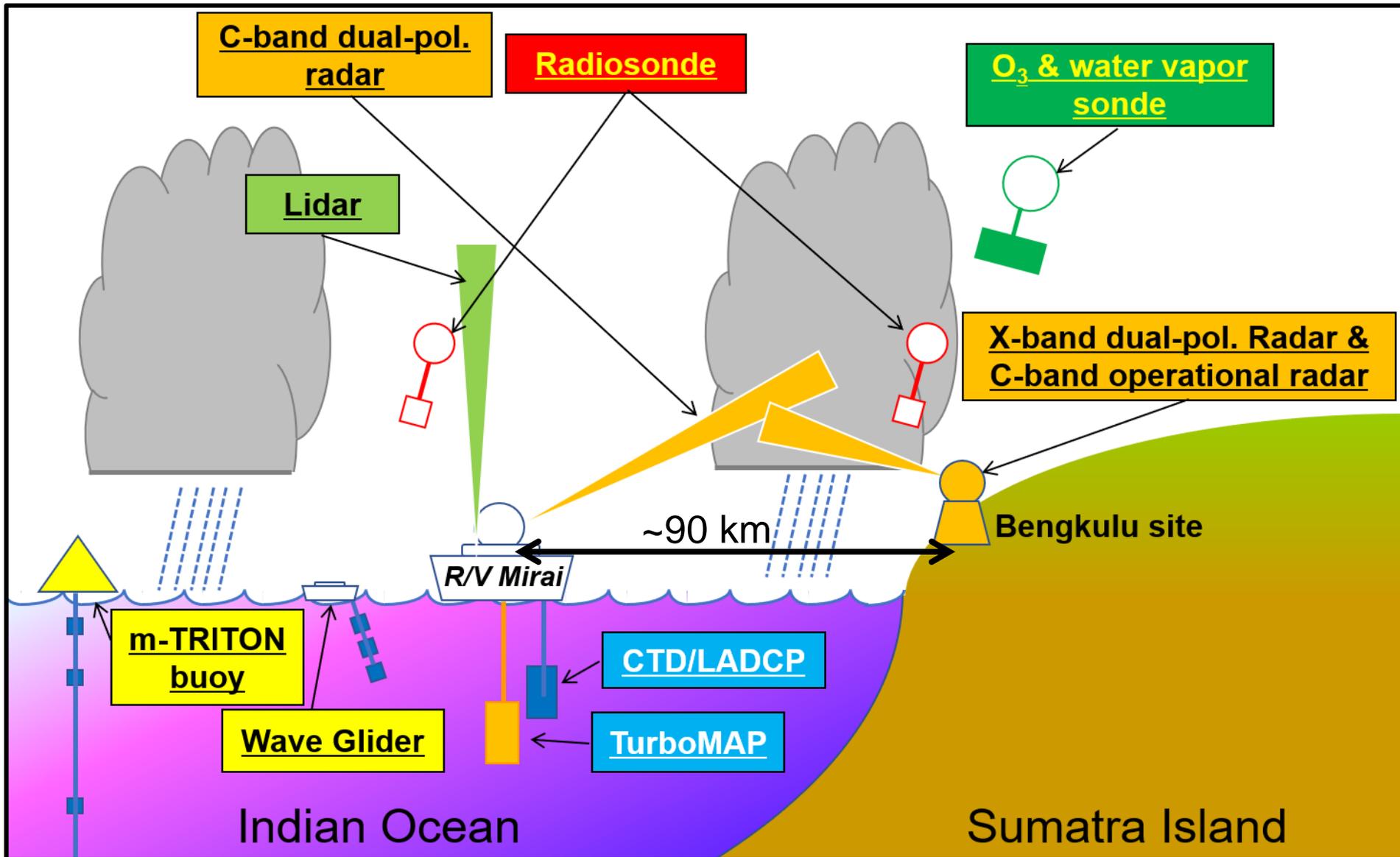
Afternoon & evening rainfall

Predawn & morning rainfall

Coastal upwelling



Schematic



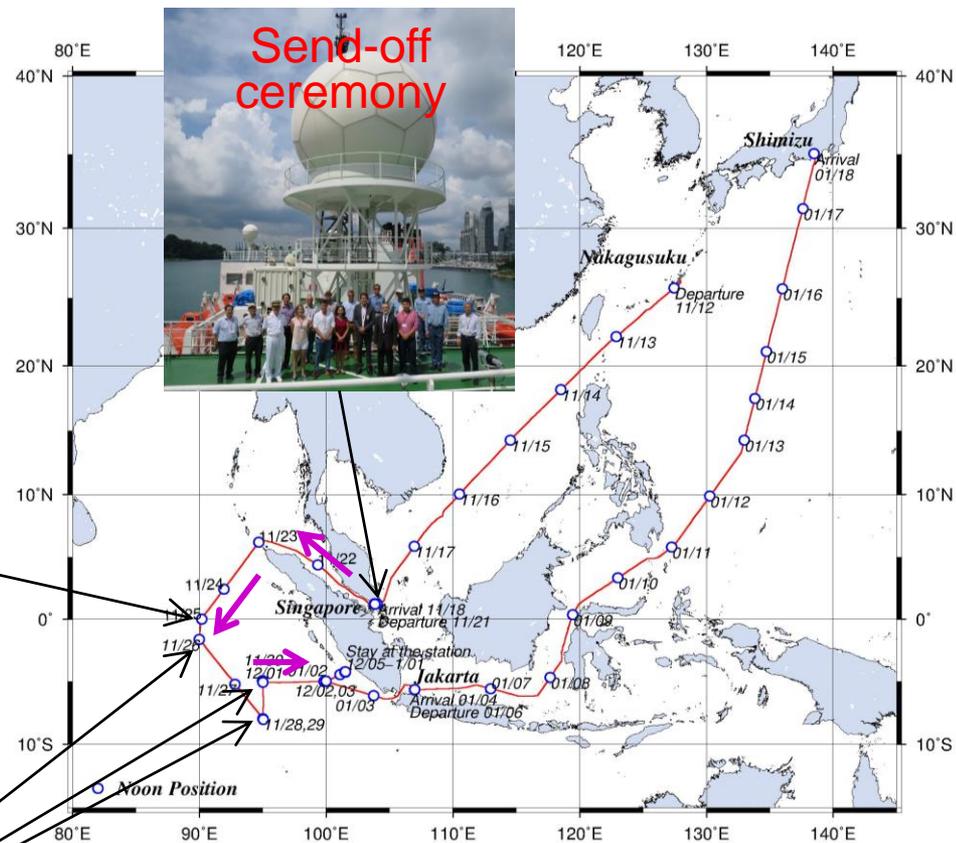
Cruise track of R/V *Mirai*



Subsurface ADCP mooring



m-TRITON



Observation details

R/V Mirai



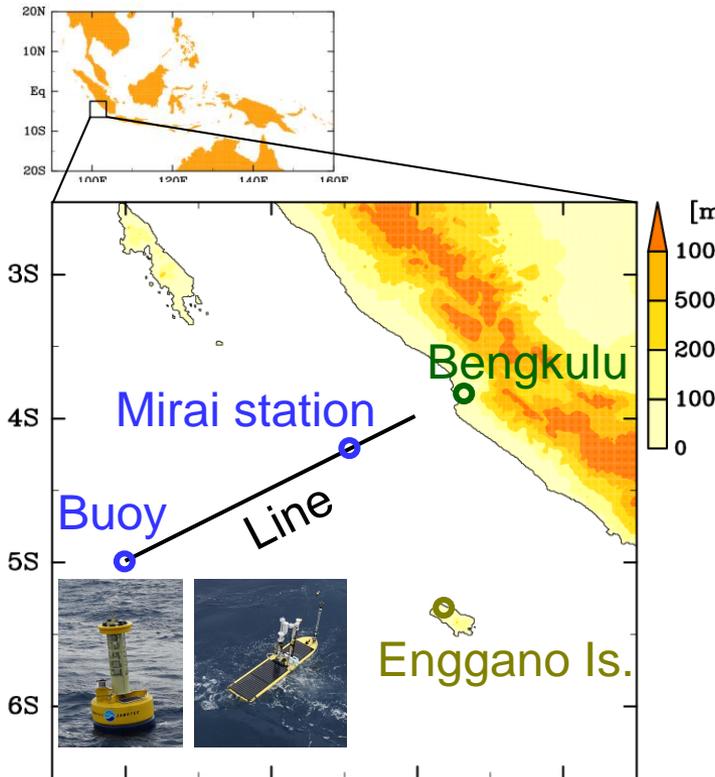
Station point: 4.24S, 101.52E

Period:

5 Dec 2017 – 1 Jan 2018

Obs items:

- 3-hourly radiosonde
- Dual-pol C-band radar
- Lidar
- Micro rain radar
- Disdrometer
- GNSS water vapor
- Water vapor and rain water stable isotope
- CO, O₃, aerosol
- MAX-DOAS
- Surface meteorology
- 3-hourly CTDO/LADCP/ ocean microprofiling
- Shipboard ADCP
- Surface water monitoring
- Sea snake thermistor
- Primary production



Deployment of
m-TRITON buoy and
wave glider

Line observation

b/w (5S, 100E) & (4S, 102E)
Cross section of water temp,
salinity, and current

Bengkulu station

Position: 3.86S, 102.34E

Period:

16 Nov 2017 – 15 Jan 2018

Obs. Items:

- 3-hourly radiosonde
- Dual-pol X-band radar
- O₃, water vapor, and cloud particle sondes
- Surface meteorology
- GNSS water vapor
- Micro rain radar
- Disdrometer
- Lightning detector
- C-band radar (operational)

Enggano Island

Position: 5.31S, 102.19E

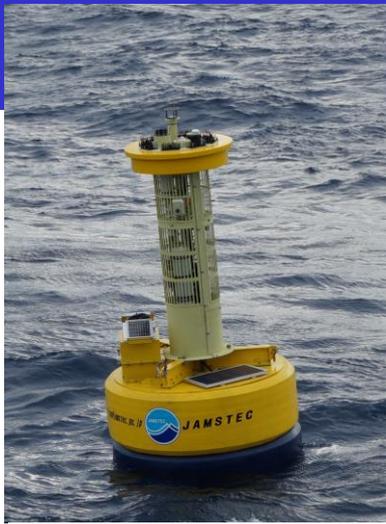
Period:

16 Nov 2017 – 15 Jan 2018

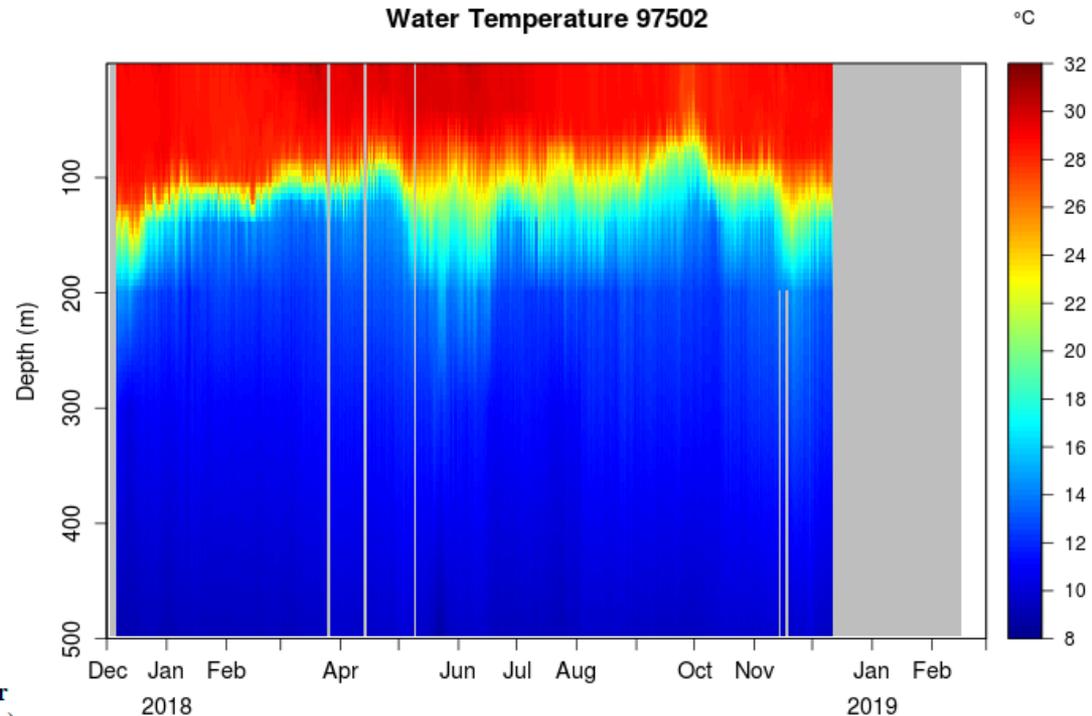
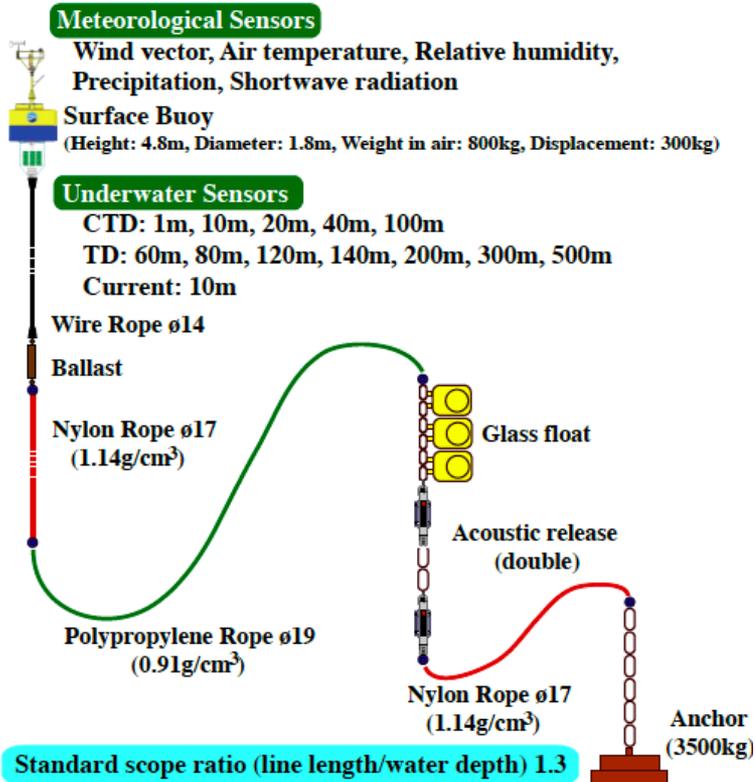
Obs. Item:

- Surface meteorology

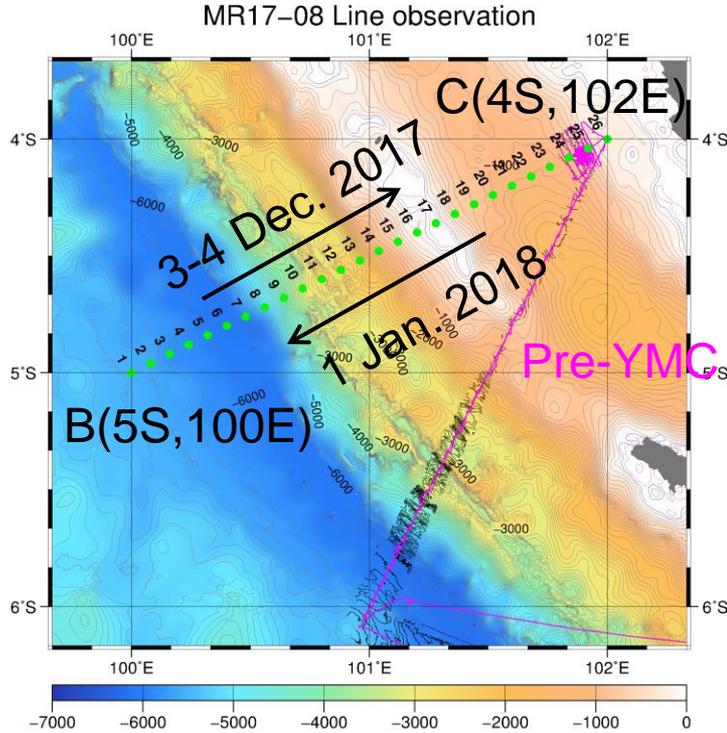
Sumatra buoy



- Deploy on 3 Dec 2017 at 5S, 100E.
- 10-min resolution data had been sent via satellite telecommunication system until 11 December 2018.
- Scheduled for recovery in September 2019.

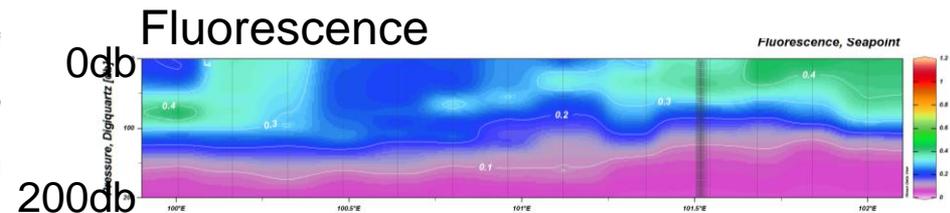
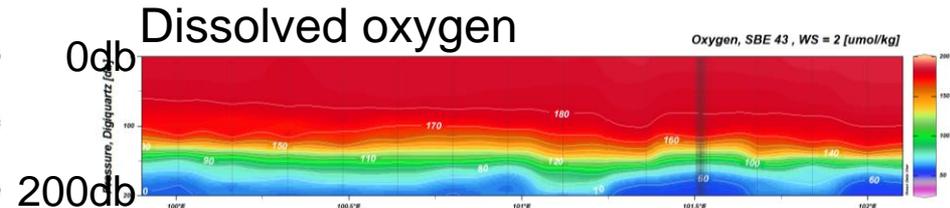
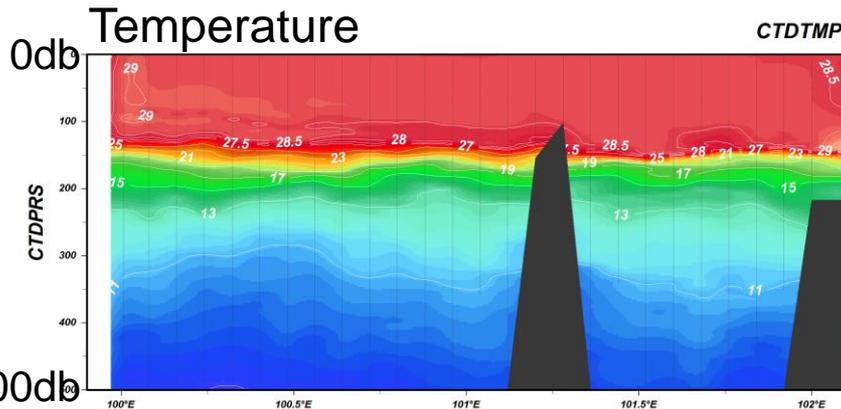


Line observation



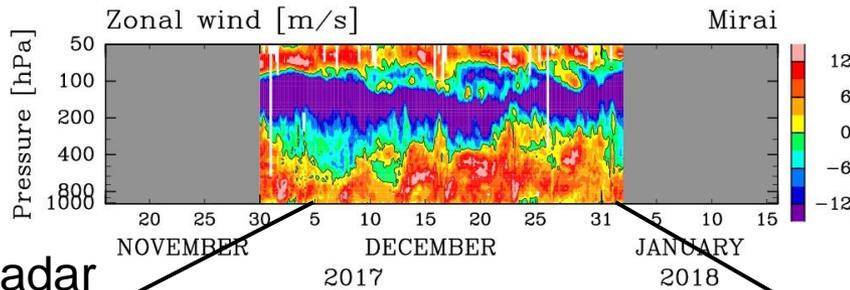
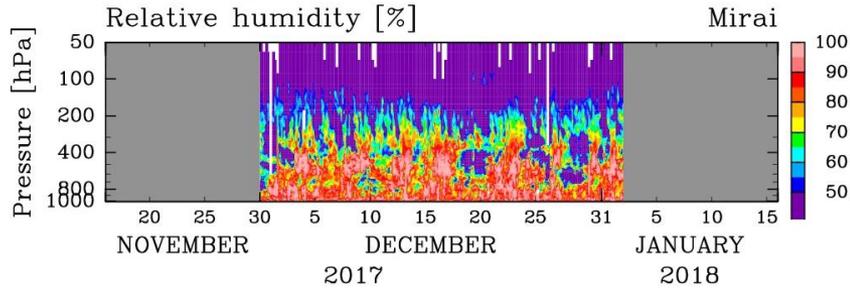
(5S, 100E) → (4S, 102E)
 on 3-4 Dec 2017, 10-km intervals
 CTD with water sampling (20-km intervals)
 & UCTD/XCTD

(4S, 102E) → (5S, 100E)
 on 1-2 Jan 2018, 20-km intervals
 UCTD/XCTD

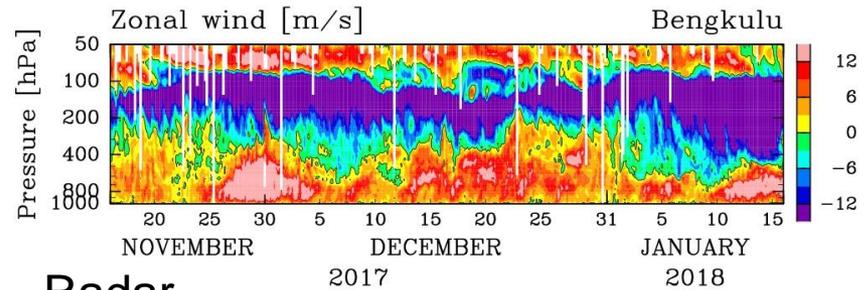
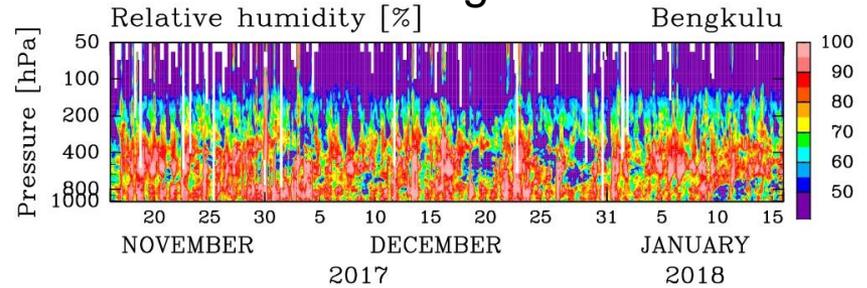


Station observation

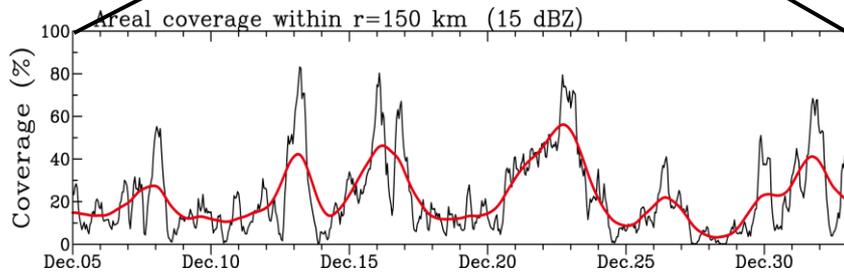
Radiosonde @ Mirai



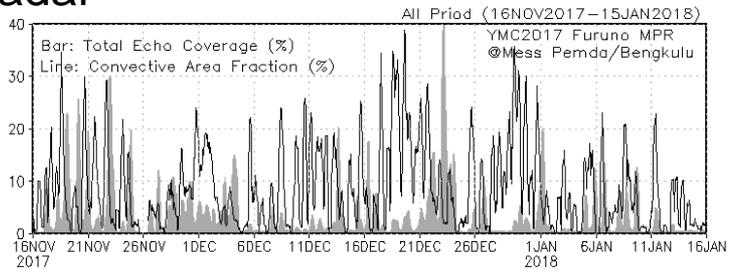
Radiosonde @ Bengkulu



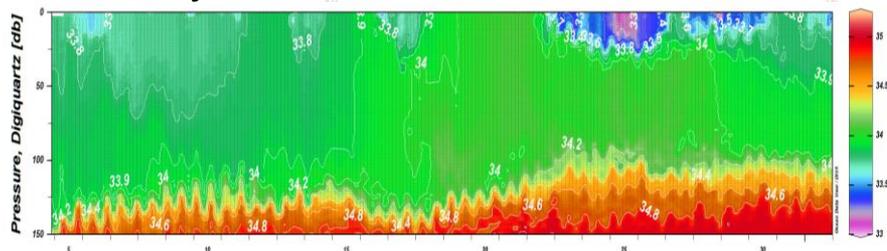
Radar



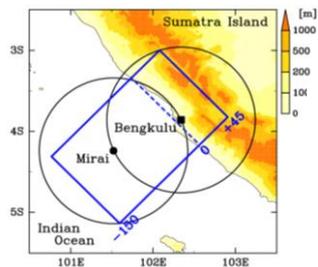
Radar



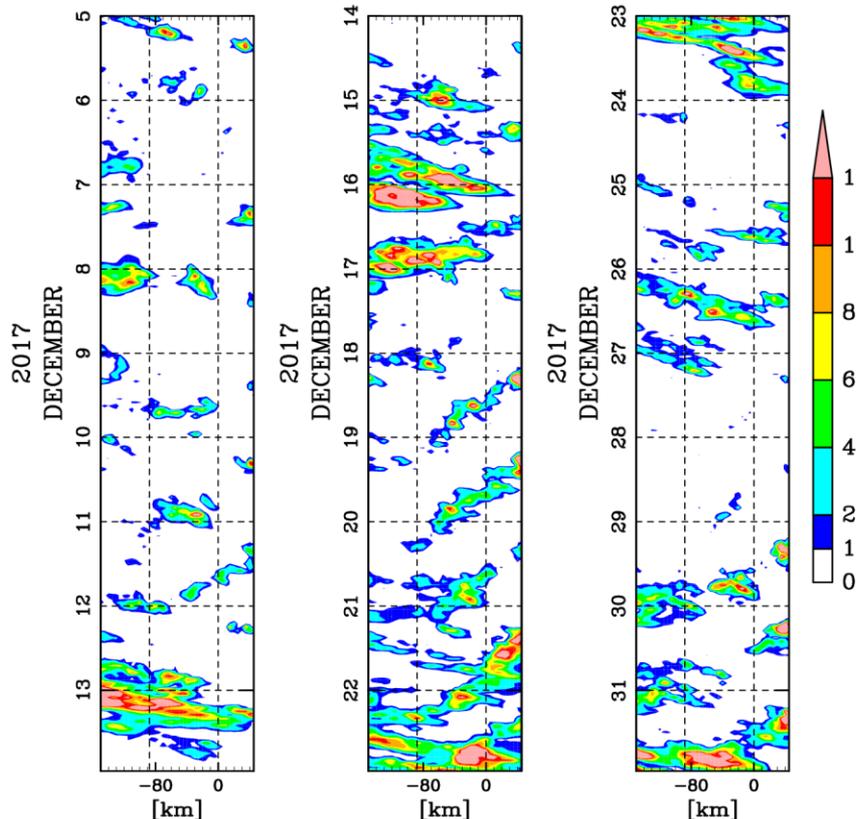
CTD salinity



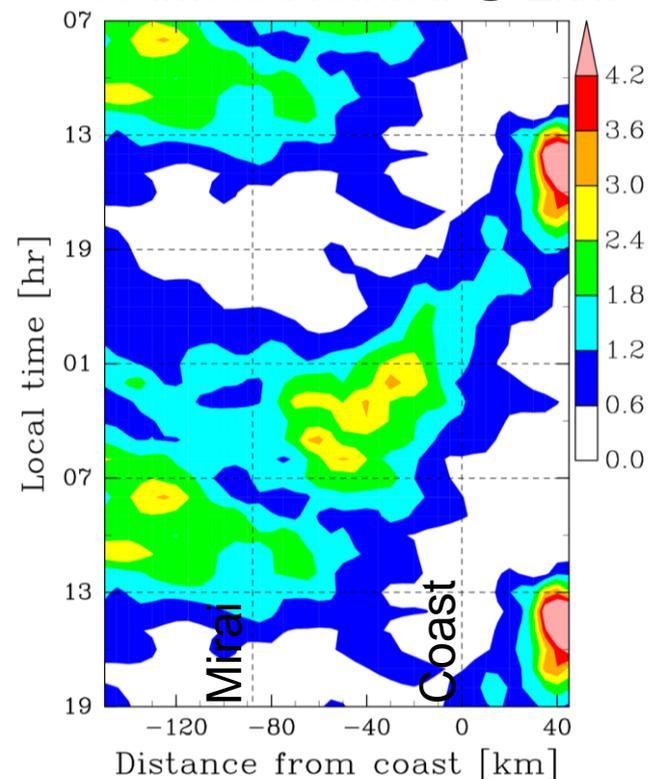
Characteristics in rainfall diurnal cycle



Distance-from-coast – Time plot of radar-estimated rainfall @ 2km



Mean diurnal cycle of radar-estimated rainfall @ 2km

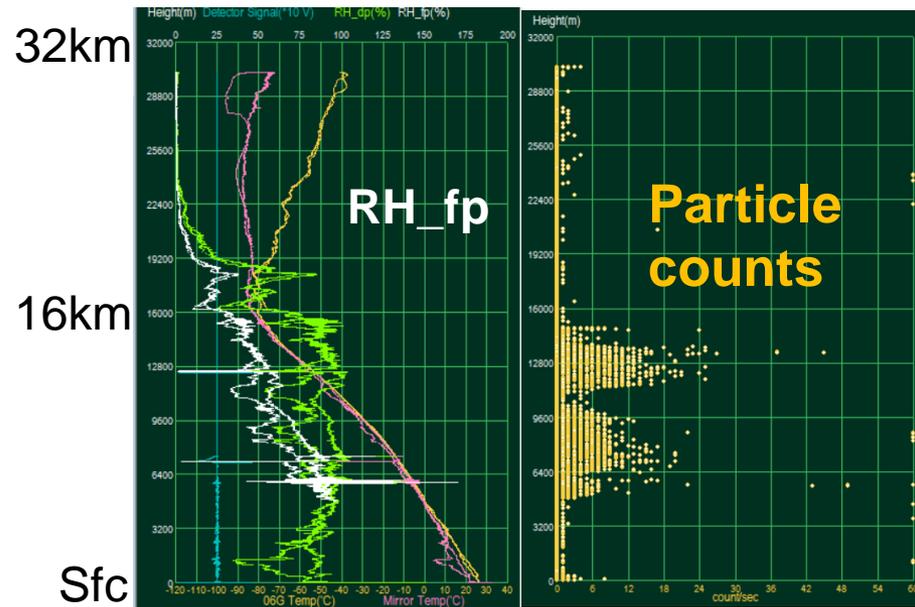


Nighttime offshore migration of rainfall area was observed for about half of the vessel's station observation period.

Yokoi et al. (*in revision*)

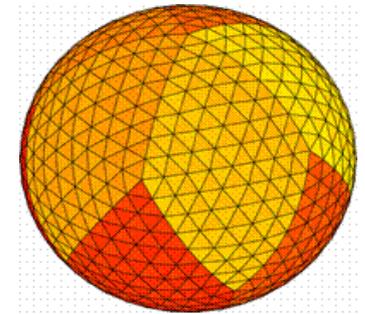
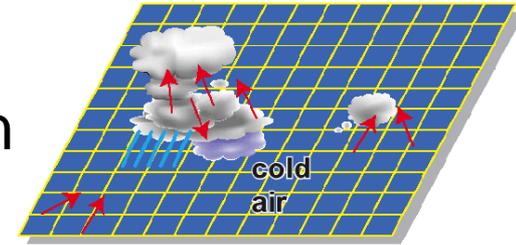
Special upper-air observation

- Radiosonde intercomparison (18 times):
 - iMS100 (Meisei) vs RS41 (Vaisala)
- Ozone sonde (11)
- Ozone sonde + water vapor sonde (10)
- Ozone sonde + cloud particle sonde (1)
- Ozone sonde + water vapor sonde + cloud particle sonde (3)



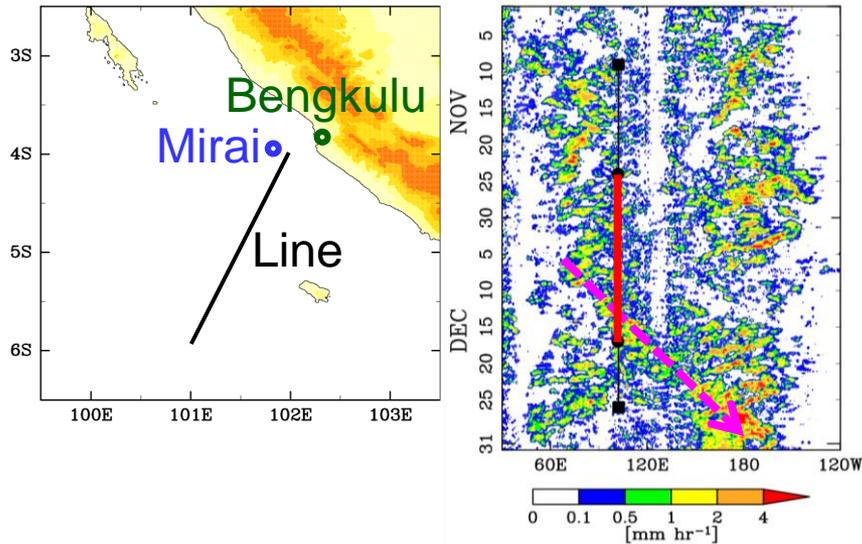
Numerical simulation activity

- Two types of forecast using Nonhydrostatic Icosahedral Atmospheric Model (NICAM) on the Earth Simulator
 - (1) 14-day, 7-km mesh (daily)
 - (2) 30-day, 14-km mesh (weekly, 4-mem ens)[<http://nicamfcst.jamstec.go.jp/>]
 - WRF near real-time dynamical downscaing from NCEP global ensemble forecast [<http://graspdb.jamstec.go.jp/ymc/index.html>]
- Forecasts were sent to on-site researchers and assisted their decision making.
- Hindcast, sensitivity experiments, and inter-model comparison (ongoing).



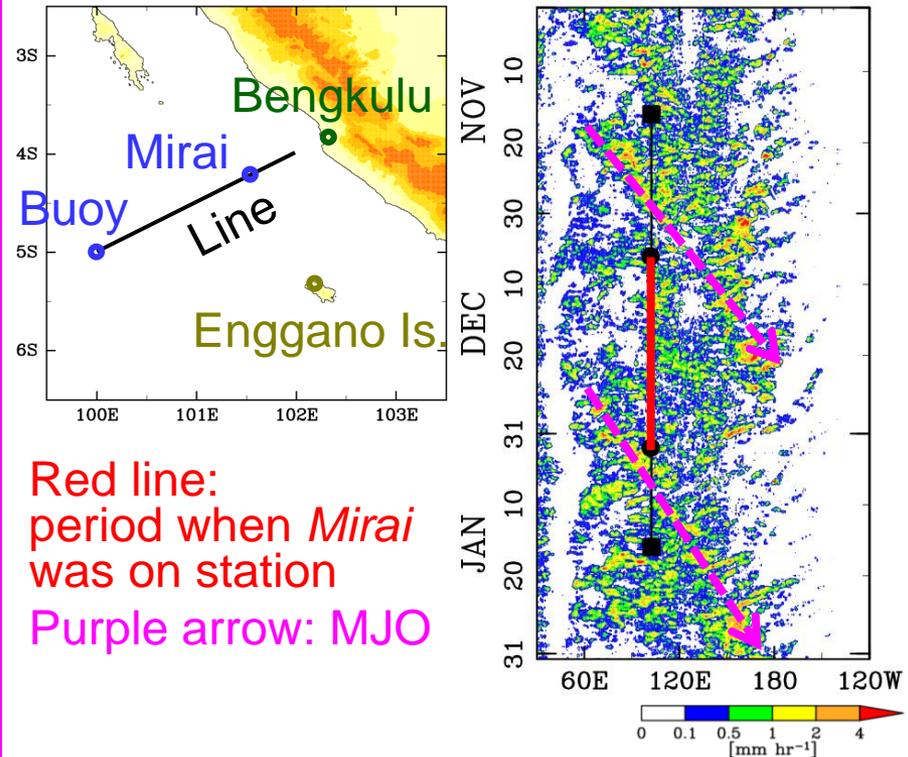
Comparison with Pre-YMC 2015

Pre-YMC 2015



- R/V *Mirai* was deployed closer to Bengkulu than YMC-Sumatra 2017.
- El Nino condition.
- R/V observed MJO developing stage.
- Lots of lightnings.

YMC-Sumatra 2017



Red line:
period when *Mirai*
was on station
Purple arrow: MJO

- La Nina condition.
- R/V observed MJO post-convective and developing stage.
- Almost no lightning.

Publication of data

- Under the YMC data policy, some of them are already available via YMC website.

[http://www.jamstec.go.jp/ymc/obs/obs_YMC-S2017.html]

- We will upload the rest of them as soon as QC process finishes.



The screenshot shows a web browser displaying the YMC website. The main header features a map of the Maritime Continent with the text "“ YMC ” Years of the Maritime Continent 2017 - 2019" and a subtitle: "Observing the weather-climate system of Earth's largest archipelago to improve understanding and prediction of its local variability and global impact." Below the map is a "Menu" sidebar with buttons for Home, About, What's New, Meetings, Campaigns, Data, Publications, Links, Members Only, and Japanese Page. The main content area is titled "Master List of YMC-Sumatra 2017/MIRAI Data Sets" and includes a sub-section "R/V MIRAI [Cruise Report]" with a table of data sets.

No.	Name	Period	Remarks
01	Radiosonde (Vaisala)	Nov. 27 - Jan. 11	Readme
02	GNSS precipitable water	Nov. 22 - Jan. 17	Readme
03	C-band Polarimetric Radar	Nov. 22 - Jan. 17	Readme
04	Micro rain radar	Nov. 22 - Jan. 17	Readme
05	Disdrometer	Nov. 22 - Jan. 17	Readme
06	Lidar	Nov. 22 - Jan. 17	Readme
07	Ceillometer	Nov. 22 - Jan. 17	Readme
08	Sky radiometer	Nov. 12 - Jan. 16	Readme
09	Aerosol and gas observations	Nov. 22 - Jan. 17	Readme
10	Stable isotope in the vapor & rainwater	Nov. 22 - Jan. 01	Readme
11	Surface meteorology	Nov. 22 - Jan. 17	Readme
12	Surface seawater	Nov. 22 - Jan. 17	Readme



Thank you for your attention.