

Cruise Summary

1. Cruise Information

Cruise ID: MR17-08

Name of vessel: MIRAI

Title of cruise: Study on air-sea interaction over upwelling region in the eastern Indian Ocean

Chief scientist: Satoru Yokoi (Japan Agency for Marine-Earth Science and Technology)
Fadli Syamsudin (Agency for the Assessment and Application of Technology, Indonesia)

Representative of Science Party:

Iwao Ueki (Japan Agency for Marine-Earth Science and Technology)

Kunio Yoneyama (Japan Agency for Marine-Earth Science and Technology)

Cruise period: Leg 1: November 12, 2017 – January 4, 2018

Leg 2: January 6, 2018 – January 18, 2018

Ports of departure/call/arrival:

Leg 1 November 12, 2017: Departure from Nakagusuku port, Okinawa, Japan
November 18, 2017 – November 21, 2017: Call at Singapore port, Singapore
January 4, 2018: Arrival at Tanjung Priok port, Jakarta, Indonesia

Leg 2 January 6, 2018: Departure from Tanjung Priok port, Jakarta, Indonesia
January 18, 2018: Arrival at Shimizu port, Shizuoka, Japan

Research area: Tropical eastern Indian Ocean “Maritime Continent”

Research map:

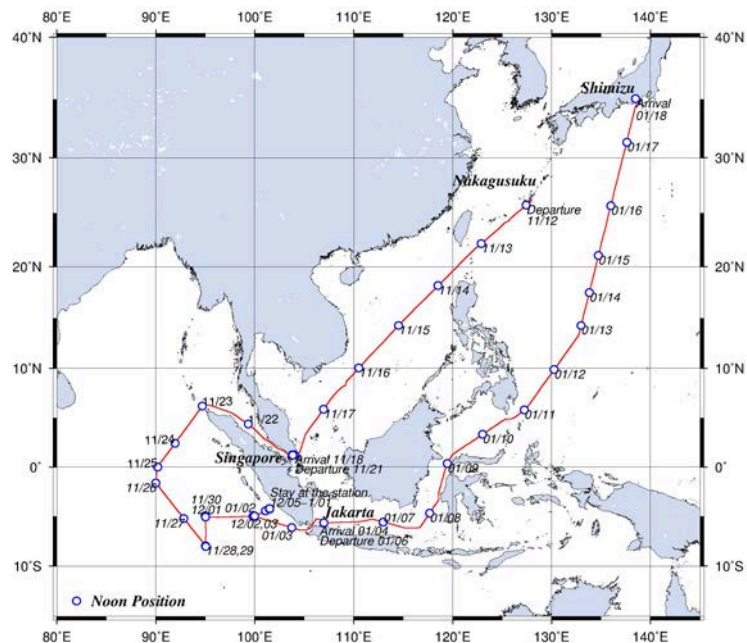


Fig. 1: Cruise track for all period.

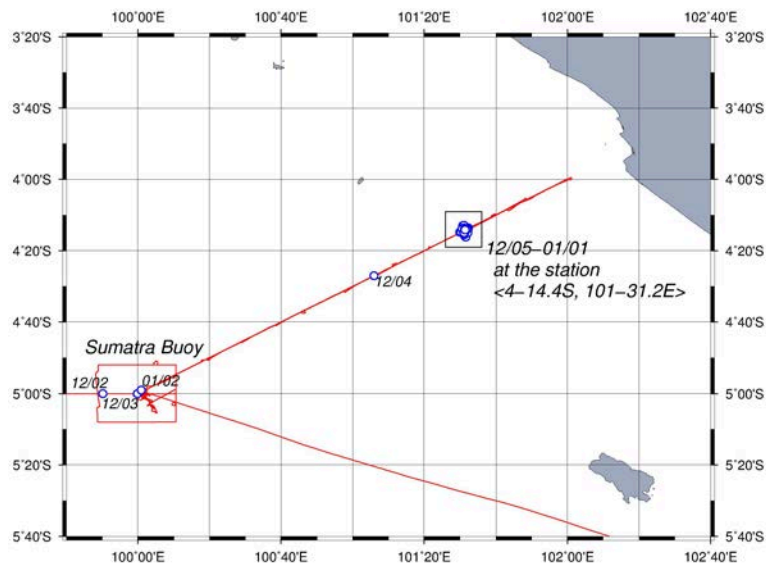


Fig. 2: Cruise track around the station.

2. Overview of research activities

(1) Background

The western coastal waters of Sumatra Island, Indonesia, are characterized by ocean upwelling and large amount of precipitation. The scientific purposes of this cruise are (1) to understand complicated physical and biogeochemical processes underlying the ocean upwelling, and (2) to reveal interaction between large-scale disturbances such as Madden-Julian Oscillation (MJO) and local circulation such as diurnal cycle through better understanding of precipitation systems from the viewpoint of ocean-atmosphere-land interaction. These purposes are tightly linked with international research activities of EIOURI (Eastern Indian Ocean Upwelling Research Initiative) and YMC (Years of the Maritime Continent), respectively.

(2) Observational items

In the first half of the cruise, recovery and deployment of an ADCP subsurface mooring at (0N, 90E), recovery of the underwater part of an m-TRITON buoy at (1.5S, 90E), deployment and recovery of m-TRITON buoys at (8S, 95E) and (5S, 95E), and deployment of an m-TRITON buoy at (5S, 100E) were performed. At (5S, 95E), deployment of a conventional Argo float and a deep-ocean Argo float was also performed.

Then, station observation was performed at (4.24S, 101.52E) during the period from December 5, 2017, through January 1, 2018. Observational items included weather radar, surface meteorology, ceilometer, lidar, micro rain radar, disdrometer, MAX-DOAS, sky radiometer, water

vapor isotope analyzer, GNSS precipitable water, shipboard ADCP, TSG, sea snake thermistor, and underway geophysics. Furthermore, radiosonde, CTD, and TurboMAP observations were performed every 3 hours. Frequency of radiosonde launch was enhanced to 1 hourly from 15SMT to 01SMT of 10 days. Sea water samples taken with the CTD sampling system and bucket were subject to laboratory measurements of salinity, dissolved oxygen, nutrients, chlorophyll-a, and primary production.

Before and after the station observation period, line observations consisting of CTD, UCTD, and XCTD were performed along the segment connecting (4S, 102E) and (5S, 100E). Wave Glider was deployed at (5S, 100E) which collected observations that can be used for comparison with data taken by the m-TRITON and the vessel, and was recovered near the station.

Series of autonomous observations except for the sea snake thermistor were performed wherever possible during the cruise. In addition, 6-hourly radiosonde observations were performed in the Indonesian EEZ during Leg 2.

In summary, we could conduct almost all the observational items we had planned. There were 355 radiosonde launches, 235 CTD casts, 116 times of sea water sampling, 217 TurboMAP casts, 23 UCTD casts, and 9 XCTD casts. In the station observation period, we observed no little amount of precipitation which varied with wide range of time scales from hours to weeks, several events of freshening of surface water, and shoaling of thermocline.