1. Cruise information

・Cruise code

MR15-05

・Platform

R/V Mirai

・Title of the cruise

Research cruise on ocean decadal variability -- Indian Ocean GO-SHIP (Global Ocean Ship-based Hydrographic Investigation Program)

・Chief scientists

Leg 1, Katsuro Katsumata（RCGC, JAMSTEC）

Leg 2, Akihiko Murata（RCGC, JAMSTEC）

・Principal investigators of the piggyback projects

Kazuma Aoki (University of Toyama)

Takuro Nunoura (JAMSTEC)

Yugo Kanaya (JAMSTEC)

Masaki Katsumata (JAMSTEC)

Kei Shiomi (JAXA)

・Piggyback projects （*1:personnel onboard on Leg 1）

(1) Aerosol optical characteristics measured by ship-borne Sky radiometer (Toyama University)

(2) *1 Geochemical and microbiological investigation from sea surface to sea bottom at tropical eutrophic ocean (JAMSTEC, University of Tokyo, Tokyo University of Agriculture and Technology, Rakuno Gakuen University, etc.)

(3) Advanced measurements of aerosols in the marine atmosphere: Toward elucidation of interactions with climate and ecosystem (JAMSTEC)

(4) Global distribution of drop size distribution of precipitating particles over pure-oceanic background (JAMSTEC)

(5) Shipboard CO_2 observations over the tropical Indo-Pacific Ocean for a simple estimation of the carbon flux between the ocean and the atmosphere from GOSAT data (JAXA)

・Cruise period

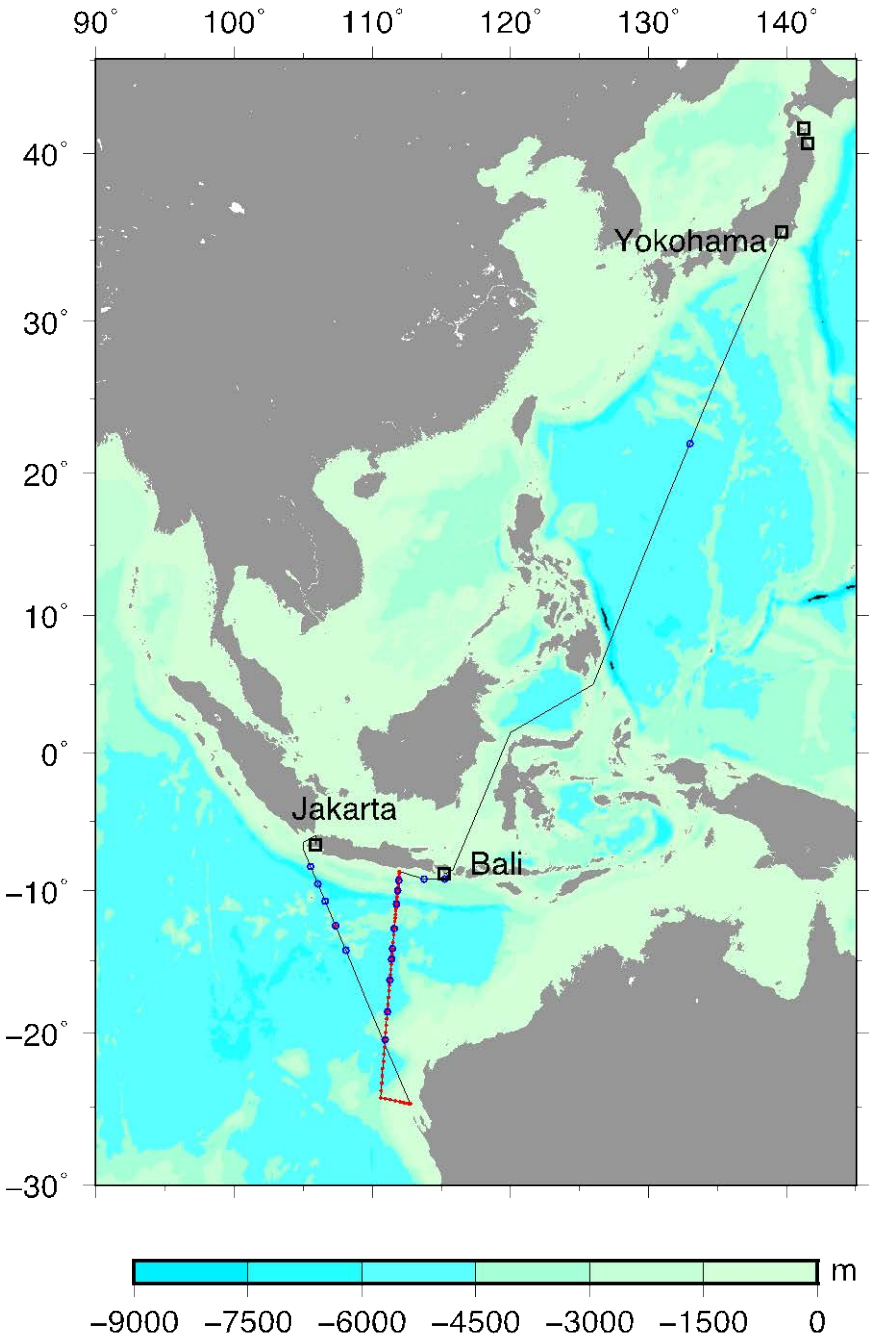
Leg1 (20 days): Jakarta (23rd December 2015) to Bali (11th January 2016)

Leg2 (13 days): Bali (13th January 2016) to Yokohama (25th January 2016)

・Research Area

The northeastern Indian Ocean and the western Pacific Ocean

・Map



MR15-05cruise map. Blue circles show Argo deployment points. Red dots show CTD/sampling stations.

２． Observation

Objective

Indonesian Throughflow is a surface component of the global ocean circulation, which transports fresh Pacific upper water masses into the north Indian Ocean with strong modification from the air-sea interaction and tidal mixing. Paucity of observation data in this part of the world ocean has always been a restriction in understanding global climate change and air-sea coupling — a problem shared amongst emerging international programmes such as Eastern Indian Ocean Upwelling Research Initiative. The main purpose of this cruise is to measure the distribution of water properties (temperature, salinity, dissolved oxygen, carbon, nutrients, etc.) in this important ocean. This is a contribution to International Indian Ocean Expedition 2.

Observation

(1) CTD, water sampling, LADCP (JAMSTEC, University of Tokyo, Tokyo University of Agriculture and Technology, Rakuno Gakuen University, National Insititute for Environmental Studies, Bigelow Laboratory for Ocean Sciences)

・We measured, with an CTD and other electrical sensors attached to a CTD frame, such hydrographical characteristics as temperature, salinity, dissolved oxygen, chlorophyll, current velocity, temperature microstructure etc.

・We sampled sea water from near surface to near bottom at maximum of 36 depths using Niskin sampler.

・We sampled surface water using bucket sampling.

(2) Precipitation system (JAMSTEC, JAXA, National Institute of Information and Communication Technology)

・Three dimensional structure of precipitating clouds were measure using Doppler radars.

・Vertical structure of precipitating clouds were observed using Ka-band radar, micro-rain radar.

・Distribution of rain drop size were measured using disdrometer.

(3) Cloud, aerosols, vapor (JAMSTEC, Toyama University)

・Cloud base height was measured continuously using ceilometer.

・Optical characeteristics of aerosols were measured using skyradiometer.

・Using MAX-DOAS (Multi-Axis Differential Optical Absorption Spectroscopy), height distribution of aerosols, NO_2, etc were measured.

・Almost continuous measurement were performed with sampled air for blackcarbon, fluorescent aerosol particles, CO, O_3 etc.

(4) Atmospheric CO_2 measurements (JAXA)

・Average columnar content of CO_2 etc. was indirectly measured through solar radiation.

(5) Meteorological observations (JAMSTEC)

・Atmospheric parameters such as pressure, temperature, humidity, wind velocity, and radiations were measured.

(6) Argo float deployments (JAMSTEC)

・Sixteen floats on leg 1 and one float on leg 2 were deployed.

(7) Continuous pump water sampling (JAMSTEC)

・With subsurface pump installed on the vessel, near-surface temperature, salinity, dissolved oxygen, chlorophyll as well as partial pressure of carbon dioxide were measured almost continuously.

(8) Geophysical observations (JAMSTEC)

・ Bathymetry, gravity, and magnetic fields were measured along the cruise track. No measurements were made in Exclusive Economical Zones except for that of Australia and Indonesia. No measurements were made in territorial waters.