

# Observations and Modeling Research Activities in Japan for EIOURI and IIOE-2

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R/V Mirai

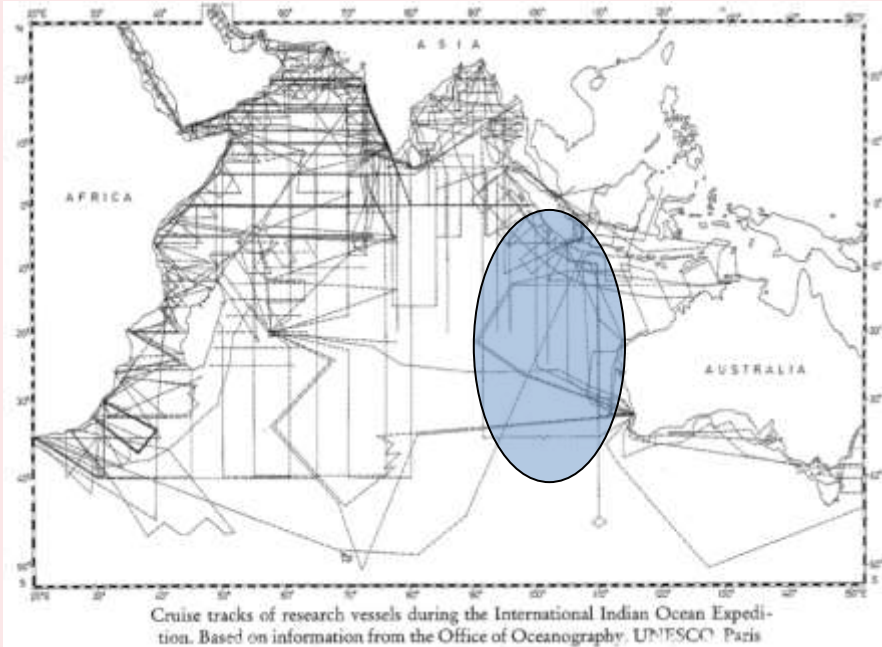


R/V Hakuho-maru



Earth Simulator

# Japanese Participation in IIOE



## International Indian Ocean Expedition (IIOE; 1959-1965)

- One of the greatest international, interdisciplinary oceanographic research efforts.
- 46 Vessels from 14 countries
- Physical oceanography, chemical oceanography, meteorology, marine biology, marine geology and geophysics
- Led to establishment of NIO, India

## Four research vessels participated in IIOE in 1963/64



Umitaka-Maru II



Koyo-Maru II



Kagoshima-Maru

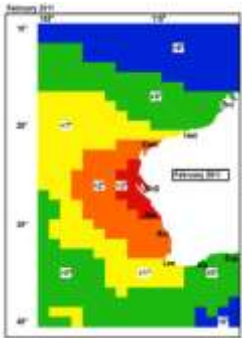


Oshoro-Maru III

# Our Present Interests

< Many Important processes have not been clarified yet >

## Dynamics of Ocean/Climate Variations

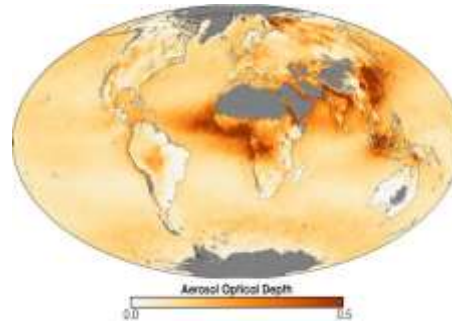


SST anomaly during Ningaloo Niño

For example...

Ocean and Atmosphere variations associated with IOD and Ningaloo Niño.

## Nitrogen Cycle in the Bay of Bengal

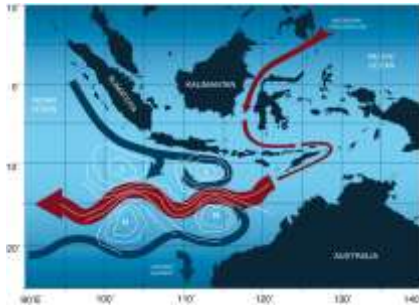


Distribution of optical depth of aerosol

For example...

Nitrogen fixation, N<sub>2</sub>O production, and their relations to upper-layer processes.

## Mapping of biogeography and biogeochemistry

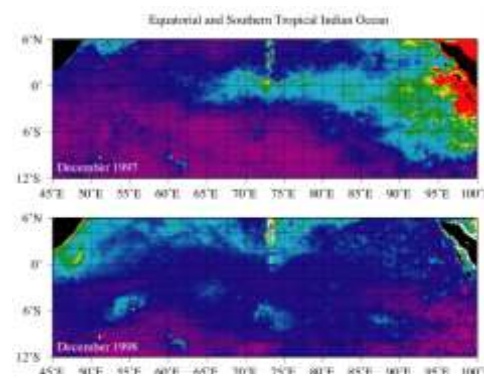


Schematic of Indonesian throughflow

For example...

Impacts of Indonesian throughflow on biogeochemistry

## Bio-Physical Relations in Upwelling Regions

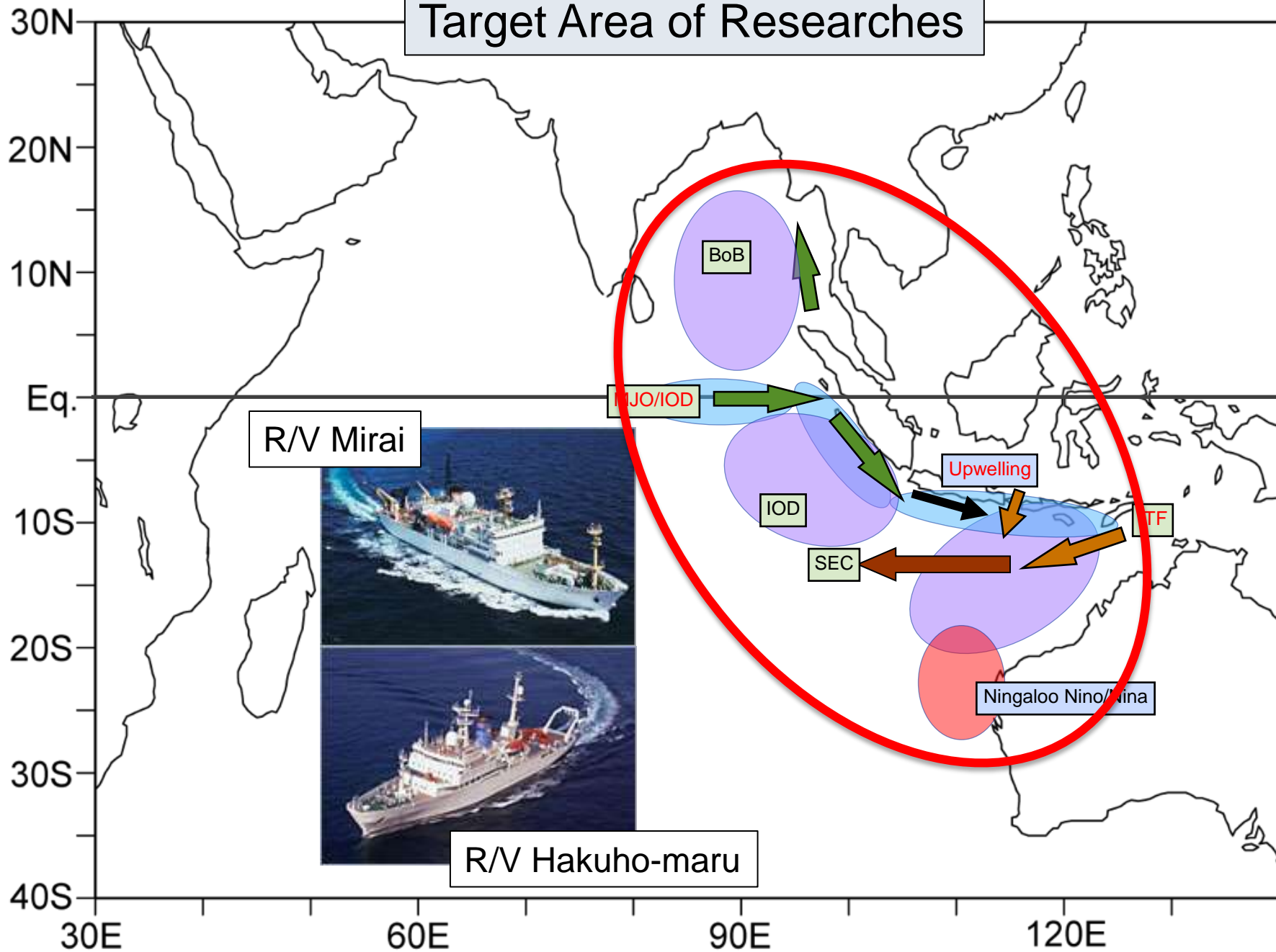


Distribution of chlorophyll concentration in IOD year and normal year

For example...

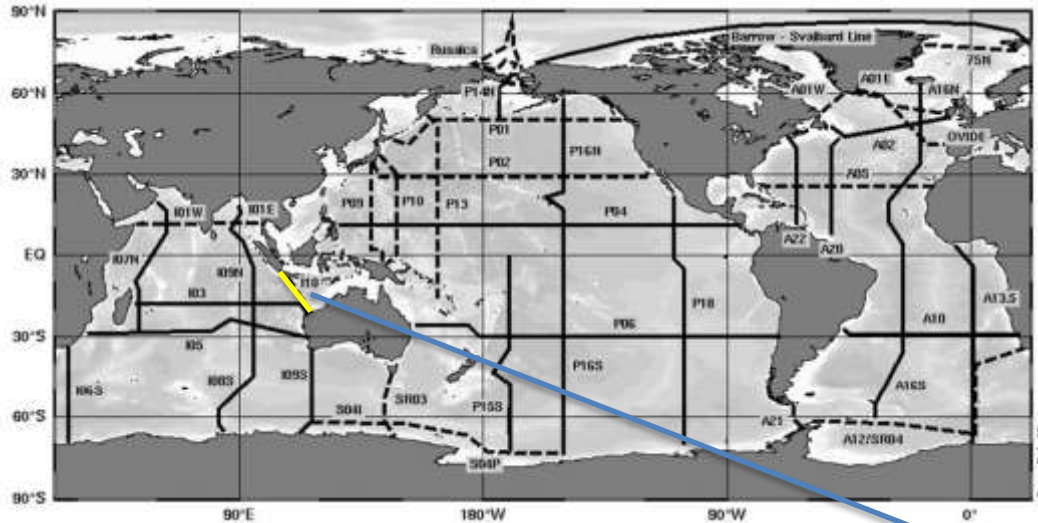
Impacts of equatorial and coastal upwelling on biogeochemical parameters.

# Target Area of Researches

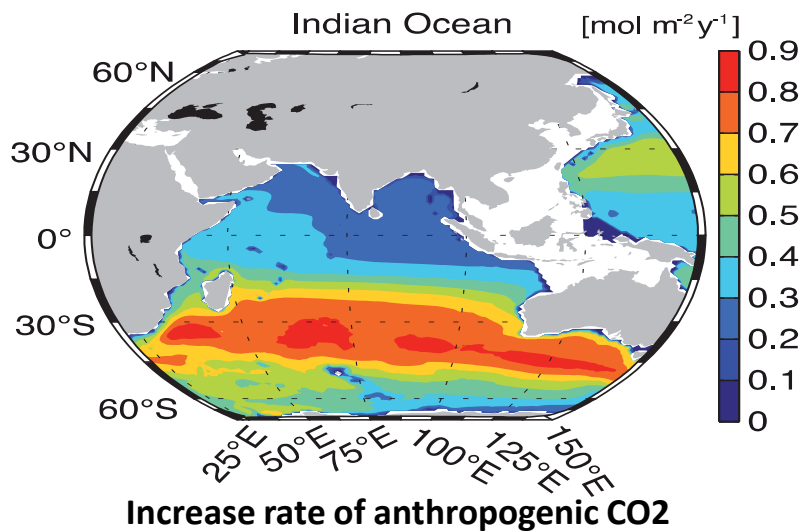
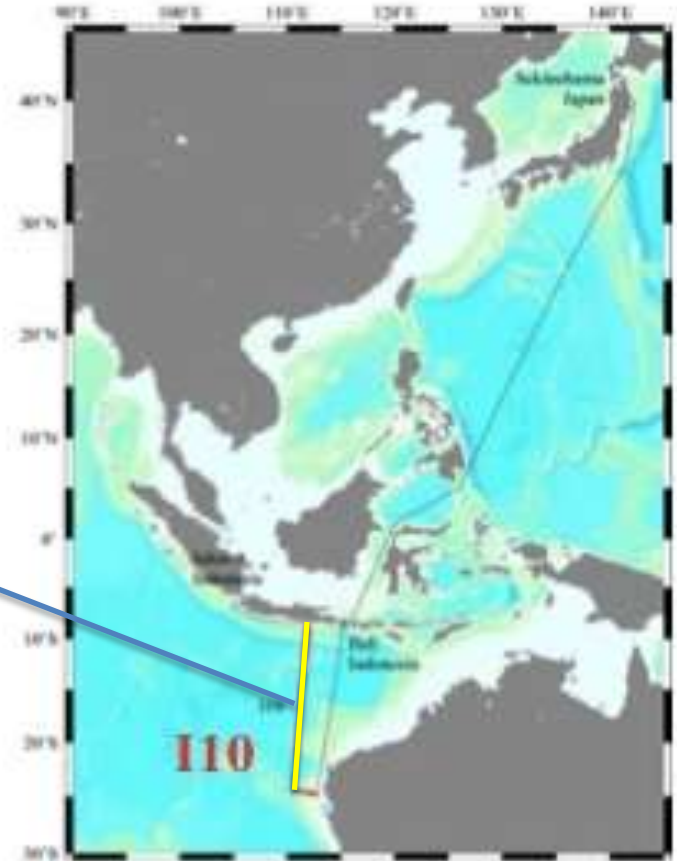


# Repeat Hydrography in GO-SHIP

-Understanding of medium- to long-term oceanic environmental changes-  
(Dec 2015 – Feb. 2016)



GO-SHIP repeat section



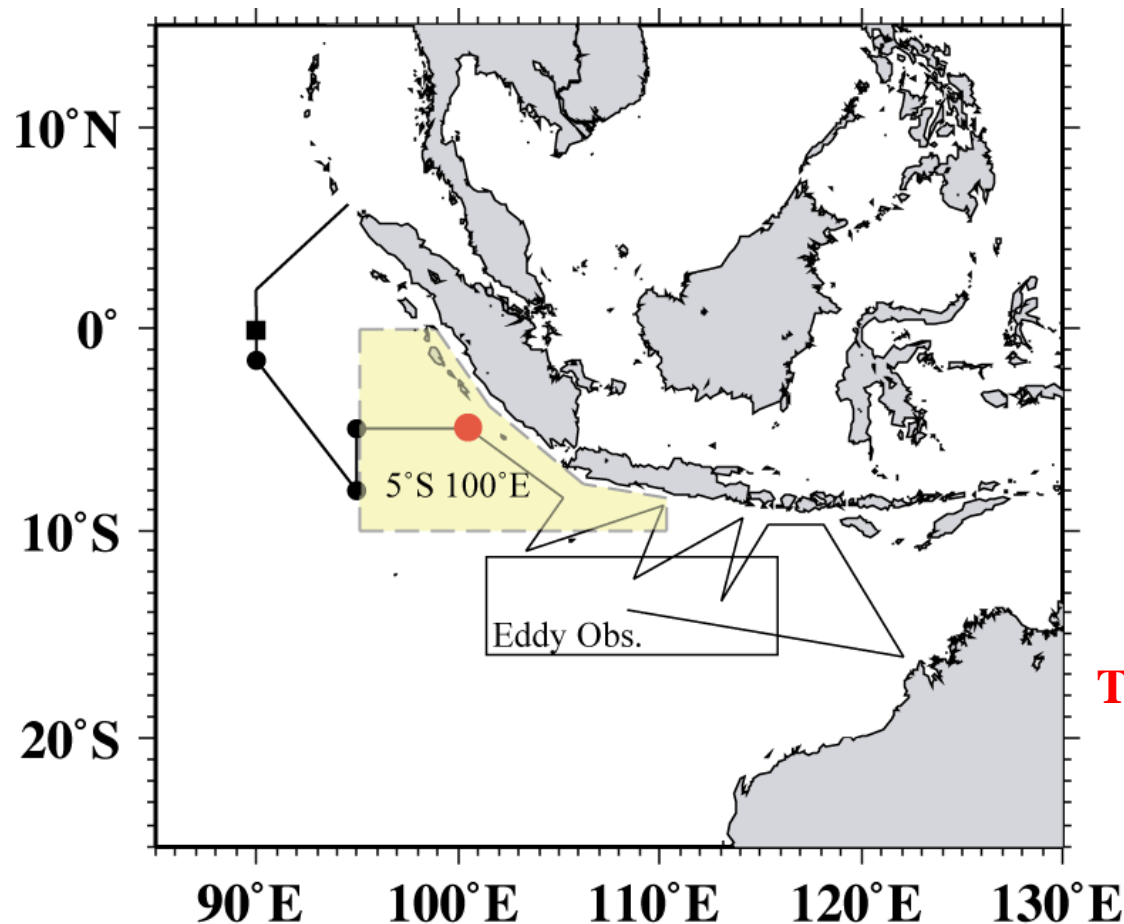
Increase rate of anthropogenic CO<sub>2</sub>

- ⊙ T, S, DO, Nuts, TA, DIC, DOC, pH, Chl-a, CFCs, SF6, 13C, 14C, 137Cs, 134Cs, 18O, LADCP
- ⊙ Continuous surface observation
- ⊙ ARGO floats

# EIOURI-Mirai cruise

**Period: Oct. – Nov. 2017 (tentative)**

**Observations: deployment of surface buoy,  
CTD/water sampling along sections &  
across eddy,**



## R/V Mirai



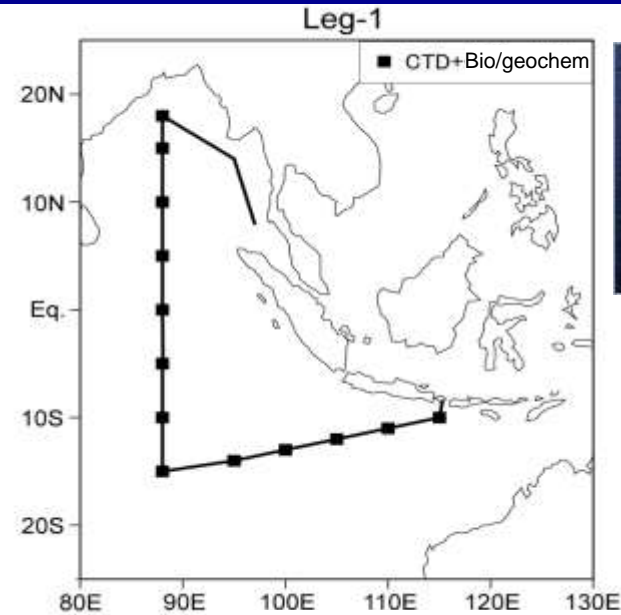
length	128.0 m
width	19.0 m
depth	13.2 m
gross tons	8,687 ton

**This cruise will contribute to EIOURI.**

# Integrated eastern Indian Ocean Expedition for Physical, Biogeochemical and Ecosystem Researches (2018 Fall – 2018/19 Winter)

## (Leg. 1) Bay of Bengal, 88° E section

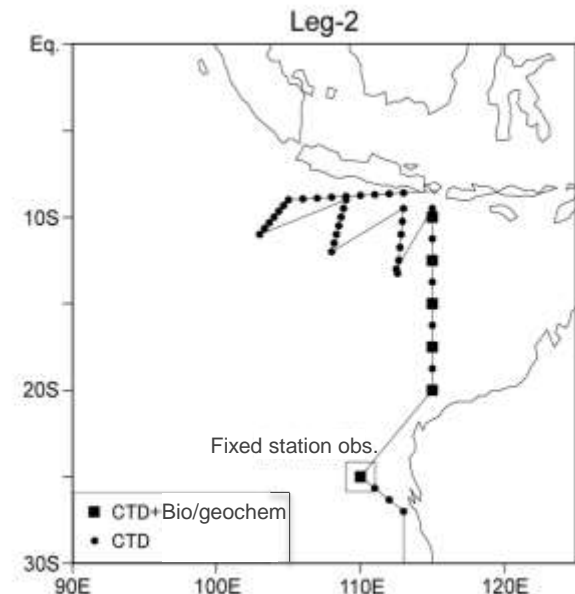
- © Air-Sea interaction and Nitrogen Cycle
  - Monsoon, Eolian dust, Fe, N<sub>2</sub> fixation, de-nitrification, N<sub>2</sub>O production
- © Mapping of biogeography and biogeochemistry
  - Bioelements, Trace elements, phyto / zoo plankton, bacteria
- © Upper-layer circulations



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## (Leg.2) off Sumatra / Java and NW Australia

- © Upwelling and biogeochemistry
  - Seasonal variation and IOD upwelling
- © Indonesian Through Flow and its impact on biogeochemistry
- © Ningaloo Niño/Niña



# High-resolution modeling

## OGCM For the Earth Simulator (OFES)

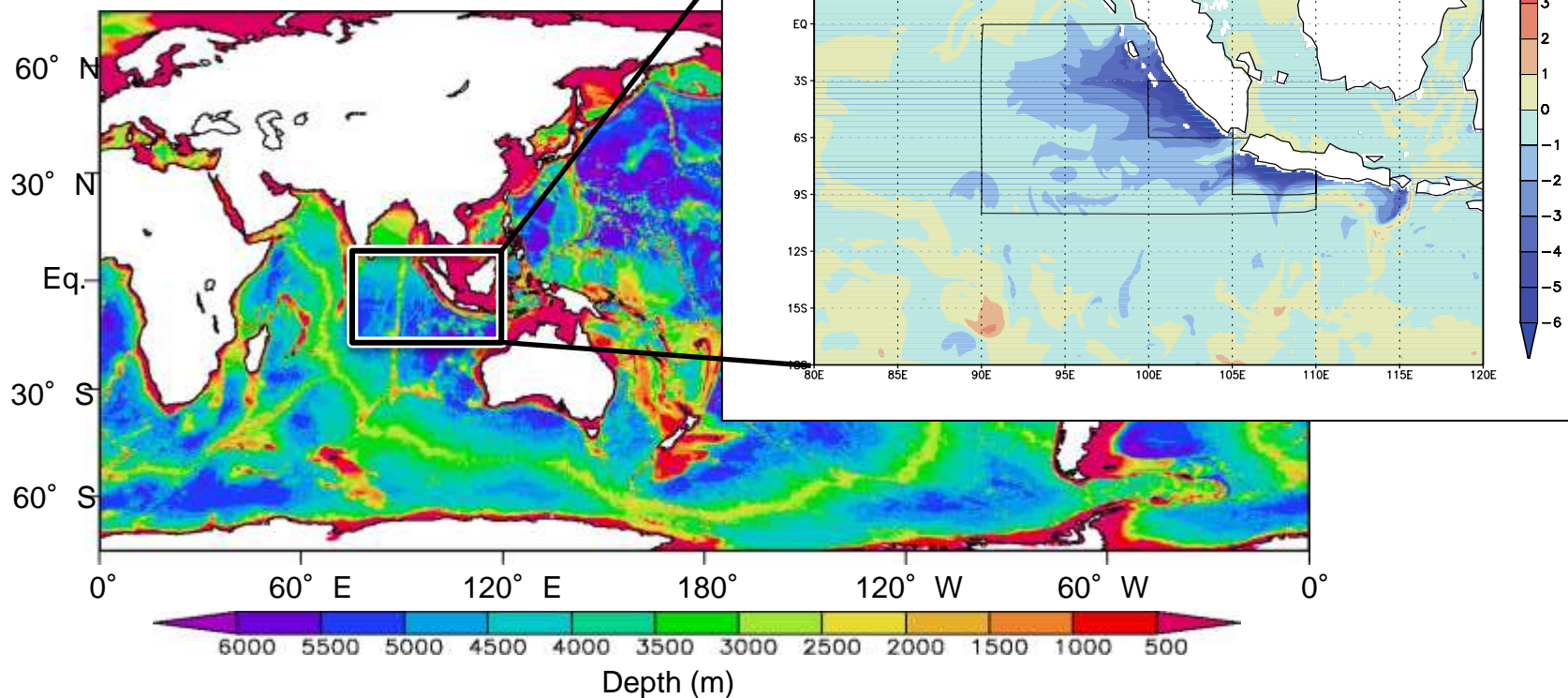
**Stand-alone ocean  
GCM based on MOM3**

Domain : 75° S-75° N

Grid spacing : 0.1°

Vertical le

Bathymet





# Summary

- There is no national committee for IIOE-2 in Japan at present
- There are several funded research cruises in coming 5 years, and research activities strongly relevant to IIOE-2 will be conducted



R/V Mirai



R/V Hakuho-maru



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