Role of the Banda Sea in MJO propagation through the Maritime Continent and 2019 YMC Banda Sea cruise

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YMC Banda Sea Cruise (November – December 2019)

Participating Institutes:
Indonesia - BMKG, BPPT, LIPI, ITB, IBP
US - PMEL, ESRL, UW, SIO

Objective: To study
- air-sea interaction, the diurnal cycle, and the MJO
- validation of NWP and wave models
- water quality
- distribution of scrombidae larva associated with air-sea interaction, influence of ocean dynamic on the primary production and micro plastic, upper-ocean bio-physical response to the MJO
- bathymetric mapping for submarine hydrothermal activities, gas seeps and marine activities around the seamount at the Banda volcanic arc
Barrier Effect of the MJO

Zhang and Ling (2017)
Possible Mechanisms for the Barrier Effect:

- Topographic interference with the MJO low-level circulation
- Reduction in surface evaporation by land
- Background state in moisture and circulation
- Diurnal cycle
- Air-Sea Interaction?
Schematic of MJO Air-Sea Interaction over the Open Ocean

Moum et al. (2014)
Complication of MJO Air-Sea Interaction due to the MC

- Deep diurnal convection over land
- Surface flux blocked islands

- Surface wind and low-level wind pattern distorted by elevated terrain

- Complicated ocean currents
- Additional mixing mechanisms
- Freshwater input from river runoff
Higher SST in the Banda and Timor Seas for MJO-C than MJO-B before their convection centers enter the MC.
Possible Role of the Diurnal Cycle in the Barrier Effect

MC-Averaged Precipitation

Rainfall over the MC

Rainfall over Land (dashed) and Water (solid) of the MC

Ratio of Rainfall over Water vs. Land of the MC

Possible Role of the Diurnal Cycle in the Barrier Effect
Mixing MJO wind
Latent and sensible fluxes
MJO wind
Night-Morning
MCS
Afternoon
Sea breeze
Land breeze
Mixing
Interaction between the diurnal cycle and MJO
Argo floats—present
Summary:

The Indonesia-US Joint YMC Banda Sea Cruise will be the first one in the Banda Sea to make simultaneous measurements of the upper ocean, atmosphere, and air-sea interaction in the Band Sea.

It is anticipated that the observations to be collected from the cruise will shed lights to the role of the Banda Sea in the barrier effect and MJO-diurnal cycle interaction.

The synergy between the Banda Sea cruise, Investigator cruise, and Terra Maris will provide broader perspectives regarding the general issues of the YMC.