

Observational study of diurnal offshore migration of precipitation area over the Indonesian Maritime Continent

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The Pre-YMC (Years of the Maritime Continent) field campaign conducted in the western coastal area of Sumatra Island during November and December of 2015 successfully observed typical diurnal cycle of precipitation over coastal waters characterized by nighttime offshore migration of heavy precipitation zone, with 3-hourly radiosonde soundings and weather radar at the research vessel *Mirai* deployed at about 50 km off the coast. Through analysis of these observational data, this study examines mechanisms responsible for the offshore migration. We find that the static stability of the offshore atmosphere decreases a couple of hours before the arrival of the precipitation zone, which is due mainly to cooling in the lower free troposphere. We further find that the cooling is due mainly to ascent motion, which is presumably a component of shallow gravity waves excited by convective systems over land. As the cooling rate is significantly correlated with offshore precipitation amount during nighttime, we can conclude that these gravity waves and the resultant destabilization play significant roles in the offshore migration of the precipitation zone via enhancement of the convective activity.

Keywords: precipitation diurnal cycle, the Indonesian Maritime Continent, gravity waves