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Plain Language Summary: The impact of mixed Rossby-gravity waves (MRGWs) on the diurnal cycle of precipitation over the southwestern coastal area of Sumatra was investigated using data captured during a pilot field campaign of the Years of the Maritime Continent (YMC) project. The results suggest that local convergence induced by the land–sea contrast is mainly responsible for driving the diurnal cycle. Notwithstanding, MRGWs exert a significant impact on the amplitude of diurnal convection and precipitation by modulating the dynamic structure of the atmosphere.

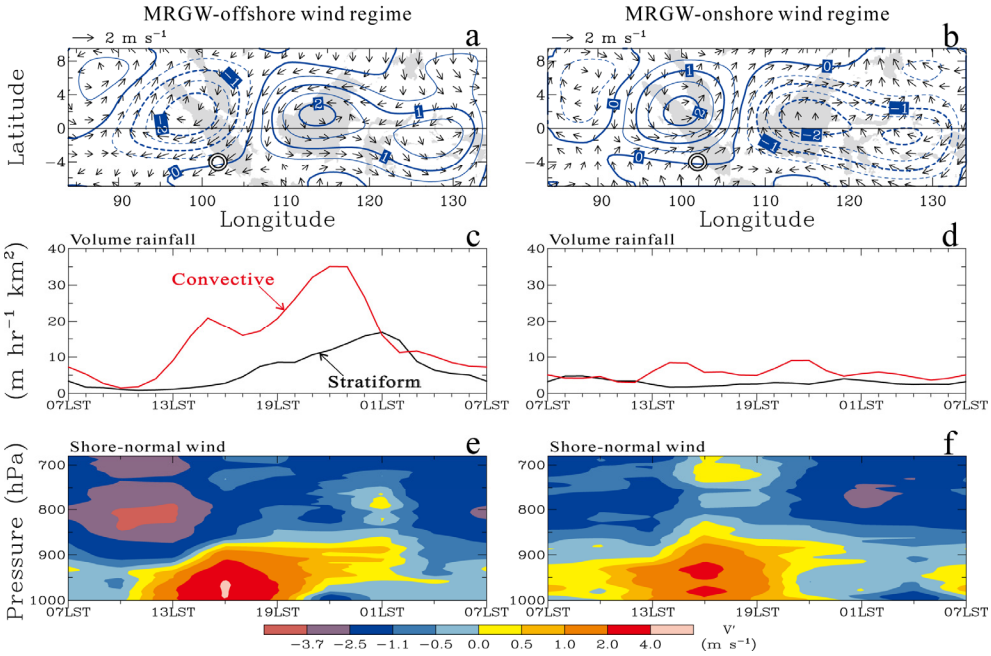

Figure 1. (a, b) Mean 700 hPa stream function (blue contours, 10^5 m^2 s^{-1}) and wind (vectors, m s^{-1}) derived from the bandpass-filtered global objective analysis data during days with a radar-derived maximum volume rainfall of > and ≦38.6 m h^{-1} km^2, respectively. The circle indicates the radar domain, and land areas are shaded in gray. (c, d) Mean diurnal cycles of radar-derived volume rainfall from convective echoes (red curve, m h^{-1} km^2) and from stratiform echoes (black curve, m h^{-1} km^2) during the MRGW-offshore and MRGW-onshore wind regimes, respectively. (e, f) Same as (c, d) but for the shore-normal wind component (color shades, m s^{-1}) observed by radiosonde. Positive (negative) values represent the component toward land (sea).

- Diurnal convection and precipitation over the land and ocean were enhanced (suppressed) when MRGW-induced offshore (onshore) wind perturbations dominated over the radar domain.
- Stronger large-scale low-level convergence and more intense sea- and land-breeze circulations were observed with the intensification of MRGW-induced offshore wind perturbations.
- However, diurnal precipitation displayed a similar well-defined phase, coherent with the regular evolution of sea- and land-breeze circulations, regardless of wind perturbations induced by MRGWs.