

Effect of the diurnal variation on the hydrological cycle over the maritime continent

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The climate of the maritime continent is characterized by huge amounts of precipitation throughout the year. The unique environment in this region with complex distribution of islands and warm pool favors the development of deep and frequent convection. The deep convection accompanied by heavy precipitation is generally observed over islands and its surrounding ocean rather than open seas. Major islands combined with surrounding warm seas, therefore, are most likely to play an important part in the energy and water cycle processes driving the complex atmospheric circulation pattern.

To understand the time-space characteristics of the hydro-climate in islands and ocean, we examined the climatological hydrological cycle from 1998-2010. The characteristics of water budget are separated between Island (including its surroundings ocean) and open seas in the maritime continent. The seasonal variation of precipitation over Borneo and the surrounding ocean is very small compared with those over other tropics. The vertically-integrated moisture flux fields show divergence throughout the year over the Borneo, suggesting that evapotranspiration from the island surface is a major source of moisture to atmosphere. In contrast, other major islands in the maritime continent, such as New Guinea, the seasonal cycle of moisture flux convergence is observed. On the other hand, the contribution of moisture flux convergence to precipitation is noticeable over the surrounding ocean of the major islands. The diurnal variance of the hydrological components is large over Island region and its surrounding oceans. Diurnal cycle of local atmospheric circulation plays an important role in exchange of water between the island and the surrounding ocean. The intraseasonal oscillation (ISO) is also a dominant mode of rainfall over this region. The influence of the ISO on the water budget appears stronger over the ocean than over the island. The vertical profile of the moisture flux and specific humidity indicate large difference in low-middle level between ocean and island.

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