[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS02]Large-scale moisture and organized cloud systems

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Water vapor plays a significant role in regulating the global atmospheric circulation, especially in the troposphere. The overturning circulation is directly driven by the longwave radiative cooling of water vapor and the latent heating/cooling through microphysical processes to balance it. This global circulation is composed of diverse atmospheric phenomena with various spatial and temporal scales. Developments of some significant turbulent motions such as 3D isotropic turbulence in clouds, stratocumulus and cumulus convection, squall lines and tropical cyclones, and the Madden-Julian oscillation, are essentially associated with moisture anomaly in each scale. Moisture is accumulated relatively slowly in larger horizontal scales, but is consumed relatively quickly in smaller ones. This significant scale gaps between the accumulation and consumption may be one of the causes of the long-lasting difficulty in developing the theory of the moist atmosphere. The aim of this session is to share the recent researches about the relationships between moisture and organized cloud systems in wider spatial and temporal scales to enhance collaborations between modeling, observational, and theoretical approaches in tackling this challenging task.

[AAS02-P02]Enhancement of Madden-Julian Oscillation realization by low-frequency zonal SST gradient

★ Invited Papers

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Keywords:Madden-Julian Oscillation , Air-Sea interaction

An environment favorable for development of the Madden-Julian Oscillation (MJO) is investigated by classifying MJO-like atmospheric patterns into MJO and regionally confined convective events (RCC). Comparison of MJO and RCC events show that even with preceding major event of convective suppression, convective events do not develop into an MJO when it is not accompanied by large scale buildup of moist static energy (MSE). The difference in the MSE accumulation between MJO and RCC is related to the contrasting low-frequency basic state sea surface temperature (SST) pattern, in which MJO and RCC are associated with prevalence of anomalously warm and cold low-frequency SST over western to central Pacific respectively. Distinct difference in the SST anomaly field between MJO and RCC identified in the low-frequency range is missing in the intraseasonal frequency range of 20-60 days. During the MJO low-frequency SST pattern is characterized by positive zonal SST gradient from the Indian Ocean to the central Pacific. This low-frequency SST pattern contributes to the sufficient build-up of MSE across Indian Ocean to the Western Pacific by providing long-standing condition that induces large-scale low-level convergence. The results of this study propose the potential importance of the low-frequency SST pattern with positive zonal SST gradient in enhancing convective activities on longer than intraseasonal time scale and realizing a complete lifecycle of the MJO.