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季節内周期振動の積雲伝播特性にもとづく分類と熱帯対流圏界面温度との関係
Cluster analysis of the intraseasonal convection and its impact on the tropical tropopause temperature

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This study investigates space-time variations of the tropical convective activities and temperatures around the tropical tropopause associated with the intraseasonal oscillation (ISO) during the southern summer by using outgoing longwave radiation (OLR) data from the National Oceanic and Atmospheric Administration and atmospheric fields from the European Centre for Medium-range Weather Forecasts Interim reanalysis data.

Cluster analysis is conducted in order to classify ISO types according to both the phase speed and the longitudinal extent of the eastward propagation. In performing cluster analysis we use the locus of convective activities observed in the unfiltered OLR data by retaining both the ISO and seasonal mean components to investigate interaction between the two. Then, the 72 ISO events in the 32 southern summers are mainly grouped into four clusters. Two of the clusters exhibit the slow (<2 m/s) propagation speed in the unfiltered OLR field and the others fast (˜4 m/s). One cluster characterized as the El Nino phase has the fast speed while passing over the date line and another as the La Nina phase has the slow speed while propagating to ˜120E. Compared with the other two clusters characterized as the weak El Nino-Southern Oscillation phase, the speed is slow while propagating to ˜135E when the SSTs over the Western Pacific are relatively low.

Low temperatures around the tropical tropopause appear to the east of the eastward-propagating convection in the tropics and to the west in the subtropics, forming a horseshoe-shaped structure. The strength of the horseshoe-shaped temperature structure is determined by that of the convective activities. Furthermore, the strength and location of the 100-hPa temperature minima differ among the clusters. This study implies that the different ISOs would cause different impacts on the dehydration process in the tropical tropopause layer depending on their types.
Keywords: Intraseasonal Oscillation, Madden-Julian Oscillation, Cluster Analysis, Teleconnection, Tropical Tropopause Layer