Distributions of latent heating from the spectral latent heating data during the 2015/16 quasi-biennial oscillation disruption

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Abstract

The latent heating (LH) profiles from the level-3 spectral latent heating (SLH) data were employed to analyze the distributions of LH during quasi-biennial oscillation (QBO) disruption in the 2015/16 Northern Hemispheric (NH) winter. The LH anomalies from observation era climatology are also used for the analysis to compensate the discrepancy between the Tropical Rainfall Measuring Mission (TRMM) and the Global Precipitation Measurement mission (GPM) observation. The differences in the LH anomalies between 2015/16 winter and the mean westerly QBO phase (LHds) reveal that the convective systems grew deeper and shifted toward the equator, releasing stronger latent heat during the 2015/16 winter than in the mean westerly QBO phase. During the 2015/16 winter, the changes of the convective systems from the mean westerly QBO phase were the most anomalous compared to the changes during other NH winters in the 1998-2019. Inside the convective systems, anomalously deep convective cells were identified as a major cause of the enhancements of the unconditional LH for each month of the 2015/16 winter, except in February 2016. The results verify that the increased LH can be considered a source of the unusual equatorial waves that participated in the 2015/16 QBO disruption. In the regional viewpoint, the enhanced LHds in the 10°S-10°N zonal band during the 2015/16 winter are from the increased depth and monthly LH intensity of the convective systems over the central-to-eastern Pacific shifted from the western Pacific compared to the mean westerly QBO phase.

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