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The Extreme Cold Anomaly over Southeast Asia in February 2008: Roles of ISO and ENSO

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A break-record, long-persisting extreme cold anomaly (ECA) over Southeast Asia, accompanied by an intraseasonal convection over the Maritime Continent, is identified during the La Niña mature phase in February 2008. The cause of the ECA, in particular the role of the intraseasonal oscillation (ISO) and El Niño and Southern Oscillation (ENSO) on the ECA, is investigated by diagnosing observations and conducting numerical experiments.

The ECA is associated with an enhanced prolonged Siberian High (SH) and a persistent northerly anomaly over Southeast Asia. In contrast to conventional cold surges, which is characterized by a synoptic time scale (less than 10 days), the northerly anomaly associated with the ECA persisted for a month or so. The onset of the northerly anomaly is concurrent with a phase change of an ISO over Sumatra. Unlike the normal ISO that continues its eastward journey, the convection associated with this ISO stationed there during the entire February 2008. Numerical experiments with an anomaly atmospheric GCM suggest that the ISO heating over the Maritime Continent is responsible for initiating and maintaining the northerly anomaly.

The westward progression of the La Niña is crucial for blocking the ISO. The circulation and SST anomalies associated with the La Niña moved westward at a speed of about 15° longitude per month. By early February, the suppressed convective anomaly had moved to the far western Pacific. The westward shift of the cold episode prevented the ISO from moving further eastward. In addition to its blocking effect, the La Niña also enhanced the heating over the Maritime Continent through the anomalous Walker circulation. Therefore, it is the combined effect of the ISO and ENSO that maintained a prolonged positive heating anomaly, which resulted in a persistent northerly anomaly and thus the ECA.