

Interannual variability of Australian summer monsoon and its remote influence on wintertime East Asian climate

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Variability of convective activity over the Maritime Continent (MC) influences climatic condition over East Asia via atmospheric teleconnections, through which SST variability such as ENSO is considered to provide seasonal predictability. In boreal winter, interannual variability of convection is centered around Indonesia and northern Australia, representing significant variability in the Australian summer monsoon (AUSM). Through an analysis of observational data, we show that interannual variability of austral summertime precipitation over northern Australia is hardly driven by tropical SST variability and is dominated by the internal variability of AUSM. Our analysis suggests that anomalously active AUSM sustains itself by inducing anomalous low-level westerlies over the eastern Indian Ocean and enhancing surface evaporation and moisture inflow into northern Australia. Anomalous AUSM activity is associated with distinct wavetrain pattern from the MC toward the extratropical North Pacific with dipolar pressure anomalies resembling the Western Pacific pattern. This teleconnection modulates the East Asian winter monsoon and exerts a significant impact on wintertime temperature and precipitation especially in Japan and Korea. This study reveals that interannual variability of the AUSM, which is unforced locally or remotely by tropical SST variability, substantially limits seasonal predictability in wintertime East Asia.

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