

Reverse August precipitation anomalies in eastern China between 1998 and 2016 synchronize with strong El Niño events

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1997/1998 and 2015/2016 El Niño episodes are regarded as two super events on record and have exerted profound influence on eastern China summer rainfall, as expected. However, on the sub-seasonal time scale, summer rainfall in these two years shows dramatic diversity, although the characteristics of the two El Niño are close. This study revealed that there is increased (decreased) rainfall over central China (approximately 30°–35°N) but decreased (increased) rainfall over southeastern China (approximately south of 25°N) in August 1998 (2016). A close teleconnection between interannual variability between sea ice area (SIA) over the Barents-Kara Sea (BKS) and eastern China precipitation is further demonstrated. With the reduction of August SIA in BKS, the albedo of underlying surface weakens, hence the in situ sea surface temperature increases. Accordingly, anomalous upward motions appear at high-latitudes, then bend equatorward at upper troposphere to middle-latitudes and descend there. Such meridional overturning causes further zonally anomalous vertical motions along the subtropical jet stream, which forms the Silk Road pattern. The Silk Road pattern propagates along the jet stream to East Asia and then leads to Bonin high anomaly, which is connected with the descending branch of Hadley cell and triggers the Pacific-Japan pattern. Consequently, anomalous cyclone appears over southeastern China and anticyclone emerges over central China at 850 hPa, which leads to decreased moisture transportation to central China and increased moisture to southeastern China. Therefore, observed positive interannual variability of SIA over BKS in August 1998 and negative in 2016 might be responsible for the reverse August precipitation anomaly in eastern China between 1998 and 2016.