



Potential Influence of Arctic Sea Ice to the Inter-annual Variations of East Asian Spring Precipitation

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Arctic sea ice (ASI) and its potential climatic impacts have received increasing attention during the past decades, yet the relevant mechanisms are far from being understood, particularly on how anomalous ASI affects climate in midlatitudes. The spring precipitation takes up as much as 30% of the annual total and has significant influences to agriculture in East Asia. Here, observed evidence and numerical experiment results manifest that the ASI variability in the Norwegian Sea and the Barents Sea in preceding winter is intimately connected with interannual variations of the East Asian spring precipitation (EAP). The former can explain about 14% of the total variances of the latter. The ASI anomalies persist from winter through the ensuing spring and excite downstream tele-connections of a distinct Rossby wave train prevailing over the Eurasian continent. For the reduced ASI, such a wave train pattern is usually associated with an anomalous low pressure center over Mongolian Plateau, which accelerates the East Asian subtropical westerly jet. The intensified subtropical westerly jet, concurrent with lower-level convergence and upper-level divergence, enhances the local convection and consequently favors rich spring precipitation over East Asia. For the excessive ASI, the situation tends to be opposite. Given that seasonal prediction of the EAP remains a challenging issue, the winter ASI variability may provide another potential predictability source besides El Niño-Southern Oscillation.