

Influence of summertime Arctic sea-ice reduction on wintertime Eurasian coldness

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Influence of the summertime Arctic sea-ice extent anomalies on the wintertime climate over Eurasia is investigated. After the record minimums of Arctic sea-ice extent in September 2005 and 2007, severe cold conditions were often observed among many parts over Eurasia from Eastern Europe to Far East in the winter for 2005/06 and 2007/2008. Observational evidence shows that significant cold anomalies over the Far East in early winter and zonally elongated cold anomalies from Europe to Far East in late winter are associated with the decrease of the Arctic sea-ice cover in the preceding summer-to-autumn seasons. Results from numerical experiments using an atmospheric general circulation model support these notions. The remote response in early winter is regarded as a stationary Rossby wave generated thermally through an anomalous turbulent heat fluxes from the ocean surface as a result of anomalous ice-cover over the Barents-Kara Seas in late autumn, which propagates southeastward over the Eurasia and tends to induce an amplification of the Siberian high causing colder conditions over the Far East. The late-winter cold anomalies over Eurasia are also reproduced in our experiment, which is associated with the negative phase of the North Atlantic Oscillation.