Name: Bingyi Wu
wby@cams.cma.gov.cn
Chinese Academy of meteorological Sciences

Country: China
Title: Winter Weather Patterns over Northern Eurasia and Arctic Sea Ice Loss
Additional authors: 2 Dörthe Handorf, 3 Klaus Dethloff,4 Annette Rinke, 5 Aixue Hu
Additional Affiliations: 2-4 Research Unit Potsdam, Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany, 5 Climate and Global Dynamics Division, NCAR, CO 80305, USA
Abstract:
Using the NCEP/NCAR and Japanese (JRA-25) re-analysis winter daily (Dec. 1 to Feb. 28) data for the period 1979 to 2012, this paper reveals the leading pattern of winter daily 850 hPa wind variability over northern Eurasia from a dynamic perspective. The results show that the leading pattern accounts for 18% of the total anomalous kinetic energy and consists of two sub-patterns: the dipole and the tripole wind patterns. The dipole wind pattern does not exhibit any apparent trend. The tripole wind pattern, however, has displayed significant trends since the late 1980s. The negative phase of the tripole wind pattern corresponds to an anomalous anticyclone over northern Eurasia during winter, as well as two anomalous cyclones respectively occurring over southern Europe and in the mid-high latitudes of East Asia. These anomalous cyclones in turn lead to enhanced winter precipitation in these two regions, as well as negative surface temperature anomalies over the mid-high latitudes of Asia. The intensity of the tripole wind pattern and the frequency of its extreme negative phase are significantly correlated with autumn Arctic sea ice anomalies. Simulation experiments further demonstrate that the winter atmospheric response to Arctic sea ice decrease is dynamically consistent with the observed trend in the tripole wind pattern over the past 24 winters, which is one of causes of the observed winter surface air temperature decline trend over Central and East Asia. The results of this study also imply that East Asia may experience more frequent and/or intense winter extreme weather events in association with the loss of Arctic sea ice.

End