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The observed formation features and climate impacts of the subseasonal Scandinavian pattern

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Based on daily data from the Japanese 55-year Reanalysis (JRA-55) for the extended winters (December-March) from 1958/59 to 2014/15, this study examines the formation features and climate impacts of the Scandinavian (SCA) pattern on subseasonal timescale. Results show that the SCA can form with or without convective events over the Gulf Stream extension region. It turns out that in the North Atlantic sector, the convection-preceded SCA patterns show a larger amplitude and longer lifespan compared to the convection-free SCA patterns. The results also indicate that in addition to the forcing of convection over the Gulf Stream extension region, the driving of divergence associated with convective heating over the northern North Atlantic region, as well as the high-frequency eddies, may also contribute to the growth and rapid development of the SCA pattern.
Another attracting feature observed in the formation processes of the SCA pattern is its downstream development, i.e. without apparent propagation of the individual anomalous centers of the SCA pattern, new anomalous centers continue to form downstream of the wavetrain, which lead to the formation of other kinds of teleconnection pattern over the western Pacific. Furthermore, vertical propagation of the SCA pattern from the troposphere into the stratosphere is also observed as the SCA pattern matures and decays. As a result of the propagation, the enhancement or weakening of the stratospheric polar vortex tends to occur. This suggests that the SCA pattern may bring about significant influence on both the surface weather/climate over the Arctic-Eurasia sector as well as the climate in the polar region of the stratosphere.