

# Role of Downward Propagating Planetary Waves in European Severe Cold Snap during a Recovery Phase of the SSW in February 2018

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A severe cold snap hit Europe at the end of February 2018 during a recovery phase of a sudden stratospheric warming (SSW) event. It is known that the negative phase of Arctic Oscillation (AO) following SSW causes cold weather over Eurasia. However, this does not explain an extreme warm weather in Japan in the following period at the beginning of March. In fact, these exceptional events in Europe and Japan are related to a development of a trough and a ridge of wavenumber 1 component of planetary waves.

Indeed, not only a negative AO, but also a nonlinear reflection of planetary waves is induced during a recovery phase of the SSW (Kodera et al, 2016). This causes an amplification of planetary waves and a formation of blockings in the troposphere (Kodera and Mukougawa, 2017). Usually, downward propagation of planetary waves following a SSW takes place in the Pacific-American sector of the stratosphere, and a blocking forms around the Aleutian sector and the eastern part of Eurasian continent. However, in the case of the 2018 SSW, downward propagation of planetary waves exceptionally started in the European sector of the stratosphere. Accordingly, cold air was advected toward Europe along a trough of planetary waves, and a blocking was formed over the North Atlantic Ocean.

Investigation of the operational one month forecast by the Japan Meteorological Agency reveals that ensemble mean forecasts initiated on 14 February failed in reproducing the downward propagation of planetary waves and the developed trough over Europe on 26 February. Whereas, the forecasts starting on 21 February successfully simulated the both aspects. This suggests a close connection between the downward propagation of planetary waves from the stratosphere and the cold snap over Europe in February 2018.

Key words: Sudden stratospheric warming, planetary wave, downward propagation, blocking, cold snap

## References

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