

Rossby Wave Propagation into the Northern Hemisphere Stratosphere: The Role of Zonal Phase Speed

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We investigate the role of zonal phase speed for the upward propagation of planetary-scale waves into the Northern Hemisphere wintertime stratosphere using the JRA-55 reanalysis data sets. A particular focus are the time periods prior to sudden stratospheric warming events (SSWs) as SSWs are regularly induced by upward propagating planetary-scales waves.

We show in a linear wave diagnostic and for reanalysis data that phase speeds tend eastward as waves propagate upward. This indicates that the stratosphere pre-selects eastward phase speeds for propagation, especially for zonal wave number 2.

This also affects SSW events: Split SSW events tend to be preceded by anomalously eastward zonal phase speeds. Zonal phase speed may indeed explain part of the increased wave flux observed during the preconditioning of SSW events, as, for example, for the record 2009 SSW event. More details are available in Domeisen et al. (2018).

Key words: Rossby wave propagation, Stratospheric Sudden Warmings, zonal phase speed

References:

Domeisen, D.I.V., O. Martius, and B. Jiménez-Esteve, 2018, *Geophys. Res. Lett.*, <https://doi.org/10.1002/2017GL076886>