

Meteor radar observations of an exceptionally mesospheric zonal wind regime above Europe in the winter 2015/16

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During the winter 2015/16 the mesosphere showed an exceptional zonal wind pattern in the mesosphere at polar latitudes. From end of December 2015 until the end of January 2016 the mesosphere was characterized by a wind reversal in the zonal wind with westwards winds below 80 km and a strong eastward jet around 90-95 km. We present meteor radar observations from three different latitudes in Europe to examine this unusual wind pattern with respect to the tidal and gravity wave activity.

In this study we present results with our latest version of the meteor radar wind retrieval including a non-linear error model. The evolved algorithm provides additional information about potential error sources on the wind retrieval and in so far it is ideal to diagnose the contribution of different error sources on the finally retrieved winds.

The gravity wave and tidal activity is also retrieved using an adaptive spectral filter technique to account for the temporal intermittency of the different waves. Based on this revised diagnostic we were able to investigate the gravity wave and tidal activity during the winter season 2015/16. Our results suggest that the tidal activity was significantly altered by the zonal wind regime. In particular, the semi-diurnal tide showed a very stable behavior during December 2015 and January 2016 and almost disappeared in February at polar latitudes. A similar pattern is found for the gravity waves.