

Reply to the comments on the manuscript

”Simultaneous ground-based observations of a large quasi 26-day wave from three different measurement sites in northern mid-latitudes ”

by Christoph Kalicinsky, Sandra Wallis, Lukas Depenthal, Christoph G. Hoffmann, Anna Lange, and Christian von Savigny

We thank the reviewer for his helpful comments and recommendations. In the following, we discuss the issues addressed by the reviewer and explain our opinions and the modifications of our manuscript.

We enumerate the comments and repeat them in bold face. The modifications of the manuscript are displayed in the marked-up manuscript version as coloured text.

Comments Reviewer 2

General comment:

This manuscript describes a quasi-periodic temperature perturbation (a quasi 26-day oscillation) in the mesosphere during the Northern Hemisphere winter 2016/2017. The combination of simultaneous ground-based OH*(3,1) rotational temperature observations at three mid-latitude stations with SABER and MLS observations provides a convincing observational basis for the analysis.

The authors present evidence supporting the interpretation of this observed quasi 26-day (or 25–27-day) oscillation as a Rossby (1,4) normal mode.

I also find interesting the discussion concerning the possible implications for the identification of solar 27-day signatures.

I consider the manuscript is an interesting contribution. It is clear and well written, in my opinion. I have, only one minor comment, which follows.

1. How specific is the quasi 26-day amplitude event observed in 2016/2017?

This study uses data from 1 July 2016 to 30 June 2017, and the pronounced quasi-periodic signal appears only during a relatively limited interval within this period, approximately from DOY 320 to 440, corresponding to a few months around the winter. Since the authors have access to longer ground-based records, I wonder whether it would be possible to investigate whether comparable quasi-26-day events occur during other winters. For example, using Greifswald and Wuppertal observations. I understand that the third station only has observations until mid 2017.

I think that the SABER and MLS datasets also provide the possibility of examining additional winters.

The analysed event shows the by far largest event in the time period from 2016 to now and the only one observed by all three instruments. There are different other events in this time interval but either with less pronounced amplitudes (or no significant results in the period range around 26 days) or with significant results at different periods than about 26 days. Thus, we concentrated on this case study to analyse the possible origin of the wave event and the connection to the Rossby wave (1,4) mode. A detailed analysis of other events especially with different periods is beyond the scope of this paper.

Nonetheless, events in this period range were the most observed events in the whole record since 1987, but the other large events observed at Wuppertal were detected before 2016. The main results concerning the occurrence frequencies of waves with different periods in different seasons have already been shown and discussed in Kalicinsky et al. 2026.