

Response to Reviewers

We thank the reviewers for their comments and the time spent preparing them.

Reviewer 1

Minor comments:

1. L196-199: One cannot get any information on the method of removing large-scale variations from the sentences in these lines. For the completeness of the manuscript, please summarize the key idea/physics behind your new method here (Hindley et al., 2022) .

Thank you. We have added some paragraphs to clarify the method (L197 - L212) and edited Fig. 1 which shows a flowchart of the steps for the method.

2. L214-223: The large-scale backgrounds are removed by a daily weighted sine fitting routine. The waves with zonal wavenumbers from 0-9 represent the background. Since the vertical wavelength of gravity and Kelvin waves could be similar (L203), how to ensure that the Kelvin waves are removed by the method proposed here (i.e., daily weighted sine fitting routine)?

Dominant Kelvin waves of the lower stratosphere are generally of zonal wavenumbers 1 and 2 and to have periods in the range of 10-20 days. Faster Kelvin waves with period 6 -10 days, and ultrafast Kelvin waves with periods of 2-5 days in the stratosphere. Our method is using a fitting sinusoidal for days with a window of 1 day, hence, excluding Kelvin waves by period. The method is also removing Kelvin waves on the zonal scale since they exclude any waves with wave numbers from 0 to 9.

Yes, Kelvin waves have similar vertical wavelength as gravity waves and there might be a very small contribution from them in the signal, but the zonal removal is the only way to exclude them and the major signature in the output is due to gravity waves.