

Response to Reviewer 1

We would like to thank the reviewer for the critical reading of our manuscript and for suggestions and comments. We are sure that the constructive comments will improve the manuscript and we are going to do our best to address them.

Comment 1: Evidence of Cooling (SABER or MLS Data)

We agree that including observational temperature data would be better for the interpretation of the results, specifically the stratospheric cooling as a possible mechanism for generation of the gravity waves. In the revised version, we will look for satellite measurements close in time and position of the observatories.

Comment 2: Wind Shear and Low Phase Velocities

The reviewer raises a very pertinent physical question regarding potential sources and wave characteristics.

- **Wind Shear:** We will investigate the wind profiles from the HWM14 model to check for evidence of significant shear at the estimated altitudes of origin. If present, we will include wind shear as a potential alternative source or contributing factor in the manuscript's discussion. But due to the absence of *in situ* wind data, we believe this is unlikely.
- **Low Phase Velocities:** We agree that the observed phase velocities are lower than those typically expected for supersonic bow waves. However, we are looking for gravity waves generated by secondary processes as thermal processes or local instabilities caused by the radiative imbalance during the eclipse. We will add a physical explanation detailing why the wave spectrum generated by an eclipse might contain low-phase-speed components, as suggested.

Comment 3: Delay in Event 3

We will explicitly address the temporal delay of Event 3. We will clarify that this interval is consistent with the time required for the perturbation to propagate vertically from the stratosphere (source) to the airglow emission region (detection altitude). Using our ray-tracing model results, we will calculate the vertical group velocity to demonstrate that the "travel time" justifies why the wave was observed significantly after the passage of the Moon's shadow.