

# **Inter-annual variability in the dynamical coupling between the thermosphere and the winter stratosphere.**

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As atmospheric gravity waves propagate through the Earth's middle atmosphere, they deposit momentum into the background flow. In the upper atmosphere, this process can be modified by the varying levels of heating induced by solar radiation – both electromagnetic and particulate. Changing levels of gravity wave drag subsequently affects the large-scale circulation of air. Similarly, different levels of planetary wave activity from season to season affects the background atmosphere through which these gravity waves must propagate, so bringing about a different response to any given set of solar conditions.

Using two distinct models of the coupled middle and upper atmosphere system, we examine the extent of the coupling between the different layers under a range of forcing scenarios, based on observed solar indices and lower boundary forcing data from the 40-year NCEP reanalysis database. We discuss the results in the context of the climatological impact of solar-terrestrial forcing.