On the enhancement of upper mesospheric quasi-lunar tides during sudden stratospheric warming events

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Sudden Stratospheric Warming events (SSWs) are planetary scale phenomena occurring at polar and mid-latitudes during local winter. Forced by upward propagated planetary waves from the lower atmosphere, SSWs strongly affect the geospace. SSW signatures were reported to be present in the middle and upper atmosphere. One clear signature is the enhancement of the lunar semidiurnal (M2) tide. Potential mechanisms include (a) the amplification of pure lunar tides due to the so-called Pekeris resonance, and (b) the nonlinear interaction of semidiurnal tides and planetary waves. Here, we explore evidence for both mechanisms from more than ten years of hourly upper mesospheric wind observations from several specular meteor radars located at mid and high latitudes in both hemispheres. We investigated the nonlinear interaction during SSWs by wavelet analysis, superposed epoch analysis, and bispectrum analysis. Our preliminary results suggest that each of the above mechanisms is able to enhance M2-like periodicities depending on the latitude and stratospheric conditions.