



Do nonmigrating tides SW1 and SW3 enhance during sudden stratospheric warming events?

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In the last decades, tides have been investigated intensively with observations from both ground-based radars and satellites. Extensively reported are enhancements of solar nonmigrating tides SW1 and SW3 (SW_x represents semidiurnal westward mode with zonal wave number *x*) during sudden stratospheric warming events (SSWs) in a broad latitudinal range in almost all upper atmospheric layers, from the stratosphere to the ionosphere. In the current work, we jointly analyze ground-based radar observations from different longitudinal sectors in both case and statistical studies, to investigate the mesospheric oscillation at the period $T=12\pm 0.5$ hr. Contrary to extensive previous literature, our results suggest that SW1 and SW3 do NOT enhance during SSWs. Instead, enhancements are observed at neighboring periods, 12.4hr and 11.6hr, which could be explained as the lower and upper sidebands of nonlinear modulation of the 16-day wave on SW2, respectively. Meanwhile, the enhancements are accompanied with a decrease in SW2 which was argued to be the main energy supplier of the sidebands in previous literature. Our analyses suggested that the sidebands might have been broadly detected at low-frequency resolutions and misinterpreted as SW1 and SW3 enhancements.