Behaviour of the semi-diurnal tidal modes in the MLT using the SuperDARN meteor-radar chain

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Atmospheric tides in the mesosphere and lower thermosphere (MLT) have been shown to couple to the ionosphere, and may themselves be enhanced by the Joule heating associated with energetic particle precipitation. However, studies have shown that the efficiency of this coupling to and from the ionosphere depends on the spatial mode of the tides. While individual stations can provide accurate information on the temporal evolution of the tides, they do not allow the different spatial modes to be separated. Similarly, satellite observations can determine the spatial modes, but alias temporal changes in tidal amplitude and structure. A method has been developed to observe the spatial structure of atmospheric tides in the northern hemisphere (50^{o}-66^{o} N) MLT using neutral atmosphere winds derived from meteor trail drifts observed by a longitudinal chain of Super Dual Auroral Radar Network (SuperDARN) radars. The tidal amplitudes determined at each radar station in the chain can be combined to infer the zonal wavenumber 1 and 2 structure of the tide and its temporal evolution without the spatial-temporal aliasing present in satellite observations. Details of the method applied to the meteor radar data will be presented, and the amplitudes and temporal variations of the wavenumber 1 and 2 components of the semi-diurnal tide in the MLT will be examined during stratospheric warming and particle precipitation events.

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