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Is there any role of tides in driving the Arctic and the Antarctic UMLT winds?

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Investigation of the commonalities and interhemispheric differences between the Arctic and Antarctic climatologies of the winds and waves in the upper mesospheric and lower thermospheric (UMLT) region are essential for understanding the forcing mechanism at polar latitudes. The present study deals with the role of upward propagation of waves and tides having westward phase speed in driving the strong summertime UMLT westward wind, using two meteor radars, deployed over Esrange (67.9°N, 21.10°E) and Rothera (67.5°S, 68.1°W). The diurnal tidal (DT) amplitude, extracted from the spectral analysis of the winds, exhibits a summertime maximum and its amplitude is observed to decrease with height. This is in contrast with the semi-diurnal tidal (SDT) amplitude, which increases with height. Significant correlations between the DT amplitude and mean zonal wind (−0.74 for Esrange and −0.54 and −0.77 for Rothera) indicate the possible role of DT in driving the westward winds in summer. The gravity wave and planetary wave variances show enhancement only in the winter months, which indicates that they can unlikely drive the westward winds via momentum deposition. The space-time spectral analysis of temperature obtained from Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument on-board the Thermosphere Ionosphere Mesosphere Energetics Dynamics (TIMED) satellite reveals the summer maximum of migrating DT of zonal wavenumber 1 (DW1), similar to DT, over 60°N and 60°S, when there is large westward zonal wind. These results suggest that due to the tidal mean flow interaction, DT due to the DW1 tide can drive the large westward wind through its westward momentum deposition into the background flow.