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Comparison of mesospheric and lower thermospheric residual wind with High Resolution Doppler Imager, medium frequency, and meteor radar winds

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Abstract

The objective of this study is to compare observed mean meridional winds with those deduced from theory. The diabatic circulation is computed from High Resolution Doppler Imager (HRDI) mesospheric and lower thermospheric temperatures during January and July conditions. The meridional wind component is compared with HRDI Eulerian mean meridional winds near 95 km and with seasonal averages of meridional winds at a number of radar medium-frequency (MF) and meteor wind (MW) sites. The diabatic wind is directed from the summer toward the winter hemisphere. Peak values exceed 20 m s^{-1} and are observed at 105 km near 20° in the summer hemisphere. A secondary maximum of about 10 m s^{-1} is observed in the wintertime lower mesosphere during the July case. The diabatic wind is qualitatively consistent with HRDI 95-km mean meridional winds at latitudes equatorward of 50° . Time-averaged summertime radar winds are consistent with HRDI and diabatic winds between 50° S and 20° N . At winter midlatitudes, MF radar winds are directed oppositely to the diabatic wind, while one available MW measurement is directed with the diabatic wind. The zonal acceleration implied by the diabatic wind is about $150\text{-}200 \text{ m s}^{-1} \text{ d}^{-1}$ in the midlatitude summer lower thermosphere. Copyright 2000 by the American Geophysical Union.
