

Phase Progression of the Atmospheric Tides Over South Pole

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A meteor radar system was installed at Amundesen-Scott South Pole station in 2001 and became fully operational in 2002. This radar has operated nearly continuously since and is providing horizontal wind measurements in four separate azimuth directions. This feature provides the ability to determine the zonal wavenumber and direction of propagation for the observed perturbations.

With multiple years of observations we now have the opportunity to investigate the coherent seasonal structure of the large scale observations over South Pole. These include large 12 and 24 hour oscillations propagating westward with zonal wavenumber one and associated with the non-migrating semidiurnal and migrating diurnal tides respectively. The observations show a clear annual variation in these perturbations with maximum amplitudes observed in the Austral summer as has been previously reported. Previously unreported and particularly interesting features appear in the observed phases of these tidal perturbations. Analysis of the phases for the four separate observing directions indicates a clear phase progression of these perturbations to later times in the spring and early times in the fall, which could indicate change in the vertical wavelength of the tides. Additionally the phase difference between the four observing directions is not exactly a quarter of a wave period as expected, indicating the possibility that these disturbances could be propagating around an offset dynamical pole. Both of these features observed in the phases are clearly repeatable from year to year. These results will be presented and possible mechanisms will be described.