Geophysical Research Abstracts
Vol. 21, EGU2019-15951, 2019
EGU General Assembly 2019

Assessing the short term tidal variability from meteor radar observations and a High Altitude Meteorological Analysis System

Gunter Stober (1), Dimitry Pokhotelov (1), Kathrin Baumgarten (1), and John McCormack (2)

(1) Institute of Atmospheric Physics (IAP), Radar Soundings and Sounding Rockets, Kuehlungsborn, Germany (stober@iap-kborn.de), (2) 2Space Science Division, Naval Research Laboratory, Washington DC

The middle atmosphere is a highly variable atmospheric region driven by various waves such as planetary waves, atmospheric tides and gravity waves. In particular, atmospheric tides gain large amplitudes at the Mesosphere/lower Thermosphere (MLT) region. Meteor radar and lidar observations show that the tidal amplitudes and phases show a considerable short term (day-to-day) variability. Here we present an initial validation/comparison of our meteor radar and lidar observations with different reanalysis data sets such as NAVGEM-HA and MERRA2. The observational time series are decomposed into a mean wind (zonal and meridional component) and temperature containing the planetary wave activity, atmospheric tides (diurnal, semi-diurnal and terdiurnal) as well as the gravity wave activity using a so-called adaptive spectral filter. The global reanalysis fields are also analyzed to extract the relative contribution of the migrating and non-migrating tides for the available data using a global version of the adaptive spectral filter.
Our results indicate that the SW2 tide, which is the dominant mode at mid- and high latitudes at the MLT, shows a large seasonal change in the amplitude and phases. Comparing NAVGEM-HA and the meteor radar observations indicate that the reanalysis reproduces rather consistent the mean seasonal behavior as well as the day-to-day variability. This is, in particular, obvious during sudden stratospheric warmings, where the SW2 tide shows a significant phase shift and amplitude modulation.
We discuss the potential implications of the short term tidal variability for thermospheric/ionospheric forcing.