Intra-seasonal Oscillations Inferred from SABER (TIMED) and MLS (UARS) Temperature Measurements

F. T. Huang, **H. G. Mayr**2, J. Russell3, M. Mlynczak4, C. A. Reber2, J. G. Mengel

(1) Creative Computing Solutions Inc. Rockville, MD, USA, (2) NASA Goddard Space Flight Center, Greenbelt, MD, USA, (3) Hampton University, Center for Atmospheric Sciences, Hampton, VA, USA, (4) NASA Langley Research Center, Hampton, VA, USA, (5) Science Systems & Applications, Lanham, MD, USA

In the zonal mean meridional winds of the upper mesosphere, intra-seasonal oscillations with periods between 1 and 4 months have been inferred from UARS measurements and independently predicted with the Numerical Spectral Model (NSM). The wind oscillations tend to be confined to low latitudes and appear to be driven, at least in part, by small-scale gravity waves propagating in the meridional direction. Winds across the equator should generate, due to dynamical heating and cooling, temperature oscillations with opposite phase in the two hemispheres. Investigating this phenomenon, we have analyzed SABER temperatures from TIMED in the altitude range between 55 and 95 km to delineate with an empirical model, the year-long variability of the migrating tides and zonal mean components. The inferred seasonal variations of the diurnal tide, characterized by amplitude maxima near equinox, are in substantial agreement with UARS observations and results from the NSM. For the zonal mean, the dominant seasonal variations in the SABER temperatures, with annual (12 months) and semi-annual (6 months) periodicities, agree well with those derived from UARS measurements. The intra-seasonal variations with periods between 2 and 4 months have amplitudes close to 2 K, almost half as large as those for the dominant seasonal variations. Their amplitudes are in qualitative agreement with the corresponding values inferred from UARS during different years. The SABER and UARS temperature variations reveal pronounced hemispherical asymmetries, consistent with meridional wind oscillations across the equator. The phase of the semi-annual temperature oscillations from the NSM agrees with the observations from UARS and SABER. But the amplitudes are systematically smaller, which may indicate that planetary waves are more important than is allowed for in the model. For the shorter-period intra-seasonal variations, which can be generated by gravity wave drag, the model results are generally in better agreement with the observations.