

NONMIGRATING TIDAL SIGNALS IN THE THERMOSPHERIC ZONAL WIND AS SEEN BY CHAMP AND TIME-GCM

KATHRIN HÄUSLER¹, Hermann Lühr¹, Maura Hagan², Astrid Maute², Ray Roble²

¹ Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Potsdam, Germany

² High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado, USA

Four years (2002-2005) of continuous accelerometer measurements taken onboard the CHAMP satellite (orbit altitude ~400 km) present a unique opportunity to investigate the thermospheric zonal wind on a global scale. Recently we were able to relate the identified wave-4 structure in the zonal wind at equatorial latitudes to the influence of nonmigrating tides and in particular to the eastward propagating diurnal tide with zonal wavenumber 3 (DE3). The DE3 tide is primarily excited by latent heat release in the tropical troposphere in deep convective clouds and thus was not expected to be found at 400 km altitude. In order to investigate the mechanisms that couple the tidal signals all the way to the upper thermosphere we started a comparison with the thermosphere-ionosphere-mesosphere-electrodynamics general circulation model (TIME-GCM) developed at the National Center for Atmospheric Research (NCAR). Therefore, the model output was processed the same way as the satellite data. Initial results for June solstice show a good agreement between the model and the satellite data for the westward propagating tides. Yet the model is underestimating the eastward propagating zonal wavenumber 2 diurnal tide (DE2) which is quite prominent in the CHAMP data. Furthermore, the model predicts a solar flux dependence of the tides with increasing (decreasing) amplitudes for the westward (eastward) propagating tides with increasing solar flux level. We can confirm the dependence on the solar flux level for the nonmigrating tidal signatures in CHAMP data as well.

Thermospheric dynamics, zonal wind, tides

Kathrin Häusler, Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Telegrafenberg, 14473 Potsdam, Germany, tel: +49 331 288-1884, fax: +49 331 288-1235, e-mail: kathrin@gfz-potsdam.de