Geophysical Research Abstracts
Vol. 18, EGU2016-14931, 2016
EGU General Assembly 2016

Local and averaged effects of GWs on OH*

Erich Becker and Mykhaylo Grygalashvyly
Leibniz-Institute of Atmospheric Physics, Theory and Modeling, Kuehlungsborn, Germany (becker@iap-kborn.de)

We present an advanced diagnostic model of the production and relaxation of excited hydroxyl (OH*). The model uses input from a chemistry-transport model (CTM) that is non-interactively coupled to a gravity-wave resolving GCM. This combination of model components allows us to estimate the local effects of gravity waves (GWs) on the OH* layer, as well as the averaged effects that mainly result from the mixing of minor constituents by GWs. Locally (i.e. on short time scales of a few hours corresponding to the GW periods), atomic oxygen and temperature vary according to the GWs. The resulting maximum variation of the OH*-peak altitude amounts to 5-10 km. Accordingly, the temperature that corresponds to the OH*-peak altitude deviates significantly from the temperature at constant pressure, and the GW variations as derived from airglow measurements are presumably biased. We performed a sensitivity experiment with the CTM using the same dynamical data from the GCM, but with GWs being either filtered out or being fully included. This allows us to estimate the averaged effects of GWs on the OH* layer (note that the large-scale flow and the residual circulation are identical in both simulations). We find that the averaged effects mainly result from the downward mixing of atomic oxygen by GWs. Accordingly, GWs lead on average to a downward shift of the OH*-layer by a few km along with a corresponding increase of the number density.