Geophysical Research Abstracts
Vol. 21, EGU2019-16465-4, 2019
EGU General Assembly 2019

Study of Long-Term changes of planetary wave activity in the middle atmosphere based on ERA-Interim, airglow, and SABER data

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Planetary waves (PW) are global scale waves in the atmosphere, which are known to considerably impact weather patterns in the mid-latitudes in the troposphere and the ozone distribution in the stratosphere. It is widely accepted that climate change leads to a change of the meridional temperature gradient. This should, in turn, change the planetary wave activity (PW-activity).
In order to quantify possible changes in the PW-activity we analyze ERA–Interim temperature data (0 and 65 km height) on both hemispheres, the so-called dynamical activity index (DAI). We also use rotational temperature data from hydroxyl airglow measurements at several stations (Germany, Antarctica) embedded in the international Network for the Detection of Mesospheric Change (NDMC) to find an indication for PW-activity changes in the upper mesosphere/lower thermosphere. Satellite data from TIMED-SABER are used to complement especially the airglow observations from Antarctica.
We find an indication for a significant increase of the PW-activity in the stratosphere. The change of the PW-activity with higher zonal wavenumbers turned out to be strongest. Although the changes of the PW-activity on both hemispheres are very similar, the hemispheres are characterized by systematically different excitation and propagation conditions for PW. Moreover, preliminary results indicate that PW favor breaking at North Atlantic / European longitudes. This is correlated with a high frequency of ozone-streamer events in this area.