Annual variability of acetone in the UTLS region based on ICON-ART simulations

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We present results of an extension to the ICOsahedral Non-hydrostatic modelling framework (ICON) [1]. ICON is a joint project of the German Weather Service and the Max-Planck-Institute for Meteorology.

We use the Aerosols and Reactive Trace gases (ART) extension for ICON which currently is under development [2]. Here, the module for including emissions from external data sources has been implemented and exploited [3].

Our test cases are the emissions of volatile organic compounds (VOCs). We test the sensitivity of the VOC concentrations in the upper troposphere and lower stratosphere (UTLS) driven by prescribed emission inventories and online calculated emissions. Because VOCs are influencing the HO_x equilibrium the annual cycle of VOCs matter for UTLS ozone concentrations.

In the UTLS region, the HO_x production due to photooxidation of the VOC acetone gets in the same order as that due to photolysis of ozone. Therefore, acetone is one of the main regulators of HO_x and ozone in this region. We compare our simulations of acetone concentrations with ground-based and CARIBIC airborne measurements for different emission scenarios and different parametrisations of the acetone lifetime.

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