



SPARC Workshop SHARP2016

Future changes in stratosphere-troposphere exchange of ozone and the contribution from climate change

Dr. Stefanie Meul, Dr. Sophie Oberländer-Hayn, Ulrike Langematz

Freie Universität Berlin

stefanie.meul@met.fu-berlin.de

The transport of ozone from the stratosphere to the troposphere represents a main source of ozone in the troposphere. The amount of ozone originating from the stratosphere and reaching the troposphere depends on the one hand on the ozone concentrations in the stratosphere and on the other hand on the effectiveness of the mass exchange processes. In the future, stratospheric ozone is projected to increase due to the decline of ozone depleting substances (ODS) but also due to stratospheric cooling induced by increasing greenhouse gas (GHG) concentrations. Furthermore, the stratospheric meridional circulation is expected to strengthen which can affect the downward transport of ozone to the troposphere.

In our study we aim to quantify the increase of the ozone mass flux from the stratosphere to the troposphere at the end of the 21st century under the extreme RCP8.5 emission scenario. Based on the analysis of multi-year simulations with the chemistry-climate model (CCM) EMAC we examine the impact of the ODS related ozone increase and the effect of GHG induced changes in ozone and the circulation on the ozone mass flux. Thus, we aim to understand to which extent the large increase of tropospheric ozone, that is projected from CCMs for the RCP8.5 scenario, is linked to an enhanced stratosphere-troposphere exchange of ozone.