Chemistry Climate Modelling on global and regional scale: Status and further perspectives

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Abstract:

The study of chemistry-climate interactions represents an important and, at the same time, difficult task of global change research. The emerging issues of climate change, ozone depletion and air quality, which are challenging from both scientific and policy perspectives are represented in Chemistry-Climate Models (CCMs). Understanding how the chemistry and composition of the atmosphere may change over the 21st century is essential in preparing adaptive responses or establishing mitigation trategies. The distribution and development of aerosols and reactive greenhouse gases is controlled by atmospheric chemistry and physics including transport of air masses integrated over global scales.

Projections of future climate change are coupled with changes in atmospheric composition, whose impacts extend from air quality to stratospheric ozone. Further, chemically active species in the troposphere are more amenable to short-term manipulations by changes in emissions and are therefore of major policy relevance to both air quality and climate. Provision of high-quality, policy-relevant information on the current state of climate and its possible future states, as well as options for adaptation are strongly dependent on the progress in this area. Increasingly, the chemistry and dynamics of the stratosphere and troposphere are being studied and modelled as a single entity in global models, and the ECHAM/MESsy Atmospheric Chemistry (EMAC) model was one of the first community models with this capability. The presentation will sketch the state-of-the art of chemistry climate modelling with a few examples based on recent EMAC results and further illustrate some near-future perspectives for further developments.