Geophysical Research Abstracts
Vol. 17, EGU2015-5274, 2015
EGU General Assembly 2015

An efficient model for comprehensive tropospheric-stratospheric chemistry in ECMWF's Integrated Forecast System

Vincent Huijnen (1), Johannes Flemming (2), Quentin Errera (3), and Simon Chabrillat (3)

(1) KNMI, De Bilt, Netherlands (huijnen@knmi.nl), (2) ECMWF, Reading, United Kingdom, (3) BIRA-IASB, Brussels, Belgium

In recent years a module for tropospheric chemistry has been developed within the ECMWF's Integrated Forecast System, based on a modified version of the CB05 chemical mechanism. This system, referred to as C-IFS-CB05, is now in place to provide operational forecasts of atmospheric composition in the framework of the MACC (Monitoring Atmospheric Composition and Climate) project. So far a linearized approach for the modeling of stratospheric ozone is in place, based on the work of Cariolle. This was shown to work well in combination with assimilation of stratospheric ozone observations from satellite instruments. Nevertheless, the model capabilities remain limited to the troposphere as a comprehensive description of the stratospheric composition was not available.

Therefore we have taken the initiative to extend C-IFS by including a module for stratospheric chemistry originating from the Belgian Assimilation System for Chemical Observations (BASCOE). In our approach we apply separate solvers for the stratosphere and troposphere, respectively, both based on the KPP format. This approach is both efficient in terms of model development and computational costs. While using the same framework, experiments can be set up easily to model the composition in the troposphere or stratosphere only, or the full atmosphere.

Here we will present the latest status of this system. In particular, we will provide details about the modeling strategy, giving special attention to the interface between the troposphere and stratosphere. We will present model evaluations against the offline BASCOE model and independent observations. Finally we will show the impact of including the stratospheric chemistry on hindcast simulations of the tropospheric composition.