Geosci. Model Dev. Discuss., 8, C2411–C2412, 2015
www.geosci-model-dev-discuss.net/8/C2411/2015/

Geoscientific Model Development Discussions

Interactive comment on "A low-order coupled chemistry meteorology model for testing online and offline data assimilation schemes" *by* J.-M. Haussaire and M. Bocquet

Anonymous Referee #3

Received and published: 5 October 2015

General comment

This manuscript describes the development of a simplified dynamical-chemistry model with the objective of studying data assimilation methods. This work is an extension of a previous model version (Bocquet and Sakov, 2013) that only included dynamics. The present version includes now a simplified chemical scheme that represents the NOx-Ozone interactions in the lower atmosphere. This article focuses on the implementation of various approaches to assimilate data, winds and species concentrations. Emphasis is placed on ensemble techniques for assimilation and the impact of the coupled approach where assimilation of species concentrations is done simultaneously with wind assimilation. This type of study can only be addressed with simplified models. This

article is very well written and gives all the necessary details on the model parameters and information for implementation. I recommend publication after responses to the following comments.

Comments

1. For advection of the minor species the authors use a Godunov scheme. This scheme is usually found very diffusive, so the gradients are not very well conserve. I would have rather used a "slope scheme" or a PPM scheme, which can be easily implemented in a 1D framework. Have you any indications on the impact of your choice on the results of your assimilation experiments? 2. As expected the impact of species assimilation on the coupled system is very different from one species to another. I would have expected more insight on that point and discussions on the relative role of dynamics and chemistry on the observed decoupling. This could certainly be done in comparing the time scales for dynamics and the lifetimes of the various species. A discussion around those ideas would certainly be of interest for future work using more complex models.

Interactive comment on Geosci. Model Dev. Discuss., 8, 7347, 2015.