Atmos. Chem. Phys. Discuss., 12, C11762–C11764, 2013
www.atmos-chem-phys-discuss.net/12/C11762/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Transport of aerosol pollution in the UTLS during Asian summer monsoon as simulated by ECHAM5-HAMMOZ model" *by* S. Fadnavis et al.

Anonymous Referee #2

Received and published: 18 January 2013

Overview

In this paper, the authors study the transport of aerosols from surface to the UTLS during the Asian Summer Monsoon. This study is based on the analysis of ECHAM5-HAMMOZ simulations for the year 2003. The work presented in the paper is of interest. The main concern on this paper is the lack of focus of the result analysis linked to a lack of focus of the paper objectives. Several other major comments also need to be addressed before acceptance for publication.

Major comments

The objectives of this paper are not fully clear and the analysis of the model simulations

does not fully fit with the paper title since the impact of aerosols in the UTLS on the microphysics and dynamics is also studied. The results are commented with regards to previous studies (which is interesting) but the way the paper is presented does not sufficiently highlight the important and/or new results.

Section 3.1 page 30091/92 : discussion of figure 5 : The comparison with observations is important to evaluate the quality of the simulation. There are large differences between the model and the observations in the 16-18km layer around the equator, with large values in the observations. What could explain these differences ? The signature in the observations is likely related to transport by deep convetion in the 20S-20N latitude band. The model signature show maxima in the subtropics likely linked to other processes.

Section 3.1 page 30090, line 27-29. Rossby wave breaking in the lower tropical tropopause is given as the most important source of transport in the study. One would expected that during the monsoon season, deep convection would be the main driver. This is also what the observations indicate (see Fig 5). A stronger argumentation on the relative role of deep convection and Rossby wave breaking is required.

Other comments

Section 2.1 page 30087: The argumentation on the choice of the year 2003 is weak. On one hand, this is argued that intrusions of subtropical and extratropical air are expected. On the other hand, the authors say that Âń monsoon circulation effects are well marked during the year 2003 Âż. This is somehow contradictory. The objective behing to study the impact of the monsoon on the aerosols in the UTLS and induced effects, a year with little subtropical and extratropical intrusion would seem more adequate.

The simulation mainly used is a 8-member ensemble. Nowhere it is explained the setup of the 8 simulations used in the ensemble and the method used to calculate the ensemble. The interest of using a 8-member ensemble in this study should be argued.

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Since the monsoon is an important driver of the aerosol vertical transport and the effect of aerosols on ice is discussed in the paper, information on the convection and the large scale cloud/precipitation parameterizations used in the model would be useful.

Section 2.1 Page 30087: The simulation uses 31 vertical levels up to 10hPa. No information is given on the vertical spacing of the vertical levels. As shown previously in several studies, this is particularly important to have a relatively fine resolution in the UTLS ($\sim$1km) since this is a layer with large gradients (including large gradients of aerosol concentrations).

Secondary organic aerosols are not considered in this study. What is their expected influence on the results ?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 30081, 2012.

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Interactive Comment