

Interactive comment on “A GCM study of organic matter in marine aerosol and its potential contribution to cloud drop activation” by G. J. Roelofs

Anonymous Referee #2

Received and published: 9 October 2007

This study aims to provide answer at three important questions for climate change: "through which mechanisms does the organic matter enter the aerosol phase, in which aerosol mode or modes is the organic matter deposited, and does the study allow for an estimate of the annual and global amount of the aerosol organics originating from the ocean surface" (Introduction, lines 5-7). The investigations are carried out with ECHAM5-HAM model in T21 resolution assuming different amounts of organics for different aerosol modes. The rational of the work is that the addition of new aerosol mass has to lead to agreement between the predicted and measured CDNC, which was not seen in Roelofs et al. (2006). By realizing this "closure" and using data from O'Dowd et al. (2004) as reference for the aerosol mass and composition, the

Interactive
Comment

author intend to answer at the three questions above. To this purpose, the study also shows a number of sensitivity tests to different assumptions regarding the mass and the distribution of organic aerosol between the aerosol modes. To the opinion of this reviewer, the approach of the study is interesting and may deserve publication if the author will improve the study by:

1) considering more observational data (aerosol mass and number, chemical composition, aerosol optical depth) to validate both the model input and output. The use of aerosol measurements at stations, local or remote, or with satellite data will make the conclusions of the study more reliable.

2) doing simulations in a higher resolution T42 or T63 (already used by Stier et al. (2005)). T21 resolution is too coarse to reproduce well cloud climatology. Therefore, this will impact on Reff through the amount of available liquid water and will prevent the CDNC closure.

Minor comments:

1) The author discusses the organic matter budget in terms of TgCyr-1, but the aerosol model uses molecule/specie. Which is the representative molecule/species used for organic matter in this study?

2) The author makes improper use of the term "boundary condition";, which have a defined significance in regional studies, throughout the paper. I suggest him to use other terminology.

3) The organic matter is assumed 50% soluble always. I suggest to the author to show that the model is insensitive to this variable and also to discuss in more detail how the soluble and insoluble organic matter is distributed between the soluble and insoluble modes in M7/HAM.

4) I also suggest to the author to discuss in more detail the role of the size of the organic particle with respect to the fixed sizes of the modal aerosol model.

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

5) The manuscript needs a more extensive discussion on the assumption that marine organic matter is emitted in the same manner as DMS and in a different way.

6) I also suggest to the author to add a brief discussion on how the 30% error in the CDNC prediction propagates on Reff predictions.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 5675, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper