Atmos. Chem. Phys. Discuss., 6, S2487–S2488, 2006
www.atmos-chem-phys-discuss.net/6/S2487/2006/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol nucleation over oceans and the role of galactic cosmic rays" *by* J. Kazil et al.

Anonymous Referee #3

Received and published: 17 August 2006

This article is an important step forward in understanding GCR-climate connections. It does not take into account dynamical processes as there are no interaction between the gridpoints. Instead, it rather estimates nucleation potential in different atmospheric regions, and its response on GCR flux.

The article is well-written with good English and the limitations of current approach are also openly discussed.

As mentioned by two other referees, assumption of particle-free atmosphere is somewhat problematic and I hope the authors follow the suggestions made by referees 12.

I would like to see the authors to discuss about the importance of ion-ion recombination as a source of new particles (e.g. Turco et al., 1998, GRL Vol. 25, pp. 635-638).

In the model of Lovejoy (2004), ion-ion recombination produces neutral particles which are able to grow if they are larger than the critical size. However, in the atmosphere, there are several compounds that may stabilize the neutral clusters, and thus ion-ion recombination can lead to a large number of clusters, which may grow to larger sizes. I would like the authors discuss also this possibility, together with more realistic background aerosol populations. How would this change the conclusions?

Small technical corrections:

- Order of pressure levels in subplots is strange

- Right axis of Figure 7 should be corrected.

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Interactive comment on Atmos. Chem. Phys. Discuss., 6, 5543, 2006.

ACPD

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