

Interactive comment on “The G4Foam Experiment: Global Climate Impacts of Regional Ocean Albedo Modification” by Corey J. Gabriel et al.

Anonymous Referee #2

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This study examines the climate impacts of a unique geoengineering experiment that has ocean surfaces in certain regions brightened in a global climate model. The goal of the experiment, in which the ocean surface albedo is increased from 0.06 to 0.15 over three subtropical regions in the southern hemisphere, is to counteract the global warming without reducing monsoon rainfall. The results of this geoengineering experiment are compared to those of the specified stratospheric aerosols experiment and the RCP6.0 scenario to understand the response of temperature and precipitation. The results are interesting and the paper is generally well written. It fits the scope of ACP and in particular this geoengineering special issue. I have the following comments and suggestions for change, most of which are relatively minor.

1) The introduction section is a bit too long. Some of the background information for geoengineering in general, motivation and review can be shortened.

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2) In many of the figures results are shown and discussed in terms of both annual mean and June-July-August (JJA) seasonal mean. It is unclear why JJA, which is neither austral summer nor the exact monsoon season in the northern hemisphere, is discussed in particular, as opposed to other seasons.

3) The color scheme in Figures 6-8 is different from that in Figures 3-5. This is fine, but using warm colors for decreases (i.e., negative changes) and cold colors for increases is a little inconvenient. Is there a particular reason for this?

4) Line 76 (also in the caption of Figure 1): the phrases of “daily average” and “fixed daytime value” are inconsistent and a little confusing. My understanding is that the albedo is changed from one constant value to another. Is that right?

5) Lines 88-99: please clarify the use of acronym SSI (versus SAI).

6) Lines 134: “the cloud feedbacks” are unclear.

7) Lines 248-249: Is this likelihood larger in this area than other areas in the SH? Please explain.

8) Lines 267-268: Is there a reference for the attribution of model improvements to finite-volume dynamical core?

9) Lines 310-311: is there a problem in the phrase inside the double quotes?

10) Line 339: needs some hyphens for “clear sky top of atmosphere”

11) Lines 341-346: it makes more sense to show net all-sky TOA flux in Fig. 2, maybe along with the net cloud forcing. The clear-sky forcing is not what is really exerted to the climate system.

12) Lines 366-373: need more evidence to support the explanation for the increase in low-cloud fraction over the three areas, where the relative humidity might have been already quite high. Why doesn't the increase occur in the entire downwind area?

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13) Lines 418-421: Please elaborate on “the temperature dependence of precipitation”.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-849, 2016.