

Interactive comment on “The climate effects of increasing ocean albedo: An idealized representation of solar geoengineering” by Ben Kravitz et al.

Anonymous Referee #2

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The paper discusses the impacts of spatially heterogeneous, near-surface solar geoengineering techniques within the idealised scenario of a homogeneous positive scaling in surface ocean albedo. The results are contrasted with solar geoengineering techniques impacting solar irradiance at the top of atmosphere. The multi-model simulations were performed within the GeoMIP initiative. The paper is well conceived and well written. The results are of high relevance to the community and I recommend publication following only minor adjustments of the manuscript.

Minor Comments:

P1L2: I would suggest to view these experiments as an idealized representation of

near-surface solar geoengineering approaches over the oceans in general. I personally would also draw a stronger connection to ocean surface albedo techniques rather than MCB. While the comparison is justified (both being geoengineering techniques associated with a regionally heterogeneous forcing), I remain unconvinced that G1ocean-albedo constitutes “an idealized representation of marine cloud brightening”. Ocean albedo modifications are most effective in the clear-sky and if anything reduce the radiative impact of clouds on the SW surface balance (contrarily to MCB). Therefore the analogue seems hard to justify physically in my opinion.

P5L23ff & Fig.5 : The persistent warming of surface air temperature to the east of the continents in the Northern Hemisphere is interesting. Is there any seasonality associated with this warming? i.e. winter or summer?

P6L20: I remain unconvinced by the assumption $dA=0$ for G1. Equation 5 does not seem essential and equation 6 would merely contain another term, which you can estimate?

Page 6 L20ff: I suggest to restructure the discussion of this section. It is sometimes difficult to follow which part of the discussion is applicable to G1 and which to G1ocean-albedo. It may be worth to split the discussion going through the assumptions of G1 and G1ocean-albedo separately and followed by a discussion contrasting these two. A few concrete suggestions follow:

L21: Rephrase “of this equation is equal to” as “of Equ. 5 equals”

P7L11ff: The paragraph starts with the discussion on assuming $dA=0$ for the G1 simulations and ends with the change in dTs,o for G1ocean-albedo. It is not clear to me, why one would use the $d\varepsilon$ from G1 to estimate dTs,o for G1ocean-albedo.

Equ. 9: A is already used for albedo.

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Discussion paper

