

## ***Interactive comment on “Effects of snow grain shape on climate simulations: Sensitivity tests with the Norwegian Earth System Model” by Petri Räisänen et al.***

### **Anonymous Referee #2**

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The study investigates the impacts of including the effects of non-sphericity of snow grains in the NorESM model in slab ocean mode. They find that due to a smaller asymmetry parameter, snow broadband albedo is generally higher. Despite a global mean radiative forcing associated with this change of only  $-0.22 \text{ W/m}^2$ , this leads to considerable differences in the simulated equilibrium climate – particularly at high latitudes.

The paper is very well written, structured, illustrated and argued. It is, quite frankly, a pleasure to read and I have only extremely minor suggestions for improvement. It fits within the journal and I suggest to accept with only minor changes.

C1

L109: Would it be relevant to mention (just briefly) if and how the sea ice model is dynamic and how this works on top of the slab ocean?

Eqs (3) and (4): Perhaps note that the time step  $\Delta T$  is multiplied onto these rates to get the  $dr$ 's used in Eqn (2).

L226: at the end of the sentence, do you mean “SPH and ERA-Interim reach  $-7 \text{ K}$ ”?

L246: Perhaps note that these diagnostic calculations were the same used to calculate the TOM RF.

L264: “smaller contribution”. It is not completely clear to me how you see that this contribution is smaller. Please explain better.

L322-330+Table 2: Is this part really necessary? If you want to shorten, this could be a place.

L337: yes, because the default parameterization was used when other parts of the model were tuned originally.

L357:NONSPH->SPH

L516: reports

L529: Perhaps: “at high latitudes up to  $XX \text{ K}$ .”

L531: Perhaps add to end of sentence something like “and therefore leads to large efficacy of the RF”. This would better justify including the efficacy section in Section 7.

L552: Delete “to”

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Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2017-118, 2017.

C2