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# ***Interactive comment on “Radiative and climate impacts of a large volcanic eruption during stratospheric sulfur geoengineering” by A. Laakso et al.***

## **Anonymous Referee #3**

Received and published: 8 September 2015

This paper focuses on the sulfur impact caused by a large tropical volcano, both in a stratospheric background fairly clean and one that contains more sulfur due to geoengineering. It is a model study, and the climate impact is calculated. Some sensitivity studies are done, e.g. testing the time of the eruption (winter instead of summer) and the location (Arctic instead of tropics). The method seems well chosen, and gives important input to the volcano/geoengineering subject. One interesting aspect is that geoengineering actually seems to reduce the impact of volcanoes. I only have minor comments:

General:

C6659

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Some discussion on the altitude of eruption would be nice. Could the impact in a geoengeered stratosphere be different when emitting at e.g. 16-18km altitude?

The authors should include a reasoning behind using fixed sea surface temperature, and also a short discussion on the expected impact of a fully coupled ocean.

Specific:

P21843, L6: Consider referring to Sect. 2.2.

P21845, L20: "...-SALSA simulations" -> "...-SALSA simulations in the stratosphere".

P21846, L3: Remove comma after "study".

P21848, L14-16: Remove parentheses.

P21849, L19: "very fast": To my understanding this means much faster than the responses in question. Suggest rephrase.

P21849, L25-28: Skip parentheses and rewrite the latter part ("and therefore effectively scales" -> "scaling well with SRMcont" ? "corresponding well with SRMcont"?).

P21850, L3: Lower than what?

P21850, L16: How is the growth rate of particles? Is it fast/slow, and have you tested how different growth rates will affect the results?

P21851, L4: "be restart" -> "be restarted".

P21852, L1-3: "similar to background conditions": This is an unclear sentence, please rewrite. You are discussing Volc vs SRM Volc?

P21855, L1-5: How large is the changes in longwave radiative forcing?

P21855, L12: Suggest moving "lead" to after "eruption".

P21855, L19: "than after" -> "than the impact of" ?

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P21856, L16: Less evaporation: Do you mean net evaporation? If not, are there perhaps changes in condensation also?

P21858, L16-17: Unclear sentence. "SRM case" and "as well as the SRM-only case".

P21858, L18: Could any of the changes be due to longwave forcing?

P21860, L11: "are depended" -> "depend" or "are dependent"

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 21837, 2015.

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