

## ***Interactive comment on “Expanding the Design Space of Stratospheric Aerosol Geoengineering to Include Precipitation-Based Objectives and Explore Trade-offs” by Walker Lee et al.***

**Anonymous Referee #2**

Received and published: 19 September 2020

This study is built upon the Geoengineering Large Ensemble simulations (GLENS) that achieve multiple temperature stabilization goals by injecting SO<sub>2</sub> into the stratosphere at four different latitudes with feedback regulation. This study expands GLENS by targeting non-temperature stabilization goals including global mean precipitation, tropical precipitation centroid, and Arctic sea ice extent. There are two novelties of this study: First, it introduces a new method of visualizing the design space that helps to predict the climate model output under a given geoengineering scenario. Second, it demonstrates that in climate models, some non-temperature-based metrics can also be stabilized simultaneously via the feedback-control scheme, which provides new insight into the design of geoengineering options. This study is clearly written. I recommend

C1

publication with minor revisions as suggested below.

Line 24: the cooling effect of anthropogenic aerosol emission is not ‘small’.

Line 25: More references should be given in addition to Robock et al. (2008) to support the statement that climate modeling studies agree . . .

Lines 42-44: If this is the motivation of this study, the motivation is weak. What does it mean by controlling precipitation? Stabilize global mean precipitation, prevents monsoon disruption, or minimize precipitation change at some regions?

Lines 46-47: Before showing 2D and 3D maps, this statement in Introduction is too abstract to understand.

Line 50: ‘a better proxy than T1’. In what manner? Please explain it in a more explicit way.

Line 185: ‘Some sensitivities’. What could be those sensitivities?

Line 415, Equation (5) shows that a for a restoration value of 100%, the value of ‘actual’ equals to that of RCP, which should indicate no restoration. But the authors state that a value of 100% indicate perfect restoration. Please check.

---

Interactive comment on Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2020-58, 2020.

C2