Supplement of

Limitations of assuming internal mixing between different aerosol species: a case study with sulfate geoengineering simulations

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Fig. S1 As Fig. 1, but for Aitken mode particles.

Fig. S2 As Fig. 1, but for Accumulation mode particles.
Fig. S3 As Fig. 4, but for particle concentration.
**Fig. S4** Size distribution of the aerosols in the upper troposphere in the three separate modes, and composite one of all three (thicker line) for Baseline (2010-2029) and GLENS (2080-2099). Standard deviation for the three modes (constant throughout the entire atmosphere) $\sigma_p$ from Mills et al. (2016). Number concentrations and aerosol sizes calculated in the black boxes from Fig. 4.

**Fig. S5** a) Annual, zonal mean amount of water content (in liquid+ice form, kg for kg of air) in the Baseline case (2010-2029 average). b) Fraction of the water in panel a) that is in solid ice form.