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Could planetary scale solar radiation management prevent a West Antarctic Ice Sheet collapse?

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Solar radiation modification (SRM) is increasingly discussed as a tool to reduce or avert global warming and concomitantly the risk of ice-sheet collapse, as is considered possible for the West Antarctic Ice Sheet (WAIS). While there is a growing body of literature on the climate impacts of various hypothetical SRM employment schemes, the concomitant effects on ice sheet dynamics are much less studied let alone understood. We present the first study explicitly modelling the Antarctic Ice Sheet response to global SRM-interventions with a continental scale ice sheet model. Intuitively, the question whether a WAIS collapse can be prevented depends on a manifold of factors such as ice sheet sensitivity, timing and design of the SRM-intervention and underlying climate scenarios. Our study suggests that safeguarding the WAIS from long-term collapse would either require rapid decarbonization efforts or quasi-immediate SRM-interventions. Both cases are either politically unrealistic or imprudent considering the precautionary principle. We discuss the response of the Antarctic Ice Sheet under various climate and SRM scenarios and the associated uncertainties which need to be resolved to get a more conclusive understanding on the impact of SRM-geoengineering strategies on earth's two remaining large ice sheets.