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Sea ice targeted geoengineering can delay Arctic sea ice decline but not global warming

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To counteract global warming, a geoengineering approach that aims at intervening in the Arctic ice-albedo feedback has been proposed. A large number of wind-driven pumps shall spread seawater on the surface in winter to enhance ice growth, allowing more ice to survive the summer melt. We test this idea with a coupled climate model by modifying the surface exchange processes such that the physical effect of the pumps is simulated. Based on experiments with RCP 8.5 scenario forcing we find that it is possible to keep the late-summer sea ice cover at the current extent for the next ∼60 years. The increased ice extent is accompanied by significant Arctic late-summer cooling by ∼1.3 K on average north of the polar circle (2021–2060). However, this cooling is not conveyed to lower latitudes. Moreover, the Arctic experiences substantial winter warming in regions with active pumps. The global annual-mean near-surface air temperature is reduced by only 0.02 K (2021–2060). Our results cast doubt on the potential of sea ice targeted geoengineering to mitigate climate change.