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Aggressive geoengineering could avert large 21st century sea level rise

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Geoengineering has been proposed as a feasible way of mitigating anthropogenic climate change, especially increasing global temperatures in the 21st century. The two main geoengineering options are limiting incoming solar radiation, or modifying the carbon cycle. Here we examine the impact of 5 geoengineering approaches on sea level; SO2 aerosol injection into the stratosphere, mirrors in space, afforestation, biochar, and bioenergy with carbon sequestration. Lower global temperatures almost immediately follow significant reduction of insolation. However, sea level responds on centennial time scales to temperature change, and has been largely driven by anthropogenic forcing since 1850. We use a model of sea level rise as a function of time-varying climate forcing factors (solar radiation, volcanism and greenhouse gas emissions). We find that sea level rise by 2100 will likely exceed 30 cm even with aggressive geoengineering under all except the most stringent greenhouse gas emissions scenarios (B1, B2).