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Assessing the impact of stratospheric aerosol injection on warm spell characteristics

Ivy Glade and James Hurrell

Department of Atmospheric Science, Colorado State University, Fort Collins, United States of America

The urgency to limit continued global mean temperature rise has prompted the emergence of methods of solar climate intervention (SCI) to cool the planet. Stratospheric aerosol injection (SAI) is a method of SCI that would cool the planet by injecting aerosols into the stratosphere to reflect a small amount of incoming solar radiation away from Earth. There is not yet a complete understanding of how the impacts and risks of SAI on human and natural systems compare to those of climate change alone. While there has been some work that has examined the potential impact of SAI on extreme weather events, none has thoroughly examined the potential impact of SAI on warm spells, defined as prolonged periods of anomalously warm temperature that may occur at any time of the year. Warm spells have detrimental impacts that are projected to worsen with continued climate warming including risks to human health, agriculture and ecosystems. Here, the impact of SAI on the frequency, magnitude, intensity, and duration of warm spells is investigated globally using the ARISE-SAI simulations. Specifically, future projections of warm spells under ARISE-SAI are compared to those under climate change alone following the moderate SSP2-4.5 emissions scenario. The ARISE-SAI simulations indicate that increases in the frequency, magnitude, intensity and duration of warm spells could be limited if SAI were to be deployed, although there is significant regional variability.