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Accelerated increases in global and Asian summer monsoon precipitation from future aerosol reductions

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There is large uncertainty in future aerosol emissions scenarios explored in the Shared Socioeconomic Pathways (SSPs), with plausible pathways spanning a range of possibilities from large global reductions in emissions to 2050 to moderate global increases over the same period. Diversity in emissions across the pathways is particularly large over Asia. CMIP6 models indicate that rapid anthropogenic aerosol and precursor emission reductions between the present day and the 2050s lead to enhanced increases in global and Asian summer monsoon precipitation relative to scenarios with weak air quality policies. However, the effects of aerosol reductions don't persist in precipitation to the end of the 21st century, when response to greenhouse gases dominates differences across the SSPs. The relative magnitude and spatial distribution of aerosol changes is particularly important for South Asian summer monsoon precipitation changes. Precipitation increases here are initially suppressed in SSPs 2-4.5 and 5-8.5 relative to SSP 1-1.9 and 3-7.0 when the impact of East Asian emission decreases is counteracted by that due to continued increases in South Asian emissions.