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Aerosol emissions impact on the 1.5C pathways

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The impact of anthropogenic aerosols on the Earth's radiative balance remains the single largest uncertainty in our understanding of current drivers
of climate change [1]. Depending on their type, aerosols have the ability
to perturb the radiative balance of the atmosphere, either directly scattering and absorbing of solar radiation, or indirectly via modifying cloud properties. Any changes in aerosol concentrations, therefore, have the potential to intensify or attenuate the effects of anthropogenic climate change.
The net effect of all present-day atmospheric aerosols is estimated to be cooling, thus globally counteracting potentially a considerable fraction of the
warming associated with greenhouse gases. Many scientific articles highlight the role of aerosols and the importance of aerosol mitigation policies on the rate and magnitude of near-term climate change. Hence, the purpose of our study is to assess the impact of
anthropogenic aerosol emission reductions on efforts to limit the temperature increase to 1.5[U+25E6]C or 2[U+25E6]C above preindustrial temperature using two climate modeling approaches with two aerosol control pathways under two greenhouse gas reduction scenarios. We found that aerosol emission reductions associated with the co-emissions with CO_2 are sufficient to push the global warming to 1.5[U+25E6]C. The modeling results show that these aerosol emission reductions account for about 0.5[U+25E6]C warming on top of 1[U+25E6]C above preindustrial levels that we have been already reached in 2015. Aggressive aerosol control due to air quality legislation increases the warming rate during the first half of the century and impacts the peak temperature which is 0.2-0.3[U+25E6]C above the 1.5[U+25E6]C limit even within the most ambitious CO_2/GHG reduction scenario. At the end of the century, the temperature differences between aerosol reduction scenarios in the context of ambitious CO_2 mitigation are negligible.