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Can an influence of changing aerosol emissions be detected in the pattern of surface temperature change between 1970 and 2000?

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Since the 1970's, there has been a rapid change in the magnitude and spatial distribution of anthropogenic aerosol particle and precursor emissions in the world with a significant decrease over e.g. Europe and North America and a substantial increase over large parts of Asia. During the same time period, there has been a significant increase in global greenhouse gas concentrations. In the present study, the global climate model CAM-Oslo is used to examine if the shift in aerosol emissions between 1970 and present day results in a clear fingerprint in the modeled atmospheric circulation, precipitation and temperature change patterns. CAM-Oslo includes a comprehensive module of the atmospheric aerosol cycle as well as descriptions of the direct and indirect effects of aerosol particles on radiation, cloud reflectivity and precipitation. We also examine if the temperature response pattern differs when aerosol effects are considered separately or simultaneously with a change in greenhouse gas concentration. To evaluate the simulations, we make use of observations and re-analysis data of surface temperature, precipitation and 300 hPa geopotential. We investigate if the modeled results correspond better or worse with the observations when aerosol and greenhouse effects are included or excluded. For a few selected regions, we also examine more closely the underlying processes that determine the surface temperature anomaly pattern and if the importance of different processes change when greenhouse effects and aerosol effects are considered separately or simultaneously.