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Contrasts in the effects on climate of anthropogenic sulfate aerosols between the 20th and the 21st century

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In this study, we examine the time evolution of the relative contribution of sulfate aerosols and greenhouse gases to anthropogenic climate change. We use the new IPSL-CM4 coupled climate model for which the first indirect effect of sulfate aerosols has been calibrated using POLDER satellite data. For the recent historical period the sulfate aerosols play a key role on the temperature increase with a cooling effect of 0.5 K, to be compared to the 1.4 K warming due to greenhouse gas increase. In contrast, the projected temperature change for the 21st century is remarkably independent of the effects of anthropogenic sulfate aerosols for the SRES-A2 scenario. Those results are interpreted comparing the different radiative forcings, and can be extended to other scenarios. We also highlight that the first indirect effect of aerosol strongly depends on the land surface model by changing the cloud cover.