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Contribution of anthropogenic aerosols to changes in the Northern Hemisphere storm tracks during the 20th and 21st centuries

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Midlatitude storm tracks are a key component of the global atmospheric circulation. Extratropical cyclones associated with and evolving along the storm tracks dominate the day-to-day weather variability in the mid-latitudes, and changes in storm track activity or location strongly impact regional climate variations. Baroclinic waves that form the storm tracks are also responsible for transporting much of the heat, moisture, and momentum poleward in the midlatitudes. Therefore, investigating how storm tracks may respond to future changes in anthropogenic forcing is of significant interest. Yet, while most of the studies have focused on the role of increased greenhouse gases and the associated response at the end of the 21st century, the role of anthropogenic aerosols has been comparatively less studied. Furthermore, identifying robust changes in the atmospheric circulation is challenging and a major source of uncertainty in climate projections given the variety of responses in different models. This study aims to address these two aspects, benefitting from the use of large ensembles of single forcing experiments for the historical period and the future under RCP8.5, which allow to better identify the contribution of internal variability and its interplay with external forcing. We will discuss changes of the northern hemisphere storm tracks over both the Atlantic and Pacific regions, disentangle the contribution of anthropogenic aerosol changes, and build a physical link with large-scale circulation and surface climate over the two-basins.