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A global off-line model of size-resolved aerosol microphysics: Identification of key uncertainties.

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We use the new GLOMAP model of global aerosol microphysics to investigate the sensitivity of modelled aerosol properties to uncertainties in the driving microphysical processes and compare these uncertainties with those associated with aerosol and precursor gas emissions. Overall, we conclude that uncertainties in microphysical processes have a larger effect on global condensation nuclei (CN) and cloud condensation nuclei (CCN) concentrations than uncertainties in present-day sulfur emissions. Our simulations suggest that uncertainties in predicted CCN abundances due to poorly constrained microphysical processes are likely to be of a similar magnitude to long-term changes in CCN due to changes in anthropogenic emissions. A full microphysical treatment of the global aerosol allows the uncertainty in climate-relevant aerosol properties to be attributed to specific processes in a way that has not been possible with simpler aerosol schemes.