

Impact of natural and anthropogenic aerosols on mixed-phase and ice clouds

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In addition to their health and direct climate effects, anthropogenically emitted aerosol particles interact with clouds and influence weather and climate in indirect ways. The interactions of aerosol particles with mixed-phase and ice clouds is particularly complex, because only a small subset of the atmospheric aerosol can act as so-called ice nuclei, initiating the formation of ice crystals at high sub-zero temperatures and low ice supersaturations where they would not have formed in the absence of these nuclei. Ice nuclei are most probably dominated by natural particles such as mineral dust, while the anthropogenic fraction (e.g. soot from industrial combustion sources and dust emitted through agricultural activities) is still under debate. We will discuss new laboratory and modeling studies which aim to clarify the role of anthropogenic aerosols in the microphysical processes in mixed-phase and ice clouds and their impact on climate forcing.