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Impact of parametric uncertainties on clouds in the present-day climate and on the indirect aerosol effect

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Clouds are important for climate and climate change by interacting with radiation and being part of the hydrological cycle. They constitute a large uncertainty in global climate modeling and climate change projections as cloud processes occur on the subgrid scale and need to be parameterized. Some processes, such as the magnitude of the warm and ice-phase precipitation formation rates, are rather uncertain. Thus they are used as tuning parameters. This means that the precipitation formation rates are enhanced or decelerated in order to yield a top-of-the atmosphere radiation budget that is balanced to within 1 W m^{-2} and that the individual radiative fluxes are within 5 W m^{-2} within the observed satellite data (ERBE and CERES). Here we systematically investigate the impact of various tunable parameters within the convective and stratiform cloud schemes and of the ice cloud optical properties on the present-day climate in terms of clouds, radiation and precipitation. Also the impact on varying these tuning parameters on the indirect aerosol effect as obtained from differences between simulations with present-day and pre-industrial simulations is investigated and will be presented.