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Tropospheric cloud and precipitation chemistry - Is this important for the chemical composition of the atmosphere in global modelling studies?

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Clouds and precipitation have a strong impact on the budgets of trace gases and aerosols in the troposphere, representing a significant sink by scavenging and subsequent wet deposition. Within the aqueous phase reaction pathways can differ substantially from the gas phase. These processes have both direct and indirect effects on the gas phase composition, either by uptake and removal or by transformations within the liquid phase and subsequent evaporation or release into the gas phase, thus influencing the oxidation capacity of the atmosphere. Since the constituents in the liquid originate from both gas and aerosol phase the chemical composition of both phases must be taken into account.
We have analysed these effects as a function of the detail of treatment of aqueous phase processes with the help of a new scavenging, liquid phase chemistry and wet deposition scheme implemented in the atmospheric chemistry general circulation model ECHAM5/MESSy. Simulations with different cloud and precipitation chemistry mechanisms are compared with each other and with a comprehensive vertical profile observation database.