



A comparison of inorganic aerosol thermodynamic properties predicted by EQSAM4 and EQUISOLV II

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A comprehensive comparison between two distinctly different gas-aerosol equilibrium models used in atmospheric chemistry-climate simulations, EQUISOLV II and EQSAM4, is conducted for various relative humidities and chemical compositions, mainly to test the applicability of the parameterization on which EQSAM4 is based. Our results show that the concentration of total particulate matter as well as the associated aerosol liquid water content predicted by these two models is similar for most conditions, which is essential for radiative forcing estimates. The normalized absolute difference in the concentration of total particulate matter (PM), aerosol water (AW) and the hygroscopic growth factor (HGF) between these two models is below 5% on average for all 200 conditions studied. Relatively largest discrepancies between these two models occur in the prediction of the solid composition and the differences in the phase partitioning of mixed solutions, although at the same time the deliquescence and water uptake compare very well with a regression coefficient of about 1.06 for all 200 conditions. Furthermore, both models largely agree for realistic atmospheric conditions as based on the data collected during the Mediterranean Intensive Oxidant Study (MINOS). The concentrations of total particulate matter are captured 90% of the time to within a factor of 2, while the aerosol water predictions are significantly correlated.