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Phase transitions and hygroscopic growth of humic acid and mixed humic acid and ammonium sulphate aerosols

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Recent research has emphasized investigations of the properties of organic aerosol which are representative of aerosols found in the atmosphere. Hundreds of individual organic compounds have been identified in the water-soluble component of atmospheric aerosol and Fuzzi *et al*. recently suggested humic or fulvic acids as representative of the polycarboxylic acid fraction. Therefore, this work uses a combination of laboratory techniques to investigate the properties of aerosols consisting of humic acid (sodium salt, Aldrich) and internal mixtures of humic acid and ammonium sulphate.

Phase transition studies were performed between 288K and 298K using an Aerosol Flow Tube - Fourier Transform Infra-Red (AFT-FTIR) spectrometer that monitored aerosol phase and water content via infrared extinction spectroscopy. No phase transitions were observed for humic acid aerosol implying the particles form super-saturated droplets. Three mixing ratios of humic acid and ammonium sulphate were studied showing that the presence of humic acid shifts the phase transitions of the ammonium sulphate component and that significant water uptake occurs in these systems prior to deliquescence of the ammonium sulphate. Quantitative results for the growth of these aerosols using a Tandem Differential Mobility Analyser (TDMA) will also be presented along with initial studies of their reactivity with respect to the hydrolysis of N_2O_5. The atmospheric implications of the results from all the experimental techniques above will be discussed.