# 4.062 Organic aerosol hygroscopicity and the contribution to CCN concentrations over a mid-latitude forest facing the North Pacific.

Early Career Scientist

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Abstract:

Biogenic secondary organic aerosol (BSOA) can be formed by the reactions of volatile organic precursors emitted from vegetation in forest environments. The formation of BSOA is potentially important to that of cloud droplets by changing the hygroscopicity and other properties of aerosols. In this study, the CCN activation of submicron aerosols and their chemical composition and size distributions were measured at a mid-latitude forest site in Japan in summer and early autumn, to assess the influence of biogenic SOA on CCN in the forest environment. The hygroscopicity of organic aerosols represented by a single parameter $k_{org}$ was determined from the CCN activation diameters and composition of the aerosols. The $k_{org}$ of organics in <100 nm particles was on average substantially lower than that of organics in >100 nm particles and $k_{org}$ related positively to the O to C atomic ratio. Histogram analysis showed that the hygroscopicity of organics explains more than 60 % of total aerosol hygroscopicity for 12 % and 35%–41% of the measured accumulation mode and Aitken mode particles, respectively. Based on size-resolved chemical composition measurement, the contributions of organic aerosols to total measured CCN concentrations were calculated with an alternative method assuming the absence of organics. In the case that the volume fraction of organic aerosol was larger than 80% the calculated average contributions were 50%, 53%, 66%, and 80% under supersaturations of 0.80%, 0.42%, 0.23%, and 0.11%, respectively. Further, histogram analysis indicated that organic aerosols contributed more than 50 % of the total CCN concentrations during 10%–15 % of the measurement periods.