



Interactions of urban aerosol plumes with stratocumulus cloud

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The interaction of ageing aerosol emitted from urban areas of the UK was investigated as the plumes are advected away from the area over the sea in a stratocumulus capped boundary layer. Detailed measurements of the size distribution and chemical composition of the aerosol were made on the UK community's new research aircraft a BAE 146. These measurements were complimented by detailed measurements of the cloud microphysics. Detailed measurements of precursor trace gases were also made. The aircraft made a series of horizontal passes perpendicular to the line of the plume below cloud, within the cloud deck and above the cloud top. This series of passes was repeated at 50 km intervals moving downwind from the source. Within cloud an airborne CVI was used to separately measure the interstitial and droplet residual aerosol components to investigate the nucleation scavenging of the particulate. There is evidence for sulphate production close to sources of sulphur dioxide. Individual plumes of polluted air have quite different properties for example both sulphate and organic dominated plumes seen, however, both sulphate and organic dominated particles seem to behave as efficient Cloud Condensation Nuclei. This is important, as organic aerosol will be efficiently wet deposited. There are cases where the organic loading of the aerosol progressively increases with distance downstream away from source. This is in contrast to other aerosol species where the loadings tend to vary little with distance. This suggests that SOA are being formed as a result of the oxidation of organic gases. The organic material in the aerosol appears to be aged, relative to the organic aerosol found in the urban environment, by the time it is measured. Coalescence of cloud droplets leads to production of large internally mixed particles, this has important implications for particle lifetime.