

"Aerosol properties and processes across Europe and their impacts: a multi-aircraft study during a European Integrated Project (EUCAARI) "

Hugh Coe

The EUCAARI project aims to advance our understanding of climate and air quality by integrating laboratory studies, both short and long term field investigations, satellite data, and modeling at regional and global scales. Airborne observations were used in an intensive study to provide a local and regional scale overview of the general composition trends of atmospheric aerosol over northern Europe. Time dependent measurements obtained by aerosol mass spectrometry enable the chemical transformation time scales of aerosol material to be explored. In particular, factor analyses of the observed organic mass spectral fingerprint demonstrates the continuum nature of chemical processing. Ammonium nitrate is an important aerosol component in NW Europe. It exists in a temperature dependent equilibrium which favours particulate formation in the moist, cool upper portion of the boundary layer. We have shown that this results in aerosol optical depths inferred from ground based measurements are biased low by up to 50% by comparison with AERONET, aircraft measurements, and lidar data during periods of high AOD in anticyclonic conditions. The ubiquitous nature of black carbon (BC) was also demonstrated. Measurements using single particle soot photometry have been used to show its variability across Europe and to explore the correlation of BC particle coating thickness with secondary aerosol species. These topics will all be explored and comparison with model studies will also be discussed.