



Deriving a speciated atmospheric nitrogen budget at Auchencorth Moss, a background site in South East Scotland

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Since 2006, the EMEP supersite, Auchencorth Moss, has routinely measured HNO_3 , HONO, NO, NO_2 , NH_3 and speciated aerosols including NH_4^+ and NO_3^- in $\text{PM}_{2.5}$ and PM_{10} . It is known that other reactive N species are important in the atmosphere at background sites including PANs, peroxy nitrates, alkyl nitrates, ClNO_2 and N_2O_5 and routine measurements are not frequently assessed against these other species. The following study presents the highlights from an intensive study, in spring 2014, where non-routine measurements (TD-LIF and PAN GC) were carried out alongside routine measurements (MARGA, ANNO_x, NO_x ThermoFisher Analyser). The objectives of the study were to understand further the role of non-routine measured species in the N budget at this site and to try to identify potential artefacts in current routine measurements.

Initial comparison studies suggest that routine measurements capture well the temporal variations in NO_x and HNO₃, though questions remain on the accuracy of the measurements. During the study on average low concentrations of all species ($\text{NO}_2 = 1.58$ ppb, $\text{NH}_3 = 2.3$ ppb, $\text{HNO}_3 = 0.09$ ppb, HONO = 0.07 ppb) were observed, though there were periods where polluted air masses arrived at the site resulting in an increase in both routine and non-routine measured species. As well as air masses transporting N species, there was evidence of atmospheric chemical transformations of N species at the site, including the photochemical production of PAN.