Geophysical Research Abstracts
Vol. 12, EGU2010-6451-1, 2010
EGU General Assembly 2010

Uptake of NO_3 and N_2O_5 to Saharan dust, ambient urban aerosol and soot: A relative rate study

Mingjin Tang, Jim Thieser, Gerhard Schuster, and John N. Cowley
Max Planck Institue for Chemistry, Atmospheric Chemistry Department, Germany (mingjintang@gmail.com)

The uptake of NO_3 and N_2O_5 to Saharan dust, ambient aerosols and soot was investigated using a novel and simple relative rate method with simultaneous detection of both NO_3 and N_2O_5. The use of cavity ring down spectroscopy to detect both trace gases enabled the measurements to be carried out at low mixing ratios ($<$ 500 pptv or 1×10^{10} molecules cm^{-3}). The uptake coefficient ratio, $\gamma(NO_3)$ / $\gamma(N_2O_5)$, was determined to be 0.9$\pm$0.3 for Saharan dust, independent of relative humidity and exposure time. Ambient (urban) aerosols showed a very limited capacity to take up N_2O_5 but were reactive towards NO_3 with $\gamma(NO_3)$ / $\gamma(N_2O_5)$ $>$15. A value of $\gamma(NO_3)$ / $\gamma(N_2O_5)$ $\approx$1.5 – 3 was obtained when using candle generated soot. The relative rate obtained for Saharan dust can be placed on an absolute basis using our recently determined value of $\gamma(N_2O5) = 1\times10^{-2}$ to give $\gamma(NO_3) = 9\times10^{-3}$, which is significantly smaller than the present literature value. With the present uptake coefficient, reaction with mineral dust will generally not contribute significantly to NO3 loss in the atmosphere or to the nitration of mineral dust.