THE TEMPORAL AND SPATIAL VARIABILITY OF SCAVENGING RATIOS FOR NSS SULFATE, NITRATE, METHANESULFONATE AND SODIUM IN THE ATMOSPHERE OVER THE NORTH ATLANTIC OCEAN

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Abstract – In this paper we study the temporal and spatial variability of scavenging ratios (SRs) based upon 2 years of continuous aerosol and precipitation data collected at three sites of the Atmosphere-Ocean Chemistry Experiment (AEROCE): Barbados, Bermuda and Ireland. At Barbados and Bermuda, the SRs for nss SO$_4^{2-}$, NO$_3^-$, and CH$_3$SO$_3^-$ fell within a relatively narrow range: 210-374; for the individual species, the absolute differences between the two site means were quite small, ranging from 9% for NO$_3^-$ to 36% for CH$_3$SO$_3^-$. SRs at Ireland were very different but the situation is complicated due to the sectoring of aerosol but not of precipitation. On shorter time scales (days to months), SRs are highly variable and can range over orders of magnitude. Consequently, SRs based on short-term measurements at one place and time should be used with caution at other places and times. Nonetheless, the similarity in our 2-year mean SRs at Barbados and Bermuda suggests that SRs might be relatively constant over longer time periods.

Key word index: Aerosol, precipitation, marine atmosphere, scavenging ratio, washout ratio, wet deposition, atmospheric chemistry, sulfate, nitrate, sodium, methanesulfonate.