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Halogen activation from NOx: Field observations of nitryl chloride (ClNO2) production from uptake of N2O5 to chloride-containing aerosol

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Nitryl chloride, ClNO2, is produced from the heterogeneous uptake of N2O5 to sea salt and other chloride-containing aerosol. Until recently, the impact of this process on the atmospheric halogen budget was thought to be modest. New analytical techniques for measurement of ClNO2 based on chemical ionization mass spectrometry (CIMS) have quantified its atmospheric abundance during recent field campaigns. The observations show unexpectedly large ClNO2 mixing ratios, in excess of 1 ppbv within marine NOx plumes. Production of these levels requires heterogeneous uptake of N2O5 both to sea salt aerosol and to chloride-containing submicron aerosol, indicating that the production of ClNO2 from NOx pollution sources is more efficient than commonly recognized in atmospheric models. This presentation will describe the implications of these measurements for air quality in polluted, coastal areas as well as the possible magnitude of ClNO2 as a global halogen source.