



New instrument for measuring atmospheric concentrations of non-OH oxidants of SO₂

Risto Taipale (1), Nina Sarnela (1), Matti Rissanen (1), Heikki Junninen (1), Pekka Rantala (1), Frans Korhonen (1), Erkki Siivola (1), Torsten Berndt (2), Markku Kulmala (1), Roy L. Mauldin III (1,3), Tuukka Petäjä (1), and Mikko Sipilä (1)

(1) University of Helsinki, Department of Physics, Helsinki, Finland (risto.taipale@helsinki.fi), (2) Leibniz Institute for Tropospheric Research, Leipzig, Germany, (3) University of Colorado at Boulder, Department of Atmospheric and Oceanic Sciences, Boulder, Colorado, USA

Oxidation of sulphur dioxide (SO₂) by the hydroxyl radical (OH) is considered the main source of gaseous sulphuric acid (H₂SO₄) in the atmosphere. However, recent studies suggest that also non-OH oxidants can have a substantial role in H₂SO₄ production. Some of these non-OH oxidants of SO₂ are stabilized Criegee intermediates (SCIs) which are formed in the ozonolysis of alkenes. An FR-CI-APi-TOF instrument for measuring the total concentration of all non-OH oxidants (X) reacting with SO₂ at a reasonable rate is presented here. The instrument consists of a flow reactor (FR) and a chemical ionisation (CI) atmospheric pressure interface (APi) time of flight (TOF) mass spectrometer. The first field measurements at a boreal forest site indicated that the summertime concentration, production rate and apparent lifetime of X were $(0.3\text{--}2.0) \times 10^6 \text{ cm}^{-3}$, $(0.3\text{--}1.9) \times 10^6 \text{ cm}^{-3} \text{ s}^{-1}$ and 0.3–5.0 s, respectively. The estimated concentration and production rate of SCIs formed in the ozonolysis of monoterpenes were substantially lower, possibly indicating the presence of SCIs from other alkenes. Detailed instrument characteristics will be presented and further instrument development will be discussed.