4.077 Winter OH reactivity in Helsinki, Finland..

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Abstract:

The total reactivity of hydroxyl radical (OH) is an important tool to assess the exhaustiveness of measurements of individual compounds during intensive measurement campaigns and while monitoring air chemical composition at atmospheric stations. This approach was initiated in the early 2000s (Kovacs and Brune, 2001), based on laser induced fluorescence (LIF) techniques. Shortly thereafter, a more affordable indirect method to measure OH reactivity has been developed, namely the Comparative Reactivity Method (CRM, Sinha et al., 2008). It relies on competition reactions for OH between a reference compound with known reaction rate added to ambient air and do not make use of lasers.

Our group started recently to develop a CRM system and it has been deployed from late January to end of February 2016 close to the main SMEAR III site (third Station for Measuring Ecosystem-Atmosphere Relations), a semi-urban station in Helsinki, Finland. The main objective was to assess the CRM performances, but the results also show insight into winter OH reactivity from this semi-urban site, covering various meteorological conditions with ambient temperatures ranging from -7 to 4°C. In addition to total OH reactivity measurements reactive organic compounds were also measured with an in situ GC-MS (C_6-C_{10} hydrocarbons) and sampled in canisters and through DNPH cartridges (24h time resolution) to be analysed by GC-FID (C_2-C_6 hydrocarbons) and LC-UV (carbonyls), respectively. The total reactivity derived from the sum of individual OH reactivities for each measured compound was compared with total OH reactivity measured.

References:

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