



## **Atmospheric measurements of total OH reactivity: Intercomparison of the pump-probe technique and the comparative reactivity method**

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The hydroxyl radical (OH) drives the oxidation of organic trace gases that can lead to the production of ozone and secondary organic aerosols in the atmosphere. A complete understanding of the sources and sinks of OH is therefore important to address issues related to both air quality and climate change. However, recent measurements of total OH reactivity [1-2], which is the inverse of the OH lifetime, have pointed out that our understanding of OH sinks is still incomplete and important reactive trace gases have not yet been identified. These measurements of total OH reactivity are of particular interest since they provide a critical test of our understanding of the OH budget. Three techniques are available to measure the total OH reactivity, including the total OH loss rate method [3], the pump-probe method [4], and the comparative reactivity method (CRM) [5]. While the first two methods are based on direct measurements of OH decays using laser-induced fluorescence instruments, the CRM is based on a different approach in which a tracer molecule is detected instead of OH to determine the ambient OH loss rate. As these instruments were deployed in different field campaigns, intercomparison exercises would be useful to ensure the accuracy of the measurements. However, such intercomparisons have not yet been published.

An informal intercomparison involving a CRM instrument from the Ecole des Mines de Douai (EMD) and a pump-probe instrument from the laboratory Physicochimie des Processus de Combustion et de l'Atmosphère (PC2A) took place in an urban environment at the university of Lille (France). The two OH reactivity instruments measured continuously side by side for a duration of two weeks. Collocated measurements of trace gases were also performed using O<sub>3</sub>, NO<sub>x</sub> and SO<sub>2</sub> monitors, as well as two automated chromatographic instruments capable of measuring more than 50 volatile organic compounds (VOC). We will present cross calibrations of the two OH reactivity instruments using complex mixtures of VOCs, as well as ambient measurements, to evaluate the reliability of OH reactivity measurements. Potential measurement artifacts will be discussed for these two techniques. In addition, we will present the OH reactivity budget for this urban environment.

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