



## **Investigation of ambient OH reactivity at a receptor site impacted by industrial, urban and marine emissions: Identification of missing OH reactivity**

Sébastien Dusanter (1,2), Vincent Michoud (1), Thierry Léonardis (1), Nadine Locoge (1), Véronique Riffault (1), and Shouwen Zhang (1)

(1) Mines Douai, Sciences de l'Atmosphère et Génie de l'Environnement, F-59508 Douai, France, (2) School of Public and Environmental Affairs, Indiana University, Bloomington, IN, US

The hydroxyl radical (OH), the main daytime oxidant in the troposphere, plays a key role in atmospheric chemistry. OH initiates the oxidation of most of the trace gases, including Volatile Organic Compounds (VOC), leading to the formation of harmful secondary pollutants such as ozone and secondary organic aerosols. VOCs are directly emitted by a large number of natural and anthropogenic sources and can be formed photochemically. It is expected that several thousand VOCs could be present in the troposphere at ppt-ppb levels (Goldstein and Galbally, ES&T, 2007), making exhaustive measurements of VOCs currently unfeasible with common analytical techniques. In this context, measuring the total sink of OH, so called total OH reactivity, can provide insights into the reactivity of unmeasured trace gases to test the completeness of VOC measurements during field campaigns.

A Comparative Reactivity Method (CRM) instrument was deployed in Dunkirk (France) to measure ambient OH reactivity during July 2014. An objective of this field campaign was to investigate the OH reactivity budget in different types of air masses, characterized by industrial, urban, and marine emissions, as well as different photochemical ages. Collocated measurements of non-methane hydrocarbons, oxygenated VOCs, and inorganic gases were also performed. OH reactivity measurements ranged from the detection limit of  $3 \text{ s}^{-1}$  up to  $90 \text{ s}^{-1}$ , with a campaign average of approximately  $14 \text{ s}^{-1}$ . Large discrepancies were observed between OH reactivity measurements and values calculated from measured trace gases, highlighting the presence of unmeasured reactive compounds. In this presentation, the measured and missing OH reactivity will be discussed regarding air mass origins and compositions. We will also present a novel approach that was implemented on the CRM instrument to identify part of the observed missing OH reactivity.