

# Volatile Organic Compounds measurement in urban tropical environment: Concentration levels near cities

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## **Theme 8: Air Pollution in a Tropical Climate**

Rapid urbanization and economic development in South-East Asia in past decades has led to air pollution problems such as excess of nitrogen oxides (NO<sub>x</sub>), carbon monoxide (CO) and volatile organic compounds (VOCs). Motor vehicle exhaust, industrial emissions, chemical solvents as well as biogenic emissions are the major anthropogenic sources of VOCs. The goal of this study is to identify and quantify the types of VOCs in urban tropical environment.

Two automated Thermal-Desorber Gas Chromatographs equipped with Flame Ionization Detectors (auto TDGC-FID) were used to monitor continuously the concentrations of VOCs in June 2014 near Bangkok in a mobile unit.

First a laboratory study has been carried out to optimize the system before installation in tropical area. One analyzer was dedicated to the monitoring of C<sub>2</sub> to C<sub>6</sub> (airmoVOC C<sub>2</sub>-C<sub>6</sub>, Chromatotec, France) and another for C<sub>6</sub> to C<sub>12</sub> (airmoVOC C<sub>6</sub>-C<sub>12</sub>, Chromatotec, France). It was possible to adjust the time, gas flow and temperature for the pre-concentration of the sample independently for both analyzers. Columns, pressure and temperature gradient have been optimized to obtain a good separation for more than 100 VOCs. The separation and identification of all compounds were carried out using an Electron Ionization Mass Spectrometer equipped with an Electron Multiplier (DET QMS, Chromatotec, France). Finally, humid samples were produced to check the efficiency of the drying systems and evaluate the impact of humidity on VOCs adsorption and modification of retention times.

Then the field deployable system has been installed near Bangkok and VOCs have been monitored for one month. Ethylbenzene, m-xylene, p-xylene and o-xylene (EX) were found to be the most abundant molecules in the ambient air near Bangkok. Benzene concentration was much lower than EX. Hydrocarbons emitted by trees such as isoprene or monoterpenes were found to be insignificant at this time of the year (less than 1% of the total emission). Recently, another automated Thermal-

Desorber Gas Chromatograph equipped with Flame Ionization Detectors and Mass spectrometer (auto TDGC-FID/MS) has been deployed in Gia Nghĩa, Vietnam. With this system we will be able to compare VOC concentrations near urban and rural tropical environment.