# Automatic hourly measurements of hydrocarbons (C2-C11) in Metropolitan Area of Sao Paulo: Spring campaign

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A large variety of volatile non-methane hydrocarbons (NMHC) is found in the atmosphere. These species have a key role in the formation of tropospheric ozone. Ozone represents one of the main atmospheric pollutants in the Metropolitan Area of Sao Paulo (MASP). In this region, its concentration exceeds the national air quality standards (80 ppb/hour) for several days of the year.

In order to characterize emission fonts and to establish the behaviour pattern for some atmospheric NMHC, a campaign was carried out in MASP, during the Spring of 2012. The sampling point is located in a west region of MASP, inside the University of São Paulo Campus, surrounded by important avenues, with intense vehicular traffic (trucks, buses and light vehicles).

The ozone precursors automated measurement from Perkin Elmer® system is based on: 1) a Thermal Desorber (TD) fitted with an air sampler accessory, in which the dried sample is concentrated in an electrically cooled sorbent trap (−30 °C) in the TD. In a second stage, the concentrated sample is desorbed by rapid heating at a rate of 40 °C $s^{-1}$ up to 325 °C, maintained for 6 min, and transferred by a helium (6.0) carrier flow into the chromatographic system. 2) A Clarus 500 gas chromatography with two columns and two flame ionization detectors (FID). Operation was optimized for systematic measurement of more than 50 NMHC (C2–C11) every hour. Ambient air samples were collected during the spring season period (2012), which are of main interest for local ozone episodes in the area.

The most abundant compounds were trans-2 hexene, toluene, ethane, ethylene, p-xylene, 2,3-dimethyl-butane and 1,2,4-trimethyl-benzene, which are related with a greater photochemical ozone potential formation following the MIR reactivity scale of Carter (Carter, 2010). These results are in agreement to the ones found in other NMHC long-term campaigns.

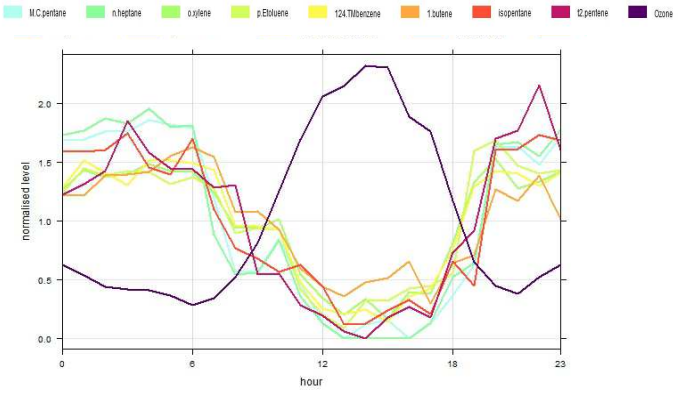


Figure 2. Evolution of the hourly average pattern of some selected NMHC and Ozone (normalized)

Statistical correlation analysis classified the data into groups with similar characteristics and infers possible emission sources of each group. In addition, Factor Analysis was applied to the base data determining descriptive factors that allow us to find specific tracers for different emissions fonts in this area of São Paulo city. The matrices of Figure 1 show a high correlation between aromatic compounds, and a negative correlation of some of them with the ozone. The hourly time average evolution can be seen in Figure 2. As can be observed, most of the compounds follow a similar pattern, which is inversed to the compared ozone daily pattern.

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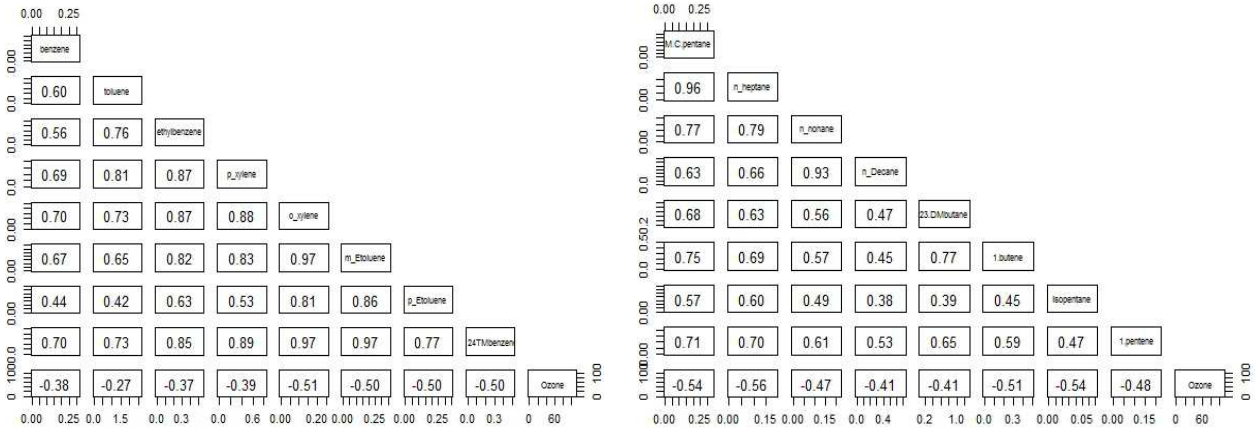


Figure 1. Correlation matrices of some NMHC and Ozone