Supplementary material of:

Non Methane Hydrocarbons variability in Athens during winter-time: The role of traffic and heating

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Figure S1. Temporal variability of (a) propane and i-butane; and (b) i- and n - pentane during the period 16 October 2015 - 15 February 2016 at the Thissio urban background site.

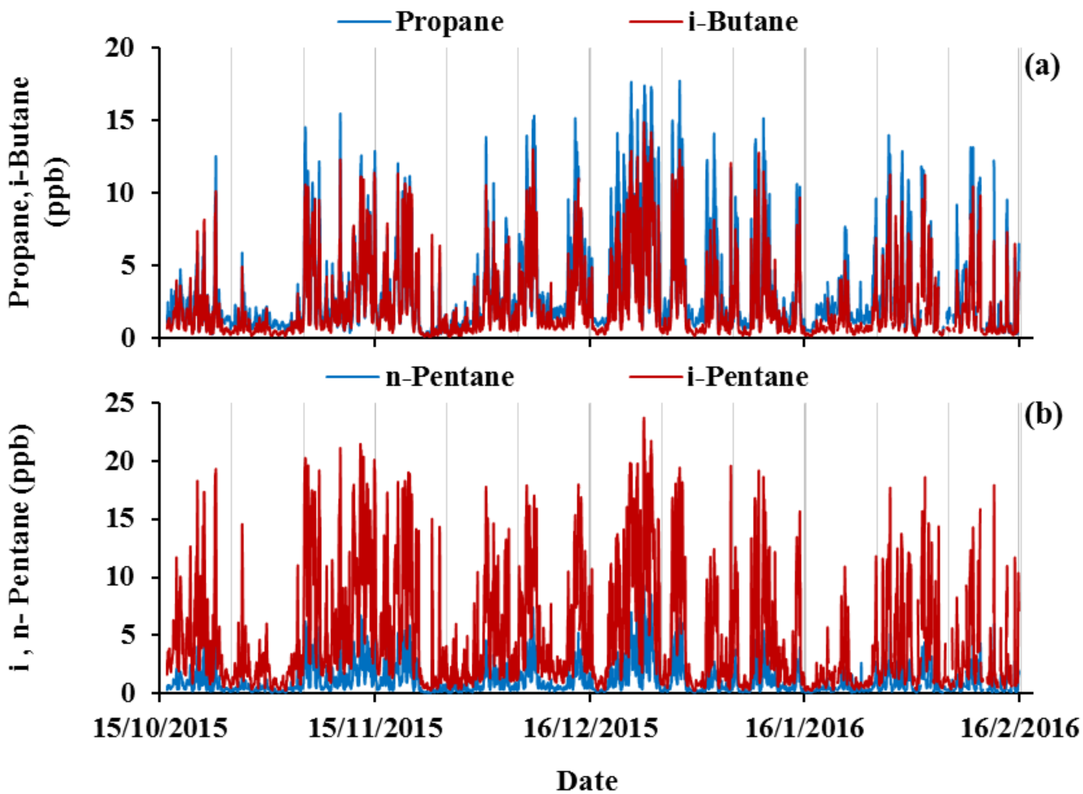


Figure S2. Mean diurnal variability of (a) ethylene, (b) propane, (c) i-butane, (d) i-pentane and (e) n-pentane for the period 16 October 2015 - 15 February 2016 at the Thissio urban background site.

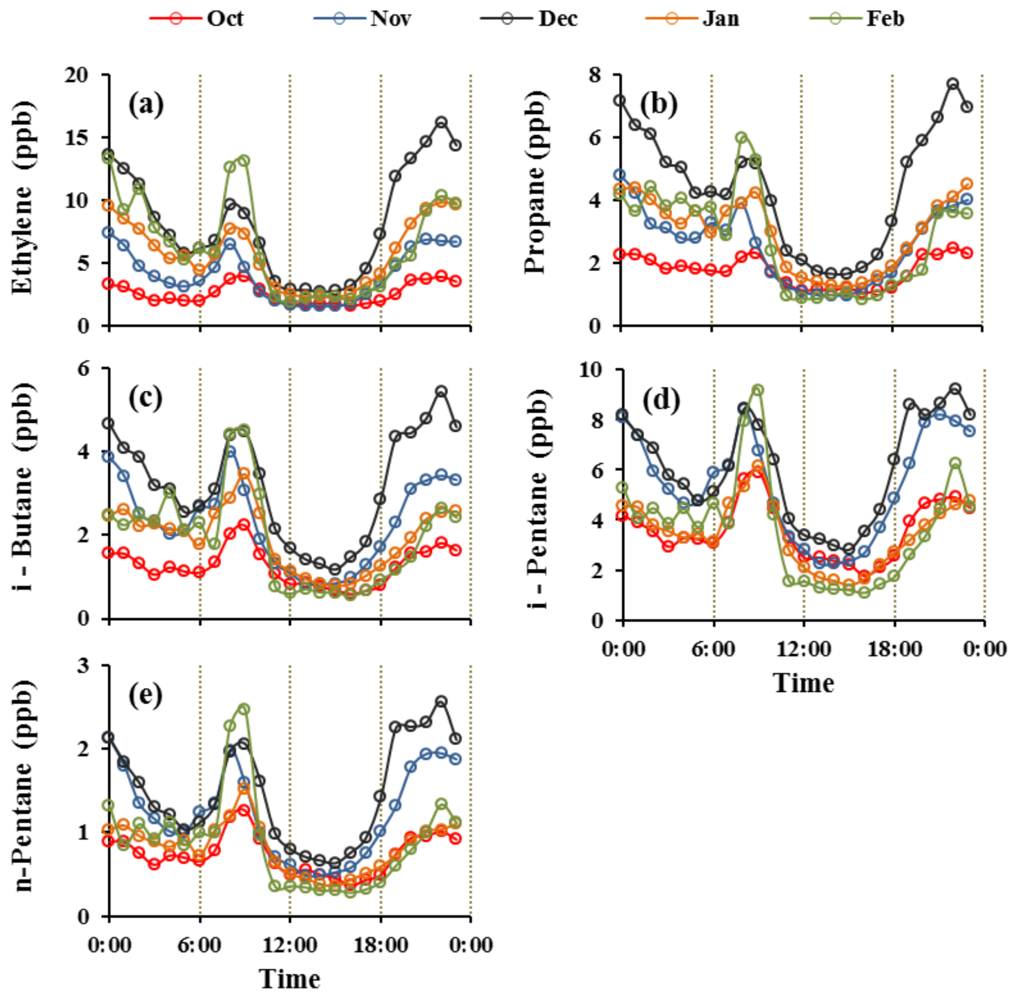


Figure S3. Correlation of (a) ethane, (b) ethylene, (c) propane, (d) propene, (e) i-butane, (f) i-pentane, (g) n-pentane, (h) isoprene, (i) CO, (j) BC, (k) BC_{wb} and (i) BC_{ff} relatively to wind speed for the period 16 October 2015 - 15 February 2016 at the Thissio urban background site.

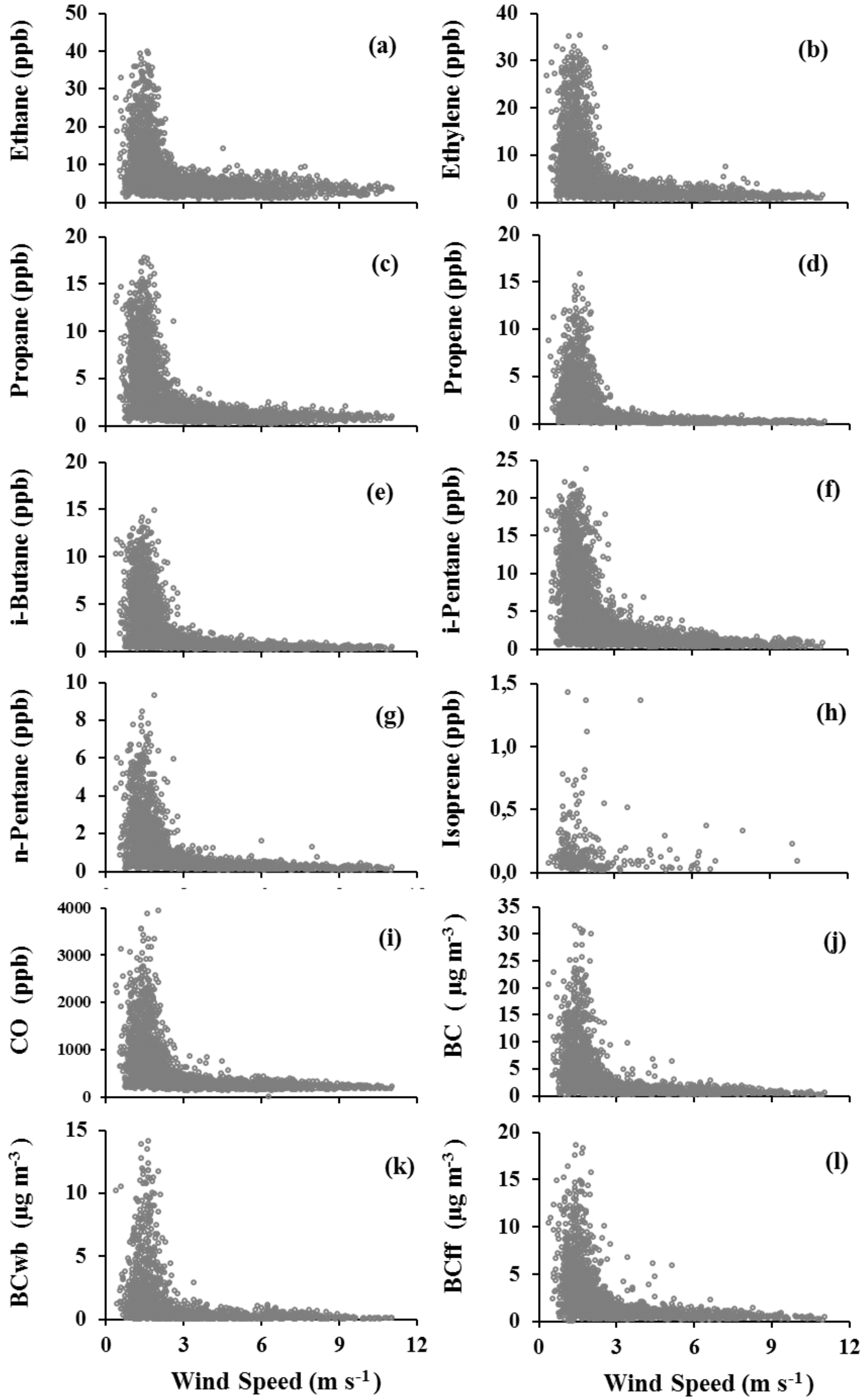


Figure S4. Mean variability of (a) ethane, (b) ethylene, (c) propane, (d) propene, (e) i-butane, (f) acetylene, (g) i-pentane, (h) n-pentane, (i) isoprene, (j) BC, (k) BC_{wb}, (l) BC_{ff}, (m) CO, (n) wind speed and (o) frequency relatively to the air masses origin for the period 16 October 2015 - 15 February 2016 at the Thissio urban background site.

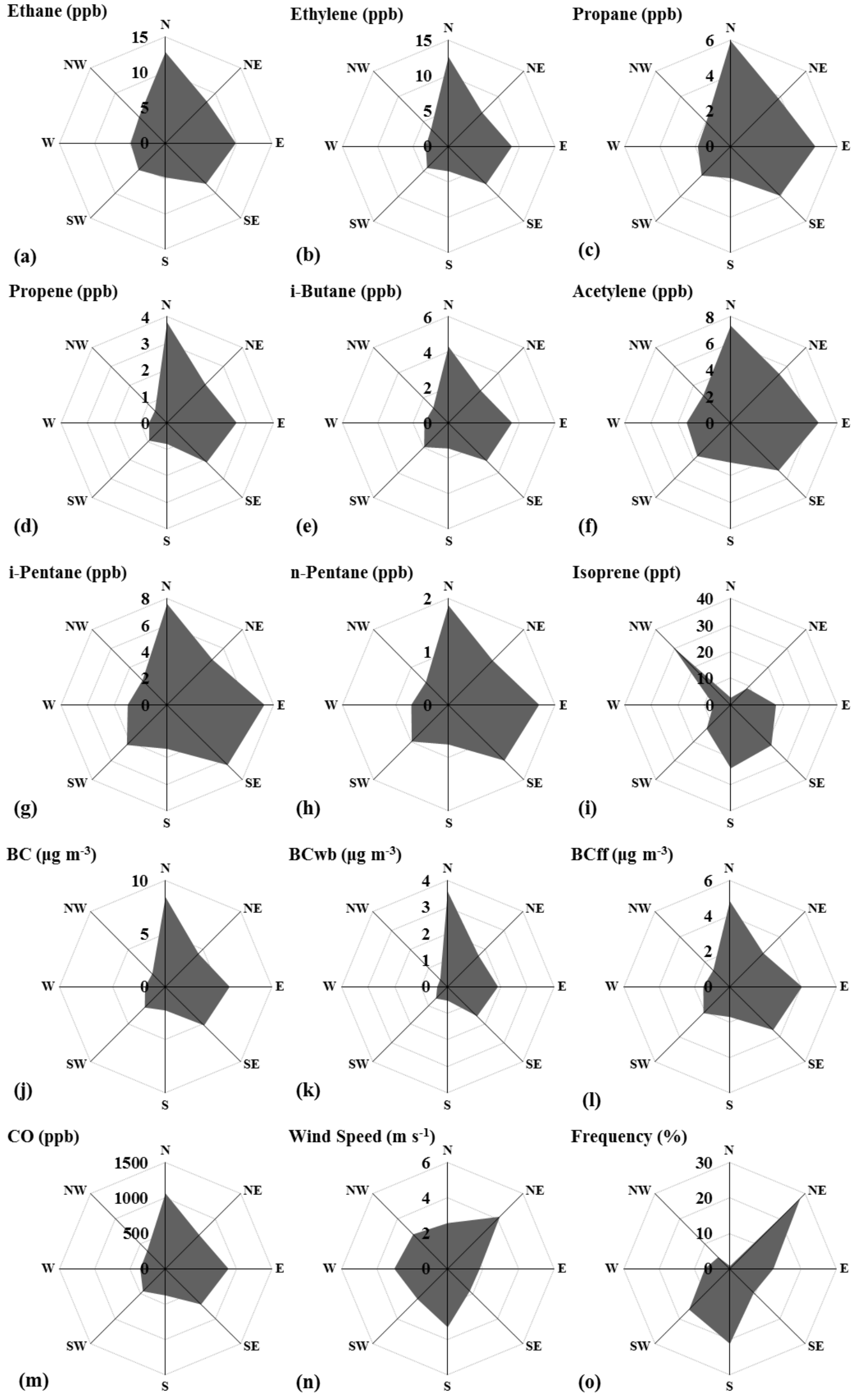


Figure S5. Monthly variability of n-butane, acetylene and benzene relatively to wind speed.

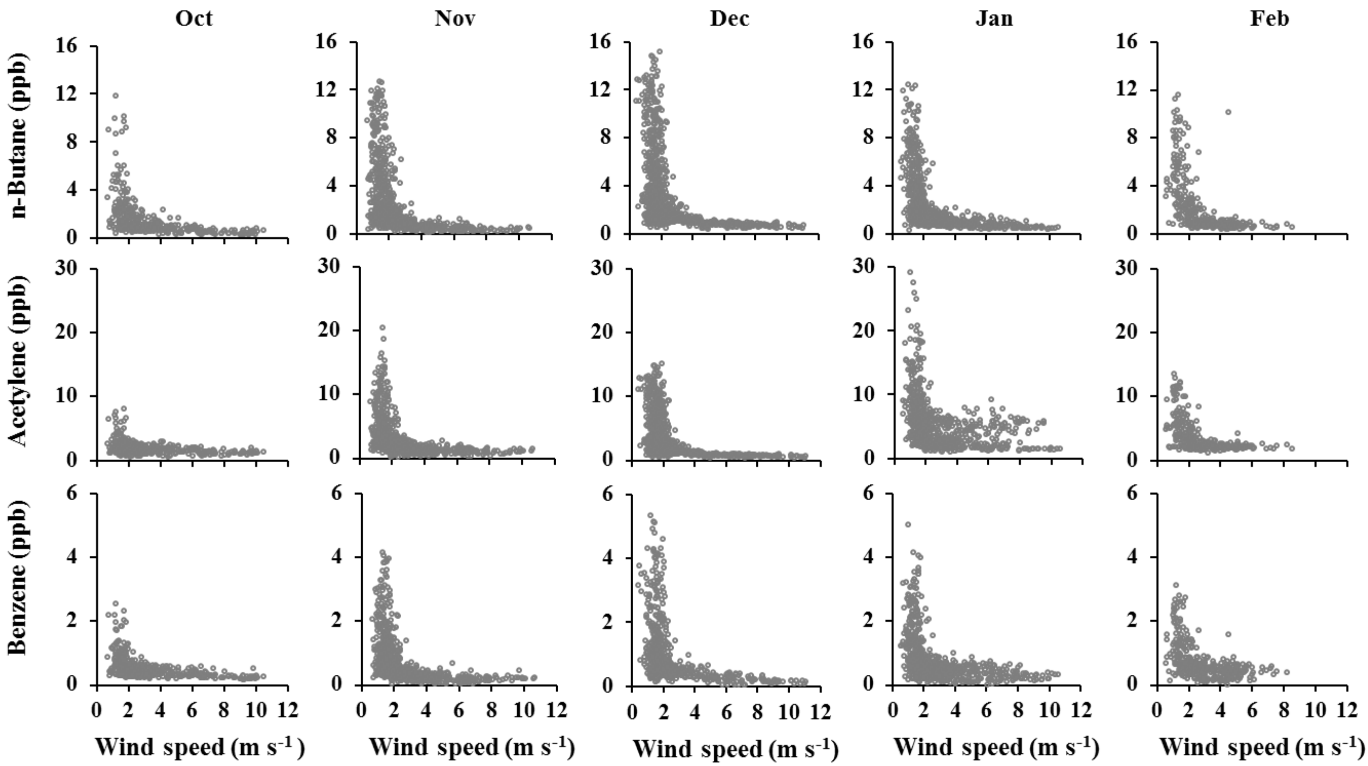


Figure S6. Rose diagrams of frequency and wind speed of air masses reaching the Thissio site; n-butane, acetylene and benzene concentrations, relatively to wind direction for October (a-e) and December 2015 (f-j) respectively.

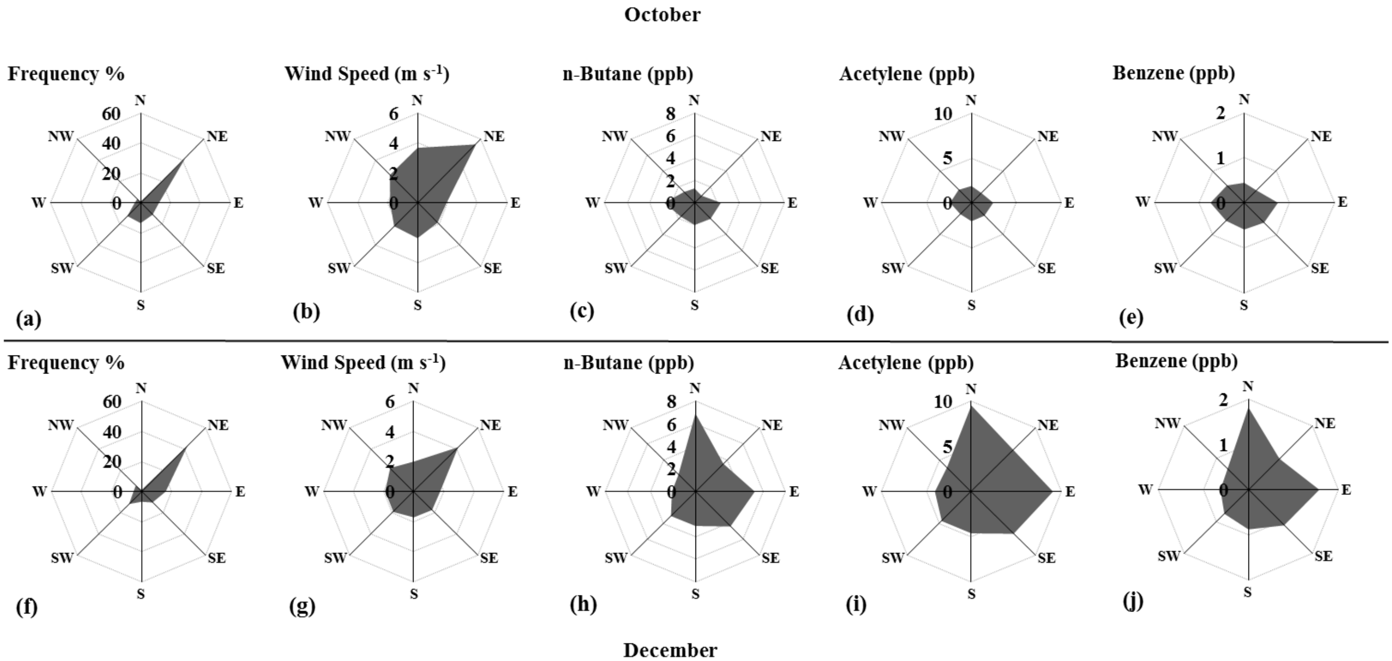
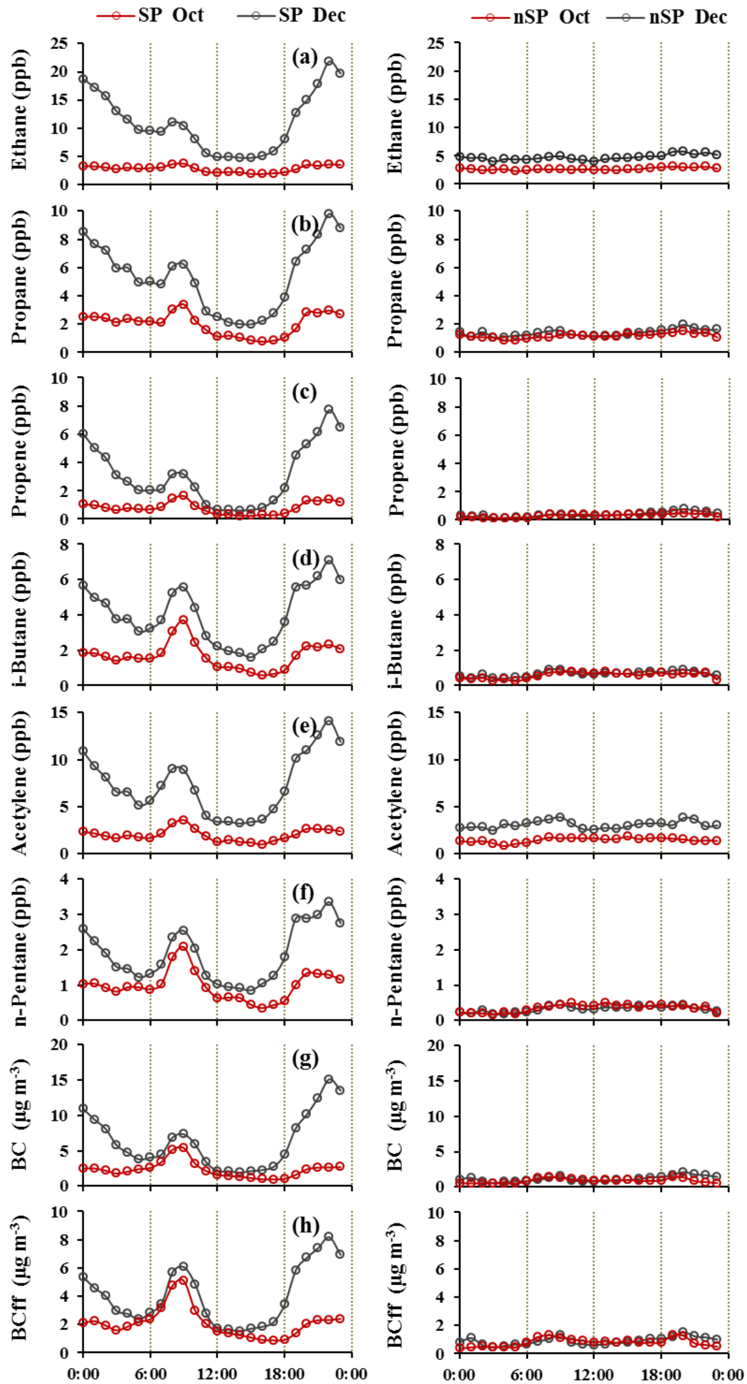


Figure S7. Diurnal patterns of (a) ethane, (b) propane, (c) propene, (d) i-butane, (e) acetylene, (f) n-pentane, (g) BC and (h) BCff during the SP (left column) and the nSP (right column) periods identified during October 2015 (red) and December 2015 (black) respectively.



Section S.2. % Mass contribution of the measured NMHCs in the morning peak (Sect. 3.4.3, Fig. 8).

The morning profile of NMHCs at Thissio station was obtained from the measurements of specific SP days of January and February 2016, due to toluene availability. The first step of the procedure is the calculation of the baseline level that will be subtracted by the morning maximum value in order to minimize the contribution of other sources besides traffic. This is important because the shape of the morning peak is not very clear, as it is depicted in Fig. 8 for i-pentane (motor vehicle exhaust marker, Baudic et al., 2016) for a representative day from the studied period.

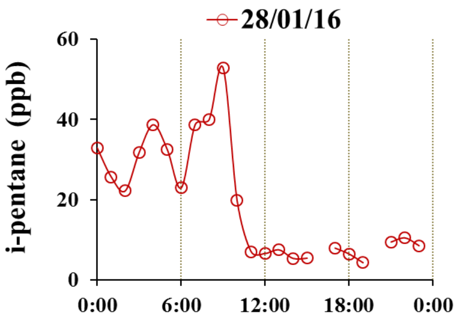


Figure S8. Daily variability of i-pentane for the 28/01/2016.

As a result, the baseline level is given from Eq. (S1), as the average of the measured concentrations at the beginning and the end of the morning peak:

$$C_{baseline,i} = \frac{C_{6,\mathrm{i}}+C_{11,i}}{2}, \tag{S1}$$

where $C_{baseline,i}$ is the calculated baseline level for the compound i, $C_{6,i}$ is the concentration of the compound i at 06:00LT and $C_{11,i}$ is the concentration of the compound i at 11:00LT.

Subsequently, the mass contribution of each NMHC for the morning peak is calculated from Eq. (S2):

$$Mass\ Contribution_i = \frac{C_{morning\ ,\mathrm{i}} - C_{baseline,i}}{\sum_{i=1}^{n} C_i^*}, \tag{S2}$$

where $Mass\ Contribution\ _i$ is the calculated contribution of the compound i to the total mass of compounds, $C_{morning,i}$ is the maximum morning concentration of the compound i between 07:00-10:00LT, $C_{baseline,i}$ is the baseline level of the compound i calculated by the Eq. (2) and C_i^* is the result of the subtraction of the $C_{baseline,i}$ from the $C_{morning,i}$ for a compound i.

Reference

Baudic, A., Gros, V., Sauvage, S., Locoge, N., Sanchez, O., Sarda-Estève, R., Kalogridis, C., Petit, J.-E., Bonnaire, N., Baisnée, D., Favez, O., Albinet, A., Sciare, J. and Bonsang, B.: Seasonal variability and source apportionment of volatile organic compounds (VOCs) in the Paris megacity (France), Atmos Chem Phys, 16(18), 11961–11989, doi:10.5194/acp-16-11961-2016, 2016b.