Geophysical Research Abstracts
Vol. 21, EGU2019-8247, 2019
EGU General Assembly 2019

18-month time-resolved measurements of C2-C12 NMHCs to an urban background environment in Athens, Greece: Temporal variability and comparison with other studies

Anastasia Panopoulou (1,2,3), Eleni Liakakou (2), Valérie Gros (4), Nadine Locoge (1), Bernard Bonsang (4), Nikolaos Mihalopoulos (2,3), and Stéphane Sauvage (1)

(1) IMT Lille Douai, Univ. Lille, SAGE – Département Sciences de l'Atmosphère et Génie de l'Environnement, 59000 Lille, France (anastasia.panopoulou@imt-lille-douai.fr), (2) National Observatory of Athens, Institute for Environmental Research and Sustainable Development, 15236 P. Penteli, Athens, Greece, (3) Environmental Chemical Processes Laboratory (ECPL), Department of Chemistry, University of Crete, 71003 Heraklion, Crete, Greece, (4) LSCE, Laboratoire des Sciences du Climat et de l'Environnement, Unité mixte CNRS-CEA-UVSQ, CEA/Orme des Merisiers, 91191 Gif-sur-Yvette Cedex, France

In Athens (Greece), a large-urban agglomeration in the Eastern Mediterranean basin, ozone and particulate matter often exceed the EU air quality limits, therefore it is important to measure their precursors, in particular NO_x and VOC. Although NO_x levels are monitored since 1981, long-term measurements of VOCs are scarce. The first VOC measurements in the city 25 years ago, reported the ambient levels of C3 – C12 organic compounds (often focused only on aromatics), mainly for summer and/or for specific time periods. Thus, this work presents the first ever extended NMHCs dataset for Athens, of quasi-continuous monitoring (30min of time resolution) of C2 – C12 NMHCs for 18 months.

The measurements were conducted at the urban background site of the National Observatory of Athens (Thissio). Meteorological and auxiliary data for the major gaseous and particulate species are also available. VOC concentrations range from below the detection limit to almost 78μg m^{-3} for isopentane, 98μg m^{-3} for toluene and 121μg m^{-3} for $m-$/ $p-$ xylenes, whereas benzene exceeds 10 μg m^{-3} in winter leading to a mean annual level of 1.7 μg m^{-3}, which is below the EU threshold of 5 μg m^{-3}. Important decrease on the NMHCs current levels was encountered, relatively to previously reported values for the Great Athens Area, which could be mainly attributed to the implementation of air quality regulations during the last decades. The comparison with recent international studies presents both similarities and discrepancies regarding each group of compounds (alkanes, alkenes, aromatics etc), leading to a discussion for the possible reasons behind these observations. Anthropogenic NMHCs present a distinct seasonal cycle with high concentrations in winter and lower in summer. A similar variability was also observed for the monoterpenes (limonene, a-pinene and b-pinene), whereas isoprene met its maximum during summer. The investigation of the monoterpenes against the meteorological parameters (temperature, wind speed and relative humidity) and tracers of combustion processes such as CO, provides indications of not only biogenic but anthropogenic emissions for all seasons.