



Origin and variability of volatile organic compounds observed at an eastern Mediterranean background site (Cyprus)

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Volatile organic compounds (VOCs) include a large number of species from various anthropic and natural sources. Their interest is linked to their toxicity and they are key players in photochemical processes leading to secondary pollutant formation such as ozone, oxygenated species and secondary organic aerosols.

More than 7,000 atmospheric measurements of over eighty C₂-C₁₆ VOCs, including a wide range of tracers of different specific sources, have been conducted at a background site in Cyprus during a 29-day intensive field campaign held in March 2015 within the framework of ChArMEx and ENVI-Med "CyAr" programs. Primary anthropogenic and biogenic VOCs and oxygenated VOCs (OVOCs), including a number of secondary oxidation products, were measured on-line thanks to flame ionization detection/gas chromatography and proton transfer mass spectrometry (2 GC-FID, time resolution 30 min, 1 PTR-QMS, time resolution 5 min). Additionally, more than 400 off-line 3h-integrated air samples were collected on cartridge and analyzed by GC-FID. Recovery of the different techniques, regular quality checks and uncertainty determination approach allow insuring a good robustness of the dataset.

In order to study the variability and the origin of these VOCs, their time series were first analyzed here on the basis of meteorological data and clustering of air mass trajectories. Biogenic compounds appear mainly of local origin and present specific diurnal cycles such as daily maximum for isoprene and a nighttime maximum for monoterpenes. Long-lived anthropogenic compounds as well as OVOCs display higher mixing ratios under the influence of eastern and northern sectors (i.e. Middle East and Turkey) indicating that long-range transport significantly contributes to the VOCs levels in the area. A first factor analysis performed in order to examine different species co-variations allows discerning different source types (primary/secondary, anthropogenic/biogenic, local/regional).