Geophysical Research Abstracts
Vol. 20, EGU2018-4535, 2018
EGU General Assembly 2018

BVOC from natural vegetation at the eastern Mediterranean and its interaction with local and regional photochemistry

Chen Dayan (1), Erick Fredj (2), Pawel Misztal (3), Allen Goldstein (3), and Eran Tas (1)

(1) The Hebrew University, Soil & Water, Rehovot, Israel , (2) Lev Academic Center, School of Engineering and Computer Science, Jerusalem, Israel, (3) Department of Environmental Science, Policy, and Management, University of California at Berkeley, Berkeley, California, USA

Biogenic volatile organic compounds (BVOCs) emitted from vegetation interact with anthropogenic air pollution to form secondary organic aerosols and ozone (O_3), affecting human health, the radiation budget and climate. This study aimed at evaluating the concentrations and fluxes of BVOCs from natural vegetation in the eastern Mediterranean. A special focus is given to study the impact of ambient conditions on BVOC emission, effects of BVOCs emission on local O_3 removal and regional O_3 formation. Mediterranean regions are occasionally characterized by strong photochemical activity and high O_3 concentrations, while emission of BVOCs from Mediterranean vegetation occurs at relatively high rates, induced by high temperatures and sunny conditions. In the past few decades BVOCs emission in these regions have been of special interest because it has been identified as an important factor in regional air pollution and climate-related properties. The research took place in Ramat Hanadiv Nature Park during summer 2015 (July - October) and autumn 2016 (November - December). The park is characterized by typical natural Mediterranean vegetation combined with planted pine and cypress. The site is located about 4 km from the eastern Mediterranean shore, about 120 meters above sea level, and is affected by local and regional photochemical pollution. To the best of our knowledge this research is the first to quantify VOC emission from vegetation in the eastern Mediterranean using a proton transfer reaction time of flight mass spectrometer (PTR-ToF-MS). This instrument has been shown to enable the measurement of a much larger number of BVOC species compared with previous studies[1]. Complementary measurements included air pollutants (O_3, NO_x, SO_2 and CO) and meteorological parameters. Significant seasonal variations were observed in BVOCs concentrations and number of observed species, with more than 600 observed VOC species in some of the measurement days. Some of the species were clearly emitted from vegetation, while contribution from anthropogenic sources was also observed. We have identified the diurnal profiles of selected BVOCs and studied the impact of ambient conditions on their emission and diurnal pattern. We studied the interaction of these emitted BVOCs with photochemical air-pollution, and their regional O_3 formation potential.

References:

Park, J. H., Goldstein, A. H., Timkovsky, J., Fares, S., Weber, R.,, Karlik, J., Holzinger, R., (2013) Active Atmosphere-Ecosystem Exchange of the Vast Majority of Detected Volatile Organic Compounds, Science, 341, 643-647.