Geophysical Research Abstracts
Vol. 12, EGU2010-9948, 2010
EGU General Assembly 2010

Plant specific volatile organic compound emission factors from young and mature leaves of Mediterranean vegetation

Araceli Bracho-Nunez (1), Saskia Welter (1), Michael Staudt (2), and Jürgen Kesselmeier (1)

(1) Max Planck Institute for Chemistry, Mainz, Joh.-J.-Becherweg 27, D-55128 Mainz, Germany, (2) Centre d'Ecologie Fonctionnelle et Evolutive Montpellier, CNRS, 1919 Route de Mende, F-34293 Montpellier Cedex 5, France

Terrestrial vegetation is the most important source of atmospheric volatile organic compounds (VOC) with significant influence on the chemistry and physics of the atmosphere. VOCs influence the oxidative capacity of the atmosphere and contribute to the formation and growth of secondary organic aerosols affecting cloud development and precipitation. The aim of our study was to investigate potential quantitative and qualitative differences in VOC emission patterns of young and mature leaves for nine typical Mediterranean plant species. The Mediterranean area was chosen due to its special diversity in VOC emitting plant species. Foliar isoprenoid emissions as well as emissions of oxygenated VOC like methanol and acetone were measured under standard light and temperature conditions during spring and summer 2008 at the CEFE-CNRS institute in Montpellier, France. A proton transfer reaction mass spectrometer (PTR-MS) was used for online measurement of VOCs. While PTR-MS is an excellent technique for fast chemical measurements it lacks specificity and compounds with the same mass cannot be distinguished. For this reason, cartridge samples were collected and afterwards analyzed with GC-FID. In parallel offline VOC analyses were performed with gas chromatography (GC) coupled to a mass spectrometer and flame ionization detector, enabling assignment of the observed PTR-MS mass to charge ratios (m/z) to specific identification based on the GC-FID retention times. Thus, combining the PTR-MS and GC-FID analyses enabled accurate and online identification of the VOCs emitted. The results emphasise that VOC emission is a developmentally regulated process and quantitative and qualitative variability is plant species specific. Leaf ontogeny clearly influenced not only the standard emission rate but also the VOC composition, with methanol being the major compound that contributes to the total VOC emissions in young leaves and maintaining or decreasing its contribution with maturity.