



Application and further development of an analytical method for the determination of biogenic total-non methane organic carbon

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Most of the organic carbon which is present in the atmosphere is found as volatile organic compounds (VOCs). A known dominant source for these volatile organic compounds is the biosphere. Approximately 1.1 Gt of carbon is emitted from biogenic sources every year on a global scale. In comparison only app. 0.15 Gt are emitted from anthropogenic sources. The emission of VOCs has a high influence on the chemical and physical properties of the atmosphere as they contribute to the formation of tropospheric ozone and secondary organic aerosols (SOA). One major limitation in advancing the understanding of this ozone and aerosol generation is the technical ability to accurately measure these volatile organics. Previous studies focused on the detection of a defined set of NMOC (non-methane organic carbon) compounds. However, the integration of these single compound measurements to the sum of organic carbon might only represent a lower limit of atmospheric carbon concentrations, since none of these methods is able to analyze all organic compounds present in the atmosphere as a whole. A few studies are known that report on total NMOC concentration measurements in ambient air but measurements of the total NMOC exchange between vegetation and the atmosphere are missing. The analysis of the total NMOC concentrations is realized by collecting these compounds on a solid adsorbent material. Due to the special characteristics of the utilized adsorbents a separation of the stable gases CO, CO₂ and CH₄ from the volatile NMOC fraction is achieved. By subsequent heating of the NMOC adsorbent trap the volatiles are desorbed and converted to CO₂ in an oxidation unit. The CO₂ is collected on a second preconcentration unit followed by thermal desorption and is detected by an infrared gas analyzer. The system was tested with a set of single calibrated VOC species from permeation devices and compared with a data set obtained under field conditions.