Geophysical Research Abstracts
Vol. 15, EGU2013-632, 2013
EGU General Assembly 2013

High Arctic Biogenic Volatile Organic Compound emissions

Michelle Schollert (1,2), Sebrina Buchard (1), Patrick Faubert (3), Anders Michelsen (1,2), Riikka Rinnan (1,2)

(1) Terrestrial Ecology Section, Department of Biology, University of Copenhagen, Denmark (mschollert@bio.ku.dk), (2) Center for Permafrost (CENPERM), Department of Geography and Geology, University of Copenhagen, Denmark (mschollert@bio.ku.dk), (3) Chaire en éco-conseil, Département des sciences fondamentales, Université du Québec à Chicoutimi, Canada (patrick1_faubert@uqac.ca)

Biogenic volatile organic compounds (BVOCs) emitted from terrestrial vegetation participate in oxidative reactions, affecting the tropospheric ozone concentration and the lifetimes of greenhouse gasses such as methane. Also, they affect the formation of secondary organic aerosols. BVOCs thus provide a strong link between the terrestrial biosphere, the atmosphere and the climate. Global models of BVOC emissions have assumed minimal emissions from the high latitudes due to low temperatures, short growing seasons and sparse vegetation cover. However, measurements from this region of the world are lacking and emissions from the High Arctic have not been published yet. The aim of this study was to obtain the first estimates for BVOC emissions from the High Arctic. Hereby, we wish to add new knowledge to the understanding of global BVOC emissions. Measurements were conducted in NE Greenland (74°30' N, 20°30' W) in four vegetation communities in the study area. These four vegetation communities were dominated by Cassiope tetragona, Salix arctica, Vaccinium uliginosum and Kobresia myosuroides/Dryas octopetela/Salix arctica, respectively. Emissions were measured by enclosure technique and collection of volatiles into adsorbent cartridges in August 2009. The volatiles were analyzed by gas chromatography-mass spectrometry following thermal desorption. Isoprene showed highest emissions in S. arctica-dominated heath, where it was the dominant single BVOC. However, isoprene emission decreased below detection limit in the end of August when the temperature was at or below 10°C. According to a principal component analysis, monoterpene and sesquiterpene emissions were especially associated with C. tetragona-dominated heath. Especially S. arctica and C. tetragona dominated heaths showed distinct patterns of emitted BVOCs. Emissions of BVOC from the studied high arctic heaths were clearly lower than the emissions observed previously in subarctic heaths with more dense vegetation and higher ambient temperature. However, high arctic BVOC emissions are expected to increase in the future as a result of the predicted pronounced climate warming effects in the High Arctic. Therefore, we suggest that further studies should be conducted to investigate the effects of climate changes in the region in order to gain new knowledge and understanding of future global BVOC emissions.