

ABSTRACT

Title of dissertation: Study of links between biogenic VOC emissions and concentration of tropospheric ozone

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Presented work focuses on influence of volatile organic compounds from biogenic sources on concentration of tropospheric ozone. Volatile organic compounds (VOC) play an important role in the tropospheric chemical system. Together with oxides of nitrogen they form two major components of reactions leading to low-level ozone formation. Volatile organic compounds are emitted into the atmosphere from anthropogenic as well as from biogenic sources. In global, VOCs from natural sources are approximately ten times higher in magnitude than those of anthropogenic origin. Biogenic VOCs are emitted from various sources among which the forest ecosystems predominate. Group of VOCs of natural origin comprises wide range of chemical compounds. Those emitted in highest concentrations are isoprene and group of monoterpenes.

Emissions of biogenic VOCs from the area of the Czech Republic have been estimated based on the high resolution land cover data giving detailed information of single tree species distribution. Emission potentials for five tree species common in the Czech Republic were obtained from emission flux measurements performed with tree samples grown in the Czech Republic in IBAF laboratory in Rome, Italy. Presented is annual profile of BVOC emissions, spatial distribution of annual BVOC estimates together with differences between BVOC emissions in summer and in winter. Amounts of estimated BVOC emissions were compared to data from national inventory of anthropogenic VOC emissions.

Ozone concentrations during episode of Spring, 2007 were simulated applying chemical transport model CAMx on three nested domains covering whole area of Europe with the smallest domain being focused on the region of the Czech Republic. Two datasets of biogenic VOC emission estimates were tested in the CAMx model and their impact on ozone formation compared to model run with anthropogenic emissions only was investigated. Modeled concentrations of tropospheric ozone were compared to measurements from selected stations from european and czech measuring network.