Geophysical Research Abstracts, Vol. 7, 04411, 2005
SRef-ID: 1607-7962/gra/EGU05-A-04411

Seasonal variation of the VOC emission from Scots pine

J. Bäck (2), **H. Hakola (1)**, P. Hari (2), H. Hellén (1) and M. Kulmala (3)

(1) Finnish Meteorological Institute, Sahaajankatu 20 E, FI-00880 Helsinki, Finland

(2) Department of Forest Ecology, P.O. Box 27, FI-00014 University of Helsinki, Finland

(3) Department of Physical Sciences, P.O.Box 64, FI-00014 University of Helsinki, Finland

Biogenic hydrocarbons contribute significantly to the VOC content and the atmospheric chemistry in forested areas where monoterpenes are a major sink for hydroxyl radicals. Sesquiterpenes are likely to play a part in these reactions as well, although their concentrations in the air cannot be measured and their emission rates are poorly known. Monoterpenes and sesquiterpenes react rapidly with ozone and there are indications that sesquiterpene ozonolysis could participate in atmospheric new particle formation frequently observed in forested locations such as Hyytiälä, Finland.

The VOC emission rates of Scots pine (*Pinus sylvestris* L.) were measured in southern Finland in Hyytiälä (61^{o}51'N, 24^{o}17'E) from April to October in 2004. The emission rates were measured from two branches daily in the afternoon except on weekends. The measured tree was growing in a natural forest stand, with an average tree height of 14 m. The samples were collected at a height of about 13 meters from two fully sunlit branches. One of the measured shoots was debudded in May before budbreak (branch A), while the other was allowed to flush in June and grow new needles during July (branch B).

The emission rates were measured using a dynamic flow through technique: A branch was enclosed in a 8-liter Teflon cuvette equipped with inlet and outlet ports and a thermometer. The flow through the cuvette was about 4 liters/minute. Samples were

collected to adsorbent tubes (filled with Tenax-TA and Carbopack-B) with 30-120 min sampling times simultaneously from the inlet and outlet ports. Ozone was removed from the inlet air using MnO_2-coated copper nets. Radiation was measured using a PPFD (photosynthetic photon flux density) sensor placed just above the cuvette. Shoot gas exchange parameters were measured continuously from two adjacent branches in the same tree.

The standardized (20˚C) monoterpene emission potentials were highest in spring for most of the monoterpenes, only 1,8-cineol had emission maximum in summer. The debudded branch emitted less 2-methyl-3-buten-2ol (MBO) and more sesquiterpenes during summer than the branch that was allowed to grow new needles. The main sesquiterpene was β-caryophyllene, which was emitted from late June to September. Two other sesquiterpenes were also detected, but they were not identified. The MBO emission potential was very low all the time. Correlations between the seasonal development of shoot gas exchange and VOC emission rates will be discussed.