



Seasonal variation of BVOC emissions from Norway spruce

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Biogenic volatile organic compounds (BVOCs) are known as a source of secondary organic aerosols (SOA) due to their high reactivity in the atmosphere [1, 2]. Dominant boreal forest species (pine, spruce and birch) have been considered to be high monoterpene (MT) emitters [3, 4], and BVOC emissions and compound composition vary considerably under different temperature and light conditions through growing season [5, 6].

We characterize the canopy BVOC emissions variation from a Norway spruce dominated boreal forest in Central Sweden (Norunda, 60°05'N, 17°29'E). Air samples were taken during growing season (June to September 2013) from transparent dynamic branch chambers set up on Norway spruce at 20m agl. using a scaffolding tower. Air samples were collected every hour from the chamber with Tenax-TA adsorbent tubes and a pocket pump, and analyzed later by gas chromatography and a mass selective detector (GC-MS) to quantify trapped terpenoid compounds. Total terpenoids emission rates in August were found to be highest even though the highest average air temperature was observed in July. Isoprene could not be detected in any sample in June and in most samples from September, but during peak season. Emissions of Isoprene, MT and sesquiterpenes (SQT) showed a clear diurnal pattern in July and August with highest emissions at noon time, however, the composition of terpenoids was slightly changing among different months. The most complex chemical composition with 13 different MT species occurred in late July, while 9 SQT species occurred in the middle of August. However, the fraction of dominant MT species (Limonene, α -Pinene, β -Pinene and Camphene) of the total terpenoids emission was almost constant throughout the whole season from June to September except for β -Pinene which showed a higher fraction in August.

References

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