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Ozone fumigation under dark/light conditions of Norway Spruce (*Picea Abies*) and Scots Pine (*Pinus Sylvestris*)

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Norway Spruce (*Picea abies*) and Scots Pine (*Pinus sylvestris*) represent dominating tree species in the northern hemisphere. Thus, the understanding of their ozone sensitivity in the light of the expected increasing ozone levels in the future is of great importance. In our experiments we investigated the emissions of volatile organic compounds (VOCs) of 3-4 year old Norway Spruce and Scots Pine seedlings under ozone fumigation (50-150 ppbv) and dark/light conditions.

For the experiments the plants were placed in a setup with inert materials including a glass cuvette equipped with a turbulent air inlet and sensors for monitoring a large range of meteorological parameters. Typical conditions were 20-25°C and a relative humidity of 70-90 % for both plant species. A fast gas exchange rate was used to minimize reactions of ozone in the gas phase. A Switchable-Reagent-Ion-Time-of-Flight-MS (SRI-ToF-MS) was used to analyze the VOCs at the cuvette outlet in real-time during changing ozone and light levels. The use of H_3O^+ and NO^+ as reagent ions allows the separation of certain isomers (e.g. aldehydes and ketones) due to different reaction pathways depending on the functional groups of the molecules.

Within the *Picea abies* experiments the ozone loss, defined as the difference of the ozone concentration between cuvette inlet and outlet, remained nearly constant at the transition from dark to light. This indicates that a major part of the supplied ozone is depleted non-stomatally. In contrast the ozone loss increased by 50 % at the transition from dark to light conditions within *Pinus sylvestris* experiments. In this case the stomata represent the dominant loss channel. Since maximally 0.1% of the ozone loss could be explained by gas phase reactions with monoterpenes and sesquiterpenes, we suggest that ozone reactions on the surface of *Picea abies* represent the major sink in this case and lead to an light-independent ozone loss. This is supported by the fact that we detected a broad range of unidentified oxygenated ozonolysis products and their fragments, whose amount exceed by far the detected loss of BVOCs under ozone exposure. However, the observed products are not attributable to neither green leaf volatiles nor to other known volatile precursors. Furthermore *Picea abies* emits a smaller amount of ozone induced green leaf volatiles than *Pinus sylvestris*. Based on this results we can explain the higher ozone tolerance of Picea abies, which has been observed before. A likely reason for the differences in stomatal and surface ozone loss on the investigated plants are differences in the amount and kind of unsaturated semi-volatile compounds on the needle surface.