

## **VEGETATION - ATMOSPHERE INTERACTIONS – THE CRUCIAL ROLE OF TROPOSPHERIC OZONE**

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*Vegetation is the dominant source of biogenic volatile organic compounds (bVOCs). On a global scale, the source strengths of bVOCs exceed those of anthropogenic VOCs (aVOCs) by an order of magnitude. Due to their high reactivity, VOCs play important roles in determining atmospheric processes such as secondary organic aerosol (SOA), or when VOCs are in the presence of anthropogenic nitrogen oxides (NO<sub>x</sub>), they increase ozone formation and alter the concentrations of hydroxyl radicals, the main atmospheric oxidant. Thus, in changing the oxidative capacity of the troposphere, VOCs influence the local and regional air composition through altering the chemical lifetime of reactive gases with substantial impacts on vegetation and climate.*

*Biogenic emissions from vegetation are species-specific and the terpenoids isoprene and monoterpenes normally dominate the overall bVOC profile of woody plants. Isoprene and monoterpenes are predominantly emitted in a 'constitutive' manner as a function of light, temperature, and seasonality. In addition to 'constitutive' emissions, significant quantities of 'stress-induced' bVOCs can be emitted into the atmosphere following abiotic (e.g., ozone) and/or biotic (e.g. herbivores) stresses. For instance, some monoterpenoids, the classes of sesquiterpenoids, benzenoids, and volatile lipoxygenase products (so called 'green leaf volatiles') are typically induced and emitted from green foliage after exposure to ozone or herbivores. However, despite the potential of terpenoids and benzoids to influence ozone and SOA formation, stress-induced bVOC fluxes are rarely considered in the context of atmospheric chemistry. In particular the net effect of multiple stress factors, which frequently co-occur in nature, on stress-induced bVOC emission remains still poorly understood.*

*Besides its release of VOCs, vegetation also represents a major sink of atmospheric VOC oxidation products, i.e. carbonyls and ketones (i.e. methyl vinyl ketone) challenging the plants' defense system. Thus in anthropogenically polluted urban and suburban areas, the vegetation can suffer*

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*twice - from the deposition of ozone and from VOC breakdown products generated during ozone formation processes.*

*The presentation will give an overview on the complexity of biosphere-atmosphere interactions and will highlight future research goals and possible strategies to mitigate harmful atmospheric feedbacks on vegetation.*