2.064 Ambient concentrations of BVOCs at a South African grazed grass-savannah ecosystem.

Early Career Scientist

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Abstract:

Ecosystems of the earth produce and emit various biogenic volatile organic compounds (BVOCs), which are involved in plant growth and reproduction, as well as acting as defensive compounds for plants. In an ecosystem the BVOC production rate depends on several physical (e.g. temperature, precipitation, moisture, solar radiation and CO_2 concentration) and biological parameters (e.g. plant species, plant-specific emission capacity, phenology, biotic and abiotic stresses, attraction of pollinators); typically 0.2-10% of the carbon uptake in photosynthesis is converted to BVOCs. BVOCs are closely associated with atmospheric chemistry in the troposphere, e.g. in the formation of

secondary pollutants such as ozone and secondary organic aerosols (SOA). This makes the atmospheric BVOC concentrations important input parameters for effective air quality management, as well as for the modelling of atmospheric chemistry at global, regional and local scales.

Despite the significance of atmospheric BVOCs, the knowledge on BVOCs in southern Africa is limited. Previous research in the region focussed on short measurement campaigns on BVOC emission rates. The hypothesis in this study was that frequent, BVOC concentration measurements throughout an extended period can reveal changes in BVOC exchange from an ecosystem at seasonal and inter-annual time scales, which will be particularly useful in estimating the total regional VOC emissions. We report the ambient concentrations of BVOCs measured for more than two years at Welgegund (www.welgegund.org, 26.57°S, 26.94°E, 1480 m a.s.l) measurement station located in a grazed grass savannah environment, ~100 km south-west of the Johannesburg-Pretoria megacity. To our knowledge, this is the first data set of ambient BVOC concentrations that covers more than two full seasonal cycles in southern Africa, and it indicates strong seasonal and inter-annual variability in the atmospheric BVOC levels.