



Grazing-induced BVOC fluxes from a managed grassland

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Grassland ecosystems cover one fourth of the Earth's land surface and are both sources and sinks of Biogenic Volatile Organic Compounds (BVOCs) which play an important role in atmospheric chemistry and air pollution. The use of grassland for cattle breeding is a common practice in many parts of the world. As it has been widely demonstrated that plants emit large bursts of BVOCs when they are mechanically damaged, grass tearing and trampling during grazing are expected to induce large BVOC emissions as well. Nevertheless, to the best of our knowledge, no study has been performed on BVOC fluxes from grazed grassland yet. Therefore investigations were performed using automated dynamic chambers in a managed grassland in Belgium over the 2015 and 2016 growing season. BVOC fluxes, together with carbon dioxide (CO₂) and water vapor (H₂O) fluxes from grazed and undisturbed grassland were followed simultaneously using PTR-MS (Proton Transfer Reaction-Mass Spectrometry) and a LI-840 non-dispersive IR gas analyzer. In addition, air in the chamber was sampled occasionally for GC-MS (Gas Chromatography-Mass Spectrometry) analysis to assist compound identification. Significant differences between grazed and undisturbed grassland patches were observed in terms of BVOC, CO₂ and H₂O vapor fluxes. Grazing by cows was found to result in enhanced emissions of several BVOCs such as methanol, acetaldehyde, acetone, acetic acid and Green Leaf Volatiles (GLVs), and induced BVOC emissions generally lasted for around 5 days following a grazing event. Quantitative data on the impact of grazing on BVOC, CO₂ and H₂O exchange between grassland and the atmosphere will be presented, and correlations between BVOC fluxes and environmental conditions will be discussed.