



Reactive halogen and trace gas emissions from the biosphere: Preliminary results from a plant enclosure experiment

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Reactive halogen trace gases are of considerable interest due to the importance many of them have in stratospheric chemistry particularly ozone depletion, direct and indirect effects on climatic change, and on tropospheric reactivity. A variety of reactive halocarbons such as methyl iodide (CH_3I), methyl chloride (CH_3Cl), methyl bromide (CH_3Br), dibromomethane (CH_2Br_2) and bromoform (CHBr_3) are known to be emitted from the ocean, from phytoplankton and macrophytic algae. CH_3Cl , CH_3Br and CHCl_3 are known to have significant terrestrial sources for example recent work has identified a novel chemical origin for CH_3Cl , which can explain its production in a variety of terrestrial environments. However, the sources and sinks of many other halogenated compounds are poorly understood. In light of recent observations it has been suggested that emissions from terrestrial vegetation have been underestimated.

During the summer of 2005 a plant enclosure experiment was conducted in Brazil to investigate the role of a small selection of plant and grass species, and their soils as terrestrial sources and sinks for reactive trace gases. Methyl chloride (CH_3Cl), methyl bromide (CH_3Br), bromoform (CHBr_3), chloroform (CHCl_3), methyl chloroform (CH_3CCl_3), methyl iodide (CH_3I), the chlorobromomethanes (CH_2BrCl , CHCl_2Br , CHClBr_2 , CH_2Br_2 and CH_2Cl_2), and around 22 other halogenated trace gases have been analysed using GCMS. Preliminary results from the experiment are presented which suggest substantial emissions of CHCl_3 and CH_3Cl from some plants. Emissions of CH_3Br , CH_3I , and most of the chlorobromomethanes are also observed. In

addition the data suggest that there are small biogenic emissions of some very surprising compounds such as acetonitrile (CH_3N) and n-propyl bromide ($\text{CH}_3\text{CH}_2\text{CH}_2\text{Br}$) which are thought to be from biomass burning and industrial sources, respectively. The data suggest that soils act as sources and sinks for some compounds and the quantity and variety of compounds emitted by different plant species varies considerably.