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Methyl halide fluxes from tropical plants under controlled radiation and temperature regimes

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Methyl halides (CH_3Cl, CH_3Br, CH_3I) contribute significantly to the halogen burden of the atmosphere and have the potential to influence the stratospheric ozone layer through their catalytic effect in the Chapman cycle. As such they have been studied over the years, and many plants and biota have been examined for their potential to act as a source of these gases. One of the potentially largest terrestrial sources identified was tropical vegetation such as tropical ferns and Dipterocarp trees. Most of these studies concentrated on the identification and quantification of such fluxes rather than their characteristics and often the chambers used in these studies were either opaque or only partially transparent to the full solar spectrum. Therefore it is not certain to which degree emissions of methyl halides are innate to the plants and how much they might vary due to radiation or temperature conditions inside the enclosures.

In a separate development it had been proposed that UV-radiation could cause live plant materials to be become emitters of methane even under non-anoxic conditions. As methane is chemically very similar to methyl halides and had been proposed to be produced from methyl-groups ubiquitously found in plant cell material there is a relatively good chance that such a production mechanism would also apply to methyl halides.

To test whether radiation can affect elevated emissions of methyl halides from plant materials and to distinguish this from temperature effects caused by heat build-up in chambers a set of controlled laboratory chamber enclosures under various radiation and temperature regimes was conducted on four different tropical plant species (*Magnolia grandiflora*, *Cinnamonum camphora*, *Cyathea lepifera*, *Angiopteris lygodiifolia*), the latter two of which had previously been identified as strong methyl halide emitters. Abscised leaf samples of these species were subjected to radiation treatments such UV-B, UV-A and broad spectrum radiation similar to natural sunlight without the UV–component and the emissions were compared to dark enclosures. Parallel to this temperature effects were studied in dark enclosures as well. The presentation will discuss the outcome of these experiments and what conclusions can be drawn from them.