



Seasonal cycles of halocarbons and alkyl nitrates at Halley Bay, Antarctica.

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Measurements of halocarbons and alkyl nitrates in ambient air and shallow firn air have been made through a full annual cycle at the Halley Bay research station in coastal Antarctica (75.5°S, 26.5°W) using GC-NICI-MS. Shallow depth profiles ($\leq 20\text{m}$) were obtained from a new permanent firn air sampling system, where studying tracer species have identified a shallow convective zone and the first 20m represents approximately 3 years of history. This system allowed us to examine recent changes in the Antarctic atmosphere as well as to study the propagation of these gases through the shallow firn.

Seasonal variations were observed for several halocarbon gases (methyl iodide, bromoform, dibromochloromethane, dichlorobromomethane, chloroform, dibromomethane and bromochloromethane) and for the short chain alkyl mononitrates, consistent with the OH and photolytic loss processes for these species. The measurements illustrate that the GC-NICI-MS instrument has excellent sensitivity, selectivity and precision for a whole suite of atmospherically important halocarbon and alkyl nitrate species.

We discuss the implications of these measurements with respect to firn diffusion modelling and to the previously reported photochemical production of specific species (e.g., methyl iodide) within the upper snow pack.