



GÖTEBORGS UNIVERSITET

Biogenic Halocarbons in Polar Sea Ice

Anna Granfors

Institutionen för kemi och molekylärbiologi
Naturvetenskapliga fakulteten

Akademisk avhandling för filosofie doktorsexamen i naturvetenskap, inriktning kemi som med tillstånd från Naturvetenskapliga fakulteten kommer att offentligt försvaras fredagen den 16 maj, 2004 kl. 10:00 i sal KB, Institutionen för kemi och molekylärbiologi, Kemigården 4, Göteborg.

ISBN: 978-91-628-9006-3



GÖTEBORGS UNIVERSITET

Abstract

Sea ice is to date a rather poorly investigated part of the cycling of volatile halogenated organic compounds, halocarbons. These compounds are natural sources of reactive iodine and bromine to the atmosphere, and are produced in the marine environment. The aim of this study was to determine the role of sea ice in terms of production and release of halocarbons to the atmosphere. Iodinated and brominated halocarbons were measured in polar sea ice as well as in snow, air, and seawater under the ice. Multiple samples were collected from the same location in order to cover variability. Studies were performed both in winter and summer, and seasonal variations were observed.

Sea ice acted as a source of halocarbons both in winter and in summer. Biotic production was observed during summer, and depth distributions of halocarbons in the ice were related to ice algal biomass. Unexpectedly high concentrations of halocarbons were found at the surface of Antarctic winter sea ice. For bromoform (CHBr_3) the concentration range was 0.2 - 20 nM in the top 10 cm of the ice. High concentrations were also found in the snow closest to the snow-ice interface. Our results suggest that an abiotic formation occurs in seasonal sea ice during polar night. This may lead to a winter accumulation of halocarbons in the marine boundary layer and enhance tropospheric ozone depletion in the polar spring.