

北極海上における生物起源揮発性有機化合物の分布 Distribution of biogenic volatile organic compounds over the Arctic Ocean

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There are a variety of biogenic volatile organic compounds (BVOCs) in the atmosphere. They are believed to be playing an important role in the global environment through aerosol formation, ozone depletion, etc. We studied spatial/temporal distribution of selected BVOCs in the atmosphere over the Arctic Ocean, and found that their concentrations were likely to be affected by sea-ice type.

Air samples were collected during an Arctic cruise conducted by the R/V Mirai from 30 August to 21 October. Sampling was done with stainless steel canisters on board at the front of the uppermost deck, forward of potential contamination from stack. After transport to the laboratory, the samples were analyzed using a pre-concentration/capillary gas chromatograph - mass spectrometry (GC-MS).

Methyl iodide (CH₃I) is the most abundant organic iodine compound in the atmosphere, which is mostly emitted from the ocean. Methyl chloride (CH₃Cl) is the most abundant chlorine compound in the atmosphere, which is mostly emitted from tropical forests followed by warm ocean and biomass burning on a global scale. Both of them showed gradual decrease with latitude, but they showed quite different variation in the marginal ice zone. CH₃Cl concentration was higher at the sites surrounded by sea ice than at the open sea near the ice edge, while CH₃I concentration decreased over/near the sea ice. This finding would suggest CH₃Cl is absorbed by the cold seawater, but CH₃I is emitted even from the cold water. Among the other BVOCs, methyl bromide (CH₃Br) was similar to CH₃Cl in the relationship to sea ice. Bromoform (CHBr₃), which is mainly emitted from macroalgae, showed the third pattern: lowest over thin (new) sea ice and highest over thick (old) sea ice. This would be consistent with that ice-algae usually grow on the old sea ice.

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