

CONCENTRATIONS OF SULFUR COMPOUNDS (MSA, SO₂
AND NSS-SO₄²⁻) IN THE MARINE ATMOSPHERE, AND
ESTIMATION OF BIOGENIC SULFUR EMISSION
FROM THE SEA (ABSTRACT)

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Concentrations of sulfur compounds such as MSA (Methane Sulfonic Acid), SO₂ and nss-SO₄²⁻ (non sea salt sulfate) in the marine atmosphere were measured along the course of the research ship SHIRASE over the North Pacific Ocean, the Indian Ocean and the Antarctic Ocean from November to December 1988.

As the result, their mean concentrations in the open sea which is isolated from anthropogenic sources were 0.03 μg/m³ for MSA, 0.4 μg/m³ for nss-SO₄²⁻ and 0.05 ppb for SO₂. The existence of MSA in the marine atmosphere was confirmed. It was also found that Dimethyl Sulfide (DMS), a precursor of MSA, is emitted widely from the sea to the atmosphere. Moreover, the highest concentration of MSA (0.187 μg/m³) was measured near the Antarctic Continent during early summer when the marine phytoplankton bloomed. This suggests that the generation of DMS from the sea depends on activities of organisms in sea water.

On the basis of the measured concentrations of MSA, SO₂ and nss-SO₄²⁻ in this study, the global emission of biogenic sulfur from the sea to the atmosphere is estimated to be about 48 TgS/year. This value is comparable to 40% of the sulfur emission (126 × 10¹² gS/year) from anthropogenic sources.

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