

AAS021-17

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PTR-MSを用いた海洋表層における揮発性有機化合物のプロセス研究 Process study of volatile organic compounds in surface seawater using PTR-MS

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We developed an equilibrator inlet-proton transfer reaction-mass spectrometry (EI-PTR-MS) method for fast detection of dimethyl sulfide (DMS) and volatile organic compounds (VOCs) dissolved in seawater. Dissolved DMS and VOCs extracted by bubbling pure nitrogen through the sample were continuously directed to the PTR-MS. DMS and several other VOCs reached equilibrium with an overall response time of minutes. The detection limit for DMS was 50 pmol L⁻¹ at 5-s integration. The EI-PTR-MS instrument was deployed during a research cruise in the western North Pacific Ocean. For DMS and VOCs, comparison of the EI-PTR-MS results with results obtained by means of membrane tube equilibrator-gas chromatography/mass spectrometry agreed reasonably well on average. EI-PTR-MS captured temporal variations of dissolved DMS and VOCs concentrations, including elevated peaks associated with patches of high biogenic activity. These results demonstrate that EI-PTR-MS was effective for highly time-resolved measurements of DMS and VOCs in the open ocean. Further measurements will improve our understanding of the biogeochemical mechanisms of the production, consumption, and distribution of DMS and VOCs in the ocean surface.

キーワード: 揮発性有機化合物, 硫化ジメチル, 海洋表層, PTR-MS, SOLAS, 生物地球化学

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