A long term variability of a bathyal *Calyptogena* community in Sagami Bay off Japan based on pore water geochemistry

T. MASUZAWA[1], U. TSUNOGAI[2] AND T. NAKATSUKA[3]

[1]Dept. of Hycrosheric-Atmospheric Sci., Nagoya Univ., Nagoya 464-8601, Japan (masuzawa@ihas.nagoya-u.ac.jp)
[2]Div. of Earth and Planetary Sci., Hokkaido Univ., Sapporo, Japan (urumu@ep.sci.hokudai.ac.jp)
[3]Inst. for Low Temp., Hokkaido Univ., Sapporo, Japan (nakatuka@soya.lowtem.hokudai.ac.jp)

Pore water samples were collected at the same patch in the largest *Calyptogena* community at the Hatsushima Site, Sagami Bay, central Japan (34-59.9N, 139-13.6E, 1146 m deep) with an *in situ* pore water squeezer (ISPS-S) by using a submersible, SHINKAI 2000, nearly once a year for 11 years from 1986 to 1996. ISPS-S squeezed at 6 depths from 0 to 45 cm below the sediment-water interface just below the living *Calyptogena* patch. Pore water samples were subjected to the analyses of major cations and anions, nutrients, H_2S, DIC and its $\delta^{13}C$ and $\Delta^{14}C$, methane and its $\delta^{13}C$, and $\delta^{34}S$ of sulfate and H_2S after appropriate chemical treatments. $\delta^{34}S$ values of gills of *Calyptogena soyoae* sampled at each dive were also measured.

In pore water samples collected during Dive 720 (26 Nov 1993), sulfate decreased remarkably below 9 cm depth and showed quite low minimum values between ca. 20 and 40 cm depth. Inversely hydrogen sulfide increased remarkably to a maximum value of 13. 8 mM at 36 cm depth, and methane increased remarkably from 529 nmol/kg at 0 cm to 125,200 nmol/kg at 36 cm depth and decreased to 6850 nnol/kg at 45 cm depth. These methane concentrations were two to four orders of higher than those in usual deep and bottom waters of Sagami Bay (4-5 nmol/kg). The chemical stoichiometry and quite low $\delta^{13}C$ value of DIC such as –42 % proved that microbial sulfate reduction using methane as reductant (Masuzawa et al., 1992) took place quite actively at ca. 20-40 cm depth just beneath the living giant clams.

Apparent isotope fractionation factor of sulfur (α') through microbial sulfate reduction in the pore water was estimated from the relationship betwenn sulfate concentration and sulfur isotope ratio of pore water sulfate. The sulfur isotope ratio in gills of *Calyptogena* changed reversely to that of the estimated α' value. These resuls indicate that the activity of the patch of *Calyptogena* at the Hatsushima Site increased from 1986 to 1993, showed the highest activity in 1993 and after that it decreased.

References

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Impact of Asian emissions on the western North Pacific regions observed at JMA monitoring stations

H. MATSUEDA[1], Y. SAWA[1], A. WADA[1], K. TSUBOI[2], K. SUDA[2] AND Y. TSUTSUMI[2]

[1]Meteorological Research Institute, Tsukuba, Japan (hmatued@mri-jma.go.jp; ysawa@mri-jma.go.jp, akwada@mri-jma.go.jp)
[2]Japan Meteorological Agency, Tokyo, Japan (tsuboi@met.kishou.go.jp; suda@met.kishou.go.jp; y-tsutsumi@met.kishou.go.jp)

Introduction

East Asia is one of the major source regions for trace gases in the troposphere. The anthropogenic emissions in Asia will become more significant for global atmospheric chemistry due to a rapid economic growth in the Asian countries. In this study, we report an impact of Asian emissions on the western Pacific regions using trace gas data from three Japanese monitoring stations of the Japan Meteorological Agency (JMA).

Data analysis

Trace gases such as carbon monoxide (CO) as well as CH_4, CO_2 and O_3 had been observed using continuous measuring instrumentations at the three JMA stations of Ryori (39°02'N, 141°50'E) from 1991, Minamitorishima (24°18'N, 153°58'E) from 1994, and Yonagunijima (24°28'N, 123°01'E) from 1998. We analyzed these time-series data sets of CO to foucus on pollution events due to an ourflow from Asian emissions. Such events were identified on the basis of increased CO peaks compared with a background level in each station. The same data analysis was used for other trace gases to examine a chemical composition of air masses from the continent.

Results and discussions

Minamitorishima station is located in a remote island far from the Asia continent. The CO data in this station clearly revealed increased peaks, suggesting an impact of Asian outflow. It was confirmed by backward trajectory analyses that the CO enahncements were caused by a long-range transport from the continent driven by a synoptic-sacle weather perturbation. These pollution events at Minamitorishima were found during winter and early spring, but there was no CO increase in maritime air masses during summer. A similar seasonality of the pollution events was also found at Yonagunijima and Ryori stations. In the both stations near the Asian continent, stronger pollution events apeared more frequently.

The CO elevation during the pollution event well coincided with the increased CH_4 peaks. This positive correlation clearly showed a seasonal change of the enrichment ratio of CH_4 to CO. These results suggested that chemical compositions of continental air masses were influenced by not only antropogenic emissions but also biogenic productoins. We will discuss in detail on the air mass origin during the pollution events using multi-species correlations combined with meteorological analyses.