Methane dynamics in wetland determined by stable isotope ratio

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Methane is global warming gas whose importance is next to carbon dioxide. The concentration of methane is now about 1.7ppm and it is increasing in a ratio of about 7ppb/ year. The carbon stable isotope ratio of atomospheric methane is about -47permill. Reductive soil, such as wetland is the measure methane source (IPCC, 2001). Wetlands contribute approximately 100-200Tg of methane to the atmosphere each year representing about 20-40% of total methane sources (Brooks et al., 1999). On the other hand, oxidic soil, such as forest soil is a sink of methane.

The isotope fractionation factor of methane is different from the microorganisms and it could change with tempreture, the amount of substrate. Therefore it become able to estimate each gross methane production and gross methane oxidation.

In wetland, 70% of methane is producted from acetic acid (Conrad, 1999). On the other hand, carbon dioxide reduction is a main methane production way in humid tropical forest soil(Teh et al.,2005)

Sampling area lies in the sothern part of Shiga Prefecture, Japan. Sampling were carried in March and May in 2004 and August in 2005 with static chamber method. The concentrarion of methane was measured with FID-gaschromatograph and the isotope ratio of methane were measured with online-methane extraction method and gas chromatograph mass spectrometry gaschromatograph.

In March, methane flux is almost under detection limit. In May and August,

methane fluxes were observed with sampling points. In Augest, the fluxees were bigger than what in May. Fluxes in some sampling spots in August were 10 times as large as in May. It is suggested that activity of microbe increased by a rise of ground temperature.

Both in May and Augaust, high spatial variability in methane flux was observed and there is no correlations between methne emission rate and isotope ratio, which suggests that there is a spatial variability of the ratio of methane production and oxidation.