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Stable Isotope Composition of Dissolved Methane from Some Peatlands in Central Japan

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Stable isotope ratio of methane in Earth's land surface such as paddy, lake and wetland have been investigated to clarify its sources since an increase in atmospheric methane due to increased methane production in such environment cause to rising global temperature (e.g., Sugimoto and Wada, 1993; Chanton et.al., 1997). That is, methane sources reflect atmospheric methane fluxes. In this study, stable isotope measurement has been made on pore water samples from some peatlands in northern central Japan collected *in situ* and to depth. The sampler was buried in the peat at 20 cm intervals to the maximum depths of 1.5 m and subsequent sampling was done via two way gas-tight syringe. The sampling period was from July, 1996 to October, 1997. Dissolved gases predominantly contain N_2 and CH_4 and little Ar, O_2 and H_2 independent of locality and depth. Methane concentrations increase with increasing depth in all localities. The carbon and hydrogen isotope compositions of peat methane range from - 55.4 to - 68.9 per mil and - 290 to- 338 per mil, and a mean of -60.7 per mil and -313 permil, respectively. Between 0.5 and 1.2 m samples, carbon isotope composition generally become isotopically lighter, whereas hydrogen isotope ratio heavier with increasing depth in all localities. In the Ikegahara, methane sampled 0.1 to 0.5 m below the surface shows isotopically opposite trend that present in below layer. These variations in carbon and hydrogen isotope signatures at each locality are attributable to differences in CH_4 production pathway (Whiticar et al., 1986) and/or oxidation (Coleman et al., 1981). Comparison of carbon and hydrogen isotope ratios in pore water CH_4 for surface samples (0.1 to 0.5 m) in the Ikegahara shows the importance of CH_4 oxidation. On the other hand, for deep CH_4 samples (0.5 to 1.2 m) enrichment in carbon isotope and depleted in hydrogen isotope in each localities has generally been associated with the acetate fermentation pathway of methanogenesis. The hydrogen isotope of CH_4 is independent of methanogenic pathway but link to hydrogen isotope of water. The pore water represents the hydrogen reservoir from which the methane has produced. Using the relationship between hydrogen isotope of CH_4 and H_2O, the relative ratio of CO_2 and acetate fermentation can be estimated. The calculated values of contribution for acetate are 29 to 67% and decrease with increasing depth.

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