Stable isotope ratios of high concentration CO2 in the depression and its surroundings of Mt. Hakkoda, Aomori

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The origin of high concentration CO2 in the depression of Mt. Hakkoda, Aomori, was discussed using d13C data of CO2. The high concentration CO2 (about 20 % (v/v)) at the bottom of the depression was characterized by high d13C values. On the other hand, d13C values of the normal soil CO2 in 50 cm depth (about 1 %) were low. The CO2 observed in this area is derived from the mixing of the deep source CO2 and the soil CO2. CO2 dissolved in hot springs and groundwaters with low pH values showed higher d13C values and the decomposition of oceanic carbonate with strong acid could not be neglected. Besides the soil CO2, the presence of two sources with different high d13C values should be taken into consideration to understand all the d13C values observed in this area.

The origin of high concentration CO2 in the depression and its surroundings of Mt. Hakkoda, Aomori, was discussed using d13C data of CO2 in the atmosphere and that dissolved in hot springs and the soil CO2. The high concentration CO2 (about 20 % (v/v)) at the bottom of the depression was characterized by high d13C values (about - 9 permil (vs. the PDB standard)). On the other hand, d13C values of the normal soil CO2 in 50 cm depth (about 1 %) were from -28 to -27 permil. d13C values of other soil CO2 and those in the air in 10 m bore holes were ranged between these two extreme values. These facts suggest that the CO2 observed in this area is derived from the mixing of the deep source CO2 and the soil CO2. The origins of the deep source CO2 are in the mantle and/or thermal metamorphism of oceanic carbonate rocks and organic debris, and d13C values of the deep source CO2 is much larger than that of the soil CO2 of biological origin (Sano, 1996). CO2 dissolved in hot springs and groundwaters with low pH values showed higher d13C values such as - 3.4 permil and the decomposition of oceanic carbonate with acid could not be neglected. Besides the soil CO2, the presence of two sources with different high d13C values should be taken into consideration to understand all the d13C values observed in this area.