

Characteristics of stable hydrogen and oxygen isotope ratio in precipitation in the Hachinohe area, Japan

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Stable isotope techniques are widely used to investigate regional water cycles. In this study, the stable hydrogen isotope ratio in precipitation in Hachinohe is analyzed for the period from January 2000 to December 2004 and the stable oxygen isotope ratio in precipitation in the location is also measured through the year of 2003.

Precipitation was collected once a day following precipitation. Droplet samples of 1.2microliter were converted to hydrogen gas in a pretreatment device (H/Device, Thermo-electron) according to the thermo-chemical reaction. The oxygen stable isotope in sample water is equilibrated with those in the standard carbon dioxide in the syringe and the oxygen stable isotope ratio in the equilibrated carbon dioxide gas was measured by the stable isotope mass spectrometer (Delta plus, Thermo-electron).

The non-weighted mean of stable hydrogen isotope ratio for this period was -53.2 permil, although the data exhibited wide scatter from 5 permil to -200 permil. The scatter is most pronounced in winter, attributable to the combination of precipitation originating from the Sea of Japan and the Pacific Ocean in this season. This phenomenon can be understood from d parameters in this season. Stable hydrogen isotope ratios higher than -10 permil were recorded in spring and autumn in association with the formation of coastal sea fog.