

Spatiotemporal variations in stable isotope ratios of precipitation in the Japanese Alps Region

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We collected precipitation samples and observed weather every month from January 2011 to December 2016 at nine locations in the Japanese Alps Region (Nagano, Matsumoto, Suwa, Omachi, Sugadaira, Norikura, Kamikochi, Shigakogen, Nishihotaka). The collected water samples were brought back to the laboratory to stable isotope analysis to determine δD , $\delta^{18}O$ and calculated d-excess. The $\delta^{18}O$ in precipitation collected more than once times per month was weighted average using the amount of precipitation and was taken as the average monthly value. As a result of examining the seasonal variation of $\delta^{18}O$ from 2011 to 2016, $\delta^{18}O$ showed two peaks in spring and summer. In order to investigate the spatial variation, the coefficient of determination between latitude, longitude, altitude and $\delta^{18}O$ was calculated, it clearly correlated with altitude from April to October. The cause of the altitude effect was thought to be due to Rayleigh's condensation process. The monthly variation of the $\delta^{18}O$ decrease rate also showed a variation close to the monthly average $\delta^{18}O$, suggesting that the seasonal variation of $\delta^{18}O$ may also be related to altitude effect. d-excess showed seasonal variation which is high in winter and low in summer. This is thought to be caused by the high d-excess precipitation from the Sea of Japan due to the winter pressure pattern. As a spatial variation, correlation with altitude is high in summer and correlation with longitude is high in winter. The relationship with the altitude in the summer was thought to be related to the Rayleigh's condensation process. The correlation between longitude and d-excess in winter is thought that high d-excess precipitation was brought by the winter pressure pattern to Omachi, Nagano, Sugadaira and Shigakogen in the eastern part of the sampling area.

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