

Mapping of Stable Isotopes in Precipitation over the Japan Alps Area and Its Verification

MAKINO, Yuki^{1*}, WAKIYAMA, Yoshifumi², YAMANAKA, Tsutomu², SUZUKI, Keisuke³

¹Graduate School of Life and Environmental Sciences, University of Tsukuba, ²Terrestrial Environment Research Center, University of Tsukuba, ³Institute of Mountain Science, Shinshu University

The isotope map serves as a useful tool for understanding movement, distribution pattern, and biogeochemical processes of water on the Earth, because the stable isotope ratios of water include information related to not only the processes of water cycle but also the cycle of various substances transported by water flow. However, the isotope map for the mountainous region cannot be easily made, because existing isotope data are very scarce in that region. Precipitation samples were collected at 14 points from July 2010 to June 2011 across the Japan Alps area and isotopic measurements of these samples were made to construct the isotope map. River water samples were collected at 45 points over the Fuji and Chikuma River basin. River water data are used by validation of the isotope map in precipitation. Correlations between $\delta^{18}\text{O}$ and altitude were significant through warm seasons whereas no significance was found in winter. Annual $\delta^{18}\text{O}$ in the Japan Alps area is controlled by altitude effect. The isotope map was created using the three interpolated methods which is (1) regression model by altitude the explaining variable, (2) geostatistical model and (3) hybrid model. Validity of these models more different among the basins, suggesting different hydrological characteristics. In particular, downstream areas have higher $\delta^{18}\text{O}$ values in river water than in precipitation.

Keywords: Stable isotope, Japan Alps area, Altitude effect, Spatial distribution