

Isotopic and chemical characteristics of well waters around Mt. Fuji

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In this study, 14 water samples were collected from wells of various depths from 4 to 1,500m and from natural springs around Mt. Fuji, and were subjected to chemical and isotopic analysis of hydrogen and oxygen (δD and $\delta^{18}O$).

The δD and $\delta^{18}O$ values of the water samples ranged from -86.4 to -49.6‰ and from -11.6 to -7.6‰, respectively, and negative correlation was recognized between isotope ratio and altitude of sampling point. Relationship between δD and $\delta^{18}O$ for sample waters was $\delta D = 8 \cdot \delta^{18}O + 12$, and is very close to the local and global meteoric water lines ($\delta D = 8 \cdot \delta^{18}O + 15.1$ from Yasuhara et al., 2007 and $\delta D = 8 \cdot \delta^{18}O + 10$ from Craig, 1961, respectively). Altitude effect of δD and $\delta^{18}O$ in sample waters (altitude of sampling point was used in calculation) were calculated at -3.5‰ and -0.43‰ per 100m altitude, respectively. These isotopic gradients are mostly the same as published values for rain and snow (-3.0‰/100m for δD and -0.4‰/100m for $\delta^{18}O$; Waseda and Nakai, 1983). Based on the trilinear diagram, water samples were basically classified as Ca-HCO₃ type at shallow depths (0~15m depth), mixed cation-HCO₃ type at intermediate depths (less than about 200m), Ca-Na-SO₄-Cl and Na-Ca-SO₄-HCO₃ types or similar to them at more deep depth. Water qualities of deep wells appeared to be derived from submarine sediments and volcanic rocks which compose the basement of Mt. Fuji region because the water qualities of deep wells are similar to that of thermal water in the green tuff region of Japan (Sakai and Matsubaya, 1974).

Keywords: Mt. Fuji, well water, hot spring water, stable isotope ratio (δD - $\delta^{18}O$), water quality