

Chemical and isotopic compositions of stream water on Yakushima Island

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We conducted field observation for stream water on Yakushima Island in July of 1998.

The Yakushima Island (YKI), known as a world heritage site, is located in 70 km south from Kyushu Island in the Ocean and has a round-shape island with 28 km diameter. The YKI has mountainous zone with over 1500 m high as Mt. Miyanoura (1935 m) in the central part. Average amounts of annual precipitation in the YKI are 4291 mm in the eastern shoreline and more than 12000 mm in the mountainous area.

Stream water samples, collected at 86 sites with 10 to 1780 m high, were weakly acidified (pH 5.6–6.8). The stream water was characterized by Na-Cl type and had close Na/Cl ratios to that of seawater. These facts indicated that most of Na and Cl in the YKI stream water were derived from sea salt through precipitations. On the other hand, the stream water in the western YKI contained higher concentrations of non sea salt SO₄, indicating that the anthropogenic pollutants on the YKI were dominantly derived from the Asian continent rather than Japan's main island.

The relationship in isotopic composition of the stream water in the YKI was regressed by an equation of $\delta D = 8.0\delta^{18}O + 11.7$. A slope of this equation is well coincident with that of the Global Meteoric Water Line, showing that effects of evaporation on the isotopic composition in the stream water were ignorable. Analysis for small catchments with less than 5 km² provided the value of -0.18 permil per 100 m rise as an altitude effects. This value was concordant with reported values of altitude effects in precipitation (Clark and Fritz, 1997). By using this value, it was estimated the Onoaida Hot-spring water in the YKI (100 m above sea level), originated from meteoric water, was recharged around 1200 m level.