

## Stable isotope of Precipitation, Spring water and Stream water in the Hakone Volcano.

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### Introduction

It is necessary to clarify the altitude effect of precipitation in the object region to presume the altitude of recharge area of the spring and the stream using the hydrogen and oxygen stable isotopes. Moreover, the altitude effect of the precipitation are different according to a slope direction and the season, so it should gather precipitation in two or more altitudes according to each slope azimuth.

In this study, the precipitation sample was gathered according to a slope azimuth, and it compared it with the ratio of the stable isotope of the spring water and the river water in the Hakone Volcano somma located in Western Kanagawa Prefecture.

### Summary of investigation

The precipitation sample are gathering in the four directions of the Hakone Volcano somma(57 - 363m), in the hillside of Mt. Komagatake(1049m), and in the Ashigara Plain(21m) from September 2006. The spring water and stream water were sampled at 28 points between December 2006 to February 2007.

### Altitude effect of precipitation

Precipitation in Hakone Volcano was a tendency to which precipitation increased as the altitude rose, and hydrogen and oxygen stable isotope ratio decreased. Annual precipitation and the ratio of the oxygen isotope in the hillside of Mt. Komagatake were 4,105mm and -10.3 permil, in the Ashigara plain were 2,337mm and -9.6 permil. There was no difference in precipitation by the direction of the slope in Hakone Volcano. The slope of regression line in Hakone Volcano was 130mm/100m, y-intercept was 2730mm, and coefficient of determination was 0.87.

On the other hand, the altitude effect of oxygen stable isotope in Hakone volcano excluding the west side slope was almost similar tendency. The slope of regression line in the north slope was -0.066permil/100m and y-intercept was -9.6permil, in the east slope was -0.071permil/100m and -9.6permil, in the south slope was -0.082permil/100m and -9.4permil, and in the west slope was -0.15permil/100m and -8.8permil. The slope of regression line excluding the west slope was -0.070permil/100m, y-intercept was -9.6permil, and coefficient of determination was 0.97. In the west side slope, the weighted average oxygen stable isotope of precipitation became about 0.6 permil heavier than estimation by the altitude effect.

### Stable isotopes of spring water and stream water

The slope and y-intercept in the altitude effect of oxygen stable isotope in spring water and stream water were -0.093permil/100m and -7.7permil in the north slope (n=4), -0.17permil/100m and -7.5permil in the east slope (n=6), -0.11permil/100m and -7.5permil in the south slope (n=10), and -0.051permil/100m and -7.5permil in the west slope (n=8).