

## Stable isotope distribution of Springwater in Kanagawa Prefecture.

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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. However, it is known that the altitude effect of precipitation changes with altitude, latitude, slope direction, seasons and others. For this reason, it is very difficult to extract the rain sample which covered these. In such a case, the recharge altitude is presumed with the groundwater occurrence curve drawn from an isotopic ratio in the small-scale springwater which gushes from mountainous watershed and altitude. However, this method is mainly used in the comparatively narrow ranges, such as mountain land. On the other hand, examination in the wide area containing a plain and a plateau part is seldom performed.

In this study, areal distribution of the stable isotope ratio of springwater in Kanagawa prefecture was clarified and the broad-based groundwater recharge isotopic ratio was examined.

### Summary of investigation

The springwater was sampled at 163 point in Kanagawa Prefecture and a neighboring area. The investigation went from April, 2009 to August, 2010. Measurement of the water temperature, pH, and electrical conductivity in springwater was performed, and analysis of dissolved ion, and hydrogen and an oxygen isotopic ratio was conducted. Moreover, the amount of springwater was measured as much as possible. As a result of investigating with the springwater of 163 points, the gush part from underground has been checked at 119 points. However, it is fixed as a springwater institution and 40 points were not able to check a gush place, and 4 points were springwater ponds. From the point which has checked the gush point, the isotopic distribution figure was created using the isotopic ratio in the springwater of 114 points which excepted five points which showed the unusual isotopic ratio.

### Oxygen isotopic ratio distribution in springwater

The minimum values of oxygen stable isotope ratio in springwater of Kanagawa Prefecture was -9.3permil and the highest was -6.8permil and arithmetic mean value was -7.9permil. The areal distribution of the oxygen isotopic ratio in springwater was low in Hakone in western Kanagawa, and the Tanzawa area, and the tendency which becomes high in an area along the shore and an eastern part of prefecture was seen. The altitude effect of oxygen stable isotope in the springwater calculated using all the points is -0.104permil/100m and coefficient of determination was 0.375.

Then, the west of the west longitude of 139.15 degrees was classified with the western prefecture. Moreover, the longitude between 139.15 to 139.45 degree was classified with the central prefecture, and the east of 139.45 degree were classified into the eastern prefecture, respectively. And it analyzed for every area about the relation between altitude and an oxygen isotopic ratio, latitude and an oxygen isotopic ratio. As a result, the altitude effect of oxygen stable isotope in the western prefecture is -0.086permil/100m and coefficient of determination was 0.474, in the central prefecture is -0.278permil/100m and coefficient of determination was 0.287, and in the eastern prefecture is -0.275permil/100m and coefficient of determination was 0.016, respectively. On the other hand, it is about the relation between latitude and an oxygen isotopic ratio in the western prefecture is -0.032permil/min and coefficient of determination was 0.146, in the central prefecture is -0.064permil/100m and coefficient of determination was 0.582, and in the eastern prefecture is -0.017permil/100m and coefficient of determination was 0.134, respectively. As a result, the central prefecture showed the value with inclination and the highest correlation coefficient. Since a central prefecture has the Tanzawa place in a northern part, this is considered because the direction of high latitude and the high altitude direction overlapped.

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