

The relation among isotope of nitrogen and oxygen of river water, topography and geology, in the upper area of the Sagami River

Yuji Miyashita[1]

[1] Hot Springs Res. Insti. Kanagawa Pref.

The Sagami River accounts for about 60 percent of the tap water source of Kanagawa Prefecture. In Lake Sagami and Lake Tsukui, abnormal growth of phytoplankton in summer seasons has been an issue since the 80's. The nitrogen origin in the river water that is one of the causes is estimated that non-specific polluter is 69% by the basic unit method. The load by precipitation and the influence of geological features are pointed out about non-specific polluter that occupies many of amounts of the nitrogen load.

Therefore, the purpose of this study is to elucidate the outflow mechanism of river water by the relationship among the stable isotope of nitrogen and oxygen of river water, topography and geology.

Sagami River is located in Yamanashi and Kanagawa, and total extension is 113km and a total area of basin is 1,680 square km.

The sampling of river water and lake water was performed at 49 points in September 2001.

These samples measured dissolved ions, concentration of total nitrogen, the stable isotope of nitrogen and oxygen. In addition, I measured river flow quantity at sampling point.

To compare the water quality of river water, the topography of the watershed such as average altitude of basin, average direction of slope, and geology were calculated using the 250m Digital Elevation Models data of the Geographical Survey Institute and Geological Map of Japan 1:1,000,000 3rd Edition, 2nd CD-ROM version mesh data of geological Survey of Japan, AIST.

The result of the geographical feature analysis using digital elevation models data at the 49 sub-basins, the elevations of sampling points were distributed from 114 to 1109m, the areas of basins were distributed from 0.3 to 1177.2 square km and the altitude difference in each sub-basin were distributed from 48 to 3,598m. Moreover, the areal average elevations of 49 sub-basins were distributed from 393 to 1314m. From a result of the geographical feature analysis in the lowest sub-basin, it was clear that the areal average elevation of the upper area of the Sagami River is 839m, the area is 1177.2 square km, and the direction of an average slope is east-northeast.

The nitrogen isotopic ratios of stream water were from -1.5 to +10.9 per mil, and oxygen isotopic ratios were from -9.8 to -6.8 per mil, and average value was +3.9 per mil and -9.1 per mil, respectively. The correlation is small between the altitude of the sampling points and the nitrogen isotopic ratios at the stream water, the nitrogen isotope ratio of the source was almost a value of rainfall, and the nitrogen isotope ratio of the down stream part showed a near value in life drainage.

In addition, a high correlation was accepted between areal average elevations of basins and the oxygen isotope ratios, and an altitude effect to be different with Doshi River and other river except Yamanaka-ko lake area. The result of the altitude effect was -0.15 per mil per 100m and y-intercept was -7.5 per mil in Doshi River. On the other hand, it was -0.22 per mil per 100m and -7.6 per mil in other river except Yamanaka-ko lake area.

To examine nitrogen load by a geological feature, I compared the concentration of total nitrogen and the stable isotope of nitrogen with a sedimentary rock, a volcanic rock and a abyssal rocks ratio to occupy to a basin area.

However, between a geological feature and the concentration of total nitrogen and stable isotope of nitrogen, the clear relation was not accepted.

From the change of stable isotope of nitrogen and concentration of total nitrogen, I calculated the concentration of ground water. As a result, it was a value of about 1mg /L at many points, but showed a high value of 2.3-4.9mg /L in Sakai Liver area. In addition, a considerably high value of +9.1 to +16.9 per mil was guessed about the stable isotope of nitrogen in Sakai Liver area.