

A Study on Groundwater Flow System and Nitrate Nitrogen Pollution of Groundwater in the Foot of Mt. Fuji

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The purpose of this study is to clarify the features of groundwater quality and groundwater flow system in detail and the mechanism of nitrate nitrogen pollution of groundwater in the foot of Mt. Fuji.

The type of water quality is dominated by Ca-HCO₃ type, and total ion concentration tends to increase with decrease in altitude. The tendencies are different in each area of the foot of the mountain, especially the concentration varies widely in the low altitude region in the southwest foot and there is a rapid increase in the concentration from the west area to the east area in the Yoshiwara region. Also, as for the samples with high concentration of total ion, the concentration of NO₃⁻ tends to be also high. On the other, there is little nitrate nitrogen pollution in the south east and north foot. The nitrogen supply source of the groundwater in the southwest foot where remarkable nitrate nitrogen pollution is found was specified the inorganic fertilizer that had been scattered on the tea plantation widely distributed in skirts of a mountain based on dissolved element composition and nitrogen stable isotope ratio. Also, the groundwater quality formation can be explained by the influence of the fertilizer. Especially, because there became clear that the Yoshiwara region having faced a new groundwater contamination of nitrate nitrogen although the problem of groundwater salinization was improved, immediate measures are hoped.

The groundwater flow system was examined by hydrogen and oxygen stable isotope compositions, principal component analysis with varimax rotation and cluster analysis. In consequence, in the southwest foot, there exist two flow systems that direction along Urui River and direction of Mt. Fuji skirts. Additionally, two flow systems are mixing in the downstream part. In the southeast foot, there exist two flow systems that direction of Gotenba mud flow and direction of Mishima lava flow by Fuji groundwater system. In the latter system, the flow of Ashitaka and Hakone groundwater system are mixing under the middle stream. In the north foot, there exists the flow system from the slope in Mt. Fuji to the direction of Lake Kawaguchi. Also, it was suggested that the flow system along Katsura River was mixed by flow system from the slope in Mt. Fuji, Lake Kawaguchi and Oshino region.

Furthermore, focusing attention on the shape of principal component plot, the calculation of the mixing ratio as three indices, (1) low degree of intensity of a chemical weathering, (2) high degree of intensity of a chemical weathering, (3) the remarkable nitrate nitrogen pollution, can give us more detailed understanding of the groundwater flow system and situation of nitrate nitrogen pollution. Also, it was clarified that existence of watershed, and mechanism of groundwater quality formation by mixing of Ashitaka groundwater flow system with nitrate nitrogen pollution and Fuji groundwater flow system without pollution. Few studies on applied technique of such a mixing ratio calculation have been done, thus it can be expected to be used.