

Analysis of nitrate variation by source and hydrologic factors in spring water of Mt. Yatsugatake

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Concerns regarding ground-water contamination in the Mt. Yatsugatake on the west slope have arisen due to a steady increase in averaged nitrate concentrations (from 1.2 to 3.5 NO₃-mg/l) during t

he past 15 years (from 1987 to 2002) in spring waters (Shimizu et al. 2007). Mt. Yatsugatake is volcano in central Japan having elevations of 2899m. The artificial and local resort towns are locating blow 1100m elevation. The stock farms are expanding from upper 1100m until 1400m elevation.

Twenty-nine water samples were collected from 750m to 2380m elevation. Multiple isotopic tracers were used to identify the sources and extent of nitrate dynamics in groundwater under the recharging systems.

The ranges of nitrate-N concentration were from <0.05 to 17.8mg/l. Few samples of high nitrate-N concentrations (5.8 and 17.8 mg/l) were located in locally concentrated of agricultural and local resort town. And 80% of collected samples were <0.9 mg/l. Although delta 15N-NO₃ values (from -0.4 to 10.5permil) were highly variable both spatially and vertically. The high delta 15N-NO₃ values are decreasing with the averaged recharge elevation of springs which was estimated by elevation effects of water hydrogen isotope values on Mt. Yatsugatake reason. Relatively high isotope value samples (4.4-10.1permil) were detected blow 2000m elevation indicated that nitrate in springs mixed from human/animal wastes consistent with landuses. The relationship between NO₃-N concentration and delta 15N values was insignificant. However the high NO₃-N concentration (>0.9 mg/l) springs having relatively small amount of discharges (850 m³/day) indicated the effects for the distribution of NO₃-N concentration is nitrogen sources rather than quantity of the groundwater.

Keywords: Spring water, Mt. Yatsugatake, Nitrate, Nitrate nitrogen and oxygen isotopes, Water hydrogen and oxygen