

Chemistry of river water in Shirasu ignimbrite plateau

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Introduction

Located in an island-arc trench system, the Japan archipelago is prominent by active volcanoes, and Quaternary volcanic rocks widely cover the land. The major basins of surface water are found in volcanic areas. However, most hydrochemical research works have been emphasizing on geothermal waters or anthropogenically polluted river water. Under such research circumstances, the presenters have been conducting hydrochemical researches in various volcanic areas, mainly in the Norikura volcanic zone, central Japan. In this study, the presenters investigated Kotsuki River in a volcanic region that is covered by almost a single ignimbrite layer. The aim of this research is to clarify the relation between the volcanic geology and the surface water chemistry and to extract the underlying factors of the hydrochemical processes in the volcanic area.

Sampling and analytical procedure

The field investigation was performed every 2 months between March 2001 and February 2003. Sampling points were selected from the water basin of the Kotsuki River down to the estuary for every 4 km. The temperature, pH, and electrical conductivity (EC) were determined in the field. The water samples were filtered and transported to the laboratory, then subjected to chemical analysis on the major components.

Results and discussion

The multivariate statistical analysis showed that the river water chemistry is highly controlled by weathering of Shirasu ignimbrite. In spite of the existence of many hot spring discharges and a municipal region in the catchment area, river water is only little influenced by hot springs or polluted waters. On the basis of the stoichiometric calculation based on water-rock interaction, the water chemistry was successfully estimated by a simple equation: $[\text{Si}] = 2 [\text{Na}^+] + [\text{Mg}^{2+}]$.