

## Spatial variation in chemical soluble ions of the surface snow in the Tateyama Mountains in Toyama Japan

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The chemical soluble ions in snow are derived from various sources such as sea salt, terrestrial surfaces, volcanos, and anthropogenic activities. The composition and concentration of ions in snow vary depending on the distance from the sources, emission rate, and the wind direction. Therefore, the spatial variation in chemical soluble ions in a snow field reflects the transportation process of the aerosols. In addition, the chemical soluble ions in snow are important to evaluate the characteristics of melt water and its effect on the ecosystems along the streams. In Tateyama Mountains in Toyama prefecture of Japan, a large amount of snow accumulates during winter, and remains until summer. Snow contain chemical soluble ions derived from fumaroles of Jigoku valley, desert dust from far west of China and anthropogenic substances. This study aims to describe the spatial and seasonal variations in chemical soluble ions in the surface snow in the Tateyama Mountains.

We collected the surface snows in Tateyama Mountains in April, May, June, July and August 2017 and measured the water stable isotopes and the concentrations of major ions ( $\text{Cl}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Na}^+$ ,  $\text{NH}_4^+$ ,  $\text{K}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ ) of the samples. Based on the results, we created maps of their spatial variation using a GIS software.

The results show the concentration of  $\text{Cl}^-$  was relatively higher in the area near the fumaroles in Jigoku valley during the study period. This is probably due to HCl contained in the volcanic gas emitted from the fumaroles. The concentrations of ions other than  $\text{Cl}^-$  were generally higher in the southern area of the Murododaira in April. This suggests that the aerosols are mainly supplied from the Tateyama caldera located in south of the mountain. These spatial variations of soluble ions may affect vegetation and microbial activity in snow.

Keywords: Snow chemistry, Spatial variation