

Spatial variation in chemical soluble ions of the surface ice of the Urumqi No.1 Glacier, Tien Shan Mountains, China

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The chemical soluble ions on the glacier surface are important in order to understand the ecology of the microbes living there and to evaluate the characteristics of melt water and its effect on the ecosystems and local people in the downstream of the glacier. This study aims to describe the spatial variations in chemical soluble ions in the surface ice of the Urumqi No.1 Glacier located in the Tien Shan Mountains, China. We collected surface ices in the ablation area of the glacier in August 2016 and measured the water stable isotopes and the concentrations of major ions (Cl^- , NO_3^- , SO_4^{2-} , Na^+ , NH_4^+ , K^+ , Mg^{2+} , Ca^{2+}) of the samples. Based on the results, we created maps of their spatial variation using a GIS software. The results show that the water stable isotopes were relatively higher in the surface of eastern side, while lower in the western side of the glacier. This is probably due to different age of the ice accumulated on the glacier. Since the accumulation area distributed along the ridgeline from south to east of the glacier, the age of ice appears to be older in western side compared with that of eastern side. The chemical soluble ions was also not simply associated with the elevation or glacier flowline, but relatively higher in the area of eastern side of the glacier. This is also likely to be due to age of ice. In contrast, Ca/Mg ratio was generally higher in the lower area of the glacier and had a significant negative correlation with the elevation. This is probably due to additional solutes by chemical weathering of dust deposited on the glacier surface. Results suggest that the spatial variations in chemical soluble ions are mainly determined by the age and flow of the glacial ice and the additional solutes from surface dust on the glacier.

Keywords: mountsin glacier, chemical soluble ion, spatial variation