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Elemental and mineralogical compositions and Sr and Nd isotopic ratios in surface dust on mountain glaciers in Asia

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Snow and ice on glaciers contain various impurities, such as mineral dusts and pollens. Dust deposited on glaciers in the past can be obtained by ice core drilling. The geochemical information of the dust in ice cores can reveal various environmental conditions in the past.

In this study, we analyzed elemental and mineralogical compositions of silicate mineral in the surface dust on Asian mountain glaciers (Altay, Tien Shan, Qilian Shan, and Himalayan) as well as the isotopic ratios to identify their provenance.

XRD analysis showed that the surface dust consisted of similar mineral compositions. They were mainly 5 silicate minerals: quartz, plagioclase, chlorite, and clay minerals such as illite and kaolinite. The minerals were most likely derived from desert sand and loess in China. In contrast, the elemental compositions of surface dust significantly varied among glaciers. Both the glaciers are located in Tien Shan Mountains, the compositions of glacier in Kyrgyzstan (western part of Tien Shan) and those of glacier in China (eastern part of Tien Shan) showed slight differences. This suggests that the elemental compositions reflect the sources of silicate minerals on the glacier.

Keywords: Sr, Nd isotopic ratios, surface dust on the glacier, XRD analysis