# Volcanic signatures from mineralogy of individual insoluble particles in an ice core of East Rongbuk glacier (Mt. Qomolangma, Himalayas) by low-*Z* particle EPMA and ATR-FTIR imaging

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In early works, we developed method for mineralogical characterization of single particles using quantitative energy-dispersive electron probe X-ray microanalysis, called low-*Z* particles EPMA, and ATR-FTIR imaging. In this study, individual insoluble particles present in four molten ice-core samples (A-D), collected from different depths (laeyers) of an ice-core from East Rongbuk (ER) glacier at Mt. Everest, Himalayas, were investigated. Samples A, C, and D were assumed to be influenced by volcanic ashes from Huayna-putina, Taal, and Pinatubo eruptions which took place at similar ages of sample depositions, respectively. The aim of this study was whether we can identify the signature of volcanic ash particles and distinguish them from normal dust storm particles. Results show that the expected volcanic influenced samples, i.e., samples A, C, and D, have different characteristics than that of sample B. For example, a number of particles in sample D were identified as amorphous glass, which could be related to volcanic origin. In addition, these samples contain a higher extent of silica polymorphs other than the quartz, e.g., cristobalite, tridymite, and coesite which have been reported to be of volcanic origin [1,2]. These silica polymorphs along with glass shards can be used as the signature for volcanic ash particles. The volcanic eruption influenced samples also exhibit high content of plagioclase and low content of montmorillonite and kaolinite, and in some cases Ti-containing particles. In this study, volcanic ash particles were distinguished from normal dust storm particles. Correlation might be established with ash or debris of historic eruptions which took place at similar periods.

[1] Baxter et al. (1999) Science, **283**, 1142-1145. [2] Damby et al. (2014) J. Appl. Cristallogr., **47**, 1205-1215.