

FRESH SNOW CHEMISTRY FROM HIGH MOUNTAIN REGIONS IN CENTRAL HIMALAYAS

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ABSTRACT: During 1997 summer, fresh snow samples were collected from the high elevation region (5400 – 7000 m) of Dasuopu Glacier on the northern slope of Mt. Xixabangma (28°33' N, 85°44' E). Compared with other remote regions in the world, major ion concentrations in fresh snow are very low during summer in Mt. Xixabangma, suggesting that the atmosphere is very clean and may represent background value for the middle/upper troposphere in the middle/low latitude area. During summer at Mt. Xixabangma the fresh snow chemistry is minimally influenced by anthropogenic pollutants as revealed by the snow pH (mean value of 6.0). Conductivity of fresh snow are low and constant. A multi-regression curve of pH vs conductivity shows a strong correlation; snow pH is negatively correlated with conductivity when pH < 6.0, and positively correlated when pH > 6.0. This suggests that the dominant chemical species of snow are interchanging between acid anions (e.g. SO₄²⁻, NO₃⁻) and crustal cations.

KEY WORDS: fresh snow; major ion concentrations; pH and conductivity; central Himalayas

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Investigations of atmospheric composition in the Himalayas has been limited in both temporal and spatial scales, mainly due to difficult logistics. Ideal sites for monitoring atmospheric composition and its evolution should be free from local pollution and representative of the remote troposphere (HUEBERT *et al.*, 1980). As the Himalayas are far removed from highly industrialized regions they provide suitable locations to monitor the chemistry of the remote troposphere and to study the evolution of atmospheric

composition (CUNNINGHAM *et al.*, 1981). Short-term aerosol sampling during monsoon and post-monsoon seasons has shown low pollutant concentrations in the Himalayan atmosphere suggesting these sites are representative of the remote troposphere (IKEGAMI *et al.*, 1978; WAKE *et al.*, 1994; SHRESTHA *et al.*, 1997). Continued population growth and increasing industrialization of Asia is expected to result in large increases in anthropogenic emissions and air pollution (ZHAO *et al.*, 1988;

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