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A 100-year snow chemistry record from the North Pacific region

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Three ice cores were recovered on, or near Mount Logan, Yukon, Canada at 3, 4.1 and 5.4 km above sea level in 2002. The one from King Col (4135m above sea level) was drilled by a Japanese team down to 220.52 m depth. The top 115 m of the core has been cut and melted for analyses of ion chemistry, stable isotopes, micro-particles, tritium etc. Stable isotopes (δ^{18}O and δD), NO_3^-, SO_4^{2-}, NH_4^+, Ca^{2+}, MSA, sea-salt ions and micro-particles show seasonal variations. The core was dated by annual layer counting, with a tritium peak at 58 m depth and a volcanic SO_4^{2-} peak at 112 m depth as reference horizons. The core was dated back to 1909 A. D. at 115 m depth. The King Col core provides us with a high time-resolution record of the past 100 year atmospheric chemistry in the North Pacific region.

Concentrations of NO_3^- and SO_4^{2-} started to increase about 1940 due to influx of anthropogenic air pollutants. In the late 1970's, SO_4^{2-} started to decrease again, probably due to pollution controls. Concentrations of Ca^{2+} and MSA were associated with the PDO (Pacific Decadal Oscillation), Ca^{2+} being negatively correlated to the PDO index, while MSA being positively correlated to the PDO index with a several-year lag. The King Col core would enable us to investigate the past atmospheric chemistry changes, both natural and anthropogenic, in the North Pacific region.