Chemical and Sr isotope composition of rainwater in the Xi'an City, NW China: effect of dust

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The chemical composition of precipitation has been widely investigated in southwest China, where acid rain affected significantly since the last three decades, however, the regions affected by acid rain are gradually expanding due to rapid economy growth and increasing fossil fuel consumption in China [1]. In fact, acid deposition is heavily influenced by alkaline dust from desert and semi-arid areas in northern China, but little is known on how dust affect the rainwater in this region.

In order to evaluate the influence of dust, chemical composition and $^{87}Sr/^{86}Sr$ ratios in rainwater and snow samples collected from the urban and rural areas of the Xi'an City were measured from 2007 to 2008. We quantify the potential sources of major ions and investigate chemical weathering of dust in the semi-arid region.

The results showed that most of rainwater samples have pH values higher than 5.6 with a range of 4.37~8.22. It did not show obvious acid mainly owing to significant neutralization of alkaline matter. Ca^{2+} was the dominant cation and SO_4^{2-} was the predominant anion in the studied samples. Using Na as an indicator of marine origin, and Al for the terrestrial inputs, the proportions of marine and crustal input were estimated. More than 98% of Ca^{2+} and 84% of SO_4^{2-} in precipitation samples are anthropogenic source, implying that intense chemical weathering of dust was occurred during anthropogenic acid interacted with that terrestrial materials. The $^{87}Sr/^{86}Sr$ values as well as those concentrations of major ions in the precipitation suggested that at least three potential sources of Sr in the rainwater and snow, included carbonate soil dust, silicate soil dust and anthropogenic sources. Among those, weathering of loess was the major source; marine source and anthropogenic input have only limited contributions.

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[1] Xu *et al*., (2015) *Atmospheric Research,* **164-165:**278–285.