Seasonal variation and altitude distribution of bulk deposition chemistry at Mt. Emei, Sichuan Province, China

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Introduction

Acid rain in one of the most serious problems of the environment in the present world including the East Asian countries. Sichuan Basin in China is one of the such areas having serious damage by acid rain. Since the pollutants in the atmosphere stay in the inside of the basin, the damage are increasing with increasing the input of anthropogenic pollutants. In order to construct the transportaaion mechanism of source materials causing acid rain in the atmosphere of the Sichuan Basin, the seasonal variation and altitudinal distribution of bulk deposition chemistry were investigated at the Mt. Emei, where is suitable field to collect rain and dry deposition from the bottom through cloud to top of the inside of the basin.

Result and Discussion

The pH, EC and concentration of water-soluble major components of the rainwater become lower with increasing the altitude from the bottom (486m) to the summit (3070m) of Mt. Emei. Anthropogenic SO_2 is the main source for acid rain of the basin. Seriously lowering pH of the rain is observed in winter time The inversion layer of source materials is annualy observed at about 1200m altitude, same as the low cloud layer, implying that the washout effect was larger than the rainout effect to remove acid materials from the atmosphere in the basin.

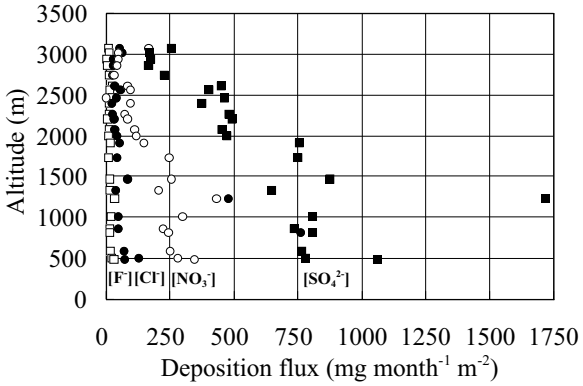

Fig. Altitudinal distribution of deposition flux of anions in Sep. 2001

Cementitious colloids: integration of laboratory, natural analogue and *in situ* field data

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In the case of a cementitious repository for radioactive or chemo-toxic wastes, it has been proposed that degradation of the cement may provide a significant source of colloids at both the cement/host rock interface and at the margins of the hyperalkaline plume produced by the leaching of the cementitious pore waters.

In the former case, five laboratory experiments examining colloid production during cement degradation and one natural analogue study at Maqarin in Jordan have been reported to date in the literature. Unfortunately, intercomparison of the data is difficult due to the significantly different methodologies used. Even in two batch leaching tests, large differences exist: in one, samples were shaken in synthetic cement pore waters while, in a second, static leaching in synthetic groundwaters was employed. The method-induced effects are apparent when the colloid populations are compared with the colloid mass concentrations: there are no clear relationships between populations and mass, suggesting significantly different colloid diameters are being measured in each experiment. This is clearly shown in the data of the first case where the measured colloid concentration varies over five orders of magnitude, depending on the settling time allowed following shaking of the samples (although the author notes that immediate measurement after end-over-end shaking of the batch cement/water samples used is unrealistic).

With respect to colloids produced at the margins of the hyperalkaline plume, no laboratory experiment has been able to reproduce this region so far and this margin has, as yet, not been accessed in the Maqarin study Arguably, the most appropriate approach to study such a margin would be in a large-scale, *in situ* experiment in an underground rock laboratory.

Clearly, any future work on these cementitious colloids would benefit from a common approach which should try to minimise method inherent differences, so producing a more compatible data set for use in assessing the likely impact of the colloids. In this paper, the existing cementitious colloid data sets are described in detail and a new, integrated approach for future work is defined. In addition, an *in situ* field experiment is proposed which will attempt to examine both the cement/host rock interface and hyperalkaline plume margin colloids simultaneously, so providing an integrated data set for impact assessment studies.