Geochemistry and tectonic setting of basalts in Shilipo native copper mineralized area, Eastern Tianshan

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Geochemistry of the Basalts

The Shilipo area with native copper mineralization occurring in the Matoutan Group is located in Eastern Tianshan of North Xinjiang. The orebearing basalts are from Low potassium to Calc-alkali series with enrichment of LREE and none Eu anomaly of basalts indicate an inner plate setting (Fig.1) and continental facies volcanic rocks.
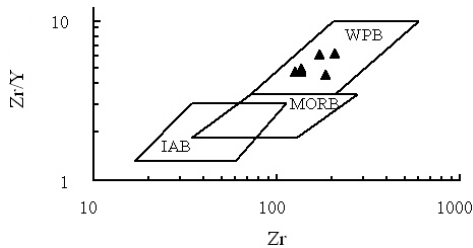

Figure1: Zr-Zr/Y diagram(after [1]).

Discussion

Wang & Xu [2] suggested the time span of the main post-collisional stage in northern Xinjiang. Combining with the ages of the orebearing basalts [3, 4], the basalts as well as the native copper mineralization were formed in the extensional regime of a post-collisional tectonic setting.

[1] Dupuy *et al.* (1992) *GCA* **56**, 2417-2423. [2] Wang & Xu (2006) *Acta Geologica Sinica* **80**, 23-31 (in Chinese) [3] Yuan *et al.* (2007) *Acta Petrologica Sinica* **23**, 1973-1980 (in Chinese) [4] Yuan *et al.* (2007) *Acta Mineralogica Sinica* **27**, 118-119 (in Chinese).

A reactive transport model to simulate uranium immobilization through pH manipulation

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Saprolite cores collected from around the former S-3 Ponds waste disposal site on the Oak Ridge Reservation in east Tennessee, USA, exhibit low pH and high concentrations of Al, Ca, Mg, Mn, various trace metals such as Ni and Co, and radionuclides such as U and Tc. Because uranium is one of the major contaminants of concern at the site, its behavior was of particular interest. The mobility of uranium depends highly on pH. Groundwater titration experiments showed that when pH was increased from 3.87 to 5.45 with addition of dissolved sodium hydroxide, concentration of aqueous uranium decreased from 50 ppm to less than 5 ppm [1]. However, base additions to the sediments to increase pH are strongly buffered by various precipitation and sorption reactions. This study was undertaken to investigate the geochemical processes that control contaminant mobility and to develop a practical model to predict uranium immobilization under conditions where pH is manipulated for remediation of geochemically complex sites.

The method of Spalding and Spalding [2] was utilized to model soil buffer capacity by treating aquifer solids as a polyprotic acid. Aluminum precipitation and dissolution kinetics was included in HydroGeoChem v5.0 [3] in addition to an equilibrium reaction model that considers aqueous complexation, precipitation, sorption and soil buffering with pH-dependent ion exchange capacity. The HydroGeoChem model was successfully utilized to simulate batch titration experiments and comparison of reactive transport model results with pH manipulation column experiments were in close agreement. The model was also calibrated to simulate acidic groundwater percolating through carbonate gravel at the site.

[1] Gu *et al*. (2003) *Geochimica et Cosmochimica Acta* **67**(15) 2749-2761. [2] Spalding & Spalding (2001) *Environ. Sci. Technol.* **35**, 365-373. [3] Yeh *et al.* (2004) *HydroGeoChem 5.0.* Oak Ridge National Laboratory.