The stable isotope composition of chlorine in hyperarid soils

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Halite (NaCl) is a water soluble mineral found in soils of the driest regions of Earth, and only modest attention has been given to the hydrological processes that distribute this salt vertically in soil profiles. The recent application of stable Cl isotope analyses to soils (Bao *et al*., 2008) set in motion the opportunity to use Cl isotopes to examine these processes. Here, we compare previously published depth profiles of Cl and Cl isotopes in Antarctica to new data on soils from the Atacama Desert in Chile. We first show, using previously published S and O isotope data for sulfates in both deserts, that downward migration of water and sulfate is the primary mechanism responsible for the depth profiles of these salts, and the S and O isotopes within them. In contrast, we found quite different Cl and Cl isotope profiles between the two deserts. For Antarctic soils with an ice layer near the soil surface, the Cl concentrations increase with decreasing soil depth, while the ratio of $^{37}Cl/^{35}Cl$ increases. Based on previous field observations by others, we found that thermally driven upward movement of brine during the winter, described by an advection/diffusion model, at least qualitatively mimics the observed profiles. In contrast, in the Atacama Desert where rare but relatively large rains drive Cl downward through the profiles, Cl concentrations increased with depth while $^{37}Cl/^{35}Cl$ ratios declined. The depth trends in Cl isotopes were more closely explained by a Rayleigh-like model of downward fluid flow. The isotope profiles, and our modeling, reveal the similarities and differences between these two very arid regions on Earth, and provide additional tools to interpret the direction of fluid flow from Cl profiles on Mars.

Bao H., Barnes J.D., Sharp Z.D., and Marchant D.R. (2008) Two chloride sources in soils of the McMurdo Dry Valleys, Antarctica. *Journal of Geophysical Research* 113(D03301)

Research on geochemistry model of Nanhe W-Mo-Cu deposit in southwest section of Qinzhou-Hangzhou metallogenic belt

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Nanhe W-Mo-Cu Deposit, lying in the zone between granite rock and layer, located at southwest limb of Zhongdong-Liangjiang Synclinorium southwest, southwest section of Qingzhou-Hangzhou Metallogenic Belt [1-3]. Its tectonic evolution experienced two stages: Continent-island arc collision and amalgamation in Caledonian and platform cracking in yanshanian [4-6]. Ore bodies occur in the zone of Caledonian mix granite, N-E shovel fault [7]. Ore analysis of W-Mo-Cu-Pb element demonstrated that: primary tungsten enriched in amphibolite. Either tungsten or molybdenum ore is mainly enriched in the weathering zone of basic volcanic rocks and Surrounding strata. It also tell us that the content of tungsten and molybdenum elements in layer is as 4-8 times high as rock mass; while the scale in granite mass is higher than the other rock mass. In addition, the content of Cu from the layer to mass present M-type and has a certain correlation with W.

1. Ore bodies are located in the volcanic layers of Cambrian and may be mineralized Paleozoic 2. W-Mo deposit must be Sedimento-Reformed Deposits and its Distribution under strict control of the basic volcanic rocks.3. Cu deposit should be porphyry copper deposits and copper comes mainly from the melting process of granitic rocks.4. Fault activity provide access for the mineralization and magmatic action provide energy and drive。

[1] Yang M G *et al*. (2009) *Geology in China* **36**, 528-543. [2] Ji X (1993) *Journal of Sun Yat-sen University* **32**, 85-94. [3] Shu L S *et al*. (2008) *Geological Bulletin Of China* **27**, 1581-1593. [4] Hu R Z *et al*. (2007) *Mineral Deposits*. **26**, 139-152. [5] Zhou Y Z (2010) report in meeting [6] Mao J W *et al*. (2009) *Geological Review* **55**: 347-354. [7] Bureau Of Guangdong Geology (1987) The Prospecting Report of Nanhe W-Mo deposit [8] Bureau Of Guangdong Geology (1987) 1:50000 report of tangpeng regional geological survey