Formation mechanism for the lanthanide tetrad effect in a topaz- and amazonite-bearing leucogranite pluton from Xinjiang, NW China

C.Z. WU[1], S.H. LIU[2], LX GU[3], Z.Z. ZHANG[3] AND R.X. LEI[1]

[1]State Key Laboratory for Mineral Deposits Research (Nanjing University), Shool of Earth Sciences and Engineering, Nanjing University, Nanjing 210093, China (wucz@nju.edu.cn)

[2]Zhoushan Entry-Exit Inspection and Quarantine Bureau of People's Republic of China, zhoushan 316000, China

[3]Eastern China Geological and Mining Organization for Non-ferrous Metals, Nanjing 210007, China

The Baishitouquan (BST) pluton is a high F and Rb leucogranite pluton, and is situated in Xinjiang, northwestern China. This pluton exhibits five lithological zones gradational from the bottom upwards: leucogranite (zone a), amazonite-bearing granite (zone b), amazonite granite (zone c), topaz-bearing amazonite granite (zone d) and topaz albite granite (zone e). Whole rock Chondrite-normalized rare earth elements (REE) patterns for above five zones from the BST pluton show clear convex tetrad effect, and the quantification factor ($TE_{1,3}$) for whole rock increases from zone a (1.02 ~ 1.16) to zone e (1.20 ~ 1.46).

We analysis the REE content of major minerals and accessory minerals selected from all above five zone of the BST pluton through Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS). Chondrite-normalized REE patterns of minerals from zone a to zone e display clear convex tetad effect, and the $TE_{1,3}$ values of these different minerals are also increases from zone a to zone e as their host rocks without exception. Therefore, we conclude the minerals (such as plagioclase, zircon, garnet, monazite etc) inherit the REE signature of the melt and do not contribute to the bulk-rock tetrad effect via mineral fractionation, while their the tetrad effect develops during magma differentiation. Additionally, Ratios of some ionic twins with similar ionic radius and charge (such as K/Rb, Y/Ho and Zr/Hf) in whole rock decrease remarkably from zone a to zone e, and present negative correlation with their $TE_{1,3}$ values, which indicate that the tetrad effect develops as a result of the interaction between melt and magmatic hydrothermal fluid. The extraction of a coexisting fluid from a peraluminous melt during magma differentiation results in a M-shaped and a W-shaped REE tetrad effect in the residual melt phase and agmatic hydrothermal fluid, respectively.

Sustainable development and utilization of groundwater resources considering land subsidence: A case study in Suzhou City, China

JICHUN WU, XIAOQING SHI, SHUJUN YE, YUQUN XUE AND YUN ZHANG

State Key Laboratory of Pollution Control and Resource Reuse, Department of Hydrosciences, Nanjing University, Nanjing, 210093, China (jcwu@nju.edu.cn)

Suzhou City, located at the lower reaches of the Yangtze River in southeastern Jiangsu Province, is a part of Su-Xi-Chang area (including Suzhou, Wuxi and Changzhou Cities), which are one of the typical regions in China suffering from severe ground settlement caused by extensive groundwater exploitation.

In accordance with the serious land subsidence, protection and management work for groundwater resource have been strengthened in Su-Xi-Chang area since 1995. By the end of 2005, an overall banning of groundwater pumping in Su-Xi-Chang was realized and the land subsidence rate was slow down and groundwater level recovered gradually.

On the other hand, the surface water (including lakes and rivers) have been increasingly polluted due to industrial and domestic wastewater and also agricultural runoff. In May 2007, Taihu Lake, the most important freshwater lake in Su-Xi-Chang area, was choked by blue-green algae, causing panic as over 200, 000 people found their tap water was undrinkable. This is China's most serious case of drinking water pollution to date. Some thoughts on water supply crisis in Suzhou City induced by explosion of incident of large bloom of blue-green algae in Taihu Lake were developed. One of the main measures is to use groundwater as an emergency water supply source because of its fine quality. A research project was carried out to investigate this problem to develop groundwater resources reasonably under condition of controlling land subsidence.

A 3-D finite element groundwater flow coupled one-dimensional land subsidence model is established. The calibrated model is then used to assess the future evolution of land subsidence in the study area under different emergency water supply scenarios, which are helpful to design reasonable quantity of exploiting the groundwater to control the land subsidence.

This research was supported by the National Nature Science Foundation of China grants No. 40702037 and 40725010.