Mining-induced groundwater environmental impact assessment at Shuyang county, Jiangsu Province, China

X.B. ZHU, J.C. WU, J.F. WU AND X. YUAN

Dept. of Hydrosciences, School of Earth Science and Engineering, Nanjing University (zxb@nju.edu.cn)

The phosphorite was found at Tangzhuang village, Shuyang county, Jiangsu province. It is about 2.2km^2. It's can be used and planned to be exploited in the future. Groundwater environment would be impacted heavily by exploiting phosphorite because the phosphorite is deep below the subsurface. The groundwater level should be reduced to the bottom elevation of the phosphorite. So, the huge cone of depression, which result in the subsidence, would be developed.

There is the phreatic aquifer and the confined aquifer in the study area. The hydrogeologic conceptual model was generalized and the numerical model of groundwater flow was built with the MODFLOW module in GMS software. The dewatering of deposit was caculated, 4100m^3/d for the upright well used for workers to get inside the exploitation platform and 13054^3/d for the exploitation channel. The drawdown is computed at the same time. The maximum drawdown is 60m for the confined auqifer and 4m for the phreatic aquifer.

The effect of phosphorite exploitation on the groundwater environment is obvious. Some engineering measures are suggested to be implemented to reduce the effect. Pumping well planned to be built to supply drinking water for people around the study area. Grouting convrete boreholes are suggested to be constructed to cut off the water exchange between the phreatic and the confined aqufer. The effect of exploitation and the subsidence due to dewatering of deposit can be controlled with these engineering measures.

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Zircon ages and Hf isotopic feature of Neoproterozoic metamorphosed sedimentary rocks in the South Qinling terrain, China

X.-Y. ZHU [1,2], F. CHEN [2], S.-Q. LI [2] AND L. YANG [1]

[1]Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, China

[2]School of Earth and Space Sciences, University of Science and Technology of China, Hefei, 230026, China

The Qinling orogenic belt, being part of the central orogenic belt in China, was resulted from the North China and South China blocks in early Mesozoic. The Shangnan-Danfeng tectonic zone is an inner suture, which separates this belt into the North and South Qinling terrains. Neoproterozoic sedimentary-volcanic sequences widely distributed in South Qinling have been considered to be basement rocks. Characteristic Neoproterozoic magmatic events (~750 Ma) were recorded in zircons from magmatic and low-grade metamorphic rocks in the South Qinling terrain and the South China block, interpreted as an indicator for close tectonic connection of both terrains in Neoproterozoic [1, 2].

This study presents results of zircon situ Lu-Hf and U-Pb isotopic analysis of low-grade metamorphic sedimentary-volcanic sequences in the South Qinling terrain. Most detrital zircons are euhedral to subhedral, implying a short transportation of material after weathering. Detrital zircon populations with oscillatory zonation of magmatic origin yield U-Pb ages mainly clustering at ~850 Ma and ~1890 Ma. Two zircon groups are characterized by distinguishable Hf isotopic feature, having negative initial εHf values of around -8.4 and positive initial εHf values of around +3.6, respectively. The atypical Neoproterozoic magmatic activity of ~850 Ma in the South Qinling terrain basement, similar to those along the northwestern and south eastern margins of South China block, are probably related to an earlier stage of the break-up of Rodinia supercontinent [3, 4].

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