

## **Geochronology and geochemistry of volcanic rocks from Tanjianshan Group in the Xitieshan Pb-Zn deposit, NW China: Implication for an Early Paleozoic back-arc basin evolution**

HUI YANG<sup>1</sup>, HUA-SHAN SUN<sup>1\*</sup> SHAO-YONG JIANG<sup>1,2\*</sup>

<sup>1</sup>School of Earth Resources, China University of Geosciences, Wuhan 430074, PR China (sunhsh@126.com)

<sup>2</sup>State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, PR China (shyjiang@cug.edu.cn)

The Xitieshan deposit is a large scale Pb-Zn deposit hosted in a volcanic-sedimentary rock sequence of Tanjianshan Group, at the northern margin of the Qaidam basin in NW China. In this study we utilize petrological, geochemical and geochronological methods to investigate the volcanic rocks of the Tanjianshan Group, aiming to reconstruct the geological setting of this large Pb-Zn deposit. The Tanjianshan Group is divided into three major volcanic sequences from bottom to top, referred as the Formation A-1/B, Formation D-1/D-4 and Formation D-3 by local geologists.

The Middle-Late Ordovician intermediate-felsic volcanic rocks from Formation A-1/B are characterized by variable initial  $^{87}\text{Sr}/^{86}\text{Sr}$  and  $\epsilon_{\text{Nd}}(t)$ , showing enrichment in Th, La and Rb and depletion in HFSEs, similar to magmatic rocks that form in active continental margin settings. The intermediate-basic rocks of Formation D-1/D-4 have low-moderate LREEs, weak positive Nb anomalies, low-moderate initial  $^{87}\text{Sr}/^{86}\text{Sr}$  and slightly negative to positive  $\epsilon_{\text{Nd}}(t)$ , with similar trace element patterns to typical E-MORB, and indicating a spinel + garnet lherzolite mantle source. The basalt and basaltic andesite from Formation D-3 shows relatively lower initial  $^{87}\text{Sr}/^{86}\text{Sr}$ , exclusively positive  $\epsilon_{\text{Nd}}(t)$  and almost flat REE and trace element patterns with a typical N-MORB geochemical signature, reflecting a mid-ocean ridge environment from a lherzolic mantle source dominated by spinel with minor or no garnet. These variable geochemical properties of the volcanic rocks reflect different stages of tectonic evolution in the Xitieshan mining area, possibly a back-arc basin development, evolving from an intra-arc rift to a small ocean basin. Rapid extension of the back-arc basin and continuous thinning of the lithosphere may have occurred between Late Ordovician and Early Silurian, with a duration of about 20 Ma.