

A geochemical lithogene in parent rock and its weathered products

TAOTAO YAN^{1,2}, QINGJIE GONG^{2*}, RUIKUN LI²

¹ Key Laboratory of Geochemical Exploration, Institute of Geophysical and Geochemical Exploration (IGGE), Chinese Academy of Geological Sciences, Langfang 065000, China

² State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing 100083, China (Correspondence: qjiegong@cugb.edu.cn)

Immobile elements are relatively stable during weathering and could retain their geochemical features of parent rocks [1, 2]. The stable relative behavior of immobile elements is similar to genetic inheritance in biology. Yan et al [3] proposed the concept of geochemical gene and its construction method. In order to compare the similarity degree of geochemical gene, the concept and calculation method of gene similarity were also proposed. Eleven immobile elements are selected to code the geochemical gene based on their abundances in the acidic, intermediate and basic rocks in China, and the sequence of these immobile elements is $\text{Al}_2\text{O}_3 \rightarrow \text{SiO}_2 \rightarrow \text{P} \rightarrow \text{Ti} \rightarrow \text{La} \rightarrow \text{Fe}_2\text{O}_3 \rightarrow \text{Th} \rightarrow \text{Zr} \rightarrow \text{Nb} \rightarrow \text{Y} \rightarrow \text{U}$. This geochemical gene is presented to characterize the geochemical attributes of the acidic, intermediate and basic rocks in China, and is therefore called geochemical lithogene.

Geological samples of four scales sourcing from the andesite of Xiong'er group in western Henan province, China are selected to test the validity of the geochemical lithogene. The results from the vertical weathering profile developed over the andesite indicate a well heredity from the fresh rock to its weathered products and a well inheritance from the top soil to its sources with different weathering degrees. The results from the lateral surficial soil profile, areal stream sediment surveys with a scale of 1:50000 and 1:200000 developed over the andesite outcrops indicate a well similarity among the soils and stream sediments sourced from the same parent rock in geochemical lithogene.

A geochemical lithogene database could be constructed on the database of regional geochemical survey and may play an important role in the scientific fields such as basic geology, environmental survey, and forensic geochemistry.

[1] Gong et al.(2011). *J. Asian Earth Sci.* **42**, 1-13. [2] Yan et al. (2016). *Acta Petrol Sin.*, **32**, 2425-2432. [3] Yan et al. (2018). *Geoscience*, **32**, 453-467.