Geochemical characteristics and tectonic implications of ca. 1.95 Ga pure sediment-derived S-type granite in the Helanshan complex, North China Craton

XIAOFEI XU, LONGLONG GOU*, YUNPENG DONG, XIAOMING LIU, ZHENGHUI LI, CHENGLI ZHANG, XIAOPING LONG, YUHANG ZHAO, FENG ZHOU

State Key Laboratory of Continental Dynamics, Department of Geology, Northwest University, Xi'an 710069, China (*corresponding author: LLgou@nwu.edu.cn)

As a typical Paleoproterozoic collisional belts within the NCC, the Khondalite belt is characterized by the occurrence of khondalites and multiple episodes of S-type granites. The ca. 1.95 Ga S-type granite within the Helanshan complex from the western Khondalite Belt exhibit large variation in whole-rock compositions [1, 2], and relatively higher Fe + Mg content than that of the experimental melts by partial melting of metasedimentary rocks. In order to better understand what controls the substantial geochemical variation of the ca. 1.95 Ga S-type granites and their tectonic implication, and their genetic relationship with the khondalites, detailed geochemical and whole-rock Nd isotope compositions of these granites and pelitic granulites are reported. Whole-rock Nd isotopic data and geochemical modeling suggest that substantial compositional variation of ca. 1.95 Ga S-type granites within the Helanshan Complex is controlled by the entrainment of peritectic garnet and plagioclase, and accessory minerals of apatite and ilmentite, with restite biotite, rather than the input of mantle-derived material. On the basis of the results in this study and those previously published in the region, two periods (ca. 1.95 Ga and 1.93–1.90 Ga) of S-type granites related to the orogenesis of the Khondalite Belt can be distincted. The ca. 1.95 Ga S-type granite is pure sediment-derived, whereas the ca. 1.93–1.90 Ga S-type granitoids were formed by mixing of sediment-derived and mantle-derived magmas [3, 4]. Thus, the different petrogenesis of these two periods of S-type granites in the Khondalite Belt reflect the continental collision between the Yinshan and Ordos Terranes at ca. 1.95 Ga, the post-collisional extension at ca. 1.93–1.90 Ga leading to intrusion of mafic magma, and the tectonic transition from compression to extension between 1.95 and 1.93 Ga.

[1] Dan et al. (2012) *Precambrian Res.* **222**–**223**, 143–158. [2] Dan et al. (2014) *Precambrian Res.* **254**, 59–72. [3] Peng et al. (2012) *Precambrian Res.* **222**–**223**, 107–123. [4] Wang et al. (2018) *Lithos* **320–321**, 435–453.