Meso-Cenozoic Tectonomagmatic Processes and Gold Mineralization, Northwestern Jiaodong Peninsula, China

Liang Zhang[1, 2], Li-Qiang Yang[1]*, Roberto F. Weinberg[2], Zhong-Liang Wang[1]

[1]State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing 100083, China
[2]School of Earth, Atmosphere and Environment, Monash University, Melbourne, 3800, Australia

*E-mail, liang.zhang3@monash.edu

The origin, genesis, classification, and tectonic setting of the giant Jiaodong gold deposits are controversial. While their characteristics have been well constrained, the complex tectonic evolution makes it difficult to understand this unique gold system. However, recent progress has made it clearer but many issues are still poorly constrained. Gold in the Jiaodong Peninsula is hosted by Mesozoic granites that recycled previously cratonic Archean rock sequences and predate gold by only a few million years.

The continental collision between the North China Craton (NCC) and South China Craton (SCC) gave rise to ultrahigh-pressure metamorphism with ages of 240 to 225 Ma, subsequent asthenosphere upwelling and lithospheric thinning played an important role in the formation of the gold-hosting Linglong (166–149 Ma) and Guojialing granite (132–123 Ma). The Linglong granitoid records in its chemistry components from both the NCC and SCC, while the Guojialing granite almost has no components from the SCC, as revealed by inherited zircon U-Pb ages. The Archean metamorphic rocks of Jiaodong Group were recycled during the widespread Mesozoic magmatism and were also involved in the later gold mineralization. Guojialing magmatism was contemporaneous with extension marked by significant regional ductile normal mylonitic shear zones having NW or SE dips and downdip lineations on different locations overprinted by brittle deformation. Gold mineralization started with a small pulse at 130 ± 4 Ma, soon after intrusion and cooling of the Guojialing granite, followed by the main mineralization at 120 ± 5 Ma, controlled by major NE-NNE-trending shear zones and faults with normal movements under brittle or brittle-ductile deformation regime. Charles et al. proposed that the gold mineralization was controlled by the development of the Linglong Metamorphic complex (MCC). However, Lin et al. argued that Linglong massif is just a batholith rather than a MCC. Two generations of fault gouge and gold-bearing/wall rock breccia show the fault underwent at least two significant movements contemporaneous to or postdating the gold mineralization. Significant post-ore movement of faults, and other influences on the postore preservation and exhumation should be the focus of future research to assist exploration.

Acknowledgments: This work was financially supported by the National Natural Science Foundation of China (41230311), the National Science and Technology Support Program (2011BAB04B09), and CSC Scholarship Program of China (201406400008).