Titanite U-Pb and sericite Rb-Sr dating of the Liba metasediment-hosted gold deposit, West Qinling Orogen, Central China: Implications for regional gold metallogeny

CHONG-GUO HE[1]*, JIAN-WEI LI[1, 2]

[1]Faculty of Earth Resources, China University of Geosciences, Wuhan 430074, China (*correspondence: cghe@cug.edu.cn)

[2] State Key Laboratory of Geological Process and Mineral Resources, Wuhan 430074, China (jwli@cug.edu.cn)

The Liba gold deposit is one of the largest orogenic gold deposits in the West Qinling Orogen. Gold mineralization is hosted in Devonian greenschist facies metamorphic sedimentary rocks and consists of disseminated ores and subordinate auriferous quartz-(sericite-polymetallic sulfide) veins localized within NWW-EW-striking faults. Ore-related hydrothermal alteration is extensive, forming sulfide-quartz-sericite-chlorite-carbonate assemblages, with pyrite being the predominant gold-bearing mineral. Titanite grains from the disseminated ores are closely intergrown or texturally associated with auriferous pyrite, rutile, allanite and minor arsenopyrite and thorite, indicating a hydrothermal origin. The hydrothermal titanite grains yield a weighted mean $^{206}Pb/^{238}U$ age of 219.1 ± 4.2 Ma, which is remarkably consistent with hydrothermal sericite Rb-Sr isochron age of 220.5 ± 4.4 Ma. These ages confirm that gold mineralization at Liba occurred at ca. 220 Ma in the late Triassic. This age overlaps zircon U-Pb ages of a lamprophyre dyke (219.6 ± 0.9 Ma), a granitic porphyry dike (221.9 ± 1.1 Ma), and a dioritic porphyry dyke (221.5 ± 1.2 Ma) in the mine, all being hydrothermally altered and mineralized. Field relationships and geochronological data thus demonstrate a closely temporal link between gold deposition and magmatism represented by the dikes, but whether or not a genetic relation exists between the two is not clear. Results presented here, when combined with existing isotopic age data of other metasediment-hosted gold deposits in the West Qinling Orogen, suggest that gold mineralization are spatially and temporally associated with extensive magmatism, both occurring mainly in the 220-210 Ma interval. The formation of these metasediment-hosted gold deposits coincides in time with the collisional orogeny between the North China Block and South China Block. As such, those deposits may represent one of the significant orogenic gold belts associated with collisional orogenic deformation in the world's phanerozoic orogen.