# Contrasting magma evolution for the copper and iron skarn mineralization in the Daye district, East China: insights from zircon chemistry

RUN-JIE ZHOU[1*] JIAN-WEI LI[1, 2] GUANG WEN[1]

[1] School of Earth Resources, China University of Geosciences, Wuhan 430074, China (*correspondence: rjzhou@foxmail.com )

[2] State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Wuhan 430074, China

The Daye district (eastern China) hosts numerous copper and iron skarn deposits of early Cretaceous ages. The copper deposits are associated with granodiorite and quartz diorite, whereas iron deposits are related to diorite and monzonite. These two types of skarn mineralization have been extensively studied, but controls on magmatic processes leading to the two mineralization styles remain poorly understood. Zircons from the copper-related intrusions generally have lower Dy/Yb (0.1-0.25) and higher 10000×(Eu/Eu*)/Y (2-20) ratios than the iron-related equivalents (0.25-0.5 vs. 0.05-0.5), indicating stronger amphibole fractionation coupled with suppression of plagioclase crystallization for the copper related rocks. Zircons from copper- and iron-related intrusions have calculated $Ce^{4+}/Ce^{3+}$ ratios ranging from 600 to 1000 and 100 to 500, respectively. This difference confirms that the magmas forming the Cu deposits had much higher oxygen fugacity compared to the Fe-forming magmas. Sharp contrast in hafnium isotopes is also observed for zircons from these two rock suites: zircons from the copper-related rocks have $\varepsilon_{Hf}(t)$ values of -6 to 0, whereas the varieties from iron-related rocks have $\varepsilon_{Hf}(t)$ values of -18 to -10. The Hf isotopes, combined with previous whole-rock Sr-Nd data, indicate that both the copper- and iron-related intrusions may have originated from an enriched lithospheric mantle source but the latter have experienced more extensive crustal contamination during the magma ascent. Results from this study highlight that Dy/Yb and 10000×(Eu/Eu*)/Y ratios coupled with hafnium isotopes of zircons can potentially be used an indicator for magmatic processes and related hydrothermal mineralization.