They occur along the extension zones perpendicular to main sutures in the compresional stage, relaxation belts parallel to the main suture, pull-apart basins and detachments along the strike-slip faults. On the whole, all the mineralizations formed during the syncollisional orogenic process occur in the tensional structures. It is difficulty to find syncollisional ore deposits in ancient orogenic belts. They could be eroded or overprinted by subsequent geological processes. Most ore deposits in ancient orogens are of postcollisional age. We take the eastern Tianshan and western Qinling as samples to discuss the nature, characteristics, process, and distribution of the postcollisional metallogenic process. Although porphyry copper deposits formed in the collisional age, the others comprising gold, skarn and vein type copper, skarn copper-iron or polymetallic silver, and Cu-Ni sulfide deposits occur at a range of 290～270 Ma in eastern Tianshan, later than the orogenic age of ca. 320 Ma. The mineralization pulse in western Qinling is 210～160 Ma, which is later than the orogenic age of 240～220 Ma, too. The mineralization on the southwestern margin of the Yangtze Craton is well-known as a region with low-temperature hydrothermal deposit association in China. It comprises Carlin type gold deposits, MVT lead-zinc deposits and flood basalt-hosted copper deposits. We propose that these mineral deposits occur in Jurassic—Cretaceous extensional basins to the east of a Mesozoic N-S-trending orogenic belt caused by the subduction of the Tethys plate, which is similar to the configuration of the Cordillera orogen and great basins. Whatever develop in collisional or subductional orogens, even in syncollisional or postcollisional time, and with different temporal-spatial locations, the distribution of metallic deposits in orogens are controlled by various types of tension structures.

Key words: mineral deposit; orogen; low-temperature metallogeny; syncollision; postcollision; back-arc basin; Xizang(Tibet); western Qinling; eastern Tianshan

安徽冬瓜山层状铜矿床成矿机制及热液叠加改造作用时代研究

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在燕山中晚期(约 140～135Ma)，扬子板块北缘处于碰撞晚期与碰撞后的伸展构造背景，铜陵地区发生了大规模岩浆侵入，导致早期形成的喷流沉积层状矿床或矿胚层发生热液叠加改造作用。作为典型矿例之一，冬瓜山矿床的矿体主要呈层状赋存于泥盆系顶部砂岩至石炭系灰岩之间。与热液叠加改造作用有关的岩浆岩为青山脚石英闪长岩-石英闪长斑岩，全岩 Rb-Sr 同位素年龄为 135.6±1.4Ma。热液交代形成的主矿化期石英脉中流体包裹体具有高温和高盐度特征，Rb-Sr 同位素年龄为 134±11Ma，氢、氧同位素显示成矿流体主要来源于岩浆。综合同位素年龄和矿床地质及流体包裹体特征，认为该矿床的形成包括两个主要成矿阶段，即在泥盆纪末期至石炭纪喷流形成了沉积型层状矿床或矿胚层，135Ma 左右的青山脚石英闪长岩的晚期岩浆热液交代喷流沉积层状矿床或矿胚层，形成冬瓜山沉积—热液叠加改造型层状铜矿床。该矿床的热液改造成矿作用与主矿体底部和矿体周围岩体中的斑岩型铜矿化可能具有等时性。

藏北双湖地区早侏罗世油页岩剖面有机地球化学与早 Toarcian 期大洋缺氧事件

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藏北羌塘盆地双湖地区发育一套以灰黑色油页岩、泥岩、泥灰岩互层为特征的岩相组合，含有丰富的菊石化石。该层位发现早侏罗世早 Toarcian 期 *Harpoceras* sp. 菊石，它与欧洲广泛出现的早 Toarcian 期大洋缺氧事件的地层相当。通过分析，有机碳含量最高可达 26.1%，有机碳同位素组成从－26.22‰变化到－23.53‰(PDB)。在地层剖面上，油页岩的 $\delta^{13}C$ 干酪根变化曲线显示明显的正偏移，偏移量接近 2.17‰，与欧洲早 Toarcian 期缺氧事件地层同位素异常有很好的可对比性。有机 C/N 原子比值从 6 变化到 43，变化趋势与 $\delta^{13}C$ 干酪根曲线一致。生物组合上表现出底栖生物缺乏，而钙质超微化石—颗石藻繁盛，标志了缺氧事件形成时表层水具有高的生物生产率，而底层水处于不利于底栖生物生活的环境。通过对双湖油页岩有机地球化学与生物组合特征的研究，初步认为 $\delta^{13}C$ 干酪根异常受到海平面变化、生物生产率变化的控制，黑色页岩特别是油页岩的富集可能与古海洋中颗石藻的勃发及高产率有关。