Hujiayu Cu deposit of Zhongtiao Mountain, North China: A Paleoproterozoic sediment-hosted stratiform copper mineralization?

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The Hujiayu Cu deposit, located on the southern edge of the North China Craton, is a representative of stratiform Cu deposits (commonly referred to as “Hu-Bi style”) in the Zhongtiao Mountain. It is primarily hosted in the Bizigou Formation (Fm.), which consists of a sequence of metamorphosed carbon-bearing semipelite to pelite and albitite. Locally, mineralization extends upward into the Yujiashan Fm., which comprises algal stromatolite dolomite. The Bizigou Fm. is underlain by dolomitic marble (Yuyuanxia Fm.), sandy slate (Longyu Fm.) and quartzite (Jiepailiang Fm.) from top to bottom.

U-Pb geochronology on detrital zircon reveals that the Bizigou Fm. was deposited between 1.85 and 2.17 Ga. Mineralization at Hujiayu is composed of disseminated sulfide and sulfide-bearing dolomite veins. The former one is generally conformable to sedimentary layering, and the later one is fault-controlled and usually crosscut the disseminated ore bodies. Microscopic under reflected light and scanning electron microscopy with X-ray microanalysis (SEM-EDS) indicate that sulfide in this ore deposit includes pyrite, chalcopyrite, sphalerite, selenian galena, (Ni-bearing) cattierite. Our preliminary SEM-EDS investigation on the albitite reveals the existence of chlorine-bearing silicate, which might be a hydrothermally altered evaporate. In addition, the albitite turns out to be rich in heavy minerals such as rutile, apatite, monazite and zircon. Preliminary fluid inclusion study on quartz from dolomite veins suggests the vein-type mineralization could be a product of metamorphic fluids which mobilized the earlier disseminated sulfide.

Currently, we are awaiting geochemical and isotopic results to further constrain the origin of Hujiayu. However, from our field observation and preliminary analyses, we tend to believe that the earlier stratiform Cu mineralization at Hujiayu is derived from an origin similar to typical sediment-hosted stratiform copper deposits, and was later superimposed by a metamorphic event. Therefore, the Hujiayu Cu deposit (or the “Hu-Bi style”) might be one of the earliest sediment-hosted stratiform copper deposits formed on earth, coeval to the copper deposits in the Kodaro-Udokan basin of Siberia.