Influence of sulfide mineralization on the oceanic sulfate reservior during the early Cambrian, South China

TAO HAN[1*], HAIFENG FAN[1], HANJIE WEN[1], BING MO[1], JAMES B. MUROWCHICK[2], ZHITONG LU[1]

[1] State Key Laboratory of Ore Deposit Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550081, China (*correspondence: hantao@mail.gyig.ac.cn)

[2] Department of Geosciences, University of Missouri-Kansas City, Kansas City, MO 64110, USA

We investigated the paragenesis and sulfur isotope composition of the widespread polymetallic Ni-Mo-Zn-PGE sulfide mineralization (ca. 521 Ma [1]) in the lower Cambrian Niutitang Formation in South China. The results suggest that the sulfide mineralization was resulted from the intermittent Mo/Fe-rich or Ni/Zn-rich hydrothermal fluids discharged into the prevailing euxinic water column during the early Cambrian, South China. Furthermore, sulfur isotope composition and the Rayleigh fractionation model indicate that about half of available seawater sulfate was consumed by intensive microbial sulfate reduction processes during the sulfide mineralization. On basis of the spatiotemporal overlap between the limited oceanic sulfate reservoir (e.g. ~2 mM or lower [2, 3]) and this sulfide mineralization in South China, we propose that the limited oceanic sulfate reservoir during the early Cambrian in South China was caused by the widespread sulfide mineralization along the Yangtze platform. The seawater sulfate concentration before the sulfide mineralization (ca. 521 Ma) in South China should be higher and be consistent with those results from model calculation and fluid inclusion study (e.g. 4.5–11 mM [4] or 3–15 mM [5]) during the early Cambrian. Also, the perturbation of the oceanic sulfate reservoir around 521 Ma may have significant influence on the oceanic chemistry and the biological diversities.

[1] Xu et al. (2011) *Econ. Geol* **106**, 511-522. [2] Feng et al. (2014) *Precambrian Res* **246**, 123-133. [3] Jin et al. (2016) *Earth Planet. Sci. Lett* **441**, 38-51. [4] Brennan et al. (2004) *Geology* **32**, 473-476. [5] Algeo et al. (2015) *Biogeosciences 12*, 2131–2151.