Trace elements and REE geochemistry of copper-bearing sandstone in the middle submember of the Liuju Member of the Upper Cretaceous Matoushan Formation, Yunnan,China

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Liuju sandstone-type copper deposit located in the North Centre of Chuxiong Basin in Yunnan province, China. The main ore-bearing strata is Liuju lower submember of the Upper Cretaceous Matoushan formation (K_2ml_1). The content of Cu is more than 2% recently discovered in Liuju middle submember (K_2ml_2) which has great prospecting futurities.

The metallogenic mechanism of K_2ml_2 is similar to that in the Liuju copper deposit (K_2ml_1). In K_2ml_2, Ta, Sc, Co, Ni, V are deficient, and chalcophile elements Mo, Cd, As, Cu enriched in grey sandstone, which has the feature of ore source rocks. It indicates that the enrichment of Cu is closely related to the water-rock interaction [1]. In terms of n (V)/n (V+Ni) >0.7, the copper ore formed in oxygen-poor environment.

The average contents of rocks $\sum$REE=123.04×10^{-6}, LREE/HREE=8.89, δEu=0.80, δCe=0.92. From the copper ore to gray bed, to purple bed, the average values of Mo、Cd、As and Hg reduced gradually, Nb、 Zr、 Hf、Th and $\sum$REE increased gradually.

Basis on geochemical research of copper-bearing sandstone in K_2ml_2, it indicates that the copper ore formed by water-rock interaction of ore-forming fluid and wall rocks, Cu is enriched in weak alkaline and reducing property environment.

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Diagenetic mobility of Mn and Fe crusts in organic-poor sediments of Lake Superior

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Sediment distributions of redox-sensitive metals, such as Fe and Mn, are often used as indicators of paleoceanographic redox conditions. Post-depositional changes in sediment redox conditions, however, may redistribute these metals within the sediment, complicating interpretations of sediment records. The rates and magnitudes of such redistributions in oceanic sediments, as well as their causes, are poorly known. We investigate the redistribution of diagenetically precipitated Fe and Mn phases in organic-poor modern sediments of Lake Superior. These sediments contain prominent (up to 10 wt%) multiple Fe and Mn-rich layers, often visible to a naked eye, and record vertical migrations of the sediment redox boundary in response to varying fluxes of organic carbon and actions of bottom currents. We use scanning XRF and chemical extractions to characterize these layers, and measure the concentrations of oxygen and dissolved metals in sediment porewaters to understand the *in situ* reaction rates and their links to past and present redox conditions. High levels of 0.5M HCl-extractable iron, as well as iron enrichment relative to Ti, within Fe-rich layers suggest that these layers formed diagnetically. Comparison of the porewater distributions of Fe (II), oxygen, and nitrate suggests a significant contribution of iron oxidation coupled to the reduction of nitrate, rather than oxygen. At one of our sampling sites, the depth of oxygen penetration has moved upwards by 4 cm and subsequently re-deepened over the course of ~40 years, as a result of sediment pollution by taconite tailings between 1950s and 1980s. The observed present-day distributions of sediment Fe and Mn and mass balance calculations show that these metals may become re-distributed over time scales as short as decades, even in a system where organic carbon is relatively unreactive (k=0.005 yr^{-1}) and in low quantity (2 wt%). Changes in organic carbon sedimentation within a factor of 2, or variations in the bottom-water oxygen concentrations by ~10% can alter the depth of oxygen penetration in these organic-poor sediments by several centimeters or more.