Granitic magmatism and related mineralization in the Altaids: Case study from the Tienshan mineral belt

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Major porphyry Cu-Au and Cu-Mo deposits (e.g. *Oyu Tolgoi* in Mongolia >2.3 Gt @ 1.16% Cu, 0.35 g/t Au and *Kal'makyr-Dalnee* in Uzbekistan >5 Gt @ 0.5% Cu, 0.4 g/t Au) are distributed across central Eurasia [1]. These deposits were formed during a range of magmatic episodes from the Ordovician to the Jurassic [2]. They are associated with magmatic arcs within the extensive subduction-accretion complex of the Altaides, Mongolides and Baikalides Orogenic Collages that developed from the late Neoproterozoic, through the Palaeozoic to the Jurassic intra-cratonic extension, predominantly on the palaeo-Tethys Ocean margin of the proto-Asian continent, but also associated with the closure of two rifted back-arc basins behind that ocean facing margin. The complex now comprises collages of fragments of sedimentary basins, island arcs, accretionary wedges and tectonically bounded terranes composed of Neoproterozoic to Cenozoic rocks. Moreover, although belonging to two different terrane settings, the giant Cu-Au porphyries of the Chatkal-Kurama range (Almalyk district, Valerianov-Beltau-Kurama magmatic arc, Middle Tien Shan) and the giant orogenic Au mineralisation hosted by black-shale series of the Central Kyzylkum slate belt (Southern Tien Shan, Khanty-Mansi accretionary complex) have some striking similarities. This hints at crust-mantle interaction and dominance of a deep-seated regime during emplacement. They are temporally close (315 to 287 Ma [3]), their isotope signatures reveal the incorporation of a moderate mantle component, and geophysical patterns from the middle crust in the region exhibit zones of low reflection indicating the existence of extended mafic bodies just beneath both giant ore-magma systems. This research was supported through NHM's CERCAMS programme and the National Basic Research Program of China - 973 Program (No. 2007CB411301, No. 2007CB411308).

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Copper requirements and uptake by plankton in the sub-Arctic NE Pacific Ocean

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Along Line P, a natural high to low iron (Fe) gradient in the northeastern sub-Arctic Pacific Ocean, we undertook the first measurements of the metabolic Cu requirements (Cu:C ratios) and steady state Cu uptake rates (ρCu_{ss}) of natural plankton assemblages using the short-lived radioisotope ^{67}Cu. Size fractionated Cu quotas varied ~3 fold (1.21-3.78 μmol Cu mol C^{-1}) among stations, values on par with biogenic Fe:C ratios in this region. As previously observed for Fe uptake, the bacterial size class accounted for half of the total particulate ρCu_{ss}. Interestingly, carbon biomass-normalized rates of Fe uptake from the siderophore desferrioxamine B (DFB) (ρFe_{DFB}; a physiological proxy for Fe-limitation) by the >20μm size class were positively correlated with intracellular Cu:C ratios, suggesting intracellular Cu requirements are higher for the most Fe-limited phytoplankton communities. At Fe-limited Ocean Station Papa (OSP) we performed short-term Cu uptake (ρCu_L) assays to determine the relative bioavailability of Cu bound to natural and synthetic ligands. Like the volumetric ρCu_{ss} measured along Line P, the bacterial size class was responsible for at least 50% of the total ρCu_L. Uptake rates of Cu from organic synthetic complexes suggest that instead of inorganic Cu (Cu') availability, the oxidation state of the complexed Cu and the Cu:ligand ratio determine uptake. These data suggest the important role Cu plays in the physiology of natural plankton communities beyond the toxicological effects studied previously.