

**4.2.P02**

### **Characterization of organic matter associated with gold mineralization of the Jinshan gold deposit, Jiangxi Province, South China**

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The Jinshan gold deposit is the most important gold source bed in Jiangxi Province, South China. Host rocks of the Middle Proterozoic Shuangqiaoshan Formation mainly consist of carbonaceous phyllite, slate, carbonaceous siltstone, silicolite and argillite. Organic carbon-rich is common in host rocks of the Shuangqiaoshan Formation, organic carbon varying from 0.15 up to 3.56 percent. The aim of this study is to interpret the association on gold mineralization with organic matter

Organic petrography, elemental analyses, reflectance measurements, laser Raman microprobe and organic carbon isotopic analyses techniques were used to study characteristics of organic matter from host rocks of the Shuangqiaoshan Formation and related Jinshan gold deposit. The study shows that the mineralized (Au>0.5 ppm), poorly mineralized (0.05<Au<0.5ppm) and background (Au<50ppb) samples have some significant characterizes: (1) The organic matter of the host rocks consists primarily of amorphous marine kerogen, algal remains (alginate), and solid bitumen. Under transmission microscopy, all kerogens appear to be highly coalied. The organic matter from mineralized samples reached a high rank of evolution, namely pre-graphitic to graphite. The bitumen is easily observed in the mineralized rocks, which is probably associated with migration of ore-bearing solution. (2) The organic carbon content of host rocks in the mineralized samples is generally exceed those of average background samples, some of samples up to 5.0 percent. The relationship between gold and organic carbon in background samples is a positive correlation which shows the same variation tendency of content both gold and organic carbon in spatial distribution. (3) Organic carbon isotopic values determinations of the bulk organic matter give values of -24.3 to -35‰ (PDB). Elemental analyses of kerogens are H-rich, O-poor, and sulfide-rich. These results indicate that the origin of organic matter belongs to sapropelic type (kerogen type I), Gold analyses of the kerogens show that the kerogen is one of major gold-bearing carriers in the host rocks. (4) The reflectance of organic matter is markedly increased associated with gold mineralization. Raman spectroscopy also provides important information about organic maturation of mineralized samples. This is because graphitization of organic matter was caused by local heating of hot brine during gold mineralization.

**4.2.P03**

### **Dissolved organic matter characterization: A challenge to understand trace metal distribution in surface waters**

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Dissolved Organic Matter (DOM) is ubiquitous in aquatic environments and plays a key role in the geochemistry of major and trace elements, acting as a major carrier and transport phase through complexation, adsorption, dissolution reactions. It both interacts with mineral phases modifying the exchange rates with solutions and constrains part of pollutant mobilities such as that of trace metals or hydrophobic organic compounds. Not only does association with DOM influence the mobility of metals through the soil/water system, it also affects their bioavailability and toxicity.

In order to study DOM-metal interactions, several methods have been tested to distinguish between organically complexed metals and 'free' metals, these 'free' metals consisting of hydrated metal cations and soluble inorganic metal complexes considered to represent the bioavailable metal fraction.

The DOM distribution was determined by fractionating the organic matrix into three fractions onto combined XAD-8 and XAD-4 Amberlite column resins : (i) the hydrophobic substances adsorbed onto XAD-8 resin, (ii) the hydrophilic fraction that adsorbed onto the XAD-4 resin and (iii) the non-adsorbed hydrophilic solutes that are contained into the XAD-4 effluent, respectively. Dissolved Organic Carbon (DOC) concentration determination coupled with UV-absorbance measurement allowed to determine the distribution of aromatic structures.

Dialysis equilibrium - that minimizes any shifting of binding equilibria and disturbance of the sample - was tested during this work. This technique is based on the separation of the smaller hydrated cations and soluble inorganic complexes from the larger DOM-metal complexes by means of a 12000 Dalton dialysis membrane. ICP-MS analysis was used to determine the metal concentration in the different fractions.

These methods allow to separate metals in three groups regards to humic acids: (i) 'free' metals such as K, Rb and Sr, (ii) intermediate including Ba, Mn, V, Cr, Al, Ni, Co, Cd and U while the the third one (iii) correspond to metals strongly bound to humic acids : REE and Th. Other experiments using progressively decreasing finer pore-size dialysis membrane will be required to get further insight on trace metal speciation as well as time series data to see how environmental factors play on such speciation.