

## The ore-forming fluids of the Mengku iron deposit in Altay, Xinjiang

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The Mengku large-type iron deposit occurs in Upper Silurian-Lower Devonian Kangbutiebao Formation metavolcanic- sedimentary sequence, with the host rocks being garnet skarn, granulite, leucogranulite and marble. The distribution of orebodies in the space is related to the skarn. Inclusions in garnet of skarn period are dominantly glassiness melt inclusions, fluid-melt inclusions and fluid inclusions. Fluid inclusions in minerals of late skarn stage are two-phase aqueous-type inclusions. Fluid inclusions in minerals of regional metamorphic period are mostly contain two-phase aqueous-type inclusions and daughter mineral bearing inclusions. Homogenization temperatures of melt inclusions in the skarn period is 1100°C, and homogenization temperatures of fluid inclusions in early skarn stage vary from 193 to 499°C, with the peak around 450°C, 350°C and 230°C. Homogenization temperatures of fluid inclusions in late skarn stage vary from 263 to 550°C, with the peak around 350°C. Fluid inclusions in the regional metamorphic period show a wide range of homogenization temperatures from 132 to 513°C, at three peaks around 350°C, 230°C and 190°C. Salinity ranges from 1.23 to 60.31 wt.% NaCl equiv. Ore fluid densities range from 0.64 to 1.16 g/cm<sup>3</sup>. The  $\delta^{18}\text{O}_{\text{SMOW}}$  values of garnet, quartz and calcite range from 0.2‰ to 8.4‰, with corresponding  $\delta^{18}\text{O}_{\text{H}_2\text{O}}$  values of -5.1‰ to 5.33‰, and  $\delta\text{D}$  values of fluid inclusions between -127‰ and -81‰. The combined isotopic data imply that the ore-forming fluids of skarn period in the Mengku iron deposit were mainly derived from magmatic fluids, with minor contributions from meteoric water, and the ore-forming fluids of regional metamorphic period was mainly derived from meteoric water, with some contributions from metamorphic water.

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## Re-Os systematics of sulfides in overmature and altered shale, Bidjovagge Cu-Au deposit, Northern Norway (Finnmark)

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The Re-Os isotopic system can be used to examine co-existing carbonaceous shales, hydrocarbons, and sulfides. The elemental and isotopic relationships between these reservoirs are important for application of Re-Os methodology to sulphide mineralization in shales and petroleum maturation. Using drill core samples from the well-described Bidjovagge Cu-Au deposit, hosted in overmature graphitic shales (greenschist facies), we use pyrite and chalcopyrite as proxies for conditions during hydrocarbon generation and sulfide deposition. Our results contribute not only to the understanding of Cu-Au mineralization, but also to the geologic processes leading to overmature and altered black shale in the vicinity of ore mineralization.

Located in a Paleoproterozoic marine rift basin containing shales, carbonates, mafic volcanic rocks, and diabase sills, Bidjovagge ores are hosted in highly altered carbonaceous shale. Re and Os concentrations in pyrite and chalcopyrite are 0.18 to 5 ppb and 6 to 96 ppt, respectively. The  $^{187}\text{Re}/^{188}\text{Os}$  and  $^{187}\text{Os}/^{188}\text{Os}$  ratios vary widely, from 131 to 21548 and 4.4 to 616, respectively; all samples contain almost no common Os. Furthermore, sulfide separates derived from a single sample suggest mixing and isotopic disequilibrium at the scale of a mineral separate. This may result from multiple episodes of fluid flux from different sources at different times. The model ages are not systematically reproducible and yield both plausible and clearly unreasonable Paleoproterozoic results. These results call for a complex history for derivation of the metals which must have included isotopic disequilibrium and/or an isotopically open and heterogeneous system. Incomplete and local mixing of magmatic-hydrothermal Cu-Au with metals derived from organic material in black shales may have occurred. The lost hydrocarbon component and the Re-Os composition of graphitic schists must be accounted for in our mineralization model.