

The North Kostobe Sediment-Hosted Gold Deposit, Eastern Kazakhstan

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Numerous gold deposits occur in the Greater Altai shear zone. To the west, the Kalba Gold Province is locally known as North Kostobe in eastern Kazakhstan. The North Kostobe gold project is located in Char suture-shear zone, which is a NW-trending fold-and-thrust belt, representing the final suture related to the amalgamation of Siberia craton and Kazakhstan microcontinent in the Late Paleozoic.

This study is based on drill core samples from a recent exploration program in North Kostobe. A NW-SE-striking mineralized zone was confirmed by drilling and considered to hold a significant resource close to the surface with an average grade of 3.1 g/t Au. Gold mineralization is hosted in Carboniferous fore-arc turbidites and occurs in both quartz veins and sulfide dissemination in carbonaceous shale and siltstone. The sulfide mineral assemblage is dominated by arsenopyrite and pyrite while gold occurs as “invisible gold” in sulfide minerals.

Several generations of sulfide minerals have been identified based on textural difference and the relationship between sulfide grains. EMPA shows variable Au content (up to 0.435 wt%) in these sulfides. In situ sulfur isotope analysis of gold-bearing sulfides exhibits a great variation of $\delta^{34}\text{S}$, from -21.87 to +44.66‰, indicating involvement of biological sulfur fractionation. Sulfur isotope $\delta^{34}\text{S}$ values clustered between -4.7 to +1.96‰, and probably indicate the sulfur source in gold-bearing sulfides was meta-sedimentary host rock.

The Kalba Gold Province contains a large gold resource; however, only a limited number of studies have been done in the region compared to other major gold belts in the world. This study serves as a new example in sediment-hosted gold deposits research, as well as an insight into gold mineralization style in this world-class gold province in eastern Kazakhstan.