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Features of formation of silver-polymetallic deposits of Kolyma-Verkhoyansk fold belt (Russia)

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The Kolyma-Verkhoyansk fold belt, which extend along the northeast margin of the ancient Siberian platform on Sakha-Yakutia and North-Eastern territories of Russa, hosts numerous vein Sn-Ag-Pb-Zn deposits.
The formation of silver- polymetallic deposits is related to the activity of granitic magmatic-hydrothermal systems. Their creation occurred when the Kolyma-Omolon superterrane collided with the Siberian plate margin, resulting in the formation of steeply dipping faults that controlled a distribution of transverse granite belts. The accretion processes, which took place along the Okhotsk active continental margin, lead to the reactivation of north-west trending regional faults. This resulted in the injection of siliceous subvolcanic magmas and generation of the fluids responsible for the formation of Ag-Pb-Zn veins. Previous studies have proposed that long-term multiple hydrothermal activity involved a circulation of fluids that were different in origin were responsible for a formation of the Mangazeyskoe, Menkeche, Prognoz and Kupol'noye Sn-Ag-Pb-Zn deposits. The formation of these deposits is usually in three stages, often separated by intraore magmatism – rare metal, cassiterite-(silicate)- sulphide, silver-polymetallic. Each stage is characterized by typomorphic mineral associations and paragenesis of minerals.
Investigated deposits differ in their characteristics. Typically, this is due to two main reasons: 1) the combination or separation of products of different stages of mineralization in the space, and 2) unequal manifestation of mineralization of different stages.
1) Products of Mineralization of different stages can be spatially separated. Examples of such a separation are Mangazeyskoe and Menkeche deposits. In the center part of Mangazeyskoe ore field is localized the rare-metal mineralization, cassiterite-sulfide mineralization prevail on the southwestern flank, and silver-polymetallic – on north-eastern flank. Despite of this spatial separation in some case superposition of different types of mineralization take place. Cassiterite-silicate-sulphide type occupies northern part of an ore field and is spatially combined with associations of silver-polymetallic stage, which can form separate ore bodies in the southern part. Progniz deposit is an example of combining all three stages of mineralization, localized in a series of latitudinal ore bodies. For this deposit is characteristic of the growing role of each subsequent type.
2) The volume of a mineralization of each stage can be both equivalent, and with prevalence of one of stages. All stages of mineralization the most distinctly and equally are manifested on the Mangazeyskoe and Menkeche deposits. In this case formation of associations in various structures leads to formation of "pure" associations of various stages. Feature of the deposit Menkeche is raised manganese content in carbonates, while the main carbonate on the other objects is siderite of conventional composition. At the Prognoz deposit clearly manifest two types of mineralization corresponding to cassiterite-sulfide and silver-polymetallic type. Despite the formation of the products of these associations in a single structure, they clearly differ in their textural and structural features because of the formation with drastically different parameters of mineral formation. A feature of the Prognoz deposit is widespread bismuth mineralization, formed as a result of redeposition of Bi-minerals of early stage. A distinctive feature of the Kupol'noe deposit is oppressed rare metal mineralization and availability silver sulfostannates.
Thus, despite similar geodynamic formation conditions, spatial division or combination of mineral associations and degree of manifestation of various stages of a mineralization on silver-polymetallic deposits of Kolyma-Verkhoyansk belt define features of their mineral composition.