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Spatial distribution of the ophiolite-hosted Co-Ni-As-rich hydrothermal mineralization in the Punta Corna Mining complex, Lanzo Valleys, Northern Italy

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Cobalt is a transition metal with a trace element abundance in the Earth's crust (26.6 ppm). It forms mainly sulfides like carrollite, siegenite and linneite and enters the cobaltite-gersdorffite solid solution and di-tri-arsenides safflorite, rammelsbergite and skutterudite while erythrite and asbolane are secondary Co phases. Cobalt is a Critical Raw Material for the EU, strategically important due to its use in the industry (batteries, superalloys, catalysts etc.).

Italy hosts several Co-bearing hydrothermal deposits, which were variably exploited in the past. In this work we focus on the Co-Fe-Ni hydrothermal veins emplaced within the metabasites of the Lanzo Valleys ophiolite complex in the western sector of the Alpine belt. The vein system is collectively called "Punta Corna mining complex", and was exploited for Fe, Ag and later Co in the past (Castelli et al., 2011, Moroni et al., 2019).

A detailed field survey of the past cobalt mining works was carried out in summer 2019, followed by sampling, mostly inside mining tunnels and from waste dumps in order to increase data about this poorly known vein system. Preliminary data comprise transmitted and reflected light study in thin section, XRD and EMPA analyses of selected samples.

Four deposition stages have been recognized in the samples, in agreement with preliminary results in Moroni et al. (2019), with Co enrichment occurring during the third stage. Detected Co phases are skutterudite, safflorite and secondary erythrite. Other common metallic minerals are löllingite, tetrahedrite, chalcopyrite, with Fe carbonate, quartz and baryte as gangue minerals.

In situ sampling allowed for the first time to map distribution of parageneses related to the different stages. Stage I, characterized by the deposition of siderite and ankerite, was detected in the western sector of Punta Corna. Stage II, characterized by baryte deposition, was not detected in any sample, but it was possible to observe baryte associated to siderite on the field in the western sector of Punta Corna. Stage III, characterized by Co-Fe-Ni arsenides, is developed mainly in the ore bodies of Punta Corna but extends also both to the West and to the East. Stage IV, characterized by base metal sulfides, covers the same area of stage III, with the exception of Speranza Mine, to the East of Punta Corna, where it was not detected. These studies are aimed to

to evaluate the full extent of the ore system and better characterize the style of the mineralization.

References:

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