Piani Resinelli District: Preliminary Data on Ore Precipitation and Multiphase Diagenetic Evolution

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The stratabound, carbonate-hosted Pb-Zn-Ag (± fluorite ± baryte) deposit of Piani Resinelli belongs to the Alpine metallogenic province located between Italy, Austria, and Slovenia. The mineralization is hosted in the Lower Carnian stratigraphic succession of the Lombardian basin (Southalpine Domain, north Italy), mainly composed of peritidal limestones. The origin of the deposit is still unknown since the previous studies are largely outdated. The aim of this study is to constrain the ore-forming conditions using petrographic, geochemical, and fluid inclusion studies on both ore minerals and associated diagenetic cements.

Preliminary results show that the mineralization was preceded by dolomitization, silicification, and brecciation events. The occurrence of saddle dolomite locally associated with micritic sediments in geopetal structures points to a shallow burial and thus a hydrothermal origin of dolomite.

Preliminary thermometric data on fluid inclusions indicate the involvement of moderately hot temperatures (between 115° and 150°C), high-salinity brines (up to ~20 eq wt % NaCl) in ore genesis. Moreover, in situ analyses (EPMA, LA-ICP-MS) of trace elements on sphalerite are presently in progress and will be presented here, including their implications for ore-forming conditions.

The origin of the Resinelli district was probably linked to an Upper Triassic hydrothermal system, in which metal-rich fluids flowed upward, possibly through faults and associated fractures. This circulation in the Upper Triassic succession caused major modifications in the host rocks such as multiphase dolomitization, silicification, and brecciation, as well as the precipitation of ore minerals in a shallow burial setting. The results of this preliminary characterization show several similarities between the Piani Resinelli and the nearby Gorno districts in terms of the diagenetic evolution of the host rocks, temperature and composition of the hydrothermal fluids, and timing of the fluids involved in ore precipitation, suggesting that both districts could have formed during the same regional mineralization event.