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Gorno and Piani Resinelli: Genesis and Correlations of Two Alpine-type Pb-Zn Districts

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The strata-bound, carbonate-hosted Pb-Zn-Ag (\pm fluorite \pm baryte) districts of Gorno and Piani Resinelli belong to the Alpine metallogenic province located between Italy, Austria, and Slovenia. The orebodies are hosted in the lower Carnian stratigraphic succession of the Lombardian Basin (Southalpine Domain, N Italy), mainly composed of peritidal limestones. The aim of this study is to constrain the ore-forming conditions using petrography, geochemistry, fluid inclusion microthermometry, and radiometric datings on both ore minerals and associated diagenetic products.

Petrographic studies reveal that the mineralization was preceded by dolomitization, silicification, and brecciation events. Thermometric data from primary fluid inclusions indicate the involvement of moderately hot (T between 70° and 150°C) and high-salinity fluids (up to ~20 eq% NaCl) during ore precipitation. Radiometric dating performed on associated diagenetic minerals that pre- and postdate the sulfide mineralization reveals that the precipitation of the ore minerals occurred during the Late Triassic. Moreover, in situ analyses (EPMA, LA-ICP-MS) of trace elements on sphalerite will be presented here, including their implications for ore-forming conditions.

Several similarities between Gorno and Piani Resinelli in terms of diagenetic evolution of the host rock, temperature and composition of the fluids, and timing of the ore precipitation highlight the possibility that both districts could be related to a unique, widespread Late Triassic hydrothermal system, in which metal-rich fluids flowed upward through faults and associated fractures. This circulation in the Upper Triassic stratigraphic succession caused major modifications in the host rocks such as multiphase dolomitization, silicification, dissolution, and brecciation, as well as the precipitation of ore minerals in a shallow burial setting.