MULTIPLE DOLOMITIZATION EVENTS RELATED WITH DIAGENESIS AND NONSULFIDE AND SULFIDE-RICH ZINC MINERALIZATION OF THE VAZANTE GROUP, MINAS GERAIS

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The Neoproterozoic Vazante Group hosts several carbonate-hosted zinc–(lead) deposits, including the Vazante, Morro Agudo, Fagundes and Ambrósia deposits. Well-preserved diagenetic features, involving multiple dolomitization events, are recognized in the dolostones that occur outside from mineralized zones, despite the overprinting of the low greenschist regional metamorphism. The temporal hierarchy of these dolomitization events could be useful for profile the diagenetic history of the Vazante dolostones and constraint the relative timing of mineralization.

The early dolomitization event is represented by microcrystalline, replacive micrite dolomite, commonly recrystallized as microspar to pseudospar dolomite due to the neomorphism. Inequant (dog-tooth) and equant (blocky) spar dolomite, accompanied by quartz, occur as void-filling cement and could be related to shallow-burial diagenesis with influence of meteoric waters. Fine- to medium-grained planar-s dolomite occurs associated with stylolites. Coarse-crystalline, non-planar, non-luminescent dolomite with undulatory extinction, accompanied by selective silicification and pyrite formation, occurs mostly as a pervasive replacement, which obliterates any remaining texture or structure. The several phases of prior dolomite cementation implies in a significant diagenetic history before the non-planar dolomite formation, which could be coherent with a deep burial setting.

Close or within the mineralized zones, the dolostones are affected by hydrothermal alteration, commonly involving dolomite precipitation/replacement, related to focused hydrologic outflow typically along faults.

Within the Vazante Shear Zone, the hydrothermal alteration of dolostones and slates that host the Vazante deposit are largely fracture-controlled, producing a complex net veined-breccia zone. The diagenetic dolomite generations are frequently recrystallized and replaced by hydrothermal, coarse-grained (0.1– >5mm) white to pinkish dolomite with undulatory extinction and zoning evidenced by red, blue, yellow, and orange cathodoluminescence zones. Mylonitization, brecciation and replacement of the hydrothermal dolomite by epigenetic willemite are also recognized.

The Ambrósia dolostones are brecciated due to interaction of recrystallization, replacement by coarse-grained dolomite, veining and faulting. This sequence of processes are mainly pre-mineralization or synchronous with base-metal sulfide mineralization, but postdates burial diagenetic features, including stylolites and the non-planar dolomite, indicating that the hydrothermal alteration is mainly epigenetic.

In the Fagundes deposit, silicification is a pre-mineralization intense process of open-space filling, which involves partial or total replacement of dolostones by layered chert concretions, chalcedony nodules, mosaic quartz and associated non-planar dolomite. The main mineralization stage postdates the silicification, but is overprinted by chemical compaction features. This could suggest a late-diagenetic to epigenetic mineralization style in Fagundes. Epigenetic coarse-crystalline dolomite with strong undulatory extinction also occurs in ribbons and late veins in the deformed zones of all deposits.

Episodic expulsion of the hot metalliferous fluid associated with the compression driven fluid-flow during Brasiliano events could be responsible by the emplacement of late-

diagenetic and epigenetic–hydrothermal mineralization, which might favor also topographically-driven flow of meteoric and shale-derived sulfur-rich fluids.

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