Platinum group element (PGE) mineralization associated with a Fe-Ti-V deposit, located in the Rio Jacaré Intrusion, Brazil

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The Rio Jacaré intrusion is located in northeastern Brazil, inside the state of Bahia. Primarily explored for its abundant titaniferous-vanadium-rich magnetite occurrences, the intrusion also contains elevated levels of Pt and Pd inside magnetite- rich pods ("Gulcari A" researched in this study). The layered mafic intrusion is composed predominantly of gabbroic rocks, containing rhythmic cycles of magnetite-pyroxenite-gabbro-anorthosite. Fine-grained, magnetite rich rocks initiate the cycle followed by pyroxenite, generally capped by coarser gabbro or thin lenses of anorthosite. Unlike the common association of platinum group mineral (PGM) mineralization with chromite layers in layered mafic intrusions (LMI), the Rio Jacaré is a rare example of PGM mineralization within magnetite lenses. Processes regarding the enrichment of PGM mineralization remain unclear. A detailed mineralogical investigation of PGM mineralization within the main magnetite pod, Gulcari A, aiming to understand the nature of PGM crystallization is ongoing.

Fourteen samples with elevated Platinum Group Element (PGE) concentrations (1050–5026 ppm Pt and 25–1106 ppm Pd) were selected for this study. Reflected light microscopy and Energy Dispersive Spectroscopy (EDS) analyses were used for mineral identification. The chemical composition of PGMs are determined using electron microprobe (EMP) analyses. The ore consists of a magnetite-ilmenite aggregate, annealed and recrystallized during metamorphism. Sulphide phases fill the interstitial space and are followed by gangue minerals. The most common Pt-phases found in these slides are Sperrylite ($PtAs_2$), nigglite (PtSn), PtNiFe, PtNi, PtSbSnNiCoS, and PtAsFeNi. The most common Pd-phases found are: PdPtSnCu, PdBiTe, PdBiSb, and PdSn. Pt-phases are found as inclusions within magnetite, ilmenite, and late forming gangue minerals. Often, PGMs form at

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the boundary between early magnetite-ilmenite grains and interstitial gangue minerals. Additionally, sperrylite grains have been found as partial inclusions within larger arsenide minerals. Pd-phases are found as inclusions within late gangue minerals, partial inclusions within arsenides, growths along grain boundaries between gangue minerals and primary magnetite-ilmenite grains, and as small subhedral grains within interstitial space. Overall, PGM mineralization forms small 2 μm, to larger 100 μm anhedral grains. The average grain size of PGM mineralization is between 2–10 μm.

Preliminary results suggest two different events for the formation of Pt-mineralization and Pd-mineralization. The study tested the proposed earlier mechanism of exsolution of PGMs from late sulphide phases and a possible remobilization of PGEs by late hydrothermal fluid.