

# GEOLOGICAL AND GEOCHEMICAL EVOLUTION OF A MESOPROTEROZOIC OPHIOLITE IN THE SOUTHWESTERN AMAZON CRATON, BRAZIL.

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**ABSTRACT:** This study documents a Mesoproterozoic ophiolite in the southwestern Amazon craton, Brazil, corresponding to the Trinchiera Complex of Calymmian age (1468-1447 Ma). The complex comprises extrusive rocks (fine-grained amphibolites derived from massive and pillowed basalts), mafic-ultramafic intrusive rocks, chert, BIFs, pelites, psammitic and a smaller proportion of calc-silicate rocks. This sequence was deformed, metasomatized and metamorphosed during the development of the Alto Guaporé Belt, a Mesoproterozoic accretionary orogen. The rocks were deformed by a single tectonic event between 1350 and 1330 Ma, which included isoclinal folding and metamorphism of the granulite-amphibolite facies. Layered magmatic structures were preserved in areas of low strain, including amygdaloidal and cumulate structures. Metamorphism was pervasive and reached temperatures of 820-853°C in mafic granulites and 680-720°C in amphibolites under an overall pressure of 6.8 kbar.

The geological and tectonic significance of the Trinchiera Complex is assessed using field relationships, petrography, mineral chemistry and whole-rock geochemistry. Its geochemical composition indicates that all noncumulus mafic-ultramafic rocks are tholeiitic basalts. The mafic-ultramafic rocks display weak to moderate fractionation of light rare earth elements (LREE), near-flat heavy rare earth elements (HREE) patterns and moderate to strong negative high field strength elements (HFSE) anomalies (especially Nb), a geochemical signature typical of subduction zones.

The lowest units of mafic granulites and porphyroblastic amphibolites in the Trinchiera ophiolite are MORB-like, although they locally display small Ta, Ti and Nb negative anomalies, indicating a small subduction influence. This behavior changes to an island arc tholeiites (IAT) signature in the upper units of fine-grained amphibolites and amphibole rich-amphibolites, characterized by progressive depletion in the incompatible elements and more pronounced negative Ta and Nb anomalies, as well as common Ti and Zr negative anomalies. Tectono-magmatic variation diagrams and chondrite-normalized REE and primitive mantle normalized patterns suggest a back-arc to intra-oceanic island arc tectonic regime for the eruption of these rocks. Therefore, the Trinchiera ophiolite appears to have originated in an intraoceanic supra-subduction setting composed of an arc-back-arc system.

Geochemical composition and lithological association are used to decipher a significant portion of the tectonic evolution of the Mesoproterozoic Southwestern Amazon craton. Accordingly, the Trinchiera Complex is a record of oceanic crust relics obducted during the collision of the Amazon craton and the Paraguá block during the Middle Mesoproterozoic.

**KEYWORDS:** AMAZON CRATON, OPHIOLITE, MAFIC-ULTRAMAFIC COMPLEX