

# TIMING OF OCEANIC CRUST FORMATION AND ACCRETION TO THE BRASILIANO OROGEN IN THE SÃO GABRIEL TERRANE, FROM U-Pb-Hf ISOTOPES OF ZIRCON FROM METASOMATITES

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**ABSTRACT:** We established the timing of oceanic crust formation and its accretion to the Brasiliano Orogen with the isotopic study of zircon from albitites and metasomatic rocks in serpentinites, juvenile São Gabriel Terrane, southern Brazilian Shield. U-Pb SHRIMP and Lu-Hf LA-ICP-MS were performed in the same region of the crystals. Albitites and chloritites yield Tonian ages for the Cerro Mantiqueiras, Ibaré and Palma ophiolites. In the Cerro Mantiqueiras ophiolite, the largest (9.0 x 0.5 km) ultramafic body (immersed in oceanic amphibolites) has an assemblage of olivine + orthopyroxene + chlorite + tremolite stable in the middle amphibolite facies of orogenic metamorphism. Granoblastic albitite occurs in two small (0.5 m) blocks immersed in the harzburgite. Analysed (n = 28) euhedral to subhedral zircon grains (n = 24) have an outstanding internal structure of homogeneous to incipiently zoned core (magmatic; Th/U = 0.3) surrounded by a wide, fractured, bright rim (metamorphic; Th/U = 0.1). Two distinct Concordia ages are 923 ±3 Ma in the cores and 786 ±13 Ma in the rims. The Ibaré ophiolite is a volcano-sedimentary succession with voluminous ultramafic rocks initially deformed in the greenschist facies of orogenic metamorphism but with a strong overprint of contact metamorphism by the Santa Rita Granite. The assemblage olivine + talc indicates low hornblende hornfels facies for large tracts of the serpentinite. A 20 x 10 m-large, fine-grained, hiatale-textured albitite lies in the core of blackwall (40 m large), the full metasomatic association immersed in metaserpentinite. The analyses (n = 21) of 19 zircon grains (magmatic, Th/U = 0.3) resulted in a single age of 892.4 ±2.8 Ma. The internal structure of the grains is homogeneous, euhedral to subhedral with embayments displaying pores in large portions. Grain size is 60-100 µm but two grains reach approximately 200 µm. A tourmalinite body (5 m large) in the extreme northwestern part of the ophiolite is in contact with chloritite. The internal structure of 140 analyzed grains (80-250 mm) from these two metasomatites is a faint and broad to irregular zoning. The euhedral grains have embayments. Euhedral apatite inclusions are common in the cores. The age is approximately 724 Ma. The Palma ophiolite a volcano-sedimentary succession with voluminous mafic-ultramafic rocks deformed in the greenschist facies with intense thermal superposition. The chloritite occurs as loose blocks (10 x 20 cm) in contact with serpentinite. The analyzed zircon grains (n = 67) are heterogeneous, subhedral, with patchy zoning, irregular external faces and embayments. Apatite and xenotime inclusions occur. Size is 100-190 µm but a few are closer to 50 µm. The 35 analyses resulted in an age of 722 Ma. The difficulty of dating ophiolites is presently overcome by the search and finding of zircon in an albitite (a possible altered oceanic plagiogranite) and metasomatic (chloritite, tourmalinite) rocks contained in serpentinite. Ophiolite formation and accretion occurred in the Tonian (923, 786, 722 Ma). This dating solution for the São Gabriel Terrane can be expanded for oceanic crust formation and accretion to the Brasiliano Orogen in eastern South America.

**KEY-WORDS:** METASOMATITE, OPHIOLITE, ZIRCON, SÃO GABRIEL TERRANE