

OPHIOLITE EVOLUTION IN THE SOUTHERN BRASILIANO OROGEN

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ABSTRACT: Remnants of proto-Adamastor and Adamastor oceanic crust and intermingled mantle constitute numerous ophiolites in extensive terranes of the Brasiliano Orogen. We developed geological and mineralogical methodology to date the ophiolites, and integrated the available field knowledge with aerogeophysical survey (CPRM, 2010) and isotope geochemistry of zircon and tourmaline to determine timing and structure of ophiolites. The examination of ophiolites in the Sul-Riograndense Shield led to the discovery and dating of zircon from albitites (Cerro Mantiqueiras and Ibaré ophiolites) and metasomatites (chloritite, rodingite, tourmalinite – Ibaré, Palma, Capané and Bossoroça ophiolites) and determination of $\delta^{11}\text{B}$ isotopes in tourmaline. All isotopic determinations (U-Pb, Lu-Hf, B) and electron microprobe analyses of tourmaline were made at Departamento de Geologia, Universidade Federal de Ouro Preto; some backscattered electron imaging was done at Universidade Federal do Rio Grande do Sul. Results are remarkable in several aspects. Age of oceanic crust is established at 920 Ma, with continuing alteration up to 720 Ma. ϵHf is positive (ca. +12) for zircon from all samples. $\delta^{11}\text{B}$ is positive (ca. +5, 0) for tourmaline (dravite) from massive tourmalinite enclosed in serpentinite. Tourmaline is resilient to alteration by metamorphism; it is homogeneous in Ibaré, but is zoned (Tur 1, Tur 2, Tur 3) in Bossoroça. Only Tur 3 has negative $\delta^{11}\text{B}$, indicative of recrystallization in the continental crust. Zircon geochemistry indicates origin in depleted mantle. Aeromagnetic data of the selected Bossoroça ophiolite display a high angle dip of the thrust fault to NNW that registers the obduction of the ophiolite onto the Campestre oceanic arc. The association with listvenites adds to indication of oceanic crust processes. The ophiolites were variably deformed in middle amphibolite facies (Cerro Mantiqueiras), low amphibolite facies (Bossoroça ophiolite) and greenschist facies (Ibaré, Palma, Capané). Oceanic crust is registered in amphibolites (Cerro Mantiqueiras) and oceanic arc in andesites (Ibaré, Palma, Bossoroça). The Capané ophiolite is unique type of ophiolite, because it was inserted by thrusting into the Porongos fold-and-thrust belt. Supra-subduction zone emplacement seems predominant. This diversified set of results positions the crust of southern Brasiliano Orogen at the first rupturing of Rodinia to form proto-Adamastor Ocean. Continuing development of full Adamastor Ocean is well marked in the information obtained. The results point to 700 Ma for the beginning of continental collision in SW Gondwana as established by the youngest age of oceanic crust dated in ophiolites. Continents started colliding after consumption of the last piece of oceanic crust.

KEYWORDS: OPHIOLITE, BRASILIANO OROGEN, ZIRCON, TOURMALINE, GEOPHYSICS.