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Neoproterozoic Oceans in the Ribeira Belt (Southeastern Brazil): The Pirapora Do Bom Jesus Ophiolitic Complex

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Within the São Roque Domain (composed by Meso to Neoproterozoic low/medium grade volcano-sedimentary sequences of Serra do Itaberaba and São Roque Groups, SRG) of the Neoproterozoic Ribeira Fold Belt (southeastern Brazil), we have identified an ophiolitic complex (Pirapora ophiolite), displaying a characteristic oceanic lithospheric stratigraphy. From bottom to top, it includes: 1) a lower crustal/upper mantle section, (dunitic cumulates with chromitite-magnetite layers); 2) a lower crustal section (metagabbro and flasergabbro mafic cumulates with gabbroic pegmatoids); and 3) an upper crustal section (deformed fine-grained, greenschist facies metamafics with remains of a sheeted dyke complex, pillow lavas and cherts). The metabasaltic rocks have geochemical characteristics that are transitional between those of MORB and island arc basalts, similar to basaltic rocks from mature back-arc basins where the influence of subduction components should not be dominant.

U-Pb ages of 628 ± 9 Ma on monazite are interpreted as the crystallization age of mafic magmas (Hachspacher et. al. 2000), and altogether the geochronological data suggests that the emplacement of Pirapora ophiolite (~ 620 Ma) took place shortly after its generation, probably during oceanic ridge collision with the continental margin. Given the orogenic polarity of the Ribeira-Damara Belt (Porada, 1989), derivation of the Pirapora ophiolite from inside the Ribeira branch is more probable than from the Damaran branch of the orogen. The geometry and kinematics of the ophiolite slice are thus conjectural, but the absence of a clear metamorphic sole suggests ophiolite emplacement as a thin obducted nappe, with very large displacement on its base.

We must conclude that the Ribeira-Damara Belt was produced by plate tectonic processes; indeed, the Pirapora back-arc basin must have been induced by the closure of a possibly large ocean (Adamastor) involved in the respective Wilson cycle. The scarcity of ophiolites, high pressure suture rocks and the large volume of synorogenic granitoids, as well as the large width of the belt, show that the Ribeira-Damara system is of Variscan type rather than of Alpine type affinities.

Reference

Hachspacher, P. et. al. (2000), Revista Brasileira de Geociências, v. 30, nº1, pp. 110 – 114.

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