

The puzzling northward termination of the Araçuaí-West Congo orogenic belt: implications for orogenic development

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The late Proterozoic–Cambrian Brasiliano/Pan-African orogenic belt along the coasts of southeastern Brazil and western Africa is generally considered to have terminated rather abruptly northwards into an embayment within the pre-Atlantic São Francisco-Congo cratonic unit. This part of the orogenic belt, the Araçuaí-West Congo orogen, has been explained by tightening of the horseshoe-shaped São Francisco-Congo craton, popularly referred to as nutcracker tectonics(1). However, there is a severe mismatch between the limited shortening predicted by the nutcracker model and the extensive orogenic evolution proposed in the literature for this orogenic segment(2). This evolution involves 45-50 m.y. of subduction-related arc magmatism (on the order of 1000 km of convergence) and a subsequent collisional history with the formation of a 650-700 km wide collisional orogenic belt. The collision involved transformation of a pre-collisional basin and its thinned crust to a 60-65 km thick orogenic crust, and must have involved ~500 km of convergence between the São Francisco and Congo cratons.

The problem can be resolved if we reinterpret the Araçuaí-West Congo orogen as a mainly intracontinental orogenic segment of the large Brasiliano/Pan-African system. No unambiguous remnants of oceanic crust have been found, and the magmatism may be related to a long-lived thermal anomaly combined with heat generated by radiogenic decay of sediments during the orogeny. There is still a need to add more flexibility to the horseshoe-shaped São Francisco-Congo craton to account for the orogenic shortening. The nutcracker-style pinching is explained by reactivation of pre-orogenic aulacogens, but these aulachogens do not show enough deformation to accommodate the shortening across the Araçuaí-West Congo orogen. To resolve this problem we suggest that the São Francisco and Congo cratons were separated by a ~150 km wide orogenic corridor along the current African Atlantic margin that accommodated some of the convergent movements.

(1)Alkmim et al. 2006. Precambrian Research 149, 43-64

(2)Gonçalves et al., 2016. Gondwana Research 36, 439–458