



Adamastor – an ocean that never existed?

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Existing models of tectonic evolution of the Neoproterozoic orogenic system rimming the shores of the southern Atlantic Ocean (the Araçuaí–Ribeira–Congo and Dom Feliciano–Kaoko–Gariép belts) interpret the belts as subduction-related orogens and stress out the role of the “Adamastor Ocean” in their pre-collisional evolution. A critical problem in such interpretation is the confined nature of the northern termination of the orogenic system, as well as a very short time span between the end of rifting and onset of convergence recognized in its southern part. Moreover, the existing subduction-related models for various parts of the orogenic system are often contradictory and incompatible with existing data. In this contribution, we summarize the data that speak against the presence of a large oceanic domain before the onset of thickening and test a new and simple intracontinental model for the Araçuaí–Ribeira–Congo and Dom Feliciano–Kaoko–Gariép belts.

In the northernmost part of the orogenic system, the Araçuaí–Congo Belt terminates into an embayment within the São Francisco–Congo Craton. The data suggest crustal thickening to ca. 60–65 km in the hot anatectic centre of the belt, which can only be achieved by ca. 500 km of orogenic shortening. In order to allow such amount of convergence, but maintain the São Francisco–Congo cratonic connection, the pre-convergence configuration must have involved smaller-scale rift domains in the northern part of the São Francisco–Congo basement that allowed for its shortening during the Neoproterozoic. The area of the Araçuaí–Congo Belt is interpreted as an intracontinental hot orogen with thermomechanical evolution similar to the Himalaya–Tibet system that developed through inversion of a ca. 750 km wide rift basin (without the presence of a significant oceanic domain), which was shortened to ca. 250 km.

Data from the Kaoko–Dom Feliciano–Gariép orogenic system suggest that the early Neoproterozoic rifting preceding the formation of this belt started at ca. 820–800 Ma and continued up to ca. 660 Ma. However, early convergence and related metamorphism on the South American side, as well as flysch sedimentation on the African side of the orogenic system at ca. 650–645 Ma suggest a very short lifetime for the presumed oceanic domain. The only remnants of oceanic-like crust are present in the Gariép Belt, where it was obducted on top of the Neoproterozoic rift-related sediments at the edge of the Kalahari Craton.

We suggest that Neoproterozoic oceanic crust played minor role in the development of the Araçuaí–Ribeira–Congo and Dom Feliciano–Kaoko–Gariép belts and that their overall architecture and thermal evolution is the result of inversion of large-scale rift structures with more than 160 my of extensional history. A true oceanic environment probably developed only in the southern part of the rift system, but it must have been narrow, suggesting the Red Sea stage of the development of the “Adamastor Rift” just before the onset of thickening.

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