



Magnetism of Cambrian plutons of the Araçuaí belt, orogenic collapse and paleogeography of West Gondwana

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Abstract

The latitudinal distribution of continental masses and mountain chains is a key element in the paleoenvironmental reconstruction of the Ediacaran-Cambrian times. Besides the unconstrained latitude of the blocks for this time interval, the age and evolution of the mountain chains is also undetermined along most of the Brasiliano-Panafrican belts. Featuring a 3000 km-long orogen, the Mantiqueira Province provides a rare opportunity to study collapsing orogens into their mid to deeper crustal sections. The following thesis begins to establish a framework for studies of the rheological behavior at different crustal levels of the collapsing Araçuaí orogen (AO, northern portion of the Mantiqueira Province), and paleogeographic reconstructions of the Gondwana using paleomagnetism and other combined techniques in post-collisional plutons of the belt. First, an in-depth study of magnetic anisotropy revealed contemporary (~500 Ma) but distinct magnetic fabric in post-collisional intrusions, recording different internal flow patterns. In the southern AO deep-seated intrusions with ellipsoidal-shape show concentric patterns of magnetic fabrics which cut across the NE-trending regional foliation. In contrast, the northern intrusions, exposed as elongate-to-irregular-shaped upper sections of batholith-size bodies, emplaced at the shallow to mid-crust, show general NS-trending magnetic fabrics roughly parallel to the strike of the orogen and the regional foliation of host rocks. This contrasting behavior reflects the different rheological behavior across a crustal-scale profile from the intrusion's roots in the south, whose deformation is decoupled from the surrounding crust, to their cupola that crop out in the north which is co-structured with the host rocks at the mid to shallow crust. Lastly, a paleomagnetic analysis was conducted on the post-collisional Santa Angélica (SA) and Venda Nova (VN) plutons (~500 Ma) from the southern portion of the AO. A combined SA plus VN pole computed from the magnetic results of both plutons (4.7° N, 332.2° E, $N=35$, $A95=4.06$ and $K=68.82$) does not resemble other poles from Gondwana or from the independent South American plate after the demise of Pangea. The SAVN pole closely matches the late Cambrian Furongian sector of the Gondwana path, which is near-entirely dominated by results from Eastern Gondwana, therefore providing a critical new constraint to the Congo-São Francisco block in the core of Western Gondwana. The body of research presented in this thesis provides many challenges to future workers, while at the same time highlighting that rock magnetism should be a useful tool for researchers interested in magma emplacement and paleogeographic reconstructions.