THE NEOPROTEROZOIC BELTS OF THE ANDEAN BASEMENT

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Resumo: The basement of the Northern, Central and Southern Andes from Colombia to the Fueguian Cordillera of Argentina and Chile from the 8°N to 52°S latitude, along more than 8,000 kilometers, provides contrasting insights to understand the amalgamation and dispersal of the Rodinia supercontinent, the reconstruction of the western Gondwana margin during Neoproterozoic times, and the dynamics of terrane accretion along the Pacific margin of South America. A series of allochthonous and para-autochthonous terranes most of them with metamorphic basements of confirmed Grenville ages, forms an apron of different basement types accreted to the Neoproterozoic protomargin of Gondwna. Most of them recorded, as the Arequipa Massif, a complex history that started with the continent-continent collision between Laurentia, and the Amazonian, Pampian and possibly Patagonian cratonic blocks. Petrological, isotopic, and metamorphic studies indicate that a Paleoproterozoic terrane was trapped in the Mesoproterozoic between these cratonic blocks. An ultrahigh temperature metamorphic episode correlates with the collapse of the Sunsás-Grenville orogeny after ~ 1,000 Ma, probably related to slab break-off, and marked the beginning of the dispersal of Rodinia. The western Grenvillian margin of western Gondwana recorded a Neoproterozoic separation after the Grenville-Sunsás deformation. This opening formed the Chiguiro basin in Los Llanos of Colombia, the metamorphic basement of the Marañón Massif in Perú, and the Tucavaca and Puncoviscana basins. These last basins developed tholeiitic mafic rocks with oceanic affinities, and they were subsequently closed at ~530 Ma in early Cambrian times. The closure of the basin was associated with calcalkaline granitoids and a strong angular unconformity with the late Cambrian clastic platform deposits in the southern segment. This deformation was coeval with the collision of eastern Sierras Pampeanas against the Río de La Plata craton. The rift-drift transitions of the early Paleozoic clastic platform among northern Perú, Bolivia and northwestern Argentina showed a gradual younging from south to north, in agreement with counterclockwise rotation inferred from paleomagnetic data of the Antofalla block during late Cambrian to early Ordovician times. The segment north of the Arequipa massif, registered the collision of the Paracas sialic block after middle Ordovician times. The age of the subduction related magmatic arc, the high grade metamorphic rocks, and the peak of deformation in northern Perú, are coeval with the Famatinian orogeny in Sierras Pampeanas. The early Paleozoic history of the Arequipa massif segment is explained by a back arc setting, which further south changed to open oceanic conditions and subsequent collisions. The Antofalla terrane has evidence of re-accretion to the continental margin by late Ordovician times. These series of accretions and subsequent separations during Mesoproterozoic, Neoproterozoic-early Cambrian, and late Cambrian-early to middle Ordovician, are explained by global changes in the absolute motion of the major plates, and plate reorganization in the Gondwana supercontinent after its amalgamation. Coeval periods of rifting and contractional deformation, all along the Pacific margin of South America, are a distinctive character of the Terra Australis accretionary orogen that may be correlated with the known diastrophism of the Brasilian platform.

Palavras-chave: Andes; Sunsas; basement.

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THE STRAIN DISTRIBUTION DURING SLOW COOLING OF A HOT OROGEN: THE NEOPROTEROZOIC RIBEIRA-ARAÇUAÍ OROGEN.

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Resumo: The neoproterozoic Ribeira-Araçuaí orogen (SE Brazil) comprises a stack of allochthons containing large amounts of anatectic and magmatic rocks. The upper allochton (~300km long, 50-100 km wide, and >10 km thick) involves peraluminous diatexites and leucogranites resulting from partial melting of the middle crust. It overlies another allochton containing huge early-to syn-collisional plutons intruded in metasediments. The basal allochtonous unit comprises HT-LP (~750°C; ~600MPa) mylonites in which synkinematic leucogranites veins were injected along the foliation. The entire allochtonous domain is thrust upon the Sao Francisco craton. Several lines of evidence are presented that constrain the thermal-mechanical evolution of this orogenic domain. Structural mapping involving AMS measurements suggest that a deformation was recorded in the solid, magmatic or anatectic rocks of the various units. Strain repartition seems not to be homogeneous and there is some evidence of strain localization, which is shown by the AMS in the plutonic rocks. U-Pb ages between 580-570 MA suggest that the deformation in the basal HT mylonites, plutonic bodies of the central unit and partial melting and deformation in the anatexites of the upper unit are contemporaneous. $^{40}Ar/^{39}Ar$ ages on amphiboles and biotites suggest slow cooling (< 5°C/Ma) from the peak metamorphism (700-800°C) to the closure temperature of biotite.
In summary, during the collision between the South America and Africa proto-continents, the northern Ribeira-Araçuaí orogenic domain was characterized by an anormally high thermal gradient (~35°/km) that resulted in a widespread partial melting of the middle crust. This thermal regime is associated with injection of huge volumes of plutonic rocks (mostly tonalites) in the central domain. Apparently there is some strain localization and deformation in magmatic rock, not similar to deformation in solid rocks. Cooling was slow and magmatic and anatectic materials may have remained so long time before they solidify.

Palavras-chave: Araçuaí orogen; Strain distribution; Slow cooling.