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THE RIBEIRA-ARAÇUAI MIGMATITIC-MAGMATIC ALLOCHTON, AN EQUIVALENT OF THE SOUTHERN TIBET "CRUSTAL ASTHENOSPHERE"

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In several, currently active, orogenic domains, geophysical evidence suggests that huge volumes (>1000000 km3) of medium/lower crust are not in the solid state. The favored image is that of a "crustal asthenosphere" made of magmatic bodies intrusive within a largely molten crust. This is for instance the case in southern Tibet where active and passive seismology experiments and magnetotelluric soundings have shown that the middle crust is characterized by low seismic velocities, bright spots and high electric conductivity. These observations were interpreted as indicating that the middle crust of southern Tibet displays a layer of at least 250 km of longitudinal extension and 10 km of thickness with a large proportion of partially molten rocks and several non-solidified plutons. Considering that this domain is tectonically active, mechanical interaction between active faults and this "crustal asthenosphere" is likely. The neoproterozoic Ribeira-Araçuai belt in Eastern Brazil displays characteristics that are similar to those inferred for the southern Tibet. A domain 300 km long and up to 100 km large involves a variety of magmatic bodies (tonalites, granodiorites, granites and charnockites) intruding a cordierite-garnet-sillimanite-bearing "peraluminous granite", which in many places provides evidence that it is in fact the molten counterpart of the initial country-rock. On its western boundary, this huge migmatitic-magmatic complex is thrusted westward over several other minor allochtonous units. The basal contact is a low-angle mylonitic shear-zone about 10 km thick in which the metamorphic conditions of deformation increase upward. The magmatic intrusive bodies as well as the "peraluminous granite" that makes up the upper magmatic-migmatitic unit are free

of any solid-state deformation fabric but display a pervasive magmatic fabric parallel to the solid-state, mylonitic fabric in the basal sole. This parallelism strongly supports a model in which a crust involving a huge partially molten domain was thrusted onto the South American margin during the continental collision between the African and South American protocontinents. This "crustal asthenosphere", because of its low stiffness, probably acted as a decoupling level during the continental convergence and was transported as a huge allochton, recording, still in the magmatic stage, the resulting flow fabric.

TS2.05 Heat and mass transfer from depth: Metamorphism and Crustal Melting in Orogenesis - from Microstructures to Tectonics M. BROWN

The Ribeira-Araçuai migmatitic-magmatic allochton, an equivalent of the southern Tibet "crustal asthenosphere"

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In several, currently active, orogenic domains, geophysical evidence suggests that huge volumes (>10^5 km^3) of medium/lower crust are not in the solid state. The favored image is that of a "crustal asthenosphere" made of magmatic bodies intrusive within a largely molten crust. This is for instance the case in southern Tibet where active and passive seismology experiments and magnetotelluric soundings have shown that the middle crust is characterized by low seismic velocities, bright spots and high electric conductivity. These observations were interpreted as indicating that the middle crust of southern Tibet displays a layer of at least 250 km of longitudinal extension and 10 km of thickness with a large proportion of partially molten rocks and several non-solidified plutons. Considering that this domain is tectonically active, mechanical interaction between active faults and this "crustal asthenosphere" is likely. The neoproterozoic Ribeira-Araçuai belt in Eastern Brazil displays characteristics that are similar to those inferred for the southern Tibet. A domain 300 km long and up to 100 km large involves a variety of magmatic bodies (tonalites, granodiorites, granites and charnockites) intruding a cordierite-garnet-sillimanite-bearing "peraluminous granite", which in many places provides evidence that it is in fact the molten counterpart of the initial country-rock. On its western boundary, this huge migmatitic-magmatic complex is thrusted westward over several other minor allochtonous units. The basal contact is a low-angle mylonitic shear-zone about 10 km thick in which the metamorphic conditions of deformation increase upward.

The magmatic intrusive bodies as well as the "peraluminous granite" that makes up the upper magmatic-migmatitic unit are free of any solid-state deformation fabric but display a pervasive magmatic fabric parallel to the solid-state, mylonitic fabric in the basal sole. This parallelism strongly supports a model in which a crust involving a huge partially molten domain was thrusted onto the South American margin during the continental collision between the African and South American protocontinents. This "crustal asthenosphere", because of its low stiffness, probably acted as a decoupling level during the continental convergence and was transported as a huge allochton, recording, still in the magmatic stage, the resulting flow fabric.