Geophysical Research Abstracts
Vol. 13, EGU2011-6810, 2011
EGU General Assembly 2011

Pre-rift lithospheric anisotropies in the Gondwana crust on either side of the South Atlantic

Hartwig Frimmel (1), Miguel Basei (2), Claudio Gaucher (3), and Hans-Peter Bunge (4)

(1) Institute of Geography & Geology, University of Wuerzburg, Germany (hartwig.frimmel@uni-wuerzburg.de), (2) Instituto de Geociências, Universidade de São Paulo, Brazil, (3) Departamento de Geología, Facultad de Ciencias, Montevideo, Uruguay, (4) Department of Earth and Environmental Sciences, Ludwig-Maximilians-Universität, Munich, Germany

In order to address the principal question, which, if any, pre-existing lithospheric suture might have dictated the position of continental rupture and subsequent Cretaceous opening of the South Atlantic oceanic basin, we examined the tectonic history of the principal Pan-African orogenic belts in southwestern Gondwana, from central and southern Africa to eastern South America. Possible links between tectono-stratigraphic units and major structures in the West Congo Belt, the Lufilian/Zambezi, Kaoko, Damara, Gariep Belts and the Saldania Belt and those on the eastern side of the Río de la Plata Craton are suggested and a revised geodynamic model for the amalgamation of SW-Gondwana is proposed. The Río de la Plata and Kalahari Cratons are considered to have become juxtaposed already by the end of the Mesoproterozoic. Early Neoproterozoic rifting led to the fragmentation of the northwestern (in today's coordinates) Kalahari Craton and the splitting off of several small cratonic blocks. The largest of these ex-Kalahari cratonic fragments is probably the Angola Block. Smaller fragments include the Luis Alves and Curitiba microplates in eastern Brazil, several basement inliers within the Damara Belt, and an elongate fragment off the western margin, named Arachania. The main suture between the Kalahari and the Congo-São Francisco Cratons is suspected to be hidden beneath younger cover between the West Congo Belt and the Lufilian/Zambezi Belts and probably continues westwards via the Cabo Frío Terrane into the Goiás magmatic arc along the Brasilia Belt. Many of the rift grabens that separated the various former Kalahari cratonic fragments did not evolve into oceanic basins, such as the Northern Nosib Rift in the Damara Belt and the Gariep rift basin. Following latest Cryogenian/early Ediacaran closure of the Brazilides Ocean between the Río de la Plata Craton and the westernmost fragment of the Kalahari Craton, the latter, Arachania, became the locus of a more than 1000 km long continental magmatic arc, the Cuchilla Dionisio-Pelotas Arc. A correspondingly long back-arc basin (Marmora Basin) on the eastern flank of that arc is recognized, remnants of which are found in the Marmora Terrane - the largest accumulation of oceanic crustal material known from any of the Pan-African orogenic belts in the region. Corresponding foredeep deposits that emerged from the late Ediacaran closure of this back-arc basin are well preserved in the southern areas, i.e. the Punta del Este Terrane, the Marmora Terrane and the Tygerberg Terrane. Further to the north, present erosion levels correspond with much deeper crustal sections and comparable deposits are not preserved anymore. Closure of the Brazilides Ocean, and in consequence of the Marmora back-arc basin, resulted from a change in the Río de la Plata plate motion when the Iapetus Ocean opened between the latter and Laurentia towards the end of the Ediacaran. In conclusion, break-up of Gondwana and opening of the South Atlantic basin most likely did not occur along a major continental suture but followed largely along the axis of the Neoproterozoic Marmora back-arc basin.