Geophysical Research Abstracts
Vol. 14, EGU2012-4001, 2012
EGU General Assembly 2012

Evolution of the South Atlantic passive continental margin in Southern Brazil derived from zircon and apatite (U-Th-Sm)/He and fission-track data

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Passive continental margins are important geoarchives for processes like mantle and lithospheric dynamics, breakup of continents, and feedback mechanism between rock uplift and erosion, and therefore, climate change. The onshore-offshore transition between São Paulo and Porto Alegre is a key area for the western margin of the South Atlantic. Quantifying rates and timing of the long-term topography evolution will provide insight into the causes. Combing thermochronological dating techniques and numerical modeling of the time-temperature evolution with the thermokinematic 3-D modeling of the long-term topography evolution will help to understand the syn- to postrift processes at the continental margin. Sampling strategy considered the recent morphology of the landscape, known fracture and fault zones, and variations in lithologies

The following contribution presents new thermochronological data attained by fission-track and (U-Th-Sm)/He analysis on apatites and zircons. The zircon fission-track ages range between 108.4 (15.0) and 539.9 (68.4) Ma, the zircon (U-Th-Sm)/He ages between 72.9 (5.8) and 427.6 (1.8) Ma whereas the apatite fission-track ages range between 40.0 (5.3) and 134.7 (8.0) Ma, and the apatite (U-Th-Sm)/He ages between 32.1 (1.52) and 92.0 (1.86) Ma. Applying the regional distribution to sort the various ages, three blocks bound by faults and old fracture zones can be separated.

The Rio Alonzo Fracture Zone separates the northern and central block whereas the Florianopolis Fracture Zone separates the central and southern block. The time-temperature evolution achieved by numerical modeling using HeFTy revealed distinct post-rift exhumation histories of the three blocks. While the central block exhibits an old stable block with no distinct exhumation after the Paraná event, the northern and especially the southern block show complex exhumation histories. The sample of the northern block exhibit two distinct cooling phases, one in the lower Cretaceous and the other in Paleogene to Neogene time.