Geophysical Research Abstracts
Vol. 17, EGU2015-418, 2015
EGU General Assembly 2015

Long-term landscape evolution of the South Atlantic "passive" continental margin in Eastern Argentina using apatite fission-track thermochronology

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To understand the evolution of the "passive" continental margin in Argentina low temperature thermochronology is an appropriate method, which might lead to new insights in this area.
The Tandilia System, also called Sierras Septentrionales, is located south of the Río de la Plato Craton in eastern Argentina in the state of Buenos Aires. North of the hills the Salado basin is located whereas the Claromecó basin is situated south of the mountain range. In contrary to most basins along the South American "passive" continental margin, the Tandilia-System and the neighbouring basins trend perpendicular to the coast line. The topography is fairly flat with altitudes up to 350 m. The igneous-metamorphic basement is pre-Proterozoic in age and build up of mainly granitic-tonalitic gneisses, migmatites, amphibolites, some ultramafic rocks and granitoid plutons. It is overlain by a series of Neoproterozoic to early Paleozoic sedimentary rocks (Cingolani 2011), like siliciclastic rocks, dolostones, shales and limestones (Demoulin 2005).
The aim of the study is to quantify the long-term landscape evolution of the "passive" continental margin in eastern Argentina in terms of thermal, exhumation and tectonic evolution.
For that purpose, samples were taken from the basement of the Sierra Septentrionales and analyzed with the apatite fission-track method. Further 2-D thermokinematic modeling was conducted with the computer code HeFTy (Ketcham 2005; Ketcham 2007; Ketcham et al. 2009). Because there are different hypotheses in literature regarding the geological evolution of this area two different models were generated, one after Demoulin et al. (2005) and another after Zalba et al.(2007).
All samples were taken from the Neoproterozoic igneous-metamorphic basement. Apatite fission-track ages range from 101.6 (9.4) to 228.9 (22.3) Ma, and, therefore, are younger than their formation age, indicating all samples have been thermally reset. Six samples accomplished enough confined spontaneous fission-tracks and were used to test geological t-T models against the AFT data set. These models will lead to a more detailed insight on the cooling history and tectonic activities in the research area.
In addition there will be an outlook on further models including AFT, ZrFT and ZrHe data, which show that the Sierras Septentrionales seems to be influenced by the folding and wrenching of the neighboring Sierras Australes (Rosello et al. 1997).

References

Cingolani, C. A. The Tandilia System of Argentina as a southern extension of the Río de la Plata craton: an overview. International Journal of Earth Sciences 100, 221-242 (2011).

Demoulin, A., Zarate, M., Rabassa, J. Longterm landscape development: a perspective from the southern Buenos Aires ranges of east central Argentina. Journal of South American Earth Sciences 19, 193–204 (2005).

Ketcham, R. A. Forward and inverse modeling of low-temperature thermochronometry data, in Low-Temperature Thermochronology: Techniques, Interpretations, and Applications (eds. by Reiners, P. W. & Ehlers, T. A.) 275-314 (Mineralogical Society of America/Geochemical Society Reviews in Mineralogy and Geochemistry, Chantilly, Virginia, 2005).

Ketcham, R. A., et al. Improved modeling of fission-track annealing in apatite. American Mineralogist, 92, 789-798 (2007).

Ketcham, R. A., Donelick, R. A., Balestrieri, M. L., Zattin, M. Reproducibility of apatite fission-track length data and thermal history reconstruction, Earth and Planetary Science Letters 284, 504–515 (2009).

Rossello, E.A.; Massabie, C.; Lopez- Gamundi, O.R.; Cobbold, P.R.; Gapais, d.; 1997: Late Paleozoic transpression in Buenos Aires and northeast Patagonia ranges, Argentina Journal of South American Earth Sciences, 10 (5-6), pp.389-402.

Zalba, P. E., Manassero, M., La Verret, E., Beaufort, D., Meunier, A., Morosi, M., Segovia, L. Middle Permian telodiagenetic processes in Neoproterozoic sequences, Tandilia System, Argentina. Int. J. of Sed. Res. 77, 525-538 (2007).