# DETAILED ZIRCON AND MONAZITE STUDIES REVEAL THE METAMORPHIC EVOLUTION OF THE EASTERN PAMPEAN RANGES, ARGENTINA

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KEY WORDS: U-Pb SHRIMP, PAMPEAN OROGEN, SLAB BREAK-OFF

The Eastern Pampean Ranges comprise high-grade supracrustal sequences with belts of ophiolite remnants. U-Pb and Nd isotopic data suggest that the tectonic evolution of the Pampean Ranges started ca. 640 Ma in a back-arc basin. To the south of the Ranges there is a body of Kinzigite. Its particular mineral association (Qtz+Grt+Crd+Pl+Bt+Mag+-Ath) and the lack of Kf distinguishes this rock unit from the migmatites around.

One kinzigite sample was selected for zircon and monazite conventional TIMS and SHRIMP U-Pb analyses, as well as for whole-rock, garnet and cordierite Sm-Nd analysis. Monazite grains are euhedral, pale yellow, clear, homogeneous. Zircon crystals are mostly euhedral, prismatic, transparent and fine grained (50 to 150 ìm). Rims of new zircon around older cores are ubiquitous. Cathodoluminiscence images reveal that virtually all zircons contain cores of low luminescence.

Uranium concentrations of the zircon grains vary between 162 and 591 ppm and Th/U ratios are from 0.018 to 1.317. The lowest Th/U ratios are for rims with the age of ca. 510 Ma whereas higher Th/U ratios correspond to cores with ages ranging from ca. 576 to 510 Ma. Both cores and rims possibly originated during a single temperature-progressive high-grade metamorphic event.

Monazite age is of 517 ± 4 Ma. and it must have grown concomitantly with the low Th/U ratio zircon rims during the highest temperature metamorphic event.

Zircon ID-TIMS U-Pb method yielded the age of 517 ± 5 Ma for the high-grade metamorphic event. Some grains, however, clearly show an older core surrounded by metamorphic zircon and a few analyses of such grains indicated ages ranging from ca. 622 to 2200 Ma. The pattern is, therefore, compatible with a detrital sedimentary protolith for the kinzigite.

Sm-Nd isotopic analyses indicated high 147Sm/144Nd ratio (0.166) and TDM model age of ca. 2.6 Ga. The high value of the Sm/Nd ratio maybe explained because the rock suffered strong LREE depletion during melting and extraction of granitic melts, resulting in some fractionation between Sm and Nd.

Previous studies (Sims et al., 1998; Rapela et al., 1998) U-Pb SHRIMP data on zircon and monazite yielded ages of 530 Ma, and were interpreted as the age of the “in situ” metamorphic peak related to crustal thickening and compression with P-T conditions of 8.6Kb and 810°C; culminating in isothermal uplift and low pressure anatexis linked to the generation of peraluminous discordantly emplaced granites (520 Ma. 4-5 Kb, 715°C). Our data reveal that high-grade metamorphism followed collision and medium-grade metamorphism and mark the final stages of evolution of orogen at 517 Ma. related to slab break-off.