Geophysical Research Abstracts
Vol. 16, EGU2014-4284-1, 2014
EGU General Assembly 2014

Cooling history of the Arize and Trois-Seigneurs Massifs, northern Pyrenees, and tectonic implications

Arnaud Vacherat (1,2,3), Frédéric Mouthereau (1,2), Raphaël Pik (3), Nicolas Bellahsen (1,2), Cécile Gautheron (4), Matthias Bernet (5), Jean-Louis Paquette (6), Bouchaïb Tibari (3), and Rosella Pinna (4)

(1) Sorbonne Universités. UPMC Univ Paris 06, UMR 7193, Institut des Sciences de la Terre Paris (iSTeP), 4 Place Jussieu, F-75005 Paris, France (arnaud.vacherat@gmail.com), (2) CNRS, UMR 7193, Institut des Sciences de la Terre Paris (iSTeP), 4 Place Jussieu, F-75005 Paris, France, (3) CRPG-CNRS, 15 rue Notre-Dame des Pauvres, 54500 Vandoeuvre-lès-Nancy, France, (4) Univ Paris Sud, UMR IDES-CNRS 8148, Bâtiment 504, Rue du Belvédère, 91405 Orsay, France, (5) Institut des Sciences de la Terre (ISTerre), Univ Joseph Fourier, 1381 rue de la piscine, Grenoble 38041, France, (6) Laboratoire Magmas et Volcans, UMR 6524, Université Blaise Pascal-CNRS, 5 rue Kessler F-63038 Clermont-Ferrand cedex, France

Providing constraints on the temporal and spatial evolution of shortening in collision zones is key to reconstruct past plate motion. Yet, dating the onset of collision is often elusive and is at best constrained by a variety of proxies. For instance, onset of plate flexure, onset of thrust-related cooling or first arrival of metamorphic clasts in foreland sourced from the orogen characterized a mature orogenic stage rather than the initiation of the collision that usually occurs underwater.

Here, we study the northern Pyrenean granitic massifs of the Arize and Trois-Seigneurs Massifs (Ariège, Central North-Pyrenean Zone) exposed on the retro-wedge side of the orogen. Apatite fission-track data from these massifs indicate that collision-related exhumation started in the Early Eocene and lasted until Miocene. However, scarce constraints from higher temperature thermochronometers and detrital thermochronological provide first arguments for an earlier cooling during Late Cretaceous.

To gain a better resolution of the cooling/exhumation history from initiation of convergence to mature collisional stage, we provide interpretations from new in-situ apatite and zircon fission-track and (U-Th-Sm)/He and zircon U-Pb data from the Arize and Trois Seigneurs, and detrital zircon fission-track and (U-Th-Sm)/He data from the Camarade Basin, north of the Ariège Massifs. These are then discussed in the light of structural data.

Our study shows that significant cooling from mid-crustal level is recorded since Late Cretaceous. Comparison with RSCM temperatures obtained from the surrounding folded Mesozoic units show temperature offsets suggesting that the cover had a distinctive tectonic history with regard to the Paleozoic massifs. This has large implications on the tectonic evolution of the Central Pyrenees and on how plate convergence was accommodated within the northern Pyrenean domain.