



Tectono-thermal evolution of the western Iberian Range

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Recent studies of the Iberia-Europe plate boundary kinematic evolution suggest that the intraplate shortening taken up in the inverted Iberian rift system is essential to reconcile plate movements with geological observations (Mouthereau et al., 2014; Tugend et al., 2015; Nirrengarten, 2016). As a part of this Mesozoic rift system, the Cameros massif, occupies a central position in Iberia. The aim of this work is to provide constraints on the thermal evolution from Mesozoic rifting to Cenozoic tectonic inversion using detrital low-T thermochronology of sandstones collected in the Cameros extensional basin and the adjacent Ebro foreland basin.

A combination of zircon and apatite fission-track and apatite (U-Th)/He analyses show that the Cameros sediments were heated locally above 300°C. Thermal modelling of a fully reset ZFT sample reveals that heating occurred at ~100 Ma during rifting, coeval with greenschist metamorphism reported in the basin. Multi-equilibrium thermobarometry allows us to determine peak pressure-temperature conditions reached in the basin, providing additional constraints on basin evolution. The thermal model also suggests that high temperatures reached in the basin lasted for 30 Myr, in agreement with the duration of the thermal anomaly in the Pyrenean rift system. Exhumation related to tectonic inversion of the Cameros basin is constrained by AFT and AHe data at ~40-30 Ma, similar to other constraints in the Pyrenees.

A large number of non-reset ZFT ages obtained from Oligocene-Miocene sandstones in the foreland sediments of the Ebro basin show two grain-age populations at ~170 Ma and ~100 Ma. They are interpreted to reflect two rift-related thermal events: (i) Early Jurassic cooling related to the Atlantic opening and (ii) Albian cooling due to Early Cretaceous extension in the Cameros basin. Additional detrital AFT data from the same samples reveals two distinct grain-age populations at ~60-50 Ma and ~40-30 Ma. The AFT age distribution is in good agreement with the timing of exhumation in the Cameros basin. We infer that the main source of sediments of the Ebro basin is the Cameros basin.

This study is included to the Orogen research project, a tripartite partnership between academy and industry (Total, BRGM, CNRS).