



Exhumation of the Source Area of the Cameros Basin revealed by detrital zircon fission track analysis

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The Cameros Basin (NW of the Iberian Range, NE of the Iberian Peninsula) was an intracontinental basin during Mesozoic times, which was inverted during Alpine compression. Its formation was due to a main rifting stage during Thithonian-Albian times related with an extensional period due to the opening of the Bay of Biscay. This extensional period is characterized by high subsidence and the filling of the basin with up to 8 km of continental sediments. A very low-grade metamorphic event is recorded during Albian times reaching maximum temperatures of $\sim 350^{\circ}\text{C}$.

Although the Cameros Basin has been studied for several decades from different geological points of view, the source area for the Cameros Basin still remains unknown.

Previous studies have given some information about the possible location and nature of the source area: (1) Paleocurrent data indicate that the main source area was located SW of the basin (Salas et al., 2001); (2) Calculated chemical alteration indices show no intense chemical weathering of the source area and no significant variations along the stratigraphic section (Mata et al., 2000); (3) mineralogical studies trace elements ratios indicate that the material source should be acid igneous rock or any rock derived from them (Mata et al., 2000).

In this work we present new detrital zircon fission track (ZFT) data from samples collected in different stratigraphic units of the Cameros Basin. Five samples were not reset for ZFT during burial and the metamorphic episode that occurred during Albian times. Those samples have a thermal signal previous to their deposition in the Cameros Basin and reveal the cooling history of the source area.

Youngest peak ages for ZFT are in a range of 149 to 214 Ma. Lag-time values for those samples show a break-in-slope at ~ 130 Ma. Older samples show a decrease in lag-time values (from 55 myr to 20 myr) which implies an increase in exhumation rate between 145 and 135 Ma coinciding with the beginning of the rifting event. Younger samples show an increase in lag-time values which indicates a decrease in exhumation rates between 125 and 106 Ma. The break-in-slope of the lag-time trend would be related with a change in tectonic activity that is recorded by an increase of the subsidence in the Cameros Basin for the final stage of the rifting event. Mean exhumation rates have been estimated considering a constant geothermal gradient of $33^{\circ}\text{C}/\text{km}$ and the values obtained are between 0.12 and 0.34 mm/yr for a lag-time of 55 and 20 myr respectively. Those rates imply a total eroded section of at least 7 km.

The Iberian Massif, located at the SW of the basin is a good candidate to be the source area of the Cameros Basin. This massif was exposed during the rifting stage, as witnessed by the unconformity of the Albian-Cenomanian sandstones on the Variscan rocks, probably producing the erosion of Paleozoic rocks which were the source material of the Cameros Basin.

References:

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