

Post Variscan Cooling Of Thin-Skinned Tectonic Structures: Apatite Fission-Track Thermochronological Evidence Against A Significant Jurassic Or Later Thermal Overprint In The Southern Cantabrian Zone, NW Spain.

Kevin. L. Carrière*, Ulrich A. Glasmacher and Günther A. Wagner
Forschungstelle Archäometrie der Heidelberger Akademie der Wissenschaften
am Max-Planck-Institute für Kernphysik. Heidelberg 69117, Germany
Kevin.C@rriere.ca

and

Thilo Bechstädt
Geologisch-Paläontologisches Institut der Universität Heidelberg. Heidelberg,
Germany.

ABSTRACT

The southern Cantabrian Zone (sCZ), NW Spain is characterised as a complex area of thin-skinned tectonism initially developed during the Variscan Orogeny of the Iberian Peninsula. Extensive deposition of clastics and carbonates (including coal basins), with rare intrusive occurrences, is evidenced in a nearly continuous sedimentary column spanning from Late Precambrian to Upper Carboniferous time.

Previous conodont alteration index, vitrinite reflectance and fluid inclusion studies suggested sediments in this region were normally only subject to diagenetic ($\leq 200^{\circ}\text{C}$) temperatures, and rarely to incipient metamorphic ($200\text{-}300^{\circ}\text{C}$) temperatures. However, exact timing(s) of the thermal event(s) were never elucidated.

Apatite Fission-Track (AFT) thermochronology offers the unique opportunity to temporally constrain a sediment's syn- to post-depositional cooling trajectory through three annealing zones a) minimal-annealing, b) partial-annealing and c) total-annealing (in which the AFT clock is reset), separated by the $\sim 60^{\circ}\text{C}$ and $\sim 110^{\circ}\text{C}$ isotherms. AFT data for the sCZ evidence that cooling trajectories have dropped below the $\sim 110^{\circ}\text{C}$ isotherm from about the Triassic-Jurassic boundary onwards. These findings suggest this region was not affected by later stage far-field activity such as the opening of the Atlantic, the Bay of Biscay or Alpine stage mountain building.

In addition, regional AFT thermochronologic evidence, coupled with knowledge about the sedimentary and structural evolution of the basins in this classic thin-skinned tectonic setting suggests the sCZ may have been overlooked as frontier target for hydrocarbon exploration.