

The continental margin structure of the eastern part of the Bay of Biscay: the role of extensional Mesozoic structure during the later contractional deformation to the Pyrenean orogen building

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The continental margin of northern Iberian Peninsula belongs to a passive margin developed during the oceanic opening of the Biscay Bay in Mesozoic times, which was partially subducted and inverted during the Upper Cretaceous-Tertiary building of the Pyrenean orogen along its southern margin.

In September 2003 a new deep reflection seismic survey (MARCONI 1) was carried in the Cantabrian Sea. Using the seismic lines acquired in this survey together with existing seismic lines (ECORS and oil industrial seismic) allow us to obtain a structural interpretation of the eastern zone of the Biscay Bay.

The structure of this zone is characterized for a relative high central area (Landes platform) bounded to the south by steep continental slope of the Cantabrian shelf, which correspond to a north-verging thrust belt system developed during the subduction and later collision of the Iberian and European plates. To the north boundary the Landes platform (Cap Ferret Canyon) it is also bounded by another north-verging thrust belt system, with an increasing dip from north to south. This system is coeval to the Pyrenean deformation more to the south and may have been detached into the sedimentary pile.

Between these two thrust systems, the main structural features observed in this Landes platform are Mesozoic extensional both north-dipping and south-dipping faults bounding a complex system of half-grabens. The faults shows preserved synrift geometries in the Mesozoic sequences then affect the basement and have partially inverted during Pyrenean compression. Extensional faults dipping to the south were preferentially inverted.

The structural configuration of the upper crust in the eastern part of the Bay of Biscay, therefore, points that inversion of extensional faults was only significant in the southern (Cantabrian shelf slope) thrust system were they control the thrust geometry. More to the north, inversion tectonics, although present, was minor and only generated the inversion of some pre-existing south-dipping faults. However, the development of a new thrust system northwards of this slightly deformed area, suggest the presence of a weakened crustal zone, which could be also related to previous extensional feature.