Geophysical Research Abstracts, Vol. 8, 02408, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02408

Structure of the Basque-Cantabrian basin in the Urbasa and Sierra de Cantabria structural domains (Western Pyrenees, Spain). Quantification of shortening and tectonic inversion.

O. Vidal, Y. Almar, J.A. Muñoz.

Grup de Geodinàmica i Anàlisi de Conques (GGAC), Dept. Geodinàmica i Geofísica, Universitat de Barcelona. Barcelona, Spain.

(oskarvidal@ub.edu / Phone: +34-934035957)

The Basque-Cantabrian basin is located in the Western Spanish Pyrenees. The structure of this basin, a sedimentary prism that reaches 12 km of Triassic to Tertiary sediments thickness, is presented in this work, specially focusing on the Urbasa and the Sierra de Cantabria structural domains. Inversion tectonics is the predominant structural style in the area as Paleogene-Neogene contractional structures are superimposed on the Early Cretaceous extensional faults. Locally, the structure of the basin becomes more complex as a result of halokinetic deformation, by means of several diapiric bodies, made of Triassic gypsum-bearing clays (Keuper facies). These ones are even able to turn aside the general trend of the Urbasa syncline, from an E-W to a NE-SW orientation. The structure is presented on the basis of a section across the Sierra de Cantabria thrust front domain and the Urbasa syncline domain. The first one is characterized by an overturned and faulted fault-bend-fold, directly related with a southwards vergent thrust which places the Basque-Cantabrian basin over the autochthonous Ebro foreland basin. The second one, a long, wide, kilometric scale syncline, shows low dipping limbs (around 15º), excepting the areas influenced by diapiric bodies, where dip changes occur reaching sub-vertical even overturned dip values.

Data have been analyzed in a 3D GIS environment to better integrate different types of surface and subsurface data (field, maps, wells, seismic, gravity, ...) and process them all together in order to obtain a unique geological model or cross section.

The result is a cross section with its corresponding restoration, which combines surface and subsurface data, from which different conclusions can be pointed out: 1) the Urbasa syncline is a growth fold developed as a result of the tectonic inversion of a previous extensional fault; 2) the presence of an important thickness of Keuper facies has determined the structural style of the area, observing wide, gentle low dipping structures, partially due to Triassic clays absorption of deformation (excepting Sierra de Cantabria thrust front); 3) a minimum shortening and southwards displacement amount of 25 km has been calculated for the Basque-Cantabrian basin across the Sierra de Cantabria domain; 4) deformation in the Sierra de Cantabria thrust front has mainly been accommodated by a single thrust sheet with smaller reverse faults in its hangingwall (i.e. San Tirso fault). Furthermore, the Ebro foreland basin has also accommodated part of the deformation by means of a backthrust that only implies Middle and Late Tertiary materials.