Geophysical Research Abstracts
Vol. 21, EGU2019-9959-1, 2019
EGU General Assembly 2019

Compressional salt tectonics in the South-Pyrenean fold-and-thrust belt: role of pre-existing diapiric structures and insights from 2D numerical modelling

Laura Burrel (1), Antonio Teixell (1), Naiara Fernandez (2), and Michael Hudec (2)

(1) Departament de Geologia, Universitat Autònoma de Barcelona. Facultat de Ciències, Edifici C (Sud), Campus UAB. 08193 Campus Bellaterra, Cerdanyola del Vallès, Spain, (2) Bureau of Economic Geology, Jackson School of Geosciences, The University of Texas at Austin, University Station, Box X, Austin, Texas, 78713-8924, USA

Triassic Keuper evaporites have long been recognized as the main detachment level for thrusting in the Pyrenean fold-and-thrust belts. The deformed Late Cretaceous to Eocene foreland basins of the Pyrenees show evidence of diapirism that has been often overlooked due to the more obvious imprint of thrusts and fault-related folds. We reinterpret a classic transect of the Southern Pyrenees (Noguera Ribagorzana river), exploring the variation of the salt-tectonics structural style and addressing the role of halokinesis in the structural and sedimentary development of the basin.

According to our interpretation, the study area includes precursor diapirs that started developing during the Mesozoic pre-orogenic extensional episode of the Pyrenees, and areas where the halokinetic movements were likely triggered during the Pyrenean compression. We report the case of the Sierras Marginales foothills, a system of polygonal salt ridges and intervening synclines filled with early synorogenic sediments that now appears intensely imbricated. The second case study is the Montsec thrust and Ager basin, which we reinterpret as a linear salt wall and an adjacent synclinal depocenter with a long history dating back to the extension, subsequently squeezed during the orogeny.

Our field observations lead to fundamental questions regarding the relative roles of buckling and drape folding by salt migration in this foreland belt, as well as the mechanisms that facilitated the transition from early salt-cored folding to late thrust-imbrication. We have addressed these questions by 2D numerical modelling of the evolution of a foreland basin under compression and syntectonic sedimentation. Numerical modelling was used to specifically investigate the role of pre-existing diapiric structures and the pre-compressional thickness of the salt in the deformation styles. The results emphasize the importance of the salt-to-overburden thickness ratio and differential sedimentary loading in the final geometry of folding and also in producing backstops for thrust propagation.