Structural Styles of Fold and Thrust Belts Reactivating Passive Margins Involving Salt

Josep Munoz[1], Pablo Granado[1], Phillip Strauss[2], Klaus Pelz[2], Eduard Roca[1], Oriol Ferrer[3], Elizabeth Wilson[1], Pablo Santolaria Otin[4]

[1]University of Barcelona; [2]OMV Exploration and Production GmbH; [3]Departament de Ciencies de la Terra i Ocea; [4]Universitat de Barcelona

9.29.2020 - 10.1.2020 – AAPG Annual Convention and Exhibition 2020, Online/Virtual

Abstract

Structural style of fold and thrust belts involving passive margins and salt mainly depends on the inherited rift fault system as well as the distribution of the weak salt horizons. Salt distribution also depends in its turn on the timing of salt deposition with respect extensional deformation and the role played by salt-sediment interaction at post-rifting stages preceding contractional deformation. Many fold and thrust belts have involved and reactivated salt structures either in convergent margins or in deep-water passive margins affected by salt gravity gliding and spreading processes. As emphasized by A.W. Bally, determining the role of basement as well as the importance of weak horizons in the overlying sedimentary sequence is commonly problematic, even with seismic reflection data. Recent research on the structure of the Pyrenees and the Northern Calcareous Alps suggest that components of passive margin thin-skinned extension and downbuilding better explain the current contractional structure of these salt-influenced fold and thrust belts. The structural style is characterized by: a) multiple structural orientations for folds and faults, b) strong changes in fold plunges, c) faults omitting or repeating stratigraphy (i.e., apparent extensional faults passing laterally into reverse/thrust faults), d) stripes of severely deformed evaporites or their equivalent leached remnants (i.e. salt welds, thrust welds) that bound thrust units having markedly different sizes and contrasting stratigraphic thicknesses, e) large panels of fully overturned stratigraphy moderately deformed internally. In this scenario, overturned panels involving a relatively reduced succession have been interpreted as the result of contractional deformation of megaflaps or

sediments overlying the salt inflated areas. However, a problem lies in the interpretation of overturned to vertical panels involving the thick successions of minibasins depocenters, as experimental models show a moderate amount of rotation during the contractional deformation. These geometries depart significantly from the fault-related fold models and structural styles commonly used for the construction of cross-sections in contractional settings and implemented in commercial software. The examples herein included based on field case studies together with analogue modelling provide new templates for structural interpretation of subsurface data sets with the aim to improve geological models and reduce the uncertainty during exploration and production in fold and thrust belts involving salt, which include some of the most prospective areas such as the Campeche Foldbelt or many other foldbelts around the planet.