Geophysical Research Abstracts
Vol. 20, EGU2018-14090, 2018
EGU General Assembly 2018

Allochthonous Triassic and Salt Tectonic Processes in the Betic-Rif Orogenic Arc

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Field observations, integrated with regional seismic profiles and well data in the foothills of the Western Betics, show Triassic evaporites overlain by Upper Cretaceous-Paleogene deep-water sediments while the Jurassic strata are absent. Exploration wells in the area penetrated a thick Triassic unit (1.5 to 3 km), mostly in Keuper evaporitic facies, overthrust onto a Triassic to Upper Cretaceous section lying above the Hercynian basement. In other cases, a reduced and condensed Jurassic section is found above the Triassic series.

We interpret the occurrence of two Triassic (Keuper) sections, with a thicker allochthonous evaporitic nappe superposed above an autochthonous level. The Upper Cretaceous-to-Middle Miocene depocentres found above the allochthonous Triassic nappe in the Western Betics are interpreted as elongated minibasins. The condensed Jurassic section observed locally above the allochthonous Triassic nappe could correspond to salt carapaces. Salt minibasins and carapaces were intensively deformed during the later Alpine contraction. Tectonic windows of the imbricated South-Iberian and North Africa passive margin units emerged from below deforming the base of the allochthonous Triassic nappe, postdating its emplacement.

All these observations suggest that before the Alpine contraction, since the Cretaceous, the primary basin of the South-Iberian and North African margins were thrust by large allochthonous salt canopies.

Secondary basins (or minibasins) with much younger sediments and tabular carapaces with condensed sequences are common structures in the subsurface accompanying allochthonous salt sheets. The Betics and Rif constitute another field analogue documenting allochthonous salt tectonic processes, exhumed finally in this case by orogenic contraction.