# Extrapolating Fold Belt-Scale Structural Data to Subsurface. Example from the Zagros

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## ABSTRACT

The Zagros Fold & Thrust Belt offers an extraordinary wealth of geological outcrops that allow for precise observations at several scales. The question then arises how to interpret the data, prior to extrapolate it to subsurface in the Arabian Plate. Between 2000 and 2008, several joint teams of NIOC and IFPEN have collected structural data and information about fractures in the Izeh zone, Dezful embayment and in Fars. Observations at kilometer scale define the global structural style and give clues to better interpret seismic data of often poor quality. At hectometer scale, Zagros outcrops offer information about carbonate diagenesis and fracture density and orientation. Some examples from our studies in the Zagros Mountains will illustrate these points. Defining more precisely the role of mechanical stratigraphy in the structural style of the Dezful Embayment or in the Fars region helps to construct balanced cross sections. From these sections, the geological history can be reconstructed and leads to a better understanding of the kinematic evolution of the Tethyan margin of the Arabian plate. Ductile layers like the Fars salt also influence the structural evolution and the shift from thin skin deformation to thick skin deformation. The development of fractures can be related to the different steps of the Zagros build up and put in relation with the Tethyan closure. Following the observations in the Zagros Fold & Thrust Belt and studies on other thrust belts ( like the Andes and their foreland) , two types of tools allow us to extrapolate these observations to subsurface at prospect or reservoir scale and will be presented. The first type of tool consists in small scale analog modeling to understand the structural evolution. Analog models with silicon and sand/pyrex beads mimic ductile and fragile layers. Forward deformation of such models under XRay scanner results in 3D voxel type data sets that can be compared to present day information. Such experiments will cross validate the kinematic evolution. The second tool is strain reconstruction through time with restoration techniques, to derive fracture density and orientation proxys. Major or minor strain orientations might be obtained through mechanical computations and compared to outcrop observations from the Zagros or core observations from wells. Such data can then be used to derive regionally more or less deformed areas, so that adequate well locations might be selected.