Hunting for the trap: Applied Structural Geology in OMV Exploration

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In OMV Upstream Exploration we use a variety of structural geological methods for the evaluation of on-shore to offshore exploration prospects. The main techniques applied are 1) kinematic modelling and restoration for validation of seismic interpretation and maps, 2) generation or use of static 3D structural models for fault seal analysis 3) analogue modelling to increase the understanding of processes and structures. This presentation will focus on the workflow for integrated structural geological interpretation. The main purpose of this is to understand the structural architecture of potential hydrocarbon traps and to de-risk the interpretation. Finding a trap in the exploration workflow usually relies on the interpretation of reflection seismic data. Especially in complex deformed areas seismic imaging often is very poor and allows more than one interpretation. In addition in the absence of 3D seismic the available 2D grid of seismic lines might be spatially too sparse for defining reliable closures. As a consequence, the amount of possible interpretations of a potential trap and thus the associated risks are high. A way of reducing the number of possible solutions is the construction of balanced cross sections. However, there might still be several geometrical solution. Thus, it is required to take as many constraints as possible into this workflow in order to find a geometrical correct solution (i.e. balanced) that also reflects process understanding (i.e. when and how rocks and regions deform). Valid solutions should honour the regional evolution, the tectonostratigraphy with a focus on the mechanical stratigraphy and the likelihood for pre-existing structures. Doing kinematical forward modelling helps to understand the geometry and temporal evolution of a structure or an area. Such models should be aligned with knowledge gained from physical and numerical models to make them more consistent. A careful consideration of all constraints yields most plausible solutions for the structural architecture and often yields new insights into the structural geological evolution of the considered region. The workflow will be applied to a case example from the Kirthar Fold belt of Pakistan. By considering all constraints from regional to local, it can be demonstrated that the most likely scenario for the deformation of the central Kirthar fold belt is thick-skinned inversion linked to trailing thin-skinned deformation.