

The Importance of a Late Stage Deformation History on the Quality of Fractured Reservoirs: A Field Based Approach

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ABSTRACT

Fractured carbonate reservoirs are the most common producing reservoirs in the Kurdistan Region of Northern Iraq. A long history of carbonate deposition followed by destructive diagenetic overprinting leads to less favourable depositional reservoir quality. Fracturing of reservoirs in this region is a staged process, and the events which enhance porosity the most are relatively recent when compared to the ages of the primary reservoir targets. Few detailed subsurface fracture data for this region exist; therefore it is crucial to undertake surface fracture studies in order to understand the overall fracture network of the region.

This, however, is not a simple process and is based on a number of assumptions; mainly that the surface stress/deformation field is the same as that seen in the subsurface. It also presumes that lithologies of formations of interest display the same competencies over large distances.

A study of surface fracturing patterns was conducted by Robertson in Kurdistan in 2011. The study showed that:

- 1) The deformation field and the stress field in the Northern Arabian Plate are different, indicated by the presence of strike slip structures.
- 2) Surface and subsurface stress fields may be different due to the insulating properties of incompetent, or ductile, material i.e. flysch deposits (Kolosh and Tanjero) and evaporitic units (Lower Fars)
- 3) The Eocene to Oligocene stress field is apparently very similar to the recent stress field, therefore, tying the fracture formation to a specific structural event is difficult
- 4) Because of the similarities in the palaeo stress field (Eocene-Oligocene), with recent (Miocene and younger) stress fields, a reactivation of fractures could be implied.
- 5) The key issue for explorationists is the timing of fracturing in comparison to the timing of hydrocarbon migration.