AAPG Datapages/Search and Discovery Article #90319 ©2018 GEO 2018 13th Middle East Geosciences Conference and Exhibition, Manama, Bahrain, March 5-8, 2018

Fracture Related Diagenesis; Record of Reservoir Tectonic Evolution: Case Study from an Onshore Field in the Middle East

Mariam N. Al Blooshi[1] and Rachel Wood[1]

[1]Geology and Geophysics, University of Edinburgh, Edinburgh, Scotland, United Kingdom.

ABSTRACT

Understanding fractures and diagenesis is essential in reservoir characterization and enhanced oil recovery. Diagenesis and fracturing can significantly alter petrophysical properties of subsurface carbonate reservoirs, but the impacts of these processes at the inter-well scale are hard to predict. A combination of both reservoir fracture cementation geochemistry and outcrop field data is held in a case study of an onshore oil field in the Middle East to help with developing a complete picture for the reservoir model and its dynamic behaviour. The study involves establishing timing of fracture formation events within paragenetic diagenetic sequence using petrography, then placing fracture formation events within tectonic evolution, and quantifying of cement volume vs fracture volume, as well as elucidating cement generations to create a stratigraphy using Cathodoluminescence (CL) imaging. Different geochemistry tools like Electron Probe Microanalysis for in-situ sampling of elements (EPMA), Ion microprobe for in-situ sampling for isotopic investigation of d18O are used to constrain the relative timing of cementation and evolution of fracture-fluid chemistry. The results of the study will be used to establish a model for evolution of porosity and permeability to define tipping points through fractures, which will be used to explain the timing of key fracture and faulting events, and relate these to the evolving fluid chemistry and permeability of fracture networks through geological time. The study proved the existence of three generations of open and cemented fractures in a field, where the existence of fractures was a debate.