Integrated reservoir characterisation of a fractured basement reservoir

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It is a considerable challenge to effectively develop heterogeneous fractured reservoirs in complex structural settings. Here we present a case study of a fractured basement reservoir hosted in structural highs formed by fault-controlled blocks in an intra cratonic rift basin in the Middle East. The target zones are the metamorphic basement rocks in which fractures provide porosity as well as permeability (type I) and a thin overlying sandstone formation that is partially eroded. A wide range of data are available to study this unconventional reservoir. The seismic database includes a wide-azimuth data set, as well as an extensive set of derived attributes and a structural interpretation. Azimuthal anisotropy, automatic fault detection methods (ant tracking), and RMS amplitudes proved to be most useful in the description of the open sub-seismic scale fracture network, the fracture corridors, and the heterogeneously distributed sandstone layer above the basement, respectively. The overburden of this field contains several salt domes that pose considerable challenges for seismic imaging. A distinct advantage of wide-azimuth seismic surveys is that these provide an optimum illumination in complex structural settings such as it is the case in the current field. In addition to the large scale data, conventional log suites and image logs were acquired in most of the wells. Borehole image log studies were conducted in order to interpret and recognise fracture features at the wells. Regarding dynamic information, flowmeter logs were acquired in addition to the production history. The main objectives of this integrated study were the creation of a conceptual model that is used for well planning. Further it constrains the static and dynamic properties of the reservoir model.