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CRITERIA FOR DISCRIMINATING DRILLING-INDUCED TENSILE FRACTURES FROM NATURAL FRACTURES IN BASEMENT ROCKS

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To date, a number of reservoir evaluation workflows have been developed and commonly used in exploration and production of fractured basement reservoirs. Identification of fractures from available borehole image logs has often been an integral part of such workflows. There have been, however, few critical analyses of methodology efficacy, especially in view of successful discrimination between natural fractures and drilling induced fractures in borehole image logs. In hard-rock reservoirs all hydrocarbon storage is in the open natural fractures, while drilling induced fractures are also open but do not contribute to the producibility of the reservoirs.

Moreover, differentiating between different fracture types is of great importance for correct determination of principal stress orientation as well as for correct assessment of a number of fracture attributes used in reservoir modeling (e.g. fracture density, length and spacing). Therefore, poor fracture interpretation can result in severe errors in total reserves estimates.

This study, using examples from basement fractured reservoirs of Southeast Asia, illustrates the problems and pitfalls facing the borehole image interpreter in discriminating between drilling-induced tensile fractures and natural open fractures. Particular attention is given to complex situations where drilling induced tensile fractures resemble natural open fractures because of the significantly inclined fracture traces on the borehole image logs. Different discrimination criteria are thoroughly re-evaluated and the validity of automated interpretation routines investigated.

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