STRESS ANALYSIS AND HYDROFRACTURING DIRECTIONS IN MALAYSIA BASED ON BOREHOLE BREAKOUT STUDIES

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Orientational data of stress-induced borehole elongations resulting from concentration of present day stress at the borehole can be gathered from the caliper data of the 4-arm dipmeter log. Over 80 wells in Sabah, Sarawak and Peninsular Malaysia show regionally consistent borehole breakout orientation. 5 stress provinces have been recognised in the Sabah and Sandakan Basins. Compression orientation is NW-SE and NNW-SSE in Central Western Sabah and North Western Sabah. In South and Central Western Sabah, the extension orientation is ENE-WSW whereas in North Western and North Sabah it is oriented NW-SE. The generally N-S compression in North Western Sabah and mainland North East Sabah is in agreement with the plate movement orientation during the 'pre-rift' and 'spreading' phases in South China Basin. The N-S breakout orientation in the North Dent Province is related to a compressional field in the E-W orientation. The NW-SE compression orientation in Central Western Sabah indicates a stress field similar to the ones in Sarawak. Sarawak have been divided into 6 stress provinces. Compression orientation is NW-SE in the East Balingian and Baram Delta Provinces and NNW-SSE in West Balingian. Whilst the extensional orientation is dominantly NW-SE, several provinces show a second set of extensional orientation: NNW-SSE in Central Luconia, E-W in East Luconia and East Balingian, and NE-SW in the Southwest Luconia Province The existence of the second set of extensional orientation is believed to be caused by subsidence in the clastic depocentres of the Rajang-Lupar Delta to the west and the Baram Delta to the east respectively. The extensional orientation is ESE-WNW to E-W to ENE-WSW in North and South Malay Basin and NW-SE in Southern Tenggol Arch. The compressional trend in the South Malay Basin is NNW-SSE. Different sets of breakouts within a stress province have been interpreted as the result of the variation of stress field in the vertical section. Present day stress field may be oriented slightly differently from observed older transgressional structures. Other possible uses of the Borehole Breakout Method are in hydrofracturing and wellbore stability control.

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