

Horizontal stress profiles reconstruction based on elastic properties and natural fractures' characteristics. NanTroSEIZE case study.

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A great amount of data acquired for IODP expedition sites in the Nankai Trough area made it possible to use a previously proposed approach of utilizing wellbore imager data to estimate the horizontal stresses distribution along wells' trajectories. Horizontal stress profiles were reconstructed for site C0002 with a decent accuracy (being in consistence with studies of other researchers) and the same profiles were estimated for several other sites in the area.

A reconstruction of stress profiles for site C0002 was based on data provided by the leak-off tests (LOTs) performed during expedition 338. The inverse problem of stress reconstruction was solved by introducing a relationship between stress field and fractures observed at the azimuthal focused resistivity images provided for the well. Although the initial formulation of the applied approach had requested a study on both resistivity and ultrasonic imagers, it has been found out that some estimations may be carried out on a single image data with extra investigations of gamma-ray, resistivity and velocity logs with the use of composition of the medium (mineralogy and organic matter). A corresponding research was carried out for this site to estimate the horizontal stresses profiles which proved to be consistent with the LOT results and breakout model.

In spite of absence of data on minimum horizontal stress magnitude from LOT performed for other sites in the area there still remains data on the fracture orientations from wellbore imagers –crucial input data for the applied approach. This approach was modified to provide some estimations on the stress profiles without direct measurements of minimum horizontal stress. The resultant stress profiles have a wider range of possible magnitudes compared to C0002 site although they still contain valuable information regarding the in-situ stress state in the area.

The modifications of the approach applied in the case, results of the stress profiles reconstruction and their comparison with other researchers' results are presented in the paper.

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