

## **Fractured Reservoirs Session Predicting Stress and Fracture Orientations with Geomechanical Reservoir Models - Lessons Learned from a Case Study**

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The study evaluates the potential of geomechanical reservoir models for a prediction of tectonic stresses and fracture networks. Such a pre-drilling knowledge is desired for a variety of tasks like borehole stability and planning of hydraulic fracs, among others. A comprehensive workflow is presented describing the various steps and data requirements to set up, run and calibrate a geomechanical model. Special focus is on integration of the modeling work with a Petrel® project. The modeling concept is applied to a data set from the eastern Sirte Basin / Libya to assess its practical value. The reservoir geometry is constrained by 3D seismics and stress and fracture data from three wells were used to check the model predictions. Modeling is carried out as a history match to mimic the increase in information during the exploration and appraisal stage. The case study shows that a robust prediction of the stress field including its local perturbations near faults can be based primarily on the reservoir geometry. Fracture prediction is more complex and requires well data for calibration as the model has to use several poorly constrained parameters like the magnitude of the paleo-stresses to infer the fracture orientations.