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3D generalised inversion as direct input into static model in Kamunsu East Field — a case study

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A reservoir characterization project was carried out on the Kamunsu East gas field in offshore North West Borneo, Malaysia. The aims were to produce a notional field development plan as quickly as possible while increasing understanding of the 3D sand body geometry and lithofacies. An innovative workflow was developed using a variety of software and techniques to best achieve the project aims. The field consists of complex deep-water canyon turbidites of Miocene age in a thrust-footwall setting. Detailed structural mapping was enhanced and updated against the results of a sparse spike inversion based on a single well and 3D seismic. Body checking of seismic and acoustic impedance volumes helped to delineate 3D sand bodies, connectivity and preliminary volumes. Core, image log and dip-meter analysis was integrated with the structural interpretation and body-checking of acoustic impedance. This together with fan-scale 'stratigraphic' slicing of the turbidite fan system aided understanding of the evolution of the fan and allowed meaningful zonation of the reservoir. In addition, neural network-based classification of well logs allowed the drilled reservoir sands to be sub-divided into 4 lithofacies. 3D geostatistical and neural network classification of AVO, acoustic impedance and dip-azimuth volumes then allowed the well-based lithofacies classification to be extended throughout the reservoir within two fluid types. The updated fault and horizon mapping was used to build the initial static model. The models were populated with sand and fluid distributions from the calibrated inversion results and reserves were computed. Subsequently an AVO inversion was carried out and derived lithology and porosity volumes were used to update and improve the static modelling. The study demonstrates that an integrated approach using a variety of techniques in a multidisciplinary team allows rapid and cost-effective 3D reservoir description leading to accelerated field development planning.

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