

Sandbody Characterization from Microresistivity Images, Palaeogene Siltstone Reservoir, China

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High-resolution microresistivity images played a unique, important role in the determination of sandbody orientations and the recognition of the associated depositional environments, as well as the detailed reservoir characterization, of a China oil field that comprised three key wells. The images complemented conventional core data and well logs in the sandbody characterization. The sandbody orientations were derived from the crossbedding analysis on the images and the depositional energy analysis from the images, and the associated depositional environments were reconstructed using the sedimentary structures and textures on the images. The sandbody characterization finally provided the classification of the sandbodies that correspond to the different reservoir parameters for further field development.

The main contributor to oil reserves and production in the field is the siltstone reservoir of the Paleogene formation, which was dominantly formed in the delta front depositional environment. The unknown sediment supply source and complex field geological structure make reservoir characterization in the oilfield very difficult, if not impossible, with only the traditional methods. In fact, the current field development demonstrates that in the oil field, the Paleogene siltstone reservoir contains structural traps and stratigraphic traps, as well as structure-stratigraphic traps. Detailed sandbody characterization is very important in further field development, but almost impossible using only conventional core data and well logs.

The case studies demonstrate the application of combining the detailed sandbody characterization from the images with seismic interpretation results, the types of the paleogene siltstone reservoirs were established, and the new well locations were determined.