

Research Well Data from an Outcrop Analogue Study, Permian Basin Floor Fans, Tanqua-Karoo Basin (South Africa): An Aid for the Development of Fine-Grained Turbidite Reservoirs

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Outcrop analogue studies can significantly be augmented by drilling wells through the same stratigraphic interval with the objective to validate the outcrop observations with well log and core data “behind the outcrop”, and thus to improve the use of such data in actual field developments. For research wells located further away from the outcrops, the increased spatial data coverage can give important insights into regional facies changes. In a study of the Permian basin floor fans of the Tanqua-Karoo basin (South Africa), seven wells were drilled to supplement the outcrop data, three of them close to the cliff faces, and four at significant distances away from exposures.

The first three wells proved useful in establishing characteristic log responses of the main architectural elements that were identified from the nearby outcrops. Lithofacies were for more than 80% of cases correctly identified using a neural network, and bore-hole images provided detailed information on sedimentary structures, including a wealth of palaeocurrent data from climbing ripples that significantly enhanced the interpretations from the outcrop measurements. The wells further away from the outcrops proved crucial in defining the lateral geometries of the fans. The combined data indicate that deposition was controlled by subtle basin floor topography, and that intrafan lobe switching took place that led to internal subdivisions, potentially causing an effective compartmentalization of the basin floor fan.