Correlation and Sedimentary Steering to Maximize Well Placement Certainty in Mature Reservoirs While Drilling

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The paper explores the use of high resolution logging while-drilling (LWD) resistivity images for detailed sedimentological interpretation, and its subsequent application to geological correlation, geological model definition and reservoir characterization.

With core calibration, event surfaces, internal sandbody architecture and palaeosol development can be interpreted. Vertical dip sequences recognized in images indicate sedimentary processes and allow high resolution image facies designation and analyses akin to those obtained using conventional wireline borehole images. Significant internal variability is seen in several of the imaged sandbodies including localized distribution of internal mudrock bands, lateral image facies discontinuities and image facies thickness variability. A palaeosol has been seen in the two imaged wells and in core. The palaeosol contains features and fabrics characteristic of the soil forming process, the development of which can be used to infer the degree to which the palaeosol has developed or "matured". This may provide an indication of lateral proximity of the soil forming location to contemporaneous flood plains and rivers, and has direct implications for the interpretation of reservoir architecture and the correlation of channel sandbodies away from areas of well control.

Comparison of LWD images with core is used to "ground-truth" the image facies and to help in correlation within sandbodies at nearly the same scale. Different sandbody types have been identified in the section including fluvial channels and deltaic lobes. When combined with NMR, image facies can be considered in a producibility context.

Real-time while drilling sedimentological information opens up the previously unachievable application of 'sedimentary steering' of a drill string BHA through constant tuning to the updated geological model. Sedimentary steering will lead to reduced uncertainty in future well placement and maximum reservoir penetration.