INTEGRATION OF CORE AND DOWNHOLE ACOUSTIC MEASUREMENTS - SHEAR AND COMPRESSIONAL

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Abstract The acquisition of reliable formation shear and compressional velocity data (V_s and V_p, respectively) is becoming increasingly important for better calculation of rock properties for use in both geophysical and petrophysical applications.

A study has been made using core samples from the Rotliegendes sandstones of the southern North Sea in order to evaluate better the laboratory measurement of both shear and compressional velocities and to improve the application of downhole velocity measurement. Excellent correlations between the log and core velocities were found.

Transforms have been established for the Rotliegendes formation to relate compaction-corrected core porosity to shear velocity, as a basis for predicting porosity from downhole shear velocity measurements. The downhole shear velocity measurements were provided by the Mobil dipole-sourced Shear Wave Acoustic Log (SWAL) which gave reliable shear velocity measurements even in cased hole. The downhole compressional velocities were acquired with the monopole-sourced Mobil Long Spaced Acoustic Log (LSAL).

Results of the laboratory measurements indicate that core velocities are sensitive to overburden stress and fairly insensitive to sample size.

Comparisons have been made of V_p/V_s ratio from core and log data, which is the input parameter for many of the petrophysical and geophysical applications. Poisson's ratios calculated from acoustic velocities ("dynamic") compare well with those measured directly during triaxial testing ("static").