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Calibration of a mobile NMR core scanner in respect to porosity and pore size distribution

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The focus of our research is set on the calibration of a new, light-weight, mobile NMR core scanning system. We use the HALBACH core scanner as a fast and non-destructive instrument to determine routinely rock porosity and to estimate the pore size distribution of drill cores. The HALBACH core scanner is especially designed for the size of standard drill cores recovered from the deep sea ocean floor by the Integrated Ocean Drilling Program (IODP). Transverse relaxation on water-saturated drill cores was measured using a CPMG sequence. A regularized Laplace transform analysis yields the distribution of transverse relaxation times. The signal amplitudes and the integrals of distribution correlate directly to the core porosity. The HALBACH tool has a sufficiently strong and homogeneous magnetic field and can determine porosities as low as 3 %.

The main advantage of the HALBACH core scanner compared to conventional methods is its small size and weight, which is particularly attractive for the shipboard use and on any drilling platform envisioned for IODP. In the future we intend to adapt current NMR processing techniques, to develop new measurement routines, and to evaluate precision and accuracy of the method.