GL04715

1991 AAPG International Conference Abstract Form

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Title of Abstract: Statistical Curvature Analysis Applied to Stratigraphic Heterogeneity in the Ferron Sandstone, Utah

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Statistical Curvature Analysis Applied to Stratigraphic Heterogeneity in the Ferron Sandstone, Utah

Recent advances in borehole imagery have greatly improved the precision of bedding orientation measurements in wells. However, because the literature contains few measurements of bedding orientations within the context of structures or facies, their identification is largely qualitative. Borehole imaging logs have been simulated by measuring bedding orientations in vertical sections through outcrops of the Cretaceous Ferron Sandstone outcrops in Utah. Heterogeneity within this fluvial-deltaic unit is due to both lateral changes in depositional character and erosion. Depositional and erosional fabrics evaluated using Statistical Curvature Analysis Techniques (SCAT) provide the first field test of this methodology on stratigraphic problems.

Variations in azimuth, dip angle and transverse and longitudinal dip components as a function of depth correlate very well with units identified in the field. In general, the range of dip angles increases as the energy of the transport system increases. The statistical bulk curvature of the units can be evaluated using plots of dip vs. azimuth and polar tangent diagrams. Examples show that trough cross beds generate Type II conical bulk curvature patterns; hummocky cross stratification generates doubly plunging fold patterns.

Different parts of individual facies are also distinguishable using SCAT. Efforts are underway to characterize facies in three dimensions using dip orientations. Two coreholes will calibrate borehole imaging logs and validate applying the SCAT method in the subsurface.