Overview of capture and 3D virtual modeling of outcrops at high accuracy and resolution with case histories in North America and Europe

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Summary

The University of Texas at Dallas has been laser rangefinder mapping geology since 1994, tracing geology and mapping terrain, all integrated with satellite positioning at survey grade level. The geologist was the best person to map geologic features such as contacts and faults since such mapping is part of the geologic analysis, but often the tracing was not done by the geologist . However after the mapping it was apparent that some features were not mapped or mapped incorrectly even by the geologist (geologists change their minds!). The solution in 1998 was the integration at high accuracy photography onto the terrain models so any digitization would be on the photorealistic (virtual) surface model with a cursor in the office, in which a patent was received in 2003. In our solution the camera and scanner works independently. Originally internal color detectors in scanners were not very satisfactory but recently they have improved significantly. The advent of the coaxial camera mounted on the scanner allowed a variety of cameras and lens combinations to be used for a wide range of resolutions and coverage. UTDallas has mapped and modeled over 60 outcrops around the world since 1998, almost all on sedimentary rocks, often for oil and gas applications such as reservoir characterization and geologic training and education. Methods for visualization and analyses of such virtual surface models were developed specifically for such models. Case histories will be presented and reviewed including Eagle Ford Shale in Texas, Ferron sandstone in Utah, Breathitt Group in Kentucky, Writing on Rock in Alberta, Jackfork Sandstone in Arkansas, Ross formation in Ireland, Arbuckle in Oklahoma and others.