



High dynamic range optical scanning of sediments and rock samples: More than colour?

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An automated high dynamic range (HDR) scanning procedure for cores and single sediment samples has been developed based on the GeoTek core scanner equipped with a 3* 2048 pixel CCD array GeoScan colour line-scan camera and a Sigma AF 105mm F2.8 EX DG MACRO lens. Repeated colour line scans of the same core sequence using different illumination and exposure time settings, but equal aperture, can be combined into single HDR images. This yields improved colour definition especially if layers of highly variable brightness occur in the same sequence. Colour calibration is performed automatically during image processing based on synchronization of colour charts. Polarized light is used to minimize gloss on wet surfaces. Beyond improved colour detection, high resolution scans with pixel size down to $25 \mu\text{m}$ provide the possibility of quantifying fabric, texture, and colour contrast between mottle and matrix. We present examples from marine sediments, lake sediments, hard rock cores, and individual soil samples. Due to the high resolution in sediment sequences, the improved images provide important background information to interpret synchronous measurements of density, magnetic susceptibility, or X-ray fluorescence with respect to their respective measurement footprint. If for example an XRF measurement indicates a 2% increase in Fe at a location of a thin black layer of 1/10 of the XRF measurement footprint, within an otherwise homogenous sequence, it can be inferred that the real Fe abundance within the layer is probably 20% higher than in the surrounding sediment. HDR scanning can therefore help to provide high resolution informed interpolation and deconvolution of measurements with larger sensor footprints.