

## **APPLICATION OF IMAGE ANALYSIS IN THE STUDY OF QUATERNARY SEDIMENTS**

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Several novel image analysis algorithms have been developed in recent years specifically for the study of Quaternary sediments. These include methods to study the microfabric as well as bore hole profiles. This presentation summarizes the work done as part of International Geological Correlation Programme 396, and includes four separate aspects. Multi-spectral methods provide a powerful method to map minerals and in particular provide an insight into processes associated with the formation of paleo-desiccated crusts formed during low-stand sea levels. The procedure involves mapping with normal SEM images and associated X-ray maps. Extensions of the technique using intensity gradient algorithms allow analysis of size and orientation of separate mineral species as well as compaction within the clay-sized matrix. Automatic grey-level morphological methods using grey-level opening and closing allow non-destructive methods for particle size analysis of particles or aggregates seen in images. This technique has been used over a wide range of scales from sub-micron to millimetre-sized particles and allows variations in size distributions from very small samples to be studied. Data obtained from the larger particles appear consistent with traditional sieve analysis, while analysis of the finer particles make allowance for aggregates. Automatic objective thresholding routines combined with binary morphological opening and closing methods can be used as objective and automatic methods for analyzing particle shapes and roundness. High resolution stratigraphic information may be obtained from processing colour images of continuous cores from boreholes. Information on variations within sequences from thicknesses as fine as 0.5 mm is possible.