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PHYSICAL CHARACTERIZATION OF COARSE CLASTS WITH 3D IMAGE-ANALYSIS METHOD: DEVELOPMENT, EVALUATION AND APPLICATION

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ABSTRACT

This thesis presents a novel three dimensional (3D) image-analysis method for characterizing the physical characteristics of coarse particles in the field, and introduces new methodology for the total analysis of glacial till samples.

The novel image analysis method, called the GID method, is capable of determining the size, shape and surface texture of each individual clast analysed. Images of particles are taken in the field and analysis is done in the laboratory. Therefore the GID method makes it feasible to analyse statistically representative large sample in short period; for poorly sorted sediments, such as till, one-tonne is required if the analysis includes cobble size. The capability of the GID method was demonstrated by studying coarse clasts (20-200 mm) from till. There is excellent agreement in the results of the size distribution obtained from the GID method and sieve analysis. The GID method results for size and shape parameters show high and very high repeatability. The particle angularity in the GID method has not been measured to acceptable level; the repeatability test shows some variability.

The new methodology for total analysis of till applied the GID method at four different locations in Sweden. The total analysis included 3D size and shape distribution of coarse particles coupled to electrical resistivity, lithological distribution and magnetic susceptibility of the clasts. The results show clear difference in the till samples from the different sites.

Keywords: 3D image analysis; Particle angularity; Sieve analysis; Particle form; Gravel analysis; Repeatability; Lithological distribution

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