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Variations in clast morphology for different till fractions: implementation of digital imagery

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The form of clastic particles provides information about debris history including abrasion and transportation which are vital to geomorphological research because of its usefulness for differentiating subglacial debris form englacialy, supraglacialy and fluvially transported sediments, and for understanding subglacial processes. There are numerous attempts to clastic particles form assessment, both qualitative and quantitative and advance in technology enables the use of digital imaging and image processing in order to calculate the precise indicators of shape and roundness (small-scale surface features superimposed on shape and roundness are not a subject of this study). Computer calculations are fast, reliable and objective and its use decrease probability of errors. They are applicable to till deposits analysis and may help in understanding the processes of glacial deposition.

Till deposits consist of a mixture of various fractions of sediment, where coarser and thinner grains are together activated, entrained in ice, transported, deposited and post-depositional transformed together in the same time and conditions. That implies similarity of processes acting on the particles, but not necessarily theirs effects. Physical properties of grain are of great significance for its vulnerability to acting forces. An important feature of the tills is grain size, which has a high volatility in a sample. The hypothesis of this issue suggests it is possible that different fractions of till sediment have significantly different form characteristics. Verification of the thesis is important because standardly only one fraction is selected to analysis and to draw conclusions from.

Main objective is to test differences in clast morphology for different till fraction. In order to answer the research problem, the author has examined samples from a contemporary glaciated region, Nordenskiöld glacier foreland in central Spitsbergen. During the field work samples were collected from surface sediments, cobbles axes were measured, their roundness was evaluated with comparison charts and additionally photographs of debris from a bird's eye were taken. Further analyzes were performed in the laboratory using automated imaging for fractions less than 2 mm and digital photography for gravels.

All the information, describing in detail the shape of the particles in the different fractions of tills, allowed to verify of the existence of statistically significant differences between the deposits of different sizes.

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