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The continuum approach in analysing the glacial landscapes of the South-Eastern sector of the Last Scandinavian glaciation

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Traditionally geomorphologists are identifying individual landforms and describing their properties. However any discrimination of individual forms on the Earth's surface is arbitrary and often subjective. We are developing an automated procedure for slope and aspect distribution analysis of the digital elevation models. Instead of considering individual forms and describing them we intend to consider the Earth's surface as continuous plane and calculate the parameters describing it along a regular set of node points.

The aim of the research is to identify and characterise fast ice flow zones in the south-eastern sector of the Last Scandinavian glaciation. We assume that different glacial landscapes – drumlin fields, glaciolimnic planes, outwash planes, complexes of marginal landforms etc. – do have their own fingerprint of slope and aspect distribution. We expect that this distribution can be used to identify and characterise the particular process that has shaped it, e.g. the fast ice flow usually is associated with streamlined glacial bed and faster flow produces stronger, more distinct lineation. Slope aspect distribution across a drumlin field will have a bidirectional, symetrical character with dominant dip directions transverse to the ice flow direction. In contrast the distribution of slope dip direction at the terrain dominated by ribbed moraines will be asymmetric and clustering in the ice flow direction.

The slope and aspect distribution for the terrain at the Saadjärve drumlin field in eastern Estonia is used as the testing ground for the methodology. SRTM elevation data set is the basic data source and results are validated against the excellent laser altimetry (LiDAR) data obtained from Estonian Land Board.

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