Geophysical Research Abstracts
Vol. 12, EGU2010-851, 2010
EGU General Assembly 2010

Subglacial conditions and ice-flow patterns reconstructed from petrographic composition

Ewelina Lipka (1) and Izabela Szuman (2)

(1) Institute of Geoecology and Geoinformation, Adam Mickiewicz University, Poznan, Poland (e.lipka@amu.edu.pl), (2) Institute of Geoecology and Geoinformation, Adam Mickiewicz University, Poznan, Poland (szuman@amu.edu.pl)

Usually the petrographic composition of sediments give a basis to distinguish sediments horizons and correlate them. In this study clasts petrography contributes to reconstruction of subglacial conditions as well. Together with till fabric analysis and geomorphological facts it can also give a valuable evidence for ice-flow patterns.
The study concerns the Great Poland region, located in central-western Poland. The research area extnents are 53.149 °N and 51.849 °N paralells and 15.899 °E and 18.249 °E meridians. The area lies within the range of the Last Glacial Maximum phase (in Poland known as the Leszno Phase) and the Poznan Phase, which is the succeeding stage of the Weichselian Ice Sheet in Poland.
The purpose of the study was twofold. Firstly, the authors aimed at revealing and reconstructing the vertical diversity of subglacial dynamics. Secondly it was intended to distinguish lower-scale flowline patterns within the major ice streams as well.
A set of data was acquired from subglacial tills deposited by an active ice sheet sole (deformation and lodgement till). The data set included results of: lithofacies analysis results, till fabric measurements (a-axes of at least 30 elongated clasts), clasts-compositional data derived from 5-10 mm gravels and grain-size distribution obtained with wet and dry (mechanical) sieving techniques. Changes in the petrographic composition of gravels were investigated in two ways. At first, in parallel profiles, to detect a spatial tendency in the petrographic composition. The latter way concerned vertical profiles within subglacial till horizons with the purpose of revealing some trends induced by vertical changes of subglacial conditions. Subsequently all the textural features were associated with geomorphic traces, demonstrated by subglacial channels and other glacial lineations, obtained from Digital Elevation Model, in order to distinguish ice-flow patterns.
The clasts petrography analysed in vertical profiles revealed a bottomward increase of the relative content of the resistant components, like cristalline rocks. In authors' opinion this increased relative content of cristalline rocks can indicate higher energy level within the ice-sediment contact zone in the areas of cumulative strain. In those areas sediments are deformed and clasts are crushed more intensively, what can entail the destruction of non-resistant components.
We believe that the lateral diversity of petrographic composition combined with the analysis of directional elements obtained both from till fabric measurments and from morpholineaments can be considered a sufficient basis to distinguish lower-scale ice-flow patterns within the limits of two major ice streams that are delimited in Poland.