Geophysical Research Abstracts
Vol. 16, EGU2014-351, 2014
EGU General Assembly 2014

New insights into palaeoglaciological processes in northeastern Germany by analysis of a LiDAR DEM: using high-resolution elevation data to reassess the geomorphology of the Barnim till plain

Jacob Hardt (1), Margot Böse (1), Robert Hebenstreit (1), and Christopher Lüthgens (2)

(1) Freie Universität Berlin, Department of Earth Sciences, Institute of Geographical Sciences, Physical Geography, Berlin, Germany (jacob.hardt@fu-berlin.de), (2) University of Natural Resources and Life Sciences, Institute of Applied Geology, Vienna, Austria

We used airborne LiDAR DEM data to reassess the current state of research of an intensively studied "classical" glacial landscape, the Barnim till plain northeast of Berlin. To gain new insights into palaeoglaciological dynamics, we examined a high-resolution DEM for geomorphic features that either prove or negate previous research. The study area was last glaciated in the Weichselian, and its landforms are associated with the W1B- (Brandenburg phase) and W1F-advances (Frankfurt phase), except for the eastern Barnim where a push moraine complex was compressed during the Saalian. The course and the timing of the W1F ice marginal position, which is assigned to the Barnim area, are contradictorily discussed in literature. Hence, landscape analysis with a high resolution DEM appears to be a promising tool.

The LiDAR data used here has a ground resolution of 1 m and a height accuracy of 30 – 50 cm. In an ArcGIS 10 environment a database was created that contains spatial information about the study area collected from different sources. These include digitized geological and geomorphological maps as well as geochronological data from different authors. Owing to the size of the Barnim ($\sim$1900 km^2), three subsets with a size of 10 x 15 km were selected for advanced analysis (western, middle and eastern Barnim). Each subset represents one of the most characteristic landscapes of the study area. For each subset we performed a qualitative analysis of landscape features. The results were compared with each other and connected to the whole Barnim area as well as the current state of research. The most remarkable discovery was made in the middle Barnim. Here we identified a set of consecutive arcuate ridges. Their widths (NE-SW) are around 1000 – 1500 m, and their lengths are around 10 – 15 km; they rise some 10 m above their surroundings. According to geological maps and our own fieldwork, they are covered by till. A sandy or peaty substrate lies between the ridges. The inner sides of the ridges are northeast-oriented and rather steep, and the outer sides face southwest with a dip at a flatter angle. The ridges are incised radially. Their lobe-like form and the distribution of the substrates suggest a glacial origin. We propose a genetic model of recessional moraines that were deposited in front of an oscillating glacier lobe; however, other possibilities are also discussed. Similar forms were recently found around the ice margin of piedmont glaciers, e.g. the Malaspina glacier in southwest Alaska.

The timing of their formation still has to be investigated. Fine gravel analyses from other studies imply that they consist of a till that can probably be associated with a Weichselian ice advance. Understanding the genesis of the newly described ridges may be a key to solve the contradictory "Frankfurt phase problem" in terms of glaciodynamics and stratigraphy

Our study shows that even in intensively researched areas high-resolution DEM data can reveal landscape features that shed a new light on landscape genesis. Nevertheless, further fieldwork and geochronological data are necessary to obtain a complete picture of palaeoglaciological processes in the northeastern German lowland.