Quaternary of the Gulf of Gdańsk and lower Vistula regions in northern Poland: sedimentary environments, stratigraphy and palaeogeography. International field symposium of the INQUA peribaltic group, Frombork, Poland, September 14-19. – Warszawa, 2008. – P. 32-34.

RELATIONSHIPS BETWEEN PRECAMBRIAN FAULT ZONES AND PRESENT-DAY LINEAMENTS IN SOUTH-EASTERN SWEDEN

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The degree of inheritance of the present topography from past geological events in the Småland-Blekinge Deformation Zone (SBDZ) area in southern Sweden has been assessed by GIS modeling of the crystalline basement upper paleosurface, the present topography surface and basement-present topography correlation, as well as topolineaments identification.

A comparison of the model of the crystalline basement upper paleosurface (Figure 1) with the digital terrain model (DTM) (Figure 2) suggests that the formation of the present topography depended on the crystalline basement topography, as well as on glacial and postglacial depositional processes. Rivers and likes are the most respondent elements of the present landscapes, reflecting the faults of the SBDZ. The majority of the recognized topolineaments (Figure 3) atop the faults are the rectified parts of rivers and lakes. Thus, as a few examples the valley of the left tributary to the Lillån River, the depression of Ulvasjön Lake and the right tributary of the Landabäcken River, all inherit the NE-SW-trending faults. The Lyckebyån River abruptly changes its flow when crossing the WNW-ESE-trending fault system. Some rectified parts of the tributaries of the Landabäcken River and the Lillån River flow along the WNW-ESE directed faults. The map of correlation coefficients between the crystalline basement upper paleosurface and the present topography (Figure 3) suggest that the present surface is mostly inherited form the crystalline basement. The correlation coefficients field is mostly positive in the eastern part of the SBDZ area. Within the areas of the thinnest sedimentary cover the correlation coefficients reach +8.5 - +9.0 (within the area where the Lyckebyån River is crossing the WNW-ESE-trending fault system and in areas of the Lillån River and its tributaries).

Those relations allow us to suggest that the faults of the SBDZ was still active after its formation in the Mesoproterozoic. The displacement of the major WNW-ESE-trending fault system has occurred later along the linked NE-SW faults. Possible accumulation of sedimentary deposit, laid down before the Pleistocene glaciations within the area, must have been eroded away during the Pleistocene ice advances. The stress in the basement, caused by the thickness of the inland ice during full glaciations (during the Last Glacial Maximum (LGM) estimated from 1750 m, as the ‘maximum’ model reconstruction after Siegert et al. (2001), to 750 m, as the ‘minimum’ model reconstruction after Siegert et al. (2001)) would cause a neotectonic subsidence of the territory during the glacial advances, changing to neotectonic uplift during the glacial retreats within the Pleistocene. Such rapid changes of neotectonic regimes must have affected the faults of the SBDZ. We suggest that there were seismic activity and neotectonic deformations along the zone during this time. After the last retreat of the Scandinavian Ice Sheet, one part of the area (below the highest shoreline) was hidden by water of the Baltic Ice Lake, and the second part (above the highest shoreline) was covered by stagnant debris-rich ice. As a result of following uplift and melting of dead ice, two types of landscapes were formed within the key area. The formation of the present landforms and the river networks in the study area depended on the topography of the crystalline basement, as well as on the glacial/postglacial environment.

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As a result of the study of the eastern part of the SBDZ key area the Mesoproterozoic-Phanerozoic activity of the SBDZ has been identified. We reached this conclusion on the basis of the following indicators:

- Positive correlation of the upper paleosurface of the crystalline basement with present topography;
- The faults of the Mesoproterozoic SBDZ substantially influenced the formation and development of the most part of the present hydrological network and a part of the present landforms.
- The present seismic activity.

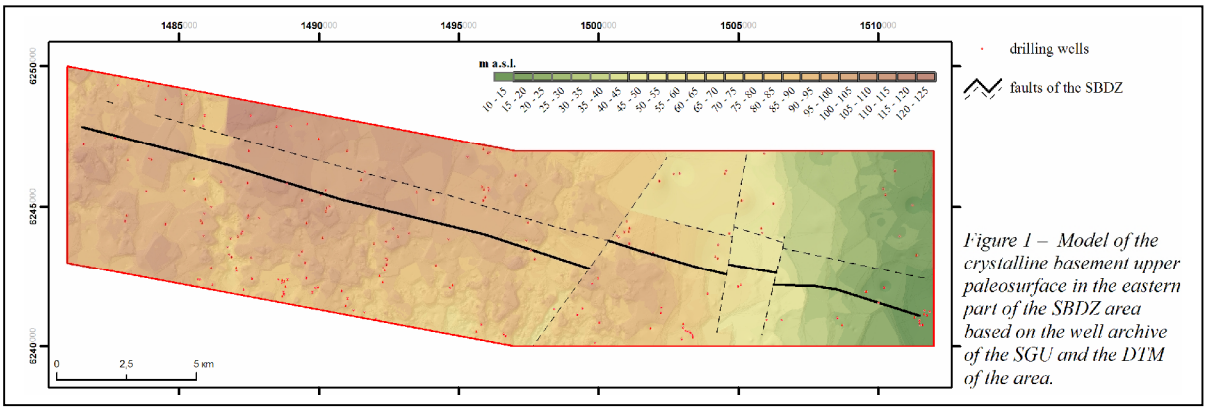

Figure 1 – Model of the crystalline basement upper paleosurface in the eastern part of the SBDZ area based on the well archive of the SGU and the DTM of the area.

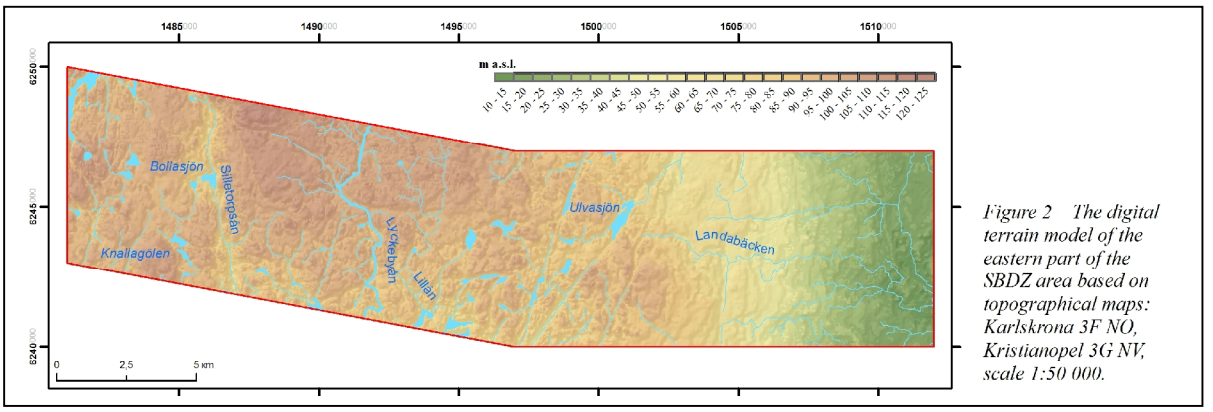

Figure 2 The digital terrain model of the eastern part of the SBDZ area based on topographical maps: Karlskrona 3F NO, Kristianopel 3G NV, scale 1:50 000.

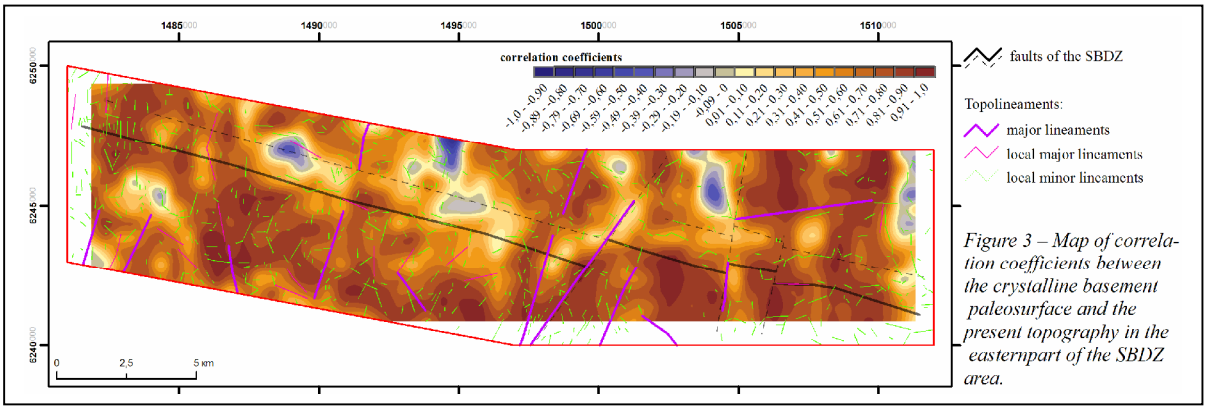

Figure 3 – Map of correlation coefficients between the crystalline basement paleosurface and the present topography in the easternpart of the SBDZ area.

REFERENCES

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