GEOLOGIJA. 2007. No. 60. P. 94–96


*Chronicle • Kronika • Хроника*

# Morphotectonics of lowland areas
## (Conference, August 27–31, 2007, Vilnius, Lithuania)

The conference "Glaciotectonic structures, palaeobasins and neotectonic setting" (August 27–31, 2007, Lithuania) organized by the Lithuanian Geological Survey and the Polish Geological Institute was held under the auspices of the European Union Project MELA (Morphotectonic map of the European Lowland Area), Contract No. MTKD-CT-2004-003108, http://www.mela.3dsign.pl). This event was the 2nd Conference of the MELA project.

The Conference of MELA was focused on a discussion on the relationship of glaciotectonic structures, Quaternary palaeobasins and neotectonic setting, the geological modeling and visualization, digital mapping of subsurface relief and remote sensing. Nevertheless, the main subject of the Conference was the methodology of the creation of the Morphotectonic Map of the European Lowland Area.

The territory of Lithuania can be regarded as one of classic regions with Quaternary cover formed during the continental glaciations. The average thickness of the Quaternary cover is 130 meters and varies from 10–30 m in the northern part of Lithuania, the area of prevailing glacial erosion, up to 200–300 meters in marginal highlands and the buried valleys of palaeoincisions. During the Quaternary period, Lithuania was covered by continental ice sheets originated in Fennoscandinavia, which correspond to all the glaciations known in the Eastern Europe so far, thus causing such complicated structure of the Quaternary of Lithuania.

The relationship of the Quaternary structure with morphotectonic phenomena was demonstrated and discussed during conferences and field excursions, and this knowledge corresponded well to the scientific focus of the Conference.

The Conference was attended by 49 geoscientists from Denmark, Estonia, Germany, Lithuania, The Netherlands and Poland.

During the Conference 20 oral presentations were made, a poster session was organized, workshops of three thematic groups were arranged and a field excursion that took one and a half days was organized.

The presentations given during the Conference can be grouped into the following main topics:

- Neotectonics, geodynamics and paleogeography of coastal zones (Bitinas A., Damušytė A., Dobracki R., Jegliński W., Koszka-Maroń , Raukas A., Relisko-Ryba J., Miotk Szpiganowicz G., Uścinowicz S., Uścinowicz G., Zachowicz J.);
- Glaciotectonics (Aleksa P., Bitinas A., Piotrowski A.);
- Satellite interferometry and geophysics (Graniczny M., Čyžienė J., Korabliova L., Mikulėnas V., Minkevičius V., Satkūnas J., Wasowski J.);
- 3D modelling of subsurface (Dominik W., Juschus O., Mazurowski M., Schroeder J. H.);
- Seismicity and geohazards (Pačėsa A., Lazauskienė J., Graniczny M., Piątkowska A., Kowalski Z., Satkūnas J., Čyžienė J., Kanopienė R.);
- Hydrogeology of Saltdomes (Holzbecher E., Mazurowski M., Kohfahl C., Bącik A., Dobies M.);
- Geomorphology and morphotectonic studies (Piotrowski A., Graniczny M., Satkūnas J., Schroeder J. H., Bregman E., Bosch A., Koomen A. J. M.);

**Fig. 1.** Participants of MELA conference
**1 pav.** MELA konferencijos dalyviai

**Fig. 2.** Participants of the 2nd MELA conference near Trakai castle
**2 pav.** Antrosios MELA konferencijos dalyviai Trakuose

- Public education, geoparks (Schroeder J.H.);
- Lithospheric rhedogy (Šliaupa S., Ershov A.);
- Recent vertical movements (Zakarevičius A., Šliaupa S., Anikenienė A., Dėnas Ž.).

During the field trips (guided by Bitinas A., Čyžiene J., Satkūnas J. and Šliaupa S.), a number of geological sites with different aspects of morphotectonic implications were visited and surveyed. Among them, the Pučkoriai outcrop in Vilnius (63 m high, glaciotectonic phenomena of the Saalian age), Devil's hole (a deep thermorkarstic depression of over 40 m reminding of a meteoritic crater, located in the relief of the Weicheselian marginal relief), the Rokai outcrop in the vicinity of Kaunas (a section of 34 m high with Middle Weichselian lacustrine and Upper Weichselian glacial complex demonstrating active geodynamic phenomena, probably correlating with an active neotectonic zone), Birštonas' salty mineral water springs (neotectonically faulted zone, Cambrian, Triassic, Cretaceous and Quaternary aquifers ) and other sites with historical and landscape values (medieval Punia mound, Kernavė historical and archaeological reserve, medieval Castle of Trakai).

Most probably, the best example of morphotectonic phenomena, demonstrated and discussed during the field trip, was the area of the Great Nemunas Loops, in the central part of which the resort of Birštonas was established in 1846 due to the occurrence of salty mineral waters (Fig. 4).

The Nemunas River, one of the largest rivers of the Baltic region, is characterized by a generally straight valley. In the middle of its course, the Great Nemunas Loops is a distinct feature that occupies an area of 320 km$^2$ near the resort of Birštonas. The Nemunas valley here is 1.5–5 km wide and 45–80 m deep. The loops are cut into glaciolacustrine plains confined between glacial and deltaic relief complexes and formed during two last phases of glaciations. The origin of the entrenched loops, as large as 6–10 km, can not be explained in conventional terms of river meandering. The activity of underlying tectonic structures is the major factor – the Great Nemunas Loops are confined to the Birštonas tectonic depression. Despite their small magnitudes, the neotectonic structures within the depression significantly influenced the glacial and meltwater sedimentation (hence, the topography) that controlled the geometry of the Nemunas valley. The initial sinuosity of the valley was only a little enhanced by a later lateral erosion. Fault activity is indicated by numerous mineral water springs and straight channel segments. Only a few sites of similar mineral water discharge are documented in Lithuania, suggesting the specific neotectonic setting of the Great Nemunas Loops. An inspection of drill cores revealed the inheritance of the Nemunas valley from underlying paleovalleys of Eemian and Holsteinian Interglacials, implying the persistence of the controlling factors.

Extensive data on geology, tectonics, geomorphology and palaeogeography of the Great Nemunas Loops were collected during the detailed geological and geophysical mapping carried out in the early 1970s. Numerous sweet- and mineral-water supply boreholes provided information on the Quaternary and sub-Quaternary geology. The stratigraphy and tectonic fabric of the sedimentary succession was reconstructed from one deep (800 m) well drilled to the crystalline basement, 15 geological mapping wells 200–400 m deep (down to the

**Fig. 3.** Participants on the Punia Mound field excursion
**2 pav.** Konferencijos dalyviai ant Punios piliakalnio

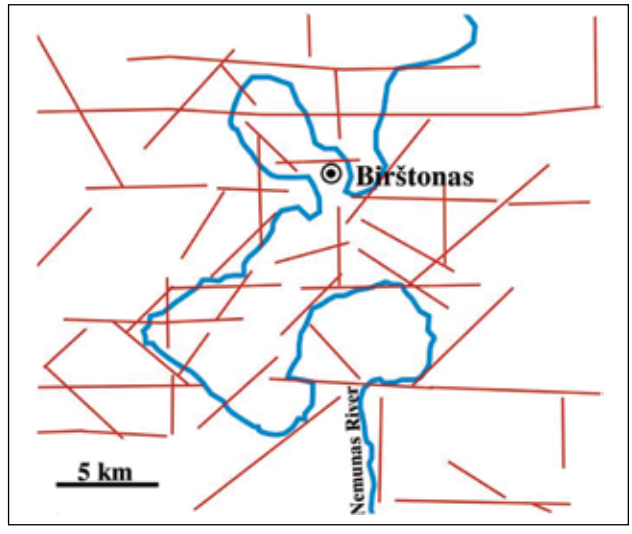


**Fig. 4.** The Great Nemunas Loops and faults of the crystalline basement of Birštonas mineral water resort area faults defined by magnetic and gravity lineaments (Baltrūnas et al., 2005)
**4 pav.** Didžiosios Nemuno kilpos ir kristalinio pamato lūžiai ties Birštonu, nustatyti pagal gravimetrinius ir magnetometrinius duomenis

**Fig. 5.** View of the Nemunas River from the Punia mound
**5 pav.** Nemuno vaizdas nuo Punios piliakalnio

Permian and Silurian) and several hundreds of hydrogeological wells.

The main output of the MELA project (www.mela.3dsign.pl) will be presented at the symposium "Morphotectonics of lowland areas" during the 33rd IGC in Oslo, August 2008. This symposium will deal with the problems of the activities of subsurface structures in connection with active subsurface and surface processes, the impact of tectonic structures on glacial morphology and glacial processes, techniques and methodologies of morphotectonic investigations as well as mapping and modelling.

The material of the 2nd MELA Conference "Glaciotectonic structures, palaeobasins and neotectonic setting", of August 27–31, 2007, Vilnius, Lithuania: Volume of Abstracts, Excursion Guide scheduled by Satkūnas J., Čyžienė J., Bitinas A.; Lithuanian Geological Survey, Polish Geological Institute–Vilnius: LGT, 2007. p. 69. are available at www.lgt.lt.

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## Žemumų morfotektonika

Šių metų rugpjūčio 27–31 dienomis Vilniuje (Lietuva) įvyko Europos Sąjungos projekto MELA (Europos žemumų morfotektoninis žemėlapis, sutartis MTKD-CT-2004-003108, http://www.mela.3dsign.pl) antroji tarptautinė konferencija „Gliaciotektonika, paleobaseinai ir neotektoniniai reiškiniai", kurią organizavo Lietuvos geologijos tarnyba kartu su Lenkijos geologijos institutu. Pagrindinis konferencijos tikslas – Europos žemumų morfotektoninio žemėlapio sudarymo metodikos klausimai. Konferencijos metu buvo aptariamas tektoninių struktūrų aktyvumas ir jų sąsaja su paviršiaus procesais, tektoninių struktūrų poveikis ledyno procesams pleistocene, neotektoninių judesių ir klimato kaitos poveikis krantų formavimosi procesams, kvartero paleobaseinai, glaciotektoniniai ir neotektoniniai procesai, geologinis modeliavimas ir erdvinis vaizdavimas, pristatyti satelitinės interferometrijos ir geofizinių tyrimų duomenys, aptarti šiuolaikiniai vertikalūs paviršiaus judesiai ir kt. Konferencijoje dalyvavo 49 mokslininkai iš Lenkijos, Estijos, Nyderlandų, Vokietijos, Danijos ir Lietuvos; perskaityta 20 žodinių pranešimų, pristatyti 4 stendiniai pranešimai. Konferencijos dalyviai lauko ekskursijos metu (ekskursiją vedė A. Bitinas, J. Čyžienė, J. Satkūnas, S. Šliaupa) buvo supažindinti su morfotektoninių požymių apraiškomis Lietuvos reljefe. Jie aplankė įvairias geologines vietoves: Puškorių atodangą Vilniuje, Velnio duobę netoli Aukštadvario, Rokų atodangą Kauno apylinkėse, Birštono mineralinio vandens versmes, taip pat susipažino su šių apylinkių istorinėmis, archeologinėmis bei kraštovaizdžio vertybėmis – Punios piliakalniu, Kernave bei Trakų pilimi. MELA projekto darbų rezultatai bus pristatyti 2008 m. rugpjūtį Osle vykstančiame IGC simpoziume „Žemumų morfotektoniniai žemėlapiai". Vilniuje vykusios antrosios MELA konferencijos medžiagą galite rasti Lietuvos geologijos tarnybos tinklalapyje www.lgt.lt arba MELA projekto tinklalapyje www.mela.3dsign.pl.

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## Морфотектоника низменностей

27–31 сентября 2007 г. в Вильнюсе (Литва) состоялась Вторая международная конференция „Гляциотектоника, погребенные бассейны и неотектонические явления", в связи с MELA (Морфометрическая карта Европейской низменности, контакт MTKD-CT-2004-003108, http://www.mela.3dsign.pl). Конференцию организовала Геологическая служба Литвы совместно с Польским геологическим институтом. Основная цель конференции – методические вопросы по составлению морфотектонической карты Европейской низменности. На конференции были обсуждены следующие вопросы: активность тектонических структур и ее связи с поверхностными процессами; влияние тектонических структур на ледниковые процессы в плейстоцене; влияние неотектонических движений и смены климата на процессы формирования берегов; четвертичные погребенные бассейны; гляциотектонические и неотектонические процессы; геологическое моделирование и пространственное изображение. Представлены результаты сателлитной интерферрометрии и геофизических исследований, обсуждены современные вертикальные движения поверхности и пр. В работе конференции принимали участие 49 ученых из Польши, Эстонии, Нидерландов, Германии, Дании и Литвы, представлены 20 докладов и 4 стендовых сообщения. Участники конференции во время экскурсий, которые проводили А. Битинас, Й. Чижене, Й. Саткунас, С. Шляупа), были ознакомлены с признаками морфометрических проявлений в рельефе Литвы. Были осмотрены различные геологические объекты: обнажение Пушкоряй в Вильнюсе, Чертова яма в районе Аукштадвариса, обнажение Рокай в Каунасском районе, источники минеральной воды в Бирштонасе. Кроме того, участники конференции были ознакомлены со следующими историческими и археологическими достопримечательностями: городище Пуня, средневековые исторические памятники Кернаве и Тракай. Результаты проекта MELA будут представлены в августе 2008 г. на симпозиуме IGC „Морфотектонические карты низменностей" (г. Осло, Норвегия). Материалы конференции MELA можно найти в интернете на сайте Геологической службы Литвы www.lgt.lt или на сайте проекта MELA www.mela.3dsign.pl.

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