

## ABSTRACTS

Grigelis, A. 2010. *BALTICA* approaches its 50 year anniversary. *Baltica*, Vol. 23 (2), 71–76. Vilnius. ISSN 0067-3064.

**Abstract** *Baltica*<sup>®</sup>, An International Journal on Geosciences, is a high-ranked, peer-reviewed research journal issued in cooperation with the geoscientists of the Baltic States region. This Editorial Column briefly reports how *Baltica*'s history remarkably changed during the semi-centenary. *Baltica* went from International Yearbook established in 1961 to a semi-annual, peer-reviewed international journal reformed in 2004. The reform drove considerable changes in journal management and raised the requirements for the quality of papers. Evidence indicates that *Baltica*'s establishment continuously increased. As a result, *Baltica* was included in the Thomson Scientific Master Journal List record in April, 2006. Beginning with Vol. 20 (1–2) 2007, *Baltica* has been indexed and abstracted in the Science Citation Index Expanded (SciSearch<sup>®</sup>), Journal Citation Reports/Science Edition. On July 2008, *Baltica* was included in the Thomson Web of Science record. On June 2010, it was notified that Thomson Reuter ISI gave *Baltica* a Journal Impact Factor of 0.529. The journal provides information on a wide range of interests of earth scientists. However, *Baltica* needs to expand its number of international subscribers.

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Emelyanov, E. M., Kravtsov, V. A., Savin, J. I., Paka, V. T., Khalikov, I. S., 2010. Influence of chemical weapons and warfare agents on the metal contents in sediments in the Bornholm Basin, the Baltic Sea. *Baltica* 23 (2), 77–90 Vilnius. ISSN 0067-3064.

**Abstract** Large quantities of German trophy chemical weapons (CW) were dumped after World War II in the Bornholm Deep of the Baltic Sea. Four ship wrecks were found on the bottom of the central part of the Bornholm Deep at depths of 90-100 m. The bottom of the deep is covered by mud with thickness of 1-3 m. The heavy metal content (iron, manganese, zinc, copper, cobalt, nickel, chromium, cadmium, lead) and arsenic in the bottom sediments of the chemical weapons dumpsite area were investigated with 378 samples in order to develop new data assessing the influence of chemical weapons on the environment. The data obtained indicate that an increased concentration of arsenic (111-277 mg/kg) in the mud of the dumpsite area is related to the chemical warfare agents, where the corrosion processes of chemical munitions and leakage of arsenic-containing agents are happening. The arsenic contamination is of local character and is not regarded hazardous for the environment. In most of the sediment samples outside the chemical weapons dumping area, the studied elements are in levels of background concentrations. Seven maps of the distribution of the toxic metals in the bottom sediments of the Bornholm Basin were compiled. The contents of the studied heavy metals decrease in the direction away from the chemical weapons dumpsite area to the border of the Bornholm Deep. Although the release of warfare gases from dumped chemical weapons has persisted for many decades, the specific pollution of sediments is found to be rather small. The prognosis for further degradation from chemical weapons should exclude catastrophic scenarios.

**Keywords** Influence of chemical weapons and warfare agents on the metal contents in sediments in the Bornholm Basin, the Baltic Sea.

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Depellegrin, D., Blažauskas, N., de Groot R.S., 2010. Mapping of sensitivity to oil spills in the Lithuanian Baltic Sea coast. *Baltica*, 23(2), 91–100, Vilnius. ISSN 0067-3064.

**Abstract** This research develops an integrated environmental assessment tool for Lithuanian coastal areas that takes due account of the major oil spill risks posed by the Russian D-6 oil drilling platform, vessel traffic in the south-eastern Baltic Sea, and operation of the Būtingė oil terminal. The goal of this paper is to present an environmental sensitivity index (ESI) mapping approach based on four specific indexes: coastal features (ESI<sub>C</sub>), socio-economic aspects (ESI<sub>E</sub>), biological (ESI<sub>B</sub>), and fishery resources (ESI<sub>F</sub>). The relevant methodology approach was selected. The core dataset is provided by a GIS-based environmental atlas updated with other

relevant GIS data of Lithuanian coastal resources. Four ESI maps were developed and an overall environmental sensitivity index (OESI) map produced. Results indicated that in case of an oil spill, two areas need to be prioritized most highly due to their biologic and socio-economic resources: the 25 km long shoreline between the settlements of Nida–Juodkrantė on the Curonian Spit (CS) and the mainland coast (MC) between Palanga and Šventoji.

*Keywords* Environmental sensitivity, oil spill risk, coastal area, oil terminal, oil platform, Būtingė, Kravtsovskoye D-6, Lithuania.

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Leont'yev, I., Ryabchuk, D., Zhamoida, V., Spiridonov, M., Kurennoy, D. Reconstruction of Late Holocene development of the submarine terrace in the eastern Gulf of Finland. *Baltica*, 23 (2), 101–108. Vilnius. ISSN 0067-3064.

**Abstract** The coastal slope morphology of the submarine coastal zone of the Eastern Gulf of Finland was identified during a VSEGEI survey involving side-scan sonar profiling, echo-sounding, surface sediment sampling. Along the northern coast of the Gulf, the sand terrace subsurface was mapped at depths of 4–5 m to 8–12 m, top to foot. In order to explain the morphogenesis of the terrace, the development of the coast over the Late Holocene was reconstructed using a mathematical model. Tectonic processes, particularly glacio-isostasy, are suggested to have been the main factors forming the terrace at earlier stages; at later stages, sea-level changes played the main role. The coastal development during the Late Holocene was subjected to the gradual erosion of the above-water terraces and the formation of underwater terraces. During transgression phases, the rate of coastal recession reached 0.5 m y<sup>-1</sup>, while at other times it was approximately half that. The submarine terrace, developed 3.2–1.2 kyr ago, broadened as a result of both coastal recession and sediment accumulation on its outer edge. During this time, the coast retreated about 500 m.

**Keywords** Eastern Gulf of Finland, submarine terrace, Late Holocene, modelling.

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Gelumbauskaitė, L.Ž. 2010. Palaeo–Nemunas delta history during the Holocene. *Baltica*, 23 (2), 109–116. Vilnius. ISSN 0067–3064.

**Abstract** A study is focused on the Palaeo–Nemunas delta morphogenesis and development during Late Glacial and Holocene time span. Geomorphometry and morphological features of the submerged delta were recognized for the first time on the submarine Curonian (Kuršių) Plateau in 1986–1992. This paper presents a pilot study applied in 2006–2008 and is based on multi-beam echo sounder and side-scan sonar images data. Two geological sections across the Palaeo–Nemunas delta are compiled from the data of core studies. Geomorphologic, sedimentological, biostratigraphical and radiocarbon AMS <sup>14</sup>C and IR–OSL analyses suggest that Palaeo–Nemunas delta begun to develop in the palaeo–topography of this area during Preboreal time and ended at the second half of Boreal. The basal residual level of the Ancyclus (A<sub>2</sub>) regression phase was identified in the delta trunks at a depth of 41.3–39.9 m and dated 9.31–8.87 ka BP (8300–8000 <sup>14</sup>C kyr BP). This residual layer is overlapped by marine depositional Litorina (L<sub>1-2-3</sub>)—Post–Litorina complexes up 2 m thick and supported by 7.40±0.5 ka BP; 6.80±0.5 ka BP (IR–OSL, RLQG 1881–118, 1882–118); 6.87±45 ka BP (6030±25 <sup>14</sup>C kyr BP); 4.66±110 ka BP (4100±25 <sup>14</sup>C kyr BP, UGAMS #03138, 03139).

**Keywords** Palaeogeomorphology, deposition, erosion, ancient shorelines displacement, Holocene, south–eastern Baltic Sea.

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Saarse, L., Vassiljev, J., Heinsalu, A. 2010. Reconstruction of the land–sea changes on the Juminda Peninsula, North Estonia, during the last 10 000 years. *Baltica* 23 (2), 117–126. Vilnius. ISSN 0067-3064.

**Abstract** New results of litho-, bio- and chronostratigraphic data from the Aabla Bog were used for creation of the GIS–based shore displacement model with a grid size of 50 x 50 m. Palaeogeographical maps for the Juminda Peninsula in northern Estonia were constructed for the last 10 300 years. The southern part of the peninsula had emerged from the waters of the Gulf of Finland before the Ancyclus Lake transgression. The highest shoreline at 18.5 and 20.5 m a.s.l. was formed during the Litorina Sea transgression at about 7800 calendar year BP. After the Litorina Sea transgression, the area of the peninsula enlarged mostly northwards and westwards due to land uplift. Diatom stratigraphic analysis indicates depositions of sand in an isolated shallow freshwater lake, but not in a lagoon of the Litorina Sea, as was concluded earlier, and suggests that the Litorina Sea maximum water level was below the Aabla basin threshold elevation at 21–21.5 m a.s.l.

**Keywords** *Litorina Sea, palaeogeography, diatoms, radiocarbon dates, shoreline displacement, North Estonia.*

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Trimonis E., Vaikutienė G., Gulbinskas S., 2010. Seasonal and spatial variations of sedimentary matter and diatom transport in the Klaipėda Strait (Eastern Baltic). *Baltica*, 23 (2), 127–134. Vilnius. ISSN 0067-3064.

**Abstract** The exchange of sediment between the Baltic Sea and the Curonian Lagoon was studied in the Klaipėda Strait from 1994 to 2008 using special sediment traps. The examination of trap samples demonstrates that migrating sedimentary matter, i.e. the concentration and composition of sediment fluxes in the strait, varies widely. Seasonal and spatial variations of sediment fluxes directly depend upon the hydrometeorological situation. The most intensive vertical flux according to mean values is recorded in the port gate water area of the strait during spring and winter seasons and also in the western passage of the Curonian Lagoon in the autumn. The smallest sediment fluxes are determined in the Malkū Bay. Grain sizes of transported sediments vary from silty-clayey mud up to fine sand. The dominating sediment fraction is 0.05–0.01 mm. The grain size of sedimentary matter is associated with the intensity of sediment transport. The more intensive sediment fluxes transport much coarser matter, and when the intensity decreases, the amount of finely dispersed matter increases. Variations in numbers of marine, brackish, and freshwater diatom specimens reflect the relative mixing of Baltic Sea marine and Curonian Lagoon fresh water together with transported sediments in the strait.

**Keywords** *Baltic Sea, Klaipėda Strait, Curonian Lagoon, sediment vertical flux, diatoms.*

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Avotniece, Z., Rodinov, V., Lizuma, L., Briede, A., Kļaviņš, M. 2010. Trends in the frequency of extreme climate events in Latvia. *Baltica*, 23 (2), 135–148. Vilnius. ISSN 0067-3064.

**Abstract** This study investigated the long–term variability of extreme climate event indicators in Latvia. To assess trends in the frequency of extreme climate events, 14 extreme climate indices, such as number of extremely hot days, number of frost days, or number of days with heavy precipitation, were calculated and compared with other indices characterizing mean climate. Trend analysis of long–term changes in the frequency of extreme climate events demonstrated a significant increase in the number of meteorological events associated with an increased summer temperature (for example, the number of summer days and tropical nights) and a decrease in the number of events associated with extreme temperature events in winter (the number of ice days and frost days). Due to the decreasing number of cold days, under the changing climate, the length of the growing season has increased. There were also increases in the number of days with heavy precipitation and in the intensity of heavy precipitation. Finally, influences of the large–scale atmospheric circulation on the occurrence of climate extremes are discussed.

**Keywords** *Climate extremes, climate change, trends, Latvia, large–scale atmospheric circulation.*

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Žaromskis, R., Gulbinskas, S. 2010. Main patterns of coastal zone development of the Curonian Spit, Lithuania. *Baltica*, 23(2), 149–156. Vilnius. ISSN 0067-3064.

**Abstract** The Curonian Spit is the largest accumulative sand formation on the Baltic Sea coast. The accumulation was caused mainly by a long-shore sediment drift affecting a shore zone more than 600 km long from the Sambian Peninsula in the south to the mouth of the Gulf of Riga in the north. Although long-shore sediment drift presents a well expressed South–North resultant, some parts of the south–eastern Baltic shore are developed rather differently due to changing natural and anthropogenic conditions. The paper analyses peculiarities of the relief and sediment composition of the Lithuanian part of the Curonian Spit coastal area embracing the underwater sand bars, beaches, and protective dune ridges. Trends in relief changes and distribution of sediments in three dynamically different shore segments –relatively stable, transitional and accumulative –are discussed.

**Keywords** Coastal area, beach, fore-dune, sand bar, long-shore drift, sediments, Curonian Spit, Lithuania.

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Kask, A., Soomere, T., Suuroja, S., Kask, J. 2010. Sand accumulation under varying lithohydrodynamic conditions in the coastal area of the north–eastern Baltic Sea. *Baltica*, 23 (2), 157–164. Vilnius. ISSN 0067-3064.

**Abstract** A total of over 90 million m<sup>3</sup> of sand have been found on the Estonian shelf in the course of explorations since the 1990s. The present paper aims to summarize the exploration results and to evaluate the occurrence, genesis, and formation conditions of sand deposits. Sand exploration has been conducted in three main regions: west of the Island of Hiiumaa in Tallinn, the Muuga and Ihasalu bay areas, and in the south-eastern Gulf of Finland. Sand deposits overlie postglacial clay in deeper areas and glacial till in shallower regions. Deposits, mostly extending down to a depth of 25 m, lie at the foot of bedrock escarpments and on the slopes of landforms consisting of glacial deposits. Parameters of mean grain size and sorting were calculated from sieve analysis results of 249 samples. Sand predominantly forms as a result of the abrading of glacial deposits. The sedimentation area is determined by hydrodynamic conditions and depths of water. Another source of sand west of the Island of Hiiumaa is the glacio-fluvial sediment, which adds more well-sorted, coarse grained material to the deposit. Sand forms deposits on the slopes of shallows where the equilibrium conditions for the settling of sand particles exist. South and south-east of the Island of Naissaar, the retreating shoreline supplies sand to the deposit, and poor sorting indicates rapid sedimentation. Sand is poorly sorted in eastern study areas that reflect rapid sedimentation and short distances between the sand sources and accumulation area. Deposits located near the islands and those located at shoals develop largely step-like terraces and are governed by infrequent strong storms. Comparative analysis of grain size distributions and statistics of different deposits provided new information about sedimentation processes in sand areas.

**Keywords** Baltic Sea, Gulf of Finland, Estonian shelf, marine sand deposits, mean grain size, sorting.

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