A comparative case study of subglacial bedforms in northern Lithuania and south-eastern Iceland

Valentinas Baltrūnas, Richard I. Waller, Vaidotas Kazakauskas, Stasys Paškauskas, Valentas Katinas

Abstract
This paper aims to compare the dynamics of the subglacial environment as determined by an analysis of the structure and sedimentology of both Pleistocene and modern glacial deposits. Investigations focused on subglacial sediments in areas of streamlined relief in northern Lithuania (Ruopiškiai megascale subglacial lineations - MSGL) and south-eastern Iceland (drumlinised terrain exposed by the recent retreat of Skeiðarárjökull glacier). Sedimentological analyses involved granulometry, till macrofabrics, and the anisotropy of magnetic susceptibility (AMS) of micro-clasts. Comparative investigations of subglacial bedforms exposed at Ruopiškiai and Skeiðarárjökull highlighted differences in their formation and post-genetic transformation. In both cases, their initiation was associated with ice advance and subglacial sediment deformation. However, subsequent dynamics were different.
Keywords: subglacial environment, drumlin, till, magnetic susceptibility

doi: 10.5200/baltica.2014.27.18

Anomalous radioactivity level and high concentrations of heavy minerals in Lemme area, South-West Estonia

Anto Raukas, Rein Koch, Krista Jüriado, Johanna-Iisebel Järvelill

Abstract As early as in the 1960s, extensive heavy-mineral concentrations containing zircon, monazite, and xenotime were discovered in the Lemme region of south-western Estonia. These concentrations contribute to the elevated radioactivity levels of the enclosing sediments. The near shore sands of the Litorina Sea contain up to 10-cm-thick interlayers with a heavy mineral content of up to 80%. These anomalous layers were formed during the transgressive phase and result from a complicated cross- and alongshore migration of sedimentary material, derived mainly from local Devonian bedrock. Radioactivity level in the study area is higher relative to the majority of the Devonian plateau. The Lemmeoja buried soil has 13 radiocarbon dates in an area of renewed interest for the investigation of the Baltic Sea history.
Keywords: Radioactivity,Heavy minerals,Transgressions,Nearshore ,Aeolian deposits

doi: 10.5200/baltica.2014.27.19

Sediment deposition in the Puck Lagoon (Southern Baltic Sea, Poland)

Ewa Szymczak, Angelika Szmytkiewicz

Abstract The article describes present-day processes related to sediment flux and deposition in the Puck Lagoon, southern Baltic Sea). In situ sediment traps were used for determining the sediment properties in the lagoon and its tributaries. Both sediment sources and the volume of incoming sediment were taken into account and a distinct zone of sediment deposition was discovered in the central part of the Puck Lagoon. The rate of sediment deposition in the Rzucewo Deep exceeded 8.0 mm y^{-1}, whereas in other parts of the Puck Lagoon it ranged from 1.9-3.9 mm y^{-1}. These findings provide the basis for predicting future sedimentation conditions in the Puck Lagoon.
Keywords: sediment deposition rate, sediment flux, sediment traps

doi: 10.5200/baltica.2014.27.20

Weather conditions during a transatlantic flight of *Lituanica* on July 15–17, 1933

Gražina Sviderskytė, Gintautas Stankūnavičius, Egidijus Rimkus

Abstract This article focuses on the 1933 transatlantic flight of the airplane *Lituanica* and weather conditions en-route. Using reanalysis methods and comparative analysis of historiographical data, the authors aimed to restore the weather conditions and to evaluate pilots' decision-making process in rapidly changing situation during a flight from New York to Kaunas. In this study, the apparent flight path of *Lituanica* (actual flight path remains undocumented) was divided into three stages, with weather conditions investigated for each segment. The findings suggest that weather-based decision making was essential throughout most of the flight and could have played a vital role in the final stage. Over the European mainland, deteriorated weather conditions became

unfavourable to maintaining the heading to Lithuania. The adverse weather had forced pilots to abandon their flight plan and consequently led to an attempted forced landing and the fatal crash in Germany.
Keywords: Steponas Darius, Stasys Girėnas, Lituanica flight, meteorological reanalysis

doi: 10.5200/baltica.2014.27.21

Diatom-based estimation of sea surface salinity in the south Baltic Sea and Kattegat

Bartosz Kotrys, Michał Tomczak, Andrzej Witkowski, Jan Harff, Jan Seidler

Abstract

The new diatom-based sea-surface salinity (SSS) estimation has been applied to a collection of 27 taxa in 48 present-day sediment and surface water samples recovered in the Baltic Sea and Kattegat. The sediment core 303610-12 (2005) from the Eastern Gotland was chosen for the study of the Holocene sequence spanning the past 8160 yrs BP. The Artificial Neuronal Network (ANN) method provided an estimation of spring (March-April) SSS values ranging between 7.04-8.25 ‰. The low amplitude of salinity change might be caused by mixing of fresh water with upper surface layer of the Baltic Sea due to high precipitation and riverine input. These findings were compared with independent geochemical proxies for salinity (K, Ti and S) derived from XRF Core Scanner record. Significant correlation between salinity and sulphur records and an inverse correlation between K and Ti demonstrate that the ANN method, when combined with quantitative and qualitative analyses of diatoms, provides a useful tool for palaeo-salinity reconstructions from the Holocene sediments of the Baltic Sea.

Keywords: diatoms (Bacillariophyta), artificial neuronal network, salinity reconstruction, reference data set

doi: 10.5200/baltica.2014.27.22

Assessment of the riverine hydrokinetic energy resources in Lithuania

Darius Jakimavičius, Brunonas Gailiušis, Diana Šarauskienė, Aldona Jurgelėnaitė, Diana Meilutytė-Lukauskienė

Abstract

The hydro-energy resources are considered as promising renewable energy sources, which emphasizes the need for assessment of theoretical hydrokinetic energy resources stored in Lithuanian rivers. This article presents the results of an investigation of the theoretical hydrokinetic energy in small and medium-size rivers. A total of 282 rivers (1487 segments) were examined and the relationships were established for evaluation of their hydrological and morphological indicators, such as river depth, width, and flow velocity. Only 41 rivers (328 segments) were identified as having a theoretical hydrokinetic potential. The total length of these valuable river segments reaches 2000 km. The estimated kinetic energy capacity calculated for a 1 km channel segment is 45.3 kW in South-eastern, 40.8 kW in Western, and 38.2 kW in Central Lithuania.

Keywords: hydrokinetic energy resources, hydrological and morphological equations

doi: 10.5200/baltica.2014.27.23

Surface drifters experiment in the south-eastern part of the Baltic Sea

Lina Davulienė, Loreta Kelpšaitė, Inga Dailidienė

Abstract

In November 2013, the first short-term surface drifter experiment has been carried out along the Lithuanian coast. Three drifters were deployed from *R/V Vėjūnas* at a location ~6 km offshore and 2.5 km north of Klaipėda. During the period of observation from 22-30 November, the drifting direction has shifted up to five times by more than 90 degrees mainly due to changes in the mean wind direction. After seven days, the drifters have reached the coast approximately 30 km south of Klaipėda. The analysis of the relationships between the mean wind speed and the mean drift speed for the three periods differentiated based on meteorological conditions yielded a regression coefficient of 0.031, with the entire experiment period characterized by a lower value of 0.014.

Keywords: Lagrangian drifter experiment, drifter pair, spreading rate, near-shore drifting

doi: 10.5200/baltica.2014.27.24