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Preface

This Special Issue of the Boreal Environment Research comprises a selection of papers based on the presentations given at the 7th Baltic Sea Science Congress, in Tallinn from 17 to 21 August 2009, with a theme "*Towards better understanding and improved technology for serving the society*". The joint meeting of the Baltic Marine Biologists, the Conference of the Baltic Oceanographers and the Baltic Sea Geologists was hosted by the Tallinn University of Technology and the University of Tartu. Together 22 lectures were assigned to the plenary sessions and 135 oral presentations and 98 poster presentations were given. Altogether, the 7th Baltic Sea Science Congress brought around 300 scientists to Tallinn.

The theme sessions of the 7th BSSC covered a broad range of topical marine research issues. The traditional sessions were "*The Baltic Sea water circulation and mixing — observations and modelling*", "*Coastal and offshore exchange processes*", "*Sedimentary systems of the Baltic Sea — function and history*", and "*Changes in marine communities in the Baltic and their external and internal drivers*" as the most popular one. The results of both specific and interdisciplinary research of the coastal sea were treated in the sessions "*Coastal and offshore developments in the Baltic: impacts and assessment*" and "*Interplay of wave dynamics, marine ecosystem and coastal processes*". Rapidly developing technological aspects of marine science were dealt with in the session "*Operational oceanography and coastal observatories*". In the sessions "*Impact of changing climate on the Baltic Sea ecosystem*" and "*The carbon/CO_2 cycle in semi-enclosed and shelf seas/marine acidification*", the open questions of the marine ecosystem response to changing climate and the carbon cycle in semi-enclosed and shelf seas were addressed. A kind of synthesis was presented in the sessions "*Ecosystem health*" and "*Linking ecosystem and society*". The latter was an initiative based on the just started BONUS+ projects.

The Gulf of Finland — an elongated basin in the north-eastern extremity of the Baltic Sea, characterised by large spatio-temporal gradients of both physical and biogeochemical parameters — was a subject of a number of papers. This is not surprising due to the fact that today the Gulf is an actively-investigated area in the Baltic Sea, and — unfortunately — one of the most polluted. Manuscripts covering both experimental and modelling studies were submitted, and 17 of them (shortly summarised below) is presented in this issue.

A review paper was written by Ryabchuk *et al*. (2011), based on field observations and hydrometeorological data, dealing with potential reasons for drastic intensification and step-like nature of coastal erosion in the Neva Bay outside the City of St. Petersburg — an area under gradually increasing anthropogenic impact.

A number of papers were devoted to various wave studies. Didenkulova (2011) investigated the properties of extreme surface waves (freak waves) in Tallinn Bay (Gulf of Finland). Soomere *et al*. (2011) in turn studied variations in wave conditions in Estonian coastal waters in different timescales; this study was based on historical visual observations and numerical simulations. In the paper by Erm *et al*. (2011) resuspension in Tallinn Bay due to wind waves and fast ferry wakes was studied. Using data gathered by visual wave observations, Kelpšaitė *et al*. (2011) studied changes in wave dynamics near the Lithuanian coast.

The selection of papers continues with the studies on circulation and related processes in the Gulf of Finland. Lilover *et al*. (2011) reported the results of an experimental study where the current

dynamics was carefully examined in an area near the Naissaar Bank. Another experimental study is that by Lilover and Stips (2011) who, based on time series of microcsturucture measurements in the Gulf of Finland, investigated kinetic energy of high frequency internal wave band and suggested a new parametrization of eddy diffusivity. The numerical study by Soomere *et al*. (2011) was devoted to investigating patterns of current-induced transport in the surface layer of the Gulf of Finland. Finally, the last paper related to analyses of current dynamics in the Gulf of Finland was that of Elken *et al*. (2011) where model-derived circulation patterns were studied using the EOF analysis.

The studies related to hydrography and nutrients in the Gulf of Finland were presented in two papers. Liblik and Lips (2011) carried out an investigation of characteristics and variability of vertical thermohaline structure in summers 1987–2008. Laanemets *et al*. (2011) did a high-resolution numerical study to simulate a series of upwelling events and related nutrient tranports. Sipelgas (2011) presented a study based on suspended matter load monitored during harbor dredging.

The last of the 13 papers devoted to physical oceanography was focused on operational modelling in the southern Baltic. A study related to hydrodynamic forecasts during storm surges was carried out in Pomeranian Bay and Szczecin Lagoon by Kowalewski and Kowalewska-Kalkowska (2011).

The marine-biology papers dealt with long-term changes in phytoplankton communities, as well as with the effects of invasive species on benthic communities in shallow areas.

Papers by Jaanus *et al*. (2011) and Olli *et al*. (2011) dealt with long-term monitoring studies and changes in phytoplankton communities along the north–south gradient in the Baltic Sea during a ca. 20- and 40-year-study periods, respectively. Interestingly, only Jaanus *et al*. found a connection between the observed changes and the parallel increase in eutrophication in the Baltic Sea. Both papers associated the observed changes mainly with the changes in climate and especially in temperature of the study areas.

Kotta *et al*. (2011) studied the effects of an introduced species, *Gammarus tigrinus*, on a native species, *G. salinus*. The study was conducted in Kõiguste Bay (Gulf of Riga). Interestingly, only slight concurrence effects were found in the experiments.

Also Herkül *et al*. (2011) conducted an experimental disturbance study in Kõiguste Bay. They studied effects of sediment removal on macrophyte and zoobenthos communities in a shallow benthic system. Physical disturbance (removal of surface sediment) seemed to have clearly more pronounced effects when occurring early in the season (spring) in comparison with the effects of disturbance later in the growth season (summer).

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