SEMI-ISOLATED FJORDIC LAGOONS IN THE BARENTS SEA AND THE STUDIES OF IMPACT OF THE INTRODUCED RED KING CRAB (*PARALITHODES CAMTSCHATICUS*) ON BENTHIC COMMUNITIES

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Inner parts of some fjords of Scandinavia and Kola Peninsula are separated from their outside parts by narrow and shallow sills forming thus semi-isolated fjordic lagoons. Such lagoons in the Ambarnaya Bay (Varanger-fjord, Barents Sea), or "salt lakes" (as local people call them) Linjalami and Sisajarvi (total area about 1 km^2, maximum measured depth 41 m, depth of outer entrance at low tide less than 1 m) host peculiar benthic communities. All age groups of red king crab (*Paralithodes camtschaticus*), a species introduced to the Barents Sea in the 1960s are present in these lagoons round year. This contrasts to most coastal areas in the Barents Sea where adult crabs are leaving shallow inshore zone in autumn and come back by late winter or spring. The predation pressure of king crabs in the lagoon appears to be relatively constant throughout the year and this makes them an interesting model area to study the impact of introduced crabs on benthic communities. Long term observations (since 2001) indicated, that interannual changes in crab density and population composition depends on the type of climatic conditions of the year and success of crab reproduction. In the years 2010 – 2012 we conducted a survey of benthic communities in the lagoons. A notable characteristic of the benthic fauna is deficiency of echinoderm species which are considered as a prey selectively consumed by red king crabs (especially in their life history periods associated with molting). In particular sea urchins *Strongylocentrotus droebachiensis* are virtually absent in the kelp zone (being abundant in kelps in the outside part of Varanger-fjord) but are common in blue mussel (*Mytilus edulis*) banks in the strait connecting Linjalampi and Sisajarvi lagoons. Both biotopes are however used as foraging grounds by king crabs so that a hypothesis explaining the absence of sea urchins in the kelp zone by crab predation faces difficulties. Iceland scallop (*Chlamys islandica*) population in the lagoon is relatively stable in spite it is also a known common prey of adult king crabs. Neither composition nor biomass of macrobenthos showed significant changes over three years of observations. Abundance – Biomass curves (ABC) which are often used as a test for presence some stressors indicated that at some places benthic communities consisted of numerous small sized species that is typical for the impact of eutrophication, hypoxia, pollution, active predation or another factors of organism mortality. As the presence of the first three factors is unlikely, this may be a result of unselective consumption of infaunal organisms by king crabs. However there is no consistent ABC pattern in space and time. Predation impact (if present) of crabs on infauna is thus at least moderate and reversible. It can be concluded that king crabs now are a normal component of the coastal ecosystem even though its present condition may be different from the one at time prior to red king crab introduction.

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SPRING SEA-ICE ALGAL AND ICE-EDGE PHYTOPLANKTON COMMUNITIES FROM THE LAPTEV SEA POLYNYA IN 2012

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Climate system of the Arctic is currently undergoing evident changes. The retreat of sea ice from the Arctic regions during the last 30 years has been receiving considerable attention. The wind-forced Laptev Sea polynya is a major area of sea-ice production in the Arctic, and it is one of the key elements of environmental system of the Laptev Sea. It is therefore essential to improve our knowledge of the Laptev Sea polynya system, as the crucial shelf area with high level of biological activity, and significant contributor to primary production. To investigate the influence of polynya on hydrological and hydrobiological properties of the Laptev Sea shelf waters, oceanographic station sites were generally confined to the location of the polynya area during Russian-German expedition TRANSDRIFT XX. To reveal temporal variability of these characteristics, the measurements were repeated several times at the same sites between March 19 and April 24 of 2012. The ENVISAR ASAR satellite imagery shows the evolution of the coastal polynya during this time. Therefore, our phytoplankton and sea-ice algal records allowed us to trace the development of biological processes in the polynya area during the early spring.

Results of microalgae study revealed, that diatoms, represented mainly by sea-ice species are the predominant group of algae both in sea-ice communities and phytoplankton in the Laptev Sea during the time observation. The single cells of heterotrophic dinoflagellates were reported mainly in the phytoplankton communities. Detail investigations of microalgae allowed us to infer the distinctive regional features of algae assemblages and theirs development during the time observation: At the stations located in the southernmost part of the Laptev Sea polynya, in the vicinity of the Lena River Delta sea-ice bottom diatom communities characterized by the greatest algal abundances and biomass, which gradually increased during the observation period and reached the maximum at the end of this period. The lowest biomass value observed under the fast-ice conditions.

RELATIONSHIPS BETWEEN DEPOSIT FEEDING ACTIVITY AND MICROPHYTOBENTHIC BIOMASS ACROSS A SEDIMENTARY GRADIENT

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The density, structure and functional roles of macrofauna and microphytobenthic (MPB) communities are known to change across sedimentary gradients, yet how relationships between deposit feeders and MPB scale-up across such transitional environments, is poorly understood. Here, sediment chlorophyll-*a* concentration (a proxy of MPB biomass) was measured in relation to the occurrence of feeding traces made by the tellinid bivalve *Macomona liliana* together with macrofaunal densities and sediment properties within 55 plots (0.12 m^2) across a sediment mud content gradient. Correlative relationships between recent deposit feeding activity and MPB biomass were scale dependent, significant only at the site scale. Generalised Least Squares regression was used to determine the relationships between mean MPB biomass and measured predictor variables between plots. MPB biomass declined by 28 % as coverage of feeding traces increased from 2 to 28 %, with feeding trace area contributing significantly to variation in chl-*a* (std. coef. = −0.24, p = 0.01). However, the interaction term between mobile suspension feeding cockles *A. stutchburyi* and sediment mud content explained a larger amount of the variability (std. coef. = 0.72, $p < 0.001$). Therefore, we need to consider the potential for interactive effects involving non deposit-feeding species on MPB across abiotic gradients.

MICROPLANKTON COMMUNITIES IN THE ICE AND UNDER-ICE WATERS OF THE WHITE SEA (KANDALAKSHA BAY)

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Composition and production characteristics of the microplankton community of the ice and under-ice water of the White Sea are analyzed in the study. Concentrations of chlorophyll *"a"*, prokariots and bacteriovorus protists (mainly heterotrophic nanoflagellates), as well as primary and bacterial production were measured at different sites of the Kandalaksha bay. Chlorophyll *"a"* concentrations in the period preceding the ice formation were extremely low (0.066–0.085 mg/m^3). It was evenly distributed in the upper 25-m layer. Phaeophytin composed 60% of the total concentration of phytopigments. Primary production was also very low, less than 0.065 mgC $m^{-3}h^{-1}$ in the upper 5 m layer and less than 0.01 mgC $m^{-3}h^{-1}$ in the deeper layer. In the early spring the primary production were essentially higher: up to 1.66 mgC $m^{-3}h^{-1}$ in the upper 0.5-m layer. However the most active growth of microalgae was recorded in the ice, the values of primary production achieved 12 mgC $m^{-3}h^{-1}$. Bacterial abundance in the period before ice formation increased from surface to the thermocline layer at 20 meters (165±28 – 217±18 $\times 10^3$ cells/ml). In winter concentrations of microorganisms was extremely low both in the water and in the ice (about 80×10^3 cells/ml), however in February a significant difference was registered in the abundance of prokaryotic cells in the ice and in the under-ice water (650±214 and 289±44 $\times 10^3$ cells/ml respectively). In the early spring