

Litter rim of the Baltic Sea coast: monitoring, impact, and remediation (BalticLitter)

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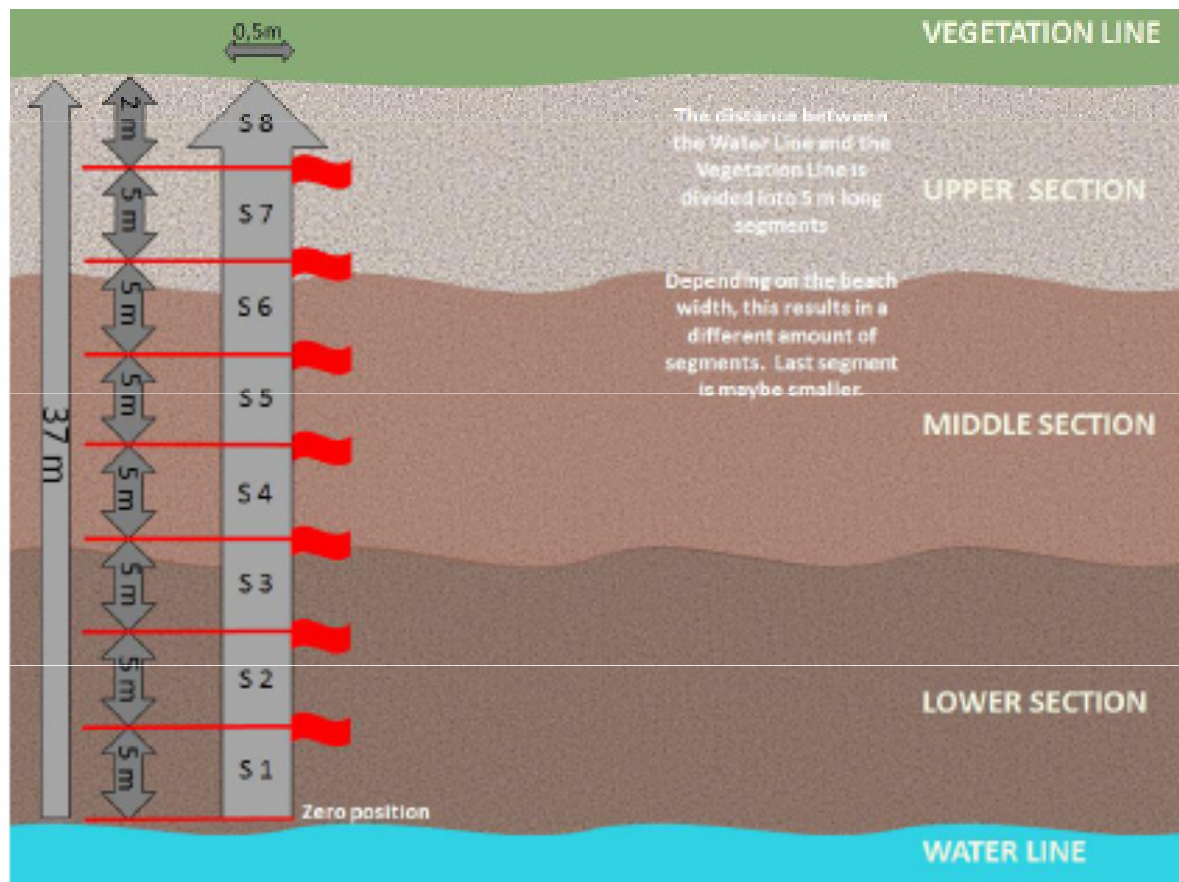
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Beach litter monitoring at the marine coasts by the unified methods

the unified methodology for monitoring of the composition and distribution of marine litter on the German, Russian, and Estonian beaches should be adopted by the teams, and subsequent monitoring of national coasts should be performed.

The Sand Rake method for the Baltic sea beaches
(Haseler et al., 2018)

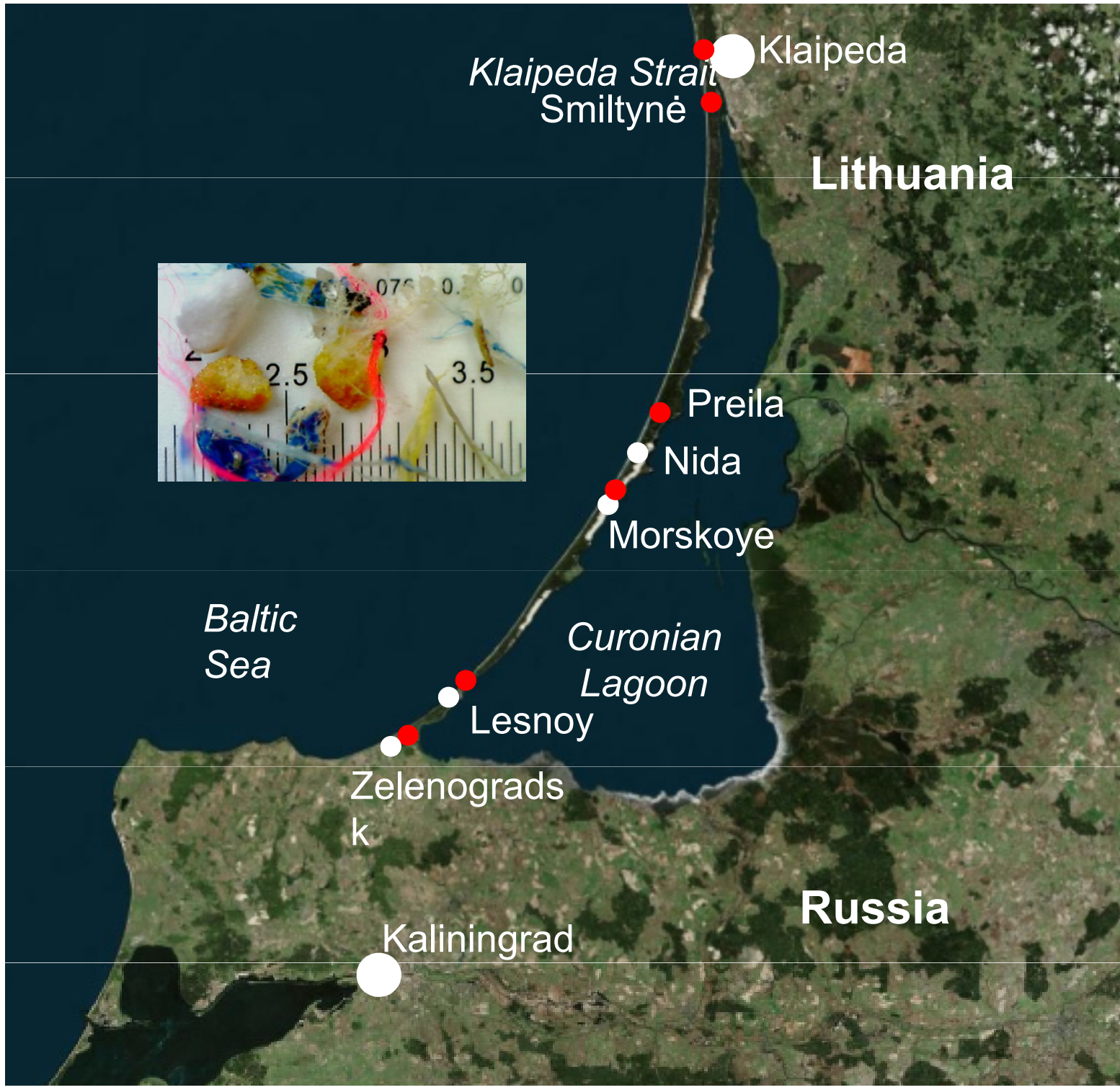


See poster number 222349
(by Elena Esiukova et al.) for more detail



Microplastics on the sea beaches of National parks: modified NOAA method

Sampling performed in spring 2018
along the marine coasts of the
Curonian Spit National Park



Beach monitoring shows that the beached litter has maximum concentrations (i) within the wracklines and (ii) after windy days and stormy events.



The "Litter Rim", embracing the shores of inner coastal waters, coastal litter sources, the marine beaches, and the sea coastal zone, is the object under investigation in the proposed cooperative Project in 2018-2020.



Application of the unified methodology to monitoring of micro-, meso-, and macro-litter along the Russian, Estonian, and German marine beaches of the Baltic Sea is the main goal of a new project co-funded by the Russian Foundation for Basic Research, the Estonian Research Council, and the German Federal Ministry of Education and Research in frames of the ERA.Net RUS Plus Call 2017 - Science & Technology (project number 429). These unified methods will also be tested on the coasts of lagoons, estuaries, and river mouths of the partner countries. Migrations of marine litter between the beach and underwater slope will be investigated, with emphasis on observations of massive litter beaching after stormy events. Link between marine litter and human pathogens will be examined. An impact of presence and migrations of litter in sea coastal zone on benthic ecosystems in coastal marine environment will be investigated in microcosm experiments. Numerical modeling will be applied to relate the amount and distribution of the beached litter to hydrophysical and meteorological conditions, allowing for the development of a new monitoring methods and a strategy for more effective cleaning of the sea coastal zone. The expected results include (i) implementation of the unified methods of the beach litter monitoring on the marine coasts of the three partner countries; (ii) results of testing of this methodology for coasts of lagoons and river mouths/estuaries, with development of specific recommendations; (iii) development of physically-based strategy for cleaning of the coasts after stormy events; (iv) results of investigation of functioning of microbial biofilms on different sorts of plastic, disclosing the relationship between litter and human-pathogens; (v) results of mesocosms experiments on effects of marine meso and macrolitter on benthic ecosystem.

Stormy events and littering of marine coasts



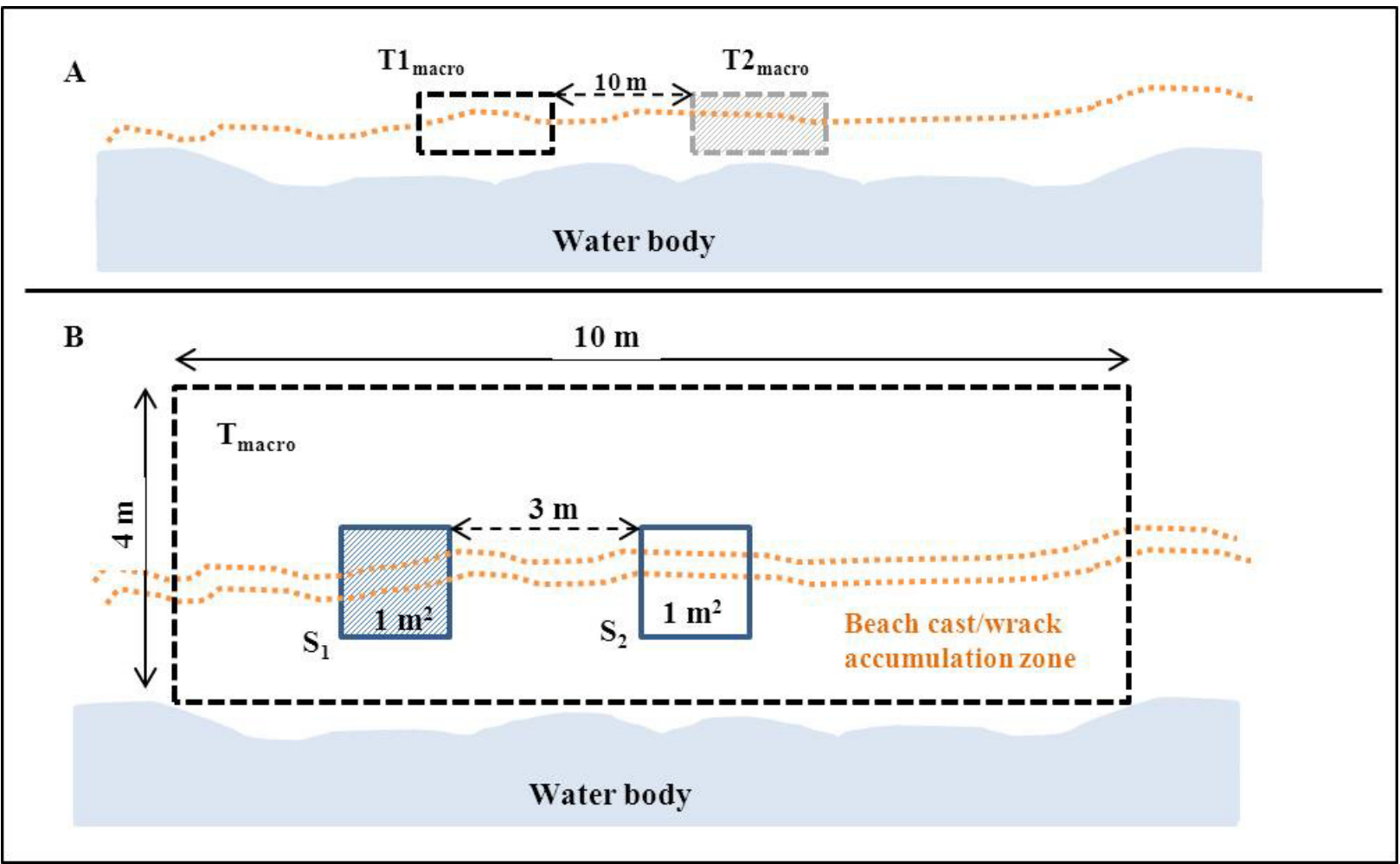
Despite common impression, most of the beached litter is heavier than coastal waters, either due to high density of the original material or because of attached sand, biofouling, or entangling in seaweed. Like sand fractions, these heavy objects seem to be moved ashore due to oscillating motion under surface waves. Still, the dependence of amount and composition of the beached litter on external meteorological and hydrodynamical conditions is unknown. Within the proposed surveys, the correlation between the amount of marine litter on the beaches and external wind/wave conditions will be monitored. For these analyses, the "composition" means not the plastic type but physical properties of the beached objects - size distribution and sinking/floating behaviour; thus, certain adjustment of general methodology will be required. Of especial value here is the possibility to monitor an impact of the same events or similar external conditions (calm weather, stormy winds, various exposition of coast to winds and waves) on different Baltic beaches, far from one another.

References:

Haseler, M., Schernewski, G., Balciunas, A., Sabaliauskaite, V., 2018. Monitoring methods for large microand meso-litter and applications at Baltic beaches. J Coast Conserv. 22, 27-50.

Testing of the methodology for coasts of lagoons and river mouths/estuaries

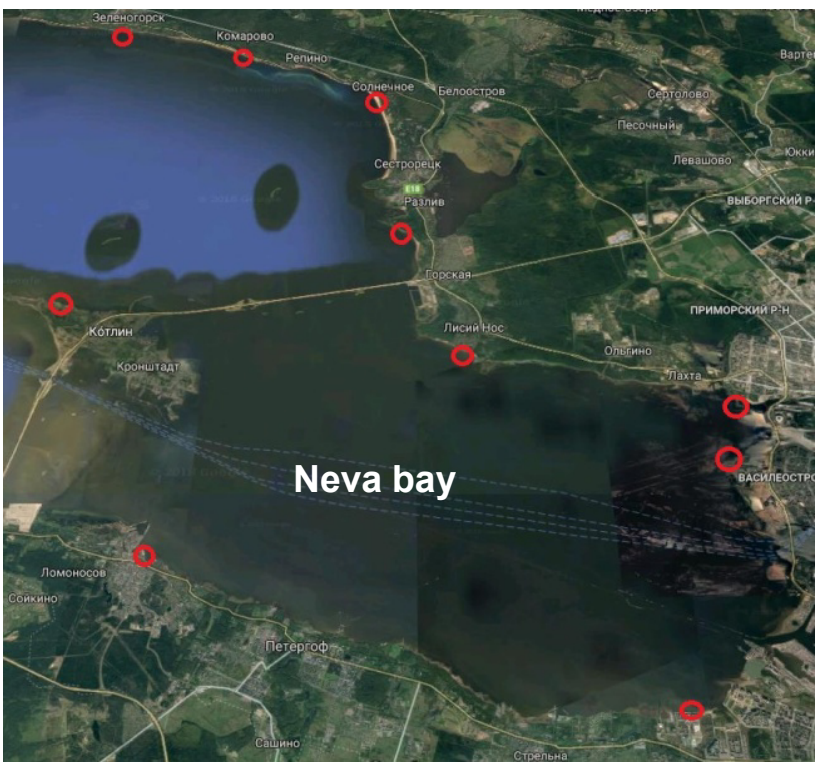
Modified Frame-method for beaches of
lagoons, estuaries and inner coastal waters



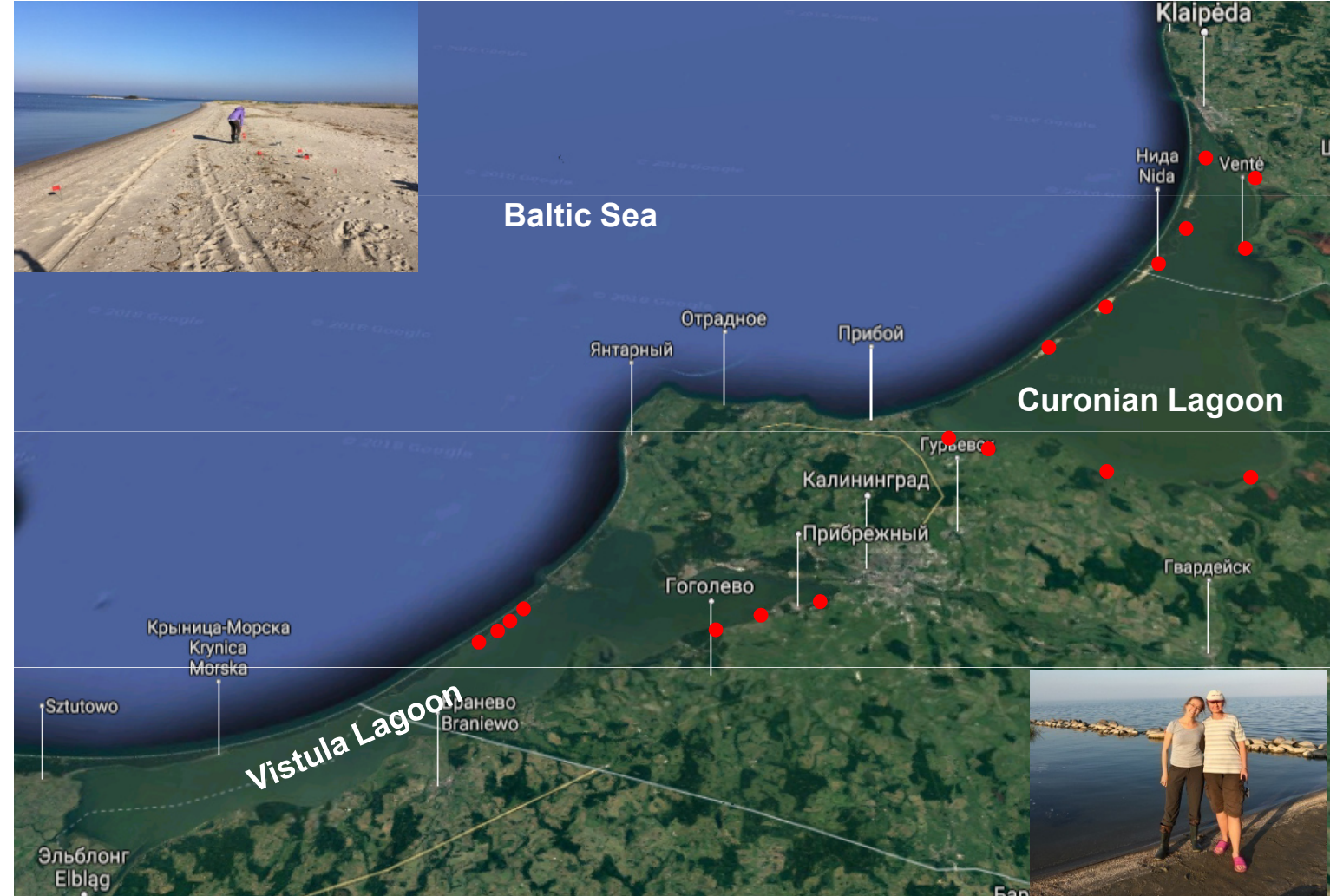
5 major areas were chosen for such monitoring with at least 10 sampling spots in each:

- Gulf of Finland, inside Saint Petersburg dam,
- Curonian lagoon (both Lithuanian and Russian side),
- Vistula lagoon (Russian side),
- Estonian lagoons,
- Szczecin Lagoon.

Stations of beach
litter monitoring
performed in the
Neva Bay in summer
2018, see Eremina et
al. (oral presentation
number 222426)



Stations of beach litter monitoring performed in the
Vistula and Curonian Lagoons in autumn 2018



Photos by E. Esiukova

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