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Analysis of wind wave statistics preceding beach cast events on the southeastern shore of the Baltic Sea (Kaliningrad region): preliminary results

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Beach cast is a material deposited on beaches after being washed up by storm (or tidal movement). The composition of beach cast usually includes seagrass or algae fragments, wracks of land plants and other materials of natural origin, (anthropogenic) marine litter, including plastic debris and microplastics. Beach casts monitoring is of current interest for beach management and maintenance of the sandy shores for recreational purposes, tracing marine litter transport and dispersion, evaluating environmental contamination by microplastics.

Large patches of marine debris appear on beaches after stormy weather. However, little is known about the sea state that precedes the formation of beach casts. From an observer's point of view, beach casts occur at random locations along the coast at unpredictable times. They may even be washed back to the sea at some time later. This work aims to disclose characteristic features of temporal variations of surface wave field parameters, which lead to beach cast formation.

Results of incidental surveys of the northern coast of the Sambia Peninsula, stretching from west to east in the southeastern part of the Baltic Sea, were analyzed. The presence of beach cast (at one or more locations) was observed during 234 days of 2011-2021. Some of the observations were performed during or shortly after the ending of the beaching process. Field information was collated with a freely available re-analysis database on surface waves (<http://marine.copernicus.eu>). Surface wave spectrum parameters were picked up from the database at the geographical point corresponding to the coastal zone's open-sea limit. Elements of Bayesian analysis were applied to overcome the lack of information on the very time of the beach casts formation and/or the unknown duration of the beaching process.

The analysis shows the values of significant wave height, peak period, and wave direction, which occurred before the beach cast appearance more often than follows from the overall time statistics ("climate"). A separate analysis of only recently formed beach casts made it possible to determine the evolution of wave spectrum parameters during the beaching process. Data suggests that most of the beach cast events on this coast are preceded by waves caused by cyclone passages from the northern direction.

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