



Nearshore wave energy dissipation patterns on a shore with multiple bars

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The study analyses bathymetric profiles along almost 100 kilometres of the northernmost part of the Polish open sea Baltic coast. Human interference at this long coastal segment is mostly negligible and the study area is a wave-dominated environment with multiple bars, typical for dissipative beaches. Done in 2005 for the purposes of national monitoring of beaches and spaced every 500 m the profiles cover the entire nearshore and backshore zones from dune/cliff crests up to a seabed depth of about 15 m. Extraction of the monotonic component of profile morphology with signal processing tools (singular spectrum analysis) allowed for relatively straightforward assessment of wave energy dissipation patterns and intensities for each of the profiles. Their interpretation in terms of local coastal morphological features and the underlying geological characteristics was then endeavoured to identify the impact of local sedimentary conditions on coastal evolution at smaller coastal cells. As a result several novel elements and clues, related to morphodynamic evolution of the coast in Poland, could be established, basing solely on the measurements of coastal morphology. They include: (1) identification of one or two areas of saturated wave energy dissipation, where the monotonic component of beach profile morphology closely resembles the Dean function, (2) the key role of inflection points in the monotonic component for determination of the offshore boundary of saturated wave energy dissipation regime, (3) identification of alongshore variations of saturated wave energy dissipation intensity, (4) identification of alongshore variation of the cross-shore width of saturated wave energy dissipation regime from profile to profile, (5) potential for use of this information in studies on local resilience against erosion at beaches with multiple bars, including possible beach fill designs.