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Natural and anthropogenic factors shaping the shoreline of Klaipeda, Lithuania

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Port of Klaipeda is situated in a complex hydrological system, between the Curonian Lagoon and the Baltic Sea, at the Klaipeda strait in the South-Eastern part of the Baltic Sea. It has almost 300 m of jetties separating the Curonian Spit and the mainland coast, interrupting the main path of sediment transport through all South-Eastern coast of the Baltic Sea. Due to the Port of Klaipeda reconstruction in 2002 and the beach nourishment project, which was started in 2014, the shoreline position change tendency was observed. Shoreline position measurements of various periods can be used to derive quantitative estimates of coastal processes direction and intensity. This data can be used to further our understanding of the scale and timing of shoreline changes in a geological and socio-economic context. This study analyzes long and short-term shoreline position changes before and after the Port of Klaipeda reconstruction in 2002. Positions of historical shorelines from various sources were used, and the rates (EPR, NSM, and SCE) of shoreline changes have been assessed using the Digital Shoreline Analysis System (DSAS). An extension of ArcGIS. K-means clustering was applied for shoreline classification into different coastal dynamic stretches. Coastal development has changed in the long-term (1984–2019) perspective: the eroded coast length increased from 1.5 to 4.2 km in the last decades. Coastal accumulation processes have been restored by the Port of Klaipeda executing the coastal zone nourishment project in 2014.