



## **Genesis, distribution, and dynamics of lagoon marl extrusions along the Curonian Spit, southeast Baltic Coast**

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The unique geological process of extrusion of lagoon marl from beneath the massive migrating sand dunes is characteristic for large segments of the Curonian Spit – a ~100-km-long sandy barrier that separates the Curonian Lagoon from the Baltic Sea. The exposures of a composite set of Holocene organic sediments such as gyttja, clayey gyttja, and gyttja clay, commonly referred to as “lagoon marl”, are common along the northern half of the lagoon coast of the spit. These outcrops of lagoon marl rise up to 3-4 m above the lagoon level and were formed by extrusion from their 7-8 m in situ depth beneath the present regional water table. New detailed investigations of the Baltic Sea bottom along the southern half of the Curonian Spit using side-scan sonar, multibeam echosounder, seismic imaging, sediment sampling, and video observations allowed identification and mapping of a unique underwater landscape formed by extensive outcrops of laminated and folded lagoon marl at water depths of 5–15 m. The combined onshore-offshore database indicates that the relict lagoon marl was deformed, compacted, and dehydrated by a massive dune-covered coastal barrier migrating landward (retrograding) over these sediments during the Litorina Sea transgression in a processes termed “dune tectonics”. Spatial analysis of structures of the relict sediments traced in offshore geophysical data help constrain the rates of the southeasterly migration of the dune massif. A conceptual dynamic model is presented to explain the present occurrence of marl exposures above the regional water table, as well as the occurrence of relict lagoon marl extrusions (diapirs) on the underwater marine slope of the Curonian Spit.

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