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Submerged karst landscape of the Prokljan Lake (Krka River estuary in the central Dalmatia)

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During the Last Glacial Maximum, a large part of the eastern Adriatic shelf was exposed, resulting in a distinctive landscape. With postglacial sea level rise, many coastal landforms were drowned and filled with Quaternary sediments. Here, we describe the geomorphological features and sedimentary processes shaping the submerged landscape of the Prokljan Lake, a part of the karst Krka River Estuary (KRE). KRE is a 24 km long microtidal salt-wedge estuary located in central Dalmatia. The estuary extends to the last active tufa waterfalls, Skradinski buk, which is a part of the National park Krka. High resolution multibeam bathymetry, sub-bottom profiling and side-scan sonar were used to determine the evolution of the seafloor morphology of the estuary shaped by postglacial sea level variability. The dataset covered approx. 6 km² of a shallow seabed area with depths of up to 25 m. The observed paleolandscape is unique and well preserved, consisting of the former terrestrial landforms. The most prominent feature is a 3.5 km long complex tufa barrier system, with adjoining basins, at depths ranging from 5 to 20 m bsl. Other distinct features are numerous carbonate mounds and incised river valley. These features are covered or partially filled with fluvial/lacustrine and estuarine sediments. In addition, 36 grab samples and video observations provided ground truth for sediment determination and classification of the estuarine bottom, while 5 piston sediment cores enabled correlation with seismic data. Based on analyzed landform morphology and sediment stratigraphy, the flooding of the river canyon due to sea level rise in the Prokljan Lake started at approx. 10000–9500 y BP and the formation of the estuary at approx. 7500 y BP. The results of ongoing study provide a better understanding of past environments in this submerged system related to the postglacial sea level rise.

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