

Medium-term survey of rapid morphodynamic evolution a gravel barrier spit during storm event (Sillon de Talbert in Brittany, France)

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The Sillon de Talbert is a large swash-aligned gravel barrier spit. It began to form around 6,000 cal BP when relative sea-level rise began to slow. The spit stretches over 3.5 km long and its sediment volume is estimated at $1.23 \times 10^6 \text{ m}^3$. Over the last decades, the spit experienced landward migration by rollover process reaching 1.1 m/yr at least since 1930, with a maximum retreat rate of 1.35 m/yr affecting the proximal section. This evolution has led during the 70's and 80's to the construction of coastal defence structures (frontal dyke, riprap and groin) to stabilize the spit. In 2001, management of the Sillon de Talbert was transferred to a public service (*Conservatoire du Littoral*), which adopted a different strategy in terms of coastal management. At the same time, a topo-morphological survey was undertaken to analyze and quantify both cross-shore and longshore morphosedimentary processes of the spit. This monitoring began in 2002 and are still ongoing. It is based on yearly DGPS field measurements and/or aerial drone stereoscopic photography. The results show that the spit landward displacement has increased during the last fifteen years to be almost twice more important than during the twenty century (2 m.yr^{-1} vs 1.2 m.yr^{-1}). The most efficient migration process occurs when a high tide level coincides with storm waves as it was the case during the 10 March 2008 storm event, or during the 2013-2014 winter storms. In that context, sluicing overwash and/or inundation regime affects the crest and the upper part of the spit profile, inducing retreat of several tens of meters through rollover process. Following such episodes of overwashing and barrier retreat, the crest of the spit may rise rapidly during fair meteorological periods. Currently, the spit is threatening to break in its proximal section where the landward retreat has been the most important since the survey began in 2002. A soft managing solution of the risk of breaking is proposed; it consists of replenishment the threatened zone by taking pebbles where the sedimentary stocks are available. The topo-morphological survey and the analysis of the sediment budget of the spit were used to justify this proposal.