



Development of adaptation strategies on for barrier islands (Halligen) in the German Bight

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The Halligen are located off the North Sea coastline of Schleswig-Holstein, the most northern federal state of Germany. They are surrounded by the Wadden Sea which was added to UNESCO's World Heritage List in 2009. The Halligen are small and low lying marsh islands that are inhabited by around 270 residents and most of them are involved in federal coastal protection activities. A Hallig essentially consists of the surface area that is frequently inundated and the artificially constructed dwelling mounds that prevent people's houses from flooding. Over the last centuries, the common impact of cultivation, subsidence, sea level rise (SLR) and storm surges caused massive land losses along the North Frisian coast. Hence, at the beginning of the 20th century revetments have been established and since then, the Halligen are mostly stable in size but still frequently inundated. Previous research projects (e. g. Sahall, ZukunftHallig) concluded that the Halligen benefit from these inundations due to sediment deposition and the subsequent vertical accretion of the marshland. However, the existing revetments can also act like a barrier, partly hindering the sediment transport onto the Halligen. Furthermore, sea level rise is expected to increase faster than the vertical accretion throughout the last century.

Here, we present methods and current findings of an ongoing research project* aiming at the development of long-term adaptation strategies for the Halligen with a special focus on increasing their natural adaptation capacity to SLR. Therefore, we use a combination of multiple regression and numerical model approaches enabling to model hydrodynamic forcing and its feedback on sediment transport. This information further allows to estimate the causes and consequences of different measures (e.g. optimized revetment heights, operational modes of sluices, optimized agricultural management). Our results are valuable for decision makers and coastal planners and provide a valuable input to prioritize between different advantageous strategies helping to preserve the status of Halligen over the next decades.

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