

Abstract

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Application of a Cross-Shore Profile Evolution Model to Barred Beaches

A cross-shore profile evolution model, Uniform Beach Sediment Transport-Time-Averaged Cross-Shore (UNIBESTTC), is used in the present study. The model was developed at WL/Delft hydraulic laboratory in the Netherlands and comprises a conglomerate of submodels representing identified processes of cross-shore sediment transport. Validation of UNIBEST-TC was carried out using the collected field data at the Egmond site in the Netherlands and at the Duck site in the US. The model is capable of predicting wave height, wave direction for both sites (Egmond site and Duck site). The prediction of long-shore current is reasonable for the Egmond site, but it is unsatisfactory for the Duck site. The difference between the measured and the predicted values for long-shore current and cross-shore current is partly due to the difference between the measured values, which are at a certain depth, and the predicted values that are depth-averaged velocity. Beside that, the turbulence in the breaker zone leads to errors in the measurements, which could be another factor. It is shown in the present study that on relative small scales, opposite morphological behavior is present. Therefore, morphodynamic profile modeling requires a representative characteristic bottom profile. To achieve a qualitative data for the calibration of the model, it is suggested that field measurements should include error ranges. Furthermore, the effect of small variations of the water depth on the processing of the signals should also be taken into account.