Application of empirical orthogonal function models to analyze shoreline change at Bangkalan Madura

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Abstrak

Bangkalan?s shoreline, especially on the opposite side of Surabaya, has been evaluated to determine the morphological changes due to wave attack, near-shore current, long-shore sediment transport and coastal configuration. This research aims to determine the dominant patterns of variation of Bangkalan?s shoreline change, expressed by Eigen-function in empirical orthogonal function (EOF) models. That was started with data collection such as oceanographic data (wave and tidal), bathymetry and topographic map and sediment data. All data was used for forecasting two-monthly shoreline. Coordinate of two-monthly shoreline was used as input of EOF model. The first Eigen mode is a profile of shoreline equilibrium. The second Eigen mode shows pivot point that separates the different behaviors, which indicates
a positive balance of shoreline from the direction of the dominant force. The models execution based on 1986?s shoreline show the shoreline change significantly at some cells e.g. around Suramadu bridge (cell 1-40), Batuporon (cell 70-100), Jungdima (cell 142-170) and at Kamal port (cell 230-250). The model of shoreline change using EOF was validated with the One-line model and data of 1995?s map?s shoreline. The E.O.F. value of model RMSE, 0.02, is less than the root mean square error (RMSE) value of One-line model, 0.04, which shows that the EOF model performance better than One-line models.