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Engineer Research and Development Center

Research Brief: Sand Transport During High-Energy Storm Events

Issue

Reliable models or methods to predict movement of sand through a regional coastal system must properly treat the process of sand transport along the coastline. Past studies suggest that annual extreme storm events define net (magnitude and direction) and gross sand transport rates within littoral systems. Numbers and severity of these storms affect longshore transport rates and regional system response. Multidimensional numerical models need improved parameterizations of sediment processes. Regional transport models need estimators of net and gross transport. Research is needed to improve existing models that will contribute to more informed and improved regional sediment management decisionmaking.

Objective

Research results will provide

- Improved parameterizations of surf and swash zone sediment transport processes for integration into multidimensional numerical models.
- Improved estimators of net and gross transport for integration into regional-scale models.
- Information on the accuracy of storm-driven longshore transport estimators for use in assessing risk and uncertainty in regional-scale, long-term predictions.
- Expansion of the number and quality of benchmark data sets available for sand transport model development, evaluation, and validation.

Research/Design

Longshore transport in the swash zone is potentially a significant percentage of sand that is moved along shore; swash processes are poorly understood; and difficulties of measuring processes in this shallow, high-energy domain exist. The initial emphasis will be placed on techniques for measuring swash processes and effect on the shoreline. A number of shore experiments will be conducted to include the use of tracer, trap, and electronic instrumentation to measure swash hydrodynamics, sediment concentration, and water surface/depth in the swash bore region. Video techniques and obstructions to create impoundments are also candidate methods for quantifying sand transport. Partnering with research staff from universities and other agencies will add to the monitoring and instrumentation scheme. Data from the storm events during two winter seasons will be analyzed to estimate the total longshore transport rates for different wind-wave, swell, and beach conditions and the distribution of longshore transport from the swash zone to the offshore limit of the FRF research pier. Results of this effort have implications on engineering and design studies, and RSM decisionmaking. Results from the field will be integrated into the LSTF calibrations.

Application

The proposed research will lead to improved numerical models and will provide information for assessing the uncertainty associated with simulations of regional-scale processes and predictions of system response. Results will contribute to more informed and improved regional sediment management decisionmaking. This work produces new tools and methods and contributes primarily to support of the USACE's navigation, flood/storm damage reduction, and environmental protection and quality missions.

Products

Links and information will be posted here. View online at http://rsm.usace.army.mil.

Research Team

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