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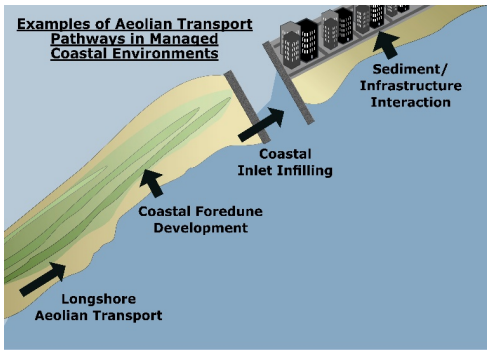
Tools for Simulating Aeolian Sediment Transport Near Inlets (FY21)

Background:

While water-driven flows, including the effects of waves, tides, and rivers, are responsible for shaping most coastal landforms, wind-blown (aeolian) processes can also play an important role in beach and coastal dune development. Aeolian processes can also lead to undesired sediment accumulation in coastal inlets or on roads and other infrastructure. Currently, few tools exist to quantify aeolian sediment transport processes in coastal environments, limiting the ability to mitigate adverse impacts of aeolian transport on critical infrastructural and navigational resources. Developing and improving tools to investigate aeolian sediment transport fluxes into both inlets and dunes and associated morphological changes would enhance the U.S. Army Corps of Engineers' (USACE) ability to develop cost-effective solutions for coastal planning and management decisions.



Approach:

The purpose of this work is to develop a suite of numerical tools to simulate sediment transport and morphology change in subaerial coastal landscapes. Continued development and validation of these process-based tools is specifically focused on improving understanding of sediment transport rates and pathways in managed coastal beach and dune environments, with particular emphasis around coastal inlets.

Technical Advancements:

- ***Aeolis***: The open-source *Aeolis* model is being extended to incorporate capabilities for simulating the influence of sand fencing and vegetation planting on the trapping of wind-blown sediments. Ongoing development with *Aeolis* is focused on how these coastal management alternatives can limit aeolian sediment fluxes into coastal inlets.
- ***C2Shore + Aeolis***: Aeolian transport and relevant dune building processes are being incorporated into the C2SHORE model suite to allow for simulating the co-evolution of the coastal zone in response to wind and wave forcing.
- ***Dune Response Tool*:** A dune erosion model forecasting tool, which can be run in hindcast or forecast mode with publicly available wave, water level and dune morphology information, has been developed in order to provide rapid information on potential dune impacts during storms.

Payoff:

Improved predictive capabilities of aeolian dynamics has the potential to inform optimum coastal management efforts on federally managed projects, including around inlets and in settings with coastal foredunes. This work serves as an incremental step towards providing USACE Districts with the tools necessary to simulate sediment transport and morphology evolution in these complex beach-dune environments.

ERDC Points of Contact:

Nicholas Cohn, Principle Investigator
Tanya M. Beck, Program Manager
CIRP@usace.army.mil
Coastal Inlets Research Program
https://cirp.usace.army.mil