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Engineer Research and Development Center

Coastal Inlets Research Program

Inlet Engineering Tools:

Tools for Simulating Coastal Foredune Evolution Near Inlets

Need

While wind-blown sediment transport is an important process for naturally growing coastal foredunes, aeolian processes can also lead to undesired sediment accumulation (e.g. 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 would enhance the Corps ability to incorporate Engineering with Nature (EWN) concepts into planning and management decisions.

Approach

- Quantify spatial dune growth patterns from existing field datasets at a prograding beach adjacent to a jettied inlet on the Oregon coast
- Extend ***Aeolis***, a process-based aeolian transport model, to account for spatial wind fields, vegetation characteristics, and hard (unerodable) structures in order to better suit the model for managed and unmanaged coastal systems
- Apply and assess ***Aeolis*** model performance for simulating dune growth and associated aeolian transport towards an adjacent coastal inlet at the Oregon field site; simulate potential effects of different management strategies (e.g. vegetation or sand fence emplacement)
- Complete assessment and development of Dune Erosion Planning tool

Technical Advancements

This work aims to continue development and testing of a promising new tool which can be used to address both fundamental science needs and for applied engineering questions. The results of this work will ultimately provide significant value towards District needs in understanding coastal aeolian sediment transport. The incorporation of new processes into the model, including parameterizing the effects of sand fencing and seasonally variable ecology, will enable the utility of the process-based ***Aeolis*** model to be further extended for complex coastal systems.

Leveraging Opportunities

This work leverages ongoing work funded by the Flood & Coastal Research Program which is supporting continuing development of Windsurf, a coupled subaqueous and subaerial morphology modeling tool which also utilizes ***Aeolis***.

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Community of Practice (CoP)

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