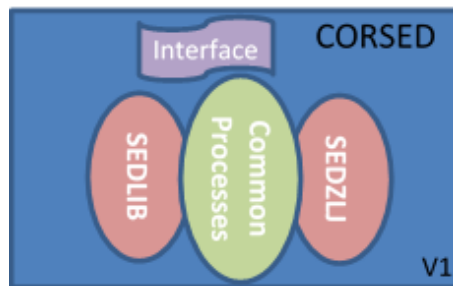




CORSED Comprehensive Sediment Transport Modeling Library

Description

ERDC maintains multiple sediment transport codes developed by different teams for differing purposes. These models simulate transport of gravel, sand, silt, and clay as well as resulting morphology change. Each code has advantages and limitations. Many of these transport codes are coupled to specific hydrodynamic modeling platforms. These models are important tools for evaluating sediment fate and morphology change in open coast, estuaries, lakes, rivers, and streams. These models are used to assess impacts of sediment transport on Corps operations. Relevant issues include navigation channel infilling,



shoreline evolution and protection, ecosystem risk and restoration, and regional sediment management strategies. Model application will be improved by 1) integrating multiple sediment transport codes into a transport library where the user selects appropriate methods for a specific application and 2) creating a transport library that is independent of the hydrodynamic platform, permitting library use with the most appropriate hydrodynamic model.

CORSED Phase 1: Combining SEDLIB library and SEDZLJ code

Issue/Challenge To Address

The project will develop a flexible and adaptable sediment transport library, CORSED, that operates across multiple hydrodynamic frameworks typically used by USACE. The Phase 1 library framework will include all functionality of the two current ERDC sediment transport libraries, SEDZLJ and SEDLIB. As a starting point, CORSED will be a merging and conjoining of the existing standalone libraries SEDLIB and SEDZLJ. Once the two libraries are housed within a single container, both libraries will be re-written to extract out common tasks and processes which in turn will be moved and developed into new modular routines. This code will be developed as a single library, which is transportable across hydrodynamic platforms. The CORSED will be validated by simulating benchmark cases and field application cases with operational hydrodynamic models. This library will provide for user-selected methods to simulate key processes and permit addition of new routines as needed. User selection of these methods is critical for developing the most appropriate sediment transport model for a specific site. In accordance with the CHL numerical model and technology modernization plan, all codes will be put under version control and an appropriate release and licenses document developed. Finally, the graphical user interfaces in the Surfacewater Modeling System (SMS) will be updated to include CORSED and its linkage with operational hydrodynamic models.

Based on evaluation of the Phase 1 library framework, a Phase 2 project may be proposed that will incorporate other transport codes used by USACE.

Successes Lessons Learned

Lessons learned will be compiled during the duration of this study.

Expected Products

Products include the CORSED library implemented in ADH, CH3D, and CMS, modularized SEDZLJ and SEDLIB, and an updated GUI in the SMS. A number of codes based on Python will be developed as a linker to connect CORSED with the hydrodynamic models. The data and results of verification and validation (V&V) will be utilized to



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establish a database for test and application of the library and the flow models. The model development and the V&V results will be published in professional conferences and documented as technical notes and technical reports. Products also include 1) a technical note documenting the library form of SEDZLJ and V&V at a test site, 2) a technical note describing the conceptual framework of SEDZLJ, SEDLIB, and CORSED, 3) a technical report documenting CORSED, including all process routines, and 4) CORSED user's manual (a living online document).

Stakeholders/Users

Users will be Corps-wide.

Projected Benefits Value Added

Benefits would include a flexible sediment transport code that can simulate critical processes critical to evaluating transport in domains relevant to USACE business lines.

Leveraging Opportunities

CORSED is a joint project between three ERDC Navigation Programs – The Dredging Operations and Environmental Research Program (DOER), the Coastal Inlets Research Program, and the RSM Program. Collaboration opportunities exist with both civil works and military programs which have issues related to sediment transport, morphology, turbidity, habitat, or contaminant transport in aquatic environments.

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Participating Partners

Dredging Operations and Environmental Research (DOER) Program
Coastal Inlets Research Program (CIRP)