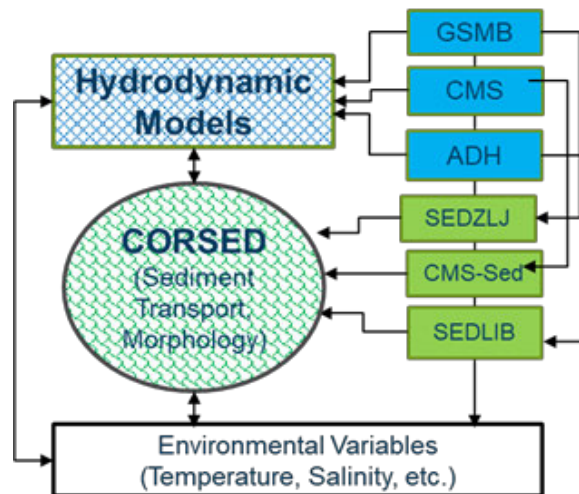




CORSED Consolidated Sediment Transport Code

Description

The research task aims to develop a flexible and adaptable sediment transport library, CORSED, that operates across multiple hydrodynamic frameworks typically used by USACE. The library framework includes all functionality of the two current ERDC sediment transport libraries, SEDZLJ and SEDLIB. 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.



CORSED-driven processes and simulation modules

Issue/Challenge To Address

ERDC maintains multiple sediment transport codes developed by different teams for differing purposes. Each code has advantages and limitations. The SEDZLJ code was originally developed to simulate transport of predominately fine-grained (silt/clay) cohesive sediment in current-dominated environments. SEDZLJ has been modified by ERDC for mixed sediment transport (sand/silt/clay) in coastal environments. SEDZLJ is the ERDC workhorse code for cohesive sediment transport in stratified coastal systems. Another ERDC developed sediment transport code is SEDLIB which was developed to simulate multi-grain transport in rivers and creeks. SEDLIB was specifically designed to simulate transport and mixing of multiple sand classes. SEDLIB has mostly been applied for reimbursable projects as a sand transport code in riverine systems. Coastal and estuarine capabilities are currently being readied for field use. ERDC has invested significant manpower and funding to developing two alternative sediment transport codes. What is required is one sediment transport code which operates across multiple hydrodynamic platforms and permits user-selected features from both SEDZLJ and SEDLIB. This unitary library code will permit ERDC to compete efficiently with other models and provide the best transport predictions to clients in a cost effective manner. There is not one “best-practice” for sediment transport modeling. The methods selected for appropriate simulation of key sediment transport processes at a site is heavily dependent



National Regional Sediment Management Program San Francisco District (SPN):



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on site conditions and is part of expert best-professional judgment. The purpose of this research is therefore to develop a single library sediment transport framework, CORSED, that provides the functionality of both SEDZLJ and SEDLIB.

Successes Lessons Learned

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

Projected Benefits Cost Savings Value Added

The advancements and benefits of this research include: 1) fostering collaboration between presently disparate sediment transport groups in ERDC, 2) a comprehensive CORSED library framework that includes all functional capabilities of both SEDZLJ and SEDLIB, 3) a flexible, adaptable framework for incorporating new sediment transport process algorithms into a documented sediment transport library, 4) a framework in which sediment transport modelers from across USACE can incorporate new sediment process methods in a documented, flexible, and version-controlled environment, and 5) a team of CORSED users within ERDC who are familiar with complexities associated with cohesive sediment transport model application.

Expected Products

- CORSED library (i.e. modularized SEDZLJ and SEDLIB)
- Linkers to connect CORSED library with CHL hydrodynamic models (GSMB, ADH, EFDC, and CMS)
- Graphic User Interface (GUI) in the SMS
- Validation and verification of CORSED library implemented into each hydrodynamic model
- Publications: Technical Note, Technical Report, Journal Article, Conference proceedings, CORSED Wiki

Stakeholders/Users

Sharing existing data and exchanging expert opinions will be accomplished with the partners in the San Francisco District, South Pacific Division, US Army Corps of Engineers.

Leveraging Opportunities

This project will provide USACE projects which require sediment transport modeling to utilize one flexible and adaptable sediment transport framework. The sediment transport library will operate across hydrodynamic frameworks typically used by ERDC for reimbursable projects and research, including ADH, GSMB, and CMS. Technologies will be transferred directly to key districts through this collaboration. In addition, this project will develop a team of sediment transport modelers who understand the complexity of sediment transport and enable to provide engineering solutions.

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