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

CORSED Consolidated Sediment Transport Code

US Army Corps
of Engineers®
Engineer Research and
Development Center

Description

CORSED is a research project for developing consolidated sediment transport code (or library) (CORSED) by integrating and modularizing ERDC's sediment transport models. This proposal proposes continued research activities in FY2020 to develop and validate linker codes for CORSED sediment transport library including SEDZLJ and SEDLIB. Model development, test case database, and results of model verification and validation (V&V) will be documented and published.
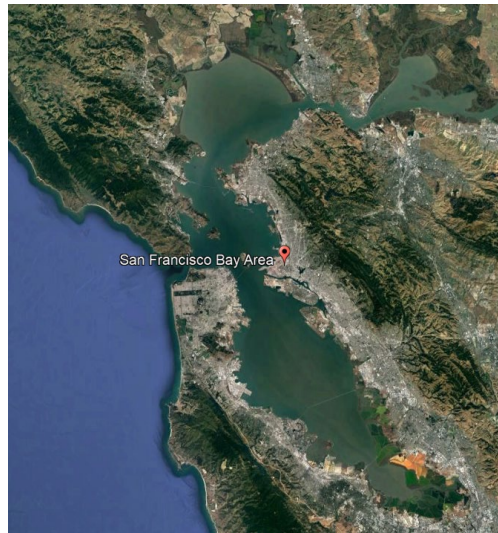

Location of RSM region or initiative(s): San Francisco Bay Area

Issue/Challenge To Address

ERDC maintains multiple sediment transport codes (e.g. SEDZJL, SEDLIB, etc.) developed by different teams for different 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. It has been modified by ERDC for mixed sediment transport (sand/silt/clay) in coastal and estuarine environments. Another ERDC developed sediment transport code, SEDLIB was developed to simulate multi-grain transport in rivers and creeks. It was 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 dependent on site conditions and is part of expert best-professional judgment. The purpose of this research is to develop a single library sediment transport framework, CORSED, that provides the functionality of both SEDZLJ and SEDLIB. As illustrated in the figure below, the framework will be flexible and adaptable, that operates across multiple hydrodynamic frameworks typically used by USACE (e.g. GSMB/CH3D, CMS, ADH, EFDC). This library will provide for user-selected methods to simulate physical 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. This

CORSED code which is developed as a single library is transportable across multiple hydrodynamic platforms.
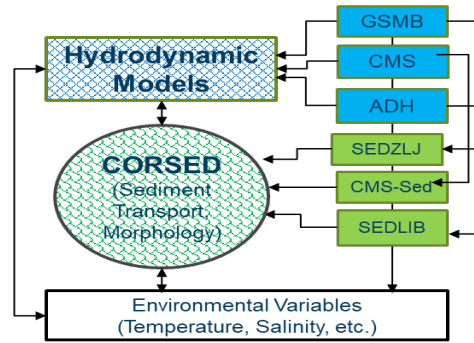
CORSED-driven Processes and Simulation Modules

Successes Lessons Learned

Lessons learned throughout this R&D project will be described in the TR scheduled to be completed in FY21.

Projected Benefits Cost Savings Value Added

The advancements and benefits of this research include:
- a comprehensive CORSED library framework that includes all functional capabilities of both SEDZLJ and SEDLIB,
- an adaptable framework for incorporating new sediment transport process algorithms into a documented sediment transport library,
- a framework in which sediment transport modelers from across USACE can incorporate new sediment process methods in a version-controlled environment, and
- a team of CORSED users within ERDC who are familiar with complexities associated with cohesive sediment transport model applications.

Expected FY20 Products

- Linker codes for GSMB-CORSED (SEDZLJ), CMS-CORSED (SEDZLJ), and AdH-CORSED (SEDLIB), and V&V tests.
- Design of CORSED Framework (I/O GUI) and Unified library.
- TN for CORSED (framework, I/O, coding strategy, etc.) and V&V.

Stakeholders/Users

Stakeholders include the partners in SPN as well as modelers we have worked with in other Districts, e.g., SAJ, SAM, POA, and LRE.

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 to key Districts (e.g., SPN, LRE, SAM, POA) through this collaboration. In addition, this project will develop a team of sediment transport modelers who understand the complexity of riverine, estuarine and coastal sediment transport and enable them to provide engineering solutions.

Points of Contact

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