CORSED: CONSOLIDATED SEDIMENT TRANSPORT CODE (FY18-FY22 – PHASE 1)

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COASTAL INLETS RESEARCH PROGRAM

FY21 IN PROGRESS REVIEW

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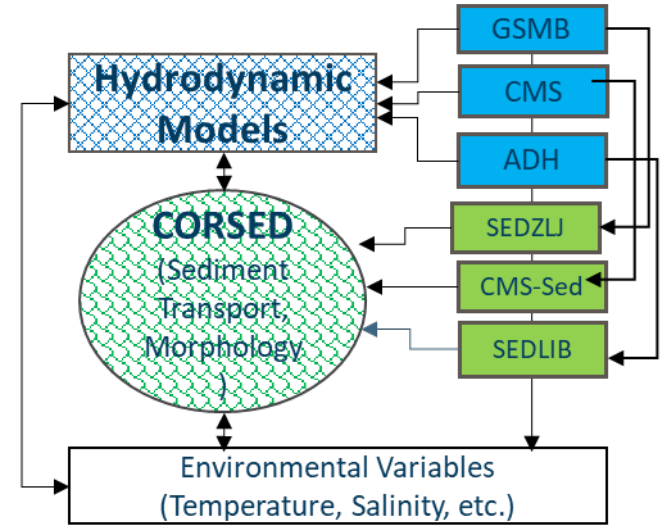
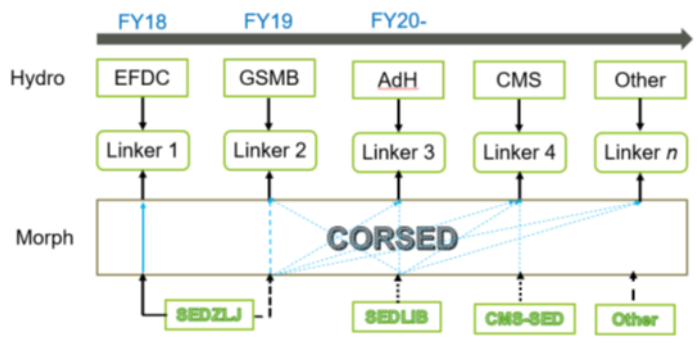




US Army Corps of Engineers

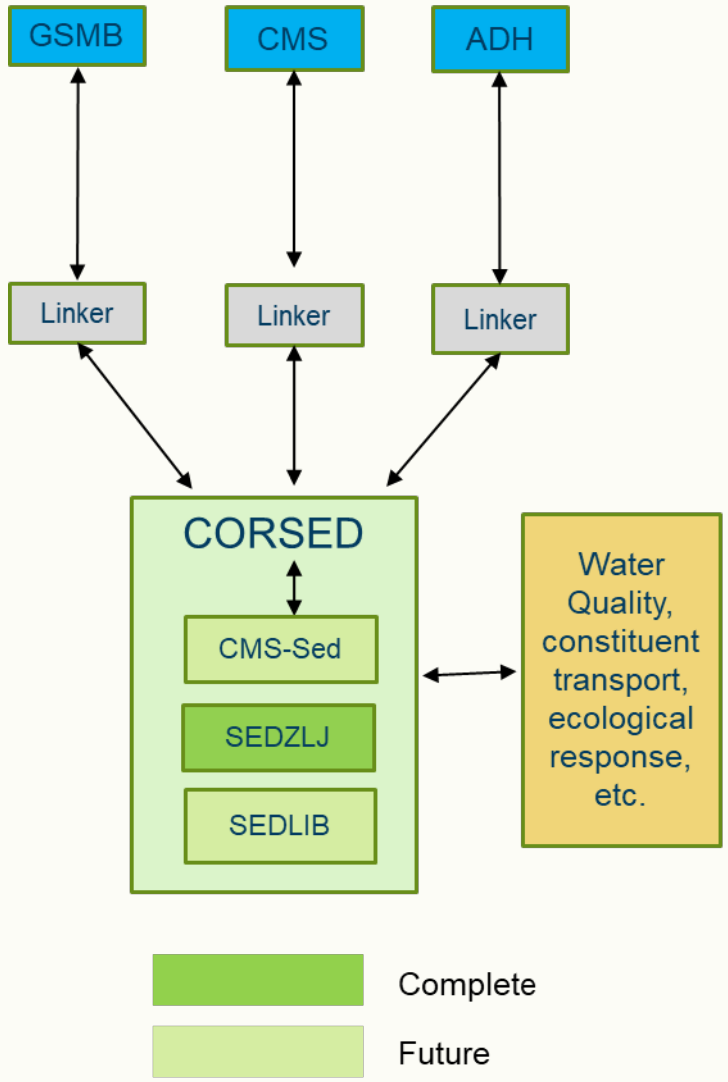
CHL COASTAL & HYDRAULICS LABORATORY

ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER

Problem Statement

- **ERDC has invested significant manpower and funding to developing three alternative sediment transport models, each operating with a different hydrodynamic model. What is required is one sediment transport code which operates across multiple hydrodynamic platforms and permits user-selected features from SEDZLJ, SEDLIB and CMS-SED. This unitary library code will permit ERDC to compete efficiently with other models (e.g., DELFT3D, MIKE21, TELEMAC) and provide the best transport predictions to clients in a cost effective manner.**

- **This project derives from CHL management discussion and the following SoNs:**
  - **2017-N-1: Testing and evaluation of USACE coastal numerical models.**
  - **2016-N-4: Quantifying wave and current driven sediment transport at nearshore dredge disposal sites.**



Capability and Strategic Impact Statement

- **CORSED will provide USACE projects which require sediment transport modeling a flexible sediment transport framework that has been demonstrated at multiple sites where validation data are available. These previous validations will provide confidence that the model can represent systems where sufficient validation data may not be available.**
- **CORSED will operate across hydrodynamic frameworks typically used by ERDC for reimbursable projects and research, including AdH, CH3D/GSMB, and CMS.**
- **In addition, ERDC and USACE will benefit from a new, integrated team of sediment transport modelers who understand the complexity of cohesive and non-cohesive sediment model application, parameterization and interpretation. This team will be developed during Phase 2 (FY23-25).**

Objectives and Approach

- **Objectives for Phase 1**
  - Develop a flexible and adaptable sediment transport library, CORSED, that operates independent of the chosen hydrodynamic and transport frameworks.
  - Develop linker codes between CORSED and various hydrodynamic and transport models used by USACE – AdH, CMS, and GSMB
  - Model demonstration, perform V&V, develop online and training documentation.
  - Establish CORSED as the base code for all further ERDC sediment transport model development.
  - Develop a flexible sediment transport framework that will be favored by academic partners.

- **Approach**
  - Develop libraries from the three existing sediment transport libraries (SEDZLJ, SEDLIB, CMS-SED).
  - Restructure hydrodynamic models (AdH, CMS, GSMB) so that they are linked to CORSED and able to drive any of the three sediment transport libraries.
  - Perform V&V of the sediment transport libraries in CORSED by simulating benchmark problems, and comparing results simulated by old and new models.
  - Standardize version control and model release.
  - Publish TNs and TRs on the different products produced during Phase 1
  - Develop user-friendly GUI/documentation.

Summary

FY21 Major Advances in Capability

- **Develop and debug CORSED-SEDZLJ linker codes for GSMB**
- **Model validation using reimbursable modeling studies**
- **Develop and test linkages between SEDZLJ-Lib-v1 and CMS and ADH**
- **Design CORSED for connecting the existing sediment libraries SEDLIB and SEDZLJ-Lib-v1**
- **Create CORSED so that SEDLIB and SEDZLJ-Lib-v1 are both able to exist side-by-side**

FY21 Major Products & Collaborations

- **1 Technical Note published**
- **1 Technical Report submitted for review**
- **3 Technical Notes submitted for review**
- **1 CIRP Technical Discussion (July 2021)**
- **Initial steps to develop an external Advisory Team are completed**
- **Funding also provided by DOER, RSM, Office of Naval Research and USTRANSCOM**

FY22 Products/Advances

- **Finalize testing of SEDZLJ-Lib-v1 linkage for AdH and CMS-Flow**
- **Develop CMS-Sed-Lib-v1 Library for CORSED**
- **Link the CMS-Sed-Lib-v1 Library to AdH and GSMB**
- **Link SEDLIB to CMS-Flow and GSMB**
- **Document CORSED-v1 with the three sediment transport libraries & linked hydrodynamic and transport codes**
- **CORSED Version Control and Code Management Using GitLab (https://git.erdc.dren.mil/groups/corsed)**
- **Establish CORSED development and application teams**
- **Conduct initial CORSED training to ERDC engineers/scientists**