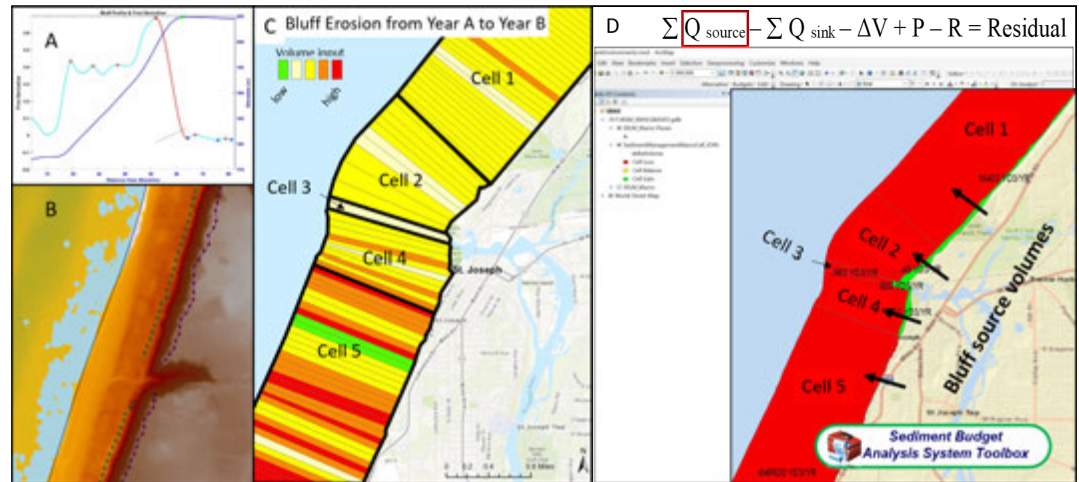




Description

This proposed effort seeks to improve feature extraction from lidar and imagery and integrate these datasets (dunes, bluffs, dune vegetation), national-level datasets (hydrographic surveys, navigation channel shoaling rates), along with existing databases (beach nourishment, dredging histories) within the sediment budget process and modify the SBAS toolbox to incorporate them in the accounting of sources and sinks.



Automated feature detection derives feature datasets, such as bluff edges, based on transects extracted from lidar datasets (A). Feature locations, characteristics, and changes can be quickly extracted and visualized. This figure shows bluff edge (red points/line) and toe (green points/line) along a section of Lake Michigan (B). With repeat bluff datasets, sediment contributions from bluff retreat can be calculated alongshore, for example (C). These volumes can then be incorporated into SBAS as a source component for adjacent cells (D).

Issue/Challenge To Address

Sediment budgets provide an accounting of sources and sinks within a region and are essential for understanding resources, challenges and requirements for effective planning and design of projects. A number of complex processes, including coastal sediment volume change, and erosion/deposition within coastal features, are major factors in sediment budgets. Datasets characterizing these processes cannot be easily integrated into the Sediment Budget Analysis System (SBAS). Recent RSM initiatives enabled integration of Joint Airborne Lidar Bathymetry Technical Center of Expertise (JALBTCX) volume change output into SBAS. This project seeks to both further develop coastal feature detection capabilities, and provide a seamless way to incorporate these feature datasets and existing enterprise datasets into SBAS.

Successes Lessons Learned

Lessons learned specific to this project will be compiled during the duration of this project. The FY18 RSM project successfully updated SBAS to easily ingest output from the JALBTCX volume change toolbox. A similar approach will be used here to ingest feature outputs (bluff input volumes).



National Regional Sediment Management Program CEERD-HNC:



Integrating Feature Extraction and Enterprise Databases: Expanding Sediment Budget Capabilities for the USACE

Feature extraction methodologies were developed through reimbursable projects in FY17 and 18 with both Galveston District (SWG) and Detroit District (LRD) as well as collaboration with USGS teams. These will be improved and built upon in this effort.

Projected Benefits Cost Savings Value Added

Feature extraction pulls easily consumable, specific, datasets from otherwise large and difficult-to-manage lidar and imagery datasets. Standardizing these methodologies not only makes them accessible to districts and researchers, but increases efficiency by replacing manual delineation with automated methods, and fosters consistency across datasets.

Enterprise databases provide an integrated platform for users and districts to pull data and work within their specific region of interest while maintaining access to nationwide datasets.

Standardizing methods for feature extraction and dataset integration into SBAS coupled with improving ease of access to these and other (eHydro/CSAT) datasets via enterprise database will vastly improve the USACE's ability to utilize these datasets for regional sediment management, environmental restoration, engineering with nature, and other projects.

Expected Products

- Feature extraction code updates
- Enterprise database access points and workflow
- SBAS tool add-on for features and enterprise data link
- Technology transfer through a Technical Report documenting the methods and results
- Present at technical conferences – ASBPA 2018 and Coastal Sediments 2019
- Present results at the annual RSM meeting and JALBTCX workshop

Stakeholders/Users

Stakeholders involved in this project include the South Atlantic Division through the SAD Coastal Comprehensive Study and including district representatives from both SAJ (Jacksonville) and SAM (Mobile).

Ultimately all USACE districts as well as ERDC laboratories will be potential stakeholders and users. Sediment budgets are relevant to most districts, and all will be able to utilize the tools created here as well as upload and download datasets to the enterprise database.

Leveraging Opportunities

This project will leverage NCMP volume change and feature detection work, as well as experience creating web apps.

The FY 18 RSM project made improvements to SBAS toolbox and developed preliminary workflows to incorporate volumes from the JALBTCX toolbox which will directly benefit this project.

USACE efforts to standardize the manner in which hydrographic surveys are processed and uploaded through the eHydro tool and production of additional datasets through CSAT will inform how we manage and develop the online databases and subsequent data products.



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The pilot study for this project will focus in the South Atlantic Division (SAD) to leverage ongoing NCMP and SAD work for the South Atlantic Division Coastal Comprehensive Study and the Mississippi Coastal Improvements Program (MsCIP).

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