
Data

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A Data Repository for Effects of Reduced Shoreline Erosion on Chesapeake Bay Water Clarity

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Spatial Information

36.7 to 39.7°N, -77.5 to -75.5°W; Chesapeake Bay, U.S.A.

Data Access

Data files linked below.

Abstract

This data repository is a permanent archive of the results presented in the associated publication (Turner et al. 2020, Science of the Total Environment, doi: 10.1016/j.scitotenv.2021.145157).

The objective of this study was to investigate the effects of shoreline erosion on water clarity in the Chesapeake Bay. To this end, we used the Chesapeake Bay ROMS Estuarine Carbon and Biogeochemistry (ChesROMS-ECB), a biogeochemical model embedded in the Regional Ocean Modeling System (ROMS). Using this model, we simulated a Chesapeake Bay estuary from 2001-2005 with varying magnitudes of sediment inputs from shoreline erosion and varying seabed erodibility conditions. Model results were compared to long-term cruise data from the Chesapeake Bay Program (CBP) (<https://datahub.chesapeakebay.net/>). These cruise data were used to calibrate certain components of the model and to evaluate model skill for the Reference Run. Three model runs are compared in the associated publication. Specifically, a Reference Run was used which most closely matched observed conditions, while a More Shoreline Erosion model run used double the realistic shoreline sediment inputs with a more erodible seabed, and a Highly Armored Shorelines model run used no shoreline erosion sediment inputs and a more stable seabed. The full results of these model runs are described in the associated publication.

Description

This dataset includes the results from the model simulations described in the associated publication (Turner et al. 2021, Science of the Total Environment, doi: 10.1016/j.scitotenv.2021.145157).

Data included in the present repository consist of model results from each of the three (3) simulations described in the paper. Data are in NetCDF format (extension .nc). Each results file in this archive corresponds to one of the experiments conducted, called, respectively, Reference Run, More Shoreline

Erosion, and Highly Armored Shorelines. Additionally, all data used to create figures that illustrate methods, e.g., initial seabed grain size distribution, are included in this archive. Please see the Methods section of the associated paper for more information on model parametrization and inputs. Additional information about the equations and parameters used in model setup can be found in the Supplementary Information document of the associated publication. Please visit the ROMS website (www.myroms.org) to obtain further information on the open source numerical model. Please contact Dr. Marjorie A. M. Friedrichs (marjy@vims.edu) with any questions regarding future implementations of the ChesROMS-ECB modeling system.

List of files:

- **Overall information:** Readme.txt
- **Initial seabed grain size:** seabed_initial_grainsize.nc
- **Seabed stresses:** seabed_stresses.nc
- **Particle parameters including ballasting effect settling velocities:** particle_parameters_ballasting_effect.nc
- **Compiled CBP data used for empirical equations:** cbp_data_for_kd_zsd_equations.nc
- **Compiled CBP data used for model-data comparison:** cbp_data_for_skill_assessment.nc
- **Results of Reference Run:** model_results_ReferenceRun.nc
- **Results of More Shoreline Erosion:** model_results_MoreShorelineErosion.nc
- **Results of Highly Armored Shorelines:** model_results_HighlyArmoredShorelines.nc

DOI

<https://doi.org/10.25773/rh56-4g63>

Keywords

Water clarity, water quality, coastal erosion, shoreline erosion, shoreline armoring, sediments, estuaries, organic matter, volatile suspended solids, VSS, fixed suspended solids, FSS, total suspended solids, TSS, light attenuation, attenuation depth, Secchi depth, ChesROMS-ECB, biogeochemical model, visibility, ROMS.

Associated Publication

Turner, Jessica S., St-Laurent, Pierre, Friedrichs, Marjorie A. M., and Friedrichs, Carl T. (2021) Effects of shoreline erosion on Chesapeake Bay water clarity. *Science of the Total Environment* 769, 145157, doi: 10.1016/j.scitotenv.2021.145157

Publication Statement

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