**Title:** Dataset: Numerical experiments on the sensitivity of Chesapeake Bay hypoxia to physical forcings and the associated code and input files

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**Document Type:**

Data

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**Spatial Information:** Longitude 75.0-77.4 deg.W, Latitude 36.5-39.6 deg.S (Chesapeake Bay)

**Data Access:** (Not applicable)

**Abstract:** A three-dimensional numerical model of the Chesapeake Bay (east coast of the United States) was used to simulate the period Jan.2010-Dec.2014. The model is an implementation of the Regional Ocean Modeling System (ROMS, https://www.myroms.org/) with modules for sediment resuspension (Warner et al. 2008), wetting-drying (Warner et al. 2013), and biogeochemistry (Estuarine Carbon Biogeochemistry, ECB, St-Laurent et al. 2020). It simulates the hydrodynamics and biogeochemistry with a uniform horizontal mesh of 600m and 20 topography-following vertical levels. Physical forcings include the ERA5 reanalysis (3-hourly) and tidal constituents from Szpilka et al. (2016). The dataset includes four numerical experiments designed to highlight the sensitivity of Chesapeake Bay hypoxia to its physical forcings: (1) control experiment with terrestrial inputs from the EPA's regulatory model (Phase 6) and with oceanic conditions from climatological observations, (2) experiment with terrestrial freshwater discharge from MOSART, (3) experiment with continental shelf conditions from Doppio, and (4) experiment with continental shelf conditions from E3SM. The model outputs are divided into 4 directories (one per experiment) each containing five years worth of model results (2010-2014) in the NetCDF format. All the metadata information necessary for the interpretation of the model outputs (dimensions, units, etc) is included inside the NetCDF files. The NetCDF files follow the CF conventions and can be opened with various software that are open source and freely available over the Internet. In addition to the model outputs, this archive includes the computer code (chesbay600m, rutgers\_roms20200313rev1013) as well as the input files necessary for reproducing the model outputs of this archive. The total size of the dataset is approximately 32 gigabytes.

**Description:** See “File Description”

**File Description (Table or list):**

--input\_files: Forcing files used in the four numerical experiments.

--outputs\_control: Outputs from the control experiment.

--outputs\_mosart: Outputs from the experiment using MOSART freshwater discharge.

--outputs\_doppio: Outputs from the experiment using Doppio oceanic conditions.

--outputs\_e3sm: Outputs from the experiment using E3SM oceanic conditions.

--hypoxic\_volumes.nc: Time-series of daily hypoxic volume for the four numerical experiments.

--chesbay600m: Implementation of ROMS-ECB for the Chesapeake Bay at 600m resolution.

--rutgers\_roms20200313rev1013: Copy of ROMS code from myroms.org.

**Keywords:** Chesapeake Bay, estuaries, model, ocean, hypoxia, eutrophication, continental shelf, ROMS, Mid-Atlantic Bight

**Associated Publication(s):** (Not applicable)

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