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Mechanisms driving decadal changes in the carbonate system of a coastal plain estuary: Associated dataset

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Abstract

This dataset includes model outputs presented in the associated publication (Da et al. 2021, Journal of Geophysical Research: Oceans). This study used a three-dimensional ecosystem model to quantify the relative impacts of multiple anthropogenic drivers on the Chesapeake Bay carbonate system over the past three decades. Model simulations highlight that increased atmospheric CO_2 concentrations and decreased terrestrial nutrient inputs are two primary drivers causing nearly equal reductions in pH in surface waters of the Bay.

Files | Description

These are daily model outputs used to generate results and figures shown in Da et al., *Journal of Geophysical Research: Oceans*, 2021. Please see associated journal article for details. We conducted nine model simulations, and outputs of each simulation are saved in two folders. Therefore, there are 18 folders, including two for 1985-1989 reference model simulation, two for 2015-2019 reference model simulation, and 14 for sensitivity simulations (see details below). All files are in netCDF format, which can be manipulated and displayed by a wide range of freely available (e.g., Python) and licensed software (e.g., MATLAB), see https://www.unidata.ucar.edu/software/netcdf/docs/. For detailed information about the open-source model: Regional Ocean Modeling System (ROMS), see: www.myroms.org. Note that both ocean_avg*.nc and ocean_dia*.nc files save daily averaged model outputs. Primary production rate is read from ocean_dia*.nc files, while other variables are read from ocean_avg*.nc files. Names of these simulations in the following “File Description Table” are also listed in Table 1 of the associated publication.

- **out_ref1985_01:** Model Output – Reference model simulation (1985-1986)
- **out_ref1985_02:** Model Output – Reference model simulation (1987-1989)

- **out_ref2015_01:** Model Output – Reference model simulation (2015-2016)
- **out_ref2015_02:** Model Output – Reference model simulation (2017-2019)
- **out_airCO2_01**: Model Output – Increased atmospheric CO_2 concentration, *AtmCO₂* sensitivity experiment (2015-2016)
- **out_airCO2_02:** Model Output – Increased atmospheric CO_2 concentration, *AtmCO₂* sensitivity experiment (2017-2019)
- **out_airT_01:** Model Output – Increased atmospheric temperature and longwave radiation, *AtmT* sensitivity experiment (2015-2016)
- **out_airT_02:** Model Output – Increased atmospheric temperature and longwave radiation, *AtmT* sensitivity experiment (2017-2019)
- **out_bryDIC_01:** Model Output – Increased oceanic dissolved inorganic carbon concentrations, *OcnC* sensitivity experiment (2015-2016)
- **out_bryDIC_02:** Model Output – Increased oceanic dissolved inorganic carbon concentrations, *OcnC* sensitivity experiment (2017-2019)
- **out_rivDIN_01:** Model Output – Decreased riverine nitrate concentrations, *RivNO₃* sensitivity experiment (2015-2016)
- **out_rivDIN_02:** Model Output – Decreased riverine nitrate concentrations, *RivNO₃* sensitivity experiment (2017-2019)
- **out_rivON_01:** Model Output – Decreased riverine organic nitrogen concentrations, *RivON* sensitivity experiment (2015-2016)
- **out_rivON_02:** Model Output – Decreased riverine organic nitrogen concentrations, *RivON* sensitivity experiment (2017-2019)
- **out_rivTADIC_01:** Model Output – Increased riverine total alkalinity and dissolved inorganic carbon concentrations, *RivC* sensitivity experiment (2015-2016)
- **out_rivTADIC_02:** Model Output – Increased riverine total alkalinity and dissolved inorganic carbon concentrations, *RivC* sensitivity experiment (2017-2019)
- **out_all_01:** Model Output – Modify all six drivers together, *All* sensitivity experiment (2015-2016)
- **out_all_02:** Model Output – Modify all six drivers together, *All* sensitivity experiment (2017-2019)

FILES ARE AVAILABLE AT: https://doi.org/10.25773/6087-bj68

Keywords

Chesapeake Bay, coastal acidification, carbonate system, decadal trends, anthropogenic drivers

Associated Publications

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