**V-PECS Abstract Submission 2021**

**Title:** Impacts of reduced shoreline erosion on estuarine water clarity: a Chesapeake Bay modeling study

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**Abstract:** Shoreline erosion supplies sediments to estuaries and coastal waters, influencing water clarity and primary production. Globally, shoreline erosion sediment inputs are changing with anthropogenic alteration of coastlines. Chesapeake Bay serves as a case study for investigating the effects of changing sediment inputs on water clarity. Long-term increases in shoreline armoring have decreased sediment inputs, changing the composition of suspended particles in surface waters. This study examined the impact of shoreline erosion on water clarity using a coupled hydrodynamic-biogeochemical-sediment transport model. Experiments were conducted to simulate realistic conditions, increased shoreline erosion, and highly armored shorelines. Together, reduced shoreline erosion and the corresponding reduced seabed resuspension resulted in decreased concentrations of inorganic particles, improving light penetration, particularly where and when riverine sediment influence was low. Greater light penetration relaxed light limitation, which increased organic matter production. Differences between the two extreme experiments, highly armored minus more erosion, revealed that in the mid-estuary in spring, surface inorganics decreased, while organics increased. This increase in the organic-to-inorganic ratio often had opposite effects on clarity according to different metrics, improving clarity in mid-Bay waters in terms of light attenuation depth, but degrading clarity in terms of Secchi depth because the resulting increase in organics decreased transparency. This incongruous water clarity effect, spatially defined here as an Organic Fog Zone, was present in spring in all years studied, but occurred farther south in wet years. In general, these findings suggest that human reduction of sediment supply may increase euphotic zones in downstream water bodies.

**Associated publication:** Turner, J.S., St-Laurent, P., Friedrichs, M.A.M., Friedrichs, C.T. 2021. Effects of reduced shoreline erosion on Chesapeake Bay water clarity. Science of the Total Environment 769, 145157. https://doi.org/10.1016/j.scitotenv.2021.145157.