Curriculum Vitae
Dr. Richard TIAN

University of Maryland Center for Environmental Science
e-mail: rchrdtian@gmail.com
Phone: 410-349-6946

Career summary: With a PhD in biogeochemical oceanography, I mostly devoted my career in coastal ecosystem and water quality modeling and responses to climate change and anthropogenic stresses. The scientific scope of my research ranges from biogeochemical cycles of organic substances, dissolved oxygen, nutrient dynamics, ecosystem function at the primary and secondary production levels, fish larvae, salt marshes and submerged aquatic vegetation, with over 50 peer-reviewed papers.

Professional experience

04/2012–present: Research scientist, University of Maryland Center for Environmental Science. Subject: Modeling of ecosystem function and water quality response to anthropogenic stressors, climate change and restoration effort in Chesapeake Bay. Multiple models have been used, including the Finite-Volume Coastal Model (FVCOM), Curvilinear-grid Hydrodynamics 3D model (CH3D), Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM) and the Regional Ocean Modeling System (ROMS) have been used as the physical simulation platform and the Army Corps of Engineers Integrated Compartment Water Quality Model (CIM), The Generalized Biological Model (GBM) and the Row Column Advance Ecological Systems Model (RCA) used as ecosystem simulation. Tidal wetland, SAV, benthic algae, shellfish and shoreline erosion are implemented in the model.

02/2005-04/2012: Research Scientist, School for Marine Science and Technology University of Massachusetts. Subject: Ecosystem and water quality simulation in the Gulf of Maine, Massachusetts Bay and Boston Harbor; Development and application of the Generalized Biological Model (GBM) and participating in the coupling of the HydroQual water quality mode RCA and FVCOM; Development of individual-based population dynamics model of Sea Scallop and application on Georges Bank and Mid Atlantic Bight.

06/2002-02/2005: Research scientist, Department of Earth and Planetary Sciences, Harvard University. Subject: Adaptive physical-biological modeling and ecological forecasts. I have developed a generalized and flexible biological model coupled with the Harvard Ocean Prediction Systems (HOPS) for adaptive simulation and real-time ecosystem forecasts. The generalized biological model consists of 7 functional groups, including nutrients, bacteria, autotrophs, heterotrophs, dissolved organic matter, biogenic detritus, and auxiliary state variables (e.g. chlorophyll, DO, CO_2, toxins, optics, acoustic properties).

9/96-6/2002: Research associate. Ocean Science Center, Memorial University, Canada. Subject: Ecological-biogeochemical modeling. I have developed a prognostic, physical-biological model of partial differential equations. The physical model is based on the Mellor-Yamada level 2.5 turbulence closure scheme and driven by meteorological data. The biological model consists of 10 state variables including the mesoplankton food web (diatom, mesozooplankton and large detritus) and the microbial food web (picophytoplankton, microzooplankton, suspended particles, dissolved organic matter and bacteria). Data assimilation, C:N ratio and zooplankton vertical migration were implemented as well.

8/91-9/96: **Research assistant**. Oceanographic Observatory, University of Pierre and Marie Curie (Villefranche/Mer, France). Subject: Biogeochemical modeling and analyses. I conducted modeling analysis on the biogeochemical cycles and prediction of anthropogenic lead in the Mediterranean Sea. Meanwhile I developed a method to evaluate new production versus regenerated production based on iodine speciation.

Peer-reviewed publications

Tian, R., X. Cai, C.F. Cerco, J. Zhang and L. Linker, 2023. Simulation of benthic microalgae impacts on water quality in shallow water systems, Corsica River, Chesapeake Bay. Frontiers in Marine Science, in press.

Linker L, G.Shenk, G. Bhatt, **R. Tian,** C. Cerco, I. Bertani, 2023. Development and application of the 2017 Chesapeake Bay climate change analysis. Journal of America Water Resource Association, in press.

Bhatt, G., L. Linker, G. Shenk, I. Bertani, **R. Tian**, J. Rigelman, K. Hinson and P. Claggett 2023. Water quality impacts of climate change, land use, and population growth in the Chesapeake Bay watershed. Journal of America Water Resource Association, 1-29. DOI: 10.1111/1752-1688.13144.

Robinson, A.R., H. Schmidt, P.J. Haley, S. Lalis, **R. Tian**, W.G, Leslie and W. Cho, 2023. Toward Dynamic Data-Driven Systems for Rapid Adaptive Interdisciplinary Ocean Forecasting. In NM Patrikalakis, PFJ Lermusiaux, C. Evangelinos, JJ McCarthy (Eds) Handbook of Dynamic Data Driven Applications Systems: 2,1-7.

Tian, R, X. Jeremy, M. Testa, D.C. Brady, C.F. Cerco and L.C. Linker6 2022. Simulation of high-frequency dissolved oxygen dynamics in a shallow estuary, the Corsica River, Chesapeake Bay. Frontiers in Marine Science, DOI 10.3389/fmars.2022.1058839.

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Cerco, C.F., and **R. Tian**, 2022. Impact of wetlands loss and migration, induced

by climate change, on Chesapeake Bay DO Standards. Journal of the American Water Resources Association, 58, 958-970. https://doi.org/10.1111/1752-1688.12919.

Zhang, Q., T.R. Fisher, C. Buchanan, A.B. Gustafson, R.R. Karrh, R.R. Murphy, J.M. Testa, **R. Tian**, P.J. Tango, 2022. Nutrient limitation of phytoplankton in three tributaries of Chesapeake Bay: Detecting responses following nutrient reductions. Water Research, 226, 11909, https://doi.org/10.1016/j.watres.2022.119099.

Shenk, G. W., Bhatt, G., Tian, R., Cerco, C.F., Bertani, I., Linker, L. 2021. Modeling Climate Change Effects on Chesapeake Water Quality Standards and Development of 2025 Planning Targets to Address Climate Change. CBPO Publication Number 328-21, Annapolis, MD. 145 pp.

Zhang Q., T.R Fisher, E.M Trentacoste , C. Buchanan, A.B. Gustafson, R. Karrh, R.R Murphy, J. Keisman, C. Wu, **R. Tian**, J.M. Testa, P.J. Tango, 2021. Nutrient limitation of phytoplankton in Chesapeake Bay: Development of an empirical approach for water-quality management. Water Res., doi: 10.1016/j.watres.2020.116407.

Hood, R.R., G.W. Shenk, R.L. Dixon, S.M.C. Smith, W. Ball, J.O. Bash, C. Cerco, P. Claggett, Z.M. Easton, A. Elmore, M.A.M. Friedrichs, L.A. Harris, L. Li, L.C. Linker, **R. Tian**, L. Wainger, D. Weller, J. Zhang 2021. The Chesapeake Bay program modeling system: Overview and recommendations for future development. Ecological modelling 456, 109635. https://doi.org/10.1016/j.ecolmodel.2021.109635.

Tian, R. 2000. Factors Controlling Hypoxia Occur rence in Estuaries, Chester River, Chesapeake Bay. Water *12*(7), 1961; https://doi.org/10.3390/w1207196.

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Zhang, Q., R.R. Murphy, **R. Tian**, M.K. Forsyth, E.M. Trentacoste, J. Keisman, P.J. Tango 2018. Chesapeake Bay's water quality condition has been recovering: Insights from a multimetric indicator assessment of thirty years of tidal monitoring data. Science of the Total Environment 637–638, 1617–1625.

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Wang, P., L Linker, H. Wang, G. Bhatt, G. Yactayo, K. Hinson and **R. Tian**, 2017. Assessing water quality of the Chesapeake Bay by the impact of sea level rise and warming. IOP Conf. Series: Earth and Environmental Science 82, 1-25, doi :10.1088/1755-1315/82/1/012001.

Wang, P., H. Wang L. Linker, **R. Tian**, 2016. Effects of cross-channel bathymetry and wind direction on destratification and hypoxia reduction in the Chesapeake Bay. Estuarine, Coastal and Shelf Science 178: 168-188.

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Tian, R.C., Chen, C.S., Qi J.H., Ji, R.B., Beardsley and Davis, C. 2015. Model study of nutrient and phytoplankton dynamics in the Gulf of Maine: patterns and drivers for seasonal and interannual variability. *ICES Journal of Marine Science* 72, 388-402.

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Lai, Z.G., Changsheng Chen, C.S., Robert C. Beardsley, R.C., Brian Rothschild, B. and **Tian, R.C.** 2010. Impact of high-frequency nonlinear internal waves on plankton dynamics in Massachusetts Bay, *Journal of Marine Research, 68:* 259–281.

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