[NICOLE] XUN CAI

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Education

2022	Ph.D., Marine Science	Virginia Institute of Marine Science | William & Mary, VA
2018	M.S., Marine Science	Virginia Institute of Marine Science | William & Mary, VA
2015	B.S., Oceanography	Nanjing University, Nanjing, China

Professional Experience

Aug. 2024 – present	**NSF Postdoctoral Research Fellow**, Yale University, CT *Mentors*: Peter Raymond (Yale), Holly Michael (U. Delaware), Sergio Fagherazzi (Boston U.)
Aug. 2022 – Jul. 2024	**ORISE Postdoctoral Fellow**, Chesapeake Bay Program, EPA, MD
Aug. 2021 – Jul. 2022	**ORISE Fellow Intern**, Chesapeake Bay Program, EPA, MD
Sep. – Oct. 2017	**International Visiting Fellow**, University of Oldenburg, Germany *Advisor*: Jörg-Olaf Wolff
Aug. 2015 – Jul. 2021	**Graduate Research Assistant**, Virginia Institute of Marine Science | William & Mary, VA *Advisors*: Joseph Zhang, Jian Shen

Peer-Reviewed Publications

[9] Tian, R., **Cai, X.**, Cerco, C., Zhang, Y., J., and Linker, L., 2024. Simulation of Benthic Microalgae Impacts on Water Quality in Shallow Water Systems, Corsica River, Chesapeake Bay. Frontiers in Marine Science. doi: 10.3389/fmars.2023.1295986.

[8]. **Cai, X.**, Shen, J., Zhang, Y., J., Qin, Q., and Linker, L., 2023. Sea-level Rise Impacts on The Tidal Marshes and Estuarine Biogeochemical Processes. Journal of Geophysical Research: Biogeosciences. doi: 10.1029/2023JG007450.

[7]. **Cai, X.**, Shen, J., Zhang, Y., J., Qin, Q., and Linker, L., 2023. The Roles of Tidal Marshes in the Estuarine Biochemical Processes: A Numerical Modeling Study. Journal of Geophysical Research: Biogeosciences. doi: 10.1029/2022JG007066.

[6]. Xiong, J., Shen, J., Qin, Q., Tomlinsom, M., Zhang, Y., **Cai, X.**, Ye, F., Cui, L., and Mulholland, M., 2023. Biophysical Interactions Control the Progression of Harmful Algal

Blooms in Chesapeake Bay: A Novel Lagrangian Particle Tracking Model with Mixotrophic Growth and Vertical Migration. Limnology and Oceanography Letters. doi: 10.1002/lol2.10308.

[5]. **Cai, X.**, Qin, Q., Shen, J., and Zhang, Y., J., 2022. Bifurcate Responses of Tidal Range to Sea-level Rise in Estuaries with Marsh Evolution. Limnology and Oceanography Letters. doi: 10.1002/lol2.10256.

[4]. Tian, R., **Cai, X.**, Testa, J., Brady, D.C., Cerco, C., and Linker, L., 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.

[3]. Qin, Q., Shen, J., Tuckey, T.D., **Cai, X.**, and Xiong, J., 2022. Using Forward and Backward Particle Tracking Approaches to Analyze Impacts of a Water Intake on Ichthyoplankton Mortality in the Appomattox River. Journal of Marine Science and Engineering. doi: 10.3390/jmse10091299.

[2]. **Cai, X.**, Shen, J., Zhang, Y., J., Qin, Q., Wang, Z., and Wang H., 2021. Impacts of Sea Level Rise on Hypoxia and Phytoplankton Production in Chesapeake Bay: Model Prediction and Assessment. Journal of American Water Resources Association. doi: 10.1111/1752-1688.12921.

[1]. **Cai, X.**, Zhang, Y., J., Shen, J., Wang, H., Wang, Z., Qin, Q., and Ye, F., 2020. A Numerical Study of Hypoxia in Chesapeake Bay Using an Unstructured Grid Model: Validation and Sensitivity to Bathymetry Representation. Journal of American Water Resources Association. doi: 10.1111/1752-1688.12887.

Grants and Proposals

Aug. 2024	**NSF Ocean Sciences Postdoctoral Research Fellowships (OCE-PRF)** – #2403359, "Connections Between Tidal Flooding, Saltwater Intrusion, and Alkalinity Exports in Tidal Marsh Wetlands" ($351,926), PI: **Xun Cai** (Yale) *Mentors*: Peter Raymond (Yale), Holly Michael (U. Delaware), Sergio Fagherazzi (Boston U.)
Waiting list	**NSF Earth Sciences Postdoctoral Fellowships (EAR-PF)** – #2403359, "Linkages Between Estuarine Hydrodynamics and Hydrological Drivers at the Coastal Critical Zone" ($180,000) *Mentors*: Holly Michael (U. Delaware), Mathew Kirwan (VIMS | W&M)
Jun. 2024	**CCRS Early Career Panel Funding Support**, Chesapeake Research Consortium and NOAA, Annapolis, MD – for joining plenary session "Beyond 2025, the Early Career Panel" ($1,850)
May 2024	**NSF Coastal Critical Zone Network Research Travel Award**, for on-site research visit to NSF Coastal Critical Zone Network Cluster, U. Delaware, DE (~$3,000)
Mar. 2023	**ECO-DAS XV Fellow**, Association for the Sciences of Limnology & Oceanography (ASLO) and National Science Foundation (NSF), Honolulu, HI ($3,337)

Apr. 2022	**W&M Open Access Financial Assistance**, for publication in L&O Letter – "Bifurcate Responses of Tidal Range to Sea-level Rise in Estuaries with Marsh Evolution" ($2,400)
Aug. 2020	**Commonwealth Coastal Research Fellowship**, VIMS, VA – for dissertation research focus which strategically advances VIMS' advisory service to the Commonwealth of Virginia in areas such as water quality research, and management and resilience approaches. ($31,245)
May 2019	**CSDMS Integration Travel Grant** at *Community Surface Dynamics Modeling System meeting 2019*, Boulder, CO – "Impact of Submerged Aquatic Vegetation on Water Quality in Cache Slough Complex, Sacramento-San Joaquin Delta: A Numerical Study"

Awards

Nov. 2023	**William R. "Randy" Boggess Best Paper Award**, American Water Resources Association – "A Numerical Study of Hypoxia in Chesapeake Bay Using an Unstructured Grid Model: Validation and Sensitivity to Bathymetry Representation."
Mar. 2022	**Top Cited Article 2020-2021**, Journal of American Water Resources Association, Wiley – "A Numerical Study of Hypoxia in Chesapeake Bay Using an Unstructured Grid Model: Validation and Sensitivity to Bathymetry Representation."
Oct. 2021	**Juliette B. & Carroll W. Owens, Sr. Fellowship**, VIMS, VA – for academic performance and progress in the Ph.D. Degree Program
May 2019	**Best Poster Award** at *Southeastern Virginia Postdoctoral Symposium*, Gloucester Point, VA – "Numerical Study of Impact of Submerged Aquatic Vegetation on Water Quality in Cache Slough Complex, Sacramento-San Joaquin Delta"

Teaching and Mentoring

Aug. 2023 – present	Co-mentor of master student Julia Abrao Teixeira, VIMS, VA – thesis "Distribution and Fate of Floating Marine Debris from Major Estuaries along the US East Coast to the Mid-Atlantic Bight: A Lagrangian Particle Tracking Approach"
Nov. 2023	Guest lecture at class ENVR 1401 at the University of Texas Rio Grande Valley – "Water Quality Modeling, Climate Change, and Sea-level Rise" (UTRGV is a Hispanic Serving Institution)
May – Jul. 2023	Mentor of undergraduate summer intern Philip Ignatoff, William & Mary, VA – design of an 8-week research project "Revisit sediment diagenesis, bioturbation, and nutrient cycling" as a case study in Gadeken et al., in prep for *L&O Letters*
Apr. 2019	Teaching lecture at SCHISM Summit workshop, Sacramento, CA – "Introduction of SCHISM-ICM water quality model"

Invited Talks and First-author Conference Presentations

May 2024	Guest speaker presentation at *Delaware Environmental Institute and the Coastal Critical Zone Network* – "Coastal Environment Facing Climate Change: Insights from Computational Methods"
Mar. 2024	Invited seminar at *Old Dominion University Ocean & Earth Sciences Department Spring Seminar Series* – "Coastal Environment Facing Climate Change: Insights from Computational Methods"
Feb. 2024	Poster presentation at *Ocean Sciences Meeting 2024*, New Orleans, LA – "Impacts of sea-level rise on the tidal marshes and estuarine biogeochemical processes"
Nov. 2023	Oral presentation at *Coastal & Estuarine Research Federation (CERF) 2023* Portland, OR – "Impacts of sea-level rise on the tidal marshes and estuarine biogeochemical processes"
May 2023	Oral presentation at *International Society for Ecological Modelling Global Conference*, Toronto, Canada – "Impacts of sea-level rise on the tidal marshes and estuarine biogeochemical processes"
Mar. 2023	Invited talk at *the first annual meeting of NSF project CHALK* – "Development of biogeochemical modeling of tidal wetlands estuarine waters of the York River"
Jun. 2022	Oral presentation at *Chesapeake Bay Symposium,* Annapolis, MD – "Impacts of sea-level rise on the material exchange between tidal marshes and the estuary"
Jun. 2022	Oral presentation at *Chesapeake Bay Symposium,* Annapolis, MD – "Development of a Next-Generation Tributary Model in the tidal James River"
Jun. 2020	Oral presentation at *Chesapeake Bay Symposium,* virtual – "Impacts of Sea-level Rise on Hypoxia and Phytoplankton Production in Chesapeake Bay: Model Validation and Assessment"
Nov. 2019	Oral presentation at *Coastal & Estuarine Research Federation (CERF) 2019*, Mobile, AL – "Numerical Simulation of Impacts from Sea-level Rise on Hypoxia in Chesapeake Bay Using an Unstructured Grid Model: Validation and Assessment"
Jun. 2016	Poster presentation at *Chesapeake Bay Symposium, 2016*, Williamsburg, VA – "Effect of pH on nutrients release and algal bloom in the Back River, Upper Chesapeake Bay"

Service and Outreach

2021 - present	Reviewer for *Geology, Journal of Geophysical Research: Biogeosciences, Ocean Modeling, Marine Pollution Bulletin, Journal of American Water Resources Association,* and USGS Colleague Review.
Jun. 2024	Panelist at plenary session "Beyond 2025, the Early Career Panel" at *Chesapeake Community Research Symposium 2024*.

Jun. 2024	Session convener at *Chesapeake Community Research Symposium 2024* – "Exploring the Linkage Between the Tidal Marsh Dynamics and the Key Processes in the Chesapeake Bay" (session proposal accepted).
May 2024	Participation at *Scientific and Technical Advisory Committee (STAC) workshop* titled 'CBP Climate Change Modeling III: Post-2025 decisions.'
2019 - 2022	VIMS Ombudsperson – Peer mentor and confidential resource for graduate students to promote conflict resolution for problems that arise in the university setting.
Aug. 2019	Oral presentation at *A Scientist Walks into A Bar – Grad Student Edition* – "To Save the Fish by Removing Seagrass?"

Professional Skills

Numerical modeling	Semi-implicit Cross-scale Hydroscience Integrated System Model (SCHISM); Integrated Compartment Model (ICM) multi-dimensional water quality model; Sediment Flux Model; Tidal Marsh Model; Submerged Aquatic Vegetation Model; Benthic Algae Model; Benthic Feeder Model; Bioturbation Model; Sediment Transport Model; Wind Wave Model; Watershed and Airshed Coupling; Groundwater model HydroGeoSphere
Data analysis and machine learning	Harmonic Analysis, Empirical Mode Decomposition (EMD), Regressions, Decision Tree, Classification and Regression Trees (CART), Generalized Linear Models (GLM), Generalized Additive Model (GAM), Random Forest, Neural Network, Empirical Orthogonal Function (EOF)
Programing skills	Fortran, Matlab, Python, HTML, Perl, C, Git, and R
Software	SMS, ArcGIS, CorelDRAW, STELLA
Operating system	Unix for high-performance computing (HPC)

Field Experience and Research Cruises

May 2024	On-site visit to NSF Coastal Critical Zone Network Cluster sites on the Delmarva Peninsula, 1 day.
Oct. 2017	RV HEINCKE HE498, CTD profiling at North Sea, 7 days.
Sep. 2017	Fish tagging cruise at Sacramento-San Joaquin delta, 1 day.