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## Research Interests

I seek to understand the interactions between the global cycles of climatically important elements and microbial activities in aquatic ecosystems (both ocean and lakes). To this end, I use idealized ecological theory, numerical models and the analysis of observed data.

## Professional Appointments

- **Assistant Professor** 2025 - Present  
*Peking University* *Beijing, China*
- **Research Scientist** 2023 - 2025  
*Massachusetts Institute of Technology* *Cambridge, MA*
  - **Advisor:** Prof. Michael J. Follows
- **Postdoctoral Associate** 2018 - 2023  
*Massachusetts Institute of Technology* *Cambridge, MA*
  - **Advisor:** Prof. Michael J. Follows

## Education

- **Peking University** China  
*Ph.D. in Environmental Sciences* 2013 – 2018
- **Peking University** China  
*B.Sc. in Environmental Sciences* 2009 – 2013

## Awards & Honors

- **Merit Student, Peking University:** 2017
- **Presidential Scholarship, Peking University:** 2017
- **Award for Scientific Research, Peking University:** 2015

## Publications

### Peer Reviewed Papers

- [1] **Z. Wu** and G. Forget. “PlanktonIndividuals.jl: A GPU supported individual-based phytoplankton life cycle model.” In: *Journal of Open Source Software* 7.73 (2022), p. 4207. DOI: doi.org/10.21105/joss.04207. URL: https://doi.org/10.21105/joss.04207.
- [2] **Z. Wu**, J. Li, Y. Sun, J. Penuelas, J. Huang, J. Sardans, Q. Jiang, J. Finlay, G. L. Britten, M. J. Follows, W. Gao, B. Qin, J. Ni, S. Huo, and Y. Liu\*. “Imbalance of global nutrient cycles exacerbated by the greater retention of phosphorus over nitrogen in lakes.” In: *Nature Geoscience* 15 (2022). DOI: doi.org/10.1038/s41561-022-00958-7.

- [3] **Z. Wu**<sup>#</sup>, D. Aharonovich<sup>#</sup>, D. Roth-Rosenberg, O. Weissberg, T. Luzzatto-Knaan, A. Vogts, L. Zoccarato, F. Eigemann, H.-P. Grossart, M. Voss, M. J. Follows<sup>\*</sup>, and D. Sher<sup>\*</sup>. “Single-cell measurements and modelling reveal substantial organic carbon acquisition by *Prochlorococcus*.” In: *Nature Microbiology* (2022). DOI: doi.org/10.1038/s41564-022-01250-5.
- [4] **Z. Wu**<sup>\*</sup>, S. Dutkiewicz, O. Jahn, D. Sher, A. White, and M. J. Follows. “Modeling Photosynthesis and Exudation in Subtropical Oceans.” In: *Global Biogeochemical Cycles* 35.9 (2021), e2021GB006941. DOI: 10.1029/2021GB006941.
- [5] **Z. Wu**, R. Zou, Q. Jiang, J. J. Elser, L. Zhao, R. Ye, and Y. Liu<sup>\*</sup>. “What maintains seasonal nitrogen limitation in hyper-eutrophic Lake Dianchi? Insights from stoichiometric three-dimensional numerical modeling.” In: *Aquatic Sciences* 82.4 (2020), pp. 1–12. DOI: 10.1007/s00027-020-00744-w.
- [6] R. Zou<sup>#</sup>, **Z. Wu**<sup>#</sup>, L. Zhao, J. J. Elser, Y. Yu, Y. Chen, and Y. Liu<sup>\*</sup>. “Seasonal algal blooms support sediment release of phosphorus via positive feedback in a eutrophic lake: Insights from a nutrient flux tracking modeling.” In: *Ecological Modelling* 416 (2020), p. 108881. DOI: 10.1016/j.ecolmodel.2019.108881.
- [7] **Z. Wu**, Y. Liu<sup>\*</sup>, Z. Liang, S. Wu, and H. Guo. “Internal cycling, not external loading, decides the nutrient limitation in eutrophic lake: A dynamic model with temporal Bayesian hierarchical inference.” In: *Water Research* 116 (2017), pp. 231–240. DOI: 10.1016/j.watres.2017.03.039.
- [8] J. P. Mattern<sup>#</sup>, K. Glauninger<sup>#</sup>, G. L. Britten, J. R. Casey, S. Hyun, **Z. Wu**, E. V. Armbrust, Z. Harchaoui, and F. Ribalet<sup>\*</sup>. “A Bayesian approach to modeling phytoplankton population dynamics from size distribution time series.” In: *PLOS Computational Biology* 18.1 (2022), e1009733. DOI: 10.1371/journal.pcbi.1009733.
- [9] M. Wang, X. Xu, **Z. Wu**, X. Zhang, P. Sun, Y. Wen, Z. Wang, X. Lu, W. Zhang, X. Wang, and Y. Tong. “Seasonal pattern of nutrient limitation in a eutrophic lake and quantitative analysis of the impacts from internal nutrient cycling.” In: *Environmental science & technology* 53.23 (2019), pp. 13675–13686. DOI: 10.1021/acs.est.9b04266.
- [10] S. Wu, **Z. Wu**, Z. Liang, Y. Liu<sup>\*</sup>, and Y. Wang. “Denitrification and the controlling factors in Yunnan Plateau Lakes (China): exploring the role of enhanced internal nitrogen cycling by algal blooms.” In: *Journal of Environmental Sciences* 76 (2019), pp. 349–358. DOI: 10.1016/j.jes.2018.05.028.
- [11] F. Dong, Y. Liu<sup>\*</sup>, **Z. Wu**, Y. Chen, and H. Guo. “Identification of watershed priority management areas under water quality constraints: a simulation-optimization approach with ideal load reduction.” In: *Journal of Hydrology* 562 (2018), pp. 577–588. DOI: 10.1016/j.jhydrol.2018.05.033.
- [12] B. Li, J. Chen, **Z. Wu**, S. Wu, S. Xie<sup>\*</sup>, and Y. Liu<sup>\*</sup>. “Seasonal and spatial dynamics of denitrification rate and denitrifier community in constructed wetland treating polluted river water.” In: *International Biodeterioration & Biodegradation* 126 (2018), pp. 143–151. DOI: 10.1016/j.ibiod.2017.10.008.
- [13] B. Li, Y. Yang, J. Chen, **Z. Wu**, Y. Liu, and S. Xie<sup>\*</sup>. “Nitrifying activity and ammonia-oxidizing microorganisms in a constructed wetland treating polluted surface water.” In: *Science of the Total Environment* 628 (2018), pp. 310–318. DOI: 10.1016/j.scitotenv.2018.02.041.
- [14] B. Li, H. Chen, N. Li, **Z. Wu**, Z. Wen, S. Xie<sup>\*</sup>, and Y. Liu<sup>\*</sup>. “Spatio-temporal shifts in the archaeal community of a constructed wetland treating river water.” In: *Science of the Total Environment* 605 (2017), pp. 269–275. DOI: 10.1016/j.scitotenv.2017.06.221.
- [15] G. Mao, L. Chen, Y. Yang, **Z. Wu**, T. Tong, Y. Liu, and S. Xie<sup>\*</sup>. “Vertical profiles of water and sediment denitrifiers in two plateau freshwater lakes.” In: *Applied microbiology and biotechnology* 101.8 (2017), pp. 3361–3370. DOI: 10.1007/s00253-016-8022-6.

- [16] Y. Chen, Y. Dai, Y. Wang, **Z. Wu**, S. Xie\*, and Y. Liu\*. “Distribution of bacterial communities across plateau freshwater lake and upslope soils.” In: *Journal of Environmental Sciences* 43 (2016), pp. 61–69. DOI: 10.1016/j.jes.2015.08.012.
- [17] Y. Dai, Y. Yang, **Z. Wu**, Q. Feng, S. Xie\*, and Y. Liu\*. “Spatiotemporal variation of planktonic and sediment bacterial assemblages in two plateau freshwater lakes at different trophic status.” In: *Applied Microbiology and Biotechnology* 100.9 (2016), pp. 4161–4175. DOI: 10.1007/s00253-015-7253-2.
- [18] Y. Yang, Y. Dai, **Z. Wu**, S. Xie, and Y. Liu. “Temporal and spatial dynamics of archaeal communities in two freshwater lakes at different trophic status.” In: *Frontiers in microbiology* 7 (2016), p. 451. DOI: 10.3389/fmicb.2016.00451.
- [19] Y. Yang, N. Li, Q. Zhao, M. Yang, **Z. Wu**, S. Xie\*, and Y. Liu\*. “Ammonia-oxidizing archaea and bacteria in water columns and sediments of a highly eutrophic plateau freshwater lake.” In: *Environmental Science and Pollution Research* 23.15 (2016), pp. 15358–15369. DOI: 10.1007/s11356-016-6707-0.
- [20] Y. Dai, **Z. Wu**, S. Xie\*, and Y. Liu\*. “Methanotrophic community abundance and composition in plateau soils with different plant species and plantation ways.” In: *Applied microbiology and biotechnology* 99.21 (2015), pp. 9237–9244. DOI: 10.1007/s00253-015-6782-z.
- [21] Y. Dai, **Z. Wu**, Q. Zhou, Q. Zhao, N. Li, S. Xie\*, and Y. Liu\*. “Activity, abundance and structure of ammonia-oxidizing microorganisms in plateau soils.” In: *Research in microbiology* 166.8 (2015), pp. 655–663. DOI: 10.1016/j.resmic.2015.07.012.
- [22] J. Zhang, Y. Dai, Y. Wang, **Z. Wu**, S. Xie\*, and Y. Liu\*. “Distribution of ammonia-oxidizing archaea and bacteria in plateau soils across different land use types.” In: *Applied microbiology and biotechnology* 99.16 (2015), pp. 6899–6909. DOI: 10.1007/s00253-015-6625-y.

## Talks & Presentations

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- [1] Z. Wu, J. Casey, and G. Forget. “Effects of thermal mortality on microbial community dynamics.” In: Ocean Sciences Meeting. New Orleans, USA, 2024.
- [2] Z. Wu, D. Sher, O. Weissberg, and M. J. Follows. “Evaluating the implications of mixotrophy in *Prochlorococcus* using an Individual-based Modeling approach.” In: ASLO Aquatic Sciences Meeting. Online, 2021.
- [3] Z. Wu, M. J. Follows, and S. Dutkiewicz. “Modeling photosynthesis and exudation of DOM in subtropical oceans.” In: Ocean Sciences Meeting. San Diego, USA, 2020.

## Teaching

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### Workshops & Short Courses

- **Modeling Marine Ecosystems At Multiple Scales Using Julia** Jul, 2021  
*Co-host* *JuliaCon, Online*
- **Kaufman Teaching Certificate Program** Sep-Dec, 2022  
*Participant* *MIT*

## Academic Service

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### Review

Earth Future, Ecological Indicators, Ecological Modelling, EST Water, Geoscientific Model Development, Journal of Hydrology, Journal of Open Source Software, Water Research