Xiaohan (Sally) Li

Postdoc Research Associate at Cooperative Institute for Modeling the Earth System
NOAA Geophysical Fluid Dynamics Laboratory (GFDL)/Princeton University
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RESEARCH INTERESTS

- Interfacial physics and chemistry
- Aerosol microphysics
- Climate modeling
- Aerosol-cloud interaction

EDUCATION

Princeton University Aug 2018 — June 2023
Ph.D. in Civil and Environmental Engineering
Thesis: *Water, Salt, Organics, and Minerals: Improved Understanding of Aerosol Microphysics From a Nanoscale Basis*
Advisor: Ian C. Bourg

Peking University Sep 2014 — June 2018
B.S. in Energy and Resources Engineering and Economics (minor)
Research Advisor: Dongxiao Zhang

ACADEMIC EXPERIENCE

NOAA GFDL/Princeton University Sep 2023 — Present
CIMES Postdoc Research Associate
Host: Paul Ginoux

Texas A&M University Aug 2023
Visiting Scholar in Atmospheric Sciences Department
Host: Yue Zhang

AWARDS

C. Ellen Gonter Environmental Chemistry Award 2023
Highest award given to students by the Division of Environmental Chemistry of the American Chemical Society for the highest quality research papers.
Civil and Environmental Engineering Departmental Travel Award 2022
School of Engineering and Applied Science Travel Grants 2022
Walbridge Fund Graduate Award for Environmental Research 2021
Awarded to Princeton Ph.D. candidates pursuing innovative research on climate science, energy solutions, environmental policy or other environmental topic.
Merit Student, Peking University (4 ×) ..... 2014 — 2018
Honor awarded annually to outstanding students for exceptional academic achievements at Peking University (with Xiaohan being elected a total of 4 times).
National Scholarship, Ministry of Education, China ..... 2016 — 2017
Highest level of national scholarship that students in higher education institutions can receive.
National Encouragement Scholarship, Ministry of Education, China (4 ×) ..... 2014 — 2018
An annual award recognizing students for exceptional academic achievements and noteworthy contributions in extracurricular activities (with Xiaohan being elected a total of 4 times).
Cyrus Tang Scholarship (4 ×) ..... 2014 — 2018
Scholarship awarded to exceptional students dedicated to leadership, community service, and fostering global understanding and cooperation (with Xiaohan being awarded a total of 4 times).
Meritorious Winner, International Mathematical Contest in Modeling (MCM), COMAP 2016
Awarded to the top 8% of teams worldwide for solving a real-world mathimatical application problem.
2nd Prize in National College Students Physics Competition, China 2015
Awarded for nationwide excellence in physics.

PUBLICATIONS

In Preparation

Li X., Wolf M., et al., Cziczo D., Zhang Y. Quantifying the Effects of Phase State on the Ice Nucleation Abilities of Organic Aerosols. Environmental Science & Technology, in prep (2024).
Li X., Zhang S., Ginoux P. A κ-Köhler theory-based parameterization of aerosol activation to cloud droplets. Geophysical Research Letters, in prep (2024).

Published

1. **Li X.**, Bourg I.C. Hygroscopic growth of adsorbed water films on smectite clay particles. *Environmental Science & Technology*, 58, 2, 1109–1118 (2024).
2. **Li X.** Water, salt, organics, and minerals: improved understanding of aerosol microphysics from a nanoscale basis. *Princeton University* (2023).
3. **Li X.**, Bourg I.C. Phase State, surface tension, water activity, and accommodation coefficient of water–organic clusters near the critical size for atmospheric new particle formation. *Environmental Science & Technology*, 57, 13092-13103 (2023).
4. **Li X.**, Bourg I.C. Microphysics of liquid water in sub-10 nm ultrafine aerosol particles. *Atmospheric Chemistry and Physics*, 23, 2525-2556 (2023).
5. Wu Y., Li P., Yan B., **Li X.**, Huang Y., Yuan J., Feng X., Dai C. A Salt-Induced Tackifying Polymer for Enhancing Oil Recovery in High-Salt Reservoirs: Synthesis, Evaluation, and Mechanism. *Green Energy & Environment*, in press (2023).
6. Zhou S., Zhang D., Wang H., **Li X.** A modified BET equation to investigate supercritical methane adsorption mechanisms in shale. *Marine and Petroleum Geology*, 105, 284-292 (2019).

TEACHING AND MENTORING

Teaching Assistant Princeton University
CEE207: Introduction to Environmental Engineering Fall 2020
— I hosted three precepts per week, developed weekly quizzes, held office hours, and graded homework.

Undergraduate Research Advising Princeton University
— I identified research topics, developed research questions, designed experiments, and supervised the following students:
- Yuno Iwasaki, Department of Physics, Class of 2023
  Topics: *Characterizing the microphysics of atmospheric organic aerosols using molecular dynamics simulations*
- George Dickinson, Department of Civil and Environmental Engineering, Class 2023
  Topics: *Molecular dynamics simulations of black carbon-water interactions in the atmosphere*
- Benjamin Henry, Department of Civil and Environmental Engineering, Class 2022
  Topics: *Molecular dynamics simulations of curvature impact on black carbon wettability*

SERVICE AND OUTREACH

DEI Activities
- **Member** of DEI committee of Atmospheric and Oceanic Program, Princeton University 2024-Present
- **Organizer** of Spring Into Science event, Science Outreach Program, Princeton University Apr 2024

Professional Service
- **Journal Reviewer** for *JACS, ACS Omega, ACS Earth and Space Chemistry* 2023-Present
- **Organizer** of Environmental Certificate Colloquium, High Meadow Environmental Institute 2021-2022
- **Co-Chair** of Scientific Session at AGU21 Fall Meeting 2021
  Session A35N: *Molecular-Scale Characterization of Atmospheric Aerosol Using Simulations and Experiments*
- **Organizer** of EEWR Brown Bag Seminar, Princeton University 2020-2021

PRESENTATIONS

1. **Li, X.**, Bourg I.C. Molecular dynamics simulations of adsorbed water films on smectite clay particles. ACS Fall Meeting, Denver, August, 2024 (**Oral, Invited**).
2. **Li, X.**, Bourg I.C. Hygroscopic growth of adsorbed water films on smectite clay particles. ACS Spring Meeting, New Orleans, March, 2024 (**Oral**).
3. **Li, X.**, Ginoux P., Paulot F. Ongoing effort to implement aerosol microphysics in the GFDL atmospheric model. GFDL Aerosol/Cloud Microphysics Roundtable, Princeton, March, 2024 (**Oral**).
4. **Li, X.** Water, salt, and organics in nano-aerosol particles: improved understanding of aerosol microphysics from molecular basis. University of Washington in St. Louis, Missouri, April 2023 (**Oral**).

5. **Li, X.**, Bourg I.C. How does water contribute to new particle formation? ACS Spring Meeting, Indianapolis, March 2023 (**Oral**).
6. **Li, X.** Aerosol microphysics from molecular understanding to improved representation in climate models. Geophysical Fluid Dynamics Laboratory, NOAA, Princeton, February 2023 (**Oral**).
7. **Li, X.**, Bourg I.C. Molecular dynamics simulations of the microphysics of liquid water in nano-aerosol droplets. AAAR 40th Annual Conference, Raleigh, October 2022 (**Oral**).
8. **Li, X.**, Bourg I.C. Molecular dynamics simulations of the effect of surface charge density and oxidation degree on the colloidal stability of graphene oxide. Goldschmidt, Honolulu, July 2022 (**Poster**).
9. **Li, X.**, Bourg I.C. Molecular dynamics simulations of water, salt, and organics in nano-aerosol particles. ACS Spring Meeting, San Diego, March 2022 (**Oral**).
10. **Li, X.**, Bourg I.C. Molecular dynamics simulations of liquid water microphysics in nano-aerosol droplets. AGU Fall Meeting, New Orleans, December 2021 (**Poster**).
11. **Li, X.**, Bourg I.C. Molecular dynamics (MD) simulation of the microphysics of liquid water in aerosol particles. SMatCH Seminar, Princeton University, November 2021 (**Oral**).
12. **Li, X.**, Bourg I.C. Phase-mixing states in secondary organic aerosol: key to water cloud condensation and optical insights. EEWR Brown Bag Seminar, Princeton University, December 2019 (**Oral**).
13. **Li, X.**, Bourg I.C. How secondary organic aerosol affects precipitation and radiative forcing. AGU Fall Meeting, San Francisco, December 2019 (**Poster**).

SKILLS

Computational Skills

- Climate modeling: GFDL AM4/AM5 (model development in Fortran)
- Molecular Dynamics (MD) simulations and Density Functional Theory (DFT): LAMMPS, Gromacs, Quantum Espresso
- Computational fluid dynamics: OpenFOAM
- Machine learning and finite element analysis programming: Python, Matlab, C++/C

Experimental Skills

- Pore structure characterization of minerals: mercury intrusion porosimeters, advanced micropore size and chemisorption analyzer
- High pressure gas and sub-critical fluid sorption measurement: rubotherm gravimetric adsorption instruments

REFERENCES

Ian C. Bourg
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E-mail: bourg@princeton.edu

Paul Ginoux
Senior Physical Scientist, Geophysical Fluid Dynamics Laboratory, NOAA
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Fabien Paulot
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Yue Zhang
Assistant Professor, Department of Atmospheric Sciences, Texas A&M University
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Dongxiao Zhang
Chair Professor, Executive Vice President and Provost, Eastern Institute for Advanced Study, China
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