Curriculum Vitae

Dr. Xiaowen Li
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Education

The University of Chicago	Geophysical Sciences	Ph.D., 2002
Chinese Academy of Meteorological Sciences	Meteorology	M.Sc., 1994
Peking University, China	Atmospheric Sciences	B.Sc., 1991

Professional Appointments

Morgan State University	Associate Professor	2022-current
Morgan State University	Senior Research Scientist	2015-2022
	Associate Research Scientist	2011-2015
University of Maryland, Baltimore County	Associate Research Scientist	2010-2011
	Assistant Research Scientist	2004-2010
	Research Associate	2002-2004
Chinese Academy of Meteorological Sciences	Research Scientist	1994-1996

Research Experience

- Climate Science: Focused on regional temperature and precipitation trends, impact of aerosols and pollution on climate, and aerosol direct radiative effects.
- Precipitation Science: Focused on aerosol impacts on convection strengths and storm organizations, space-borne radar rainfall retrieval, surface rainfall spatial and temporal patterns associated with mesoscale convective systems, precipitation land-sea contrasts, and sub-seasonal rainfall variations associated with the Madden-Julian Oscillation.
- Satellite Observations: More than 15 years' experiences serving as a science team member at NASA's precipitation measurement satellite missions (the Tropical Rainfall Measurement Mission, TRMM, and the Global Precipitation Measurement, GPM, Mission), ocean surface wind satellite (Cyclone Global Navigation Satellite System, CYGNSS Mission), and cloud and aerosol measurement (CloudSat/CALIPSO Mission).
- Regional Model Simulations: More than 10 years' experiences with the Weather Research and Forecast (WRF) model and the Coupled-Ocean-Atmosphere-Wave-Sediment Transport (COAWST) model with spatial resolution ranging from 1km to 4km. Case studies include mesoscale convective systems and squall lines, orographic precipitation, sea breeze convection, and Madden-Julian Oscillations. Main scientific focus includes satellite retrieval applications, convective storm structures and microphysics, model validations using satellite observations, ice-phase microphysics, and air-sea interactions.
- Cloud-Resolving Model Simulations: Main developer of the Goddard Cumulus Ensemble (GCE) model, focusing on the spectral bin microphysical scheme and the Morrison two-moment scheme. The spatial resolutions of the GCE model range from 0.1km to 1km. Main scientific focus is on cloud and

precipitation process studies, including aerosol-cloud-precipitation interactions, convective mixing, convective cell lifecycles, and evolution of hydrometeor particle densities and size distributions.

- High-Performance Computing, Big Data Analysis, and Machine Learning: Expert in statistical methods and applications to large satellite and model data analysis and visualization. Twenty years' experiences working with NASA high-performance computing systems with parallel computing and parallel I/O. Main developer of NASA Goddard Super Cloud Library with database management and online data query. Working experiences with machine learning algorithms for automatic identification and tracking of 3D atmospheric convection.

Synergistic Activities

- Associate editor, American Geophysical Union, Journal of Advances in Modeling Earth Systems (JAMES), 2022-present.
- Member of American Meteorological Society, Atmospheric Chemistry Committee, leading activities in aerosol-cloud interactions, 2016-2022.
- Main organizer of the AMS Symposium on Aerosol-Cloud-Climate Interactions, 2021, 2022.
- Session chairs and conveners for AMS and AGU Annual Meetings.
- Reviewer for proposals submitted to NASA, NSF, and DOE.
- Member of proposal review panels for NASA, NSF, and DOE.

Management/Leadership/Volunteer Experiences

- Director, Division of Climate Science, Morgan State University, 2022-present
- Chief Scientist, Goddard Earth Sciences Technology and Research II (GESTAR II), 2022.
- Group lead in Morgan State GESTAR Program, 2013-2022.
- President of the Chinese American Oceanic and Atmospheric Association, 2021.
- President of neighborhood Homeowners' Association, 2014-2018.
- Secretary and webmaster, Goddard Chinese-American Club, 2015-2019.

Teaching/Mentoring Experience

- EASC 102, Meteorology, Morgan State University, 2022-2023.
- Teaching assistant, The University of Chicago, Department of Geophysical Sciences:
  Geosci/Physci 134, Global Warming, 1997, 1998, 1999, 2001.
  Geosci 231, Physical and Chemical Atmosphere, 2000, 2001.
- Guest lecturer, Howard University, Department of physics and astronomy, 2011.
- Teacher, Chinese as a second language for local Chinese School, 2006.
- Mentor of summer students and visiting students at NASA/Goddard Space Flight Center (2005, 2006, 2007, 2008, 2020) and Morgan State University (2019, 2020, 2021,2022).

Awards

- Best Senior Author Publication Award, Laboratory for Atmospheres, NASA/GSFC, 2019.
- Robert H. Goddard Team Award, Goddard Chinese American Club, 2018.

- NASA Group Achievement Award, Goddard Mesoscale Dynamics and Modeling Group, 2017.
- Contractor Performance Award, Earth Science Division, NASA/GSFC, 2014.
- Outstanding Scientific Achievement, Mesoscale Atmospheric Processes Lab, NASA/GSFC, 2013.
- Best Senior Author Publication Award, Laboratory for Atmospheres, NASA/GSFC, 2009.
- Exceptional Scientific Research Award, Mesoscale Atmospheric Processes Branch, NASA/GSFC, 2008.
- Exceptional Science Support Award, Mesoscale Atmospheric Processes Branch, NASA/GSFC, 2005.
- Outstanding Thesis Award, Chinese Academy of Meteorological Sciences, 1994.
- Institutional Scholarship, Chinese Academy of Meteorological Science, 1992.
- Guanghua Award, Peking University, 1991.

Referred Publications

Zeng, X., Z. Ulanowski, A. J. Heymsfield, Y. Wang, and **Xiaowen Li**, 2023: Stability Analysis of Ice Crystal Orientation. *J. Atmos. Sci.*, 1621-1633. https://doi.org/10.1175/JAS-D-22-0223.1

Zeng, X. and **Xiaowen Li**, 2023: Explicitly modeling the effects of cloud condensation nuclei on warm rain initiation. *J. Atmos. Sci., 259-272,* doi: https/doi.org/10.1175/JAS-D-22-0017.1.

Tao, W.-K., T. Iguchi, S. Lang, **Xiaowen Li**, K. Mohr, T. Matsui, S.C. van den Heever, and S. Braun, 2022: Relating vertical velocity and cloud/precipitation properties: A numerical modeling study. J. *Adv. Modeling Earth Sys., 14*, e2021MS002677. https://doi. org/10.1029/2021MS002677

Brogniez, H., R. Roca, F. Auguste, J.-P. Chaboureau, Z. Haddad, S.J. Munchak, **Xiaowen Li,** D. Bouniol, A. Depee, T. Fioleau, and P. Kollias, 2022: Time-delayed tandem microwave observations of tropical deep convection: Overview of the C2OMODO mission. *Frontiers in Rem. Sens.,* doi: 10.3389/frsen.2022.854735.

Zeng, X., A.J. Heymsfield, Z. Ulanowski, R.R. Neely III, **Xiaowen Li**, J. Gong, and D. L. Wu, 2022: The radiative effect on cloud microphysics from the Arctic to the Tropics. *Bull. American Meteor. Soc*., 103(9), E2108-E2129, https://doi.org/10.1175/BAMS-D-21-0039.1.

Zeng, X., J. Gong, **Xiaowen Li**, and D. L. Wu, 2021: Modeling the radiative effect on microphysics in cirrus clouds against satellite observations. *J. Geophy. Res.: Atmos*, **126,** e2020JD0033923, https://doi.org/10.1029/2020JD033923.

Gong, J., X. Zeng, D. L. Wu, S. J. Munchak, **Xiaowen Li**, S. Kneifel, D. Ori, L. Liao, and D. Barahona, 2020: Linkage among ice crystal microphysics, mesoscale dynamics and cloud and precipitation structures revealed by collocated microwave radiometer and multi-frequency radar observations. Atmos. Chem. Phys. 20, 12633-12653. https://doi.org/10.5194/acp-20-12633-2020.

Chern, J.-D., W.-K. Tao, S. E. Lang, **Xiaowen Li**, T. Matsui, 2020: Evaluating precipitation features and rainfall characteristics in a multi-scale modeling framework. *J. Adv. Model. Earth Sys.,* 12(8), https://doi.org/10.1029/2019MS002007.

Zeng, X. and **Xiaowen Li**, 2020: A two-moment bulk parameterization of the drop collection growth in warm clouds. *J. Atmos. Sci.,* **77**, 797-811, https://doi.org/10.1175/JAS-D-19-0015.1.

Fridlind, A., M. van Lier-Walqi, S. Collis, S. Giangrande, R. Jackson, **Xiaowen Li**, T. Matsui, R. Orville, M. Picel, D. Rosenfeld, A. Ryzhkov, R. Weits, and P. Zhang, 2019: Use of polarimetric radar

measurements to constrain simulated convective cell evolution: A pilot study with Lagrangian tracking. *Atmos. Meas. Tech.,* **12,** 2979-3000, https://doi.org/10.5194/amt-12-2979-2019

Tao, W.-K., J. Chern, T. Iguchi, S. Lang, M.-J. Lee, **Xiaowen Li,** A. Loftus, T. Matsui, K. Mohr, S. Nicholls, C. Peters-Lidar, D. Posselt, and G. Skofronick-Jackson, 2019: Microphysics in Goddard Multi-scale Modeling Systems. "*Current trend in the Representation of Physical Processes in Weather and Climate Models*" by Springer Nature, 253-316 (2 February 2019).

Li, Xiaowen, M. Janiga, S. Wang, W.-K. Tao, A. Rowe, W. Xu, C. Liu, T. Matsui, 2018: Evolution of precipitation structure during the November DYNAMO MJO event: Cloud-resolving model inter-comparison and cross-validation using radar observations. *J. Geophy. Res.* **123**. https://doi.org/10.1002/2017JD027775.

Gong, J., X. Zeng, D. L. Wu, and **Xiaowen Li**, 2018: Diurnal variation of tropical ice cloud microphysics: Evidence from Global Precipitation Measurement Microwave Imager polarimetric measurements. *Geo. Res. Lett.,* **45**, 1185-1193. https://doi.org/10.1002/2017GL075519 .

Fridlind, A. M., **Xiaowen Li,** D. Wu, M. van Lier-Walqui, A. S. Ackerman, W.-K. Tao, G. M. McFarquhar, W. Wu, X. Dong, J. Wang, A. Ryzhkov, P. Zhang, M. R. Poellot, A. Neumann, and J. M. Tomlinson, 2017: Use of an observation-based aerosol profile in simulations of a mid-latitude squall line during MC3E: Similarity of stratiform ice microphysics to tropical conditions, *Atmos. Chem. Phys.,* **17,** 5947-5972, https://doi.org/10.5194/acp-17-5947-2017 .

Lolli, S., B. Demoz, P. Di Girolamo, **Xiaowen Li**, and E. J. Welton, 2017: Rain evaporation rate estimate from multi-wavelength Lidar measurements and intercomparison against a model analytical solution, *J. Atmos. Ocean. Tech.,* **34**, 829-839, https://doi.org/10.1175/JTECH-D-16-0146.1 .

Tao, W.-K., **Xiaowen Li**, 2016: The relationship between latent heating, vertical velocity, and precipitation processes: The impact of aerosols on precipitation in organized deep convective systems. *J. Geophy. Res.***, 121**, 6299-6320, https://doi.org/10.1002/2015JD024267 .

O'Halloran, T. L., J. D. Fuentes, W.-K. Tao, **Xiaowen Li,** 2015: Sensitivity of convection to observed variation in aerosol size and composition at a rural site in the Southeastern United States. *J. Atmos. Chem.***, 72(3),** 441-454, https://doi.org/10.1007/s10874-015-9300-x.

Tao, W.-K., S. Lang, X. Zeng, **Xiaowen Li**, T. Matsui, K. Mohr, D. Posselt, J. Chern, P. Norris, I.-S. Kang, A. Hou, K.-M. Lau, I. Choi, M. Yang, 2014: The Goddard Cumulus Ensemble (GCE) Model: Improvements and Applications for Studying Precipitation Processes. *Atmos. Res.,* **143,** 392-424, https://doi.org/10.1016/j.atmosres.2014.03.005

Lang, S. E., W.-K. Tao, J.-D. Chern, D. Wu, and **Xiaowen Li**, 2014: Benefit of a 4th ice class in the simulated radar reflectivities of convective systems using a bulk microphysics scheme. *J. Atmos. Sci.,* **71,** 3583-3612, https://doi.org/10.1175/JAS-D-13-0330.1

Li, Xiaowen, W.-K. Tao, H. Masunaga, G. Gu and X. Zeng, 2013: Aerosol effect on cumulus contestus over the Tropical Pacific: A cloud-resolving modeling study. *J. Meteor. Soc. Japan*, **91(6),** 817-883, https://doi.org/10.2151/jmsj.2013-607

Matsui T., T. Iguchi, **Xiaowen Li**, M. Han, W.-K. Tao, W. Petersen, T. L'Ecuyer, R. Meneghini, W. Olson, C. D. Kummerow, A. Y. Hou, M. R. Schwaller, E. F. Stocker, J. Kwiatkowski, 2013, GPM satellite simulator over ground validation sites, *Bulletin of American Meteorological Society*, **94 (11),** 1653-1660, https://doi.org/10.1175/BAMS-D-12-00160.1

Zeng, Xiping, W.-K. Tao, T. Matsui, S. Xie, S. Lang, M. Zhang, D. O'C Starr, and **Xiaowen Li**, 2011: Estimating the ice crystal enhancement factor in the Tropics. *J. Atmos. Sci.,* **68,** 1424-1434, https://doi.org/10.1175/2011JAS3550.1

Li, Xiaowen, W.-K. Tao, T. Matsui, C. Liu, and H. Masunaga, 2010: Improving a spectral bin microphysical scheme using long-term TRMM satellite observations. *Quart. J. Roy. Meteoro. Soc.,* **136**, 382-399, https://doi.org/10.1002/qj.569

Li, Xiaowen, W.-K. Tao, A. Khain, J. Simpson, and D. Johnson, 2009: Sensitivity of a cloud-resolving model to the bulk and explicit bin microphysical schemes. Part I. Comparisons. *J. Atmos. Sci.,* **66**, 3-21, https://doi.org/10.1175/2008JAS2646.1

Li, Xiaowen, W.-K. Tao, A. P. Khain, J. Simpson, and D. E. Johnson, 2009: Sensitivity of a cloud-resolving model to the bulk and explicit bin microphysical schemes. Part II: Cloud microphysics and storm dynamics interactions. *J. Atmos. Sci.,* **66,** 22-40, https://doi.org/10.1175/2008JAS2647.1

Zeng, Xiping, W.-K. Tao, M. Zhang, A. Y. Hou, S. Xie, S. Lang, **Xiaowen Li**, D. Starr, X. Li, and J. Simpson, 2009: An indirect effect of ice nuclei on atmospheric radiation. *J. Atmos. Sci,* **66,** 41-61, https://doi.org/10.1175/2008JAS2778.1

Tao, W.-K., D. Anderson, J. Chern, J. Entin, A. Hou, P. Houser, R. Kakar, S. Lang, W. Lau, C. Peter-Lidard, **Xiaowen Li**, T. Matsui, M. Rienecker, M. R. Schoeberl, B.-W. Shen, J. J. Shi, and X. Zeng, 2009: A Goddard Multi-Scale Modeling System with unified physics, *Annales Geophysicae*, **27**, 3055-3064, https://doi.org/10.5194/angeo-27-3055-2009

Zeng, Xiping, W.-K. Tao, M. Zhang, A. Hou, S. Xie, S. Lang, **Xiaowen Li**, D. Starr, and X. Li, 2009: A contribution by ice nuclei to global warming. *Quart. J. Roy. Meteor. Soc.,* **135,** 1614-1629, https://doi.org/10.1002/qj.449

Guo, Huan, Y. Liu, P. H. Daum, X. Zeng, **Xiaowen Li,** and W.-K. Tao, 2008: Effects of model resolutions on entrainment (inversion heights), cloud-radiation interactions, and cloud radiative forcing. *Atmos. Chem. Phys. Discussion*, **8**, 20399-20425, https://doi.org/10.5194/acpd-8-20399-2008

Tao, W.-K., C. Peters-Lidard, W. Lau, S. Lang, A. Hou, P. Houser, J.-D. Chern, R. Atlas, D. Anderson, R. Kakar S. Kumar, W. Lapenta, **Xiaowen Li,** T. Matsui, M. Rienecker, B.-W. Shen, J.-J. Shi, J. Simpson, and X. Zeng, 2008: A Goddard multi-scale modeling system with unified physics. *GEWEX News,* **18** (1), 6-8.

Tao, W.-K., **Xiaowen Li**, A. P. Khain, T. Matsui, S. Lang, and J. Simpson, 2007: The role of atmospheric aerosol concentration on deep convective precipitation: Cloud-resolving model simulations. *J. Geophy. Res.,* **112,** D24S1, https://doi.org/10.1029/2007JD008728

Fan, Jiwen, R. Zhang, G. Li, W.-K. Tao, and **Xiaowen Li**, 2007: Simulations of cumulus clouds using a spectral microphysics cloud-resolving model. *J. Geophys. Res.,* 112, D04201, https://doi.org/10.1029/2006JD007688

Li, Xiaowen, 2002: Simulation of Evaporation in Stratiform Rain and the Application on RADAR Rainfall Measurement. The University of Chicago, Ph.D. dissertation, pp133.

Li, Xiaowen, and R. C. Srivastava, 2001: An analytical solution for raindrop evaporation and its application to radar rainfall measurements. *J. Applied Meteor.,* Vol. **40**, 1607-1616, https://doi.org/10.1175/1520-0450(2001)040<1607:AASFRE>2.0.CO;2

Li, Xiaowen, Weiliang Li and Xiuji Zhou, 1998: The study of recent 30 years solar radiation of China. *Quart. J. Appl. Meteor*., Vol. **9**, 24-31.

Li, Xiaowen, Weiliang Li, Xiuji Zhou and Longxun Chen., 1995: The cooling of Sichuan Province in recent 40 years and its probable mechanism. *Acta Meteorologica Sinica,* Vol. **9**, No. 1, 57-68.