Qiu Yang

Position: Earth Scientist at Pacific Northwest National Laboratory (PNNL)
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Last update: June 23, 2023

RESEARCH INTERESTS

[1] Multi-scale organization of tropical convection, such as Madden-Julian Oscillation, diurnal cycle, ITCZ, convectively coupled equatorial waves, mesoscale convective systems, Monsoon, and El Niño

[2] Modeling of mid-latitude extreme precipitation, such as mesoscale convective systems

[3] Theoretical modeling of large-scale atmospheric flows, such as multi-scale asymptotic models and stochastic dynamic models

[4] Computational fluid dynamics methods for idealized and intermediate models, cloud-resolving simulations, and general circulation models

[5] E3SM multiscale modeling framework, multicloud parameterization, and convective momentum transport parameterization

PROFESSIONAL EXPERIENCE

Research Scientist 2020 Sep.–present

· Address: Earth & Biological Sciences Directorate, Pacific Northwest National Laboratory, USA
· Project: 1) Water Cycle and Climate Extremes Modeling, 2) E3SM Multiscale Modeling Framework
· Project PI: Lai-yung Ruby Leung (PNNL)

Visiting Scholar 2018 Mar.–May

· Climate and Global Dynamics Laboratory, National Center for Atmospheric Research (NCAR), USA
· Host: Mitchell Moncrieff

Visiting Scholar 2017 Sep.–Dec., 2019 May–Jul.

· Department of Mathematics and Statistics, University of Victoria (UVic), Canada
· Host: Boualem Khouider

Postdoc Associate 2017 Jul.–2020 Aug.

· Address: Center for Atmosphere Ocean Science, Courant Institute, New York University, USA
· Project: Upscale Impact of Mesoscale Convective Systems on Tropical Weather and Climate
· Mentor: Andrew Majda (NYU), Mitchell Moncrieff (NCAR), and Boualem Khouider (UVic)

EDUCATION

Ph.D. in Mathematics and Atmosphere & Ocean Sciences 2012 fall–2017 spring

· Center for Atmosphere Ocean Science, Courant Institute, New York University (NYU), NY, USA
· Thesis: Multi-Scale Models for the Scale Interaction of Organized Tropical Convection
· Advisor: Andrew J. Majda (NYU)

B.S. in Mathematics (major) and Physics (minor) 2008 fall–2012 spring

· Zhiyuan College, Shanghai Jiao Tong University (SJTU), Shanghai, China
· Thesis: Optimal Transport of Water in the Biological Network
· Advisor: David Cai (NYU) and Dan Hu (SJTU)

PUBLICATIONS

I have 13 published papers in total as the first author and/or corresponding author, and 5 extra ones as a co-author. Below * denotes corresponding author and my name is marked in bold.

2023

[20] Xingchao Chen*, Ruby Leung, Zhe Feng, Xingchao Chen, **Qiu Yang**, 2023: *Environmental controls on MCS's lifetime rainfall over tropical oceans*. Submitted to Geophysical Research Letters.

[19] **Qiu Yang***, L. Ruby Leung, Zhe Feng, Xingchao Chen: *A Moist Potential Vorticity Model for Mid-Latitude Mesoscale Convective Systems over the Land*. Journal of the Atmospheric Sciences, in revision, https://qiuyang50.github.io/files/MCS_PV_11122022.pdf

[18] Xingchao Chen*, Ruby Leung, Zhe Feng, Xingchao Chen, **Qiu Yang**, 2023: *Diurnal MCS prior to the genesis of tropical cyclone Mora (2017): the role of convectively forced gravity waves*. Journal of the Atmospheric Sciences, https://doi.org/10.1175/JAS-D-22-0203.1.

2022

[17] **Qiu Yang***, L. Ruby Leung, Zhe Feng, Xingchao Chen, 2022: *Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*. Journal of Climate, https://doi.org/10.1175/JCLI-D-22-0291.1

[16] **Qiu Yang***, Walter Hannah, L. Ruby Leung, 2022: Convective Momentum Transport and its Impact on the Madden-Julian Oscillation in E3SM-MMF. Journal of Advances in Modeling Earth Systems. e2022MS003206, https://doi.org/10.1029/2022MS003206

[15] Fengfei Song*, L. Ruby Leung, Zhe Feng, Xingchao Chen, **Qiu Yang**, 2022: Historical and future changes of large-scale environments for spring MCS initiation over the U.S. Great Plains. Geophysical Research Letters, 49(15), e2022GL098799, https://doi.org/10.1029/2022GL098799

[14] Xingchao Chen*, L. Ruby Leung, Zhe Feng, **Qiu Yang**, 2022: *Precipitation-moisture interactions over tropical oceans: consecutive roles of different convective systems*. Geophysical Research Letters, 49(7), p.e2022GL097836, https://doi.org/10.1029/2022GL097836

2021

[13] **Qiu Yang***, L. Ruby Leung, Zhe Feng, Fengfei Song, Xingchao Chen, 2021: *A Simple Lagrangian Parcel Model for the Initiation of Summer-time MCSs over the Central US*, Journal of the Atmospheric Sciences, 78(11), 3537-3558, https://doi.org/10.1175/JAS-D-21-0136.1

[12] Xingchao Chen*, L. Ruby Leung, Zhe Feng, Fengfei Song, **Qiu Yang**, 2021: *Mesoscale Convective Systems Dominate the Energetics of the South Asian Summer Monsoon Onset*, Geophysical Research Letters, e2021GL094873, https://doi.org/10.1029/2021GL094873

[11] **Qiu Yang***, Andrew J. Majda, Nan Chen, 2021: *ENSO Diversity in a Tropical Stochastic Skeleton Model for the MJO, El Nino, and Dynamic Walker Circulation*, Journal of Climate, 34(9), pp. 3481-3501, https://doi.org/10.1175/JCLI-D-20-0447.1

2019

[10] **Qiu Yang***, Andrew J. Majda, Noah D. Brenowitz, 2019: *Effects of Rotation on the Multiscale Organization of Convection in a Global 2D Cloud Resolving Model*, Journal of the Atmospheric Sciences, 76(11), pp.3669-3696, https://doi.org/10.1175/JAS-D-19-0041.1

[9] **Qiu Yang***, Andrew J. Majda, Mitchell W. Moncrieff, 2019: *Upscale Impact of Mesoscale Convective Systems and Its Parameterization in An Idealized GCM for An MJO Analog above the Equator*, Journal of the Atmospheric Sciences, 76(3), pp.865-892, https://doi.org/10.1175/JAS-D-18-0260.1

[8] **Qiu Yang**, Boualem Khouider*, Andrew J. Majda, Michele De La Chevrotiere, 2019: *Northward Propagation, Initiation and Termination of Boreal Summer Intraseasonal Oscillations in a Zonally Symmetric Model*, Journal of the Atmospheric Sciences, 76(2), pp.639-668, https://doi.org/10.1175/JAS-D-18-0178.1

[7] **Qiu Yang***, Andrew J. Majda, 2019: *Upscale Impact of Mesoscale Disturbances of Tropical Convection on 2-Day Waves*. Journal of the Atmospheric Sciences, 76(1), pp.171-194, https://doi.org/10.1175/JAS-D-18-0049.1

2018

[6] Noah D. Brenowitz*, Andrew J. Majda, **Qiu Yang**, 2018: *The Multiscale Impacts of Organized Convection in Global 2-D Cloud-Resolving Models*. Journal of Advances in Modeling Earth Systems, 10(8), pp.2009-2025, https://doi.org/10.1029/2018MS001335

[5] **Qiu Yang*** and Andrew J. Majda, 2018: *Upscale Impact of Mesoscale Disturbances of Tropical Convection on Convectively Coupled Kelvin Waves*. Journal of the Atmospheric Sciences, 75(1), pp.85-111, https://doi.org/10.1175/JAS-D-17-0178.1

2014-2017 (my Ph.D. studies)

[4] **Qiu Yang***, Andrew J. Majda and Boualem Khouider, 2017: *ITCZ Breakdown and Its Upscale Impact on the Planetary-Scale Circulation over the Eastern Pacific*. Journal of the Atmospheric Sciences, 74(12), pp.4023-4045, https://doi.org/10.1175/JAS-D-17-0021.1

[3] **Qiu Yang*** and Andrew J. Majda, 2017: *Upscale Impact of Mesoscale Disturbances of Tropical Convection on Synoptic-Scale Equatorial Waves in Two-Dimensional Flows*. Journal of the Atmospheric Sciences, 74(9), pp.3099-3120, https://doi.org/10.1175/JAS-D-17-0068.1

[2] Andrew J. Majda and **Qiu Yang***, 2016: *A Multi-Scale Model for the Intraseasonal Impact of the Diurnal Cycle over the Maritime Continent on the Madden-Julian Oscillation*. Journal of the Atmospheric Sciences, 73(2), pp.579-604, https://doi.org/10.1175/JAS-D-15-0158.1

[1] **Qiu Yang*** and Andrew J. Majda, 2014: *A Multi-scale Model for the Intraseasonal Impact of the Diurnal Cycle of Tropical Convection*. Theoretical and Computational Fluid Dynamics, 28(6), pp.605-633, https://doi.org/10.1007/s00162-014-0336-3

CONFERENCES AND TALKS

[33] **04/21/2023** Seminar talk at the Atmospheric and Oceanic Sciences Colloquium (ATOC) in University of Colorado Boulder. The title of my talk is "*Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*".

[32] **04/20/2023** Seminar talk at the Mesoscale & Microscale Meterorology (MMM) Laboratory of NCAR. The title of my talk is "*Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*".

[31] **04/13/2023** Seminar virtual talk in the Meteorology seminar at the department of earth, ocean, & atmospheric science, Florida State University. The title of my talk is "*Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*".

[30] **04/10/2023** Seminar talk in the Atmospheric & Chemistry Seminar at the department of atmospheric sciences, University of Washington. The title of my talk is "*Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*".

[29] **12/15/2022** Oral talk in AGU fall meeting session "A45H: Understanding and Modeling of Mesoscale and Severe Local Convective Storm Processes III Oral". The title of my talk is "*Impact of Global Warming on U.S. Summertime Mesoscale Convective Systems: A Simple Lagrangian Parcel Model Perspective*".

[28] **12/14/2022** Oral talk in AGU fall meeting session "A33E: High-Resolution Earth System Modeling on Large Supercomputers I Oral". The title of my talk is "*Convective Momentum Transport and its Impact on the Madden-Julian Oscillation in E3SM-MMF*".

[27] **06/13/2022 Invited virtual talk** in Canadian Applied And Industrial Mathematics Society (CAIMS) annual meeting, MS14 session: Models for the Atmosphere, Climate, and Ocean Dynamics. The title of my talk is "*A Simple Lagrangian Parcel Model for the Initiation of Summertime Mesoscale Convective Systems over the United States*".

[26] **01/25/2022** Remote poster presentation in the AMS's 10th Symposium on the Madden-Julian Oscillation and Sub-Seasonal Monsoon Variability of the AMS 102nd Annual Meeting. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[25] **01/24/2022** Remote presentation in the AMS's 19th Conference on Mesoscale Process of the AMS 102nd Annual Meeting. The title of my talk is "*A Simple Lagrangian Parcel Model for the Initiation of Summer-time Mesoscale Convective Systems over the Central United States*".

[24] **12/14/2021** Virtual talk in the 2021 AGU fall meeting. The title of my talk is "*A Simple Lagrangian Parcel Model for the Initiation of Summer-time Mesoscale Convective Systems over the Central United States*".

[23] **12/13/2021** Virtual talk in the 2021 AGU fall meeting. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[22] **09/02/2021** Virtual talk in the Climate Extremes monthly meeting. The title of my talk is "*A Simple Lagrangian Parcel Model for the Initiation of Summer-time MCSs over the Central US*".

[21] **05/11/2021** Virtual talk in the 34th Conference on Hurricanes and Tropical Meteorology in New Orleans, LA. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[20] **01/08/2020** Seminar talk at the Institute of Natural Sciences, Shanghai Jiao Tong University. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[19] **01/03/2020** Seminar talk at the Atmosphere-Ocean Department, Peking University. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[18] **01/02/2020** Seminar talk at the Institute of Atmospheric Physics, Chinese Academy of Sciences. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[17] **12/27/2019** Seminar talk at the Atmosphere-Ocean Department, Fudan University. The title of my talk is "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*".

[16] **12/11/2019** AGU fall meeting at San Francisco, poster presentation entitled "*Upscale Impact of Mesoscale Convective Systems on the Madden-Julian Oscillation and Its Parameterization in a Coarse-Resolution GCM*"..

[15] **07/25/2019 Invited talk** in the celebration conference in honor of Professor Andrew J. Majda's 70th birthday, "Scientific Grand Challenges and New Perspectives in Applied Mathematics: Ocean, Atmosphere and Climate Sciences" at University of Victoria. Oral talk entitled "*Upscale Impact of Mesoscale Convective Systems on the CCEWs and MJO and Its Parameterization in an Idealized GCM*".

[14] **12/21/2018** 2018 Young Mathematician Forum at Department of Mathematical Sciences, Shanghai Jiao Tong University, China, Oral talk entitled "*Multi-scale interactions of organized tropical convection: from multi-scale asymptotic models to comprehensive numerical simulations*".

[13] **12/19/2018** Academic Colloquium at Department of Atmospheric and Oceanic Sciences, Fudan University, China, Oral talk entitled "*Upscale Impact of Mesoscale Convective Systems and Its Parameterization in an Idealized GCM for a MJO Analog above the Equator*".

[12] **12/10/2018** AGU fall meeting at Washington, DC, poster presentation entitled "*Upscale Impact of Mesoscale Convective Systems and Its Parameterization in an Idealized GCM for a MJO Analog above the Equator*".

[11] **05/03/2018 Invited talk** in Climate & Global Dynamics (CGD) research report at NCAR, Oral Talk entitled "*Upscale Impact of Mesoscale Convective Systems and Its Parameterization in GCMs: an idealized testbed*".

[10] **04/16/2018** American Meteorological Society's 33rd Conference on Hurricanes and Tropical Meteorology, Oral Talk entitled "*Upscale Impact of Mesoscale Disturbances of Tropical Convection on Convectively Coupled Kelvin Waves*".

[9] **12/11/2017** AGU fall meeting at New Orleans, Poster Presentation.

[8] **11/29/2017** Applied math seminar in Department of Mathematics and Statistics at UVic, Victoria, Canada, Oral Talk.

[7] **05/09/2017** Seminar talk at Department of Atmosphere Science, Princeton University, New Jersey, Oral Talk.

[6] **12/12/2016** AGU fall meeting at San Francisco, Poster Presentation.

[5] **09/15/2016** AOCD seminar series at Department of Geology & Geophysics, Yale University, New Haven, Oral Talk.

[4] **01/28/2016** Multidisciplinary University Research Initiative (MURI) Workshop, New York, Oral Talk.

[3] **09/01/2015** Columbia Workshop "Monsoons & ITCZ: the annual cycle in the Holocene and the future", New York, USA, Poster Presentation.

[2] **04/01/2015** BIRS Workshop "Stochasticity and Organization of Tropical Convection", Banff, Canada, Oral Talk.

[1] **08/16/2014** The World Weather Open Science Conference (WWOSC), Montreal, Canada, Poster Presentation.

HONORS

NYU GSAS Dean's Student Travel Grant Program	2016
McCracken scholarship of New York University	2012-2017
Meritorious Award in the Mathematical Contest in Modeling	2010

TEACHING

Recitation Leader for Algebra and Calculus, MATH-UA.9.002-003 — Spring 2015
(Overall teaching score based on students' evaluation = 4.0/5.0)

COMMUNITY SERVICE

Associate Editor for Journal of the Atmospheric Sciences — Since 09/01/2022
Reviewer for Banff international research station workshop proposal — Sep 2022
Paper reviewer for — since 2017

- *Journal of the Atmospheric Sciences*
- *Journal of Climate*
- *Climate Dynamics*
- *Dynamics of Atmospheres and Oceans*
- *Journal of Geophysical Research: Atmospheres*
- *Quarterly Journal of the Royal Meteorological Society*
- *International Journal of Climatology*
- *npj climate and atmospheric science*
- *Journal of Advances in Modeling Earth Systems*
- *Theoretical and Applied Climatology*
- *Atmosphere*

Chair of 2022 AGU session "A41E: Understanding and Modeling of Mesoscale and Severe Local Convective Storm Processes I Online Poster Discussion" — *Dec 2022*
Chair of 2018 AGU session "A13K: Panel discussions: Clouds in Tropics: Stochasticity and Organization, Observation, and Simulation" — *Dec 2018*
Organizing Chair of Young Scientist Professional Development (YSPD) group at PNNL — *2022*
Outstanding Student Presentation Award (OSPA) Judge for AGU fall meeting — *Since 2019*
Member of the reviewer board & topic board for the MDPI journal Atmosphere — *since Nov 2019*
Member of American Meteorological Society and American Geophysical Union — *since 2016*
Research proposal reviewer for National Science Center, Poland — *June 2017*

COMPUTER SKILLS

Programming languages:
Fortran, C++, MATLAB, Python, Linux, High-Performance Computing clusters, Latex, Lyx

Running and revising codes for models:
System for Atmospheric Modeling (SAM), Weather Research and Forecasting Model (WRF), HOMME dynamic core for CAM, both deterministic and stochastic multicloud models

LANGUAGE

English (fluent), Mandarin (native)

REFERENCES

[1] **Andrew J. Majda** (my Ph.D. advisor)
Title: Member of US National Academy of Sciences, Morse Professor of Arts and Science at the Courant Institute of New York University
Affiliation: Center for Atmosphere and Ocean Science, Courant Institute of Mathematical Sciences, New York University, USA
Email: jdm11@cims.nyu.edu (This email belongs to his secretary Jacquelyn Mileski, who will send the reference letter that Prof. Majda wrote for my academic job application in 2020)

[2] **Lai-yung Ruby Leung** (principal investigator of my current projects)
Title: Member of US National Academy of Engineering, Battelle Fellow at Pacific Northwest National

Laboratory, Fellow of American Meteorological Society, Fellow of American Geophysical Union
Affiliation: Atmospheric Science and Global Change Division at Pacific Northwest National Laboratory, USA
Email: ruby.leung@pnnl.gov

[3] **Mitchell W. Moncrieff** (one of my Postdoc mentors)
Title: NCAR Senior Scientist, Fellow of American Meteorological Society, Fellow of Royal Meteorological Society
Affiliation: Climate and Global Dynamics Laboratory, National Center for Atmospheric Research, USA
Email: moncrief@ucar.edu

[4] **Boualem Khouider** (one of my Postdoc mentors)
Title: Professor, Editor of the Journal "Mathematics of Climate and Weather Forecasting"
Affiliation: Department of Mathematics and Statistics, University of Victoria, Canada
Email: khouider@uvic.ca