

Qiu Yang

Position: Earth Scientist at Pacific Northwest National Laboratory (PNNL)

Address: 902 Battelle Blvd, Richland, WA 99354, USA

Email: qiu.yang@pnnl.gov

Website: <https://qiuyang50.github.io/>

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, multcloud 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)

- 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

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- [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 Meteorology (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 multcloud 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