Curriculum Vitae

Fan Yang

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OVERVIEW

Dr. Yang is an atmospheric scientist in the Environmental & Climate Sciences Department. His research focuses on understanding physical processes in atmospheric clouds that impact weather and climate. His recent work has focused on integrating theory, observations, and modeling of low-altitude, boundary layer clouds that—despite their critical importance to the Earth's energy balance and the hydrological cycle—are poorly simulated by weather forecasting and climate models. Dr. Yang's research topics have ranged from droplet formation at the microscopic level to cloud mesoscale organization, contributing to diverse areas including ice nucleation, droplet activation and warm precipitation processes, cloud entrainment and mixing, aerosol-cloud interactions, and cloud modeling.

EDUCATION

Degree			Years	Advisor
PhD	Atmospheric Sciences	Michigan Technological University	2012 – 2017	R.A. Shaw
MS	Atmospheric Sciences	Peking University	2009 – 2012	H. Xue
BS	Atmospheric Sciences	Peking University	2005 – 2009	H. Xue

RECENT EMPLOYMENT HISTORY

2022.4 – present **Atmospheric Scientist**
Environmental & Climate Sciences Department, Brookhaven National Laboratory, Upton, NY

2019.4 – 2022.3 **Goldhaber Distinguished Postdoctoral Fellow**
Environmental & Climate Sciences Department, Brookhaven National Laboratory, Upton, NY

2017 – 2019.3 **Postdoctoral Research Associate**
Environmental & Climate Sciences Department, Brookhaven National Laboratory, Upton, NY

2016 Spring **Visiting Student**
Atmospheric Sciences & Global Change, Pacific Northwest National Laboratory, Richard, WA

2012 – 2017 **Graduate Research Assistant**
Atmospheric Sciences Program, Michigan Technological University, Houghton, MI

AWARDS

2020 March	SPOTLIGHT Award for exceptional service, Brookhaven National Laboratory
2019 April	Gertrude and Maurice Goldhaber Distinguished Postdoctoral Fellowship
2018 Fall	First Prize for Group Research during the Second ARM Summer Training Event
2016 Fall	Dean's Award for Outstanding Scholarship, Michigan Technological University
2014, 2016	Graduate Student Government Presenting Travel Grant, Michigan Technological University

PEER-REVIEWED PUBLICATIONS

Prabhakaran, P., S. Thomas, W. Cantrell, R.A. Shaw, and **F. Yang**, Sources of stochasticity in the growth of cloud droplets: supersaturation fluctuations versus turbulent transport, *Journal of the Atmospheric Sciences*, doi: 10.1175/JAS-D-22-0051.1, 2022.

Zhu, Z., P. Kollias, E. Luke, and **F. Yang**, New insights on the prevalence of drizzle in marine stratocumulus clouds based on a machine learning algorithm applied to radar Doppler spectra, *Atmospheric Chemistry and Physics*, doi: 10.5194/acp-22-7405-2022, 2022.

Yang, F., M. Ovchinnikov, S. Thomas, A. Khain, R. McGraw, R.A. Shaw, and A.M. Vogelmann, Large-eddy simulations of a convection cloud chamber: Sensitivity to bin microphysics and advection, *Journal of Advances in Modeling Earth Systems*, doi: 10.1029/2021MS002895, 2022.

Thomas, S., P. Prabhakaran, **F. Yang**, W. H. Cantrell, R. A. Shaw, Dimensionless parameters for cloudy Rayleigh--Benard convection: Supersaturation, Damkohler, and Nusselt numbers. *Physical Review Fluids*, doi: 10.1103/PhysRevFluids.7.010503, 2022.

Luke, E. P., **F. Yang**, P. Kollias, A. M. Vogelmann, and M. Maahn, New insights into ice multiplication using remote-sensing observations of slightly supercooled mixed-phase clouds in the Arctic. *Proceedings of the National Academy of Sciences,* doi: 10.1073/pnas.2021387118, 2021.

Zhu, Z., P. Kollias, **F. Yang**, and E. Luke, On the Estimation of In-Cloud Vertical Air Motion Using Radar Doppler Spectra, *Geophysical Research Letters*, doi: 0.1029/2020GL090682, 2021.

McMichael, L. A., **F. Yang**, T. Marke, U. Löhnert, D. Mechem, A. Vogelmann, K. Sanchez, M. Tuononen, and J. Schween, Characterizing subsiding shells in shallow cumulus using Doppler lidar and large-eddy simulation, *Geophysical Research Letters*, doi: 10.1029/2020GL089699, 2020.

Yang, F., W. Cantrell, A. Kostinski, R. Shaw, and A. Vogelmann, Is contract nucleation caused by pressure perturbation? *Atmosphere*, doi: 10.3390/atmos11010001, 2020.

Yang, F., R. McGraw, E. Luke, D. Zhang, P. Kollias, and A. Vogelmann, A new approach to estimate supersaturation fluctuations in stratocumulus cloud using ground-based remote sensing measurements, *Atmospheric Measurement Techniques*, doi: 10.5194/amt-12-5817-2019, 2019.

Chandrakar, K., I. Saito, **F. Yang**, W. Cantrell, T. Gotoh, and R. Shaw, Droplet size distributions in turbulent clouds: experimental evaluation of theoretical distributions, *Quarterly Journal of the Royal Meteorological Society*, doi: 10.1002/qj.3692, 2019.

Zhang, D., A. Vogelmann, P. Kollias, E. Luke, **F. Yang**, D. Lubin, and Z. Wang, Comparison of Antarctic and Arctic Single‐layer Stratiform Mixed‐phase Cloud Properties Using Ground-based Remote Sensing Measurements, *Journal of Geophysical Research: Atmosphere*, doi: 10.1029/2019JD030673, 2019.

Thomas, S., M. Ovchinnikov, **F. Yang**, D. Voort, W. Cantrell, S. Krueger, and R. Shaw, Scaling of an Atmospheric Model to Simulate Turbulence and Cloud Microphysics in the Pi Chamber, *Journal of Advances in Modeling Earth Systems*, doi: 10.1029/2019MS001670, 2019.

Borque, P., E.P. Luke, P. Kollias, and **F. Yang**, Relationship Between Turbulence and Drizzle in Continental and Marine Low Stratiform Clouds, *Journal of the Atmospheric Sciences*, doi: 10.1175/JAS-D-18-0060.1, 2018.

Yang, F., E.P. Luke, P. Kollias, A.B. Kostinski, and A.M. Vogelmann, Scaling of drizzle virga depth with cloud thickness for marine stratocumulus clouds, 45, 8, *Geophysical Research Letters*, doi:10.1029/2018GL077145, 2018.

Yang, F., P. Kollias, R.A. Shaw, and A.M. Vogelmann, Cloud droplet size distribution broadening during diffusional growth: ripening amplified by deactivation and reactivation, 18, 10, *Atmospheric Chemistry and Physics*, doi:10.5194/acp-2017-1125, 2018.

Yang, F., O. Cruikshank, W. He, A.B. Kostinski, and R.A. Shaw, Nonthermal ice nucleation observed at distorted contact lines of supercooled water drops, *Physical Review E*, 97, 2, doi: 10.1103/PhysRevE.97.023103, 2018.

Chandrakar, K.K., W. Cantrell, K. Chang, D. Ciochetto, D. Niedermeier, M. Ovchinnikov, R.A. Shaw, and **F. Yang**, Aerosol indirect effect from turbulence-induced broadening of cloud droplet size distributions, *Proceedings of the National Academy of Sciences USA*, 113, 50, doi: 10.1073/pnas.1612686113, 2016.

Yang, F., R.A. Shaw, and H. Xue, Conditions for super-adiabatic droplet growth after entrainment mixing, *Atmospheric Chemistry and Physics*, 16, 9421-9433, doi: 10.5194/acp-16-9421-2016, 2016.

Yang, F., M. Ovchinnikov, and R.A. Shaw, Long-lifetime ice particles in mixed-phase clouds: quasi-steady and recycled growth, *Journal of Geophysical Research–Atmospheres*, 120, 22, doi: 10.1002/2015JD023679, 2015.

Yang, F., R. Shaw, C. Gurganus, S.K. Chong, and Y.K. Yap, Ice nucleation at the contact line triggered by transient electrowetting fields, *Applied Physics Letters*, 107, 26, doi: 10.1063/1.4938749, 2015.

Yang, F., M. Ovchinnikov, and R.A. Shaw, Microphysical consequences of the spatial distribution of ice nucleation in mixed-phase stratiform clouds, *Geophysical Research Letters*, 41, 14, doi: 10.1002/2014GL060657, 2014.

Li, Z., H. Xue, and **F. Yang**, A modeling study of ice formation affected by aerosols, *Journal of Geophysical Research–Atmospheres*, 118, 19, doi: 10.1002/jgrd.50861, 2013.

Yang, F., M. Ovchinnikov, and R.A. Shaw, Minimalist model of Ice microphysics in mixed-phase stratiform clouds, *Geophysical Research Letters*, 40, 14, doi: 10.1002/grl.50700, 2013.

Yang, F., H. Xue, Z. Deng, C. Zhao, and Q. Zhang, A closure study of cloud condensation nuclei in the North China Plain using droplet kinetic condensational growth model, *Atmospheric Chemistry and Physics*, 12, 5399-5411, doi:10.5194/acp-12-5399-2012, 2012.

THESES

Yang, F., *Laboratory, Computational and Theoretical Investigations of Ice Nucleation and its Implications for Mixed Phase Clouds*, PhD Dissertation, Michigan Technological University, 220 pp, 2017.

Yang, F., *A closure study of cloud condensation nuclei in the North China Plain (in Chinese)*, MS Thesis, Peking University, 59 pp, 2012.

INVITED SCIENTIFIC PRESENTATIONS

2021 **Exploring aerosol-cloud interactions in a convection cloud chamber**. Topics in Atmospheric and Oceanic Sciences (TAOS) Seminar Series, Stony Brook University, NY.

2017 **Laboratory Investigations of Ice Nucleation and Its Applications in the Atmosphere**. Topics in Atmospheric and Oceanic Sciences (TAOS) Seminar Series, Stony Brook University, NY.

2016 **Stochastic ice nucleation and its effect on the microphysical properties of mixed-phase stratiform cloud.** Mesoscale & Microscale Meteorology Laboratory Seminar Series, National Center for Atmospheric Research, Boulder, CO.

2016 **Stochastic ice nucleation and its effect on the microphysical properties of mixed-phase stratiform cloud.** Brookhaven National Laboratory, NY.

2016 **Stochastic ice nucleation in the mixed−phase stratiform clouds?** Pacific Northwest National Laboratory, WA.

CONFERENCE ORAL & POSTER PRESENTATIONS (LEAD AUTHOR ONLY)

Yang, F., F. Hoffmann, R.A. Shaw, M. Ovchinnikov, and A.M. Vogelmann, "Haze and cloud droplets in a convection cloud chamber", Oral presentation at KITP program Multiphase Flows in Geophysics and the Environment, Oct. 26, 2022.

Yang, F., F. Hoffmann, R.A. Shaw, M. Ovchinnikov, and A.M. Vogelmann, "Exploring the Importance of Haze Particles and Their Interactions with Cloud Droplets in a Convection Cloud Chamber Using Large-Eddy Simulations with Bin and Lagrangian Microphysics Schemes", Oral presentation at AMS Collective Madison Meeting, Aug. 12, 2022.

Yang, F., M. Ovchinnikov, S. Thomas, R.A. Shaw, R.L. McGraw, and A.M. Vogelmann, "comparison of convection cloud chamber simulations using two bin microphysics schemes", Oral presentation at workshop on laboratory facilities for cloud, virtual, Sep. 22, 2021.

Yang, F., M. Ovchinnikov, S. Thomas, R.A. Shaw, R.L. McGraw, and A.M. Vogelmann, "comparison of convection cloud chamber simulations using two bin microphysics schemes", poster presentation at the International Conference on Clouds and Precipitation, virtual, Aug. 6, 2021.

Yang, F., M. Ovchinnikov, S. Thomas, R.A. Shaw, R.L. McGraw, and A.M. Vogelmann, "comparison of convection cloud chamber simulations using two bin microphysics schemes", presented at the 10th international cloud modeling workshop, virtual, July 26-30, 2021.

Yang, F., M. Ovchinnikov, S. Thomas, R.A. Shaw, R.L. McGraw, and A.M. Vogelmann, "comparison of convection cloud chamber simulations using two bin microphysics schemes", 2021 ARM/ASR PI meeting, Virtual, Poster presentation, June 21-24, 2021.

Yang, F., R. McGraw, E. Luke, D. Zhang, P. Kollias, A. Vogelmann, "A new approach to estimate supersaturation fluctuations in stratocumulus cloud using ground-based remote sensing measurements", 2019 Gordon Research Conference Radiation and Climate, ME, Poster presentation, Jul. 21-26, 2019

Yang, F., R. McGraw, E. Luke, D. Zhang, P. Kollias, A. Vogelmann, "A new approach to estimate supersaturation fluctuations in stratocumulus cloud using ground-based remote sensing measurements", 2019 Gordon Research Seminar Radiation and Climate, ME, Poster presentation, Jul. 20-21, 2019

Yang, F., M. Ovchinnikov, D. Zhang, E. Luke, M. Oue, D. Lubin, P. Kollias, A. Vogelmann, "Effects of decoupling boundary layer on the change of phase partitioning in the mixed-phase stratiform clouds", AWARE breakout session, 2019 ARM/ASR PI meeting, MD, Oral presentation, Jun. 12, 2019

Yang, F., R. McGraw, E. Luke, D. Zhang, P. Kollias, A. Vogelmann, "Estimate supersaturation in stratocumulus clouds", ACE-ENA breakout session, 2019 ARM/ASR PI meeting, MD, Oral presentation, Jun. 11, 2019

Yang, F., M. Ovchinnikov, D. Zhang, E. Luke, M. Oue, D. Lubin, P. Kollias, A. Vogelmann, "Effects of decoupling boundary layer on the change of phase partitioning in the mixed-phase stratiform clouds", 2019 ARM/ASR PI meeting, MD, Poster presentation, Jun. 10-13, 2019

Yang, F., M. Ovchinnikov, R. Shaw, "Scaling of an atmospheric model to simulate the turbulence and cloud-microphysics in the Pi chamber", Pi chamber modeling workshop at Michigan Technological University, Oral presentation, May 23, 2019

Yang, F., M. Ovchinnikov, D. Zhang, E. Luke, M. Oue, D. Lubin, P. Kollias, A. Vogelmann, "Effects of decoupled boundary layer on the change of phase partitioning in the mixed-phase stratiform clouds", Mixed-phase cloud workshop at Stony Brook University, Oral presentation, Apr. 12, 2019

Yang, F., R. McGraw, E. Luke, D. Zhang, P. Kollias, A. Vogelmann, "Estimation of supersaturation fluctuation in the stratocumulus clouds during ACE-ENA based on remote sensing and in-situ measurements", ACE-ENA workshop at Brookhaven National Laboratory, Oral presentation, Jan. 30, 2019

Yang, F., O. Cruikshank, W. He, A.B. Kostinski, and R.A. Shaw, "Freezing of Supercooled Drops in Motion: Pressure Matters, Not Just Temperature", Seminar at Brookhaven National Laboratory, Sep. 27, 2018.

Yang, F., O. Cruikshank, W. He, A.B. Kostinski, and R.A. Shaw, "Ice Formed By Contact Freezing: Pressure Matters, Not Just Temperature", AMS 15th Conference on Cloud Physics, Vancouver, Oral Presentation, July 9-13, 2018.

Yang, F., E. P. Luke, P. Kollias, A. B. Kostinski and A. M. Vogelmann, "Investigation of Drizzling Virga Depth and Vertical Velocity below Marine Stratocumulus Clouds Using Ground-Based Remote Sensing", AMS 15th Conference on Cloud Physics, Vancouver, Poster Presentation, July 9-13, 2018.

Yang, F., E. P. Luke, P. Kollias, A. B. Kostinski and A. M. Vogelmann, "Azores Virga Depth: analytical expression as a function of cloud depth evaluated with observations", Warm marine low cloud processes and modeling breakout session, DOE ARM/ASR PI meeting, Vienna, VA, Oral and Poster Presentation, Mar. 19-23, 2018.

Yang, F., O. Cruikshank, W. He, A.B. Kostinski, and R.A. Shaw, "What is special about contact nucleation of ice? The role of a moving or distorted three-phase contact line", DOE ARM/ASR PI meeting, Vienna, VA, Poster Presentation, Mar. 19-23, 2018.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Large eddy simulations of turbulence-induced broadening of cloud droplet size distributions in a cloud chamber", Gordon Research Conference on Radiation & Climate, Lewiston, ME, Poster Presentation, July 16-21, 2017.

Yang, F., R.A. Shaw, C. Gurganus, S.K. Chong, Y.K. Yap, "Moving contact lines due to electrowetting enhance ice nucleation rates", International Commission on Clouds and Precipitation, Manchester, UK, Oral Presentation, July 25-29, 2016.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Aerosol-cloud-precipitation interactions: initial results for case 4 and possible connection to the lab", 9th Cloud Modeling Workshop, Exeter, UK, Oral Presentation, July 18-22, 2016

Yang, F., M. Ovchinnikov, R.A. Shaw, "Microphysical consequences of the spatial distribution of ice nucleation in the mixed phase stratiform clouds", DOE ARM/ASR meeting, Vienna, Oral Presentation, May 2-6, 2016.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Long lifetime ice particles in the mixed phase stratiform cloud", DOE ARM/ASR meeting, Vienna, Poster Presentation, May 2-6, 2016.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Long lifetime ice particles in the mixed phase stratiform cloud", American Geophysical Union Fall Meeting, San Francisco, Poster Presentation, Dec. 14-18, 2015.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Lagrangian studies of ice nucleation and growth in mixed-phase stratiform clouds", 14th American Meteorological Society Conference on Cloud Physics, Boston, Poster Presentation, July 7-11, 2014.

Yang, F., M. Ovchinnikov, R.A. Shaw, "Minimalist model of Ice microphysics in mixed-phase stratiform clouds", Ice-Nuclei Research Unit Summer School, Braunfels, Germany, Poster Presentation, Sep.15-20, 2013.

Yang, F., H. Xue, Z. Deng, C. Zhao, and Q. Zhang, "A closure study of cloud condensation nuclei in the North China Plain using droplet kinetic condensational growth model", American Geophysical Union Fall Meeting, San Francisco, Poster Presentation, Dec., 5-9, 2011.