

Wenchang Yang

Associate Research Scholar

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Research Interests

Climate Dynamics, Change, Impact and Modeling

Tropical Cyclone; Volcanic Eruption; Climate and Epidemic Dynamics; Urbanization and Climate

Arctic Sea Ice and Climate; East African Hydroclimate; ITCZ and ENSO; Monsoon; Storm Tracks

Education

2014 Ph.D., Columbia University

2004 B.S., 2007 M.S., Peking University, China

Employment

2019 – Present, Associate Research Scholar, Princeton University

2017 – 2019, Postdoctoral Research Associate, Princeton University

2015 – 2017, Postdoctoral Scholar, University of California at Irvine

Grants and Awards

2022 Urbanization and Compound Heat Waves, *Cooperative Institute for Modeling the Earth System at Princeton University*, Co-PI.

2022 – 2024 Assessing Climate and Stochastic Forcing of North Atlantic Tropical Cyclone Activity over the Past Millennium, *NSF*, Co-PI.

2022 – 2026 Investigating Global Cloud Feedback Dependence on Southern Ocean Salinity, *NASA*, Co-I.

2021 Responses of ENSO to Volcanic Eruptions in High-resolution Climate Model Simulations, *Princeton HEMI Summer Internship Program*, Co-PI.

2020 – 2023 Investigating Cloud-Circulation Feedbacks in Earth System Models, *DOE*, Co-I.

Publications

2022 [27] Philip SY et al. (2022): Rapid attribution analysis of the extraordinary heatwave on the Pacific Coast of the US and Canada June 2021. *Earth Syst. Dynam.*, doi: 10.5194/esd-13-1689-2022.

[26] Harrington LJ et al. (2022): Limited role of climate change in extreme low rainfall associated with southern Madagascar food insecurity, 2019-21. *Environmental Research: Climate*, doi: 10.1088/2752-5295/aca695.

[25] Bhatia K, A Baker, **W Yang**, G Vecchi, T Knutson, H Murakami, J Kossin, K Hodges, K Dixon, B Bronselaer, C Whitlock (2022): A potential explanation for the global increase in tropical cyclone rapid intensification. *Nat. Commun.*, doi: 10.1038/s41467-022-34321-6.

- [24] Hsieh TL, **W Yang**, GA Vecchi, M Zhao (2022): Model spread in the tropical cyclone frequency and seed propensity index across global warming and ENSO-like perturbations. *Geophys. Res. Lett.* doi: 10.1029/2021GL097157.
- 2021 [23] **Yang W**, TL Hsieh, GA Vecchi (2021): Hurricane annual cycle controlled by both seeds and genesis probability. *Proc. Natl. Acad. Sci.* doi: 10.1073/pnas.2108397118.
- [22] Liu M, GA Vecchi, BJ Soden, **W Yang**, B Zhang (2021): Enhanced hydrological cycle increases ocean heat uptake and moderates transient climate sensitivity. *Nat. Clim. Change.* doi: 10.1038/s41558-021-01152-0.
- [21] Zhang B, BJ Soden, GA Vecchi, **W Yang** (2021): Investigating the causes and impacts of convective aggregation in a high resolution atmospheric GCM. *J. Adv. Model. Earth Syst.*, doi: 10.1029/2021MS002675
- [20] Chan D, GA Vecchi, **W Yang**, P Huybers (2021): Improved simulation of 19th- and 20th-century North Atlantic hurricane frequency after correcting historical sea surface temperatures. *Sci. Adv.* doi: 10.1126/sciadv.abg6931.
- [19] Wang C, BJ Soden, **W Yang**, GA Vecchi (2021): Compensation between cloud feedback and aerosol-cloud interaction in CMIP6 models. *Geophys. Res. Lett.* doi: 10.1029/2020GL091024.
- [18] Baker RE, **W Yang**, G Vecchi, CJE Metcalf, BT Grenfell (2021): Assessing the influence of climate on wintertime SARS-CoV-2 outbreaks. *Nat. Commun.*, doi: 10.1038/s41467-021-20991-1.
- [17] Zhang B, BJ Soden, GA Vecchi, **W Yang** (2021): The role of radiative interactions in tropical cyclone development under realistic boundary conditions. *J. Clim.*, doi: 10.1175/JCLI-D-20-0574.1
- 2020 [16] Baker RE, SW Park, **W Yang**, GA Vecchi, CJE Metcalf, BT Grenfell (2020): The impact of COVID-19 non-pharmaceutical interventions on the future dynamics of endemic infections. *Proc. Natl. Acad. Sci.*, doi: 10.1073/pnas.2013182117
- [15] Hsieh TL, GA Vecchi, **W Yang**, IM Held, ST Garner (2020): Largescale control on the frequency of tropical cyclones and seeds: a consistent relationship across a hierarchy of global atmospheric models. *Clim. Dyn.*, doi: 10.1007/s00382-020-05446-5
- [14] Jacobson TWP, **W Yang**, GA Vecchi, LW Horowitz (2020): Impact of volcanic aerosol hemispheric symmetry on Sahel rainfall. *Clim. Dyn.*, doi: 10.1007/s00382-020-05347-7
- [13] Wagner CE, M Hooshyar, RE Baker, **W Yang**, N Arinaminpathy, G Vecchi, CJE Metcalf, BT Grenfell (2020): Climatological, virological and sociological drivers of current and projected dengue fever outbreak dynamics in Sri Lanka. *J. R. Soc. Interface*, doi: 10.1098/rsif.2020.0075
- [12] Baker RE, **W Yang**, G Vecchi, CJE Metcalf, BT Grenfell (2020): Susceptible supply limits the role of climate in the early SARS-CoV-2 pandemic. *Science*, doi: 10.1098/rsif.2020.0075

- 2019 [11] Baker RE, A Mahmud, C Wagner, **W Yang**, V Pitzer, C Viboud, G Vecchi, CJE Metcalf, B Grenfell(2019): Epidemic dynamics of respiratory syncytial virus in current and future climates. *Nat. Commun.*, doi: 10.1038/s41467-019-13562-y
- [10] **Yang W**, G Vecchi, S Fueglistaler, L Horowitz, D Luet, Á Muñoz et al.(2019): Climate impacts from large volcanic eruptions in a high-resolution climate model: the importance of forcing structure. *Geophys. Res. Lett.*, doi: 10.1029/2019GL082367
- 2018 [09] **Yang W**, G Magnusdottir (2018): Year-to-year variability in Arctic minimum sea ice extent and its preconditions in observations and the CESM large ensemble simulations. *Sci. Rep.*, doi: 10.1038/s41598-018-27149-y
- 2017 [08] **Yang W**, G Magnusdottir (2017): Springtime extreme moisture transport into the Arctic and its impact on sea ice concentration. *J. Geophys. Res. Atmos.*, doi: 10.1002/2016JD026324
- 2016 [07] **Yang W**, G Magnusdottir (2016): Interannual Signature in daily ITCZ states in the east Pacific in boreal spring, *J. Clim.*, doi: 10.1175/JCLI-D-16-0395.1
- 2015 [06] **Yang W**, R Seager, MA Cane, B Lyon (2015): The rainfall annual cycle bias over East Africa in CMIP5 coupled climate models. *J. Clim.*, **28**, doi: 10.1175/JCLI-D-15-0323.1
- [05] **Yang W**, R Seager, MA Cane, B Lyon (2015): The annual cycle of the East African precipitation. *J. Clim.*, doi: 10.1175/JCLI-D-14-00484.1
- 2014 [04] **Yang W**, R Seager, MA Cane, B Lyon (2014): The East African long rains in observations and models. *J. Clim.*, doi: 10.1175/JCLI-D-13-00447.1
- 2013 [03] **Yang W**, R Seager, MA Cane (2013): Zonal momentum balance in the tropical atmospheric circulation during the global monsoon mature months. *J. Atmos. Sci.*, doi: 10.1175/JAS-D-12-0140.1
- 2008 [02] Nie J, P Wang, **W Yang**, BK Tan (2008): Northern Hemisphere storm tracks in strong AO anomaly winters. *Atmos. Sci. Lett.*, doi: 10.1002/asl.186
- 2007 [01] **Yang W**, J Nie, P Lin, BK Tan (2007): Baroclinic wave packets in an extended quasi-geostrophic two-layer model. *Geophys. Res. Lett.*, doi: 10.1029/2006GL029077

Teaching Experience

- 2021, 2020, 2019 (Fall), Instructor, Princeton University
Junior Colloquium of the Geosciences Department
- 2009, 2008 (Fall), Teaching Assistant, Columbia University
Quantitative Models of Climate-Sensitive Natural and Human Systems
- 2006 (Spring), Teaching Assistant, Peking University, China
Atmospheric Dynamics

Mentoring Experience

Princeton Undergraduates:

Ben Buchovecky ('23, 2023-); David Ban ('24, 2022-); Charlotte Merchant ('24, 2022-); Grace Liu ('23, 2022-); Demetra Yancopoulos ('22, 2021-2022); Jessica Stikons ('23, 2021-2022); Ryan Eusebi ('22, 2020-2022); Nina Grant ('21, 2020-2021); Emma McMahon ('21, 2019-2021); Alexander Cavoli ('20, 2019-2020); Tess Jacobson ('19, 2018-2020);

Presentations

2022 Mar 21 (invited, virtual), UNCW.

The Challenge of Understanding Tropical Cyclone Frequency and the Framework of Seeds and Transition Probability

Feb 07 (invited, virtual), U of Houston.

Understanding Tropical Cyclone Frequency: the Framework of Seeds and Genesis Probability

2021 Dec 17 (invited, virtual), AGU Annual Meeting.

What Drives Atlantic Hurricane Activity in the Last Millennium?

2020 Dec 11, AGU Annual Meeting, virtual.

What controls the annual cycle of the North Atlantic tropical cyclone frequency?

Jan 15, AMS Annual Meeting, Boston.

Climate Impacts from Explosive Volcanic Eruptions, Solar Radiation Change and CO2 Increase.

2019 Jun 3, 9th Northeast Tropical Workshop, Endicott House, Dedham MA.

Climate Impact from Explosive Volcanic Eruptions Depends on Latitudinal Distribution of Aerosol Loading.

Apr 16-17 (poster), CMI Annual Meeting, Princeton.

Climatic Impacts from Large Volcanic Eruptions: the Role of Radiation Forcing Structure.

Apr 11, European Geophysical Union Fall Meeting, Vienna, Austria.

Inter-hemispherically Asymmetric versus Symmetric Volcanic Forcings and the Impacts on Climate.

2018 Dec 10 (poster), American Geophysical Union Fall Meeting, Washington, D.C.

Climate Impact from Inter-Hemisphere Asymmetric Volcanic Eruptions in the FLOR Ensemble Modelling.

Apr 27, AOS Student/Postdoc Seminar, Princeton University.

Impact of Large Volcanic Eruptions in the FLOR Climate Model.

2016 Dec 16, American Geophysical Union Fall Meeting, San Francisco.

Springtime Extreme Moisture Transport into the Arctic - Its Impact and Associated Large-scale Atmospheric circulation.

Jun 08, AOS Seminar, Peking University.

Decadal Variability of East African Hydroclimate in Observations and Models and the Implication for the Future Projection.

2015 Dec 14 (poster), American Geophysical Union Fall Meeting, San Francisco.

The East Pacific Double ITCZ during Boreal Spring in Observations.

2014 Sep 25, AOCD Seminar, Yale University.

Why is East Africa Drying during the Spring Rainy Season in Recent Decades?

Jun 04, GFDL Seminar, Princeton University.

East African Precipitation and Droughts: from Decadal Variability to Annual Cycle.

May 28, GloDecH Meeting, Columbia University.

The Dual Peaked Seasonal Cycle of Precipitation Over Tropical East Africa.

2013 Dec 9-13 (poster), American Geophysical Union Fall Meeting, San Francisco.

The East African Long Rains in Observations and Models.

Jun 12, GloDecH Meeting, Columbia University.

Decadal Variability of the East African Long Rains in Obs. and Models.

2012 Dec 3-7 (poster), American Geophysical Union Fall Meeting, San Francisco.

Zonal Momentum Balance in the Tropical Atmospheric Circulation during the Global Monsoon Mature Months.

2011 Dec 5-9 (poster), American Geophysical Union Fall Meeting, San Francisco.

Simulating and Diagnosing the Dynamics of the Global Monsoon in a Simple Tropical Atmosphere Model.

Jun 20, Atmosphere-Ocean Science Days, MIT.

Global Monsoon Simulation in a Simple Numerical Model.

Professional Services

Proposal Reviewer for NSF

Journal Reviews

Nature Climate Change, Nature Communications, Scientific Reports

Journal of Climate, Journal of the Atmospheric Sciences, Climate Dynamics

Geophysical Research Letters, Journal of Geophysical Research-Atmospheres, Earth's Future

Quarterly Journal of the Royal Meteorological Society, International Journal of Climatology

Journal of Applied Meteorology and Climatology, Advances in Atmospheric Sciences

Bulletin of the American Meteorological Society

Other Services

2015 Judge for the Outstanding Student Paper Awards in the AGU Fall Meeting

2010 – 2011, Coordinator for the DOCP Seminars at Lamont, Columbia University

Professional Associations

American Geophysical Union (AGU), member

American Meteorology Society (AMS), member

Awards and Honors

- 2019 Editors' Citation for Excellence in Refereeing for *Geophysical Research Letters*
- 2007 Faculty Fellowship of GSAS, Columbia University
 - Second Prize in "Zhong Shengbiao Education Foundation" Student Academic Forum
- 2005 May 4th Scholarship
- 2004 Outstanding Graduates of All Universities in Beijing
 - Outstanding Graduates of Peking University
- 2002 Merit Student of Peking University
- 2001 Merit Student of Peking University
- 2001 – 2004, Cyrus Tang Foundation Scholarship
- 2000 Merit Student of High Schools in Jiangsu Province, China
- 1999 First Prize in National High School Mathematics Olympiad, Jiangsu, China
 - Second Prize in National High School Biology Olympiad, Jiangsu, China
 - Third Prize in National High School Physics Olympiad, Jiangsu, China