

# ZHIHONG TAN

AOS/CIMES Princeton University (working at NOAA Geophysical Fluid Dynamics Laboratory)  
Room 240, GFDL, 201 Forrester Road, Princeton, NJ 08540, USA  
Tel: (609) 452-6536; Email: zhihongt@princeton.edu; ORCID: 0000-0002-7422-3317.

## Research Interests

Cloud-radiation-circulation interaction, Boundary layer turbulence and convection, Jet and circulation dynamics, Modeling of Earth's climate system

## Academic Positions

- 2021–present Associate Research Scholar, Atmospheric and Oceanic Sciences Program at Princeton University and NOAA Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA
- 2020 Postdoctoral Research Associate, Atmospheric and Oceanic Sciences Program at Princeton University and NOAA Geophysical Fluid Dynamics Laboratory, Princeton, NJ, USA
- 2016–2019 Postdoctoral Scholar, Department of the Geophysical Sciences, University of Chicago, Chicago, IL, USA
- 2013–2016 Academic Visitor in Climate Dynamics Group, Geological Institute, Swiss Federal Institute of Technology (ETH) Zurich, Switzerland

## Education

- 2009–2016 California Institute of Technology (Caltech), Pasadena, CA, USA  
Ph.D. in Environmental Science and Engineering June 2016  
Thesis: “Simulations and Mechanisms of Subtropical Low-cloud Response to Climate Change”  
Advisor: Prof. Tapio Schneider (Co-advised by Dr. Joao Teixeira)
- M.S. in Environmental Science and Engineering June 2013
- 2005–2009 Peking University, Beijing, China  
B.S. in Mathematics and Applied Mathematics July 2009

## Awards and Fellowships

- 2019 Quarterly Journal Prize Reviewer's Certificate, Royal Meteorological Society, UK
- 2019 Reviewer Award for Journal of Meteorological Research, Chinese Meteorological Society, China
- 2018 Held Symposium Travel Scholarship, Princeton University
- 2009–2010 Vanoni Student Fellowship, Caltech
- 2009 Outstanding Graduate of Peking University
- 2005–2009 Mingde Scholarship, Peking University

## Teaching Assistant

2014	Cloud and Boundary Layer Dynamics	651-2126-00, ETH Zurich
2012	Large-Scale Atmosphere Dynamics	ESE 133, Caltech
2011	Methods in Applied Statistics and Data Analysis	ACM/ESE 118, Caltech
2010	Global Environmental Science: Climate Change	ESE/Ge 148a, Caltech

## First-Authored Publications

**Tan, Z.** and Shaw, T. A., 2020: Quantifying the impact of wind and surface humidity-induced surface heat exchange on the circulation shift in response to increased CO<sub>2</sub>. *Geophysical Research Letters*, **47**, e2020GL088053.

**Tan, Z.**, O. Lachmy, and T. A. Shaw, 2019: The sensitivity of the jet stream response to climate change to radiative assumptions. *Journal of Advances in Modeling Earth Systems*, **11**, 934–956.

**Tan, Z.**, C. M. Kaul, K. G. Pressel, Y. Cohen, T. Schneider, and J. Teixeira, 2018: An extended eddy-diffusivity mass-flux scheme for unified representation of subgrid-scale turbulence and convection. *Journal of Advances in Modeling Earth Systems*, **10**, 770–800.

**Tan, Z.**, T. Schneider, J. Teixeira, and K. G. Pressel, 2017: Large-eddy simulation of subtropical cloud-topped boundary layers: 2. Cloud response to climate change. *Journal of Advances in Modeling Earth Systems*, **9**, 19–38.

**Tan, Z.**, T. Schneider, J. Teixeira, and K. G. Pressel, 2016: Large-eddy simulation of subtropical cloud-topped boundary layers: 1. A forcing framework with closed surface energy balance. *Journal of Advances in Modeling Earth Systems*, **8**, 1565–1585.

## Collaborated Publications

Dong, W., M. Zhao, **Z. Tan**, and V. Ramaswamy, 2024: Atmospheric rivers over eastern US affected by Pacific/North America pattern, *Science Advances*, **10**, eadj3325.

Li, X., **Z. Tan**, Y. Zheng, M. Bushuk, and L. J. Donner, 2023: Open water in sea ice causes high bias in polar low-level clouds in GFDL CM4, *Geophysical Research Letters*, **50**, e2023GL106322.

Zhang, B., M. Zhao, H. He, B. Soden, **Z. Tan**, B. Xiang, and C. Wang, 2023: The dependence of climate sensitivity on the meridional distribution of radiative forcing, *Geophysical Research Letters*, **50**, e2023GL105492.

Yang, J., Y. Zhang, Z. Fu, M. Yan, X. Song, M. Wei, J. Liu, F. Ding, and **Z. Tan**, 2023: Cloud behavior on tidally locked rocky planets from global high-resolution modelling, *Nature Astronomy*, **7**, 1070–1080.

Kieu, C., M. Zhao, **Z. Tan**, B. Zhang, and T. Knutson, 2023: On the role of sea surface temperature in the clustering of global tropical cyclone formation, *Journal of Climate*, **36**, 3145–3162.

Liu, J., J. Yang, Y. Zhang, and **Z. Tan**, 2023: Convection and clouds under different planetary gravities simulated by a small-domain cloud-resolving model, *The Astrophysical Journal*, **944**, 45.

Yin, Z., K. L. Findell, P. A. Dirmeyer, E. Shevliakova, S. Malyshev, K. Ghannam, N. Raoult, and **Z. Tan**, 2023: Daytime-only mean data enhance understanding of land-atmosphere coupling, *Hydrology and Earth System Sciences*, **27**, 861–872.

Zhang, B., M. Zhao, and **Z. Tan**, 2023: Using a Green's function approach to diagnose the pattern effect in GFDL AM4 and CM4, *Journal of Climate*, **36**, 1105–1124.

Shen, Z., A. Sridhar, **Z. Tan**, A. Jaruga, and T. Schneider, 2022: A library of large-eddy simulations forced by global climate models. *Journal of Advances in Modeling Earth Systems*, **14**, e2021MS002631.

Fan, B., **Z. Tan**, T. A. Shaw, and E. S. Kite, 2021: Reducing surface wetness leads to tropical hydrological cycle regime transition, *Geophysical Research Letters*, **48**, e2020GL090746.

Shen, Z., K. G. Pressel, **Z. Tan**, and T. Schneider, 2020: Statistically steady state large-eddy simulations forced by an idealized GCM: 1. Forcing framework and simulation characteristics. *Journal of Advances in Modeling Earth Systems*, **12**, e2019MS001814.

Miyawaki, O., **Z. Tan**, T. A. Shaw, and M. F. T. Jansen, 2020: Quantifying key mechanisms that contribute to the deviation of the tropical warming profile from a moist adiabat. *Geophysical Research Letters*, **47**, e2020GL089136.

Shaw, T. A. and **Z. Tan**, 2018: Testing some latitudinally-dependent explanations of the circulation response to increased CO<sub>2</sub> using aquaplanet models. *Geophysical Research Letters*, **45**, 9861–9869.

Pressel, K. G., S. Mishra, T. Schneider, C. M. Kaul, and **Z. Tan**, 2017: Numerics and subgrid-scale modeling in large eddy simulations of stratocumulus clouds. *Journal of Advances in Modeling Earth Systems*, **9**, 1342–1365.

Brient, F., T. Schneider, **Z. Tan**, S. Bony, X. Qu, and A. Hall, 2016: Shallowness of tropical low clouds as a predictor of climate models' response to warming. *Climate Dynamics*, **47**, 433–449.

Pressel, K. G., C. M. Kaul, T. Schneider, **Z. Tan**, and S. Mishra, 2015: Large-eddy simulation in an anelastic framework with closed water and entropy balances. *Journal of Advances in Modeling Earth Systems*, **7**, 1425–1456.

### Submitted Manuscripts

Liang, W., M. Zhao, **Z. Tan**, T. Knutson, W. Dong, and B. Zhang: The direct radiative effect of CO<sub>2</sub> increase on summer precipitation in North America, submitted to *Geophysical Research Letters*.

Zhang, B., L. J. Donner, M. Zhao, and **Z. Tan**: Improved precipitation diurnal cycle in GFDL climate models with non-equilibrium convection, submitted to *Journal of Advances in Modeling Earth Systems*.

Gentile, E. S., M. Zhao, V. E. Larson, C. M. Zarzycki, and **Z. Tan**: The effect of coupling between CLUBB turbulence scheme and surface momentum flux on global wind simulations, submitted to *Journal of Advances in Modeling Earth Systems*.

## Manuscript in Preparation

**Tan, Z.** and M. Zhao: Impact of the NCEP TKE-based Eddy-Diffusivity Mass-Flux Boundary Layer Scheme on the Climatology and Warming Response of GFDL AM4.0 Model, in prep for *Journal of Advances in Modeling Earth Systems*.

## Invited Talks

- 04/2023 Atmospheric Science Seminar at the UC Davis, Davis, CA
- 02/2019 Seminar at the Pacific Northwest National Laboratory, Richland, WA
- 11/2018 Seminar at the Geophysical Fluid Dynamics Laboratory, Princeton, NJ
- 09/2018 AOS Seminar at Peking University, China
- 12/2017 AGU Fall Meeting, Section ‘Coupling of Clouds and Moisture with the Large-Scale Atmospheric Circulation’, New Orleans, LA
- 01/2016 GeoSci Seminar at the University of Chicago, Chicago, IL

## Contributed Presentations

- 07/2023 2023 Joint CFMIP-GASS Meeting on Cloud, Precipitation, Circulation and Climate Sensitivity
- 12/2022 2022 AGU Fall Meeting, Section ‘Processes of (Sub) Cloud Scales: Modeling, Observations, and Parameterizations II’
- 12/2021 2021 AGU Fall Meeting, Section ‘Atmospheric Physics, Radiation, Clouds, and Aerosols III’
- 12/2020 2020 AGU Fall Meeting, Section ‘The Dynamics of the Large-Scale Atmospheric Circulation in Past, Present, and Future Climate: Jet Streams, Storm Tracks, Stationary Waves, and Monsoons I’
- 06/2019 22<sup>nd</sup> Conference on Atmospheric and Oceanic Fluid Dynamics
- 12/2018 2018 AGU Fall Meeting, Section ‘Large-Scale Moist Circulations and Tropical Variability’
- 10/2018 Held Symposium: ‘Understanding and Modeling the Earth's Climate’
- 06/2018 Rossbyalooza Summer School: ‘Understanding Climate through Simple Models’
- 06/2017 21<sup>st</sup> Conference on Atmospheric and Oceanic Fluid Dynamics
- 06/2016 International Workshop ‘Cloud and Boundary Layer Closures: The Next Decade’
- 12/2015 2015 AGU Fall Meeting, Section ‘Clouds, Precipitation, and Climate Change I’
- 06/2015 20<sup>th</sup> Conference on Atmospheric and Oceanic Fluid Dynamics
- 06/2015 2015 CFMIP Meeting on Cloud Processes and Climate Feedbacks
- 12/2014 2014 AGU Fall Meeting, Section ‘Physics of Climate Models III’
- 07/2014 7<sup>th</sup> International Scientific Conference on the Global Water and Energy Cycle
- 06/2014 The Latsis Symposium 2014: ‘Atmosphere and Climate Dynamics, from Clouds to Global Circulations’
- 02/2014 Exoclines III Conference
- 01/2014 Decadal and Regional Climate Prediction using Earth System Models (EaSM) PI Meeting
- 06/2013 EUCLIPSE International Summer School on "Clouds and Climate"
- 06/2013 19<sup>th</sup> Conference on Atmospheric and Oceanic Fluid Dynamics

04/2013 2013 EGU General Assembly, Section ‘Clouds, Aerosols and Radiation’  
12/2012 2012 AGU Fall Meeting, Section ‘Turbulent Mixing and Convection in Climate Models: Atmosphere and Ocean’  
03/2012 Workshop on the Physics of Weather and Climate Models  
06/2011 18<sup>th</sup> Conference on Atmospheric and Oceanic Fluid Dynamics

### **Professional Services**

2018, 2019 Junior Mentor for the ‘Leadership Alliance’ undergraduate summer research program  
2015–present Reviewer for *Advances in Atmospheric Sciences*, *Atmospheric Chemistry and Physics*, *Climate Dynamics*, *Geophysical Research Letters*, *Journal of Advances in Modeling Earth Systems*, *Journal of Climate*, *Journal of Meteorological Research*, *Journal of the Atmospheric Sciences*, *Nature Climate Change*, *Quarterly Journal of the Royal Meteorological Society*, and *Theoretical and Applied Climatology*

### **Professional Memberships**

Member of American Meteorological Society and American Geophysical Union