

# Aaron Match

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## PROFILE

I am a stratospheric dynamicist focusing on the Quasi-Biennial Oscillation (QBO) of the tropical stratosphere. My work connects theory, observations, and comprehensive model results to understand the basic structure of the QBO and its sensitivity to dynamical perturbations and global warming. In my research and as a founding member of Climate Up Close, I bear witness to what is known about Earth's atmosphere and global warming, how it is known, and what remains uncertain.

## EDUCATION

### Princeton University, Princeton, NJ

- Ph.D. Atmospheric and Oceanic Sciences (AOS) 2015 – 2021
  - Thesis: *The Unified Internal Dynamics and Global Interactions of the Quasi-Biennial Oscillation*
  - Advisor: Prof. Stephan Fueglistaler

### Cornell University, Ithaca, NY

- B.S. Atmospheric Science, minor in Mathematics, summa cum laude 2011 – 2015
  - Thesis: *Diagnosing the structure of finite amplitude wave activity in the polar stratosphere*
  - Advisor: Prof. Gang Chen

## PUBLICATIONS

A. Match, S. Fueglistaler, 2021: **Large internal variability precludes global warming signal detection in observed lower stratospheric QBO amplitude.** *Journal of Climate*, 34, 24, 9823–9836.

A. Match, S. Fueglistaler, 2021: **Anomalous dynamics of QBO disruptions explained by 1D theory with external triggering.** *Journal of the Atmospheric Sciences*, 78, 2, 373–383.

A. Match, S. Fueglistaler, 2020: **Mean flow damping forms the buffer zone of the Quasi-Biennial Oscillation: 1D theory.** *Journal of the Atmospheric Sciences*, 77, 1955–67.

A. Match, S. Fueglistaler, 2019: **The buffer zone of the Quasi-Biennial Oscillation.** *Journal of the Atmospheric Sciences*, 76, 11, 3553–3567.

A. Butler, D. Seidel, S.C. Hardiman, N. Butchart, T. Birner, A. Match, 2015: **Defining sudden stratospheric warmings.** *Bulletin of the American Meteorological Society*, 96, 11, 1913–1928.

## AWARDS & SCHOLARSHIPS

Recognized for Service and Outreach by Princeton Department of Geosciences	2021
Princeton Energy and Climate Scholar	2017 – 2019
Graduate Research Fellowship, National Science Foundation	2016 – 2019
Centennial Fellowship in the Natural Sciences, Princeton University	2015 – 2019
Merrill Presidential Scholar, Cornell University	2015
Academic Excellence in Atmospheric Sciences Award, Cornell University	2015
Barry M. Goldwater Scholarship	2014 – 2015
NOAA Ernest F. Hollings Scholarship	2013 – 2015
Orville Family Endowed Scholarship, American Meteorological Society	2014
Freshman Undergraduate Scholarship, American Meteorological Society	2011

## TEACHING

Assistant-in-Instruction, GEO 361: Earth's Atmosphere. Prof. Stephan Fueglistaler	Fall 2019
Assistant, FRS 151: Time Capsules for Climate Change. Prof. Rob Socolow	Fall 2018

## RESEARCH INTERNSHIPS

NOAA Hollings: Geophysical Fluid Dynamics Laboratory, Princeton, NJ	2014
• Project: "Sensitivities of stratospheric aerosol dispersal to variations in location and timing"	
• Advisors: Jasmin John and Dr. Larry Horowitz	
NSF REU: Center for Multiscale Modeling of Atmospheric Processes, Fort Collins, CO	2013
• Project: "Dynamically motivating a definition for sudden stratospheric warmings"	
• Advisor: Prof. Thomas Birner	

## OUTREACH

Founding member, Climate Up Close. [climateupclose.org](http://climateupclose.org) 2019-Pres.  
Climate scientists sharing the essentials of climate science in person with a broad audience. Lecture, Q&A, demos.  
• Summer 2019 Tour of Central PA: 3 churches, 3 libraries, synagogue, meetinghouse, private home. 500 attendees.  
• Winter 2020 Tour of Philadelphia, PA: Synagogue, Friends Center, library, private home. 250 attendees.  
Co-presenter, Princeton Day School Energy and Climate Scholars, 3 presentations 2018-2019  
Co-organizer, AOS workshop on Tropical Dynamics, Princeton University 2017  
Co-organizer, AOS workshop on Climate Engineering, Princeton University 2016

## PROFESSIONAL SERVICE

- Student member, AMS Middle Atmosphere Committee 2021
- Student member, AMS Atmospheric and Oceanic Fluid Dynamics Committee 2017-2019
- Reviewer: *Geophysical Research Letters*, *Atmospheric Chemistry and Physics*, *Quarterly Journal of the Royal Meteorological Society*

## SELECTED PRESENTATIONS

- A. Match. “Stratospheric dynamics for Tropical Tropopause Layer scientists.” Talk.
  - *NSF PIRE-CIRRUS student/postdoc seminar*, remote, Dec 2020.
- A. Match, S. Fueglistaler. “QBO inference in reanalyses and idealized models: The buffer zone and disruptions.” Talk.
  - *NCAR Whole Atmosphere Community Climate Model (WACCM) development team meeting*, remote, Nov 2020.
  - *Stanford University Climate, Atmosphere, and Ocean Dynamics Seminar (CLAOD) seminar*, remote, Nov 2020.
  - *NASA Global Modeling and Assimilation Office (GMAO) informal QBO team*, remote, Oct 2020.
  - *Lutsko group meeting at Scripps Institute of Oceanography*, remote, Oct 2020.
- A. Match, S. Fueglistaler. “The Buffer Zone of the Quasi-Biennial Oscillation: Formation and Variability.”
  - *American Meteorological Society Annual Meeting*, Boston, MA, USA, Jan 2020. Poster.
  - *Atmospheric Circulation in a Changing Climate Workshop*, Madrid, Spain, Oct 2019. Poster.
- A. Match, S. Fueglistaler. “The Case for a Resilient Quasi-Biennial Oscillation.”
  - *22<sup>nd</sup> Atmospheric and Oceanic Fluid Dynamics Conference*, Portland, Maine, Jun 2019. Poster.
  - *IUGG General Assembly*, Montreal, QC, CA, Jun 2019. Talk.
  - *Graduate Climate Conference*, Woods Hole, MA, Nov 2019. Talk.
- A. Match, S. Fueglistaler. “What can observed temperatures tell us about stratospheric dynamics over the past 40 years?” *19<sup>th</sup> Conference on the Middle Atmosphere*, Portland, Oregon, Jun 2017. Talk.
- A. Match, M. Abalos, J. Sheng, A. Stenke, D. Paynter, S. Fueglistaler. “Stratospheric dynamics following the eruption of Mt. Pinatubo.”
  - *2<sup>nd</sup> Stratospheric Sulfur and Its Role in Climate Workshop*, Potsdam, Germany, Apr 2016. Talk.
  - *European Geosciences Union General Assembly*, Vienna, Austria, Apr 2016. Poster.
- A. Match, G. Chen. “Diagnosing the structure of finite amplitude wave activity in the polar stratosphere,” *20<sup>th</sup> Atmospheric and Oceanic Fluid Dynamics Conference*, Minneapolis, MN, USA, Jun 2015. Poster.\*
- A. Match, J. John, L. Horowitz. “Sensitivities of stratospheric aerosol dispersal to variations in location and timing,” *18<sup>th</sup> Conference on the Middle Atmosphere, American Meteorological Society*, Phoenix, AZ, USA, Feb 2014. Talk.\*
- A. Match and T. Birner, “Dynamically motivating a definition for sudden stratospheric warmings,” *26<sup>th</sup> Conference on Climate Variability and Change, American Meteorological Society*, Atlanta, GA, USA, Feb 2014. Poster.

\*Denotes best student presentation award