

# Aaron Hill

## Curriculum Vitae

### Research Interests

Data science and statistical methods, artificial intelligence for atmospheric science, mesoscale meteorology, predictability, data assimilation, ensemble forecasting, targeted observing, innovative observing systems

### Education

- 2019 **Ph.D., Geosciences**, *Texas Tech University*.  
Dissertation: Demonstration of ensemble sensitivity-based targeted observing for convective-scale applications: Perfect-model experiments
- 2014 **M.S., Atmospheric Sciences**, *Texas Tech University*.  
Thesis: Mesoscale data assimilation and ensemble sensitivity analysis towards improved predictability of dryline convection
- 2012 **B.S., Atmospheric Sciences**, *University of Washington*.  
Minor: Applied Mathematics

### Research Experience

- 2019-present **Postdoctoral Research Fellow**, *Colorado State University*.  
Advisor: Dr. Russ Schumacher
- 2012 - 2019 **Graduate Research Assistant**, *Texas Tech University*.  
Advisors: Drs. Chris Weiss and Brian Ancell
- July - Sep 2018 **Graduate Student Visitor**, *Mesoscale and Microscale Meteorology Laboratory, National Center for Atmospheric Research*.  
Sponsor: Dr. Glen Romine
- 2011-2012 **Undergraduate Research Assistant**, *University of Washington*.  
Advisor: Dr. Robert Houze, Jr.

### Teaching Experience

#### Instructor of Record

Summer 2016 and 2017 ATMO 1300: Introduction to Atmospheric Science, Texas Tech University

#### Guest Lecturer

- 2019 ATMO 3316: Severe and Hazardous Weather  
2015 ATMO 1300: Introduction to Atmospheric Science  
2014 ATMO 2301: Weather, Climate, and Human Activities

#### Other

- 2020 **Co-Instructor**: Department of Atmospheric Science Machine Learning Workshop, Colorado State University  
2015, 2017-2018 **Writing Tutor**: Graduate Student Writing Center, Texas Tech University  
2015 **Guest Speaker**: 6th Grade Science Class, Tahoka Middle School, Tahoka, TX

### Funding Support

**Co-Principal Investigator** (PI: Russ Schumacher): "Medium-range excessive rainfall forecasts with machine learning models", National Oceanic and Atmospheric Administration Joint Technology Transfer Initiative, ~\$338,000, 8/21-7/23, PENDING.

**Co-Principal Investigator** (PIs: Brian Ancell, Kristen Rasmussen, Yonggang Wang): "Collaborative Research: Mesoscale Predictability Across Climate Regimes", National Science Foundation, \$393,173, 4/21-3/24, PENDING.

**Co-Principal Investigator** (PI: Russ Schumacher): "Generating calibrated forecast guidance for severe weather beyond day 1", National Oceanic and Atmospheric Administration Joint Technology Transfer Initiative, \$433,209, 9/20-8/22.

**Doctoral Dissertation Completion Fellowship**: one year of salary (\$24,000), 9/1/18-8/31/19.

**Student Travel Award**: 20th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, \$550, January 2017.

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## Refereed Publications

- 2021 **Hill, A. J.** and R. S. Schumacher, 2021: Forecasting excessive rainfall with random forests and a deterministic convection-allowing model. *Weather and Forecasting*, submitted.
- Hill, A. J.**, C. C. Weiss, and D. C. Dowell, 2021: Influence of a portable near-surface observing network on experimental ensemble forecasts of deep convection during VORTEX-SE. *Weather and Forecasting*, in review.
- Schumacher, R. S., **A. J. Hill**, M. Klein, J. Nelson, M. Erickson, S. M. Trojaniak, and G. R. Herman, 2021: From random forests to flood forecasts: A research to operations success story. *Bulletin of the American Meteorological Society*, in review.
- 2020 **Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2020: Factors influencing ensemble sensitivity-based targeted observing prediction at convection-allowing resolutions. *Monthly Weather Review*, 148, 4497-4517, doi:10.1175/MWR-D-20-0015.1.
- Hill, A. J.**, G. R. Herman, and R. S. Schumacher, 2020: Forecasting severe weather with random forests. *Monthly Weather Review*, 148, 2136-2161, doi:10.1175/MWR-D-19-0344.1.
- 2016 **Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2016: Ensemble sensitivity analysis for mesoscale forecasts of dryline convection initiation. *Monthly Weather Review*, 144, 4161-4182. doi:10.1175/MWR-D-15-0338.1.
- 2014 Rasmussen, K. L., **A. J. Hill**, V. E. Toma, M. D. Zuluaga, P. J. Webster, and R. A. Houze, Jr., 2014: Multiscale analysis of three consecutive years of anomalous flooding in Pakistan. *Quart. J. Roy. Meteor. Soc.*, 141, 1259-1276. doi:10.1002/qj.2433.

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## Recent Lead-Author Presentations

Full presentation list: [https://ahill1818.github.io/full\\_preslist.html](https://ahill1818.github.io/full_preslist.html)

- 2021 **Hill, A. J.** and R. S. Schumacher, 2021: Medium-range severe weather forecasts with random forests, 20th Conference on Artificial Intelligence for Environmental Science, 3.2.
- Hill, A. J.** and R. S. Schumacher, 2021: Short-term excessive rainfall forecasts using random forests and a deterministic convection-allowing model, 20th Conference on Artificial Intelligence for Environmental Science, joint 12.8.
- 2020 (invited) **Hill, A. J.**, 2020: Machine learning for convection hazard forecasts. NWS Southern Region Science and Technology Services Division Science Circle.
- (invited) **Hill, A. J.**, 2020: Forecasting our future: machine learning and AI for high-impact weather. National Weather Association Annual Meeting.
- (invited) **Hill, A. J.**, 2020: Statistical tools for high-impact weather. Naval Postgraduate School, Monterey, CA.
- Hill, A. J.** and R. S. Schumacher, 2020: Heavy precipitation and flash flood forecasts using random forests and convection-allowing models. 30th Conference on Weather and Forecasting / 26th Conference on Numerical Weather Prediction, Boston, MA., J71.2
- Hill, A. J.** and R. S. Schumacher, 2020: Random-Forest Severe Guidance from the GEFS. Storm Prediction Center Fall Forecaster Training.
- Hill, A. J.**, R. S. Schumacher, M. Klein, J. Nelson, and M. Erickson, 2020: First-guess excessive rainfall outlooks from machine learning models. Hydrometeorological Testbed Flash Flood and Intensive Rainfall Experiment.

**Hill, A. J.**, C. C. Weiss, and D. C. Dowell, 2020: Assimilating near-surface observations from a portable mesoscale network of StickNet platforms during VORTEX-SE with the High Resolution Rapid Refresh Ensemble. Severe Local Storms Symposium, Boston, MA., 950

**Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2020: Factors influencing ensemble sensitivity-based targeted observing predictions at convection-allowing resolutions. 24th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Boston, MA., 10.4

2018 (invited) **Hill, A. J.**, 2018: The utility of ensemble-sensitivity analysis for targeted observing, ensemble subsetting, and investigating environmental controls on storm characteristics. Cooperative Institute for Research in the Atmosphere, Fort Collins, CO.

**Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2018: Towards improving forecasts of severe convection along the dryline through targeted observing with ensemble sensitivity analysis. 29th Conference on Severe Local Storms, Stowe, VT, paper 14.2.

**Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2018: Ensemble-sensitivity analysis based observation targeting experiments for mesoscale convection forecasts and factors influencing observation-impact prediction. 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Austin, TX, paper 613.

**Hill, A. J.**, C. C. Weiss, and D. C. Dowell, 2018: Exploring the utility of assimilating observations from a mesoscale network of StickNet platforms during VORTEX-SE with the High Resolution Rapid Refresh Ensemble. 29th Conference on Severe Local Storms, Stowe, VT, paper 74.

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## Honors and Awards

- 2019-2020 **WxChallenge Category 1 cumulative winner, runner-up in Cold Bay, AK and Cheyenne, WY**
- 2017 **WxChallenge final-four finalist in 2017 end-of-year tournament**
- 2013 **TTU Geoscience Scholarship:** Awarded to graduate students nominated by their respective department
- 2012 **Jurica Fellowship:** Awarded to new, incoming graduate students nominated by their prospective department
- 2012 **Atmospheric Sciences Achievement Award:** Graduating seniors in the Department of Atmospheric Sciences (Washington) who have achieved a GPA of 3.5 or higher in degree courses
- 2012 **Phil Church Award:** Graduating senior in the Department of Atmospheric Sciences (Washington) with the most outstanding record of scholarship, leadership, and service
- 2010-2012 **Naval Weather Service Association Scholar:** Proven academic achievement and student community leadership

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## Leadership Activities and Service

- 2020-present **Associate Editor:** Monthly Weather Review
- 2020-present **Chair:** AMS 31st Conference on WAF/27th Conference on NWP Program Committee
- 2016-present **Reviewed Manuscripts for:** Weather and Forecasting, Monthly Weather Review, Journal of Atmospheric Sciences, Journal of Applied Meteorology and Climatology, JGR-Atmospheres, Geophysical Research Letters, Weather and Climate Dynamics, Meteorological Applications, Energies, and Journal of Operational Meteorology
- 2019-present **Member:** AMS Scientific and Technological Activities Commission, Committee on Weather Analysis and Forecasting
  - 2021 **Session Co-Chair:** Special Symposium on Global and Mesoscale Models: Updates and Center Overviews: Utilization and Development of Rapidly Updating Mesoscale Models for Impact-Based Decision Support Services, AMS Annual Meeting 2021
- 2019-2020 **Member:** AMS 30th Conference on WAF/26th Conference on NWP Program Committee, Conference Session Chair
- 2019, 2020 **Participant:** Hydrometeorological Testbed (NOAA) Flash Flooding and Intense Rainfall Experiment
- 2019 **Participant:** Workshop: Increasing Inclusivity in the Engineering Classroom
- 2013-2019 **Team Manager:** WxChallenge Competition, Texas Tech University
- 2017-2018 **Member:** AMS 29th Conference on WAF/25th Conference on NWP Program Committee
- 2017-2018 **Student Member:** Texas Tech University College of Arts and Sciences Committee on Academic Programs
- Rapporteur:** 2017 NOAA R2O meeting and 2018 AMS Community Meeting
- 2014, 2018 **Participant:** Hazardous Weather Testbed (NOAA) Spring Forecast Experiment

- 2015-2016 **Member:** 15th AMS Student Conference Planning Committee  
Poster Session Subcommittee and Session Chair
- 2014-2015 **Member:** 14th AMS Student Conference Planning Committee
- 2013-2015 **Secretary:** American Meteorological Society Student Chapter, Texas Tech University
- 2013, 2014 **Reviewer:** Texas Tech University Undergraduate Research Conference
- 2012-2013 **President:** American Meteorological Society Student Chapter, Texas Tech University
- 2011-2012 **President:** American Meteorological Society Student Chapter, University of Washington

## Fieldwork Participation

- 2019 Targeted Observations by Radars and UAS of Supercells (**TORUS**): Assisted fieldwork operations and led numerous forecast discussions.
- 2013-2019 Deploying mobile radars for interceptions of outflow boundaries, tornadoes, and mesoscale convective systems for the Texas Tech University Severe Storm Research Group.
- 2018 National Robotics Initiative: Assisted fieldwork operations with two mobile Ka-band radars to support unmanned aircraft flights in and around supercell thunderstorms.
- 2017 Rivers of VORTicity in Supercells (**RiVorS**): Assisted fieldwork operations with a mobile Ka-band radar to observe vorticity rivers.
- 2016-2017 Verification of the Origins of Rotation in Tornadoes Experiment-Southeast (**VORTEX-SE**): Student technician responsible for: integrating solar panel hardware into the Texas Tech StickNet observing platforms, altering existing hardware and software, maintaining stationary observing sites, developing web display, and producing analysis graphics.
- 2014-2015 Air Force Office of Scientific Research (**AFOSR**) project: Assisted fieldwork operations with mobile Ka-band radars to adaptively sample baroclinic boundaries near supercells. Contributed to development of computer processing techniques and communications for real-time dual-doppler analyses.
- 2013 Assisted in the rebuilding of TTU StickNet data acquisition systems in support of the TTU Hurricane Research Team.

## Professional Interviews

- 9/24/18 Daily Toreador newspaper regarding severe storm research in the Texas Tech Atmospheric Sciences Group
- 2/24/17 Texas Tech University Communications for the VORTEX-SE 2017 field program
- 3/16/16 Alabama Public Radio for Texas Tech involvement with the VORTEX-SE field program
- 2/11/16 Texas Tech University Climate Science Center Videos for Science series
- 12/15 Texas Living Magazine (online) regarding Texas weather

## Professional Associations and Activities

- 2017-present American Geophysical Union
- 2012-present American Meteorological Society

## Technical Skills

\* indicates proficiency

Programming Languages: Python\*, shell\*, Fortran, NCL, LabVIEW, HTML/CSS/PHP/Javascript  
 Meteorological Software: WRF\*, DART\*