Aaron Hill

Curriculum Vitae

Colorado State University
Department of Atmospheric Science
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Research Interests

Machine learning applications in numerical weather prediction and severe-storm hazards (e.g., flash flooding)

Predictability of severe convection via ensemble prediction systems, ensemble-based sensitivity analysis, observation targeting, and mesoscale data assimilation

Research to operational-forecasting environments to aid in the prediction of severe storms

Unmanned Aerial Systems (UASs) to observe the near-surface and near-storm environments of severe thunderstorms

Ground-based, near-surface observational instrumentation (e.g., StickNet platforms)

Python programming language in the atmospheric sciences

Education

2019 **Ph.D., Geosciences**, *Texas Tech University*.
Advisors: Drs. Christopher Weiss and Brian Ancell
Dissertation: Demonstration of Ensemble Sensitivity-based Targeted Observing for Convective-Scale Applications: Perfect-model experiments

2014 **M.S., Atmospheric Sciences**, *Texas Tech University*.
Advisors: Drs. Christopher Weiss and Brian Ancell
Thesis: Mesoscale data assimilation and ensemble sensitivity analysis towards improved predictability of dryline convection

2012 **B.S., Atmospheric Sciences**, *University of Washington*.
Advisor: Dr. Robert Houze, Jr.
Minor: Applied Mathematics

Experience

2019-present **Postdoctoral Research Fellow**, *Colorado State University*.

2012 - 2019 **Graduate Research Assistant**, *Texas Tech University*.

July - Sep 2018 **Graduate Student Visitor**, *Mesoscale and Microscale Meteorology Laboratory, National Center for Atmospheric Research*.
Mentor: Glen Romine

2017-2018, 2015 **Writing Tutor**, *Texas Tech University*.
Graduate Student Writing Center

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

2011-2012 **Undergraduate Research Assistant**, *University of Washington*.

Publications and Presentations

Publications

2019 **Hill, A. J.**, C. C. Weiss, D. C. Dowell, and C. Alexander, 2019: Influence of a mobile mesoscale near-surface observing network on ensemble forecasts during VORTEX-SE. In preparation for submission to Weather Analysis and Forecasting.

2019 **Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2019: Convective-scale observation targeting and assimilation impacts on dryline forecasts. In preparation for submission to Monthly Weather Review.

2019 **Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2019: Factors influencing ensemble sensitivity-based targeted observing prediction at convection-allowing resolutions. In preparation for submission to Monthly Weather Review.

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.

Presentations

* indicates upcoming

2019 *Ancell, B. C., A. A. Coleman, and **A. J. Hill**, 2019: Ensemble Sensitivity-Based Subsetting Overview and Evaluation Activities at the 2018 NOAA HWT. European Geophysical Union General Assembly 2019, Vienna, Austria, EGU2019-2435.

Ancell, B. C., A. A. Coleman, and **A. J. Hill**, 2019: Ensemble sensitivity-based subsetting overview and evaluation activities at the 2018 NOAA HWT. 23rd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Phoenix, AZ, paper 2.3A.

Weiss, C. C., D. C. Dowell, N. Yussouf, and **A. J. Hill**, 2019: Insights into Mesoscale and Storm-Scale Predictability Gained through Ensemble Sensitivity Analysis. 23rd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Phoenix, AZ, paper 20.1

2018 Ancell, B. C., A. A. Coleman, and **A. J. Hill**, 2018: Ensemble sensitivity-based subsetting overview and evaluation activities at the 2018 NOAA HWT. American Geophysical Union Fall Meeting, Washington, D.C.

Ancell, B. C., A. A. Coleman, **A. J. Hill**, and C. C. Weiss, 2018: Ensemble sensitivity-based subsetting overview and evaluation activities at the 2018 NOAA HWT. 29th Conference on Severe Local Storms, Stowe, VT, paper 3A.4.

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 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.

Weiss, C. C., D. C. Dowell, **A. J. Hill**, J. McDonald, E. C. Bruning, and J. Dahl, 2018: An update on VORTEX-SE activities at Texas Tech University. 29th Conference on Severe Local Storms, Stowe, VT, paper 3B.1.

Hill, A. J., 2018: (invited) 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: 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.

Weiss, C. C., D. C. Dowell, **A. J. Hill**, and N. Yussouf, 2018: Ensemble sensitivity analysis of controls on storm-scale vertical vorticity for two southeastern U.S. tornado events. 22nd Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Austin, TX, paper 610.

2017 **Hill, A. J.**, C. C. Weiss, and B.C. Ancell, 2017: Ensemble-sensitivity analysis based observation targeting for mesoscale convection forecasts and factors influencing observation-impact prediction. American Geophysical Union Fall Meeting, New Orleans, LA, paper NG31A-0157.

Weiss, C. C., E. C. Bruning, J. Dahl, D. C. Dowell, C. R. Alexander, **A. J. Hill**, and V. C. Chmielewski, 2017: Preliminary results from the 2016 and 2017 VORTEX-SE project. 9th European Conference on Severe Storms, Pula, Croatia, paper ECSS2017-155.

Kenyon, A. and **A. J. Hill**, 2017: Using Python to process and visualize real-time atmospheric data during VORTEX-SE. Scipy 2017: Scientific Computing with Python, Austin, TX.

Hill, A. J., C. C. Weiss, and B. C. Ancell, 2017: Ensemble sensitivity-based observation targeting experiments for Southern Plains dryline convection. 21st Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Seattle, WA, paper 15.5.

Weiss, C. C., D. C. Dowell, **A. J. Hill**, and N. Yussouf, 2017: Ensemble sensitivity analysis of controls on updraft rotation for two southeastern US tornado events. 21st Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Seattle, WA, paper 11.6.

Weiss, C. C, E. C. Bruning, J. Dahl, D. C. Dowell, C. R. Alexander, **A. J. Hill**, and V. C. Chmielewski, 2017: An overview of Texas Tech operations during VORTEX-SE 2016. Special Symposium on Severe Local Storms: Observation Needs to Advance Research, Prediction, and Communication, Seattle, WA, paper 939.

2016 Bruning, E. C., V. C. Chmielewski, C. C. Weiss, J. Dahl, **A. J. Hill**, C. J. Schultz, and J. Bailey, 2016: Flash size distributions characterized by mobile LMA deployments during VORTEX-SE. 28th Conference on Severe Local Storms, Portland, OR, paper 9.4.

Hill, A. J., C. C. Weiss, and B. C. Ancell, 2016: Ensemble sensitivity-based observation targeting experiments for Southern Plains dryline convection. 28th Conference on Severe Local Storms, Portland, OR, paper 7B.6.

Weiss, C. C, E. C. Bruning, J. Dahl, D. C. Dowell, C. R. Alexander, **A. J. Hill**, and V. C. Chmielewski, 2016: An overview of Texas Tech operations during VORTEX-SE 2016. 28th Conference on Severe Local Storms, Portland, OR, paper 3.5.

Weiss, C. C., D. C. Dowell, **A. J. Hill**, and N. Yossouf, 2016: Ensemble sensitivity analysis of controls on updraft rotation for the 27 April 2011 Tornado Outbreak. 28th Conference on Severe Local Storms, Portland, OR, paper 137.

Ancell, B. C., **A. J. Hill**, and B. Burghardt, 2016: The TTU WRF ensemble prediction system. 2nd Ensemble Design Workshop for Convection Allowing Models, College Park, Maryland. MD.

Hill, A. J., C. C. Weiss, and B. C. Ancell, 2016: Ensemble sensitivity-based observation targeting OSSEs for Southern Plains dryline convection. 20th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, New Orleans, LA, paper J7.7.

2015 **Hill, A. J.**, B. Burghardt, and B. C. Ancell, 2015: Advanced ensemble techniques for improved predictability of storm-scale features. 1st Ensemble Design Workshop for Storm-Scale Ensembles, Boulder, CO.

Ancell, B. C., **A. J. Hill**, and B. Burghardt, 2015: The use of ensemble-based senstivity with observations to improve predictability of severe convective events. 27th Conference on Weather Analysis and Forecasting / 23rd Conference on Numerical Weather Prediction, Chicago, IL, paper 8B.5.

Hill, A. J., C. C. Weiss, and B.C. Ancell, 2015: Mesoscale ensemble sensitivity and observation targeting of dryline convection. Preprints, 19th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Phoenix, AZ, paper 9.3.

Ancell, B. C., **A. J. Hill**, and B. Burghardt, 2015: The use of ensemble-based sensitivity with observations to improve predictability of severe convective events. Preprints, 19th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface, Phoenix, AZ, paper 9.1.

2014 Ancell, B. C., **A. J. Hill**, and B. Burghardt, 2014: The use of ensemble-based sensitivity and observations to improve predictability of severe convective events. American Geophysical Union Fall Meeting, San Francisco, CA, NG31B-3798.

Hill, A. J., C. C. Weiss, and B. C. Ancell, 2014: Mesoscale ensemble sensitivity of dryline convective initiation. Preprints, 27th Conference on Severe Local Storms, Madison, WI, paper 8B.4.

Hill, A. J., C. C. Weiss, and B. C. Ancell, 2014: Applicaiton of mesoscale ensemble-based sensitivity analysis to observation targeting. 26th Conference on Weather Analysis and Forecasting / 22nd Conference on Numerical Weather Prediction, Atlanta, GA, paper 610.

2013 **Hill, A. J.**, C. C. Weiss, and B. C. Ancell, 2013: Utilizing ensemble sensitivity for data denial experiments of the 4 April 2012 Dallas, Texas dryline-initiated convective outbreak using West Texas Mesonet observations and WRF-DART data assimilation. Preprints, 15th Conference on Mesoscale Processes, Portland, OR, paper 11.

Houze, R. A., Jr., K. L. Rasmussen, **A. J. Hill**, and M. D. Zuluaga, 2013: Using TRMM Precipitation Radar to understand the Pakistan and India floods of 2010-2012. American Geophysical Union Fall Meeting, San Francisco, CA.

Houze, R. A., Jr., K. L. Rasmussen, and **A. J. Hill**, 2013: TRMM insights into recent floods in Pakistan. PMM Science Team Meeting, Annapolis, MD.

Professional Leadership and Service

2019-present **Student Member:** AMS Scientific and Technological Activities Commission, Committee on Weather Analysis and Forecasting

2019-present **Program Committee Member:** AMS 30th Conference on WAF/26th Conference on NWP

2019 **Guest Lecturer:** Atmospheric Science 3316: Severe and Hazardous Weather (Undergraduate Minor)

2013-2019 **Team Manager:** WxChallenge Competition, Texas Tech
Final-four finalist in 2017 End-of-Year Tournament

2017-2018 **Program Committee Member:** AMS 29th Conference on WAF/25th Conference on NWP

2017-2018 **Student Member:** Texas Tech University College of Arts and Sciences Committee on Academic Programs

2015-2016 **Planning Committee Member:** 15th AMS Student Conference
Poster Session Subcommittee and Session Chair

2014-2015 **Planning Committee Member:** 14th AMS Student Conference

2013-2015 **Secretary:** American Meteorological Society Student Chapter, Texas Tech University

2015 **Guest Speaker:** 6th Grade Science Class, Tahoka Middle School, Tahoka, TX

2015 **Guest Lecturer:** Atmospheric Science 1300: Introduction to Atmospheric Science

2014 **Guest Lecturer:** Atmospheric Science 2301: Weather, Climate, and Human Activities

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**):

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.

Honors and Awards

2018-2019 **Doctoral Dissertation Completion Fellowship**: Nominated by graduate advisor and department

2017 **Student Travel Award**: In recognition of an outstanding abstract for the 20th Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface

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

Synergistic Activities

Reviewed manuscripts for: Journal of Operational Meteorology, Weather and Forecasting, Monthly Weather Review, and JGR-Atmospheres

Contributed to NOAA and NSF research proposals and progress reports

Rapporteur for NOAA R2O meeting and 2018 AMS Community Meeting

2019	Hydrometeorology Testbed (NOAA) Flash Flooding and Intense Rainfall Experiment participant
9/24/18	Interview with Daily Toreador regarding severe storm research in Texas Tech Atmospheric Sciences Group
2014, 2018	Hazardous Weather Testbed (NOAA) Spring Forecast Experiment participant
2/24/17	Interview with Texas Tech University Communications for the VORTEX-SE 2017 field program
3/16/16	Interview with 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: (https://www.youtube.com/watch?v=0-KN-QTGPsM)
12/15	Interview with Texas Living Magazine (online) regarding Texas weather

Memberships

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

Technical skills

Programming Languages: Python*, shell*, Fortran, NCL, LabVIEW, HTML/CSS/PHP

Meteorological Software: WRF*, DART*

(* indicates proficiency)

Meetings Attended

2014, 2016, 2018	AMS Severe Local Storms
2018	AMS Summer Community Meeting
2011,2013-2018	AMS Annual Meeting
2017	AGU Fall Meeting
2017	NOAA: Building a Weather-Ready Nation Workshop
2015, 2016	Storm-Scale Ensemble Workshop
2016	VORTEX-SE Planning Meeting
2013	AMS Mesoscale Conference
2013	SciPy: Scientific Computing with Python