

# Thomas M. Gowan

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## Education

### 2017 – Present **Ph.D., Atmospheric Sciences, University of Utah**

- Advisor: Jim Steenburgh
- Ph.D. Thesis (in progress): *“Improving the Understanding and Prediction of Lake-Effect Precipitation using Idealized Modeling, Machine Learning, and Novel Verification Techniques”*

### 2015 – 2017 **M.S., Atmospheric Sciences, University of Utah**

- Advisor: Jim Steenburgh
- M.S. Thesis: *“Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States”*

### 2011 – 2015 **B.S., Meteorology, Pennsylvania State University**

- Schreyer Honors College Scholar
- Graduated with High Distinction
- Advisor: Fuqing Zhang
- Honor’s Thesis: *“The Effect of Vertical Wind Shear and Sea Surface Temperature on the Cyclogenesis and Intensity of Hurricanes”*

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## Research

Focus	numerical weather prediction, machine learning, statistical post-processing, large-eddy simulations, model verification, orographic and lake-effect precipitation, boundary layer meteorology
Languages	<i>Proficient:</i> Python; <i>Experience:</i> Fortran, MATLAB, R, C-Shell, BASH
Modeling	CM1, WRF
Tools	TensorFlow, Keras, xarray, Dask, HPC, Git (Github <a href="#">[link]</a> )

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## Honors and Awards

2020	<b>2<sup>nd</sup> Place Student Oral Presentation, 19<sup>th</sup> Conference on Mountain Meteorology, (virtual)</b> American Meteorological Society
2020	<b>Outstanding Student Oral Presentation, 30<sup>th</sup> Conference on Weather Analysis and Forecasting, Boston, MA</b> American Meteorological Society

- 2019      **1st Place Student Oral Presentation, 18th Conference on Mesoscale Processes, Savannah, GA**  
American Meteorological Society
- 2018      **1st Place Student Poster Presentation, 18th Conference on Mountain Meteorology, Santa Fe, NM**  
American Meteorological Society
- 2017      **1st Place Student Poster Presentation, 24th Conference on Numerical Weather Prediction, Seattle, WA**  
American Meteorological Society
- 2015      **The John A. Dutton Award in Atmospheric Dynamics**  
Pennsylvania State University
- 2011 – 2015      **Schreyer Honors College Academic Excellence Scholarship**  
Pennsylvania State University
- 2014      **Robert Case Memorial Scholarship for Meteorology**  
Pennsylvania State University
- 2014      **Marie Radomsky and Vernon W. Ellzey Honors Scholarship**  
Pennsylvania State University
- 2013      **Kruhoeffer Endowed Scholarship for Meteorology**  
Pennsylvania State University

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## Professional Experience

- 2015 – Present      **Graduate Research Assistant, *University of Utah***
- Idealized large-eddy simulations of lake-effect precipitation and downstream terrain effects with CM1
  - Machine learning to post-process and enhance lake-effect precipitation forecasts
  - Probabilistic and deterministic model validation of mountain precipitation forecasts
- 2017–2019      **Visiting Scientist, *The National Center for Atmospheric Research***
- *2019*: Collaborated with David Gagne on using machine learning to enhance lake-effect precipitation forecasts
  - *2018*: Collaborated with MMM Lab scientists on idealized simulations of lake-effect precipitation
  - *2017*: Collaborated with Craig Schwartz and NCAR Ensemble team to validate precipitation forecasts from the NCAR Ensemble
- 2013 – 2015      **Undergraduate Researcher, *Pennsylvania State University***
- Member of Fuqing Zhang’s research group
  - Investigated sensitivities of environmental conditions to cyclogenesis and intensity of hurricanes
- 2014      **Intern, *The National Center for Atmospheric Research***

- SIParCS program in NCAR's Computational and Information Systems Laboratory (CISL)
- Project: "Profiling Application Performance"; Identified bottlenecks in CESM [[presentation](#)]

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## Publications

- 2020 **Gowan, T.M.**, W.J. Steenburgh, and J.R. Minder, 2020: Downstream Evolution and Coastal-to-Inland Transition of Landfalling Lake-Effect Systems. *Mon. Wea. Rev.* **(submitted)**.
- 2020 **Gowan, T.M.**, W.J. Steenburgh, and J.R. Minder, 2020: Orographic Effects of Landfalling Lake-Effect Systems. **(in prep.)**.
- 2018 **Gowan, T.M.**, W.J. Steenburgh, and C.S. Schwartz, 2018: Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States. *Wea. Forecasting*, **33**, 739-765, <https://doi.org/10.1175/WAF-D-17-0144.1>.

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## First-Authored Presentations

### Invited

- 2019 **Gowan, T. M.**: Idealized Modeling with CM1. *University of Innsbruck Numerical Modeling Group*, 6 May 2019, (virtual).
- 2018 **Gowan, T. M.**: Winter Forecast for Northern Utah and Some Common Misconceptions. *Park City Rotary Club*, 2 October 2018, Park City, UT.
- 2017 **Gowan, T. M.**, W. J. Steenburgh, and C. S. Schwartz: Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States. *NWS Salt Lake City, UT Fall Seminar*, 1 November 2017, Salt Lake City, UT.

### Select Presentations

- 2020 **Gowan, T.M.**, W.J. Steenburgh, and J.R. Minder, 2020: Orographic Effects and Lake Geometry in Idealized Simulations of Banded and Cellular Lake- and Sea-Effect Precipitation Systems. *Abstr. 19<sup>th</sup> Conference on Mountain Meteorology*, 13-17 July 2020, (virtual). **2<sup>st</sup> place award**. [[abstract and presentation](#)]
- 2020 **Gowan, T. M.** and W. J. Steenburgh: Influences of Orography on Banded and Cellular Lake- and Sea-Effect Systems in Idealized Simulations. *Abstr. 30<sup>th</sup> Conference on Weather Analysis and Forecasting*, 12 - 16 January 2020, Boston, MA. **Outstanding presentation award**. [[abstract and presentation](#)]
- 2019 **Gowan, T. M.** and W. J. Steenburgh: Banded and Cellular Lake-Effect Systems Interacting with Terrain in Idealized Simulations. *Abstr. 18<sup>th</sup> Conference on Mesoscale Processes*, 29 July - 1 August 2019, Savannah, GA. **1<sup>st</sup> place award**. [[abstract and presentation](#)]

- 2018 **Gowan, T. M.** and W. J. Steenburgh: Using Idealized Large-Eddy Simulations to Understand the Impact of Downstream Terrain on Lake-Effect Snowfall. *Abstr. 18th Conference on Mountain Meteorology*, 25-29 June 2018, Santa Fe, NM. [[abstract and presentation](#)]
- Gowan, T. M.**, W. J. Steenburgh, and C. S. Schwartz: Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States. *Abstr. 18th Conference on Mountain Meteorology*, 25-29 June 2018, Santa Fe, NM. **1st place award.**
- Gowan, T. M.**, W. J. Steenburgh, and C. S. Schwartz: Validation of Mountain Precipitation Forecasts from the Convection-Permitting NCAR Ensemble and Operational Forecast Systems over the Western United States. *Abstr. 25th Conference on Numerical Weather Prediction*, 04-08 June 2018, Denver, CO.
- 2017 **Gowan, T. M.** 2017: Using WRF to Investigate the Sensitivity of Lake Effect Snow to Terrain Height over the Tug Hill. *NCAR ASP 2017 Summer Colloquium: The Interaction of Precipitation with Orography (IPRO)*, 5-16 June 2017, Boulder, CO.
- Gowan, T. M.** and W. J. Steenburgh 2017: Performance of Precipitation Forecasts from a Convection-Permitting Ensemble Relative to Operational Guidance over the Western United States. *Abstr. 2017 HMT-WPC Winter Weather Experiment*, 6-10 February 2017, College Park, MD.
- Gowan, T. M.** and W. J. Steenburgh 2017: Overview of the NCAR High-Resolution (3-km) Ensemble and Validation of Its Quantitative Precipitation Forecasts Over Complex Terrain in the Western US. *Abstr. 24th Conference on Numerical Weather Prediction at 97th American Meteorological Society Annual Meeting*, 22-26 January 2017, Seattle, WA. **1st place award.** [[abstract and poster](#)]
- Gowan, T. M.** and W. J. Steenburgh 2017: Regional Performance of Precipitation Forecasts from a Convection-Permitting Ensemble Relative to Operational Guidance over the Western United States. *Abstr. 24th Conference on Numerical Weather Prediction at 97th American Meteorological Society Annual Meeting*, 22-26 January 2017, Seattle, WA.
- 2016 **Gowan, T. M.** and W. J. Steenburgh 2017: Validation and Intercomparison of Quantitative Precipitation Forecasts from the NCAR High-Resolution (3-km) Ensemble and NCEP Operational Models Over the Western US. *Abstr. 17th Conference on Mountain Meteorology*, 27 June - 1 July 2016, Burlington, VT.

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## Academic Teaching Experience

- 2016 **Teaching Assistant, Department of Atmospheric Sciences, University of Utah**  
*ATMOS 5110/6110: Synoptic-Dynamic Meteorology I*

2014      **Teaching Assistant, Department of Meteorology, Pennsylvania State University**  
*METEO 003: Introductory Meteorology*

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## Field Campaign Experience

- 2018      **Radar Operator, RELAMPAGO field campaign in Argentina**
- Remote sensing of Electrification, Lightning, And Mesoscale/Microscale Processes with Adaptive Ground Observations (RELAMPAGO)
  - Operated the CSWR C-band radar located southwest of Córdoba, Argentina
- 2017      **Co-PI, Outreach and Radar Education in Orography (OREO) field campaign**
- Planned and executed several IOPs and EOPs using a CSWR Doppler on Wheels (DOW) mobile radar
  - Investigated the interaction of precipitation systems with complex terrain in northern Utah [[media](#)]

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## Workshops

- 2018      *NCAR WRF-Python and VAPOR Tutorial*, Boise, ID
- 2017      *The NCAR ASP 2017 Summer Colloquium: The Interaction of Precipitation with Orography (IPRO)*, Boulder, CO
- 2017      *HMT-WPC Winter Weather Experiment*, College Park, MD (Invited)

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## Additional Experience and Projects

- 2018 – Present    Develop and maintain trajectory code [[github](#)]
- Used by several research groups
- 2018 – Present    **Co-Founder and Co-President**, Python Users' Group, University of Utah
- 2020 – Present    Reviewer: *JGR Atmospheres*
- 2018 – Present    Reviewer: *Weather and Forecasting*
- 2017 – 2018      **President**, Utah Ski Weather [[forecast blog](#)]
- 2015              Participant, Summer 2015 Ozone Study (SO3S), University of Utah