

Peter G. Veals

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Research Interests

My research during my graduate studies focused mainly on snowfall in mountainous regions - improving how it is forecasted, modelled, and estimated. This has since led me into more broad applications of radar meteorology, instrumentation, and numerical modelling. My current work includes examining the effects of aerosols on the intensity of deep convective clouds, tracking and measuring the lifecycle of mesoscale convective systems (MCSs) in the sparsely-instrumented tropics, estimating ice-water content using nosecone radar on commercial aircraft to mitigate engine failure incidents for the Raytheon Corporation, and using machine learning to improve snow-to-liquid-ratio forecasts in the leading operational models. I've also co-developed a process and machine capable of producing nature-identical snowfall, and we are commercializing it via our company called Quantum Snow.

Professional Experience

Research Assistant Professor – University of Utah	2021-
Co-Founder and CEO – Quantum Snow LLC	2020-
Postdoctoral Research Associate – University of Utah	2019-2021
Pathways Researcher – National Weather Service	2015-2019
Graduate Research Assistant – University of Utah	2012-2019
Student Outreach Coordinator – Oklahoma Mesonet	2010-2012

Education

Ph.D. Atmospheric Sciences – University of Utah	2019
M.S. Atmospheric Sciences – University of Utah	2014
B.S. Meteorology (with distinction) – University of Oklahoma	2012

Publications

Steenburgh, W.J., J.A. Cunningham, P.T. Bergmaier, B. Geerts, and **P.G. Veals**, 2023: Characteristics of Lake-Effect Precipitation over the Black River Valley and Western Adirondack Mountains. Submitted to *J. Appl. Meteor. Climatol.*

Veals, P.G., A.C. Varble, J.O.H. Russell, and E.J. Zipser, 2022: Indications of a Decrease in the Depth of Deep Convective Cores with Increasing Aerosol Concentration during the CACTI Campaign. *J. Atmos. Sci.*, **79**, 705-722.

Russell, J.O.H., M. Rajagopal, **P.G. Veals**, G. Skok, and E.J. Zipser, 2022: A Dataset of Tracked Mesoscale Convective Systems in the Tropics. Accepted to *Geosci. Data. J.*

Veals, P.G., W.J. Steenburgh, S. Nakai, and S. Yamaguchi, 2020: Intrastorm Variability of the Inland and Orographic Enhancement of a Sea-Effect Snowstorm in the Hokuriku Region of Japan. *Mon. Wea. Rev.*, 148, 2527-2548.

Veals, P.G., W.J. Steenburgh, S. Nakai, and S. Yamaguchi, 2019: Factors Affecting the Inland and Orographic Enhancement of Sea-Effect Snowfall in the Hokuriku Region of Japan. *Mon. Wea. Rev.*, 147, 3121-3143.

Veals, P.G., W.J. Steenburgh, and L.S. Campbell, 2018: Factors Affecting the Inland and Orographic Enhancement of Lake-Effect Precipitation over the Tug Hill Plateau. *Mon. Wea. Rev.*, 146, 1745-1762.

Campbell, L.S., W.J. Steenburgh, **P.G. Veals**, T.W. Letcher, and J.R. Minder, 2016: Lake-Effect mode and precipitation enhancement over the Tug Hill Plateau during OWLeS IOP2b. *Mon. Wea. Rev.*, 144, 1729-1748.

Minder, J.R., T. Letcher, L.S. Campbell, **P.G. Veals**, and W.J. Steenburgh, 2015: The evolution of lake-effect convection during landfall and orographic uplift as observed by profiling radars. *Mon. Wea. Rev.*, 143, 4422-4442.

Veals, P.G., and W.J. Steenburgh, 2015: Climatological Characteristics and Orographic Enhancement of Lake-Effect Precipitation east of Lake Ontario and over the Tug Hill Plateau. *Mon. Wea. Rev.*, 143, 3591-3609.

Coffer, B.E., L.C. Maudlin, **P.G. Veals**, and A.J. Clark, 2013: Dryline Position Errors in Experimental Convection-Allowing NSSL-WRF Model Forecasts and the Operational NAM. *Wea. Forecasting*, 28, 746-761.

Departmental and Invited Presentations

“Estimating ice water content using simulated Collins radar at flight altitudes” Raytheon Inc - virtual	2020
Host and Moderator of Forum: “Can Utah’s Ski Industry Survive Climate Change?” Hinckley Institute of Politics - University of Utah	2019
“Improving the MRMS QPE over the Western U.S.” NOAA National Severe Storms Laboratory - Norman, OK	2018
“The inland and orographic enhancement of sea-effect snowfall in the Hokuriku Region of Japan” University of Utah Atmospheric Sciences - departmental seminar	2017
“Factors affecting the inland and orographic enhancement of lake-effect precipitation” NIED Snow and Ice Research Center - Nagaoka, Japan	2017
“HRRR QPF verification over the Western U.S.” NOAA Earth Systems Research Laboratory - Boulder, CO	2017

Funding Awarded

W.J. Steenburgh (PI) and **P.G. Veals** (co-PI). Multiridge Orographic Precipitation in Continental Mountain Environments. Awarded Sep 2022 by U.S. National Science Foundation for \$666,969.

W.J. Steenburgh (PI) and **P.G. Veals** (co-PI). Advancing Probabilistic Prediction of Snow-to-Liquid Ratio and Snowfall during High-Impact Winter Storms. Awarded June 2022 by U.S. National Oceanic and Atmospheric Administration for \$385,065.

E.J. Zipser (PI), J.O. Russell and **P.G. Veals** (Co-Is). Upscale Growth of Mesoscale Convective Systems: A NASA Field Campaign in the Eastern Tropical Atlantic. Awarded March 2020 by U.S. National Aeronautical and Space Administration for \$704,870.

E.J. Zipser (PI), J.O. Russell and **P.G. Veals** (Co-Is). Interactions Between Aerosols, Meteorology, and Early Convective Cloud Lifecycle as Measured During CACTI. Awarded August 2019 by U.S. Department of Energy for \$291,998.

Teaching and Mentoring

Supervised an undergraduate summer researcher for the REALM program	2022
Advisor of graduate student Michell Tinoco-Morales	2021-
Assisted in the mentoring of two graduate students: Manikandan Rajagopal and Julie Cunningham	2020-2022
Developed and taught material for the “Snow and Avalanche Dynamics” course at the University of Utah	2018
Supervised an undergraduate researcher for a capstone project	2018
Supervised an undergraduate researcher for a capstone project	2016
Teaching assistant for the “Synoptic-Dynamic Meteorology I” course at the University of Utah	2014
Developed and taught the weather module in an earth science class at Copper Hills High School	2014
Developed and taught material to emergency managers on decision-making in severe weather events	2011-2012
Developed and taught material for a meteorology summer camp for middle and high school students	2011

Field Campaigns and Deployments

Convective Processes Experiment: Cabo Verde (NASA/ESA) – 2022

Convective Processes Experiment: Aerosols and Winds (NASA/ESA) – 2021

Outreach and Radar Education in Orography (U of Utah) – 2017

Olympic Mountains Experiment (NASA) – 2015-2016

Ontario Winter Lake-Effect Systems (NSF) – 2013-2014

Mountain Terrain Atmospheric Modelling and Observations (Office of Naval Research) – 2012

Service and Outreach

Reviewer for Quarterly Journal of the Royal Meteorological Society, Monthly Weather Review, Weather And Forecasting, Journal of Applied Meteorology and Climatology, Meteorological Applications, and Atmospheric Chemistry and Physics	Ongoing
Reviewer for NSF proposals	Ongoing
Session chair and coordinator for AMS Mountain Meteorology Conference	2020
Served on the AMS Mountain Meteorology Committee	2016-2018
Conducted events for the public explaining the equipment for the OREO field campaign and performing a variety of experiments and demonstrations	2017
Served on the design/advisory team for the “Greatest Snow on Earth” exhibit at the Alf Engen Ski Museum	2016-2017
Presented “Flash Flood Forecasting and Decision Making for Utah’s Canyon Country” to the Utah Canyoneering Association	2016
Toured high schools in Upstate New York with presentations and demonstration of equipment used in the OWLeS field program	2014
Subject matter expert for Utah Museum of Natural History’s “Science Movie Night”	2013-2014
Subject matter expert for Utah Museum of Natural History’s “Nature Unleashed” Exhibit	2013
Featured as Utah Museum of Natural History’s “Scientist in the Spotlight”	2013

Technical Skills

Proficient in Python, MATLAB, HTML, and FORTRAN coding languages

Proficient with a variety of Linux-based high performance computing environments

Proficient with a variety of meteorological instrumentation including surface weather stations, precipitation gauges, radiosonde systems, DOW mobile C-band radars, MRR profiling radars, and disdrometers

Proficient in electronics and circuitry, including Arduino and Raspberry Pi microcontrollers

Proficient with the WRF model, including modifications to boundary conditions, parameterizations, and core code

Enthusiastic and comfortable communicating with peers in English and Spanish