

**Eric James**  
CIRES Associate Scientist III  
NOAA/ESRL, R/GSD1  
325 Broadway  
Boulder, CO 80305-3328  
Office Phone (303) 497-4278  
[eric.james@noaa.gov](mailto:eric.james@noaa.gov)

orcid.org/0000-0002-6507-4997  
ResearcherID: C-7713-2015  
Scopus ID: 55434490100

---

### Education

*M.S. in Atmospheric Science*, Colorado State University, Fort Collins, Colorado, 2009.  
*B.S. in Meteorology*, University of Utah, Salt Lake City, Utah, 2006.  
*B.S. in Geography*, University of Utah, Salt Lake City, Utah, 2006.

### Work Experience

*Cooperative Institute for Research in Environmental Sciences, University of Colorado*, 216 UCB, Boulder, CO 80309.  
Professional Research Assistant, May 2010 to present. Helped with the development, maintenance, testing of high-resolution short-range numerical weather prediction models in preparation for operational implementation. Full time. Salary \$72,000. Supervisor Dr. Stan Benjamin (303) 497-6387, [stan.benjamin@noaa.gov](mailto:stan.benjamin@noaa.gov).

*Department of Atmospheric Science, Colorado State University*, 1371 Campus Delivery, Fort Collins, CO 80526.  
Research Associate, June 2009 to April 2010. Undertook research in mesoscale meteorology, prepared related papers for publication. Full time. Salary \$26,000. Supervisor Dr. Richard Johnson (970) 491-8321, [johnson@atmos.colostate.edu](mailto:johnson@atmos.colostate.edu).

*Department of Atmospheric Science, Colorado State University*. 1371 Campus Delivery, Fort Collins, CO 80526.  
Graduate Research Assistant, August 2006 to May 2009. Conducted thesis research in mesoscale meteorology, prepared related presentations and papers. 40 hours/week. \$12.50/hour. Supervisor Dr. Richard Johnson (970) 491-8321, [johnson@atmos.colostate.edu](mailto:johnson@atmos.colostate.edu).

*The Forge for Families*. 3150 Yellowstone Blvd., Houston, TX 77054. Group Leader, June to July 2006.  
Supervised fund-raising car washes by inner city youth. 20 hours/week. \$8.00/hour. Supervisor Mr. Dan Walmer (713) 664-5033.

*Department of Meteorology, University of Utah*. 135 S. 1460 E. Rm 819, Salt Lake City, UT 84112. Lab Aide, April 2005 to April 2006. Backed up data, handled data requests, monitored mesonet status. 40 hours/week followed by 10 hours/week. \$8.25/hour. Supervisor Dr. John Horel (801) 581-7091, [john.horel@utah.edu](mailto:john.horel@utah.edu).

*Shell*. 5270 Beechnut St., Houston, TX 77096. Store Clerk, June to July 2004. Sold fuel, supplies, car maintenance to customers. 15 hours/week. \$7.00/hour. Supervisor Sam Zamer (713) 666-7774.

*Landes, Inc.* 7600 Renwick Dr., Houston, TX 77081. Shipping Clerk, June to August 2002. Handled incoming and outgoing bag shipments. 40 hours/week. \$6.00/hour. Supervisor Mr. Jay Glanton (713) 665-0655.

### Peer-Reviewed Publications

Pichugina, Y. L., R. M. Banta, J. B. Olson, J. R. Carley, M. C. Marquis, W. A. Brewer, J. M. Wilczak, I. Djalalova, L. Bianco, E. P. James, S. G. Benjamin, and J. Cline, 2017: Assessment of NWP forecast Models in simulating offshore winds through the lower boundary layer by measurements from a Ship-based scanning Doppler lidar. *Monthly Weather Review*, in press.

James, E. P., and S. G. Benjamin, 2017: Observation system experiments with the hourly updating Rapid Refresh model using GSI hybrid ensemble-variational data assimilation. *Monthly Weather Review*, **145**, 2897-2918. DOI:10.1175/MWR-D-16-0398.1.

James, E. P., S. G. Benjamin, and M. Marquis, 2017: A unified high-resolution wind and solar dataset from a rapidly updating numerical weather prediction model. *Renewable Energy*, **102**, 390-405. DOI:10.1016/j.renene.2016.10.059.

Benjamin, S. G., S. S. Weygandt, J. M. Brown, M. Hu, C. R. Alexander, T. G. Smirnova, J. B. Olson, E. P. James, D. C. Dowell, G. A. Grell, H. Lin, S. E. Peckham, T. L. Smith, W. R. Moninger, J. S. Kenyon, and G. S. Manikin, 2016: A North American hourly assimilation and model forecast cycle: The Rapid Refresh. *Monthly Weather Review*, **144**, 1669-1694. DOI:10.1175/MWR-D-15-0242.1.

James, E. P., and R. H. Johnson, 2010: A climatology of midlatitude mesoscale convective vortices in the

- rapid update cycle. *Monthly Weather Review*, **138**, 1940-1956. DOI: 10.1175/2009MWR3208.1.
- James, E. P., and R. H. Johnson, 2010: Patterns of precipitation and mesoscale evolution in midlatitude mesoscale convective vortices. *Monthly Weather Review*, **138**, 909-931. DOI:10.1175/2009MWR3076.1.

### Meeting Presentations

- James, E. P., C. R. Alexander, S. Weygandt, J. Olson, S. Benjamin, D. Dowell, J. Kenyon, T. Alcott, I. Jankov, T. Ladwig, M. Hu, J. Beck, T. Smirnova, R. Ahmadov, G. Grell, and J. Brown, 2017: Rapidly-Updating numerical weather prediction for fire weather situational awareness and forecasting: The High-Resolution Rapid Refresh model. Invited presentation at spring seminar series, U.S. Forest Service Fire Sciences Laboratory, Missoula, MT.
- James, E. P., R. Ahmadov, G. Grell, C. Alexander, S. Benjamin, T. Alcott, J. Stewart, S. Freitas, G. P. Pereira, B. Pierce, S. McKeen, S. Peckham, A. Edman, M. Goldberg, and B. Sjoberg, 2017: Experimental Smoke forecast system: The HRRR-smoke model. Workshop on Opportunities to Apply Remote Sensing in Boreal/ Arctic Wildfire Management and Science, Fairbanks, AK.
- James, E. P., T. Alcott, and C. R. Alexander, 2017: Statistical reliability of quantitative precipitation forecasts From the High-Resolution Rapid Refresh. 31<sup>st</sup> Conference on Hydrology, Seattle, WA.
- James, E. P., and S. Benjamin, 2017: A unified wind and solar dataset from the 3-km High-Resolution Rapid Refresh. Eighth Conference on Weather, Climate, and the New Energy Economy, Seattle, WA.
- Weygandt, S. S., C. R. Alexander, S. G. Benjamin, J. M. Brown, T. G. Smirnova, M. Hu, J. Kenyon, J. B. Olson, D. C. Dowell, E. James, and I. Jankov, 2017: RAP and HRRR model/assimilation system Improvements for aviation weather applications: Latest upgrades and ongoing work. 18<sup>th</sup> Conf. on Aviation, Range, and Aerospace Meteorology, Seattle, WA.
- Alexander, C. R., E. James, M. Hu, and S. G. Benjamin, 2017: Observation impacts in mesoscale numerical Weather prediction. Special Symposium on Severe Local Storms: Observation needs to advance Research, prediction, and communication, Seattle, WA.
- Alexander, C. R., D. C. Dowell, T. Alcott, I. Jankov, T. Ladwig, M. Hu, J. Beck, J. B. Olson, T. G. Smirnova, J. Kenyon, G. Grell, S. G. Benjamin, S. Weygandt, J. Brown, E. P. James, T. L. Smith, and J. A. Hamilton, 2017: Expanding the High-Resolution Rapid Refresh (HRRR) from deterministic to Ensemble data assimilation, forecasts and post-processing. 28<sup>th</sup> Conference on Weather Analysis And Forecasting / 24<sup>th</sup> Conference on Numerical Weather Prediction, Seattle, WA.
- Grell, G. A., R. Ahmadov, E. P. James, S. R. Freitas, G. Pereira, I. A. Csizar, M. Tsidulko, R. B. Pierce, S. A. McKeen, C. Alexander, S. E. Peckham, P. E. Saide, and S. Benjamin, 2017: Wildfires and Anthropogenic emissions in the HRRR: Forecasting Dispersion of smoke (HRRR-smoke) and its Impact on numerical weather prediction. 33<sup>rd</sup> Conference on Environmental Information Processing Technologies, Seattle, WA.
- Benjamin, S., and E. P. James, 2017: Observation system experiments with the hourly-updating Rapid Refresh (RAP) model using GSI hybrid ensemble/variational data assimilation. 21<sup>st</sup> Conference on Integrated Observing and Assimilation Experiments for the Atmosphere, Oceans, and Land Surface, Seattle, WA.
- Benjamin, S., J. B. Olson, J. Kenyon, T. T. Ladwig, E. P. James, C. R. Alexander, S. S. Weygandt, and M. Hu, 2017: 2016-17 HRRRv3/HRRR-ensemble cloud and wind modeling/assimilation toward increased renewable energy penetration. Eighth Conference on Weather, Climate, Water, and the New Energy Economy, Seattle, WA.
- Deanes, L., R. Ahmadov, K. L. Manross, S. A. McKeen, G. Grell, and E. P. James, 2017: Evaluation of High-Resolution Rapid Refresh-Smoke (HRRR-smoke) model products for a case study using surface PM2.5 observations. 16<sup>th</sup> Annual AMS Student Conference, Seattle, WA.
- Benjamin, S., E. James, J. Kenyon, J. B. Olson, C. Alexander, and M. Marquis, 2016: Progress towards Improved solar forecasts in hourly updated RAP and HRRR forecasts. Seventh Conference on Weather, Climate, and the New Energy Economy, New Orleans, LA.
- Weygandt, S. S., C. R. Alexander, S. G. Benjamin, T. G. Smirnova, D. C. Dowell, M. Hu, J. B. Olson, J. Kenyon, E. P. James, H. Lin, and I. Jankov, 2016: Improvements in forecasting regions of aviation Hazard impact from advances in the HRRR and RAP models. Fifth Aviation, Range, and Aerospace Meteorology Special Symposium, New Orleans, LA.
- James, E. P., M. Hu, S. Benjamin, and S. Weygandt, 2016: Observation sensitivity experiments with the Hourly Rapid Refresh using hybrid-ensemble/variational data assimilation. 20<sup>th</sup> Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), New Orleans, LA.
- Weygandt, A. A., C. R. Alexander, D. C. Dowell, M. Hu, E. P. James, S. G. Benjamin, T. G. Smirnova, H. Lin, J. Kenyon, and J. B. Olson, 2016: Radar data assimilation impacts in the RAP and HRRR models. 20<sup>th</sup> Conference on Integrated Observing and Assimilation Systems for the Atmosphere, Oceans, and Land Surface (IOAS-AOLS), New Orleans, LA.
- Alexander, C. R., S. S. Weygandt, S. G. Benjamin, D. C. Dowell, M. Hu, T. G. Smirnova, J. B. Olson, J. Kenyon, G. Grell, E. P. James, H. Lin, and J. M. Brown, 2016: Operational upgrades to the Rapid Refresh (RAP) and High-Resolution Rapid Refresh (HRRR). Sixth Conference on Transition of

- Research to Operations, New Orleans, LA.
- James, E. P., S. G. Benjamin, J. B. Olson, M. Marquis, and C. R. Alexander, 2015: Solar forecasts from the 3-km High-Resolution Rapid Refresh. Sixth Conference on Weather, Climate, and the New Energy Economy, Phoenix, AZ.
- Benjamin, S., J. B. Olson, E. James, J. Brown, C. Alexander, and J. Kenyon, 2015: HRRR/Rapid Refresh Assimilation/Modeling Improvements for Wind/Solar Energy Guidance. Sixth Conference on Weather, Climate, and the New Energy Economy, Phoenix, AZ.
- Alexander, C. R., S. S. Weygandt, S. G. Benjamin, D. C. Dowell, M. Hu, T. G. Smirnova, J. B. Olson, J. S. Kenyon, J. M. Brown, E. P. James, and I. Jankov, 2015: The High-Resolution Rapid Refresh (HRRR): The Operational Implementation and Future Direction with the Aviation Community. 17<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Phoenix, AZ.
- Brown, J. B., T. G. Smirnova, J. B. Olson, G. Grell, J. S. Kenyon, D. C. Dowell, C. R. Alexander, E. P. James, S. S. Weygandt, and M. Hu, 2015: Physics in the HRRR and RAP: Recent progress and future plans. 17<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Phoenix, AZ.
- Kenyon, J. S., J. B. Olson, J. M. Brown, C. R. Alexander, S. G. Benjamin, D. C. Dowell, G. Grell, M. Hu, E. P. James, T. G. Smirnova, and S. S. Weygandt, 2015: Recent improvements in Rapid Refresh and High-Resolution Rapid Refresh forecasts of low ceilings. 17<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Phoenix, AZ.
- Szoke, E., S. G. Benjamin, C. R. Alexander, E. P. James, J. Brown, D. T. Lindsey, and B. Jamison, 2015: HRRR model performance for the September 2013 northeastern Colorado floods. 28<sup>th</sup> Conference on Hydrology, Phoenix, AZ.
- James, E. P., S. G. Benjamin, and C. R. Alexander, 2015: A precipitation climatology from the 3-km High-Resolution Rapid Refresh. 28<sup>th</sup> Conference on Hydrology, Phoenix, AZ.
- Weygandt, S. S., C. R. Alexander, J. A. Hamilton, S. G. Benjamin, E. P. James, T. G. Smirnova, M. Hu, and I. Jankov, 2015: Generation of ensemble-based hazardous weather guidance products from rapidly updated models: The HRRR Convective Probability Forecast (HCPF) and related post-processing work. 31<sup>st</sup> Conference on Environmental Information Processing Technologies, Phoenix, AZ.
- Alexander, C. R., G. Manikin, S. Benjamin, S. S. Weygandt, G. DiMego, M. Hu, and T. G. Smirnova, 2015: The High Resolution Rapid Refresh (HRRR): The Operational Implementation. 31<sup>st</sup> Conference on environmental Information Processing Technologies, Phoenix, AZ.
- Weygandt, S. S., S. Benjamin, T. G. Smirnova, M. Hu, J. B. Olson, H. Lin, C. R. Alexander, G. Manikin, E. P. James, I. Jankov, J. M. Brown, and D. C. Dowell, 2015: Rapid Refresh: version 2 upgrade at NCEP and work toward version 3 and the North American Rapid Refresh Ensemble (NARRE). Fifth Conference on Transition of Research to Operations, Phoenix, AZ.
- Marquis, M., J. B. Olson, R. M. Banta, Y. L. Pichugina, S. Benjamin, E. P. James, J. M. Wilczak, I. V. Djalalova, L. Bianco, J. Carley, and J. W. Cline, 2015: Results from the Position of Offshore Wind Energy Resources (POWER) study. 6<sup>th</sup> Conference on Weather, Climate, and the New Energy Economy, Phoenix, AZ.
- James, E. P., C. R. Alexander, and S. Benjamin, 2015: Convective scale forecasts for day two from the High-Resolution Rapid Refresh. 27<sup>th</sup> Conference on Severe Local Storms, Madison, WI.
- Alexander, C. R., D. C. Dowell, S. S. Weygandt, S. Benjamin, T. G. Smirnova, M. Hu, E. P. James, J. B. Olson, J. S. Kenyon, and J. M. Brown, 2015: High-Resolution Rapid Refresh: The operational Implementation and ongoing research. 27<sup>th</sup> Conference on Severe Local Storms, Madison, WI.
- Szoke, E. J., B. D. Jamison, S. Benjamin, C. R. Alexander, J. M. Brown, E. P. James, and D. T. Lindsey, 2015: Examination of the predictability of the September 2013 northeastern Colorado floods by the HRRR model. 27<sup>th</sup> Conference on Severe Local Storms, Madison, WI.
- James, E. P., C. R. Alexander, B. E. Jamison, and S. G. Benjamin, 2013: Renewable energy resource assessments from a climatology of short-range High-resolution Rapid Refresh forecasts. Fourth Conference on Weather, Climate, and the New Energy Economy, Austin, TX.
- James, E. P., C. R. Alexander, B. E. Jamison, S. G. Benjamin, and S. S. Weygandt, 2012: A climatology of short-range weather forecasts from the High-resolution Rapid Refresh. 21<sup>st</sup> Conference on Numerical Weather Prediction, Montreal, QC, Canada, 2E2.2.
- Alexander, C. R., S. S. Weygandt, S. G. Benjamin, D. C. Dowell, T. G. Smirnova, M. Hu, J. M. Brown, P. Hofmann, E. P. James, and H. Lin, 2012: The High-resolution Rapid Refresh (HRRR): An hourly updating convection permitting forecast system nested in an hourly cycled mesoscale model with multi-scale data assimilation. 21<sup>st</sup> Conference on Numerical Weather Prediction, Montreal, QC, Canada, 3B3.2.
- Benjamin, S. G., E. P. James, H. Lin, S. S. Weygandt, S. S. Sahn, and W. Moninger, 2012: Impact of upper-air and near-surface observations on short-range forecasts from NOAA hourly assimilation cycles (RUC and Rapid Refresh). WMO Workshop on the Impact of Observations on Numerical Weather Prediction, Sedona, CA.
- Benjamin, S. G., S. S. Weygandt, C. R. Alexander, E. P. James, and P. Hofmann, 2012: The High Resolution Rapid Refresh (HRRR). Global Systems Division (GSD) Program Review, Boulder, CO.
- Weygandt, S. S., C. R. Alexander, M. Hu, T. G. Smirnova, S. G. Benjamin, G. S. Manikin, P. Hofmann, E. P. James, J. M. Brown, and D. C. Dowell, 2011: Analysis of the forecast improvement from radar-data

- assimilation within the RUC, Rapid Refresh, and HRRR. 35<sup>th</sup> Conference on Radar Meteorology, Pittsburgh, PA, 18A.3.
- Brown, J. M., T. G. Smirnova, J. B. Olson, G. A. Grell, D. C. Dowell, S. G. Benjamin, C. R. Alexander, E. P. James, S. S. Weygandt, M. Hu, P. Hofmann, and H. Lin, 2011: Improvement and testing of WRF physics options for application to Rapid Refresh and High-Resolution Rapid Refresh. Preprints, 15<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Los Angeles, CA, 5.5.
- Dowell, D. C., C. R. Alexander, M. Hu, S. S. Weygandt, S. G. Benjamin, T. G. Smirnova, E. P. James, P. Hofmann, H. Lin, and J. M. Brown, 2011: Radar-data assimilation into the Rapid Refresh (RR) and High-resolution Rapid Refresh (HRRR) models toward improved convective guidance for aviation. Preprints, 15<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Los Angeles, CA, 7.3.
- James, E. P., C. R. Alexander, S. S. Weygandt, and S. G. Benjamin: Probabilistic thunderstorm guidance from the High-resolution Rapid Refresh (HRRR) model: Evaluation and evolution of a prototype system. 15<sup>th</sup> Conference on Aviation, Range, and Aerospace Meteorology, Los Angeles, CA, 8.2.
- Weygandt, S. S., C. R. Alexander, E. P. James, P. Hofmann, S. G. Benjamin, T. Smirnova, M. Hu, and J. M. Brown, 2011: 2010 results from the 3km HRRR: Verification, case study assessment, and HRRR-based convective probabilistic forecasts (HCPF). Preprints, 2<sup>nd</sup> Aviation, Range, and Aerospace Meteorology Special Symposium on Weather-Air Traffic Management Integration. Amer. Meteor. Soc., Seattle, WA, 1.2.
- Benjamin, S. G., S. S. Weygandt, C. R. Alexander, J. M. Brown, T. G. Smirnova, P. Hofmann, E. P. James, and G. Dimego, 2011: NOAA's hourly-updated 3km HRRR and RUC/Rapid Refresh: Recent (2010) and upcoming changes toward improving weather guidance for air-traffic management. Preprints, 2<sup>nd</sup> Aviation, Range, and Aerospace Meteorology Special Symposium on Weather-Air Traffic Management Integration. Amer. Meteor. Soc., Seattle, WA, 3.2.
- Alexander, C. R., S. S. Weygandt, S. G. Benjamin, T. G. Smirnova, J. M. Brown, P. Hofmann, and E. P. James, 2011: The High Resolution Rapid Refresh (HRRR): Recent and future enhancements, time-lagged ensembling, and 2010 forecast evaluation activities. Preprints, 20<sup>th</sup> Conf. on Numerical Weather Prediction, Amer. Meteor. Soc., Seattle, WA, 12B.2.
- Alexander, C. R., D. A. Koch, S. S. Weygandt, T. G. Smirnova, S. G. Benjamin, and E. P. James, 2011: Recent enhancements to real-time probabilistic thunderstorm guidance products from a time-lagged ensemble of High Resolution Rapid Refresh (HRRR) forecasts. Preprints, 20<sup>th</sup> Conf. on Numerical Weather Prediction, Amer. Meteor. Soc., Seattle, WA, 459.
- James, E. P., C. R. Alexander, S. S. Weygandt, S. G. Benjamin, and J. M. Brown, 2011: Addressing convective-scale forecast challenges with the high resolution rapid refresh (HRRR) model. Preprints, 20<sup>th</sup> Conf. on Numerical Weather Prediction, Amer. Meteor. Soc., Seattle, WA, 461.
- Alexander, C. R., S. S. Weygandt, T. G. Smirnova, S. G. Benjamin, P. Hofmann, E. P. James, and D. A. Koch, 2010: High resolution rapid refresh (HRRR): Recent enhancements and evaluation during the 2010 convective season. Preprints, 25<sup>th</sup> Conf. on Severe Local Storms, Amer. Meteor. Soc., Denver, CO, P9.2.
- Alexander, C. R., S. S. Weygandt, T. G. Smirnova, S. G. Benjamin, P. Hofmann, E. P. James, and D. A. Koch, 2010: High-resolution Rapid Refresh (HRRR): Recent enhancements and evaluation during the 2010 convective season. 25<sup>th</sup> Conference on Severe Local Storms, Denver, CO, 9.2.
- James, E. P., and R. H. Johnson, 2009: Repeating patterns of precipitation and surface pressure evolution in midlatitude mesoscale convective vortices. Preprints, 13<sup>th</sup> Conf. on Mesoscale Processes, Amer. Meteor. Soc., Salt Lake City, UT, P1.2.

### Workshops

- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 23-27 May 2011
- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 14-18 May 2012
- Front Range Computer Research Consortium Symposium, Fort Collins CO, 13-14 Aug 2012
- Gridpoint Statistical Interpolation (community-supported data assimilation software) Tutorial, Boulder CO, 21-23 Aug 2012
- NCAR Solar Forecasting Kickoff Meeting, Boulder CO, 12-13 Mar 2013
- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 27-31 May 2013
- WRF Workshop, Boulder CO, 24-28 Jun 2013
- NCAR Solar Forecasting Workshop, Boulder CO, 26-27 Aug 2014
- Photovoltaic Solar Resource Workshop, Golden CO, 27 Feb 2015
- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 11-15 May 2015
- Aviation Weather Testbed Winter Experiment, Kansas City MO, 22-26 Feb 2016
- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 2-6 May 2016
- Unmanned Aerial System Traffic Management Workshop, San Jose CA, 18-21 Jul 2016
- Utility Variable Integration Group Forecasting Workshop, Denver CO, 27-29 Sep 2016
- Workshop on Opportunities to Apply Remote Sensing in Boreal/ Arctic Wildfire Management and Science, Fairbanks AK, 3-5 Apr 2017
- Hazardous Weather Testbed Experimental Forecast Programme, Norman OK, 1-5 May 2017

## **Skills**

Familiar with UNIX systems, spreadsheet programs and word processors.  
Experience with workflow management software and extensible markup language (XML)  
Experience with the Gridpoint Statistical Interpolation community-supported data assimilation software (attended a 3-day tutorial at the National Center for Atmospheric Research (NCAR))  
Experience with General Meteorological Package (GEMPAK), Grid Analysis and Display System (GrADS), National Center for Atmospheric Research (NCAR) Command Language (NCL), Advanced Weather Interactive Processing System (AWIPS), and ESRI ArcMap GIS Software.  
Knowledge of programming languages Fortran and Matlab, with some experience in C.  
Knowledge of shell scripting, including Perl and korn shell.  
Experience running the Rapid Update Cycle (RUC) model and the Advanced Research version of the Weather Research and Forecasting (WRF-ARW) model in simulating real mesoscale weather events.  
Experience and skill in scientific and general audience writing.  
Experience in scientific presentations.  
Strong interest in and knowledge of meteorology and climatology, particularly in the western United States.

## **Awards and Honours**

International Baccalaureate Diploma, 2002.  
Academic Full Tuition Non-Resident Scholarship, University of Utah, 2002-06.  
College of Mines and Earth Sciences Scholarship, University of Utah, 2002-06.  
Dean's List (GPA 3.987), University of Utah, 2002-06.  
Outstanding Senior, Meteorology Department, University of Utah, 2005-06.  
Nominated for National Center for Atmospheric Research (NCAR) Undergraduate Leadership Workshop, 2005.  
First Place, University of Utah Meteorology Department Weather Forecasting Competition, 2005-06.  
Third Place, Graduate Student Category, WxChallenge Weather Forecasting Competition, 2007-08.  
Research Employee of the Year Team Award, University of Colorado / Cooperative Institute for Research in Environmental Sciences (CU/CIRES), 2012.  
Award for Five Years of Service within CU/CIRES, 2015  
Global Systems Division (GSD) Team Member of the Month, Oct 2015  
Gold Medal Award, CU/CIRES, 2016  
NOAA Technology Transfer Award, NOAA/GSD, 2017  
UVIG Achievement Award, 2017

## **Memberships**

*CIRES Members Council (GSD representative)*, 2016-present.  
*American Meteorological Society*, 2006-present.