

Benjamin R. Johnston

University Corporation for Atmospheric Research, Boulder, CO
2051 Zlaten Dr Apt F218 Longmont, CO 80504
724-984-9206
bjohnston@ucar.edu

EDUCATION

Texas A&M University-Corpus Christi – Corpus Christi, TX **01/2014 – 12/2019**
Doctor of Philosophy in Coastal and Marine System Science (4.0 GPA)

University of Maryland – College Park, MD **08/2010 – 05/2012**
Master of Science in Atmospheric Science (3.0 GPA)

California University of Pennsylvania – California, PA **08/2005 – 12/2009**
Bachelor of Science in Meteorology and Environmental Earth Science (3.8 GPA)

RELEVANT WORK EXPERIENCE

University Corporation for Atmospheric Research – Boulder, CO

Project Scientist I **04/2022-present**

- Performed a study to demonstrate the impact that the assimilation of COSMIC-2 GNSS-Radio Occultation (RO) bending angle profiles has on tropical cyclone track and intensity forecasts in the Hurricane Weather Research and Forecasting model by focusing on the 2020 Atlantic hurricane season, which was the most active Atlantic season on record, and selecting eight cases for study from tropical cyclones that reached hurricane strength and impacted land.
- Also using NOAA's next-generation hurricane model, the Hurricane and Analysis Forecast System (HAFS), and focusing on tuning the RO data assimilation scheme in HAFS to maximize the impact of COSMIC-2 and commercial RO data sources on operational hurricane analyses and forecasts.

Postdoctoral Research Fellow **01/2020 – 04/2022**

- Designed/conducted independent research projects using GPS RO.
- The first project evaluated tropospheric moisture data from the recently-launched COSMIC-2 mission with ERA5 and MERRA-2 reanalysis moisture data. Key results include good agreement with ERA5 and larger differences with MERRA-2. Also, profile pairs with large moisture differences often occurred in areas with sharp moisture gradients.
- The second project studied long-term moisture and temperature variability using COSMIC-1. Tropical interannual variability was dominated by El Niño-Southern Oscillation (ENSO), with strong correlations of ENSO and moisture even into the subtropical upper troposphere and midlatitude lower stratosphere.
- Additionally, I was tasked with quality controlling, debugging, and improvement of RO moisture data retrievals that are released to the public.

Texas A&M University-Corpus Christi – Corpus Christi, TX
Adjunct Instructor

01/ 2017 – 05/2017

- Instructor of record for ATSC/ESCI 3403: Meteorology. Taught two lectures per week.
- Developed lecture material to discuss relevant course topics according to university guidelines and facilitated student discussion and interaction.
- Created and graded quizzes, exams, and a group project for student assessment.
- Held regular office hours and assisted students in both one-on-one and group settings.

Teaching Assistant

09/2017 – 12/2017

- Lab teaching assistant for MATH 1442: Statistics for Life. Three lab sections per week.
- Presented weekly statistics lab material, answered group questions about labs, and graded/provided feedback to students on labs.
- Provided detailed weekly overview of JMP statistical software package for use in labs.

Research Assistant (Advisor: Dr. Feiqin Xie)

09/2014 – 12/2019

- Dissertation research focused on the effects of deep convection on the vertical temperature structure and tropopause throughout the tropical and extratropical upper troposphere/lower stratosphere.
- Analysis utilized collocated datasets including the NASA TRMM and GPM satellites to identify convection locations along with COSMIC-1 GPS RO and ERA-Interim reanalysis to obtain nearby temperature profiles.
- Conducted additional NASA-funded research on improving the retrieval of GPS RO profiles in the presence of atmospheric ducting conditions as well as generating global planetary boundary layer climatologies using GPS RO and ERA-Interim.

NASA Goddard Space Flight Center – Greenbelt, MD

06/2014 – 08/2014

Graduate Internship

- Completed research under the tutelage of Dr. Santiago Gasso titled “Dust Activity and Transport in the High Latitudes”.
- Bi-regional study focused on the Patagonian Desert and the Copper River Delta.
- Meteorological data for Patagonia was provided by the Argentina National Weather Service and analyzed to determine seasonal/yearly changes for dust events.
- Synoptic weather maps and HYSPLIT4 model data was analyzed in Alaska to determine the typical synoptic setup and dust concentrations during a dust event.

University of Maryland – College Park, MD

08/2010 – 05/2012

Teaching Assistant (Advisor: Dr. Robert Hudson)

- Responsible for instruction in the discussion sections of AOSC 200: Weather and Climate and the AOSC 201 lab. Taught two discussion sections and one lab section per week.
- Created PowerPoint presentations to summarize important facets of the main lectures.
- Facilitated “hands-on” lab exercises by reviewing the weekly assignment manual and addressing student issues to maximize their learning experience.
- Proctored exams, graded quizzes, midterm/final exams and labs, provided feedback on group projects and graded group projects.

Research Assistant (Advisor: Dr. Ning Zeng)

06/2011 – 05/2012

- Successfully selected and defended master’s thesis titled “The Effects of White Roofs and Pavement on Climate and Energy”.

- Key results suggest that changing global roof albedo to a lighter color would reduce the global average surface temperature by 0.3°C as well as significantly reduce energy usage.
- Results varied significantly by latitude, with the largest energy reduction in the tropics.

EDUCATION EXPERIENCE

- Led daily weather briefings, synoptic outlooks, and severe weather discussions in a classroom and voluntary group setting.
- Presented a variety of talks on numerous meteorology topics, including remote sensing, severe weather, forecasting, and winter weather.
- Conducted published original research and presented many talks/posters on atmospheric dynamics/thermodynamics, convection, and remote sensing.

SKILLS AND ABILITIES

- Extensive experience using IDL programming language, working knowledge of Python, Fortran, Shell, and ArcGIS.
- Proficient in a Windows or Linux environment.
- Extensive work in a high-performance computing environment.
- Expert in Microsoft Office including Word, Excel, and PowerPoint.
- Widespread knowledge in earth science/meteorology/environmental science.
- Knowledgeable in the analytical techniques involved in successful weather forecasting.
- Adaptability in work and social settings allows creation of a productive work environment.
- Able to convey scientific information to colleagues and teach college courses to students.

PUBLICATIONS

1. Johnston, B. R., & Randel, W.R. (2022). **Interannual Variability of Tropospheric Moisture and Temperature and Relationships to ENSO Using COSMIC-1 GNSS-RO Retrievals.** *Journal of Climate*, 35. <https://doi.org/10.1175/JCLI-D-21-0884.1>
2. Johnston, B. R., Xie, F., & Liu, C. (2022). **Relationships Between Extratropical Precipitation Systems and Upper Tropospheric and Lower Stratospheric Temperatures and Tropopause Height Observed from GPM and GPS Radio Occultation.** *Atmosphere*, 13. <https://doi.org/10.3390/atmos13020196>
3. Johnston, B. R., Randel, W. J., & Sjoberg, J. P. (2021). **Evaluation of Tropospheric Moisture Characteristics Among COSMIC-2, ERA5 and MERRA-2 in the Tropics and Subtropics.** *Remote Sensing*, 13. <https://doi.org/10.3390/rs13050880>
4. Johnston, B. R., & Xie, F. (2020). **Characterizing Extratropical Tropopause Bimodality and its Relationship to the Occurrence of Double Tropopauses Using COSMIC GPS Radio Occultation Observations.** *Remote Sensing*, 12. <https://doi.org/10.3390/rs12071109>
5. Johnston, B. R., Xie, F., & Liu, C. (2018). **The effects of deep convection on regional temperature structure in the tropical upper troposphere and lower stratosphere.** *Journal of Geophysical Research: Atmospheres*, 123. <https://doi.org/10.1002/2017JD027120>

CONFERENCE PRESENTATIONS

1. Johnston, B. R. and L. Cucurull, *Impacts of Assimilating COSMIC-2 GNSS-RO Bending Angle Observations on HWRF Tropical Cyclone Forecasts from the 2020 Atlantic Hurricane Season (Poster)*, AMS Annual Meeting, Denver, CO, January 8-12, 2023
2. Johnston, B. R., W. R. Randel, *Interannual Variability of Tropospheric Moisture and Temperature and Relationships to ENSO Using COSMIC-1 GNSS-RO Retrievals (Oral)*, OPAC-IROWG 2022, Leibnitz, Austria, September 8-14, 2022
3. Johnston, B. R., W. R. Randel, *Long-Term Moisture and Temperature Variability and its Relationship to ENSO using COSMIC-1 GNSS-RO Observations (Poster)*, AGU Fall Meeting 2021, New Orleans, LA, December 13-17, 2021
4. Johnston, B. R., W. R. Randel, and J. Sjoberg, *Evaluation of Tropospheric Moisture Characteristics Among COSMIC-2, ERA5, and MERRA-2 in the Tropics and Subtropics (Poster)*, 8th International Radio Occultation Working Group Meeting, Virtual, April 7-13, 2021
5. Johnston, B. R., W. R. Randel, and J. Sjoberg, *Evaluation of Tropospheric Moisture Characteristics Between COSMIC-2, ERA5, and MERRA-2 in the Tropics and Subtropics (Poster)*, AGU Fall Meeting 2020, Virtual, December 1-17, 2020
6. Johnston, B. R., F. Xie, and C. Liu, *Quantifying the Impact of Midlatitude Deep Convection on Upper Troposphere/Lower Stratosphere Temperatures and Moisture from Satellite and Reanalysis Data (Poster)*, AMS Annual Meeting, Austin, TX, January 7-11, 2018
7. Johnston, B. R., F. Xie, and C. Liu, *The Effects of Deep Convection on Regional Temperatures in the Tropical Upper Troposphere/Lower Stratosphere (Oral)*, MSGSO 7th Annual Research Forum, Corpus Christi, TX, December 7, 2017
8. Johnston, B. R., F. Xie, and C. Liu, *The Effects of Deep Convection on Regional Temperatures in the Tropical Upper Troposphere/Lower Stratosphere (Poster)*, Joint COSMIC Tenth Data Users' Workshop and IROWG-6 Meeting, Estes Park, CO, September 21-27, 2017
9. Johnston, B. R., F. Xie, and C. Liu, *The Effects of Deep Convection on Regional Temperatures in the Tropical Upper Troposphere/Lower Stratosphere (Poster)*, AGU Fall Meeting 2016, San Francisco, CA, December 12-16, 2016

AWARDS

- Eberly Family Scholarship, 2005-2009: Full-tuition undergraduate scholarship.
- Intensive Summer School for Computing in Environmental Sciences (ISSCENS), Summer 2014: Computer programming workshop at the University of Virginia (20 attendees).
- Ruth Campbell Scholarship, 2017-2018.

PROFESSIONAL AFFILIATIONS

- American Geophysical Union
- American Meteorological Society
- Corpus Christi American Meteorological Society Student Chapter