Paytsar Muradyan

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EDUCATION

Ph.D. in Atmospheric Sciences, Purdue University, West Lafayette, IN 2012
M.S. in Atmospheric Sciences, Purdue University, West Lafayette, IN 2009
B.S. in Physics, Yerevan State University, Yerevan, Armenia 2002

HONORS AND AWARDS

Women in Science Award, Purdue University 2008 and 2012
Faculty for the Future Fellowship, Schlumberger Foundation 2007-2012
(Full tuition, stipend and travel funds based on yearly competition)

PROFESSIONAL EXPERIENCE

Argonne National Laboratory, Environmental Science Division 06/2018 – present
Assistant Atmospheric Scientist

- Research interest in atmospheric remote sensing, investigation of planetary boundary layer; Utilization of wind profiling instruments in atmospheric research; Wind resource characterization; Aerosol detection and retrieval of aerosol optical properties with micropulse lidars.
- Wind Forecast Improvement Project: Complex terrain and offshore wind resource characterization.
- Radar Wind Profiler (RWP), Micropulse Lidar (MPL) and Sound Detection And Ranging (Sodar) instrument mentor for the Atmospheric Radiation Measurement (ARM) Program. Investigation of novel remote sensing approaches and instrumentation. Data quality assurance, quarterly instrument calibrations, communication with site operators and instrument vendors to ensure timely resolution of instrument problems maintaining ARM data integrity.

Argonne National Laboratory, Environmental Science Division 06/2015 – 06/2018
Postdoctoral Associate

- Retrieval of extinction profiles from Micropulse Lidar measurements, in particular determination of extinction profiles during the 2016 and 2017 biomass burning seasons over the ARM Ascension Island mobile facility.
- Derivation and analysis of large-scale mean vertical motion from a triangular network of RWPs at the ARM SGP sites. Validation of the derived mean vertical velocities in comparison with a regional climate model. Analysis of diurnal and seasonal cycle of the long-term (5 years) averages of vertical air motion, providing valuable insights into weather and climate patterns.
- Development of the RWP adaptive sampling algorithm for the ARM four Southern Great Plains (SGP) profilers. The method improves utilization of the RWP sampling periods, results in better-defined winds and higher temporal resolution vertical sampling during precipitation events.
- Determination of the boundary layer height (BLH) from the RWP measurements deployed during the Wind Forecast Improvement Project in Complex Terrain (WFIP2) field campaign. Analysis of the BLH seasonal variations at various WFIP2 sites. Model intercomparison to improve the understanding of BLH response to local and region drivers in complex terrain.
- Installation, maintenance, data quality assurance and visualization for multiple remote sensing instruments for the 18-month WFIP2 field campaign.

Scripps Institution of Oceanography, UC San Diego 12/2012 – 04/2013
Research Consultant

Retrieved, analyzed and visualized atmospheric properties from comprehensive GPS radio occultation measurements for the analysis of tropical cyclogenesis and evolution.

Purdue University, Department of Earth & Atmospheric Sciences 08/2012 – 12/2012
Research Consultant

Developed tools for automating the processing and analysis of radio occultation data in open-loop mode.

Purdue University 05/2007 – 08/2012
Graduate Research Assistant

- Developed and tested a simulation system for retrieving atmospheric refractivity profiles from airborne GPS radio occultation measurements.
- Carried out a simulation study dedicated to understanding the largest errors in the retrieval of atmospheric parameters from airborne radio occultation measurements. Through the analysis of the error statistics, demonstrated the potential impact of the technique for regional and global weather studies; published in GPS Solutions.
- Developed and evaluated various filtering approaches for optimal noise reduction in GPS radio occultation observations.
- Designed and implemented a software for processing and analysis of airborne radio occultation data.
- Performed a quantitative and statistical analysis of the airborne radio occultation system performance on a large data set. Determined the accuracy of the airborne GPS radio occultation technique proving it as a valuable contribution for weather forecasting and climate studies especially in data sparse regions.

Purdue University, Department of Earth & Atmospheric Sciences 03/2006 – 06/2006
Visiting Scholar

Investigated the cause of ionospheric plasma bubbles using GPS measurements in Brazil. Demonstrated correlation between ionospheric plasma bubbles and airglow in the upper atmosphere. Developed tools for GPS total electron content data visualization.

PUBLICATIONS AND MANUSCRIPTS IN PREPARATION

P. Muradyan and R. Coulter (2020). Radar Wind Profiler and Radio Acoustic Sounding System Instrument Handbook. *DOE Office of Science Atmospheric Radiation Measurement Program, DOE/SC-ARM-TR-044*

P. Muradyan and R.Coulter (2020). Micropulse Lidar Instrument Handbook. *DOE Office of Science Atmospheric Radiation Measurement Program, DOE/SC-ARM-TR-019*

P. Muradyan and R. Coulter (2020). Sonic Detection and Ranging Wind Profiler Instrument Handbook. *DOE Office of Science Atmospheric Radiation Measurement Program,DOE/SC-ARM-TR-154*

L. Bianco, **P. Muradyan**, I. Djalalova, J. M. Wilczak, J. B. Olson, J. S. Kenyon, R. Kotamarthi, K. Lantz, C. Long, and D. Turner. Comparison of planetary boundary layer heights in the Columbia River Gorge and basin from wind profiling radars and numerical weather prediction models during the second Wind Forecast Improvement Project (WFIP2). *Boundary Layer Meteorology (under review).*

I. Djalalova, L. Bianco, E. Akish, J. M. Wilczak, J. B. Olson, J. S. Kenyon, L. K. Berg, A. Choukulkar, R. Coulter, R. Eckman, H. J. S. Fernando, E. Grimit, R. Krishnamurthy, J. K. Lundquist, **P. Muradyan**, D. Turner, and S. Wharton. Wind ramp events validation in NWP forecast models during the second Wind Forecast Improvement Project (WFIP2) using the Ramp Tool and Metric. *Weather and Forecasting (under review).*

P. Muradyan and R. Coulter. Radar wind profiler adaptive sampling algorithm *(In preparation for Atmospheric Measurement Techniques).*

W. Shaw, C. Draxl, J. Mirocha, **P. Muradyan**, V. Ghate, M. Optis, and A. Lemke (2019). Workshop on Research Needs for Offshore Wind Resource Characterization: Summary Report. *EERE Report, PNNL-29276, DOI: 10.2172/1572142*

K. McCaffrey, J. Wylczak, L. Bianco, E. Grimit, J. Sharp, R. Banta, K. Friedrich, H.J.S. Fernando, R. Krishnamurthy, Laura Leo, and **P. Muradyan** (2019). Identification and Characterization of Persistent Cold Pool Events from Temperature and Wind Profilers in the Columbia River Basin. *Journal of Applied Meteorology and Climatology, DOI: 10.1175/JAMC-D-19-0046.1*

L. Bianco, I. Djalalova, J. Wilczak, J. Olson, J. Kenyon, A. Choukulkar, L. Berg, H.J.S. Fernando, E.P. Grimit, R. Krishnamurthy, J.K. Lundquist, **P. Muradyan**, M. Pekour, Y. Pichugina, M.T. Stoelinga, D. D. Turner (2019). Impact of model improvements on 80-m wind speeds during WFIP2 *Geoscientific Model Development, DOI: 10.5194/gmd-2019-80*

J. Wilczak, M. Stoelinga, L. Berg, J. Sharp, C. Draxl, K. McCaffrey, R. Banta, L. Bianco, I. Djalalova, J. K. Lundquist, **P. Muradyan**, A. Choukulkar, L. Leo, T. Bonin, R. Eckman, C. Long, R. Worsnop, J. Bickford, N. Bodini, D. Chand, A. Clifton, J. Cline, D. Cook, H. J. S. Fernando, K. Friedrich, R. Krishnamurthy, K. Lantz, M. Marquis, J. McCaa, J. Olson, S. Otarola-Bustos, Y. Pichugina, G. Scott, W. J. Shaw, S. Wharton, and A. B. White (2019). The Second Wind Forecast Improvement Project (WFIP2): Observational Field Campaign *Bulletin of the American Meteorological Society, DOI: 10.1175/BAMS-D-18-0035.1*

Z. Paquita, A. J. Sedlacek, C. Flynn, S. Springston, A. C. Aiken, R. Delgadillo, J. Zhang, Allison C. Aiken, A. Koontz, and **P. Muradyan** (2018). The Ascension Island boundary layer in the remote southeast Atlantic is often smoky. *Geophysical Research Letters, DOI: 10.1002/2017GL076926*

K. N. Wang, J. L. Garrison, J. S. Haase, B. J. Murphy, **P. Muradyan**, and T. D. Lulich (2016). Open-loop tracking of rising and setting GPS RO signals from an airborne platform: signal model and error analysis. *IEEE TGRS, 54(7), 3967-3984*

B. J. Murphy, J. S. Haase, **P. Muradyan**, J. L. Garrison, K. N. Wang, and U. Acikoz (2015). Airborne GPS RO profiles observed in tropical storm environments. *Journal of Geophysical Research, DOI: 10.1002/2014JD022931*

J. S. Haase, B. J. Murphy, **P. Muradyan**, F. G. Nievinski, K. M. Larson, J. L. Garrison, and K. N. Wang (2014). First results from an airborne GPS RO system for atmospheric profiling. *Geophysical Research Letters, DOI: 10.1002/2013GL058681*

K. N. Wang, **P. Muradyan**, J. L. Garrison, J. S. Haase, B. J. Murphy, U. Acikoz, and T. D. Lulich (2013). Open-loop tracking of rising and setting GNSS radio-occultation signals from an airborne platform: Signal model and statistical analysis. *IGARSS, DOI: 10.1109/IGARSS.2013.6723550*

C. Evans, ... **P. Muradyan** et al. (2011). The Pre-Depression Investigation of Cloud-systems in the Tropics Field Campaign: Perspectives of Early Career Scientists. *Bulletin of American Meteorological Society, DOI: 10.1175/BAMS-D-11-00024.1*

P. Muradyan, J. S. Haase, F. Xie, J. L. Garrison, T. D. Lulich, and J. Voo (2010). GPS/INS navigation precision and its effect on airborne RO retrieval accuracy. *GPS Solutions, DOI: 10.1007/s10291-010-0183-7*

T. D. Lulich, J. L. Garrison, J. S. Haase, Y. -M. Yang, J. Voo, F. Xie, and **P. Muradyan** (2010). Open-loop tracking of RO signals from an airborne platform. *Proceedings of the 23rd International Technical Meeting of the Satellite Division of the Institute of Navigation, Portland, OR*

F. Xie, J. S. Haase, T. D. Lulich, **P. Muradyan**, J. L. Garrison, E. Calais (2008). Profiling the atmosphere with an airborne GPS receiver system. *Proceedings of the 88th AMS Annual Meeting, New Orleans, LA*

SELECTED PRESENTATIONS

Radar Wind Profiler Adaptive Sampling *(Invited presentation).* June 10-13, 2019
ARM Atmospheric System Research meeting, Rockville, MD

Vertical Distribution and Monthly Variations of Biomass Burning Aerosols as Observed by the Micropulse Lidar during LASIC. *AMS Annual Meeting, Phoenix, AZ* January 6-10, 2019

Vertical Variability of Biomass Burning Aerosols over Southeast Atlantic and Radiative Impact. *AGU Fall Meeting, Washington, D.C.* December 10-14, 2018

Evolution of Biomass Burning Aerosols: Implications on Regional Aerosol Distributions. March 19-23, 2018
ARM Atmospheric System Research meeting, Tysons, VA

Boundary layer depth variability over complex terrain as observed during WFIP2. January 7-11, 2018
American Meteorological Society Annual Meeting, Austin, TX

Estimates of lower-tropospheric divergence and average vertical motion. December 12-16, 2016
American Geosciences Union Fall Meeting, San Francisco, CA

Estimates of lower-tropospheric divergence and average vertical motion in the Southern Great Plains region. *ARM Atmospheric System Research meeting, Tysons, VA* May 2-6, 2016

GPS RO technique overview. *Argonne National Laboratory, Lemont, IL* October 2, 2014

Profiling the atmosphere with the airborne RO technique. *National Oceanic and Atmospheric Administration, Boulder, CO* August 8, 2014

GPS radio occultation technique. *National Academy of Sciences of the Republic of Armenia, Yerevan, Armenia* August 29, 2012

Profiling the atmosphere with the airborne RO technique using GPS signals recorded in open-loop mode. *International Radio Occultation Working Group -2. Estes Park, CO* Mar 28-Apr 03, 2012

Airborne RO retrieval results. *University Corporation for Atmospheric Research, Boulder, Colorado* April 26-27, 2011

Observations with the GISMOS airborne RO system. *European Geophysical Union General Assembly, Vienna, Austria* May 2-7, 2010

Profiling the atmosphere with the airborne RO technique. *Armenian State Meteorological Center* May 18, 2008

New atmospheric observations from the airborne GNSS Instrument System for Multistatic and Occultation Sensing. *American Geosciences Union Fall Meeting, San Francisco, CA* December 15-19, 2008

Sounding the atmosphere with the airborne RO technique and its potential application to understanding precipitation in a changing climate. *Purdue Climate Change Research Center Green Week, West Lafayette, IN* September 18, 2008

SKILLS

MATLAB/Octave, Python, Fortran, Mathematica, Bash, Csh, Awk, Sed, HTML, LaTeX
Operating Systems: Linux/Unix, Mac OSX, Microsoft Windows
Specialized Software: GMT, GAMIT, Applanix POSPac
Languages: Armenian (native), English (fluent), Russian (fluent)

PROFESSIONAL SERVICE

Serving Member ARM Clouds and Precipitation Measurements and Science Group Member

Co-facilitator, member of organizing committee Workshop on Research Needs for Offshore Wind Resource Characterization, March 5-6, 2019, Washington D.C.

Reviewer DOE Wind Energy Technologies Program

Reviewer Journal of Geophysical Research

Reviewer Journal of Atmospheric and Oceanic Technology

Reviewer AGU Fall Meeting Student Travel Grant

Reviewer AGU Berkner Travel Fellowship

FIELDWORK EXPERIENCE

- Participated in the set up and evaluation of Beam Steerable Radar Wind Profiler and MPL for Measurements of Aerosols, Radiation and Clouds over the Southern Ocean (MARCUS) campaign.
- Participated in the set up, maintenance, troubleshooting, and data quality assurance efforts for three RWPs and three Sodars for WFIP2.
- Participated in three data collection campaigns with the purpose of validating the airborne radio occultation instrument system.
- Led a group of students in an interdisciplinary data collection campaign devoted to understanding hurricane evolution. Supervised in-field data processing, real-time airborne GPS radio occultation data quality monitoring, and on-the-flight troubleshooting of the instrument system ensuring a successful campaign.

HARDWARE EXPERIENCE

- Daily involvement in RWP, Sodar and MPL operations and troubleshooting at ARM facilities.
- Technical training for Beam Steerable Radar Wind Profiler at DeTect Inc. facilities.
- Hands on experience in the development and testing of airborne GPS radio occultation instrument system. Extensive work with various types of GPS receivers.

OUTREACH ACTIVITIES

Science Careers in Search of Women, Mentor (*Argonne National Laboratory*)	2018 and 2019
Annual Postdoctoral Research and Career Symposium, Organizer and Facilitator *(Argonne National Laboratory)*	2017
Introduce a Girl to Engineering Day, Mentor (*Argonne National Laboratory*)	2017
Illinois SKYWAY STEM Collegiate Conference, Judge (*Elgin Community College*)	2017
Naper Elementary Science Fair, Judge (*Naperville, IL*)	2016
Illinois SKYWAY STEM Collegiate Conference, Judge (*Waubonsee Community College*)	2016
Mary Lou Cowlishaw Elementary Science Fair, Judge (*Naperville, IL*)	2015

WEB PRESENCE

ANL Feature Story on WFIP-2 Article

SigmaSpace's Cover of LASIC MPL Retrievals

ANL Feature Story on WFIP-2 Field Campaign

ANL EVS Feature Story: Mentee Receives AMS Outstanding Student Presentation Award

Faces of ARM Profile

ScienceDaily Highlight on Airborne GPS Radio Occultation Technology

AGU Highlight on Airborne GPS Radio Occultation Technology

Purdue University Highlight on PREDICT Field Campaign

News Highlight on PREDICT Field Campaign

PROFESSIONAL AFFILIATIONS

American Geophysical Union (AGU)	Current
American Meteorological Society (AMS)	Current
National Postdoctoral Association	2015 - 2018
European Geosciences Union (EGU)	2009 - 2011
Women in Science Program, Purdue University *(Head of the departmental branch in 2008-2009)*	2007 - 2012

TEACHING EXPERIENCE

Assistant instructor of Physics — Summer 2005
Gifted Education Resource Institute, Purdue University

Molecular Physics instructor — Spring 2002
L. Shant High School, Yerevan, Armenia