

Mathews S Richardson

SUMMARY	Scientist and software engineer with over 10 years experience in instrument development comfortable working with customers in new environments. Specific work has involved: <ul style="list-style-type: none">• data acquisition and instrument control for optical measurement systems• development of embedded applications on systems utilizing a real time operating system as well as on bare metal• design of control applications for thermal and mechanical systems		
CONTACT INFORMATION	2313 Rockspray Ct Longmont, CO 80503	Phone: (303)931-6760 E-mail: matt.richardson@msrconsults.com	
NETWORKS	<ul style="list-style-type: none">• Github: https://github.com/lo-co• StackExchange: https://stackexchange.com/users/3626794/cirrusio• NI Community: https://decibel.ni.com/content/people/cirrusio		
EDUCATION	Colorado State University , Fort Collins, CO Ph.D., Atmospheric Science, May 2009 Dissertation Title: “Making Real Time Measurements of Ice Nuclei Concentrations at Upper Tropospheric Temperatures: Extending the Capabilities of the Continuous Flow Diffusion Chamber” Advisor: Sonia Kreidenweis Texas A&M University , College Station, TX M.S., Mechanical Engineering, August, 2003 Thesis Title: “A System for Continuous Sampling of Bioaerosols Generated by a Postal Sorting Machine” Advisor: Andrew McFarland University of Texas , Austin, TX B.S., Mechanical Engineering, May, 1999		
CERTIFICATIONS	<ul style="list-style-type: none">• Certified LabVIEW Developer		
COMPUTER SKILLS	<ul style="list-style-type: none">• Languages: C, C++, C#, Ada, Python, Java, Javascript, HTML, CSS, PHP, elm• Applications: MATLAB, L^AT_EX, common Windows database, spreadsheet, and presentation software, Fluent, SolidWorks, LabVIEW, Visual Studio, WebStorm, PyCharm, IntelliJ, NetBeans• Operating Systems: Unix/Linux, Windows		
	Cardinal Peak, LLC , Lafayette, CO <i>Sr Embedded Software Engineer</i> October 2018 - present Work with and provide guidance for a variety of customers in the audio/visual (AV) and internet of things (IoT) space to develop software for embedded systems. Development is driven by agile principles and is primarily in C and C++. Software is deployed on a range of platforms, from bare-metal to those utilizing a real-time operating system. In addition, develop and execute manual and automated test plans for quality assurance.		

EXPERIENCE

MSR Consulting, LLC, Longmont, CO

Software Consultant and Systems Integrator

January 2013 - present

Owner and primary consultant of this National Instruments Alliance Partner company. Work with a variety of companies to develop data acquisition and analysis solutions at all project phases, from product selection to architecting of the system to execution of the software. Developed applications have been deployed on platforms such as the Beaglebone Black as well as on microncontrollers such as those in the STM32 family. These applications have been used to

- aggregate data from a variety of sources for processing, storage and display
- provide feedback control for thermal and mechanical systems
- automate complex control tasks
- provide real time user access to embedded systems

Cooperative Institute for Research in Environmental Sciences, Boulder, CO

Research Associate

December 2008 - October 2018

Serve as principle software engineer in the Cloud and Aerosol Processes group in the Chemical Sciences Division of the National Oceanic and Atmospheric Administration in Boulder. Responsibilities included

- provide recommendations and assemble off the shelf systems for instrument data acquisition systems.
- architect and develop applications for acquiring data from high-performance, one-of-a-kind instrumentation for sampling and analyzing atmospheric aerosol using a variety of languages.
- support airborne and ground-based campaigns utilizing instrumentation developed in the laboratory.
- analyze data and synthesize results from experiments for presentation and publication.

Colorado State University, Fort Collins, CO

Research Assistant

August 2003 - December 2008

Conducted research in the atmospheric chemistry group under Sonia Kreidenweis concerning cold cloud formation.

- Operated and supported further development of the Continuous Flow Diffusion Chamber (CFDC).
- Participated in several ground- and air-based campaigns utilizing the CFDC.
- Developed fluid dynamic models for studying heat and mass transport in the CFDC in connection with a dissertation.
- Conducted ground based experiments to validate model findings of CFDC performance.
- Presented results from experiments and campaigns in a final dissertation.

Texas A&M University, College Station, TX

Research Assistant

January 2002 - August 2003

Conducted research in the Aerosol Technology Laboratory under Andrew McFarland concerning the sampling of bioaerosols.

- Worked with engineers from Siemens to develop a system for sampling bioaerosol from a mail sorting machine.
- Collected and analyzed samples using biological techniques including culturing bacteria.
- Assimilated analyzed data for presentation to the United States Post Office as well as a thesis.

Texas A&M University, College Station, TX

Graduate Teaching Assistant

August 2001- December 2001

Served as graduate assistant for engineering thermodynamics (MEEN 315).

- Graded homework and exams.
- Proctored exams.
- Conducted study sessions.
- Taught when professor was unavailable.

Geologics, Houston, TX

Software Consultant

July 2001

Temporary consulting position to support training operations associated with software developed in capacity with Booz, Allen and Hamilton.

Booz, Allen, and Hamilton, Houston, TX

Software Engineer

December 1999 - May 2001

Developed training models using Ada for the International Space Station in the Structural and Mechanical group as a subcontractor to Raytheon. Assisted in operation of large scale simulations.

PUBLICATIONS

Richardson, M. S., P. J. DeMott, S. M. Kreidenweis, D. Cziczo, E. J. Dunlea, J. L. Jimenez, D. Thomson, L. Ashbaugh, R. D. Borys, D. Westphal, G. Casuccio and T. Lersch (2007), Measurements of heterogeneous ice nuclei in the western United States in springtime and their relation to aerosol characteristics, *J. Geophys. Res.*, 112, D02209, doi:10.1029/2006JD007500.

Prenni, A. J., P. J. DeMott, C. Twohy, M. R Poellot, S. M. Kreidenweis, D. C. Rogers, S. D. Brooks, **M. S. Richardson**, and A. J. Heymsfield (2007), Examinations of ice formation processes in Florida cumuli using ice nuclei measurements of anvil ice crystal particle residues, *J. Geophys. Res.*, 112, D10221, doi:10.1029/2006JD007549.

Richardson, M. S., DeMott, P. J., Kreidenweis, S. M., Petters, M. D., and Carrico, C. M. (2010), Observations of ice nucleation by ambient aerosol in the homogeneous freezing regime, *Geophys. Res. Lett.*, 37, L04806.

DeMott, P. J., Prenni, A. J., Liu, X., Kreidenweis, S. M., Petters, M. D., Twohy, C. H., **Richardson, M. S.**, Eidhammer, T., and Rogers, D. C. (2010). Predicting global atmospheric ice nuclei distributions and their impacts on climate, *Proc. Natl. Acad. Sci.*, 107 (25), 11217-11222. Paciorek, C.J., J.S. Risbey, V. Ventura, and R.D.Rosen. 2002. Multiple indices of Northern Hemisphere Cyclone Activity, Winters 1949-1999, *J. of Climate*, 15:1573-1590.

DeMott, P.J., A.J. Prenni, X. Liu, S.M. Kreidenweis, M.D. Petters, C.H. Twohy, **M.S. Richardson**, T. Eidhammer and D.C. Rogers (2010), Predicting global atmospheric ice nuclei distributions and their impacts on climate, *Proc. Natl. Acad. Sci. U. S. A.*, 107 (25) 11217-11222, issn: 0027-8424, ids: 614KS, doi:10.1073/pnas.0910818107.

Langridge, J.M., **M.S. Richardson**, D. Lack, D. Law and D.M. Murphy (2011), Aircraft Instrument for Comprehensive Characterization of Aerosol Optical Properties, Part I: Wavelength-Dependent Optical Extinction and Its Relative Humidity Dependence Measured Using Cavity Ringdown Spectroscopy, *Aerosol Sci. Technol.*, 45 (11) 1305-1318, issn: 0278-6826, ids: 816MF, doi:10.1080/02786826.2011.592745.

Lack, D.A., **M.S. Richardson**, D. Law, J.M. Langridge, C.D. Cappa, R.J. McLaughlin and D.M. Murphy (2012), Aircraft Instrument for Comprehensive Characterization of Aerosol Optical Properties, Part 2: Black and Brown Carbon Absorption and Absorption Enhancement Measured with Photo Acoustic Spectroscopy, *Aerosol Sci. Technol.*, 46 (5) 555-568, issn: 0278-6826, ids: 912CQ, doi:10.1080/02786826.2011.645955.

Langridge, J.M., **M.S. Richardson**, D.A. Lack, C.A. Brock and D.M. Murphy (2013), Limitations of the Photoacoustic Technique for Aerosol Absorption Measurement at High Relative Humidity, *Aerosol Sci. Technol.*, 47 (11) 1163-1173, issn: 0278-6826, ids: 218VD, doi:10.1080/02786826.2013.827324.

Wagner, N.L., C.A. Brock, W.M. Angevine, A. Beyersdorf, P. Campuzano-Jost, D. Day, J.A. de Gouw, G.S. Diskin, T.D. Gordon, M.G. Graus, J.S. Holloway, G. Huey, J.L. Jimenez, D.A. Lack, J. Liao, X. Liu, M.Z. Markovic, A.M. Middlebrook, T. Mikoviny, J. Peischl, A.E. Perring, **M.S. Richardson**, T.B. Ryerson, J.P. Schwarz, C. Warneke, A. Welti, A. Wisthaler, L.D. Ziemba and D.M. Murphy (2015), In situ vertical profiles of aerosol extinction, mass, and composition over the southeast United States during SENEX and SEAC(4)RS: observations of a modest aerosol enhancement aloft. *Atmos. Chem. Phys.*, 15 (12) 7085-7102, issn: 1680-7316, ids: CL6ZC, doi:10.5194/acp-15-7085-2015.

Brock, C.A., N.L. Wagner, B.E. Anderson, A.R. Attwood, A. Beyersdorf, P. Campuzano-Jost, A.G. Carlton, D.A. Day, G.S. Diskin, T.D. Gordon, J.L. Jimenez, D.A. Lack, J. Liao, M.Z. Markovic, A.M. Middlebrook, N.L. Ng, A.E. Perring, **M.S. Richardson**, J.P. Schwarz, R.A. Washenfelder, A. Welti, L. Xu, L.D. Ziemba and D.M. Murphy (2016), Aerosol optical properties in the southeastern United States in summer - Part 1: Hygroscopic growth, *Atmos. Chem. Phys.*, 16 (8) 4987-5007, issn: 1680-7316, ids: DN3BK, doi:10.5194/acp-16-4987-2016.

Gordon, T.D., N.L. Wagner, **M.S. Richardson**, D.C. Law, D. Wolfe, E.W. Eloranta, C.A. Brock, F. Erdesz and D.M. Murphy (2015), Design of a novel open-path aerosol extinction cavity ringdown spectrometer, *Aerosol Sci. Technol.*, 49 (9) 716-725, issn: 0278-6826, ids: CO4VX, doi:10.1080/02786826.2015.1066753.

Warneke, C., M. Trainer, J.A. de Gouw, D.D. Parrish, D.W. Fahey, A.R. Ravishankara, A.M. Middlebrook, C.A. Brock, J.M. Roberts, S.S. Brown, J.A. Neuman, B.M. Lerner, D. Lack, D. Law, G. Hubler, I. Pollack, S. Sjostedt, T.B. Ryerson, J.B. Gilman, J. Liao, J. Holloway, J. Peischl, J.B. Nowak, K.C. Aikin, K.E. Min, R.A. Washenfelder, M.G. Graus, **M. Richardson**, M.Z. Markovic, N.L. Wagner, A. Welti, P.R. Veres, P. Edwards, J.P. Schwarz, T. Gordon, W.P. Dube, S.A. McKeen, J. Brioude, R. Ahmadov, A. Bougiatioti, J.J. Lin, A. Nenes, G.M. Wolfe, T.F. Hanisco, B.H. Lee, F.D. Lopez-Hilfiker, J.A. Thornton, F.N. Keutsch, J. Kaiser, J.Q. Mao and C.D. Hatch (2016), Instrumentation and measurement strategy for the NOAA SENEX aircraft campaign as part of the Southeast Atmosphere Study 2013, *Atmos. Meas. Tech.*, 9 (7) 3063-3093, issn: 1867-1381, ids: DS9HQ, doi: 10.5194/amt-9-3063-2016.