

Curriculum Vitae

Penny M. Rowe

Research Scientist
Northwest Research Associates
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Affiliate Scientist
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Education Ph.D., Physical Chemistry, University of Washington (2004)
B.S., Chemistry, with honors (minor in mathematics),
University of Puget Sound (1997)

Research History

Research Scientist: NorthWest Research Associates (March 2016 - current)
Research Affiliate / Postdoctoral Research: Universidad de Santiago de Chile (USACH),
Departamento de Física, (Aug. 2014 – current).
Research Affiliate: University of Idaho, Department of Geography (2014-2015).
Postdoctoral Research: University of Idaho, Department of Geography, Research directed
by Prof. Von P. Walden (2004 - 2014).
Graduate Research Assistant: University of Washington, Department of Chemistry,
Research directed by Prof. Stephen G. Warren and Prof. Von P. Walden (1999-2004).
Participated in Surface Heat Budget of the Arctic (SHEBA) program in the Arctic
(Summer 1998).

Refereed Publications

Butterfield, N., Rowe, P. M., Stewart, E., Roesel, D., & Neshyba, S., 2017: Quantitative three-dimensional ice roughness from scanning electron microscopy. *Journal of Geophysical Research: Atmospheres*, 122(5), 3023–3041.

Weaver, D., Strong, K., Schneider, M., Rowe, P. M., Sioris, C., Walker, K. A., et al., 2017: Intercomparison of atmospheric water vapour measurements at a Canadian High Arctic site. *Atmospheric Measurement Techniques*, 10, 2851–2880.

Rowe, P. M., Cox, C., & Walden, V. P., 2016: Toward autonomous surface-based infrared remote sensing of polar clouds: Cloud height retrievals. *Atmospheric Measurement Techniques*, 9, 3641–3659. <http://doi.org/10.5194/amt-9-3641-2016>.

Cox, C., Rowe, P. M., Neshyba, S., & Walden, V. P., 2016: A synthetic data set of high-spectral resolution infrared spectra for the Arctic atmosphere. *Earth System Science Data Discussions*, 1–29. <http://doi.org/10.5194/essd-2015-40>.

Cordero, R. R., Damiani, A., Seckmeyer, G., Jorquera, J., Caballero, M., Rowe, P. M., et al., 2016: The Solar Spectrum in the Atacama Desert. *Scientific Reports*, 6. <http://doi.org/10.1038/srep22457>.

Gladich, I., A. Oswald, N. Bowens, S. Naatz, P. Rowe, M. Roeselova and S. Neshyba, 2015: Mechanism of Anisotropic Surface Self-Diffusivity at the Prismatic Ice-Vapor Interface, *Physical Chemistry Chemical Physics*, 2015, 17, 22947 – 22958, DOI: 10.1039/C5CP01330E.

Cox, C., Walden, V. P., Rowe, P. M., & Shupe, M., 2015: Humidity trends imply increased sensitivity to clouds in a warming Arctic. *Nature Communications*, 6, 10117.

Lubin, D., B.H. Kahn, M.A. Lazzara, P.M. Rowe, and V.P. Walden, 2015: Variability in AIRS-retrieved cloud amount and thermodynamic phase over west versus east Antarctica influenced by the SAM, *Geophys. Res. Lett.*, 42, doi:10.1002/2014GL062285.

Cox, C., V. Walden, G.P. Compo, P.M. Rowe, M. Shupe, and K. Steffen, 2014: Downwelling longwave flux over Summit, Greenland, 2010–2012: Analysis of surface-based observations and evaluation of ERA-Interim using wavelets, *J. Geophys. Res. Atmos.*, 119(21), 12317–12337, doi:10.1002/2014JD021975.

Cox, C.J., D.D. Turner, P.M. Rowe, M.D. Shupe, and V.P. Walden, 2014: Cloud microphysical properties retrieved from downwelling infrared radiance measurements made at Eureka, Nunavut, Canada (2006-2009), *J. Appl. Meteor. Climatol.*, doi: 10.1175/JAMC-D-13-0113.1.

Rowe, P.M., S. Neshyba, and V.P. Walden, 2013: Radiative consequences of low-temperature infrared refractive indices for supercooled water clouds, *Atmos. Chem. Phys.*, 13, 11925-11933, doi: 10.5194/acp-13-11925-2013.

Neshyba, S.P., B. Lowen, M. Benning, A. Lawson, and P.M. Rowe, 2013: Roughness metrics of prismatic facets of ice. *J. Geophys. Res.* (Accepted Jan. 2013, Marked for “Editor Highlight” on the *J. Geophys. Res.* homepage and listed in the Special Research Spotlight of EOS).

Shupe, M., Turner, D. D., Walden, V. P., Bennartz, R., Cadeddu, M. P., Castellani, B. B., Cox, C., D.R. Hudak, M.S. Kulie, N.B. Miller, R.R. Neely, W. Neff, P.M. Rowe, 2013: High and Dry: New Observations of Tropospheric and Cloud Properties above the Greenland Ice Sheet, *B. Am. Meteorol. Soc.*, 169-186, DOI 10.1175/BAMS-D-11-00249.1.

Cox, C.J., V.P. Walden, and P.M. Rowe, 2012: A comparison of the atmospheric conditions at Eureka, Canada and Barrow, Alaska (2006-2008), *J. Geophys. Res.*, 117, D12204 doi: 10.1029/2011JD017164.

Mariani, Z, K. Strong, M. Wolff, P. Rowe, V. Walden, P.F. Fogal, T. Duck, G. Lesins, D.S. Turner, C. Cox, E. Eloranta, J.R. Drummond, C. Roy, D.D. Turner, D. Hudak, and I.A. Lindenmaier, 2012: Infrared measurements in the Arctic using two Atmospheric Emitted Radiance Interferometers, *Atmos. Meas. Tech.*, 5, 329-344; doi:10.5194/amt-5-329-2012.

Rowe, P.M., S. Neshyba, and V.P. Walden, 2011: Responsivity-based criterion for accurate calibration of FTIR emission spectra: Theoretical development and bandwidth estimation, *Optics Express*, 19 (7), 5930-5941; doi:10.1364/OE.19.005930. (See www.opticsinfobase.org/abstract.cfm?uri=oe-19-7-5930.)

Rowe, P.M., S. Neshyba, C.J. Cox, and V.P. Walden, 2011: A responsivity-based criterion for low noise in FTIR emission spectra: Identification of in-band low-responsivity wavenumbers, *Optics Express*, 19 (6), 5451-5463; doi: 10.1364/OE.19.005451. (See www.opticsinfobase.org/abstract.cfm?uri=oe-19-6-5451.)

Walden, V.P., R.L. Tanamachi, P.M. Rowe, H.E. Revercomb, D.C. Tobin, and S.A. Ackerman, 2010: Improvements in the data quality of the Interferometric Monitor of Greenhouse Gases, *Appl. Opt.*, 49, 520-528, doi: 10.1364/AO.49.000520.

Rowe, P., and V.P. Walden, 2009: Improved measurements of the foreign-broadened continuum of water vapor in the 6.3 mm band at -30°C, *Appl. Opt.*, 48, 1358-1365, doi: 10.1364/AO.48.001358.

Rowe, P., L.M. Miloshevich, D.D. Turner, and V.P. Walden 2008: Dry bias in radiosonde humidity profiles over Antarctica, *J. Atmos. Ocean. Tech.*, 25, 1529-1541, doi: 10.1175/2008JTECHA1009.1

Rowe, P., V.P. Walden, and S.G. Warren, 2006: Measurements of the foreign-broadened continuum of water vapor in the 6.3- μm band at -30 C, *Appl. Opt.*, 45 (18), 4366-4382, doi: 10.1364/AO.45.004366.

Rowe, P. M., 2004: Measurements of the Foreign-Broadened Continuum of Water Vapor in the 6.3 micron band at -30 Celsius. University of Washington, Seattle, Washington, 278 pp.

Rathke, C, S. Neshyba, M. D. Shupe, P. Rowe, and A. Rivers, 2002: Radiative and microphysical properties of Arctic stratus clouds from multiangle downwelling infrared radiances, *J. Geophys. Res. A*. 107(D23), 4703, doi:10.1029/2001JD001545 (2002).

Contributed Datasets and Computer code

- Computational Guided Inquiry modules that use Jupyter Notebooks or Excel Worksheets to give undergraduate students hands-on experience obtaining and working with polar research and data (six total).
- Temperature-dependent refractive indices of liquid water:
webspaces.pugetsound.edu/facultypages/nesh/supercooled_water_optical_constants/.
- Code for using the Discrete Ordinates Radiative Transfer (DISORT) program to calculate infrared radiances from python:
https://bitbucket.org/clarragroup/rundisort_py and Matlab/Octave:
https://bitbucket.org/clarragroup/rundisort_mat.
- A pedagogical code illustrating cloud-property inverse retrievals from infrared spectra: <https://bitbucket.org/cgigroup/greybodyretrieval>.
- Simulated line-by-line clear and cloudy sky infrared radiances for atmospheric profiles characteristic of the Arctic, archived at the NSF Arctic Data Center:
[https://arcticdata.io/catalog/ - view/doi:10.5065/D61J97TT](https://arcticdata.io/catalog/-view/doi:10.5065/D61J97TT).

Invited Science Talks

Retrievals of polar cloud properties from infrared radiance spectra, Thompson Hall Science and Mathematics Seminars, University of Puget Sound, September 19, 2013.

Importance of new Temperature-Dependent Refractive Indices of Water for Simulated Thermal Emission from Super-Cooled Liquid Water Clouds, Noble Seminar Series. Reginald and Murial Noble Fund, University of Toronto Atmospheric Physics Group, November 5, 2012.

Research Mentoring Experience

Katie Gray: Computational Guided Inquiry for bringing polar data into undergraduate classrooms. May-June 2018.

Emma Sevier: Computational Guided Inquiry for bringing polar data into undergraduate classrooms. May-June 2018.

Mathew Fergoda: Infrared radiance of Antarctic Clouds. Summers 2017 and 2018.

Connor Krill: Infrared radiance of Antarctic Clouds. Summer 2017.

Aedin M. Wright: Temperature inversions in radiosoundings and Computational Guided Inquiry for bringing polar data into undergraduate classrooms. October 2016 – August 2018.

Edgardo Sepulveda Araya: Clouds and atmospheric structure over King George Island, Antarctica. March 2016 – current.

U.S. and Chilean graduate and undergraduate students: Snow sampling and filtering for black carbon in the Chilean Andes, Austral winters 2015, 2017. U.S. students include Alec Pankow and Emily Stewart of the University of Puget Sound.

Alessio Spassiani: NSERC CREATE Undergraduate Summer Internship, June - August 2011.

Public Outreach

Organized and implemented Spanish language translation for High-Adventure Science online educational module (HAS.concord.org; “What is the Future of Earth’s Climate?”). (Completed 2018).

STEM Career fair panelist at Sammamish High School, Bellevue, WA, May 2017.

Participated in the Pacific Science Center Polar Science Weekend with an exhibit “Where is the Polar Front?” Seattle, WA (2015)

Judge for the Bryant Middle School Science Fair (2011, 2012, 2014, 2015)

Participated in the University of Puget Sound Art+Science salon hosted by the Tacoma Art Museum, Tacoma, WA (2013)

Numerous Presentations to Elementary, Middle, and High School students:

- Seabury Middle School, “The Greenhouse Effect and Climate Change,” Tacoma, WA, Oct. 11, 2016.
- Colegio Aleman de Valparaiso (High School), “Climate Change and Atmospheric Science in the Cryosphere,” Vina del Mar, Chile, June 20, 2016.
- Sammamish High School (High School chemistry class), “Infrared Spectra of Clouds and Greenhouse Gases”, Bellevue, WA, 2013.
- University of Puget Sound (Undergraduate chemistry class), “Infrared Spectra of Clouds and Greenhouse Gases”, Tacoma, WA, 2013.
- Bryant Elementary (elementary class), “Cloud in a jar,” Tacoma, WA, 2012.