

Debra Wunch

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Education

Ph.D.: Atmospheric Physics, University of Toronto, Supervisor: J.R. Drummond, 2007

M.Sc.: Atmospheric Physics, University of Toronto, Supervisor: J.R. Drummond, 2002

B.Sc.: Physics, University of Toronto, 2000

Research Experience

ACOS Validation Lead December 2009–Present
Professor Paul O. Wennberg California Institute of Technology
Analyse, validate and calibrate data from the Total Carbon Column Observing Network (TCCON), maintain the Park Falls, WI and Lamont, OK TCCON stations, improve retrievals for the Atmospheric Chemistry Experiment (ACE)-FTS, and participate in Greenhouse gas Observing Satellite (GOSAT) validation.

Postdoctoral Scholar January 2007–December 2009
Professor Paul O. Wennberg California Institute of Technology
Analyse data from the Total Carbon Column Observing Network (TCCON), maintain the Park Falls, WI and Lamont, OK TCCON stations, improve retrievals for the Atmospheric Chemistry Experiment (ACE)-FTS, and participate in Greenhouse gas Observing Satellite (GOSAT) validation.

Research Assistant Summer 2000
Professor James R. Drummond University of Toronto
Participated in the MANTRA 2000 high-altitude balloon field campaign by preparing a nitric acid radiometer for flight.

Research Assistant Summer 1999
Dr. Pierre F. Fogal University of Denver
Worked with data from an emission Fourier transform spectrometer, situated in Eureka, NU, Canada, to determine cloud temperature and height.

Research Assistant Summer 1998
Professor Kimberly Strong University of Toronto
Participated in the MANTRA 1998 high-altitude balloon field campaign. Assisted in preparing a Nitric Acid Radiometer for flight.

Awards Received

Seymour H. Vosko Memorial Prize 2005–2006
A departmental award supporting women graduate students in physics.

NSERC PGS-B and MSC Supplement 2003–2005
A national award from the Natural Sciences and Engineering Research Council of Canada.
The MSC supplement is awarded by the Meteorological Service of Canada.

Ontario Graduate Scholarship 2002–2003
An Ontario government graduate student scholarship.

Publications

D. Wunch, P. O. Wennberg, G. C. Toon, G. Keppel-Aleks, and Y. G. Yavin. **Emissions of greenhouse gases from a North American megacity**, *Geophys. Res. Lett.*, **36**, L15810, 2009.

D. Wunch, J. R. Taylor, D. Fu, P. Bernath, J. R. Drummond, C. Midwinter, K. Strong and K. A. Walker. **Simultaneous observations of O₃, HCl, N₂O and CH₄ over Toronto by three ground-based Fourier transform spectrometers with different resolutions**, *Atmos. Chem. Phys.*, **7**, 2007.

D. Wunch, C. Midwinter, J. R. Drummond, C. T. McElroy and A.-F. Bagès. **University of Toronto's balloon-borne Fourier transform spectrometer**. *Rev. Sci. Instr.*, **77**, 2006.

D. Wunch, M. P. Tingley, T. G. Shepherd, J. R. Drummond, G. W. K. Moore, K. Strong. **Climatology and Predictability of the Late Summer Stratospheric Zonal Wind Turnaround over Vanscoy, Saskatchewan**. *Atmos.-Ocean*, **43**(4), 2005.

J. R. Taylor, D. Wunch, C. Midwinter, A. Wiacek, J. R. Drummond and K. Strong. **Extended intercomparison of simultaneous ground-based FTIR observations at the Toronto Atmospheric Observatory**. *JQSRT*, **104**(13), 2008.

A. Fraser, P. F. Bernath, R. D. Blatherwick, J. R. Drummond, P. F. Fogal, D. Fu, F. Goutail, T. E. Kerzenmacher, C. T. McElroy, C. Midwinter, J. R. Olsen, K. Strong, K. A. Walker, D. Wunch and I. J. Young. **Intercomparison of ground-based ozone and NO₂ measurements during the MANTRA 2004 Campaign**. *Atmos. Chem. Phys.*, **7**, pp. 5489-5499, 2007.

M. Toohey, B.M. Quine, K. Strong, P.F. Bernath, C.D. Boone, A.I. Jonsson, C.T. McElroy, K.A. Walker and D. Wunch. **Balloon-borne radiometer measurement of Northern Hemisphere mid-latitude stratospheric HNO₃ profiles spanning 12 years**. *Atmos. Phys. Chem. Discuss.*, **7**, 11561-11586, 2007.

B. M. Quine, M. Toohey, J. R. Drummond, K. Strong, D. Wunch, C. Midwinter and C. T. McElroy. **The Concentration Profile of Nitric Acid and Other Species over Saskatchewan in August 1998: Retrieval from Data Recorded by Thermal-Emission Radiometry**. *Atmos.-Ocean*, **43**(4), p. 361-376, December 2005.

K. Strong et al. **MANTRA—A Balloon Mission to Study the Odd-Nitrogen Budget of the Stratosphere**. *Atmos.-Ocean*, **43**(4), p. 283-299, December 2005.

B. M. Quine, K. Strong, A. Wiacek, D. Wunch, J. A. Anstey, and J. R. Drummond. **Scanning the Earth's Limb from a High-Altitude Balloon: the Development and Flight of a New Balloon-Based Pointing System.** *J. Atmos. Ocean. Tech.*, **19**, p. 618-632, May 2002.

Conference Presentations and Posters

D. Wunch, G. C. Toon, S. C. Wofsy, B. B. Stephens, J. L. Blavier, G. Keppel-Aleks, V. Sherlock, B. J. Connor, N. M. Deutscher, D. W. Griffith, R. Macatangay, P. O. Wennberg. **A Calibration for the Total Carbon Column Observing Network using HIPPO Aircraft Profiles.** Oral presentation at the *American Geophysical Union Fall Meeting*, San Francisco, USA, December 14 - 18, 2009. A44A-02.

D. Wunch, P. O. Wennberg, G. C. Toon, G. Keppel-Aleks, Y. G. Yavin. **Methane, carbon dioxide and carbon monoxide budgets for the Los Angeles area from September 2007 through June 2008.** Poster presented at the *American Geophysical Union Fall Meeting*, San Francisco, USA, December 15-19, 2008.

D. Wunch, G. C. Toon, P. O. Wennberg, S. McLeod, P. Bernath, J. Wright, A. Sobel. **HDO:H₂O ratios in the tropical UTLS from the ACE-FTS.** Poster presented at the *American Geophysical Union Fall Meeting*, San Francisco, USA, December 10-14, 2007.

D. Wunch, J. R. Drummond, C. Midwinter, J. R. Taylor, K. Strong. **The University of Toronto's Balloon-Borne Fourier Transform Spectrometer.** Oral presentation at the *Committee on Space Research Conference*, Beijing, China, July 16-22, 2006. COSPAR paper number A1.1-0068-06.

D. Wunch, M. Tingley, G. W. K. Moore, T. G. Shepherd, D. Sankey, K. Strong, J. R. Drummond. **Can We Predict the Late Summer Turnaround in Zonal Wind over Vanscoy?** Oral presentation to the *Canadian Meteorological and Oceanic Society*, Ottawa, ON, June 2-5, 2003.

B. Quine, K. Strong, J. Drummond, J. McConnell, T. McElroy, F. Murcray, B. Solheim, D. Sommerfeldt, R. Blatherwick, J. Davies, P. Fogal, J. Kosters, C. Laurin, C. Midwinter, J. Olsen and D. Wunch. **Inter-comparison of Trace Gas Profiles Measured by Emission Radiometer, FTIR, UV-Spectrometer and Sonde during the MANTRA (Middle Atmosphere Nitrogen Trend Assessment) 1998 and 2000 Balloon Missions.** Oral presentation at the *IAMAS Congress*, Innsbruck, Austria, July, 2001.

B. Quine et al. **MANTRA 2000: Middle Atmosphere Nitrogen Trend Assessment: The 2000 Balloon Mission.** Oral presentation to the *Canadian Association of Physicists, Division of Atmospheric and Space Physics* 2001 Winter Workshop, Saskatoon, SK, February 23-24, 2001.

B. M. Quine, J. R. Drummond, K. Strong, D. Wunch, C. Midwinter, and C. T. McElroy. **The Retrieval of Volume Mixing Ratio Profiles by Forward Estimation: Profile Results from Emission Radiometers Flown on the MANTRA 1998 Balloon Mission, Saskatoon Canada, August 1998.** Oral presentation to the *Canadian Association*

of Physicists, Division of Atmospheric and Space Physics 2000 Winter Workshop, Toronto, ON, February 17–18, 2000.

B. M. Quine, J. R. Drummond, C. T. McElroy, C. Midwinter, K. Strong, and D. Wunch. **The Retrieval of Nitric Acid, Ozone, CFC-11 and CFC-12 Profiles Using Balloon-Based Emission Radiometry During the 1998 MANTRA Campaign.** Oral presentation to the 1999 Spring Meeting of the *American Geophysical Union*, Boston, MA, May 31–June 4, 1999.

Workshop Presentations and Posters

Debra Wunch, Paul Wennberg, Geoff Toon, Gretchen Keppel Aleks, Yael Yavin. **Emissions of CH₄ and CO in the Los Angeles Area.** Presentation at the *Network for the Detection of Atmospheric Composition Change, Infrared Working Group Meeting – TCCON Subgroup*, Garmisch, Germany, June 11, 2009.

D. Wunch, P. O. Wennberg, G. C. Toon, and G. Keppel-Aleks. **The Airmass Dependence of CO₂ from the Park Falls, Darwin and JPL TCCON Sites.** Presentation at the *Network for the Detection of Atmospheric Composition Change, Infrared Working Group Meeting – TCCON Subgroup*, Pasadena, CA, USA, May 15, 2008.

D. Wunch, G. Toon, P. Wennberg and G. Keppel-Aleks. **Investigating the ILS of the Brüker IFS 125 HR in the NIR.** Presentation at the *Network for the Detection of Atmospheric Composition Change Infrared Working Group Meeting*, Tenerife, Spain, May 1–5, 2007.

D. Wunch, J. R. Drummond, C. Midwinter, J. R. Taylor, D. Fu, P. Bernath, C. T. McElroy, T. G. Shepherd, K. Strong, M. P. Tingley, K. A. Walker. **MANTRA, Turnaround, and the University of Toronto’s Balloon-Borne Fourier Transform Spectrometer.** Poster presented at the *Community Workshop on Science from Suborbital Vehicles*, Toronto, ON, February 1–2, 2007.

D. Wunch, J. R. Taylor, J. R. Drummond, C. Midwinter, K. Strong and H. Fast. **The University of Toronto’s Balloon-Borne Fourier Transform Spectrometer.** Poster presented at the *Canadian Meteorological and Oceanic Society Congress*, Toronto, ON, May 29–June 1, 2006.

D. Wunch, J. R. Taylor, J. R. Drummond, C. Midwinter, D. Fu and K. Walker. **The University of Toronto’s Balloon-Borne Fourier Transform Spectrometer and the Mini-MANTRA Ground-Based Campaign.** Poster presented at the *Canadian Space Agency Niche Workshop*, Montreal, QC, September 29–30, 2005.

D. Wunch, J. R. Drummond, C. Midwinter, J. Taylor, K. Strong, H. Fast. **The University of Toronto’s Balloon-Borne Fourier Transform Spectrometer.** Oral presentation to the *Network for the Detection of Stratospheric Change Infrared Working Group Annual Meeting*, Toronto, ON, June 13–15, 2005.

D. Wunch, J. R. Drummond, C. Midwinter, K. Strong, H. Fast. **The University of**

Toronto's Balloon-Borne Fourier Transform Spectrometer. Oral presentation to the *Atmospheric Science from Space using Fourier Transform Spectrometry 12th Workshop*, Quebec City, QC, May 18–20, 2005.

D. Wunch, J. R. Drummond, C. Midwinter and H. Fast. **The University of Toronto's Balloon-Borne Fourier Transform Spectrometer.** Poster presented at the *Canadian Space Agency Atmospheric Environment Workshop*, Banff, AB, May 5–7, 2005.

D. Wunch, M. Tingley, G. W. K. Moore, T. G. Shepherd, D. Sankey, K. Strong, J. R. Drummond. **Can We Predict the Fall Turnaround in Zonal Wind over Vanscoy?** Oral presentation to the 10th *Global Chemistry for Climate Workshop*, Toronto, ON, December 16–17, 2002.

D. Wunch, J. R. Drummond, K. Strong, H. Fast, P. Fogal. **Preparing a Bomem DA5 Fourier Transform Spectrometer for Flight aboard the MANTRA 2002 Balloon.** Poster presentation at the 4th *Canadian Space Agency Atmospheric Environment Workshop*, London, ON, May 15–17, 2002.

D. Fu, K. A. Walker, K. Sung, C. Boone, R. Skelton, P. Bernath, J. R. Taylor, D. Wunch, K. Strong and J. R. Drummond. **PARIS-IR Ground-based Observation in Summer 2005.** Poster presentation at the 21st *Annual Symposium On Chemical Physics* in Waterloo, ON, October 28–30, 2005.