

## Sean P. Burns

P.O. Box 3000, Boulder, CO 80307  
Phone: (303) 497-8934

sean@ucar.edu  
<http://www.mmm.ucar.edu/people/burns/>

### PROFESSIONAL EXPERIENCE:

- 2008 Associate Scientist III, National Center of Atmospheric Research, Boulder, Colorado.  
Supervisors: Dr. Jielun Sun, (303) 497-8994 and Dr. Britt Stephens, (303) 497-1018.
- 2003 Professional Research Assistant, Department of Ecology and Evolutionary Biology,  
University of Colorado.  
Supervisor: Professor Russell Monson, (303) 492-6319.
- 2001 Professional Research Assistant, Program in Atmospheric and Oceanic Sciences, University of Colorado.  
Supervisor: Dr. Jielun Sun, (303) 497-8994.
- 1999 Associate Scientist II, National Center of Atmospheric Research, Boulder, Colorado.  
Supervisor: Dr. Jielun Sun, (303) 497-8994.
- 1997 Assistant Specialist, Department of Mechanical Engineering, University of California, Irvine.  
Supervisor: Professor Carl Friehe, (949) 824-6159.

### RESEARCH EXPERIENCE:

- Maintained CO<sub>2</sub> instrumentation for the ROCKY RACCOON project (<http://raccoon.ucar.edu>).
- Managed a meteorological/flux tower in the forest below Niwot Ridge, Colorado; maintained tower instrumentation, processed tower data, and distributed data to the AmeriFlux community.
- Participated in field projects CHATS, CASES-99 and SHOWEX. Helped set-up and maintain thermocouple data collection. Processed the thermocouple data for other science groups to use.
- Maintained webpages at the University of Colorado ([http://urquell.colorado.edu/data\\_ameriflux/](http://urquell.colorado.edu/data_ameriflux/)) and NCAR (<http://www.mmm.ucar.edu/abl/>) to exchange data and information.
- Participated in the TOGA COARE field experiment. Resided in the Solomon Islands for four months, and flew aboard the NOAA WP-3D aircraft as a research scientist. Processed the WP-3D data and organized the data archives.
- Developed software to process the WP-3D “hi-rate” 40-Hz aircraft data for turbulent flux calculations, and supplied these data to other researchers.
- Extensive comparisons of COARE aircraft, ship, and buoy data.

### EDUCATION:

- 1993 M.S. Engineering, University of California, Irvine, Irvine, CA.  
- Thesis Title: The Effect of Turbulence on the Average Heat Transfer from a Cylinder in Crossflow.  
- Research Adviser: Dr. John LaRue.  
- Coursework: Fluid Mechanics, Turbulence, Digital Data Analysis, Statistical Thermodynamics.
- 1990 B.S. Mathematics, University of Washington, Seattle, WA.  
- Concentration in Mechanical Engineering with emphasis on Power and Fluid Dynamics.

### PUBLICATIONS (lead author):

**Burns, S.P.**, J. Sun, D.H. Lenschow, S.P. Oncley, B.B. Stephens, C. Yi, D.E. Anderson, J. Hu, and R.K. Monson, 2010: Atmospheric stability effects on wind fields and scalar mixing within and just above a subalpine forest in sloping terrain. *Boundary-Layer Meteorology*, Online First, doi:10.1007/s10546-010-9560-6

**Burns, S.P.**, A.C. Delany, J. Sun, B.B. Stephens, S.P. Oncley, G.D. Maclean, S.R. Semmer, J. Schröter, and J. Ruppert, 2009: An evaluation of calibration techniques for in situ carbon dioxide measurements using a programmable portable trace-gas measuring system. *Journal of Atmospheric and Oceanic Technology*, **26**, 291–316, doi:10.1175/2008JTECHA1080.1

**Burns, S.P.**, J. Sun, A.C. Delany, S.R. Semmer, S.P. Oncley, and T.W. Horst, 2003: A field intercomparison technique to improve the relative accuracy of longwave radiation measurements and an evaluation of CASES-99 pyrgeometer data quality. *Journal of Atmospheric and Oceanic Technology*, **20**, 348–361.

**Burns, S.P.**, D. Khelif, C.A. Friehe, A.G. Williams, P. Hignett, A.L.M. Grant, J.M. Hacker, D.E. Hagan, Y.L. Serra, D.P. Rogers, E.F. Bradley, R.A. Weller, M.F. Cronin, S.P. Anderson, C.W. Fairall, C.A. Paulson, and P.A. Coppin, 2000: Comparisons of aircraft, ship, and buoy radiation and SST measurements from TOGA COARE. *Journal of Geophysical Research*, **105**, 15,627–15,652.

**Burns, S.P.**, D. Khelif, C.A. Friehe, A.G. Williams, P. Hignett, A.L.M. Grant, J.M. Hacker, D.P. Rogers, E.F. Bradley, R.A. Weller, M.F. Cronin, S.P. Anderson, C.W. Fairall, and C.A. Paulson, 1999: Comparisons of aircraft, ship, and buoy meteorological measurements from TOGA COARE. *Journal of Geophysical Research*, **104**, 30,853–30,884.

#### **PUBLICATIONS (co-author):**

Yi, C., et. al., 2010: Climate control of terrestrial carbon exchange across biomes and continents. *Environmental Research Letters*, **5** (3), 0304007 (10 pp), doi:10.1088/1748-9326/5/3/034007

Sun, J., S. P. Oncley, **S. P. Burns**, B. B. Stephens, D. H. Lenschow, et al., 2010: A multiscale and multidisciplinary investigation of ecosystem-atmosphere CO<sub>2</sub> exchange over the Rocky Mountains of Colorado. *Bulletin of the American Meteorological Society*, **91** (2), 209–230, doi:10.1175/2009BAMS2733.1

Hu, J., D. J. P. Moore, D. A. Riveros-Iregui, **S. P. Burns**, and R. K. Monson, 2010: Modeling whole-tree carbon assimilation rate using observed transpiration rates and needle sugar carbon isotope ratios. *New Phytologist*, **185**, 1000–1015, doi:10.1111/j.1469-8137.2009.03154.x

Xiao, J., et. al., 2010: A continuous measure of gross primary production for the conterminous United States derived from MODIS and AmeriFlux data. *Remote Sensing of Environment*, **114**, 576–591, doi:10.1016/j.rse.2009.10.013

Monson, R. K., M.R. Prater, J. Hu, **S. P. Burns**, J. P. Sparks, K. L. Sparks, and L.E. Scott-Denton, 2010: Tree species effects on ecosystem water-use efficiency in a high-elevation, subalpine forest. *Oecologia*, **162** (2), 491–504, doi: 10.1007/s00442-009-1465-z

Hu, J., D. J. P. Moore, **S. P. Burns**, and R. K. Monson, 2010: Longer growing seasons lead to less carbon sequestration by a subalpine forest. *Global Change Biology*, **16**, 771–783, doi:10.1111/j.1365-2486.2009.01967.x

Bowling, D. R., J. B. Miller, M. E. Rhodes, **S. P. Burns**, R. K. Monson, and D. Baer, 2009: Soil, plant, and transport influences on methane in a subalpine forest under high ultraviolet irradiance. *Biogeosciences*, **6**, 1311–1324

Molotch, N. P., P. D. Brooks, **S. P. Burns**, M. Litvak, R. K. Monson, J. R. McConnell, and K. Musselman, 2009: Ecohydrological controls on snowmelt partitioning in mixed-conifer sub-alpine forests. *Ecohydrology*, **2**, 129–142, doi:10.1002/eco.48

Blanken, P. D., M. W. Williams, **S. P. Burns**, R. K. Monson, J. Knowles, K. Chowanski, and T. Ackerman, 2009: A comparison of water and carbon dioxide exchange at a windy alpine tundra and subalpine forest site near Niwot Ridge, Colorado. *Biogeochemistry*, **95**, 61–76, doi:10.1007/s10533-009-9325-9

Turnipseed, A. A., **S. P. Burns**, D. J. P. Moore, J. Hu, A. B. Guenther, and R. K. Monson, 2009: Controls over ozone deposition to a high elevation subalpine forest. *Agricultural and Forest Meteorology*, **149**, 1447–1459, doi:10.1016/j.agrformet.2009.04.001

Oncley, S. P., K. Schwenz, **S. P. Burns**, J. Sun, and R. K. Monson, 2009: A cable-borne tram for atmospheric measurements along transects. *Journal of Atmospheric and Oceanic Technology*, **26**, 462–473, doi:10.1175/2008JTECHA1158.1

Bowling, D. R., W. J. Massman, S. M. Schaeffer, **S. P. Burns**, R. K. Monson, and M. W. Williams, 2009: Biological and physical influences on the carbon isotope content of CO<sub>2</sub> in a subalpine forest snowpack, Niwot Ridge, Colorado. *Biogeochemistry*, **95**, 37–59, doi:10.1007/s10533-008-9233-4

Yi, C., D. E. Anderson, A. A. Turnipseed, **S. P. Burns**, J. P. Sparks, D. I. Stannard, and R. K. Monson, 2008: The contribution of advective fluxes to net ecosystem CO<sub>2</sub> exchange in a high elevation, subalpine forest. *Ecological Applications*, **18**, 1379–1390, doi:10.1890/06-0908.1

Xiao, J., et. al., 2008: Estimation of net ecosystem carbon exchange for the conterminous United States by combining MODIS and AmeriFlux data. *Agricultural and Forest Meteorology*, **148**, 1827–1847, doi:10.1016/j.agrformet.2008.06.015

## PUBLICATIONS (CON'T):

- Zobitz, J. M., **S. P. Burns**, M. Reichstein, and D. R. Bowling, 2008: Partitioning net ecosystem carbon exchange and the carbon isotopic disequilibrium in a subalpine forest. *Global Change Biology*, **14**, 1785–1800, doi:10.1111/j.1365-2486.2008.01609.x.
- Schaeffer, S.M., D.E. Anderson, **S.P. Burns**, R.K. Monson, J. Sun, and D.R. Bowling, 2008: Canopy structure and atmospheric flows in relation to the  $\delta^{13}\text{C}$  of respired  $\text{CO}_2$  in a subalpine coniferous forest. *Agricultural and Forest Meteorology*, **148**, 592–605, doi:10.1016/j.agrformet.2007.11.003
- Zobitz, J.M., **S.P. Burns**, J. Ogee, M. Reichstein, and D.R. Bowling, 2007: Partitioning net ecosystem exchange of  $\text{CO}_2$ : A comparison of a Bayesian/isotope approach to environmental regression methods. *Journal of Geophysical Research*, **112**, G03013, doi:10.1029/2006JG000282.
- Sun, J., **S.P. Burns**, A.C. Delany, S.P. Oncley, A.A. Turnipseed, B.B. Stephens, D.H. Lenschow, M.A. LeMone, R.K. Monson, and D.E. Anderson, 2007:  $\text{CO}_2$  transport over complex terrain. *Agricultural and Forest Meteorology*, **145**, 1–21, doi:10.1016/j.agrformet.2007.02.007.
- Monson, R.K., **S.P. Burns**, M.W. Williams, A.C. Delany, M. Weintraub, and D.A. Lipson, 2006: The contribution of beneath-snow soil respiration to total ecosystem respiration in a high-elevation, subalpine forest. *Global Biogeochemical Cycles*, **20**, GB3030, doi:10.1029/2005GB002684.
- Heinsch, F.A., et. al., 2006: Evaluation of remote sensing based terrestrial productivity from MODIS using regional tower eddy flux network observations. *IEEE Transactions On Geoscience And Remote Sensing*, **44**, 1908–1925, doi:10.1109/TGRS.2005.853936.
- Monson, R.K., D.L. Lipson, **S.P. Burns**, A.A. Turnipseed, A.C. Delany, M.W. Williams, and S.K. Schmidt, 2006: Winter forest soil respiration controlled by climate and microbial community composition. *Nature*, **439**, doi:10.1038/nature04555.
- Yi, C., R.K. Monson, Z. Zhai, D.E. Anderson, B. Lamb, G. Allwine, A.A. Turnipseed, and **S.P. Burns**, 2005: Modeling and measuring the nighttime drainage flow in a high-elevation, subalpine forest with complex terrain. *Journal of Geophysical Research*, **110**, D22303, doi:10.1029/2005JD006282.
- Monson, R.K., J.P. Sparks, T.N. Rosenstiel, L.E. Scott-Denton, T.E. Huxman, P.C. Harley, A.A. Turnipseed, **S.P. Burns**, B. Backlund, and J. Hu, 2005: Climatic influences on net ecosystem  $\text{CO}_2$  exchange during the transition from wintertime carbon source to springtime carbon sink in a high-elevation, subalpine forest. *Oecologia*, **146** (1), 130–147.
- Bowling, D.R., **S.P. Burns**, T.J. Conway, R.K. Monson, and J.W.C White, 2005: Extensive observations of  $\text{CO}_2$  carbon isotope content in and above a high-elevation subalpine forest. *Global Biogeochemical Cycles*, **19**, GB3023, doi:10.1029/2004GB002394.
- Sun J., **S.P. Burns**, D. Vandemark, M.A. Donelan, L. Mahrt, T.L. Crawford, T.H.C. Herbers, G.H. Crescenti, and J.R. French, 2005: Measurement of directional wave spectra using aircraft laser altimeters. *Journal of Atmospheric and Oceanic Technology*, **22**, 869–885.
- Yi, C., R. Li, P.S. Bakwin, A. Desai, D.M. Ricciuto, **S.P. Burns**, A.A. Turnipseed, S.C. Wofsy, J.W. Munger, K. Wilson, and R.K. Monson, 2004: A nonparametric method for separating photosynthesis and respiration components in  $\text{CO}_2$  flux measurements. *Geophysical Research Letters*, **31**, L17107.
- Turnipseed, A.A., D.E. Anderson, **S. Burns**, P.D. Blanken, and R.K. Monson, 2004: Airflows and turbulent flux measurements in mountainous terrain: Part 2: Mesoscale effects. *Agricultural and Forest Meteorology*, **125**, 187–205.
- Sun J., D.H. Lenschow, **S.P. Burns**, R.M. Banta, R.K. Newsom, R. Coulter, S. Frasier, T. Ince, C. Nappo, B.B. Balsley, M. Jensen, L. Mahrt, D. Miller, and B. Skelly, 2004: Atmospheric disturbances that generate intermittent turbulence in nocturnal boundary layers. *Boundary-Layer Meteorology*, **110**(2), 255–279.
- Sun J., **S.P. Burns**, A.C. Delany, S.P. Oncley, T.W. Horst, and D.H. Lenschow, 2003: Heat balance in the nocturnal boundary layer during CASES-99. *Journal of Applied Meteorology*, **42**, 1649–1666.
- Poulos, G.S., and **S.P. Burns**, 2003: An evaluation of bulk Ri-based surface layer flux formulas for stable and very stable conditions with intermittent turbulence. *Journal of the Atmospheric Sciences*, **60** (20), 2523–2537.
- Sun, J., **S.P. Burns**, D.H. Lenschow, R. Banta, R. Newsom, R. Coulter, S. Frasier, T. Ince, C. Nappo, W. Blumen, X. Lee, X.Z. Hu, 2002: Intermittent turbulence associated with a density current passage in the stable boundary layer. *Boundary-Layer Meteorology*, **105**, 199–219.

**PUBLICATIONS (CON'T):**

Poulos, G.S., W. Blumen, D.C. Fritts, J.K. Lundquist, J. Sun, **S.P. Burns**, C. Nappo, R. Banta, R. Newsom, J. Cuxart, E. Terradellas, B. Balsley, and M. Jensen, 2002: CASES-99: A comprehensive investigation of the stable nocturnal boundary layer. *Bulletin of the American Meteorological Society*, **83**, 555–581.

Mahrt, L., D. Vickers, R. Nakamura, M.R. Soler, J. Sun, **S.P. Burns**, and D.H. Lenschow, 2001: Shallow Drainage Flows. *Boundary-Layer Meteorology*, **101**, 243–260.

Blumen, W., R. Banta, **S.P. Burns**, D.C. Fritts, R. Newsom, G.S. Poulos, and J. Sun, 2001: Turbulence statistics of a Kelvin-Helmholtz billow event observed in the night-time boundary layer during the Cooperative Atmosphere-Surface Exchange Study field program. *Dynamics of Atmos. and Oceans*, **34**, 189–204.

Khelif, D., **S.P. Burns**, and C.A. Friehe, 1999: Improved wind measurements on research aircraft, *Journal of Atmospheric and Oceanic Technology*, **16**, 860–875.

Walsh, E.J., R. Pinkel, D.E. Hagan, R.A. Weller, C.W. Fairall, D.P. Rogers, **S.P. Burns**, and M. Baumgartner, 1998: Coupling of internal waves on the main thermocline to the diurnal surface layer and sea surface temperature during the Tropical Ocean Global Atmosphere Coupled Ocean-Atmosphere Response Experiment. *Journal of Geophysical Research*, **103**, 12613–12628.

Walsh, E.J., D.E. Hagan, D.P. Rogers, R. Pinkel, R.A. Weller, C.W. Fairall, C.A. Friehe, **S.P. Burns**, D. Khelif, D.C. Vandemark, R.N. Swift, and J.F. Scott, 1998: Observations of sea surface mean square slope under light wind during the TOGA COARE experiment. *Journal of Geophysical Research*, **103**, 12603–12612.

Walsh, E.J., D.C. Vandemark, C.A. Friehe, **S.P. Burns**, D. Khelif, and R.N. Swift, 1998: Measuring sea surface mean square slope with a 36 Ghz scanning radar altimeter. *Journal of Geophysical Research*, **103**, 12587–12601.

**Burns S.P.**, 1993: The effect of turbulence on the average heat transfer from a cylinder in crossflow. *M.Sci. Thesis*, Department of Mechanical Engineering, University of California, Irvine.

### SCIENTIFIC MEETINGS and WORKSHOPS:

**Burns, S.P.**, A.A. Turnipseed, D.R. Bowling, J. Hu, and R.K. Monson, 2009: Ten-year variability in fluxes, meteorology, and environmental conditions at a Colorado subalpine forest. Poster, *2009 AGU Fall Meeting*, San Francisco, CA, American Geophysical Union, 14-18 December.

**Burns, S.P.**, R.K. Monson, M.V. Losleben, A.A. Turnipseed, M.W. Williams, and N.P. Molotch, 2006: Measurements of snowpack temperature in a Colorado subalpine forest. Poster, *2006 AGU Fall Meeting*, San Francisco, CA, American Geophysical Union, 11-15 December.

**Burns, S.P.**, J. Sun, S.P. Oncley, A.C. Delany, B.B. Stephens, D.E. Anderson, D.S. Schimel, D. H. Lenschow, and R.K. Monson, 2006: Measurements of the diurnal cycle of temperature, humidity, wind, and carbon dioxide in a subalpine forest during the Carbon in the Mountains Experiment (CME04). Preprints, *17th Symposium on Boundary Layers and Turbulence and 27th Conference on Agricultural and Forest Meteorology*, San Diego, CA, American Meteorological Society, JP4.7.

**Burns, S.P.**, J. Sun, S.P. Oncley, A.A. Turnipseed, C. Yi, D. Lenschow, and R.K. Monson, 2006: An evaluation of in-canopy flux measurements. Poster, *Flux Measurements in Difficult Conditions, a Specialist Workshop by ILEAPS*, Boulder, CO, International Geosphere-Biosphere Programme, 26-28 January.

**Burns, S.P.**, A.C. Delany, J. Sun, G. Maclean, S.P. Oncley, S.R. Semmer, and R.K. Monson, 2004: HYDRA: A programmable portable, trace-gas measuring system. Poster, *2004 AGU Fall Meeting*, San Francisco, CA, American Geophysical Union, 13-17 December.

**Burns, S.P.**, and J. Sun, 2000: Thermocouple temperature measurements from the CASES-99 main tower. Preprints. *14th Symposium on Boundary Layers and Turbulence*, Aspen, CO, American Meteor. Soc., 358-361.

**Burns, S.P.**, J. Sun, A. C. Delany, S. P. Oncley, and T. W. Horst, 2000: Radiative flux divergence measurements during CASES-99. Preprints. *14th Symposium on Boundary Layers and Turbulence*, Aspen, CO, American Meteor. Soc., 351-354.

Oosterhuis, G., J. Sun, and **S.P. Burns**, 2000: Wavelet analysis of thermocouple measurements during CASES-99. Preprints. *14th Symposium on Boundary Layers and Turbulence*, Aspen, CO, American Meteor. Soc., 590-592.

Sun, J., **S.P. Burns**, G. Oosterhuis, and D. H. Lenschow, 2000: Turbulence intermittency in the stable boundary layer. Preprints. *14th Symposium on Boundary Layers and Turbulence*, Aspen, CO, American Meteor. Soc., 329-331.

Friehe, C.A., **S.P. Burns**, D. Khelif and X. Song, 1996: Meteorological and flux measurements from the NOAA WP3D aircraft in TOGA COARE. Preprints, *Eighth Conference on Air-Sea Interaction and Conference on the Global Ocean-Atmosphere-Land System (GOALS)*, Atlanta, American Meteor. Soc., J42-J45.

**Burns, S.P.**, C.A. Friehe, D. Khelif, A. Grant, D.P. Rogers and R.B. Grossman, 1995: Meteorological and turbulent flux results from the NOAA WP3D aircraft in TOGA COARE. *Twenty First General Assembly*, Honolulu, IAPSO, 222.

Rogers D., Y.L. Serra, D.E. Hagan, C.A. Friehe, D. Khelif, **S.P. Burns**, R.B. Grossman, R.A. Weller and S.P. Anderson, 1995: Mean structure and surface flux in TOGA COARE. *Twenty First General Assembly*, Honolulu, IAPSO, 221.

Friehe C.A., D. Khelif and **S.P. Burns**, 1994: Spectral characteristics of surface-layer turbulence in TOGA COARE. *TOGA COARE International Data Workshop*, Toulouse, France.

Friehe C.A., D. Khelif and **S.P. Burns**, 1994: Turbulence Measurements from the NOAA WP3D aircraft measurements in TOGA COARE. *TOGA COARE International Data Workshop*, Toulouse, France.

**Burns, S.P.**, D. Khelif and C.A. Friehe, 1994: Surface flux variability from aircraft measurements during TOGA COARE. *TOGA COARE International Data Workshop*, Toulouse, France.

**Burns, S.P.**, D. Khelif and C.A. Friehe, 1994: Aircraft-to-aircraft intercomparisons during TOGA COARE. *TOGA COARE International Data Workshop*, Toulouse, France.

**Burns, S.P.**, D. Khelif and C.A. Friehe, 1993: Aircraft measurements of wind and fluxes in TOGA COARE. *Fall Meeting of American Geophysical Union*, San Francisco.