

K. SEBASTIAN SCHMIDT

University of Colorado, LASP, UCB 392, Boulder, CO, 80309

Phone: office (303) 492-6423, mobile (303) 579-4396, fax (303) 735-3737

E-mail: sebastian.schmidt@lasp.colorado.edu

Profile:

Dr. Sebastian Schmidt works as a Research Scientist II at the Laboratory for Atmospheric and Space Physics at the University of Colorado, Boulder. His research is focused on atmospheric remote sensing and energy budget studies from aircraft, from the ground, and from space. He specializes in spectrally resolved measurements of shortwave radiation, 1D and 3D radiative transfer calculations, and has participated in numerous cloud and aerosol field experiments. Currently, he is working on joint spectral retrieval algorithms for cloud-aerosol layers, ocean color and trace-gas properties, and on new hardware for airborne irradiance measurements. He has taught classes in radiative transfer and is co-advisor for four graduate students at CU. He collaborates with numerous atmospheric scientists across the community and is PI on four projects that involve field experiments as well as instrument and algorithm development.

Education:

2005	Ph.D. University of Leipzig, Germany
1999	Diploma in Physics, University of Leipzig, Germany
1995-96	Master Course in Physics, University of Edinburgh, Scotland
1994-95	Undergraduate Degree in Physics, University of Leipzig, Germany

Professional Development:

2009-present	Research Scientist II, Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder
2008	Research Scientist, University of Mainz and University of Colorado, Boulder
2005-07	Postdoc, University of Colorado, Laboratory for Atmospheric and Space Physics (RS-I)

Teaching/Educational Experience:

2012	Lecturer, University of Colorado, Boulder, Department of Astrophysical and Planetary Sciences undergraduate course: ASTR 3800, <i>Introduction to Scientific Data Analysis and Computing</i> , Spring 2012
2011	Co-adviser for engineering student who assisted in building a stabilizing platform
2010	Guest lecturer, University of Colorado, Boulder, Department of Atmospheric and Oceanic Sciences graduate course: ATOC 5560, <i>Radiative Processes in Planetary Atmospheres</i>
2010	Internship Adviser for undergraduate student from the University of Munich (instrument calibration and remote sensing)
2009-present	Co-adviser for five graduate students in the Atmospheric Radiation Group at the University of Colorado (Bruce Kindel, Patrick McBride,

- Yolanda Roberts, Samuel LeBlanc, Shi Song
- 2008 Co-lecturer, University of Mainz, Germany, Department of Atmospheric Physics, graduate course, *Atmospheric Radiation and Remote Sensing*
- 2008 Tutor/lecturer for the exercises of the above course

Research Expertise:

- Cloud/aerosol microphysical instrumentation development (1999-2004)
- Shortwave irradiance/radiance spectrometers; longwave radiometers (2002-present)
- 3D micro-/macrophysical cloud generators for use in 3D radiative transfer models
- 3D and 1D radiative transfer modeling (1999-present)
- Satellite-, ground-based, and airborne remote sensing of clouds, aerosols, gases, and surface properties; development of new spectral techniques
- Cloud/aerosol field experiment participation and flight planning (1999-present)
- Studies of the cloud and aerosol radiative effect as seen from aircraft vs. satellite
- Miniaturized instruments for aircraft and unmanned airborne vehicles
- Extensive proposal writing experience, in PI and Co-I roles.

Special Activities and Service:

- Airborne Science Lead for CU LASP Atmospheric Radiation Group
- Associate Editor for Atmospheric Measurement Technologies (since 2011)
- NASA panel reviews in Washington DC (2012/2011/2010/2008)
- Science team member of several recent or upcoming field experiments: ARCTAS, ARCPAC, MILAGRO, CalNex, ATTREX, SEAC⁴RS, DC³, PODEX
- Member of OCO-2, CLARREO, and TORERO science team
- Contributor to PACE science definition team (2012)
- PI for stabilizing platform (gimbal) development for Solar Spectral Flux Radiometer (SSFR) onboard NASA ER-2
- Instrument PI for SSFR during the NASA ARCTAS experiment (2008)
- Instrument PI for SSFR during the NASA SEAC⁴RS experiment (2013)
- Instrument PI for SSFR during the NSF/NASA DC³ experiment (2012)
- PI for NASA Remote Sensing Theory Cloud-Aerosol Retrieval development
- Fellow of Joint NASA Goddard/LASP Sun-Climate Research Center
- Participation in Strüngmann Forum (formerly Dahlem conferences) in Frankfurt (Germany): *Perturbed Clouds in the Climate System* (2008)
- Reviewer for six peer-reviewed journals
- AGU member

Awards:

NASA Group Achievement Awards, ARCTAS, TC⁴, and INTEX-NA Science Team

Invited Talks (2011-2012):

Aircraft and Ground-based Measurements of Spectral Solar Radiation. *September 19, 2012, SORCE Science Team Meeting, Annapolis, Maryland.*

Cloud-aerosol radiative effects: Navigating the spectral dimension. *September 12, 2012, First Pan-Global Atmosphere System Studies Conference, Boulder, Colorado.*

Shortwave Cloud-Aerosol Observations and Modeling: Navigating the Spectral Dimension. *April 5, University of Wisconsin, Madison, Wisconsin.*

Spectral Shortwave Irradiance Measurements in Inhomogeneous Cloud-Aerosol Fields. July 5, *IUGG-IAMAS, Melbourne, Australia*.
Measurements of Shortwave Radiation: The Value of Spectral Resolution for Cloud and Aerosol Remote Sensing. July 11, *HISE, Toronto, Canada*.
The spectral fingerprint of ice clouds. September 26, *WaVaCS workshop, Paris, France*.

Selected Publications:

2013

Coddington, O., Pilewskie, P., Schmidt, K. S., McBride, P. J., and Vukicevic, T., 2013: Characterizing a new surface-based shortwave cloud transmittance retrieval for soil and vegetated surface types, under review for *Atmosphere*.
Wendisch, M., P. Pilewskie, B. Bohn, A. Bucholtz, S. Crewell, C. Harlow, E. Jäkel, K. S. Schmidt, R. Shetter, J. Taylor, D. Turner, Martin Zöger, 2013: Atmospheric Radiation measurements, in *Airborne Measurements for Environmental Research – Methods and Instruments* –, Wendisch and Brenguier, eds., in press.

2012

LeBlanc, S. E., K. S. Schmidt, P. Pilewskie, J. Redemann, C. A. Hostetler, R. Ferrare, J. Hair, J. M. Langridge, and D. A. Lack, 2012: Spectral aerosol direct radiative forcing from airborne radiative measurements during CalNex and ARCTAS, *J. Geophys. Res.*, doi:10.1029/2012JD018106, in press.
McBride, P. J., K. S. Schmidt, P. Pilewskie, A. Walther, A. K. Heidinger, D. E. Wolfe, C. W. Fairall, and S. Lance, 2012: CalNex cloud properties retrieved from a ship-based spectrometer and comparisons with satellite and aircraft retrieved cloud properties, *J. Geophys. Res.*, 117, D00V23, doi:10.1029/2012JD017624.

2011

Schmidt, K. S., and P. Pilewskie, 2011: Airborne Measurements of Spectral Shortwave Radiation in Cloud and Aerosol Remote Sensing and Energy Budget Studies, in *Light Scattering Reviews*, 6, A. Kokhanovsky (ed.), Springer.
Kindel, B. C., P. Pilewskie, K. S. Schmidt, O. Coddington, and M. D. King (2011), Solar spectral absorption by marine stratus clouds: Measurements and modeling, *J. Geophys. Res.*, 116, D10203, doi:10.1029/2010JD015071.
McBride, P. J., Schmidt, K. S., Pilewskie, P., Kittelman, A. S., and Wolfe, D. E., 2011: A spectral method for retrieving cloud optical thickness and effective radius from surface-based transmittance measurements, *Atmos. Chem. Phys.*, 11, 7235-7252.
Kalesse, H., K. S. Schmidt, R. Buras, M. Wendisch, B. Mayer, P. Pilewskie, M. King, L. Tian, G. Heymsfield, S. Platnick, 2011: Cirrus spatial heterogeneity and ice crystal shape: Effects on remote sensing of cirrus optical thickness and effective crystal radius, *under revision for J. Geophys. Res.*
Brock, C. A., Cozic, J., Bahreini, R., Froyd, K. D., Middlebrook, A. M., McComiskey, A., Brioude, J., Cooper, O. R., Stohl, A., Aikin, K. C., de Gouw, J. A., Fahey, D. W., Ferrare, R. A., Gao, R.-S., Gore, W., Holloway, J. S., Hübler, G., Jefferson, A., Lack, D. A., Lance, S., Moore, R. H., Murphy, D. M., Nenes, A., Novelli, P. C., Nowak, J. B., Ogren, J. A., Peischl, J., Pierce, R. B., Pilewskie, P., Quinn, P. K., Ryerson, T. B., Schmidt, K. S., Schwarz, J. P., Sodemann, H., Spackman, J. R., Stark, H., Thomson, D. S., Thornberry, T., Veres, P., Watts, L. A., Warneke, C., and Wollny, A. G.:

Characteristics, sources, and transport of aerosols measured in spring 2008 during the aerosol, radiation, and cloud processes affecting Arctic Climate (ARCPAC) Project, *Atmos. Chem. Phys.*, 11, 2423-2453, doi:10.5194/acp-11-2423-2011, 2011

2010

Schmidt, K. S., P. Pilewskie, B. Mayer, M. Wendisch, B. Kindel, S. Platnick, M. D. King, G. Wind, G. T. Arnold, L. Tian, G. Heymsfield, and H. Eichler, 2010a:

Apparent Absorption of Solar Spectral Irradiance in Heterogeneous Ice Clouds, 115, D00J22, *J. Geophys. Res.*, doi:10.1029/2009JD013124.

Schmidt, K. S., Bierwirth, E., Coddington, O., Pilewskie, P., Wendisch, M., Bergstrom, R., Gore, W., Redemann, J., Livingston, J., and Russel, P., 2010b: A new method for deriving aerosol solar radiative forcing and its first application within MILAGRO/INTEX-B, *Atmos. Chem. Phys.*, 10, 7829–7843, doi:10.5194/acp-10-7829-2010, 10, 2731-2767.

Kindel, B. C., K. S. Schmidt, P. Pilewskie, B. A. Baum, P. Yang, and S. Platnick, 2010: Observations and modeling of ice cloud shortwave spectral albedo during the Tropical Composition, Cloud and Climate Coupling Experiment (TC4), *J. Geophys. Res.*, 115, D00J18, doi:10.1029/2009JD013127.

Coddington, O. M., P. Pilewskie, J. Redemann, S. Platnick, P. B. Russell, K. S. Schmidt, W. J. Gore, J. Livingston, G. Wind, and T. Vukicevic (2010), Examining the impact of overlying aerosols on the retrieval of cloud optical properties from passive remote sensing, *J. Geophys. Res.*, 115, D10211, doi:10.1029/2009JD012829.

Bergstrom, R. W., K. S. Schmidt, O. Coddington, P. Pilewskie, H. Guan, J. M. Livingston, J. Redemann, and P. B. Russell: Aerosol spectral absorption in the Mexico City area: results from airborne measurements during MILAGRO/INTEX B, *Atmos. Chem. Phys.*, 10, 6333–6343, doi:10.5194/acp-10-6333-2010, 2010.

Bucholtz, A., D. L. Hlavka, M. J. McGill, K. S. Schmidt, P. Pilewskie, S. M. Davis, E. A. Reid, and A. L. Walker, 2010: Directly measured heating rates of a tropical subvisible cirrus cloud, *J. Geophys. Res.*, 115, D00J09, doi:10.1029/2009JD013128.

Davis, S., Hlavka, D., Jensen, E., Rosenlof, K., Yang, Q., Schmidt, S., Borrmann, S., Frey, W., Voemel, H., Bui, T. P., 2010: In situ and lidar observations of tropopause subvisible cirrus clouds during TC4, *J. Geophys. Res.*, 115, D00J17, doi:10.1029/2009JD013093.

2009

Schmidt, K. S., G. Feingold, P. Pilewskie, H. Jiang, O. Coddington and M. Wendisch, 2009: Irradiance in polluted cumulus fields: Measured and modeled cloud-aerosol effects. *Geophys. Res. Lett.*, doi:10.1029/2008GL036848

Livingston, J. M., R. Redemann, P. B. Russell, O. Torres, B. Veihelmann, P. Veefkind, R. Braak, A. Smirnov, L. Remer, R. W. Bergstrom, O. Coddington, K. S. Schmidt, P. Pilewskie, R. Johnson, and Q. Zhang, Comparison of aerosol optical depths from the Ozone Monitoring Instrument (OMI) on Aura with results from airborne sunphotometry, other space and ground measurements during MILAGRO/INTEX-B, *Atmos. Chem. Phys.*, 9, 6743-6765, 2009.

2008

Coddington, O., K. S. Schmidt, P. Pilewskie, W. J. Gore, R. W. Bergstrom, M. Román, J. Redemann, P. B. Russell, J. Liu, and C. C. Schaaf, 2008: Aircraft measurements of

spectral surface albedo and its consistency with ground-based and space-borne observations, *J. Geophys. Res.*, 113, doi:10.1029/2008JD010089.

Isaac, G., and S. Schmidt (2008), Cloud Properties from In Situ and Remote Sensing Measurements: Capability and Limitations, in *Perturbed Clouds in the Climate System*, Frankfurt, Germany, March 2008, Heintzenberg, J., and R. J. Charlson, eds. 2008.

2007

Schmidt, K. S., P. Pilewskie, S. Platnick, G. Wind, P. Yang, and M. Wendisch, 2007: Comparing irradiance fields derived from Moderate Resolution Imaging Spectroradiometer airborne simulator cirrus cloud retrievals with solar spectral flux radiometer measurements, *J. Geophys. Res.*, 112, D24206, doi:10.1029/2007JD008711.

Alexander Kokhanovsky, B. Mayer, W. von Hoyningen-Huene, S. Schmidt, and P. Pilewskie: Retrieval of cloud spherical albedo from top-of-atmosphere reflectance measurements performed at a single observation angle, *ACP*, 7, 3633-3637.

Thiel, S., Ammannato, L., Bais, A., Bandy, B., Blumthaler, M., Bohn, B., Engelsen, O., Gobbi, G. P., Gröbner, J., Jäkel, E., Junkermann, W., Kazadzis, S., Kift, R., Kjeldstad, B., Kouremeti, N., Kylling, A., Mayer, B., Monks, P. S., Reeves, C. E., Schallhart, B., Scheirer, R., Schmidt, S., Schmitt, R., Schreder, J., Silbernagl, R., Topaloglou, C., Thorseth, T. M., Webb, A. R., Wendisch, M., and Werle, P.: Influence of clouds on the spectral actinic flux density in the lower troposphere (INSPECTRO): overview of the field campaigns, *ACP*, 7, 13417-13473.

Schmidt, S., V. Venema, F. Di Giuseppe, R. Scheirer, M. Wendisch, and P. Pilewskie, 2007: Reproducing cloud microphysical and irradiance measurements using three 3D cloud generators. *Quart. J. Roy. Meteorol. Soc.* (133) 624.

2005

Kylling, A., Webb, A. R., Kift, R., Gobbi, G. P., Ammannato, L., Barnaba, F., Bais, A., Kazadzis, S., Wendisch, M., Jäkel, E., Schmidt, S., Kniffka, A., Thiel, S., Junkermann, W., Blumthaler, M., Silbernagl, R., Schallhart, B., Schmitt, R., Kjeldstad, B., Thorseth, T. M., Scheirer, R., and Mayer, B.: Spectral actinic flux in the lower troposphere: measurement and 1-D simulations for cloudless, broken cloud and overcast situations, *Atmos. Chem. Phys.*, 5, 1975-1997, doi:10.5194/acp-5-1975-2005, 2005

2004

Schmidt, S., Lehmann, K., Wendisch, M., 2004: Minimizing instrumental broadening of the drop size distribution with the M-Fast-FSSP, *J. Atmos. Oceanic Technol.*, 21, 1855-1867, doi:10.1175/JTECH-1673.1

Selected first author conference contributions:

Schmidt, S., Peter Pilewskie, Graham Feingold, Hongli Jiang: Impact of aerosol and clouds on 3D irradiance fields during the Gomaccs experiment, AGU Fall meeting, San Francisco, 2007 (oral)

Schmidt, K. S., Feingold, G., Jiang, H., Pilewskie, P., Platnick, S., Wind, G.: The shortwave radiative properties of cloud fields during TC4 and Gomaccs, 15th International Conference on Clouds and Precipitation, Cancun, Mexico, July 2008 (poster)

- Schmidt, K. S., Pilewskie, P., Wendisch, M., Platnick, S., Wind, G.: The shortwave radiative properties of Cirrus Cloud Fields during TC4. International Radiation Symposium, Iguacu, Brazil, August 2008 (poster)
- Schmidt, K. S., G. Feingold, P. Pilewskie, H. Jiang, O. Coddington: Measured and Modeled Cloud-aerosol Radiative Effects in Polluted Cumulus Clouds, MOCA (IAMAS/IAPSO/IACS joint assembly in Montreal, Canada, July 2009 (oral)
- Schmidt, K. S., E. Bierwirth, P. Pilewskie, J. Redemann, R. Brandt, A. Lyapustin, C. Gatebe, C. Schaaf, R. Kahn: Airborne measurement of surface albedo in Alaska, EGU 2009 (poster)
- Schmidt, K. S., P. Pilewskie, M. D. King, G. Wind, L. Tian, S. Platnick, and T. Arnold: Apparent Absorption of Spectral Solar Radiation in Heterogeneous Tropical Cirrus Clouds, MOCA (IAMAS/IAPSO/IACS joint assembly in Montreal, Canada, July 2009 (oral)
- Schmidt, K. S., P. McBride, and P. Pilewskie: New Spectral Methods in Cloud and Aerosol Remote Sensing Applications, AMS meeting, Portland, OR, July 2010, (oral)
- Schmidt, K. S., P. Pilewskie, B. C. Kindel: Airborne Measurements of Solar Radiation: The value of spectrally-resolved observations for cloud-aerosol remote sensing and energy budget, AGU 2010 (poster)
- Schmidt, K. S., P. Pilewskie, B. C. Kindel: The Spectral Shape of Shortwave Cloud Albedo and Apparent Absorption, AMS meeting, Portland, OR, July 2010 (poster)
- Schmidt, K. S., P. McBride, P. Pilewskie, G. Feingold, and H. Jiang: New spectral methods in cloud and aerosol remote sensing applications, EGU Vienna, 2010 (oral)
- Schmidt, K. S., P. Pilewskie, J. Redemann, P. Russell, R. Bergstrom, E. Bierwirth, and M. Wendisch: Constraining aerosol radiative forcing – is urban outflow special? EGU Vienna, 2010 (oral)
- Schmidt, K. S.: Cloud Properties from SSFR onboard Atlantis and P-3, CalNex experiment data workshop, Sacramento, CA, January 2011 (oral)
- Schmidt, K. S., Pilewskie, P., Kindel, B.: The spectral radiative effects of inhomogeneous clouds and aerosols, SORCE science team meeting, Sedona, AZ, September 2011 (oral)
- Schmidt, K. S., Pilewskie, P., Feingold, G., Coddington, O., Song, S., McComiskey, A.: Spectral radiative effects and remote sensing of aerosol-immersed cumulus cloud fields. *16th International Conference on Clouds and Precipitation, August 2012, Leipzig, Germany (oral)*
- Schmidt, K. S., Coddington, O., Pilewskie, P., Song, S.: Cloud inhomogeneities, aerosol particles, thermodynamic phase, and crystal shape in hyperspectral shortwave measurements and model calculations. *International Radiation Symposium, August 2012, Berlin, Germany (oral)*