

Stefan Schwietzke, Ph.D.

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EDUCATION

Ph.D.	2013	Engineering and Public Policy	Carnegie Mellon University, USA
Dipl.-Ing. (M.S. equiv.)	2008	Technology Management	Universität Stuttgart, Germany
Vordiplom (B.S. equiv.)	2004	Mechanical Engineering	Universität Stuttgart, Germany

PROFESSIONAL EXPERIENCE

- 01/2019 – present – **International Scientist, Climate and Energy**, *Environmental Defense Fund (Berlin, Germany & Boulder, Colorado)*
- Coordinating and ensuring rigor of a series of scientific studies to measure methane emissions from global oil and gas operations with a diverse group of stakeholders including industry, academics, and public sector.
 - Contributing to the design, planning and execution of these studies.
 - Providing expert scientific guidance to EDF's international oil and gas methane initiatives, and continue to conduct independent research.
 - Leading efforts to convene worldwide experts to facilitate discussions of science advancements and emerging issues related to methane emissions.
- 05/2015 – 12/2018 – **Research Scientist II** (Research Scientist I until 03/2017), *University of Colorado Boulder, Cooperative Institute for Research in Environmental Sciences (CIRES) and National Oceanic and Atmospheric Administration (NOAA), Earth System Research Laboratory (ESRL), Global Monitoring Division (GMD)*
- Led or contributed to atmospheric modeling during field work deployments in oil and natural gas producing regions across North America to quantify methane emissions.
 - Collaborated with oil and gas industry management, operational teams, and environmental regulators to interpret data, identify potential sources for methane emission reductions, and compare modeled and industry reported emissions.
 - Analyzed the cost-effectiveness of using aircraft-based methane measurements to prioritize natural gas leak detection and repair programs.
- 05/2014 – 04/2015 – **Postdoctoral Research Associate**, *NOAA/ESRL/GMD*
- Led an international team of atmospheric chemists, geologists, and data scientists to revise global inventories of energy-related methane emissions up by 20-60%, revealing greater potential to recover produced natural gas for sales.
 - Identified research funding opportunities, drafted funding proposals, and was awarded two research grants.
 - Supervised undergraduate student researcher for creating a database of field measurements.
- 08/2009 – 12/2013 – **Research Assistant**, *Carnegie Mellon University, Center for Climate and Energy Decision Making*
- Compared emission inventory-based greenhouse gas estimates of renewable and fossil energy systems using climate modeling and atmospheric measurements.
 - Project manager for a semester long research project involving 22 undergraduate and graduate students.
 - Coursework includes decision and risk analysis (e.g., benefit-cost analysis) and climate change economics.

- 02/2009 – **Intern, PricewaterhouseCoopers, Automotive Strategy Consulting (Germany)**
 06/2009
- Analyzed how shifts in national carbon dioxide emission targets, vehicle technologies, car markets, and the global economic crisis in 2008 questioned traditional business models in the automotive industry.
- 08/2007 – **Research Assistant, Purdue University, Laboratory of Renewable Resources Engineering**
 12/2008
- Assistant to project director for a [study](#) of the International Energy Agency (IEA) highlighting research gaps of 2nd generation transportation biofuels.
 - Carbon dioxide emission analysis of 2nd generation transportation biofuels.
- 01/2006 **Assistant to a Member of Parliament, State Parliament of Baden-Württemberg (Germany)**
- Gained insights in the internal mechanisms of the state legislative process.
- 05/2005 – **Intern, Porsche AG, Quality Management (Germany)**
 09/2005
- Implemented (planned, executed) an SAP-Software package for the corporate quality management process.
 - Trained senior managers in using the tool.
 - Performed vehicle prototype audits, determined warranty costs, prepared management presentations.
- 08/2002 – **Intern, DaimlerChrysler AG (now Daimler AG), Research and Development (Germany)**
 09/2002
- Operated industrial manufacturing machines and produced model parts for use in corporate research and development.

PEER REVIEWED PUBLICATIONS

- Lan, X., Tans, P., Sweeney, C., Andrews, A., Dlugokencky, E., **Schwietzke, S.**, *et al.* (2019) Long-term measurements show little evidence for large increases in total U.S. methane emissions over the past decade. In review.
- Mielke-Maday, I., **Schwietzke, S.**, *et al.* (2019) Methane source attribution in a United States dry gas basin using spatial patterns of ground and airborne ethane and methane measurements. In review.
- Zaimes, G., Littlefield, J., Augustine, D., Cooney, G., **Schwietzke, S.**, *et al.* (2019) Characterizing Regional Methane Emissions from Natural Gas Liquids Unloading. In review.
- Miller, S., Michalak, A., Detmers, R., Hasekamp, O., Bruhwiler, L., **Schwietzke, S.** (2019) China's coal mine methane regulations have not curbed growing emissions. *Nature Communications* 10, 303. [Full text](#).
- Etiopé, G., Ciotoli, G., **Schwietzke, S.**, Schoell, S. (2019) Gridded maps of geological methane emissions and their isotopic signature. *Earth Syst. Sci. Data*, 11, 1–22. [Full text](#).
- Vaughn, T., Bell, C., Pickering, C., **Schwietzke, S.**, *et al.* (2018) Temporal variability largely explains top-down/bottom-up difference in methane emission estimates from a natural gas production region. *Proc. Natl. Acad. Sci.* 115 (46) 11712-11717. [Full text](#).
- Schwietzke, S.**, Harrison, M., Lauderdale, T., Branson, K., Conley, S., *et al.* (2018) Aerially-guided leak detection and repair: A pilot field study for evaluating the potential of methane emission detection and cost-effectiveness. *J. Air Waste Manag. Assoc.* 69 (1), 71-88. [Full text](#).
- Dalsøren, T., Myhre, G., Hodnebrog, O., Lund Myhre, C., Stohl, A., Pisso, I., **Schwietzke, S.**, *et al.* (2018) Discrepancy between simulated and observed ethane and propane levels explained by underestimated fossil fuel emissions. *Nature Geoscience* 11, 178–184. [Full text](#).

- Feinberg, A., Coulon, A., Stenke, A., **Schwietzke, S.**, Peter, T. (2017) Isotopic source signatures: impact of regional variability on the $\delta^{13}\text{C}_{\text{CH}_4}$ trend and spatial distribution. *Atmos. Env.*, 174, 99–111. [Full text.](#)
- Johnson, M., Tyner, D., Conley, S., **Schwietzke, S.**, Zavala-Araiza, D. (2017) Comparisons of Airborne Measurements and Inventory Estimates of Methane Emissions in the Alberta Upstream Oil and Gas Sector. *Environ. Sci. Technol.* 51 (21), 13008–13017. [Full text.](#)
- Vaughn, T., Bell, C., Yacovitch, T., Roscioli, J., Herndon, S., Conley, S., **Schwietzke, S.**, Heath, G., Pétron, G., Zimmerle, D. (2017) Comparing facility-level methane emission rate estimates at natural gas gathering and boosting stations. *Elem. Sci. Anth.* 5: 71. [Full text.](#)
- Schwietzke, S.**, Petron, G., Conley, S., Pickering, C., Mielke-Maday, I., Dlugokencky, E., Tans, P., *et al.* (2017) Improved mechanistic understanding of natural gas methane emissions from spatially-resolved aircraft measurements. *Environ. Sci. Technol.* 51 (12), 7286–7294. [Full text.](#)
- Sherwood, O., **Schwietzke, S.**, Arling, V., Etiope, G. (2017) Global inventory of gas geochemistry data from fossil fuel, microbial and biomass burning sources, Version 2017. *Earth Syst. Sci. Data*, 9, 639-656, 2017. [Full text.](#)
- Conley, S., Faloona, I., Mehrotra, S., Suard, M., Lenschow, D., Sweeney, D., Herndon, S., **Schwietzke, S.**, Pétron, G., Pifer, J., Kort, E., Schnell, R. (2017) Application of Gauss's Theorem to quantify localized surface emissions from airborne measurements of wind and trace gases. *Atmos. Meas. Tech. Disc.*, DOI:10.5194/amt-2017-55. [Full text.](#)
- Smith, M., Kort, E., Gvakharia, A., Sweeney, C., Conley, S., Faloona, I., Newberger, T., Schnell, R., **Schwietzke, S.**, Wolter, S. (2017) Airborne quantification of methane emissions over the Four Corners region. *Environ. Sci. Technol.* 51 (10), 5832–5837. [Full text.](#)
- Barkley, Z., Lauvaux, T., Davis, K., Deng, A., Cao, Y., Sweeney, C., Martins, D., Miles, N., Richardson, S., Murphy, T., Cervone, G., Karion, A., **Schwietzke, S.**, Smith, M., Kort, E., Maasackers, J. (2017) Quantifying methane emissions from natural gas production in northeastern Pennsylvania. *Atmos. Chem. Phys. Discuss.*, DOI:10.5194/acp-2017-200. [Full text.](#)
- Bruhwiller, L., Basu, S., Bergamaschi, P., Bousquet, P., Dlugokencky, E., Houweling, S., Ishizawa, M., Kim, H., Locatelli, R., Maksyutov, S., Montzka, S., Pandey, S., Patra, P., Pétron, G., Saunio, M., Sweeney, C., **Schwietzke, S.**, *et al.* (2017) U.S. CH_4 emissions from oil and gas production: have recent large increases been detected? *J. Geophys. Res. Atmos.* 122 (7), 4070–4083. [Full text.](#)
- Schwietzke, S.**, Sherwood, O., Bruhwiler L., Miller, J., Etiope, G., Dlugokencky E., *et al.* (2016) Upward revision of global fossil fuel methane emissions based on isotopic database. *Nature* 538, 88-91. [Full text.](#)
- Schwietzke, S.**, Griffin, M., Matthews, S., Bruhwiler, L. (2014) Global natural gas fugitive emissions rates constrained by atmospheric methane and ethane. *Environ. Sci. Technol.* 48 (14), 7714–7722. [Full text.](#)
- Schwietzke, S.**, Griffin, M., Matthews, S., Bruhwiler, L. (2014) Global bottom-up fossil fuel methane and ethane emissions inventory for atmospheric modeling. *ACS Sustain. Chem. Eng.* 2, 1992–2001. [Full text.](#)
- Schwietzke, S.**, Griffin, M., Matthews, S. (2011) Relevance of emissions timing in biofuel greenhouse gases and climate impacts. *Environ. Sci. Technol.* 45 (19), 8197–8203. [Full text.](#)

BOOK CHAPTERS, REPORTS, THESES

- Schwietzke, S.**, Vaughn, T., Zimmerle, D., Pétron, G., Conley, S., Mielke-Maday, I., Wolter, S., Dlugokencky, E., Tans, P., Schnell, R., Bell, C., Heath, G., Nummedal, D. (2018) Evolution, current state of the art, and interpretation of aircraft-based methane emission quantification at the

natural gas basin-level. *Proceedings of the 27th World Gas Conference*, June 2018, Washington D.C. [Full text](#).

Schwietzke, S. (2013) Atmospheric impacts of biofuel and natural gas life cycle greenhouse gas emissions and policy implications. Ph.D. dissertation, Carnegie Mellon University, Department of Engineering and Public Policy. [Full text](#).

Schwietzke, S., Kim, Y., Ximenes, E. Mosier, N., Ladisch, M. (2009) Ethanol Production from Maize, p. 347-364, Chapt. 23, *Biotechnology in Agricult. and Forestry*, Vol. 63, Springer, Berlin. [Full text](#).

Schwietzke, S., Ladisch, M., Russo, L., Kwant, K., Mäkinen, T. Kavalov, B., *et al.* (2008) Gaps in the Research of 2nd Generation Transportation Biofuels, *International Energy Agency*, Bioenergy: T41(2): 2008:01. [Full text](#).

Schwietzke, S. (2008) Impact of corn stover removal for bioenergy on soil organic carbon. Thesis, University of Stuttgart, Institute for Energy Economics and Rational use of Energy. [Full text](#).

RECENT CONFERENCE PRESENTATIONS

- “Aerially guided leak detection and repair: A pilot field study for evaluating the potential of methane emission detection and cost-effectiveness.” *American Geophysical Union Fall Meeting*. Washington, DC, December 2018. Oral presentation.
- “Isotopic constraints on global atmospheric methane sources and sinks: a critical assessment of recent findings and new data.” *American Geophysical Union Fall Meeting*. New Orleans, LA, December 2017. Invited.
- “Basin-scale aircraft measurements of oil and gas methane emissions.” *National Academies of Sciences*, Workshop on Anthropogenic Methane Emissions in the U.S. Boulder, CO, March 2017. Invited.
- “Spatially-resolved aircraft-based quantification of methane emissions from the Fayetteville Shale Gas Play.” *American Geophysical Union Fall Meeting*. San Francisco, CA, Dec. 2016.
- “Global fossil fuel methane emissions: Top-down science, recent findings, research needs.” *Stanford University*, Natural Gas Initiative Workshop, Stanford, CA, November 2016. Invited.
- “Methane emissions from oil and gas development – field measurements in the U.S. and abroad.” *Colorado-Wyoming Academy of Science*. Denver, CO, November 2015. Invited
- “Global methane budget and natural gas leakage based on long-term $\delta^{13}\text{C}_{\text{CH}_4}$ measurements and updated isotopic source signatures.”
 - *17th Global Emissions Initiative (GEIA) Conference*, Beijing, China. November 2015.
 - *Our Common Future Under Climate Change*, Paris, France. July 2015.

GRANTS, AWARDS, HONORS

- 04/2017 – **NASA**, Interdisciplinary Research in Earth Science grant: “Process-level investigation of revised global methane budget based on in situ and remote sensing of atmospheric composition and the land surface”, \$1,282,000; PI until 12/2018 (job change)
- 03/2020
- 05/2015 – **CIRES**, Innovative Research Proposal grant: “Global Inventory of Natural Gas Isotopic and Chemical Composition for Improved Atmospheric Methane Budgeting”, \$22,000 (Co-PI)
- 04/2016
- 06/2014 **American Chemical Society**, Editor’s Choice Award for publication “Global bottom-up fossil fuel fugitive methane and ethane emissions inventory for atmospheric modeling”
- 05/2014 – **National Academies of Sciences**, National Research Council, Postdoctoral Research
- 04/2015 Associate Fellowship.

- 04/2012 – **ERM Foundation North-America**, Sustainability Fellowship.
03/2013
- 02/2011 **Carnegie Mellon University** (Dept. of Engineering and Public Policy), Herbert L. Toor Award for outstanding research paper submitted in the Ph.D. qualifying exam.
- 10/2004 – **Baden-Württemberg State Foundation** (Germany), Study-abroad Fellowship.
04/2005

OTHER PROFESSIONAL ACTIVITIES, EDUCATION, and VOLUNTEERING

- 09/2017 – Consultant to AECOM Inc. for assessing the cost-effectiveness of natural gas leak
02/2018 detection technologies using airborne atmospheric measurements
- 05/2017 Session chair, Global Monitoring Annual Conference in Boulder, CO.
- 10/2016 – Journal guest editor, *Elementa Science of the Anthropocene*, Oil and Natural Gas
present Special Forum
- 09/2016 Session co-chair, 14th International Global Atmospheric Chemistry (IGAC) Conference in Breckenridge, CO.
- 12/2012 Science communication competition regional finalist, NASA FameLab
- 02/2011 – Peer-reviewer for scientific journals: *Nature*, *Environmental Science and Technology*,
present *Global Biogeochemical Cycles*, *Journal of Geophysical Research – Atmospheres*, *Waste Management*, *Elementa Science of the Anthropocene*, *Journal of Unmanned Vehicle Systems*
- 07/2010 Environmental law coursework: "Natural Resource and Damage Assessment and Restoration", Vermont Law School
- 10/2004 – Study-abroad (Economics, French), Université de La Réunion, France (DOM)
04/2005
- 07/2001 – Military service, 5./Paratrooper Bataillon 373, Doberlug-Kirchhain, Germany.
03/2002