

CURRICULUM VITAE

August, 2018

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PROFESSIONAL PREPARATION

Westfälische Wilhelmsuniversität	Münster, Germany	Physics and Geophysics	Vor-Diploma	1994
University of Cologne	Cologne Germany	Geophysics	M.S. (Diploma)	1998
Johann Wolfgang Goethe Univ	Frankfurt Germany	Geophysics and Geography	Ph.D	2004

APPOINTMENTS

2014-present	Project Scientist II, Atmospheric Chemistry Observations and Modeling, National Center for Atmospheric Research, Boulder, Colorado
2010-present	Chemistry Climate Liaison for the Community Earth System Model
2008-2014	Project Scientist I, Atmospheric Chemistry Division, National Center for Atmospheric Research, Boulder, Colorado
2006-2008	Postdoctoral fellow, Advanced Study Program, National Center for Atmospheric Research, Boulder, Colorado
2005-2006	Postdoctoral fellow, Deutschen Akademie der Naturforscher, Leopoldina, performed at the National Center for Atmospheric Research, Boulder, Colorado, Subject: "Arctic Ozone Loss and Climate Change: Impact of changing environmental conditions on Arctic Ozone Loss – Simulations with the NCAR ROSE Model"
2000-2005	PhD student and Postdoctoral fellow, Institute of Stratospheric Research, Jülich, Germany; Subject: "Chemical Ozone Loss in the Arctic and Antarctic Polar Stratosphere"
1999	Scientist at the Department for Research and Development of the Deutscher Wetterdienst, Offenbach, Germany; Subject: "Local Photo-Chemistry at the GAW-Station Hohenpeissenberg, Germany"
1995-1998	Undergraduate scientific assistant at the EURAD-Project (European Acid Deposition Model, Institute for Geophysics and Meteorology), University of Cologne, Germany

WEB OF SCIENCE

h-index: 32, 112 publications

RESEARCH INTERESTS

- Coupling between stratospheric dynamics, chemistry, and aerosols, and their influence on climate
- Impacts of potential future climate scenarios, including solar and stratospheric aerosol geoengineering, on atmospheric composition, air quality, and climate
- Importance of tropospheric chemistry and aerosol interactions on air quality and climate

HONORS / AWARDS

- Elected Chair for the Gordon research conference (GRC) on Climate Engineering in 2022
- Successful completion of UCAR's Leadership Academy, 2017-2018
- Recognition Award for immense contribution of the advancements of air quality research in Nigeria, by the Center for Atmospheric Research, Nigeria, March 2018
- UCAR Diversity Award Nomination on “1st West African workshop on Air Quality; Measurements and Modeling, June 2014”, 2016
- CGD Christmas Award for internal work effort on Geoengineering, December 2016
- ACOM Christmas Award for internal work effort on Chemistry-Climate Modeling Initiative (CCMI) work, December 2016
- UCAR Outstanding Publication Award Nomination in 2009: Tilmes, S., R. Müller, R. Salawitch(2008) The sensitivity of polar ozone depletion to proposed geo-engineering schemes, *Science* 320, 1201; DOI: 10.1126/science.1153966
- Awarded for the Postdoctoral Appointment of the Advanced Study Program at the National Center for Atmospheric Research, 2006
- Awarded Fellow of the Deutschen Akademie der Naturforscher, Leopoldina Halle, Germany, 2005

COMMUNITY SERVICE

Internal Committees

- NCAR, CGD directors search committee member, 2017-2018
- Organized MOU between Nigeria Center for Atmospheric Research and UCAR, 2015
- Chairperson of the Early Career Scientist Assembly, NCAR, July 2010-2014
- Co-Chair of the NCAR Scientist Assembly, Nov 2010-April 2013
- Committee member on the Status of Women in Physics (CSWP); Ad-Hoc Organizing Committee, 2009, Committee Member: Woman in science at NCAR
- Advanced Study Program (ASP) representative on Early Career Scientist Assembly committee, July 2007- July 2008
- Co-chair of the ASP informal social committee, June 2007- June 2008

External Committees / Panels

- Panel member in Terraforming Workshop, Harvard, March 2018
- NASA MAP review panel in Washington DC, January 30 – February 2, 2017
- Panel member on the “Meeting of the Academic Working Group on International Governance of Climate Engineering, on the state of SRM scientific investigation”, Washington DC, March 2016
- Dissertation committee member for Lili Xia, Rutgers University, 2012
- NASA SEAC4RS Instrument/Measurement Panel, Washington DC, August 23-26, 2011

- Panel member of the Climate Engineering workshop by the U.S. Government Accountability Office (GAO), Keck Center in Washington, D.C., October 6-7, 2011

Workshop Organizer / Session Convener

- ACOM workshop organizer on “[Fundamentals in Atmospheric Chemistry and Aerosol Modeling](#)” Boulder, August 2018
- Session organizer at the Climate Engineering Conference 2017, Berlin, Germany, Oct. 2017
- NCAR organizer for the Geoengineering Summer School 2015, and 5th GeoMIP workshop in Boulder, July 20-24, 2015 ([EOS Article](#))
- Participation support of the Native American workshop, September 24, 2015.
- Organized first air quality workshop in Nigeria, June 2015 ([EOS Article](#))
- Organized panel discussions on: Talking with Reporters; Talking with Funders, April 2013, and on Career opportunities at NCAR and Beyond, October 2012
- Organized NCAR ASP ECSA-WCRP Workshop: Regional Climate Issues in Developing Countries, October 2011 ([EOS Article](#))
- Co-Convener of the ‘Geo-engineering’ Session at the EGU, April 2009 and May 2010, April 2011, Session for AGU 2016
- Convener of the ‘Geo-engineering’ Session at the EGU, April 2008

EDUCATION / LECTURER

- Lecturer: Annual CAM-chem / WACCM lecture during NCAR CESM tutorial 2010-2018
- Lecturer: Atmospheric and Ocean Science Workshop on Climate Engineering, Princeton University, August 2017
- Guest lecturer at CU Boulder (with Jen Kay), April 2017
- Lecturer: Geoengineering HITEC-Day, Juelich Germany, June, 2016
- Organized visit and education of Nigerian delegation visiting NCAR April, 2015
- Lecturer: GeoMIP Summer workshop: Chemistry, Dynamics and Surface UV, July 21, 2015
- Speaker at Climate Voices webinar: Explore geoengineering, March 10, 2015.
- Speaker at Cafe Scientific: Talk on Geoengineering, May 2010, Millennium Hotel, Boulder
- Presenter at the Environmental Defense Fund Science Day on Geoengineering, San Francisco, February 2010,
- Tutorial on Tracer-tracer correlation method in polar regions, at LARC, University of Colorado, Boulder, February 2009
- Jury: Peak to Peak Science Fair, 2007, 2008, 2009 and 2010; Mesa Elementary school 2010
- Girls Scout activity, May 2007

PRESS RELEASES / MEDIA

- New approach to geoengineering simulations is significant step forward; Modeling strategy allows scientists to explore ways to limit warming, reduce side effects. November 6, 2017, <https://news.ucar.edu/129835/new-approach-geoengineering-simulations-significant-step-forward>
- The 2-degree goal and the question of geoengineering; How much geoengineering would it take to hit temperature target? September 7, 2016, <https://news.ucar.edu/122687/2-degree-goal-and-question-geoengineering>

- Geoengineering the climate could reduce vital rains; Shading the planet would reduce vital rainfall in many regions, October 31st, 2013, <https://news.ucar.edu/10531/geoengineering-climate-could-reduce-vital-rains>
- Stratospheric injections to counter global warming could damage ozone layer, April 24, 2008, <https://news.ucar.edu/942/stratospheric-injections-counter-global-warming-could-damage-ozone-layer>

In the news: Mentioned ~350 times between 2011-2018, media outlets include the NY Times, CNBC, ABC News, Forbes, the Washington Post, MSNBC, Discovery, National Geographic, and Wired

MENTORING

- Mentor and advisor during 3 months NCAR visit of Sabine Robrecht, Juelich, Germany, Sept-Nov 2018
- Mentor and advisor during 1 months NCAR visit of Daniele Visioni, Italy, January 2018
- Mentor and co-supervise Nigerian PhD student Najib Yusuf (ongoing)
- Mentor and science support for Umar Saleh Abubakar, engineer from Nigeria Center for atmospheric research, during 1 month NCAR visit, May, 2015
- Scientific advisor and support for Lili Xia, Rutgers University, Swarnali Sanyal and Arezoo Khodayari, University of Illinois, Matthias Braekebusch, CU Boulder, Dalton Stone, Texas University and others.

FUNDED PROPOSALS

- PI NSF Proposal 2018-0270: Fundamentals of Atmospheric Chemistry and Aerosol Modeling, Workshop support, April 2018 (\$27000)
- DARPA through NSF, Co-PI together with Yaga Richter, October 2016 (\$400,000) and February 2017 (\$240,000)
- Collaborator on NSF IA AGS-15559702 proposal by Doug MacMartin: Building Confidence in an Intelligently-designed Climate Intervention Strategy
- Collaborator on SSP-DFG Foerderprojekt on “Stratospheric Ozone Loss in Mid-latitudes in summer – a Potential Risk of Climate Engineering”, PI: Baerbel Vogel, Research Center Juelich, Germany, funded between 2016-2018
- Collaborator on NSF proposal “CAREER: Monsoon and the Upper Troposphere Lower Stratosphere”, PI: Yutian Wu Purdue University, 2017-2020
- Collaborator: The Impact of Short Lived Halogen Species on the Troposphere and Stratosphere, PI: Douglas Kinnison
- Collaborator: Proposal Title: Bromine and Air Quality, Principal Investigator (PI): Ross Salawitch, Team Member Role: Collaborator, ROSES-2013
- Collaborator: Photochemistry of Atmospheric Ozone, Principal Investigator (PI): Ross Salawitch, Team Member Role: Collaborator, ROSES-2011

Internal

- FY11 NCAR Directorate Diversity Fund: WORLS - Seminar Series

Recent NCAR Strategic Capability (NSC) Computer Allocations (PI only)

- Climate and air quality impacts including an interactive fire model for future climate scenarios with and without geoengineering November 2017 (9.5M Core hours)
- Advanced Science Discovery proposal, January 2017 (23M Core hours)

PROFESSIONAL REVIEWS

- Funding agencies: SNSF (Swiss National Fond), National Aeronautics and Space Administration (NASA), National Science Foundation (NSF), European Research Council (ERC), LinkSCEEM/Cy-Tera Production 2013, NCAR ASP proposals
- Journals and Assessment Reports: CCMVal and WMO ozone assessments, Atmospheric Chemistry and Physics, Atmospheric Environment, Geophysical Research Letters, Journal of the Atmospheric Sciences, Journal of Climate, Journal of Geophysical Research – Atmospheres, Nature Climate Change, Quarterly Journal of the Royal Meteorological Society, Science, Proceedings of National Academy of Science, Science Magazine, Advances in Atmospheric Sciences, BAMS

CAMPAIGNS

- Co-Investigator of the Stratosphere-Troposphere Analyses of Regional Transport Experiment (START08) aircraft campaign: 04/2008 – 07/2008

PRESENTATIONS

Seminars

- NCAR CGD Seminar, CESM1 (WACCM) Geoengineering Large Ensemble Project, May 2018
- Harvard University Seminar, Geoengineering Large Ensemble (GLENS) Project, March 2018
- NCAR EOL Seminar, Climate Engineering, Benefits, Side Effects, Risks and Opportunities, January 2017
- Seminar Juelich Research Center, Germany, Climate impacts in delayed mitigation and geoengineering scenarios, June 2016
- Seminar at Institute for Advanced Sustainability Studies e.V., Postdam, Germany, Geoengineering Challenges and Impacts of SRM, June 2013
- NCAR CGD Seminar, The hydrological impact of geoengineering in the Geoengineering Model Intercomparison Project (GeoMIP), April 2013
- NCAR ACD Seminar: Impact of proposed geoengineering schemes on Troposphere and Stratosphere, 2008

Invited Presentations

- Geoengineering and the future ozone layer, *Proceedings of Symposium for the 30th Anniversary of the Montreal Protocol*, entitled, Paris, Sept. 20th, 2017
- Climate Engineering, Plenary speaker at the *Princeton University Atmospheric and Ocean Sciences workshop*, GFDL, August 2017
- Impact of Sulphate Aerosol Geoengineering on Stratospheric Ozone, *Gordon Conference*, Maine, June 2017
- What Is the Arctic We Need to Sustain the Global Climate System? — Workshop, *Week of the Arctic, side event to the Arctic Council Meeting*, Fairbanks, Alaska, May 2017
- *Special Envoy for Climate Change Jonathan Pershing, and the Bureau of Intelligence & Research, U.S. Department of State*, presenter on Geoengineering, Washington DC, December 9th 2016
- Climate impacts in delayed mitigation and geoengineering scenarios, *Workshop on 5C Arctic warming in a 2C world*, (Skype presentation), July 14th, 2016
- DARPA presentation on first seedling: Washington DC, August 15, 2016

- The State of SRM Scientific Investigation using Earth System Model, *Meeting of the Academic Working Group on International Governance of Climate Engineering*, organized by the School of International Service, American University, Washington DC, March 7, 2016
- Impact of Geoengineering on the Atmosphere with Ecological Implications, *The World Science Summit on Climate Engineering: Future Guiding Principles and Ethics, Council of Science and Society Presidents*, U.S. National Academy of Sciences, Washington DC, Dec 2-3, 2014.
- Impact of Very Short-lived Halogens on Stratospheric Ozone Abundance and UV radiation in a Geo-engineered Atmosphere, *AGU Fall Meeting*, San Francisco, CA, December 07, 2012
- The Impact of Solar Radiation Management on Stratospheric Chemistry, *Atmospheric Chemical Mechanisms - Atmospheric Chemistry into the Future*, UC Davis Conference Center, December 10-12 2012
- Impact of Geo-engineering on the Ozone Abundance in the Stratosphere, Monitoring of Geoengineering Effects and their Natural and Anthropogenic Analogues - Part II: California Institute of Technology Pasadena, November 15-18, 2011
- The impact of geo-engineered aerosols on Troposphere and Stratosphere, *Environmental Defense Found Science Day on Geo-engineering*, San Francisco, USA: February 2010
- The impact of geo-engineered aerosols on Troposphere and Stratosphere, *Asilomar Conference on Climate Interventions*, Monterey, CO: March 22-25, 2010, Poster Presentation
- Impact of Geo-engineered Aerosols on Stratospheric Ozone, *94th ESA Annual Meeting* Albuquerque: August, 2009
- Impact of Proposed Geo-engineering schemes on Troposphere and Stratosphere, *AMS/AGU Head and Chair Meeting* Boulder: 16. October, 2008
- Relevance of simulations of chemical responses to climate change for atmospheric chemistry, *Managing Solar Radiation Workshop*, San Francisco, USA: Nov. 2006
- Overview of chemical ozone loss in polar regions over the last 12 years based on satellite observations: HALOE, ILAS, and ILAS-II, *The International Association of Geomagnetism and Aeronomy*, Toulouse: July 2005

Recent Oral Presentations:

- Chemistry and aerosol performance of CESM2 WACCM and CAM-chem, *CESM working group meeting*, Boulder, June 2018
- Overshoot scenarios discussion, GeoMIP meeting, Zürich, Switzerland, April 2018
- NCAR CGD CAP meeting presentation on geoengineering, March 2017
- New Tier1 GeoMIP Experiment: Overshoot, *Climate Engineering Conference 2017*, Berlin, Germany, October 2017
- Stratospheric Aerosol Geoengineering, 20-Member Ensemble Experiment using Feedback-Control, *Climate Engineering Conference 2017*, Berlin, Germany
- Climate impacts in delayed mitigation and geoengineering scenarios, *NCAR Networking and Discovery day*, April 22, 2016
- New SOA approach in CESM WACCM and CAMchem, *CESM working group meeting*, Breckenridge, June 2016
- Overview of the large ensemble geoengineering simulations, *Meeting at CAS and societal dimension group*, October 19, 2016.
- Climate impacts in delayed mitigation and geoengineering scenarios, *AGU Meeting*, Dec 2017
- CESM working group meeting February / March 2017
 - Chemistry-Climate Working Group: State of CAMchem

- Joint AMWG/WACCM/CHWG: Summary of the WACCM/CAM/Chemistry modelling suite
 - Societal Dimensions Working Group: Large Ensemble Climate Intervention Simulations
 - Advanced Science Discovery Presentation: “Large Ensemble Climate Intervention Simulations”
- CESM working group meeting February 2016:
 - Chemistry-Climate Working Group: Coupling the fire model with the atmosphere in CESM.
 - Societal Dimensions Working Group: Climate outcome of combined geoengineering and mitigation scenarios.
- Controlling factors of OH and Methane Lifetime, *Chemistry Climate Model Intercomparison, (CCMI) Workshop*, Rome, Italy, October 2015
- Representation of CESM CAM4-chem within the Chemistry-Climate Model Initiative (CCMI), *20th Annual CESM Workshop*, Breckenridge, June 18th, 2015
- Can regional Geoengineering save the Arctic Sea-ice?, *Fourth GeoMIP Stratospheric Aerosol Geoengineering Workshop*, Paris, France, April 24-25, 2014
- Proposal for a new GeoMIP experiment for Chemistry Climate Model Initiative (CCMI), *Third Chemistry-Climate Model Initiative (CCMI) Workshop*, Lancaster, UK, May 20-22, 2014, oral presentation
- S. Tilmes, Global Chemistry-Climate Modeling, Simulating West African Air Quality, *1st West African Workshop on Air Quality*, Abuja, Nigeria, June 2014
- UCAR’s Members Meeting, booth and poster on Geoengineering Model Intercomparison Project (GeoMIP)

PUBLICATIONS

[Complete list](#)

Selected Recent Publications

- Tilmes, S., Richter, J.H., Kravitz, B., MacMartin, D.G., Mills, M.J., Simpson, I.R., Glanville, A.S., Fasullo, J.T., Phillips, A.S., Lamarque, J.F. and Tribbia, J., 2018. CESM1 (WACCM) Stratospheric Aerosol Geoengineering Large Ensemble (GLENS) Project. *Bulletin of the American Meteorological Society*, <https://doi.org/10.1175/BAMS-D-17-0267.1>
- Tilmes, S., Richter, J.H., Mills, M.J., Kravitz, B., MacMartin, D.G., Garcia, R.R., Kinnison, D.E., Lamarque, J.F., Tribbia, J. and Vitt, F., 2018. Effects of different stratospheric SO₂ injection altitudes on stratospheric chemistry and dynamics. *Journal of Geophysical Research: Atmospheres*, 123(9), pp.4654-4673.
- Tilmes, S., J. H. Richter, M. J. Mills, B. Kravitz, D.G. MacMartin, F. Vitt, J. J. Tribbia, and J.-F. Lamarque, 2017: Sensitivity of aerosol distribution and climate response to stratospheric SO₂ injection locations, *JGR-Atmospheres*, <https://doi.org/10.1002/2017JD026888>
- Tilmes, S., B. M. Sanderson, and B. C. O’Neill, Climate impacts of geoengineering in a delayed mitigation scenario, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL070122, 2016
- Tilmes, S., J.-F. Lamarque, L. K. Emmons, D. E. Kinnison, D. Marsh, R. R. Garcia, A. K. Smith, R. R. Neely, A. Conley, F. Vitt, M. Val Martin, H. Tanimoto, I. Simpson, D. R. Blake, and N. Blake, Representation of the Community Earth System Model (CESM1) CAM4-chem within the Chemistry-ClimateModel Initiative (CCMI), *Geosci. Model Dev.*, 9, 1853-1890, doi:10.5194/gmd-9-1853-2016, 2016

- Tilmes, S., J.-F. Lamarque, L. K. Emmons, D. E. Kinnison, P.-L. Ma, X. Liu, S. Ghan, C. Bardeen, S. Arnold, M. Deeter, F. Vitt, T. Ryerson, J. W. Elkins, F. Moore, J. R. Spackman, and M. Val Martin, Description and evaluation of tropospheric chemistry and aerosols in the Community Earth System Model (CESM1.2), *Geosci. Model Dev.*, 8, 1395-1426, doi:10.5194/gmd-8-1395-2015, 2015

Assessments

- *WMO Ozone Assessment 2018*: Chapter 6 Co-author, Section author on climate engineering
- *TOAR co-author chapter 6*: Assessment of global-scale model performance in replicating global and regional scale ozone distributions and trends, 2017
- *Overview of IGAC/SPARC Chemistry-Climate Model Initiative (CCMI) Community Simulations in Support of Upcoming Ozone and Climate Assessments*, Co-author of Chapter 6: Stratospheric Chemistry and Chapter 7: Upper Troposphere Lower Stratosphere, SPARC Newsletter No. 40, p. 48-66, 2013
- *WMO ozone assessment 2010*: Co-author in Chapter 5: Information and Options for Policymakers, Contributor of Chapter 2: Stratospheric
- Investigation of trace gas variability for use in model evaluation, J. Zimmerman and S. Tilmes (1999), *GLOREAM Annual Report*, 1999

Non-refereed Publications

- **S. Tilmes**, Short Comment in *Atmos. Chem. Phys. Discussion* o, 1977-2020, 2009, to the Paper: Evaluation of CLaMS, KASIMA and ECHAM5/MESSy1 simulations in the lower stratosphere using observations of Odin/SMR and ILAS/ILAS-I, F. Khosrawi, R. Müller, M. H. Proffitt, R. Ruhnke, O. Kirner, P. Jöckel, J.-U. Grooß, J. Urban, D. Murtagh, and H. Nakajima (March 2009)
- R. Müller and **S. Tilmes** (2008), Comment on “Middle atmosphere CO, N₂O, HNO₃, and temperature profiles during the warm Arctic winter 2001–2002” by G. Muscari et al., *J. Geophys. Res.*, **113**, doi:10.1029/2007JD009709

Diplomarbeit

- S. Kanera (1998), Die Bestimmung der trockenen Deposition in einem mesoskaligen Chemie-Transport-Model (EURAD), *Diplomarbeit*, Universität Köln

Dissertation and Books

- Book on *Stratospheric Ozone Depletion and Climate Change*, Chapter Author: Impact of Geo-engineering on Stratospheric Ozone and Climate, Edited by Rolf Müller, published 2012
- Book on *Geo-Engineering Climate Change. Environmental Necessity or Pandora's Box?* Chapter Author , Edited by Brian Lauder and J. Michael T. Thompson, published 2010
- S. Tilmes (2004), Chemical ozone loss in the Arctic polar stratosphere derived from satellite observations, *Ph.D. thesis* Johann Wolfgang Goethe Universität, Frankfurt, Germany, Tilmes2003-Dissertation.pdf, 172pp.
- S. Tilmes (2004), Chemical ozone loss in the Arctic polar stratosphere: an analysis of twelve years of satellite observations, Jülich, Forschungszentrum, Zentralbibliothek, Schriften des Forschungszentrums Jülich, *Reihe Umwelt / Environment*, **43** 3-89336-347-5, 162pp