Curriculum vitae

Personal Name Nationality Address	Bernd <u>Kärcher</u> German Institut für Physik der Atmosphäre (IPA), Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, 82234 Wessling, Germany
Education	
2000	Venia Legendi in Theoretical Physics (Ludwig-Maximilians-University Munich, LMU) Lecture: Particles in the tropopause region – New results and research perspectives
1999	Habilitation (Venia Legendi) in Physics, Ruprecht-Karls-University Heidelberg Thesis: Aviation-produced aerosols and contrails Lecture: Evolution of entropy in the Gay-Lussac experiment
1991	Ph.D. in Physics (summa cum laude), Technical University of Munich (TUM) Thesis: Ion-beam-driven plasma described by rate equations
1988	Diplom, (M.Sc. equivalent) in Physics (with distinction), Technical University of Darmstadt Thesis: Self-similar solutions of ion-beam-driven plasma expansion
Employment	
since 2006	external Professor, Meteorological Institute Munich (MIM), Department of Physics (LMU)
2001-2002	Professor (C3) at MIM (LMU), Radiation and Remote Sensing Group
1997-present	Research Physicist, Institute for Atmospheric Physics at DLR
1992-1997	Research Assistant (C1) at LMU

1991–1992 Postdoctoral fellow at the Max-Planck-Institute for Quantum Optics (MPQ)

1988–1991 Doctoral Student, Graduate Studies of Atomic and Plasma Physics at TUM and MPQ

Honors

1990	Scientific stay at the Kapitza Institute of Physical Problems, Moscow; visits to research
	laboratories in Moscow and Cernogolovka, incl. the L.D. Landau Institute for Theoretical
	Physics; funded by a bilateral exchange program between the German Science Foundation
	(DFG), the (formerly) USSR Academy of Sciences and the Max-Planck Society (MPG)
1996	Research Award of the German Meteorological Society (DMG) for work on the "Formation
	of Aerosols and Ice Crystals in the Upper Troposphere"
2002	Short-term Visitor at MISU, Stockholm University
2008	Presented with a copy of the Nobel Peace Prize certificate bestowed on the IPCC in 2007 for
	substantial contributions to the work of the IPCC since its inception
2014	NASA Group Achievement Award to the ACCRI Aircraft Cloud Effects Team
2016	CIRES Visiting (sabbatical) Fellow, University of Colorado and NOAAs Earth System
	Research Laboratory (Chemical Sciences Division), Boulder, CO, USA
2017	Short-term Visitor at ACES, Stockholm University
2021-present	Member of the Energy and Environment Commission, French Air and Space Academy
-	(AAE), Toulouse, France
2022	Invité Expert Scientifique, Laboratoire de Météorologie Dynamique (LMD), Ecole
	Polytechnique, Palaiseau, France

Research profile

I have many years of experience in developing atmospheric process models, understanding the microphysical and chemical behavior and atmospheric impacts of airborne aerosol particles and ice-phase clouds, and integrating experimental data with cloud physical theory in order to develop parameterization schemes for large-scale models. My contributions to atmospheric ice formation processes and the physics of ice clouds have led to significant changes in cloud schemes of numerical weather prediction and climate models.

I was involved in, and received outside funding from, numerous projects in EU framework programs, German Federal Ministry of Science and Education and Research (BMBF) collaborative programs, and the German Helmholtz Society (HGF). I acted as responsible scientist and administrator of DLR-IPAs Aviation-Climate projects 1999-2009 securing significant internal funding that included several aircraft field campaigns on contrail- and cirrus-related problems.

Professional activities

Co-editor (2002–2011) with subject areas Aerosols, Clouds and Precipitation for the interactive open-access journal Atmospheric Chemistry and Physics (ACP).

Contributor to the German National Research Plan 2004–2009 *The Role of the Atmosphere in Climate and the Earth System*, and have been **lead author, contributor, or reviewer** of various scientific assessments, including the: NASA/NOAA/EC/ICAO/UNEP/WMO **program report** *Global Atmospheric Effects of Aviation* (1997); Intergovernmental Panel on Climate Change (IPCC) **special report** *Aviation and the Global Atmosphere* (1999); International Global Atmospheric Chemistry Project (IGAC) **monograph** *Atmospheric Chemistry in a Changing World* (2003); Stratospheric Processes and their Role in Climate (SPARC) **assessment** of *Stratospheric Aerosol Properties* (2006); **white paper** *Climate impact of contrails and contrail cirrus* of the U.S. Federal Aviation Agencies (FAA) Aviation Climate Change Research Initiative (2007); **4th Assessment Report** of the IPCC (2007); and IGACs *Bounding the Role of Black Carbon in the Climate System – A Scientific Assessment* (2013).

Session convenor at international conferences including the: European Aerosol Conference (EAC), Trinity College, September 2000, Dublin, Ireland, Session *Atmospheric Aerosols - Particle Formation and Growth*; European Geophysical Union (EGU) Joint General Assembly with AGU, April 2003, Nice, France, Session *Cirrus Clouds at the Tropopause* and General Assemblies 2003–2005, Session *Clouds, Aerosols, and Radiation*; IGAC/SPARC Workshop "Processes governing the chemical composition of the extratropical UTLS", May 2005, Mainz, Germany, Session *Chemical and physical processes*; American Geophysical Union (AGU) Fall Meeting, December 2006, San Francisco, USA, Sessions *Water Vapor and Cirrus Clouds in the Tropical Upper Troposphere* and *Aerosols, Clouds, and Climate*.

Participation in the **GEWEX Cloud System Study (GCSS)** cirrus parcel model intercomparison project and in the GCSS cloud-resolving cirrus model intercomparison study.

Theses supervision and project evaluation

I served as examiner, co-examiner, and external examiner in PhD thesis committees at the Universities of Munich, Lancaster, Leeds, and Warsaw, at Sorbonne Université and ETH Zurich. I acted as a referee in search committees for German and U.S. professorships. As proposal reviewer in evaluation and moderating panels including Deutsche Forschungsgemeinschaft (DFG), Staatssekretariat für Bildung und Forschung (Switzerland), the Natural Environment Research Council (NERC, U.K.), the National Science Foundation (NSF, U.S.A.), the American Meteorological Society (AMS) and the U.S. Department of Energy (DOE).

Conference contributions and outreach

I presented since 1988 80+ partly invited or solicited papers at national and international conferences and 25+ contributions to summer schools and advanced study courses, and since 1985 95+ invited seminars or talks in universities and research laboratories. I acted as convenor of a number of conference sessions.

I had several interviews on scientific questions related to the impact of aviation on chemistry and climate for various radio stations, newspapers, and magazines, including two radio broadcast features from WDR5 (Westdeutscher Rundfunk, 5/2007) and from BR2 (Bayerischer Rundfunk, 10/2012). I authored the DLR press release about research into aerodynamic contrails and their potential climatic relevance (4/2009) and co-authored international press releases about the global radiative forcing from contrail cirrus. I contributed the essay "Does aircraft soot matter for the climate impact of aviation?" in the Springer Nature Sustainability Community Blog (https://sustainabilitycommunity.springernature.com) and to the feature "Stolen light – the economical effect of contrails on solar energy, climate and agriculture" available on Youtube www.youtube.com/watch?v=X1iIYOXa808.

Teaching experience

Two lecture series at the LMU Meteorological Institute (MIM) since 2000: *Atmospheric Aerosols* (two courses: Fundamental, Advanced) and *Atmospheric Chemistry*; prior to 2000: lectures on *General Meteorology* and *Climatology* at the LMU and on *Atmospheric Aerosols* and *Stratospheric Chemistry* as part of the Environmental Physics curriculum at the University of Heidelberg. Invited lecture "Formation of Cirrus Clouds" given at the Université Pierre et Marie Curie, Paris.

Contributions to the EC Advanced Study Course "Atmospheric Effects of Aircraft Emissions in the Upper Troposphere and Lower Stratosphere" (Bergen, Norway, 1999), the International Max-Planck Research School (IMPRS) as part of the First French-German Summer School "Aerosols, Heterogeneous Chemistry, and Climate" (Ile D'Oléron, France, 2004), the Telluride Science Research Center Aerosols and Clouds (Telluride, CO, USA, 2012), and the Leipzig Graduate School Clouds, Aerosols and Radiation (Leipzig, Germany, 2018).