# Prof. Dr. Susanne Crewell | Curriculum Vitae

## Personal Information

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| Born: | 01.01.1964, Hagen/Bremen Germany |
| Citizenship: | German |
| Marital Status: | Married |
| Address \| Office: | Institute for Geophysics and Meteorology,<br>University of Cologne, Pohligstr. 3, 50969 Cologne<br>e-mail: susanne.crewell@uni-koeln.de<br>Phone +49 221 470-5286 |
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| Web | http://www.geomet.uni-koeln.de/crewell.html<br>http://www.academia-net.org/profil/prof-dr-susanne-crewell/1133666<br>Researcher ID: O-1640-2013; ORCID: 0000-0003-1251-5805 |

## Education

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| 06/2002 | Habilitation, Meteorological Institute, University of Bonn, Germany<br>*Ground-based remote sensing and its use for atmospheric model evaluation* |
| 03/1993 | PhD, Dr. rer. nat., Institute for Environmental Physics, University of Bremen, Germany, Supervisor: Prof. Dr. Klaus Künzi<br>*Submillimeter-radiometry using an airborne receiver to measure stratospheric trace gases* |
| 01/1990 | Diploma in Meteorology, Institute for Marine Sciences, University of Kiel, Germany, Supervisor: Prof. Dr. Eberhard Ruprecht<br>*Determination of latent heat flux over the northern Atlantic using a combination of microwave satellite measurements and ship derived wind fields* |

## Experience

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| since 05/2006 | Professor for Meteorology (W3), Institute for Geophysics and Meteorology, University of Cologne, Germany |
| 02/2004 - 04/2006 | Professor for Experimental Meteorology (C3),<br>Meteorological Institute, Ludwig-Maximilian University Munich |
| 09/1996 - 01/2004 | Assistant Professor (C1/C2), Meteorological Institute, Rheinische Friedrich Wilhelms University Bonn, Germany |
| 05/1994 - 05/1996 | Research Associate, Department of Physics, State University of New York, Stony Brook, USA |
| 05/1993 - 04/1994 | Post-Doctoral Fellow, Institute of Environmental Physics, University Bremen |
| 04/1990 – 04/1993 | Research Fellow, Institute of Environmental Physics, University of Bremen |
| 1986 - 1990 | Student Assistant, Institute for Marine Sciences, University of Kiel, Germany |

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| 2020 | Max-Delbrück Prize, University of Cologne |
| 2019 | Alfred-Wegener Medaille, Deutsche Meteorologische Gesellschaft |
| 2018 | Astronomer temporaire, Laboratoire d'Etudes du Rayonnement et de la Matière en Astrophysique et Atmosphères (LERMA), Department de Radioatronomie Millimetrique, Observatoire de Paris, France, |
| 04/2018 | Guest NOAA Earth System Research Laboratory, Boulder, CO, USA |
| 2015 | Hans Liebe Lectureship in microwave and optical spectroscopy, U.S. National Committee of the Union of Radio Scientists Internationale (URSI) |
| 2013 | Academy of Sciences, Humanities and the Arts North Rhine Westphalia, Düsseldorf, Germany |
| 2008 | Albertus Magnus Teaching Award, University of Cologne |
| 10/2008 – 12/2008 | Visiting Scientist Atmospheric and Oceanic Sciences Department, University of Wisconsin, Madison, WI, USA |

# Research

Since nearly three decades my research is dedicated to the development and application of novel observation techniques to better understand the processes determining the atmospheric water cycle. Observations and process knowledge are used to evaluate models in order to arrive at better weather forecasts and climate predictions. Specific research interests are

- Development of novel microwave instrumentation for ground-based, airborne and satellite operation including radiative transfer studies and retrieval development and transfer to operational environment
- Use of synergetic measurements at atmospheric supersites for process understanding and model evaluation, e.g. established Jülich Observatory for Cloud Evolution (JOYCE), (co-) organized of several international field campaigns
- Understanding boundary layer processes, i.e. thermodynamic and dynamic structure, diurnal evolution, convection, and cloud physics, i.e. formation, precipitation formation
- Investigating the ability of numerical weather prediction models to correctly represent water cycle parameters, e.g. by developing and using forward simulators for fair model intercomparisons
- Detecting the climate change signal in water cycle related quantities from longterm microwave satellite observation
- Exploiting novel high-resolution analysis for investigating spatio-temporal variability of renewable energy, i.e. solar and wind energy

Since 2006 I have accquired funding for more than seven million Euro at University of Cologne from DFG, BMBF, ESA, European Union and Deutscher Wetterdienst. I have (co-) led large coordinated projects such as a Marie Curie Initital Training network and three DFG Collaborative Research Centers. In addition, four large infrastructure proposals (§91b) were approved by DFG, i.e. dual polarization microwave radiometer, boundary layer microwave and sodar profiler and Atmospheric Emitted Radiance Interferometer (AERI), Microwave Radar/radiometer of Arctic Clouds.

## Community Service

| Membership in Scientific Bodies (selected) | |
|---|---|
| 2016 - present | Deputy Speaker, CRC/TR 172 "Arctic Amplification" |
| 2016 - present | Cluster Speaker, CRC 1211 "Earth at its Dry Limit" |
| 2015 - present | DFG Senate Committee on Collaborative Research Centres |
| 2014 - present | Joint ESA-EUMETSAT Microwave Imager & Ice Cloud Imager Science Advisory Group nominated by the European Space Agency (ESA) |
| 2014 - present | Scientific Advisory Board, German Weather Service (DWD) |
| 2012 - present | Steering Committee High Definition of Clouds and Precipitation for Climate Prediction (HD(CP)²) funded by the German Science Ministry (BMBF) |
| 2012 - 2016 | Coordinator, Marie-Curie Initial Training Network for Atmospheric Remote Sensing (ITaRS) |
| 2012 - 2015 | Senate Commission of the Helmholtz Association of German Research Centers |
| 2011 - 2014 | Steering Committee ABC/J Geoalliance |
| 2011 - 2014 | DFG Senate Commission on Water Research |
| 2007 - 2018 | Speaker for University of Cologne, TR 32 "Patterns in Soil-Vegetation-Atmosphere Systems" |
| 2008 - 2014 | DFG Review Board for Atmospheric Science and Oceanography |
| 2008 - 2012 | Management Committee COST Action (IC0802) “Propagation Tools and Data for Integrated Telecommunication, Navigation and Earth Observation Systems” |
| 2008 - 2010 | Board Member of Atmospheric Radiation Measurement (ARM) Climate Research Facility, US Department of Energy |
| 2006 - 2013 | Post-EPS Mission Experts Team, EUMETSAT |
| 2006 - 2012 | Scientific Advisory Board, Leibniz Institute for Tropospheric Research Leipzig |
| 2006 – 2009 | European Fleet for Airborne Research Panel on Education and Training” |
| 2005 – 2007 | Scientific Director Environmental Research Station Schnee-fernerhaus (UFS) |

| Academic Self-government at University of Cologne | |
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| 2018 - present | Vice Dean of Research at the Faculty of Mathematics and Natural Sciences |
| 2014 - present | Member of the Steering Committee, Graduate School of Geosciences (GSGS) |
| 2014 - 2018 | Speaker of university wide Albertus Magnus Graduate Center (AMGC) |
| 2014 - 2016 | Head of Department of Geosciences |
| 2014 - 2017 | Guest participant in the Steering Committee of the University of Cologne Institutional Strategy |
| 2012 - 2017 | Leader of the Network Project “Women in Science, Technology, Engineering and Mathematics STEM” |
| 2010 - 2013 | Equal Opportunities Officer, Faculty of Mathematics and Natural Sciences |
| 2009 - present | Vice head Master Examination Board, Institute of Geophysics and Meteorology |
| 2007 - 2008 | Head of Department of Geosciences |
| 2007 - 2014 | Head of Bachelor Examination Board, Institute of Geophysics and Meteorology |

**Diverse**

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| Editorial | Geoscience Remote Sensing Letters GRSL (2005-2011), Advisory Board, Meteorologische Zeitschrift (2005-2010) |
| Journals | Reviews for most important journals in the field, e.g. of American Meteorological Sciety, American Geophysical Union, Copernicus, Springer Nature Group |
| Funding Agencies | Funding Agencies in more than 10 countries |
| Diverse | Reviewing Services for many Academic Position, Habilitations and Prices as well as Departments, e.g. Department of Environmental System Science, ETH Zürich |
| Organisation | Convener of multiple sessions at international conferences; Organisation of several Worksops, e.g. latest LES Modelling and Visualization, Cologne 2018, and summer schools |

# Teaching Statement

Seeing how students grow during the course of their study program, develop their research skills within their PhD work and become independent researchers is one of the most rewarding aspects of my profession. However, it is important to say that while research-oriented teaching is at the core of my interest I find it highly important that student education and also graduate training prepare students and young researchers for a career outside academia. In summary, I

- have been involved in teaching since 1991 (lab courses for physics students) at the universities Bremen, Bonn, Munich and Cologne
- have a broad repertoire of different lectures within Bachelor and Master programs with emphasis in observational methods including practical aspects, e.g. clouds physics, advanced remote sensing, inverse modelling, general meteorology
- have been actively involved in the transformation of the German Diploma system to the Bachelor/Master system
- initiated a series of summer schools on observation/modelling of clouds and precipitation as coordinator of the EU ITaRS in 2013 which continues since then jointly with American and European partners on both sides of the Atlantic

**Supervision**

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| **Postdocs** | Supervided about 15 postdocs from which three became professors, i.e. Felix Ament, Ulrich Löhnert, Nicole von Lipzig |
| | Currently advising three postdocs |
| **Doctoral students** | Supervised 12 doctoral students as main advisor who successfully finished at University Cologne |
| | Currently advising 6 PhD students |
| | Examiner / Opponent for 15 dissertations in 8 Eurpean countries, e.g. ETH, Sorbone, TU Selft, Stockholm, Barcelona |
| | Examiner of about 30 PhD theses at german universities |
| **Students** | Main Supervisor of 12 Diploma, 5 master and 12 Bachelor students |

# Publications

My publication record spans a wide range of topics

- with more than 100 peer-reviewed publications as of 13 April 2020
  Publons O-1640-2013: 102 publications, 2353 citations, h-index=27
  Scopus: 132 Publications, 2698 citations, h-index = 29
  Google: 4505 citations, h-index = 39
- and book contributions/review reports related to observational techniques and the future development of measurement strategies.

Below also invited talks and specific reports of interest are given. The full list of my publications including conference contributions, talks and posters can be found at
http://gop.meteo.uni-koeln.de/ag_crewell/doku.php?id=publications:publications

## 10 most important publications


1. Frank, C. W., B. Pospichal, S. Wahl, J. D. Keller, A. Hense, and S. Crewell, 2020: The added value of high resolution regional reanalyses for wind power applications, Renewable Energy , 148, 1094-1109 https://doi.org/10.1016/j.renene.2019.09.138,
2. Marke, T., U. Löhnert, V. Schemann, J.H. Schween, and S. Crewell, 2020: Detection of land-surface-induced atmospheric water vapor patterns, Atmos. Chem. Phys., 20, 1723–1736, https://doi.org/10.5194/acp-20-1723-2020.
3. Schnitt, S., E. Orlandi, M. Mech, A. Ehrlich, and S. Crewell, 2017: Characterisation of Water Vapor and Clouds during the Next-Generation Aircraft Remote-sensing for Validation (NARVAL)-South studies, IEEE Journal on Selected Topics in Earth Observation and Remote Sensing (JSTARS), 10:7, 3114-3124, https://doi:10.1109/JSTARS.2017.2687943.
4. Corbetta, G., T. Heus, R. Neggers, E. Orlandi, and S. Crewell, 2015: Overlap statistics of shallow boundary layer clouds: comparing ground-based observations with large-eddy simulations, Geophys. Res. Lett., 42:19,8185-8191, https://doi:10.1002/2015GL065140.
5. Löhnert, U., J. H. Schween, C. Acquistapace, K. Ebell, M. Maahn, M. Barrera-Verdejo, A. Hirsikko, B. Bohn, A. Knaps, E. O'Connor, C. Simmer, A. Wahner, and S. Crewell, 2015: JOYCE: Jülich Observatory for Cloud Evolution, Bulletin of the American Meteorological Society, 96(7), 1157-1174, https://doi:10.1175/BAMS-D-14-00105.1.
6. Eikenberg, S., C. Köhler, A. Seifert, and S. Crewell, 2015: How microphysical choices affect simulated infrared brightness temperatures, Atmospheric Research, 156, 67-79, https://doi:10.1016/j.atmosres.2014.12.010.
7. Schween, J. H., A. Hirsikko, U. Löhnert, and S. Crewell, 2014: Mixing layer height retrieval with ceilometer and Doppler lidar: from case studies to long-term assessment, Atmospheric Measurement Techniques, 7, 3685-3704, https://doi:10.5194/amt-7-3685-2014.
8. Ebell, K., E. Orlandi, A. Hünerbein, U. Löhnert, and S. Crewell, 2013: Combining ground and satellite based measurements in the atmospheric state retrieval: Assessment of the information content, Journal of Geophysical Research, 18, 6940-6956, https://doi:10.1002/jgrd.50548.
9. Crewell, S., and U. Löhnert, 2007: Accuracy of boundary layer temperature profiles retrieved with multi-frequency, multi-angle microwave radiometry, IEEE Transactions on Geoscience and Remote Sensing, 45(7), 2195-2201, https://doi:10.1109/TGRS.2006.888434.
10. Crewell, S., C. Simmer, H. Bloemink, A. Feijt, S. García, D. Jolivet, O. Krasnov, A. van Lammeren, U. Löhnert, E. van Meijgaard, J. Meywerk, K. Pfeilsticker, M. Quante, S. Schmidt, M. Schröder, T. Scholl, T. Trautmann, V. Venema, M. Wendisch, and U. Willén, 2004: The BALTEX Bridge Campaign: An integrated approach for a better understanding of clouds, Bulletin of the American Meteorological Society, 85(10), 1565-1584, https://doi:10.1175/BAMS-85-10-1565.

## Invited Talks (last 5 years)

2020 Crewell, S., K. Ebell, A. von Lerber, A. Radovan, B. Kulla, L.-L. Kliesch, M. Mech, A. Rinke, V. Schemann, M. Wendisch: Arctic Amplification – what can we learn from microwave measurements? Institute seminar, Institut für Physik der Atmosphäre, ETH Zürich, 27 April 2020.

Crewell, S., K. Ebell, A. von Lerber, A. Radovan, B. Kulla, L.-L. Kliesch, M. Mech, A. Rinke, V. Schemann, M. Wendisch: Arctic Amplification – what can we learn from microwave measurements? Institute seminar, Institut für Physik der Atmosphäre, DLR Oberpfaffenhofen, 8 Januar 2020.

2019 Cloud observations in 2030, Understanding Clouds and Precipitation (UCP2019), Berlin, Germany, 25 February - 1 March 2019

Arctic clouds - Insights from the ACLOUD campaign around Svalbard, Seminar Talk, University Centre in Svalbard/, Longyearbyen, Svalbard, 28 March 2019

Crewell, S., M. Mech, S. Bühler, P. Eriksson, C. Prigent, X. Xie: The Ice Cloud Imager (ICI) – a new perspective on ice clouds and precipitation, EUMETSAT MTG & EPS-SG User Days, Darmstadt, 14 November 2019.

Crewell, S., M. Mech, S. Bühler, P. Eriksson, C. Prigent, X. Xie: Eumetsat Polar System – Second Generation (EPS-SG): Neue Einblicke in Eiswolken, DMG Fortbildung, Bonn, 26 November 2019.

2018 Arctic clouds - first insights from the ACLOUD campaign around Svalbard, Colloquium, University of Bremen, 12 January 2018

The Role of Mixed-Phase Clouds in the Arctic, Seminar Talk, Colorado State University, Fort Collins, 20 April 2018

Crewell, S., Warum erwärmt sich die Arktis am stärksten – und was haben die Wolken damit zu tun? STUMETA, University of Bonn, 10 May 2018

Microwave radiometry for atmospheric application: a journey across the world from ground, via aircraft to satellites, Seminar talk, LERMA, Paris, 5 June 2018

Microwave radiometry - an important component of the global observing system, ARM Summer workshop, Norman, Oklahoma, 20 July 2018

2017 Future Campaigns. HD(CP)2 Annual Meeting, Schneefernerhaus, 15 February 2017

Narval Next-generation aircraft remote-sensing for validation studies, HALO Symposium, Oberpfaffenhofen, 14 March 2017

Microwave Radiometry and Sensor Synergy, Winter school on the observation and modeling of high - latitude and Arctic clouds, Hyytiälä, Finland, March 19-25, 2017

Planned HALO/HAMP campaigns + Polar 5/MiRAC, ISMAR Workshop, Eumetsat, Darmstadt, 10 May 2017

Wasser und Wolkenbildung – Atmosphäre und mögliche Vorhersagen. Wissenschaft im Rathaus, Köln, 9 October 2017

The AC3 project: why is the Arctic warming faster than the mid latitudes? Svalbard Science Conference, Oslo, 6-9 November 2017

2016 What can we learn from atmospheric profiling stations to better understand climate processes? Challenges of Atmospheric Research, DLR Conference on Climate Change, Cologne, 5 - 7 April 2016

Atmospheric Remote Sensing: Challenges and Applications, 1st ECARS Summer School, Romania, 2 June 2016

Assessment of sampling effects on precipitable water climatology, GEWEX Water Vapor Assessment (GVAP) Workshop, Eumetsat, Darmstadt, 22 September 2016

Crewell, S.: Was ist gute Betreuung? Promovierendentag, Universität zu Köln, 2 November 2016

ArctiC Amplification: Climate Relevant Atmospheric and SurfaCe Processes, and Feedback Mechanisms (AC)3 with a focus on clouds. MISU, University of Stockholm, Seminar talk, 29 November 2016