



## Prof. Dr. Markus Quante Curriculum Vitae

### **Regional modelling of chemistry transport in a changing climate**

Coordination of the **North Sea Region Climate Change Assessment (NOSCCA)**

#### **Affiliation**

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Helmholtz-Zentrum Geesthacht, Member of the Helmholtz Association  
Institute of Coastal Research

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Honorary Professor at Leuphana University Lüneburg, Germany

#### **Education**

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Academic Secondary School: Märkisches Gymnasium, Hamm/Germany

Diploma in Environmental Technology, University of Applied Science,  
Münster/Germany

Diploma in Meteorology (*summa cum laude*), University of Cologne,  
Cologne/Germany (Major: Climate Physics, Atmospheric Chemistry)

Doctorate (Dr. rer. nat.), University of Hamburg, Hamburg/Germany  
(*Disputation summa cum laude*)

#### **Employment**

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| 1982-1983 | Industrial Trainee, British Gas Corporation, Wind Tunnel Lab.,<br>Watson House Research Center, London/UK |
| 1984-1989 | Graduate Assistant, Institute for Geophysics and Meteorology,<br>University of Cologne/Germany            |

|              |   |
|--------------|---|
| 1989-1990    | Research Scientist, Institute for Geophysics and Meteorology, University of Cologne/Germany   |
| 1990-1996    | Research Scientist, Institute for Physics, GKSS Research Centre, Geesthacht/Germany   |
| 1996-2001    | Research Scientist, Institute for Atmospheric Physics, GKSS Research Centre (since 2001 head of Atmospheric Measurements Department)                              |
| 2002-present | Senior Research Scientist, Institute for Coastal Research, GKSS Research Center (head of Coastal Meteorology Dep., since 2004 deputy head of Environ. Chem. Dep.) |

### **Professional activities**

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Consulting / Expert Report for: UK-Natural Environment Research Council (NERC), Dutch Climate Research Programme, University of Electro-Communications Tokyo (UEC), US-Department of Energy (DOE)

Science Team member of the CloudSat-Mission, NASA Jet Propulsion Laboratory, Pasadena

Since 04/2008 member of the joint NASA CALIPSO/CloudSat-Mission Science Team

Member of the Advisory Committee "European Research Course on Atmospheres" University Joseph Fourier, Grenoble

Member of the Steering Group on Climate Change, International Council for the Exploration of the Sea, ICES, 2009 to 2011

Scientific Coordinator of the North Sea Region Climate Change Assessment (NOSCCA)

User Group Selection Panel of European Fleet for Airborne Research (EUFAR)

Member of European Fleet for Airborne Research (EUFAR): Expert Group on Turbulence;

Member of European Fleet for Airborne Research (EUFAR): Expert Group on Active Remote Sensing;

Member of the German Meteorological Society (DMG);

Reviewer for international scientific journals as: Journal of Geophysical Research, Geophysical Research Letters, Journal of the Atmospheric Sciences, Journal of Applied Meteorology, Quarterly Journal of the Royal Meteorological Society, Atmospheric Research, Climate Research, Atmospheric Chemistry and Physics, Annales Geophysicae, Meteorologische Zeitschrift etc.

## **Teaching Activities**

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In the centre of the teaching activities are about 18 years of uninterrupted lectures on *Environmental Meteorology* and *Urban and Vegetation Climate* at the Leuphana University of Lüneburg/Germany.

### ***Lectures at the Leuphana University of Lüneburg:***

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|-----------------|---|
| 2008 to present | Global Change Modelling, <i>MSc. Sustainability Science</i>   |
| 2008 to present | Climate Change and Ecology, <i>MSc. Sustainability Science</i>  |
| 2010 to present | Matter transport in the Atmosphere, <i>BSc. Env. Sciences</i>   |
| 1990 to 2008    | <i>Environmental Meteorology</i>  |
| 1991 to 2008    | <i>Urban Meteorology and Vegetation Climate</i>   |
| 1993 to 1999    | <i>The Atmosphere</i> , University of Applied Science, Lower Saxony, Suderburg (now Leuphana University Lüneburg) |
| 2008, 2009      | <i>Climatology</i> , Leuphana University Lüneburg/Suderburg (MSc Course Trop. Water Management)                   |

### ***National and International Courses***

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| 2004 to 2012 | European Research Course on Atmospheres (ERCA), Université Joseph Fourier, Grenoble/France (lecturer and advisory committee)                 |
| 1995         | NATO Advanced Science Institute „ <i>Remote Sensing of Processes Governing Energy and Water Cycles in the Climate System</i> “, Plön/Germany |
| 1998         | Autumn School on <i>Radar Meteorology</i> , German Aerospace Center, Oberpfaffenhofen/Germany  |
| 2002         | Summer School on " <i>Coastal Seas, System Analysis and Monitoring</i> ", IOW, Warnemünde/Germany  |
| 2002         | Postgraduate Summer Course " <i>Coastal Environmental Surveying</i> ", University of Kiel/Germany  |
| 2004         | Postgraduate Summer Course " <i>Coastal Environmental Surveying</i> ", University of Kiel/Germany  |

- 2005 Autumn School on "*Radar Meteorology*", University of Munich (LMU)/Germany
- 2007 5<sup>th</sup> GKSS School on Environmental Research, "*Persistent Pollution – Past, Present, Future*", Geesthacht/Germany (initiator and lecturer)

### **Invited talks**

(selection) Penn State University, State College/USA; Oregon State University, Corvallis/USA; University of Utah, Salt Lake City/USA; Optical Society of America, Baltimore/USA; University of Hokkaido, Sapporo/Japan; Communication Research Lab., Kashima/Japan; Communication Research Lab., Tokyo/Japan; University of Tohoku, Sendai/Japan; University of Hannover/Germany; German Aerospace Center, Oberpfaffenhofen/Germany; Institute for Tropospheric Research (IfT), Leipzig/Germany; IFM/Geomar, University of Kiel/Germany; University of Lüneburg/Germany; University of Manchester (UMIST)/Germany; University Blaise Pascal, Clermont Ferrand/France; University of Oslo/Norway; Ev. Akademie Loccum/Germany; TU Darmstadt, Germany, and public lectures on climate, clouds, and water cycle issues.

### **Stipends and Awards**

Stipend award by „Prof. Dr. Koepchen Stiftung“, RWE

Stipend by Ruhrgas AG, Essen, for Research Visit to British Gas Research Laboratory, Watson House, London/UK

Stipend from NATO for a Summer Semester at University of Washington, Seattle/USA, Atmospheric Sciences (1986)

Young Scientist Award, „Freunde und Förderer des GKSS Forschungszentrum e.V.“, Geesthacht/Germany

### **Research Interests (Keywords)**

- Environmental meteorology and global change
- Impacts of climate change
- Regional climate modelling
- Chemistry transport modelling
- Deposition of air pollutants and nutrients
- Atmospheric turbulence

- Clouds and climate
- Remote sensing of atmospheric water cycle components

### **Publications (selected from different topic areas)**

- **Gryning, S.-E., E. Batchvarova, M. Quante, and V. Matthias, 2012:** Evaluation of vertical profiles in mesoscale meteorological models based on observations for the COST728 study of winter 2003 PM episodes over Europe. In Steyn, D.G., and S. Trini Castelli (eds.): *Air Pollution Modelling and its Application XXI*. NATO Science for Peace and Security Series C: Environmental Security 4, Springer Science + Business Media, 499-503.
- **Quante, M., A. Aulinger, und V. Matthias, 2011:** Der Schifftransport und sein Beitrag zum Klimawandel. In J. Lozán, H. Graßl, L. Karbe und K. Reise, *Warnsignal Klima: Die Meere - Änderungen und Risiken*. Wissenschaftliche Auswertungen, Hamburg, ISBN 978-39809668-5-2, 286-293.
- **Quante, M., 2011:** The role of clouds in atmospheric transport and chemistry. In. Quante et al., 2011: *Persistent Pollution - Past, Present, Future*. Springer Verlag, Berlin, 299-316.
- **Quante, M., R. Ebinghaus, and G. Flöser (eds.), 2011:** *Persistent Pollution - Past, Present, Future*. Springer Verlag, Berlin, 417pp. Authors: F. Adams, A. Aulinger, C. Barbante, N. Berrojalbiz, M. Bolshov, C. Boutron, P. Brimblecombe, P. Cescon, G. Cozzi, J. Dachs, R. Ebinghaus, H. Elbern, V. Hellwig, H. Helmholtz, C. Ferrari, E. Friese, C. Galban, P. Garbrielli, R. Giola, H. Graßl, H. Hintelmann, S. Hong, S.-D. Hur, A. Jahnke, K. Jones, R. Khaiwal, V. Matthias, L. Mejanelle, L. Nieradzki, L. Nizzetto, J. Pacyna, W. Palm, J. Plane, M. Quante, K. Rosman, H. von Storch, A. Strunk, N. Theobald, C. Turetta, P. Vallelonga, S. del Vento, Z. Xie.
- **Holliday, N.P., M. Quante, T. Sherwin, G. Nolan, K.-A. Mork, H. Cannaby, and D. Berry, 2011:** North Atlantic circulation and atmospheric forcing. In Reid, P. C., and Valdés, L. (eds.): ICES status report on climate change in the North Atlantic. ICES Cooperative Research Report No. 310, 5-20.
- **Holliday, N.P., S.L. Hughes, K. Borenäs, R. Feistel, F. Gaillard, A. Lavìn, H. Loeng, K.-A. Mork, G. Nolan, M. Quante, and R. Somavilla 2011:** Long-term physical variability in the North Atlantic Ocean. In Reid, P. C., and Valdés, L. (eds.): ICES status report on climate change in the North Atlantic. ICES Cooperative Research Report No. 310, 21-46.
- **Holliday, N.P., S.L. Hughes, M. Quante, and B. Rudels, 2011:** Sea level rise and changes in Arctic sea ice. In Reid, P. C., and Valdés, L. (eds.): ICES status report on climate change in the North Atlantic. ICES Cooperative Research Report No. 310, 47-58.

- **Yang, H., S. Dobbie, G. G. Mace, A. Ross, and M. Quante, 2011:** GEWEX Cloud System Study (GCSS) cirrus cloud working group: modelling case development based on 9 March 2000 ARM SGP observations. *Geosci. Model Dev. Discuss.*, **4**, 2751-2790.
- **Hermans, A., F. Ament, B. Geyer, V. Matthias, M. Quante, and B. Rockel, 2011:** Evaluation of Humidity, Clouds and Precipitation in COSMO-CLM and MM5 over Germany. *Meteorologische Zeitschrift*, **XX**, under revision
- **Matthias, V., A. Aulinger, J. Bieser, J. Cuesta, B. Geyer, B. Langmann, I. Serikov, I. Mattis, A. Minikin, L. Monad, M. Quante, U. Schumann, B. Weinzierl, 2011:** The ash dispersion over Europe during the Eyjafjallajökull eruption - comparison of CMAQ simulations to remote sensing and air-borne in-situ observations. *Atmospheric Environment*, *accepted*
- **Bieser, J, A. Aulinger, V. Matthias, M. Quante, and H.A.C. Denier van der Gon, 2011:** Vertical emission profiles for Europe based on plume rise calculations. *Environmental Pollution*, *accepted*
- **Bieser, J., Aulinger, A., Matthias, V., Quante, M., Builtjes, P., 2011:** SMOKE for Europe – Adaptation, modification and evaluation of a comprehensive emission model for Europe. *Geoscientific Model Development*, **4**, 47-68.
- **Aulinger, A., V. Matthias, and M. Quante, 2011:** An approach to temporally disaggregate Benzo(a)pyrene emissions and their application to a 3D Eulerian atmospheric chemistry transport model. *Water, Air, & Soil Pollution*, **216**, 643-655.
- **Drees, C., P. Brandmayr, J. Buse, P. Dieker, S. Gürlich, J. Habel, I. Harry, W. Härdtle, A. Matern, H. Meyer, R. Pizzolotto, M. Quante, K. Schäfer, A. Schuldt, A. Taboada, and T. Assmann, 2011:** Poleward range expansion without a southern contraction in the ground beetle *Agonum viridicupreum* (Coleoptera: Carabidae). *ZooKeys*, **100**,333-352.
- **Matthias, V., I. Bewersdorff, A. Aulinger, and M. Quante, 2010:** The contribution of ship emissions to air pollution in the North Sea regions. *Environmental Pollution* **158**,2241-2250.
- **Quante, M., 2010:** *The Changing Climate - Past, Present, Future*. In Habel, J., and T. Assmann(eds.): *Relict Species – Phylogeography and Conservation Biology*. Springer Verlag, Berlin, 9-56.
- **Quante, M., V. Matthias, S.-E. Gryning, E. Batchvarova, A. Aulinger, C. Chemel, G. Geertsema, B. Geyer, H. Jakobs, A. Kerschbaumer, M. Prank, R. San José, H. Schlünzen, J. Struzewska, B. Szintai, R. Wolke., 2009:** Using windprofiler data in time and frequency domain for the evaluation of meteorological drivers employed in chemistry transport modelling. *8th International Symposium on Tropospheric Profiling, ISTP, Delft, S07 - 006*.
- **Quante, M., 2009:** Spectral behaviour of modelled wind time series and a comparison to respective windprofiler observations. In H. Schluentzen (ed.), *COST728-Report Workshop Hamburg 2008, in print*.

- **Volker Matthias, V., A. Aulinger, and M. Quante (2009):** CMAQ simulations of the benzo(a)pyrene distribution over Europe for 2000 and 2001. *Atmos. Env.*, **43**, 4078-4086.
- **Quante, M., und R. Zakrzewski, 2008:** Entwicklung der Temperatur- und Niederschlagszeitreihen in der Region Lüneburg. *Jb. Naturw. Verein Fstm. Lbg.*, **44**, 83–88.
- **Matthias, V., M. Quante, and A. Aulinger, 2009:** The influence of MM5 nudging schemes on CMAQ simulations of Benzo(a)Pyrene concentrations and depositions in Europe. *Environmental Fluid Dynamics*, **9**, 91-108, DOI 10.1007/s10652-008-9103-6
- **Bewersdorff, I. A. Aulinger, V. Matthias, M. Quante, 2009:** The effect of temporal resolution of PAH emission data on transport and deposition patterns simulated with the community multiscale air quality modelling system (CMAQ). *Meteorol. Zeitschrift*, **18**, 41-53.
- **Matthias, V., A. Aulinger, and M. Quante, 2007:** Adapting CMAQ to investigate air pollution in North Sea coastal regions. *Environmental Modelling & Software* **23** 356-368.
- **Quante, M., 2007:** Distribution and transport of water in the atmosphere. In *Lozán, J.L., H. Graßl, P. Hupfer, L. Menzel, and Ch.-D. Schönwiese (eds.): GLOBAL CHANGE: Enough Water for all?, Wissenschaftliche Auswertungen, Hamburg, 45-52.*
- **Sassen, K., L. Wang, D.O’C. Starr, J. Compstock, and M. Quante, 2007:** A midlatitude cirrus cloud climatology from the Facility for Atmospheric Remote Sensing: V. Cloud structural properties. *J. Atmos. Sci.* **64**, 2483-2501.
- **Quante, M., and V. Matthias, 2006:** Water in the Earth’s atmosphere. *Journal de Physique*, **139**, 37-61.
- **Aulinger, A., V. Matthias, and M. Quante, 2006:** Introducing a partitioning mechanism for PAHs into the Community Multiscale Air Quality modelling system and its application to simulating the transport of benzo(a)pyrene over Europe. *J. Appl. Meteorol.* , **46** 1718-1730.
- **Scholl, T., K. Pfeilsticker, A. Davis, H. Klein Baltink, S. Crewell, U. Löhnert, C. Simmer, J. Meywerk, and M. Quante, 2006:** Path length distributions for solar photons under cloudy skies: Comparison of measured first and second moments with predictions from classical and anomalous diffusion theories. *J. Geophys. Res.*, **111** , D12211, doi:10.1029/2004JD005707.
- **van Lipzig, N.P.M., M. Schröder, S. Crewell, F. Ament, J.-P. Chaboureau, U. Löhnert, V. Matthias, E. van Meijgaard, M. Quante, U. Willén, W. Yen, 2006:** Model predicted low-level cloud parameters. Part I: Comparison with observations from the BALTEX Bridge Campaigns. *Atmos. Res.* >, **82**, 55-82.
- **Quante, M., 2005:** Verteilung und Transport von Wasser in der Atmosphäre. In *J.L. Lozán, H. Graßl, P. Hupfer, L. Menzel und C.-D. Schönwiese (Hrsg.): Warnsignal Klima: Genug Wasser für alle?, Wissenschaftliche Auswertungen, Hamburg, ISBN 3-9809668-0-1, 49-56.*

- **Meywerk, J., M. Quante and O. Sievers, 2005:** Radar based remote sensing of cloud liquid water - application of various techniques - a case study. *Atmos. Res.*, **75**, 167-181.
- **Quante, M., 2004:** The role of clouds in the climate system. *Journal de Physique IV*, **121**, 61-86.
- **Donovan, D.P., M. Quante, I. Schlimme, and A. Macke, 2004:** Use of equivalent spheres to model the relation between radar reflectivity and optical extinction of ice cloud particles. *Applied Optics*, **43** (25), 4929-4940.
- **Crewell, S., C. Simmer, U. Löhnert, V. Venema, A. Feijt, E. van Meijgaard, A. van Lammeren, H. Bloemink, D. Jolivet, M. Schröder, U. Willen, M. Quante, J. Meywerk, O.A. Krasnov, T. Trautmann, S. Gimeno Garcia, K. Pfeilsticker, and T. Scholl, 2004:** The BALTEX Bridge Campaign - An integrated approach for a better understanding of clouds. *Bull. Amer. Meteorol. Soc.*, **85(10)**, 1565-1584.
- **Russenberg, H., S. Crewell, U. Loehnert, M. Quante, J. Meywerk, H. Klein Baltink, and O. Krasnov, 2004:** Radar observations of stratocumulus compared with in situ aircraft data and simulations. *Proceedings of ERAD*, 296-300
- **Hogan, R. J., P. N. Francis, H. Flentje, A. J. Illingworth, M. Quante and J. Pelon, 2003:** Characteristics of mixed-phase clouds: Part I: Lidar, radar and aircraft observations from CLARE'98. *Quart. J. Roy. Meteorol. Soc.*, **129**, 2117-2134.
- **Quante, M., G. Teschke, M. Zhariy, P. Maaß, and K. Sassen, 2002:** Extraction and analysis of structural features in cloud radar and lidar data using wavelet based methods. *Proceedings of ERAD*, 95-103.
- **Raschke, E., und M. Quante, 2002:** Wolken und Klima. *Promet*, 28.Jahrgang, Heft 3/4, 99-111.
- **Quante, M., and D. O'C. Starr, 2002:** Dynamical processes in cirrus clouds: Review of observational results. Chapter 17 in: D. Lynch, K. Sassen, D.O'C. Starr, G. Stephens (eds.): *Cirrus*. Oxford University Press, New York, 346-374.
- **Starr, D. O'C., and M. Quante, 2002:** Dynamical processes in cirrus clouds: Concepts and models. Chapter 18 in: D. Lynch, K. Sassen, D.O'C. Starr, G. Stephens (eds.): *Cirrus*. Oxford University Press, New York, 375-396.
- **Lynch, D.K., K. Sassen, A. Del Genio, A. Heymsfield, P. Minnis, M. Platt, M. Quante, U. Schumann, and H. Sundqvist, 2002:** Cirrus: The future. Chapter 21 in: D. Lynch, K. Sassen, D.O'C. Starr, G. Stephens (eds.): *Cirrus*. Oxford University Press, New York, 449-555.
- **Donovan, D.P., van Lammeren, A.C.A.P., Hogan, R.J., Russchenberg, H., Apituley, A., Francis, P., Testud, J., Pelon, J., Quante, M., and Goddard, J., 2000:** Cloud effective particle size and water content profile retrievals using combined lidar and radar observations: Part II: Comparison with IR radiometer and in-situ measurements of ice clouds. *J. Geophys. Res.*, **106**, 27449-27464.

- **Crewell, S., U. Löhnert, A. van Lammeren, and M. Quante, 2000:** Cloud remote sensing by combining synergetic sensor information. *Phys. Chem. Earth (B)*, **25**, 1043-1048.
- **Danne, O., M. Quante, E. Raschke, and C. Weitkamp, 1999:** Investigations of cloud layer base and top heights from 95 GHz radar reflectivity data. *Phys. Chem. Earth (B)*, **24** (3), 167-171.
- **Danne, O., M. Quante, D. Milferstädt, H. Lemke, and E. Raschke, 1999:** Relationships between Doppler spectral moments within large-scale cirro- and altostratus cloud fields observed by a ground-based 95 GHz cloud radar. *J. Appl. Meteorol.*, **38** (2), 175-189.
- **Fujiyoshi, Y., M. Quante, O. Danne, and E. Raschke, 1999:** Properties of deep stratiform ice cloud revealed by 95 GHz GKSS cloud radar - a case study. *Contr. Atmos. Phys.*, **72** (1), 113-125.
- **Lemke, H., H. Okamoto, M. Quante, 1998:** Comment on error analysis of backscatter from discrete dipol approximation for different ice particle shapes. *Atmos. Res.*, **49**, 189-197.
- **Lemke, H., and M. Quante, 1999:** Backscatter characteristics of nonspherical ice crystals: Assessing the potential of polarimetric radar measurements. *J. Geophys. Res.*, **104** (D24), 31739-31752.
- **Okamoto, H., A. Macke, M. Quante, E. Raschke, 1995:** Modeling of backscattering by non-spherical ice particles for the interpretation of cloud radar signals at 94 GHz. An error analysis. *Contr. Atmos. Phys.*, **68**, 319-334.
- **Quante, M., 1998:** Millimeterwellen-Radargeräte zur Wolkenfernerkundung. *Ann. der Meteorologie*, **32**, 197-210.
- **Quante, M., P.R.A. Brown, R. Baumann, B. Guillemet, and P. Hignett, 1996:** Three aircraft intercomparison of dynamical and thermodynamical measurements during the Pre-EUCREX campaign. *Contr. Atmos. Phys.*, **69**, 129-146.
- **Quante, M., H. Lemke, H. Flentje, P. Francis, and J. Pelon, 2000:** Boundaries and internal structure of mixed phase clouds as deduced from ground based 95-GHz radar and airborne lidar measurements. *Phys. Chem. Earth.*, **25** (10-12), 889-895.
- **Quante, M., J.P.V. Poiares Baptista, E. Raschke (eds.), 1998:** Synergy of Active Instruments in the Earth Radiation Mission. Report ESA EWP-1968 / GKSS/98/E/10, 205pp.
- **Raschke, E., und M. Quante, 2000:** Do we need a cloud radar in space? Key Note in H. Kumagai, H. Kuroiwa, and H. Okamoto (eds.): Proceedings First International Workshop on Spaceborne Cloud Profiling Radar, 24-26 January 2000, Tsukuba, Japan. 15-22.

- **Ström, J., R. Busen, M. Quante, B. Guillemet, P.R.A. Brown, J. Heintzenberg, 1994:** Pre-EUCREX Intercomparison of airborne humidity measuring instruments. *J. Atmos. Ocean. Tech.*, Vol. 11, 1392-1399.