

Nils Peter Wedi

CURRICULUM VITAE

Date of Birth 29. November 1969
Place Greven, Nordrhein-Westfalen, Germany
Nationality German

DEGREES

2001-2004 PhD, Ludwig-Maximilians-Universität München, Germany
supervisor: Prof. Dr. U. Schumann, external advisor: P. K. Smolarkiewicz
1990-1995 Diplom, Johannes Gutenberg-Universität Mainz, Germany
supervisor: Prof. Dr. W. Zdunkowski

EMPLOYMENT

2010- Principal Scientist at the European Centre for Medium-Range Weather Forecasts (ECMWF)
2004-2010 Senior Scientist at ECMWF
2001-2004 Scientist at ECMWF
1995-2001 Analyst at ECMWF

SELECTED PUBLICATIONS

- 2010 **Wedi, N. P.** and P. Smolarkiewicz, A nonlinear perspective on the dynamics of the MJO: idealised large-eddy simulations, *J. Atmos. Sci.* **67**, 1202–1217
- 2009 **Wedi, N. P.**, K. Yessad and A. Untch, The nonhydrostatic global IFS/ARPEGE: model formulation and testing, Technical Report **594**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2009 **Wedi, N. P.** and P.K. Smolarkiewicz, A framework for testing global nonhydrostatic models, *Q.J.R. Meteorol. Soc.* **135**, 469–484
- 2006 **Wedi, N. P.** and P.K. Smolarkiewicz, Direct numerical simulation of the Plumb-McEwan laboratory analogue of the QBO, *J. Atmos. Sci.* **63**, 3226–3252
- 2004 **Wedi, N. P.** and P.K. Smolarkiewicz, Extending Gal-Chen & Somerville terrain-following coordinate transformation on time-dependent curvilinear boundaries, *J. Comput. Phys.* **193**, 1–20.

INTERNATIONAL COLLABORATIONS

April 2009 Visiting the Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US

- Juni/Juli 2005 Visiting the Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US
Juni/Juli 2004 Visiting the Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US
Juni/Juli 2003 Visiting the Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US
Juni/Juli 2002 Visiting the Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US
in collaboration with Dr P.K. Smolarkiewicz

ORGANISATION OF INTERNATIONAL CONFERENCES

- 2010 Convener of the International Workshop on Nonhydrostatic Modelling, 8-10 November, ECMWF, Reading, UK
2008- Co-convenor at the EGU General Assembly for the session "Recent developments in geophysical fluid dynamics", Vienna, Austria

EXTERNAL CONTRIBUTIONS

- 2010- Executive Board Member of the Unified Model (UM) dynamical core project, which is part of the Next-Generation-Weather-and-Climate-Prediction (NGWCP) programme
2007- Expert member of the *Short Range Numerical Weather Prediction* (SRNWP) network "Dynamics and lateral boundary coupling"
2003-2008 Member of the *Partnership for Research Infrastructures in Earth System Modelling* (PRISM)

REVIEWER OF

Journal of Computational Physics, Elsevier Science
International Journal for Numerical Methods in Fluids, John Wiley & Sons
Quarterly Journal of the Royal Meteorological Society, The Royal Meteorological Society
Journal of the Atmospheric Sciences, American Meteorological Society
Monthly Weather Review, American Meteorological Society
Journal of the Meteorological Society of Japan, Meteorological Society of Japan
Climate Dynamics, Springer Verlag
NSF funding proposals, US National Science Foundation
NERC funding proposals, UK Natural Environment Research Council

TEACHING ACTIVITIES

- 2002- ECMWF Training course: Numerical Methods and adiabatic formulation of models, "Numerical Methods", "Governing equations"
2000-2009 ECMWF Training course: Parametrization of Diabatic Processes, "Numerics of Parametrization"
1993-1994 Johannes Gutenberg-Universität Mainz: Übungen zur "Theoretischen Meteorologie III (Strahlung)"

TECHNICAL EXPERIENCE

Supercomputing

Athena Cray XT4, Kraken Cray XT5, ibm_power3/4/5/6 (AIX), Fujitsu vpp300/700/5000 (UXP/V), NEC SX6 (Super-UX), Cray C90, YMP-2E, T3D (Unicos), IBM rs6000 (AIX), SGI origin, octane (IRIX), SUN SPARC workstation (Solaris)

Programming

Languages: Fortran 77/90, C/C++, Java, Unix shell scripting (sh,csh,ksh,bash), X/Motif/Xdesigner, perl, html/xml

Techniques: Scalar- and vector-programming, parallelisation with MPI, OpenMP, Java threads, process control and macro-parallelism with SMS/Xcdp, web-based client-server programming with tomcat/apache via servlets, Java RMI, Earth-system modelling with OASIS3/4

PUBLICATIONS

Peer reviewed articles

- 2012 M. Blackburn, D. L. Williamson, K. Nakajima, W. Ohfuchi, Y. O. Takahashi, Y.-Y. Hayashi, H. Nakamura, M. Ishiwatari, J. McGregor, H. Borth, V. Wirth, H. Frank, P. Bechtold, **N. P. Wedi**, H. Tomita, M. Satoh, M. Zhao, I. M. Held, M. J. Suarez, M.-I. Lee, M. Watanabe, M. Kimoto, Y. Liu, Z. Wang, A. Molod, K. Rajendran, A. Kitoh, R. Stratton, *The aqua planet experiment (APE): Control SST simulation*, Special issue *J. Met. Soc. Japan*, submitted.
- 2012 M. Blackburn, D. L. Williamson, K. Nakajima, W. Ohfuchi, Y. O. Takahashi, Y.-Y. Hayashi, H. Nakamura, M. Ishiwatari, J. McGregor, H. Borth, V. Wirth, H. Frank, P. Bechtold, **N. P. Wedi**, H. Tomita, M. Satoh, M. Zhao, I. M. Held, M. J. Suarez, M.-I. Lee, M. Watanabe, M. Kimoto, Y. Liu, Z. Wang, A. Molod, K. Rajendran, A. Kitoh, R. Stratton, *The aqua planet experiment (APE): Response to changed meridional SST profile*, Special issue *J. Met. Soc. Japan*, submitted.
- 2012 J.L. Kinter, D. Achuthavarier, J. Adams, E. Altshuler, B. Cash, P. Dirmeyer, B. Huang, E. Jin, L. Marx, J. Manganello, C. Stan, T. Wakefield, T. Palmer, M. Hamrud, T. Jung, M. Miller, P. Towers, **N. P. Wedi**, M. Satoh, H. Tomita, C. Kodama, Y. Yamada, P. Baer, M. Ezell, C. Halloy, D. John, B. Loftis, K. Wong, *Revolutionizing climate modelling – Project Athena: A multi-institutional, international collaboration*, *Bull. Am. Meteorol. Soc.*, submitted.
- 2011 M. Satoh, K. Oouchi, T. Nasuno, H. Taniguchi, Y. Yamada, H. Tomita, C. Kodama, J. Kinter, D. Achuthavarier, J. Manganello, B. Cash, T. Palmer, and **N. P. Wedi**, *The Intra-Seasonal Oscillation and its control of tropical cyclones simulated by high-resolution global atmospheric models*, *Clim. Dyn.*, accepted.
- 2011 J. V. Manganello, K. I. Hodges, J. L. Kinter, B. A. Cash, L. Marx, T. Jung, D. Achuthavarier, J. M. Adams, E. L. Altshuler, B. Huang, E. K. Jin, C. Stan, P. Towers, and **N. P. Wedi**, *Tropical Cyclone Climatology in a 10-km Global Atmospheric GCM: Toward Weather-Resolving Climate Modeling*, *J. Climate*, accepted.
- 2011 T. Jung, M. J. Miller, T. N. Palmer, P. Towers, **N. P. Wedi**, D. Achuthavarier, J. M. Adams, E. L. Altshuler, B. A. Cash, J. L. Kinter, L. Marx, C. Stan, and K. I. Hodges, *High-resolution global climate simulations with the ECMWF model in the project Athena: Experimental design, model climate and seasonal forecast skill*, *J. Climate*, accepted.
- 2011 Dirmeyer, P., B. A. Cash, J. L. Kinter, T. Jung, L. Marx, M. Satoh, C. Stan, H. Tomita, P. Towers, **N. P. Wedi**, D. Achuthavarier, J. M. Adams, E. L. Altshuler, B. Huang, E. K. Jin, and J. Manganello, *Simulating the diurnal cycle of rainfall in global climate models: resolution versus parameterization*, *Clim. Dyn.* DOI 10.1007/s00382-011-1127-9
- 2010 **Wedi, N. P.** and P. Smolarkiewicz, *A nonlinear perspective on the dynamics of the MJO: idealised large-eddy simulations*, *J. Atmos. Sci.* **67**, 1202–1217
- 2009 **Wedi, N. P.** and P. Smolarkiewicz, *A framework for testing global nonhydrostatic models*, *Q.J.R. Meteorol. Soc.* **135**, 469–484
- 2008 **Wedi, N. P.** and P. Smolarkiewicz, *A reduced model of the Madden-Julian oscillation*, *Int. J. Numer. Methods Fluids* **56**, 1583–1588
- 2007 R. Buizza, J.-R. Bidlot, **N. P. Wedi**, M. Fuentes, M. Hamrud, G. Holt and F. Vitart, *The new ECMWF VAREPS (Variable resolution ensemble prediction system)*, *Q.J.R. Meteorol. Soc.* **133**, 681–695
- 2006 **Wedi, N. P.** and P. Smolarkiewicz, *Direct numerical simulation of the Plumb-McEwan laboratory analogue of the QBO*, *J. Atmos. Sci.* **63**, 3226–3252
- 2006 **Wedi, N. P.**, *The energetics of wave-driven mean flow oscillations*, Special Issue: Multidimensional Positive Definite Advection Transport Algorithm Methods, *Int. J. Numer. Methods Fluids* **50**, 1175–1191

- 2005 **Wedi, N. P.** and P. Smolarkiewicz, *Laboratory for internal gravity-wave dynamics: The numerical equivalent to the quasi-biennial oscillation (QBO) analogue*, *Int. J. Numer. Methods Fluids* **47**, 1369–1374
- 2004 Simmons, A., P. Jones, V. da Costa Bechtold, A. Beljaars, P. Kallberg, S. Saarinen, S. Uppala, P. Viterbo, and **N. P. Wedi**, *Comparison of trends and variability in CRU, ERA40 and NCEP/NCAR analysis of monthly-mean surface air temperature*, *J. Geophys. Res.* **109**(D24115)
- 2004 **Wedi, N. P.** and P. Smolarkiewicz, *Extending Gal-Chen & Somerville terrain-following coordinate transformation on time-dependent curvilinear boundaries*, *J. Comput. Phys.* **193**, 1–20
- 1998 Buizza, R., T. Petriolagis, T. Palmer, J. Barkmeijer, M. Hamrud, A. Hollingsworth, A. Simmons, and **N. P. Wedi**, *Impact of model resolution and ensemble size on the performance of an ensemble prediction system*, *Q.J.R. Meteorol. Soc.* **124**, 1935–1960
- 1997 Eichhorn, J., K. Cui, M. Flender, T. Kandlbinder, W.-G. Panhans, R. Ries, J. Siebert, T. Trautmann, **N. P. Wedi**, and W. Zdunkowski, *A three-dimensional viscous topography mesoscale model*, *Beitr. Phys. Atmosph.* **70**, 301–317

ECMWF seminar contributions

- 2011 **Wedi, N. P.**, M. Hamrud, and G. Mozdzyński, Nonhydrostatic modelling with IFS: current status. in *Proc. ECMWF Workshop on Nonhydrostatic Modelling*, Reading, UK, pp. 79–86. Eur. Cent. For Medium-Range Weather Forecasts
- 2010 **Wedi, N. P.**, Diagnostics of model numerical cores: a model hierarchy. in *Proc. ECMWF Workshop on Diagnosis of Forecasting and Data Assimilation Systems*, Reading, UK, pp. 191–203. Eur. Cent. For Medium-Range Weather Forecasts
- 2004 **Wedi, N. P.**, Numerical simulation of internal gravity wave dynamics, in *Proc. ECMWF Workshop on Recent Developments in numerical methods for atmosphere and ocean modelling*, Reading, UK, pp. 221–232. Eur. Cent. For Medium-Range Weather Forecasts
- 2004 Beljaars, A., P. Bechtold, M. Köhler, J.-J. Morcrette, A. Tompkins, P. Viterbo, and **N. P. Wedi**, The numerics of physical parametrization, in *Proc. ECMWF Workshop on Recent Developments in numerical methods for atmosphere and ocean modelling*, Reading, UK, pp. 113–134. Eur. Cent. For Medium-Range Weather Forecasts
- 2001 Cullen, M., D. Salmond, and **N. P. Wedi**, Interaction of parameterised processes with resolved dynamics, in *Proc. 2001 Seminar on key issues in the parametrization of subgrid physical processes*, Reading, UK, pp. 127–149. Eur. Cent. For Medium-Range Weather Forecasts

Technical Reports

- 2012 K. Yessad and **N. P. Wedi**, The hydrostatic and non-hydrostatic global model IFS/ARPEGE: deep-layer model formulation and testing, Technical Report **657**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2012 D. L. Williamson, M. Blackburn, B. J. Hoskins, K. Nakajima, W. Ohfuchi, Y. O. Takahashi, Y.-Y. Hayashi, H. Nakamura, M. Ishiwatari, J. McGregor, H. Borth, V. Wirth, H. Frank, P. Bechtold, **N. P. Wedi**, H. Tomita, M. Satoh, M. Zhao, I. M. Held, M. J. Suarez, M.-I. Lee, M. Watanabe, M. Kimoto, Y. Liu, Z. Wang, A. Molod, K. Rajendran, A. Kitoh, and R. Stratton, APE-Atlas, NCAR Technical Report, TN-484, NCAR, Boulder, US
- 2010 M. Rodwell, T. Jung, P. Bechtold, P. Berrisford, N. Bormann, C. Cardinali, L. Ferranti, T. Hewson, F. Molteni, **N. P. Wedi**, M. A. Balmaseda, G. Balsamo, M. Bonavita, R. Buizza, M. Dahoui, A. Garcia-Mendez, M. Leutbecher, P. Lopez, Y. Tremolet, and F. Vitart, Developments in diagnostic research, Technical Report **637**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2009 **N. P. Wedi** and P. K. Smolarkiewicz, A nonlinear perspective on the dynamics of the MJO: idealized large-eddy simulations, Technical Report **602**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2009 **Wedi, N. P.**, K. Yessad and A. Untch, The nonhydrostatic global IFS/ARPEGE: model formulation and testing, Technical Report **594**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK

- 2009 A. Orr and **N. P. Wedi**, The representation of non-orographic gravity waves in the IFS Part I: Assessment of the middle atmosphere climate with Rayleigh friction, Technical Report **592**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2004 Simmons, A., P. Jones, V. da Costa Bechtold, A. Beljaars, P. Kallberg, S. Saarinen, S. Uppala, P. Viterbo, and **N. P. Wedi**, 18. Comparison of trends and variability in CRU, ERA40 and NCEP/NCAR analysis of monthly-mean surface air temperature, *ERA40 Project Report Series*, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2003 **Wedi, N. P.** and P. Smolarkiewicz, Extending Gal-Chen & Somerville terrain-following coordinate transformation on time-dependent curvilinear boundaries, Technical Report **405**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 2003 Guilyardi, E., R. Budich, G. Brasseur, and G. Komen (Eds.), *Prism System Specification Handbook* (1.0 ed.), contributed chapters: REDOC I.4, II.1, II.4; ARCDI III., IV.3
- 2002 Brankovic, C., C. Jakob, M. Miller, A. Untch, and **N. P. Wedi**, Climate diagnostics of the ECMWF AMIP-2 simulations, Technical Report 360, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 1999 **Wedi, N. P.**, The numerical coupling of the physical parameters to the dynamical equations in a forecast model, Technical Report **274**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK
- 1998 Buizza, R., T. Petriolagis, T. Palmer, J. Barkmeijer, M. Hamrud, A. Hollingsworth, A. Simmons, and **N. P. Wedi**, Impact of model resolution and ensemble size on the performance of an ensemble prediction system, Technical Report **245**, Eur. Cent. For Medium-Range Weather Forecasts, Reading, UK

Conference proceedings

- 2001 **Wedi, N.**, M. Cullen (2001), On a stable and consistent numerical incorporation of parametrized processes into a global forecast model, in *Numerical Methods for Fluid Dynamics VII* 533–539, M.J. Baines (Ed.), ICFD Oxford, UK
- 1998 **Wedi, N.**, A. Beljaars, P. Janssen and M. Hortal, On the impact of a second-order accurate incorporation of physical parametrizations in a global NWP model, in *Numerical Methods for Fluid Dynamics VI* 547–553, M.J. Baines (Ed.), ICFD Oxford, UK

Newsletter articles

- 2010 **Wedi, N. P.** and S. Malardel, Non-hydrostatic modelling at ECMWF, *ECMWF Newsletter* (125), 17–21
- 2007 Valcke, S., R. Budich, M. Carter, E. Guilyardi, M.-A. Foujols, M. Lautenschlager, R. Redler, L. Steenman-Clark, and **N. P. Wedi**, A European Network for Earth System Modeling, *Eos Trans. AGU*, 88(12), doi:10.1029/2007EO120003
- 2001 **Wedi, N. P.**, Progress report of ECMWF 2000, *LAM Newsletter* No.30, European Working Group on Limited Area Modelling (EWGLAM). 26–28
- 1999 **Wedi, N. P.**, Recent Developments at ECMWF, Numerics and Resolution, *LAM Newsletter* No.28, European Working Group on Limited Area Modelling (EWGLAM), 43–47
- 1999 **Wedi, N. P.**, Global modelling via the Internet, *ECMWF Newsletter* (83), 7–10

Invited lectures

- 2011 Seminar, Cottbus University, Cottbus, Germany
- 2011 Seminar, Loughborough University, Loughborough, UK
- 2010 Seminar, Loughborough University, Loughborough, UK
- 2009 Seminar, Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US
- 2008 Seminar, Laboratoire de Meteorologie Dynamique, Ecole Normale Supérieure, Paris, France
- 2005 Seminar, Los Alamos National Laboratory, Los Alamos, US
- 2004 Seminar, Meteorologisches Institut München, Germany
- 2004 Seminar, Department of Applied Mathematics & Theoretical Physics, Cambridge, UK
- 2004 Seminar, Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US

- 2003 Seminar, Institut für Physik der Atmosphäre des DLR, Oberpfaffenhofen, Germany
- 2003 Seminar, Mesoscale and Microscale Meteorology Division, NCAR, Boulder, US

Conference presentations

Talks

- 2011 SRNWP workshop on non-hydrostatic modelling, Bad Orb, Germany
- 2011 EGU General Assembly "Recent Advances in Geophysical Fluid Dynamics", Vienna, Austria
- 2010 ECMWF Workshop on Non-hydrostatic Modelling, Reading, ECMWF, UK (invited speaker)
- 2010 2nd International workshop of EULAG Users, Sopot, Poland (invited speaker)
- 2010 Solutions of partial differential equations on the sphere, Potsdam, Germany
- 2010 EWGLAM and SRNWP meeting, Exeter, UK
- 2009 EWGLAM and SRNWP meeting, Athens, Greece
- 2009 Solutions of partial differential equations on the sphere, Santa Fe, New Mexico, US
- 2009 ECMWF Diagnosis of Forecasting and Data Assimilation Systems, ECMWF, Reading, UK (invited speaker)
- 2008 1st International workshop of EULAG Users, Bad Toelz, Germany (invited speaker)
- 2007 EGU General Assembly "Recent Advances in Geophysical Fluid Dynamics", Vienna, Austria (invited speaker)
- 2007 Aquaplanet intercomparison project (APE), 2nd workshop in Choshi, Japan
- 2007 Solutions of partial differential equations on the sphere, Exeter, UK
- 2006 Short-Range Numerical Weather Prediction (SRNWP) - Numerical Techniques mini-workshop, Zagreb
- 2006 Critical Regions in Geophysical Flows - Numerical Modelling and Analysis, Lighthill Institute of Mathematical Sciences, London, UK (invited speaker)
- 2005 FEF05 - Thirteenth Conference on Finite Elements for Flow Problems, special session on MPDATA, Swansea, UK (invited speaker)
- 2005 Partnership for Research Infrastructures in Earth System Modelling (PRISM): Sustained Initiative meeting, UKMO, Exeter, UK
- 2004 ECMWF Workshop on Recent Developments in Numerical Methods for Atmosphere and Ocean Modelling, ECMWF, Reading, UK (invited speaker)
- 2004 3rd ESMF Community Meeting, NCAR, Boulder, US (invited speaker)
- 2003 10th Layered Ocean Model Users' Workshop, University of Miami's Rosenstiel School of Marine and Atmospheric Science, Miami, US
- 2002 1st PRISM project meeting, Toulouse, France
- 2002 1st Workshop on System Collaboration, Toulouse, France
- 2002 GLOAMOS workshop, ECMWF, Reading, UK
- 2001 ICFD Conference on Numerical Methods for Fluid Dynamics, Oxford, UK
- 2000 EWGLAM and SRNWP meeting, Toulouse, France
- 1999 The Oxford/RAL Spring School in Quantitative Earth Observation, Oxford, UK
- 1998 ICFD Conference on Numerical Methods for Fluid Dynamics, Oxford, UK
- 1998 General Assembly of the EGS, Nice, France
- 1998 EWGLAM and SRNWP meeting, Copenhagen, Denmark

Poster sessions

- 2008 EGU General Assembly
- 2007 EGU General Assembly
- 2007 ICFD Conference on Numerical Methods for Fluid Dynamics, Reading, UK

- 2006 EGU General Assembly
- 2004 3rd SPARC General Assembly, Victoria, Canada
- 2004 ICFD Conference on Numerical Methods for Fluid Dynamics, Oxford, UK