Prof. Tijana Janjic Pfander, PhD — Curriculum Vitae

ACADEMIC NAME — Tijana Janjić

CONTACT INFORMATION
Mathematical Institute for machine learning and data science
Katholische Universität Eichstätt-Ingolstadt
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RESEARCH AREAS OF INTEREST — data assimilation (computational inference), predictability, atmospheric dynamics, data science, numerical methods, convective scale data assimilation, ensemble based Kalman filter algorithms, uncertainty quantification, scale interactions, large-scale linear and nonlinear constrained optimization, machine learning

EDUCATION

Ludwig-Maximilians-Universität München, Munich, Germany

Habilitation in Meteorology, 2016, *Data assimilation for atmospheric and oceanic applications from the models perspective.*

University of Maryland, College Park, USA

Ph.D. in Applied Mathematics, 2001, *Error due to Unresolved Scales in Estimation Problems for Atmospheric Data Assimilation.* Supervised by Prof. James A. Carton and Dr. Stephen E. Cohn. Candidacy reached in December 1999.

University of Belgrade, Belgrade, Serbia

Diplom in Theoretical and Applied Mathematics, 1995.

FELLOWSHIPS/AWARDS

The Quarterly Journal Editor's Award for 2020
in recognition of a significant contribution to the journal or editorial process.

Heisenberg Award, 2019
Acceptance into the DFG Heisenberg Program: "Data assimilation on convective scale based on first physical principles", funding volume up to € 565 000. Funding period 5 years, 2019-2024.

Max Kade fellowship, 2012 *"Preservation of physical properties during data assimilation with ensemble based Kalman filter algorithms".*

The National Academies (USA), National Research Council Postdoctoral Fellowship Research Associateship Award, 2003 *Stipend to work at NASA Goddard Space Flight Center from December 2003 till December 2004 on the project entitled: "Error due to Unresolved Scales in Estimation Problems for Atmospheric Data Assimilation"*

DFG research grant (PI, self funded position), 2002 *Stipend for the project entitled "High-Resolution Studies of Transport Processes in the Atmospheric Boundary Layer using the Synergy of Large Eddy Simulation and Measurements of Advanced Lidar Systems"*

EMPLOYMENT HISTORY

Katholische Universität Eichstätt-Ingolstadt, Ingolstadt, Germany **02.2022 — present**

Heisenberg Professor for Data Assimilation, tenured (W2).

Ludwig-Maximilians-Universität München, Germany **06.2019 — 01.2022**

DFG Heisenberg Program *for project "Data assimilation on convective scale based on first physical principles".*

German Weather Service, Munich, Germany **09.2012 — 12.2018**

Head of data assimilation branch of Hans Ertel Center for Weather Research, *jointly with Dr. Weissmann leading the research group consisting of 5-11 members (PhD students, post doctoral research associates) located at Institute of Meteorology, Ludwig-Maximilians-Universität München.*

Massachusetts Institute of Technology, Cambridge, USA **01.2012 — 09.2012**

Max Kade fellow *for project "Preservation of physical properties during data assimilation with ensemble based Kalman filter algorithms", while on leave of absence from Alfred Wegener Institute.*

Alfred Wegener Institute, Bremerhaven, Germany **10.2005 — 09.2012**

Scientist *in the group of Dr. J. Schroeter/Prof. T. Jung. Working on the development of data assimilation system for the finite element ocean model of the Alfred Wegener Institute.*

Jacobs University Bremen, Bremen, Germany **12.2004 — 10.2005**

Visiting scientist *Taught a course entitled "Introduction to mathematical modeling" jointly with Prof. P. Oswald, Prof. M. Oliver and Prof. G. Pfander.*

NASA's Goddard Space Flight Center, Greenbelt, USA **12.2003 — 12.2004**

National Research Council (NRC) fellow *for project "Error due to Unresolved Scales in Estimation Problems for Atmospheric Data Assimilation".*

Jacobs University Bremen, Bremen, Germany **08.2002 — 12.2003**

DFG research fellow *for DFG funded project "High-Resolution Studies of Transport Processes in the Atmospheric Boundary Layer using the Synergy of Large Eddy Simulation and Measurements of Advanced Lidar Systems".*

University of Hohenheim, Hohenheim, Germany **09.2001 — 08.2002**

Postdoctoral position *Institute for Physics and Meteorology, group of Prof. Wulfmeyer.*

University of Maryland, College Park, USA **01.1996 — 08.2001**

PhD student *Graduate research assistant at the Departement of Atmospheric and Oceanic Science. Teaching assistant at the Departement of Mathematics for the Calculus and taught independently the course "Elementary Mathematical Models".*

Funded scientific visit

NASA's Goddard Space Flight Center, Greenbelt, USA **08.2006 — 09.2006**

Research visit *at and funded by the NASA Goddard Space Flight Center, Greenbelt, MD.*

Secondary employments

Jacobs University Bremen, Bremen, Germany **09.2007 — 12.2011**

College Master *Responsible for the development of policies for residential colleges, as well as for the personell of College 3.*

Jacobs University Bremen, Bremen, Germany **09.2003 — 12.2003**

Lecturer *for block course "Natural Science Laboratory Mathematics", a course on implementing numerical algorithms in Matlab.*

Research grants

Klaus-Tschira-Stiftung, 2024-2027, (PI), 2024

"Uncertainty-aware and physics-informed machine learning for short range atmospheric forecasts", € 268 861

German Weather Service, IDEA-S4S, 2023-2027, (PI), 2023

"Towards the assimilation of dual-polarization radar data (T-POL)", € 430 141

DFG funded Heisenberg Award, 2019-2024, (PI), 2019

"Data assimilation on convective scale based on first physical principles", € 565 000

DFG project within the SPP 2115 "Fusion of radar polarimetry and numerical atmospheric modelling towards an improved understanding of cloud and precipitation processes" (PROM), 2019-2022, (PI), 2018

"Representing model error and observation error uncertainty for data assimilation of polarimetric radar measurements", € 483 650

DFG transregio Waves to Weather, phase 2, 2019-2024, Member of the Steering Group, 2018

Funded project (PI) "New data assimilation approaches to better predict tropical convection", € 372 840

DFG project within the transregio Waves to Weather, 2015-2019, (PI), 2015

"Parameter estimation using a data assimilation system for improved representation of clouds", € 181 900

DFG Research Grant, 2015-2018, (PI), 2014

"Conservation laws and ensemble Kalman filter algorithms", € 250 050

Hans Ertel Centre for Weather Research phase 2 proposal funded by Federal Ministry of Transport and Digital Infrastructure, 2015-2018, co-author, 2014

"Convective-scale data assimilation, ensemble generation and predictability", € 1 600 000

COSMO activity funding the 3^{rd} ISDA symposium at LMU (PI), 2014

International Symposium for Data Assimilation (ISDA) 2014, € 15 000

Federal Ministry of Transport and Digital Infrastructure Grant (PI), 2013

"High-resolution ensemble data assimilation system for the aviation forecasts", € 202 300

Funding for documentation of data assimilation system of DWD (co-PI), 2013

Documentation of the DWD data assimilation system, € 28 024.50

COSMO activity funding, 2013

Radar data assimilation exchange with DWD, € 6 000

Research grant by the Max Kade Foundation (PI), 2012

"Preservation of physical properties during data assimilation with ensemble based Kalman filter algorithms", € 38 000

The National Academies (USA), National Research Council Postdoctoral Fellowship Research Associateship Award, 2003

Stipend to work at NASA Goddard Space Flight Center from December 2003 till December 2004 on the project entitled: "Error due to Unresolved Scales in Estimation Problems for Atmospheric Data Assimilation"

DFG research grant (PI, self funded position), 2002

Stipend for the project entitled "High-Resolution Studies of Transport Processes in the Atmospheric Boundary Layer using the Synergy of Large Eddy Simulation and Measurements of Advanced Lidar Systems"

Research community contributions

Editorial Board member and Associate editor of Quarterly Journal of the Royal Meteorological Society since July, 2013.

Editorial Board member and Associate editor of Journal of Advances in Modeling Earth Systems (JAMES) December, 2018 till December, 2023.

Lead editor for "Combined machine learning and data assimilation for the atmosphere and ocean sciences", a special collection of Quarterly Journal of the Royal Meteorological Society.

Lead editor for "Advances in Data Assimilation Methods", a special section of Quarterly Journal of the Royal Meteorological Society consisting of 8 papers.

Steering group member for SFB/TRR 165 the collaborative research center "Waves to Weather" (W2W), November, 2016 till June, 2024.

Founder and main organizer of **LMU Colloquia in Data science for Atmospheric and Ocean Applications** January, 2021-February, 2022.

Co-speaker for the 5 branches of the Hans Ertel Centre for Weather Research January 2016 - December, 2018.

Co-convener of EGU sessions **Inverse problems, Predictability, and Uncertainty Quantification in Geosciences using data assimilation and its combination with machine learning** from 2019-2022 and EGU session **Developments in storm and convective scale data assimilation and observations** from 2021.

One of main organizers of **International Symposium on Data Assimilation 2014**, February 24-28, 2014 and **International Symposium on Data Assimilation 2018**, March 05-09, 2018. Scientific Advisory Committee member for **International Symposium on Data Assimilation**, October 16-20, 2023, July 18-22, 2016, Oct 8-11, 2012, Sept 28-30, 2011.

Teaching

Supervision of PhD students:

Bardachova, T.: Towards the assimilation of dual-polarization radar data (T-POL), Katholische Universität Eichstätt-Ingolstadt, expected PhD in 2026.

Semrau, F.: Representing model error and observation error uncertainty for data assimilation of polarimetric radar measurements, Ludwig-Maximilians-Universität München, expected PhD in 2024.

Feng, Y.: Model error in representation of hydrometeors, China Scholarship Council, Ludwig-Maximilians-Universität München, PhD in June 2022. Jointly with Prof. J. Min.

Ruckstuhl, Y.: Joint state and parameter estimation to address model error in convective scale numerical weather prediction systems, Ludwig-Maximilians-Universität München, PhD June 2019.

Lange, H.: On the use of radar and aircraft data in ensemble data assimilation of convection for non-hydrostatic numerical weather prediction, Ludwig-Maximilians-Universität München, PhD December 2016. Jointly with Prof. G.C. Craig.

Haslehner, M.: Nonlinear filtering with particle filter, Ludwig-Maximilians-Universität München, PhD July 2014. Jointly with Prof. G.C. Craig.

Examining committee member of PhD students:

Shah, A. PhD defense at University of Bergen on 16.09.2019.

Bocher, M. PhD defense at University of Lyon on 25.11.2016.

Reviewer of a PhD dissertation from

Mathis Peyron, University of Toulouse, 2024.

Quentin Malartic, École Nationale des Ponts et Chaussés, 2024.

Xiaohui Wang, University of Delft, 2022.

Yuan Cheng, University of Potsdam, 2016.

Supervision of MSc students:

Duran, C.: Machine Learning and Prediction of Rain: Simple Model Results, Ludwig-Maximilians-Universität München, MSc September 2022.

Legler, S.: Combining Data Assimilation and Machine Learning to Estimate Parameters of a Convective-Scale Model, Ludwig-Maximilians-Universität München, MSc July 2021.

Gleiter, T.: Improving Data Assimilation for MJO Prediction based on Experiments with the Skeleton Model for Tropical Intraseasonal Variability, Ludwig-Maximilians-Universität München, MSc March 2021.

Courses:

Statistical learning, Katholische Universität Eichstätt-Ingolstadt, Summer Semester 2024, BSc level, 2+1h per week.

Introduction to scientific computing, Katholische Universität Eichstätt-Ingolstadt, Summer Semesters 2023, 2024, BSc level, 2+2h per week.

Introduction to statistics, Katholische Universität Eichstätt-Ingolstadt, Winter Semesters 2022, 2023, 2024, BSc level, 2+2h per week.

Introduction to stochastics, Katholische Universität Eichstätt-Ingolstadt, Winter Semesters 2023, 2024, BSc level, 2+2h per week.

Atmospheric Data Assimilation, Ludwig-Maximilians-Universität München, Summer Semesters 2015, 2016, 2017, 2018, 2019, 2020 and 2021, MSc level, 4h per week.

Advanced Atmospheric Dynamics, Ludwig-Maximilians-Universität München, Summer Semester 2014, MSc level, 4h per week. Jointly with Dr. M. Weissmann. The lecture notes for Advanced Atmospheric Dynamics course were written as well.

Introduction to data assimilation, Ludwig-Maximilians-Universität München, Winter Semester 2012, MSc level, 2h per week. Jointly with Dr. M. Weissmann.

Introduction to mathematical modeling, Jacobs University Bremen (previously International University Bremen), Germany. Jointly with Prof. P. Oswald, Prof. M. Oliver and Prof. G. Pfander from Jacobs University Bremen. Course was intended for 2nd year undergraduate students in computational science, 2004-2005, BSc level, 3h per week.

As graduate student at University of Maryland, College Park, I was a **teaching assistant for the Calculus and taught independently Elementary Mathematical Models**. Both courses were undergraduate courses at the Department of Mathematics, BSc level.

Block lectures:

Natural Science Laboratory Mathematics, Jacobs University Bremen. This course aims at learning mathematics alongside providing skills to use the matlab to solve problems, Fall 2003, 8h p/w, 4 weeks each module.

Lecture on Data assimilation and ensemble forecasting in meteorology and oceanography, **Akademie für Lehrerfortbildung und Personalführung**, Sept 27th, 2018.

Lecturer at **DWD-HErZ winter school on data assimilation**, Feb 13-17, 2012.

PERSONAL DATA

Born on 18.04.1973 in Belgrade, Serbia. Married with 3 children born on 02.01.2003, 24.02.2006 and 15.09.2014.

Due to parental leave and maternity leave, I have not worked for 24 months, have worked half time for 32 months and have worked on 3/4 of a position for 33 months.

LIST OF PEER REVIEWED PUBLICATIONS

Supervised students or postdocs are marked by asterisks.

1. Jung, H., P. Knippertz, Y. Ruckstuhl*, R. Redl, T. Janjic and C. Hoose, 2023: Understanding the dependence of mean precipitation on convective treatment and horizontal resolution in tropical aquachannel experiments, Weather and Climate Dynamics, **4**, 1111–1134, doi = 10.5194/wcd-4-1111-2023.

2. Janjić, T., M. Lukáčová-Medvidóvá, Y. Ruckstuhl* and B. Wiebe, 2023: Comparison of uncertainty quantification methods for cloud simulation. Q J R Meteorol Soc., **149(756)**, 2895–2910, https://doi.org/10.1002/qj.4537.

3. Cheng, S., C. Quilodrán-Casas, S. Ouala, A. Farchi, C. Liu, P. Tandeo, R. Fablet, D. Lucor, B. Iooss, J. Brajard, D. Xiao, T. Janjić, W. Ding, Y. Guo, A. Carrassi, M. Bocquet, R. Arcucci, 2023: Machine Learning With Data Assimilation and Uncertainty Quantification for Dynamical Systems: A Review, IEEE/CAA Journal of Automatica Sinica, **10 (6)**, 1361-1387, doi=10.1109/JAS.2023.123537.

4. Gleiter*, T., T. Janjić, N. Chen, 2022: Ensemble Kalman Filter based Data Assimilation for Tropical Waves in the MJO Skeleton Model, Q. J. R. Meteorol. Soc., **148**, 1035–1056, https://doi.org/10.1002/qj.4245.

5. Legler*, S. and T. Janjić, 2022: Combining data assimilation and machine learning to estimate parameters of a convective-scale model, Q. J. R. Meteorol. Soc., **148**, 860–874, https://doi.org/10.1002/qj.4235.

6. Janjić, T. and Y. Zeng*, 2021: Weakly constrained LETKF for estimation of hydrometeor variables in convective-scale data assimilation, Geophysical Research Letters, **48**, e2021GL094962, https://doi.org/10.1029/2021GL094962.

7. Feng*, Y., T. Janjić, Y. Zeng*, A.Seifert, J. Min, 2021: Representing Microphysical Uncertainty in Convective-scale Data Assimilation using Additive Noise, Journal of Advances in Modeling Earth Systems, **13**, e2021MS002606, https://doi.org/10.1029/2021MS002606. (Editor highlight)

8. Trömel, S., Simmer, C., Blahak, U., Blanke, A., Ewald, F., Frech, M., Gergely, M., Hagen, M., Hörnig, S., Janjić, T., Kalesse, H., Kneifel, S., Knote, C., Mendrok, J., Moser, M., Möller, G., Mühlbauer, K., Myagkov, A., Pejcic, V., Seifert, P., Shrestha, P., Teisseire, A., von Terzi, L., Tetoni, E., Vogl, T., Voigt, C., Zeng, Y., Zinner, T., and Quaas, J., 2021: Overview: Fusion of Radar Polarimetry and Numerical Atmospheric Modelling Towards an Improved Understanding of Cloud and Precipitation Processes, Atmos. Chem. Phys., **21**, 17291–17314, https://doi.org/10.5194/acp-2021-346.

9. Zeng*, Y., Janjić, T., Feng*, Y., Blahak, U., de Lozar, A., Bauernschubert, E., Stephan, K., and Min, J., 2021: Interpreting estimated Observation Error Statistics of Weather Radar Measurements using the ICON-LAM-KENDA System, Atmos. Meas. Tech., **14**, 5735–5756, https://doi.org/10.5194/amt-14-5735-2021.

10. Craig, G.C., A. H. Fink, C. Hoose, T. Janjić, P. Knippertz, A. Laurian, S. Lerch, B. Mayer, A. Miltenberger, R. Redl, M. Riemer, K. I. Tempest, V. Wirth, 2021: Waves to Weather: Exploring the limits of predictability of weather, Bulletin of the American Meteorological Society, **102 (11)**, E2151–E2164, https://doi.org/10.1175/BAMS-D-20-0035.1.

11. Zeng*, Y., A. de Lozar, T. Janjić, A. Seifert, 2021: Applying a new integrated mass-flux adjustment filter in rapid update cycling of convective-scale data

assimilation, Geoscientific Model Development, **14**, 1295–1307, https://doi.org/10.5194/gmd-14-1295-2021.

12. Ruckstuhl*, Y., T. Janjić, S. Rasp, 2021: Training a convolutional neural network to conserve mass in data assimilation, Nonlin. Processes Geophys., **28**, 111–119, https://doi.org/10.5194/npg-28-111-2021.

13. Janjić, T., Y. Ruckstuhl* and P. L. Toint, 2021: A data assimilation algorithm for predicting rain, Q. J. R. Meteorol. Soc., **147**, 1949–1963, https://doi.org/10.1002/qj.4004.

14. Zeng*, Y., T. Janjić, A. de Lozar, C. A. Welzbacher, U. Blahak, A. Seifert, 2021: Assimilating radar radial wind and reflectivity data in an idealized setup of the COSMO-KENDA system, Atmospheric Research, **249**, 105282, https://doi.org/10.1016/j.atmosres.2020.105282.

15. Zeng*, Y., T. Janjić, A. de Lozar, S. Rasp, U. Blahak, A. Seifert, G. C. Craig, 2020: Comparison of methods accounting for subgrid-scale model error in convective scale data assimilation, Mon. Wea. Rev., **148**, 2457–2477, https://doi.org/10.1175/MWR-D-19-0064.1.

16. Ruckstuhl*, Y. and T. Janjić, 2020: Combined State-Parameter Estimation with the LETKF for Convective-Scale Weather Forecasting. Mon. Wea. Rev., **148**, 1607–1628, https://doi.org/10.1175/MWR-D-19-0233.1.

17. Zeng*, Y., T. Janjić, M. Sommer*, A. de Lozar, U. Blahak, A. Seifert, 2019: Representation of model error for data assimilation on convective scale: additive noise based on truncation error, Journal of Advances in Modeling Earth Systems, **11**, 752–770, https://doi.org/10.1029/2018MS001546.

18. Zeng*, Y., T. Janjić, A. de Lozar, U. Blahak, H. Reich, C. Keil and A. Seifert, 2018: Representation of model error in convective-scale data assimilation: additive noise, relaxation methods and combinations, Journal of Advances in Modeling Earth Systems, **10**, 2889–2911, https://doi.org/10.1029/2018MS001375.

19. Sommer*, M. and T. Janjić, 2018: A flexible additive inflation scheme for treating model error in Ensemble Kalman Filters, Q. J. R. Meteorol. Soc., **144**, 2026–2037, doi:10.1002/qj.3254.

20. Janjić, T., R. Potthast, P. J. Van Leeuwen , 2018: Editorial for Advances in Data Assimilation Methods, Q. J. R. Meteorol. Soc., **144:713**, 1189–1190, doi:10.1002/qj.3382.

21. Ruckstuhl*, Y. M. and T. Janjić, 2018: Parameter and state estimation with ensemble Kalman filter based approaches for convective scale data assimilation, Q. J. R. Meteorol. Soc., **144:712**, 826–841, doi:10.1002/qj.3257.

22. Gustafsson, N., T. Janjić, C. Schraff, D. Leuenberger, M. Weissman, H. Reich, P. Brousseau, T. Montmerle, E. Wattrelot, A. Bučánek, M. Mile, R. Hamdi, M. Lindskog, J. Barkmeijer, M. Dahlbom, B. Macpherson, S. Ballard, G. Inverarity, J. Carley, C. Alexander, D. Dowell, S. Liu, Y. Ikuta and T. Fujita, 2018: Survey of data assimilation methods for convective-scale numerical weather prediction at operational centres, Q. J. R. Meteorol. Soc., **144:713**, 1218–1256, doi:10.1002/qj.3179.

23. Janjić, T., N. Bormann, M. Bocquet, J. A. Carton, S. E. Cohn, S. L. Dance, S. N. Losa, N. K. Nichols, R. Potthast, J. A. Waller, P. Weston, 2018: On the representation error in data assimilation, Q. J. R. Meteorol. Soc., **144:713**, 1257–1278, doi:10.1002/qj.3130.

24. Lange*, H., G. C. Craig, T. Janjić, 2017: Characterizing Noise and Spurious Convection in Convective Data Assimilation, Q. J. R. Meteorol. Soc., **143:709**, 3060–3069, doi:10.1002/qj.3162.

25. Zeng*, Y., T. Janjić, Y. Ruckstuhl* and M. Verlaan, 2017: Ensemble-type Kalman filter algorithm conserving mass, total energy and enstrophy, Q. J. R. Meteorol. Soc., **143:708**, 2902–2914, doi:10.1002/qj.3142.

26. Zeng* Y., T. Janjić, 2016: Study of Conservation Laws with the Local Ensemble Transform Kalman Filter, Q. J. R. Meteorol. Soc., **142:699**, 2359–2372, doi: 10.1002/qj.2829.

27. Haslehner*, M., T. Janjić, G. C. Craig, 2016: Testing particle filters on convective scale models. Part l: A stochastic cloud model, Q. J. R. Meteorol. Soc., **142:696**, 1439-1452, doi:10.1002/qj.2745.

28. Haslehner*, M., T. Janjić, G. C. Craig, 2016: Testing particle filters on convective scale models. Part lI: A modified shallow water model, Q. J. R. Meteorol. Soc., **142:697**,1628-1646, doi: 10.1002/qj.2757.

29. Lange*, H., T. Janjić, 2016: Assimilation of Mode-S Aircraft Observations in COSMO-KENDA, Mon. Wea. Rev., **144:5**, 1697–1711, doi:10.1175/MWR-D-15-0112.1.

30. Simmer, C., G. Adrian, S. Jones, V. Wirth, M. Göber, C. Hohenegger, T. Janjic, J. Keller, C. Ohlwein, A. Seifert, S. Trömel, T. Ulbrich, K. Wapler, M. Weissmann, J. Keller, M. Masbou, S. Meilinger, N. Riβ, A. Schomburg, C. Stein, A. Vormann, 2016: HErZ – The German Hans-Ertel Centre for Weather Research, Bull. Amer. Meteor. Soc., **97**, 1057-1068, doi: 10.1175/BAMS-D-13-00227.1.

31. Janjić, T., D. McLaughlin, S. E. Cohn, M. Verlaan, 2014: Conservation of mass and preservation of positivity with ensemble-type Kalman filter algorithms, Mon. Wea. Rev., **142**, No. 2, 755-773, doi: 10.1175/MWR-D-13-00056.1.

32. Losa, S.N, S. Danilov, J. Schröter, T. Janjić, L. Nerger, F. Janssen, 2014: Assimilating NOAA SST data into BSH operational circulation model for the North and Baltic Seas: Part 2. Sensitivity of the forecast's skill to the prior model error statistics, Journal of Marine System, **129**, 259-270, http://dx.doi.org/10.1016/j.jmarsys.2013.06.011.

33. Albertella A.,R. Savcenko,T. Janjić, R. Rummel, W. Bosch and J. Schröter, 2014: Mean dynamic ocean topography in the Southern ocean from GRACE and GOCE and multi-mission altimeter data, Earth on the Edge: Science for a Sustainable Planet, International Association of Geodesy Symposia, Springer Berlin Heidelberg, 139, 81–87, doi: 10.1007/978-3-642-37222-3__10.

34. Weissmann,M., M. Göber, C. Hohenegger, T. Janjić, J. Keller, C. Ohlwein, A. Seifert, S. Trömel, T. Ulbrich, K. Wapler, C. Bollmeyer, H. Deneke, 2014: The Hans-Ertel Centre for Weather Research – Research objectives and highlights from its first three years, Meteoroligische Zeitschrift, Vol. 23, No. 3, 193–208, doi: 10.1127/0941-2948/2014/0558.

35. Albertella, A., R. Savcenko, T. Janjić, R. Rummel, W. Bosch, J. Schröter, 2012: High resolution dynamic ocean topography in the Southern Ocean from GOCE, Geophysical Journal International, **190**, 922 – 930, doi: 10.1111/j.1365-246X.2012.05531.x.

36. Janjić, T., J. Schröter, R. Savcenko, W. Bosch, A. Albertella , R. Rummel, O. Klatt, 2012: Impact of combining GRACE and GOCE gravity data on ocean circulation estimates, Ocean Sci. **8**, 65-79, doi:10.5194/os-8-65-2012.

37. Nerger, L., T. Janjić, J. Schröter, W. Hiller, 2012: A regulated localization scheme for ensemble-based Kalman filters, Q. J. R. Meteorol. Soc., **138**, 802–812, doi: 10.1002/qj.945.

38. Nerger, L., T. Janjić, J. Schröter, W. Hiller, 2012: A Unification of Ensemble Square Root Kalman Filters, Mon. Wea. Rev., **140**, 2335–2345, doi: 10.1175/MWR-D-11-00102.1.

39. Janjić, T., J. Schröter, A. Albertella, W. Bosch, R. Rummel, R. Savcenko, J. Schwabe, M. Scheinert, 2012: Assimilation of geodetic dynamic ocean topography using ensemble based Kalman filter, Journal of Geodynamics, **59–60**, 92–98, doi:10.1016/j.jog.2011.07.001.

40. Janjić, T., L. Nerger, A. Albertella, J. Schröter, and S. Skachko, 2011: On domain localization in ensemble based Kalman filter algorithms, Mon. Wea. Rev., **139**, No. 7., 2046–2060, https://doi.org/10.1175/2011MWR3552.1.

41. Janjić, Z., T. Janjić, and R. Vasić, 2011: A Class of Conservative Fourth-Order Advection Schemes and Impact of Enhanced Formal Accuracy on Extended-Range Forecasts. Mon. Wea. Rev., **139**, 1556-1568, doi:10.1175/2010MWR3448.1.

42. Rollenhagen, K., R.Timmermann, T. Janjić, J. Schröter and S. Danilov, 2009: Assimilation of sea ice velocity data in a Finite element Sea Ice Model with the Singular Evolutive Interpolated Kalman Filter. J. Geophys. Res., **114**, C05007, doi:10.1029/2008JC005067.

43. Skachko, S., S. Danilov, T. Janjić, J. Schröter, D. Sidorenko, R. Savchenko and W. Bosch, 2008: Sequential assimilation of multi-mission dynamical topography into a global finite-element ocean model. Ocean Science, **4**, 307-318.

44. Janjić, T. and S. E. Cohn, 2006: Treatment of Observation Error due to Unresolved Scales in Atmospheric Data Assimilation. Mon. Wea. Rev., **134**, No. 10, 2900-2915.

45. Wulfmeyer, V. and T. Janjić, 2005: 24-h Observations of the Marine Boundary Layer Using Ship-borne NOAA High-Resolution Doppler Lidar. Journal of Applied Meteorology, **44**, No. 11, 1723-1744.

46. Janjić, T. and V. Wulfmeyer 2003: High-Resolution Studies of Transport Processes in the Atmospheric Boundary Layer using the Synergy of Large Eddy Simulation and Measurements of Advanced Lidar Systems. In High Performance Computing in Science and Engineering 2003: Transactions of the High Performance Computing Center Stuttgart (HLRS) 2003, E. Krause, W. Jäger, M. Resch (Eds.), Springer-Verlag, 478 pp.

47. Janjić, T., 1998: Comments on "A finite-volume integration method for computing pressure gradient force in general vertical coordinates", by Shian-Jiann Lin (July B, 1997, 123, 1749-1762). Quart. J. Roy. Meteor. Soc., **124**, 2527-2529.

OTHER PUBLICATIONS

1. Legler, S., T. Janjic, M. H. Shaker, E. Hüllermeier, 2022: Machine learning for estimating parameters of a convective-scale model: A comparison of neural networks and random forests, Proceedings - 32. Workshop Computational Intelligence: Berlin, 1. - 2. Dezember 2022, Ed: H. Schulte, F. Hoffmann, R. Mikut, pg 1-9, doi: 10.5445/KSP/1000151141.

2. Janjić, T., H. Lange*, Y. Ruckstuhl* and Y. Zeng*, 2016: Approaches to convective scale data assimilation, Proceedings of CAWCR Annual Workshop 2016, Melbourne, December 5th-9th, 2016.

3. Zagar, N., J. Bojarova, N. Gustafsson, T. Janjić, G.-J. Marseille, M. Rennie, A. Stoffelen, M. Savli, 2016: Mesoscale data assimilation and the role of winds in limited-area models for NWP in Europe, Proceedings of workshop on wind profiles and mesoscale data assimilation, Ljubljana, 19-20 September 2016.

4. Janjić, T., 2015: Data assimilation for atmospheric and oceanic applications from the models perspective. Habilitation Thesis. Ludwig-Maximilians-Universität München, Munich, Germany.

5. A. Rhodin, H. Lange*, R. Potthast, T. Janjić-Pfander: Documentation of the DWD Data Assimilation System. 305 pp.

6. Janjić, T. , D. B. McLaughlin, S. E. Cohn: Preservation of physical properties with ensemble based Kalman filter algorithms, Mathematical and Algorithmic Aspects of Atmosphere-Ocean Data Assimilation, Mathematisches Forschungsinstitut Oberwolfach, Report No. **58/2012**, 17–20, doi:10.4171/OWR/2012/58.

7. Albertella, A., R. Savcenko, T. Janjić, R. Rummel, W. Bosch, J. Schröter, 2012: Mean Dynamic Ocean Topography in the Southern hemisphere from GRACE and GOCE and multi-mission altimeter data, Proceedings of IUGG, Melbourne, 28th June - 7th of July, 2011.

8. Janjić, T., J. Schroeter, R. Savcenko, W. Bosch, A. Albertella , R. Rummel, O. Klatt, 2011: Impact of combining GRACE and GOCE gravity data on ocean circulation estimates, Ocean Sci. Discuss., 8, 1535-1573.

9. Albertella, A., R. Rummel, R. Savcenko, W. Bosch, T. Janjić, J. Schröter, T. Gruber, J. Bouman, 2010: Dynamic Ocean Topography from GOCE - Some Preparatory Attempts, Proceedings of ESA Living Planet Symposium, 28 June-2 July 2010, Bergen, Norway.

10. Losa, S., Nerger, L., Janjic, T., Schroeter, J., Janssen, F., 2010: Entwicklung und Implementierung eines Verfahrens zur Datenassimilation von Fernerkundungsdaten in ein operationelles Modell für die Nord- und Ostsee (DOM), De-Marine Umwelt, Jahresbericht 2009-2010, Operationalisierung mariner GMES-Dienste in Deutschland, 57 - 68.

11. Janjić, T., A. Albertella, S. Skachko, J. Schroeter, R. Rummel, 2009: Observational error covariance specification in ensemble based Kalman filter algorithms, Proceedings of 5th WMO Symposium on the Assimilation of Observations for Meteorology, Oceanography and Hydrology Melbourne 5-9 October 2009.

12. Janjić, T., 2001: Error due to Unresolved Scales in Estimation Problems for Atmospheric Data Assimilation. Ph.D. Thesis. University of Maryland, College Park, USA.

List of selected conference presentations

1. Janjić: Learning from observations by combining data assimilation and machine learning, October 7th, 2022, MIT (invited).

2. Janjić: Weakly constrained LETKF for convective-scale data assimilation, August 10th, 2022, University of Maryland (invited).

3. Janjić: Towards next generation data assimilation algorithms for convective scale applications, 19 Feb. 2021, University of Wisconsin (invited).

4. Janjić et al.: Representation of model error in convective scale data assimilation, Mathematics of the weather, 14-16, Oct. 2019, Bad Orb, Germany (invited).

5. Janjić, T. , Y. Zeng, Y. Ruckstuhl: Data assimilation on convective scale based on first physical principles, Moist Processes in the Atmosphere, Mathematisches Forschungsinstitut Oberwolfach, February 17-23, 2019 (invited).

6. Janjić, T.: Preservation of physical properties with Ensemble-type Kalman Filter Algorithms, European Geophysical Union, Vienna, Austria, April 08th-13th, 2018 (invited).

7. Keynote at 3rd Leibniz Mathematical Modeling and Simulations (MMS) Days, Leipzig, February 28th-March 2nd, 2018. Janjić, T.: Challenges of atmospheric data assimilation.

8. Janjić, T.: Preservation of physical properties with Ensemble-type Kalman Filter Algorithms, American Geophysical Union 2017, New Orleans, USA, December 11th-15th, 2017 (invited).

9. Keynote at RMetS Annual Conference 2017, Exeter University, UK, July 13th-14th, 2017. Janjić, T.: On the representation error in data assimilation.

10. Keynote at CAWCR Annual Workshop 2016, Melbourne, December 7th, 2016. Janjić, T.: Approaches to convective scale data assimilation.

11. Janjić, T. : Challenges of atmospheric data assimilation, Challenges in Statistical Inference, Technische Universität München, November 7, 2016 (invited).

12. Janjić, T. , Y. Zeng, Y. Ruckstuhl: Conservation laws and the ensemble Kalman filter, Mathematical and Algorithmic Aspects of Data Assimilation in the Geosciences, Mathematisches Forschungsinstitut Oberwolfach, October 2 - 8, 2016 (invited).

13. Janjić, T.: Approaches to convective scale data assimilation, University of Maryland, College Park, August 31st, 2015 (invited).

14. Janjić, T.: Constraint ensemble Kalman filter for convective-scale data assimilation, Les Houches, April 6-April 10, 2015 (invited).

15. Janjić, T.: Treatment of representativeness error in an ensemble data assimilation system, ESA workshop on correlated observation errors, University of Reading, April 23-April 25, 2014 (invited).

16. Janjić,T., D. McLaughlin, S. E. Cohn, M. Verlaan: Conservation of mass and preservation of positivity with ensemble-type Kalman filter algorithms, SciCADE, September 16-20, 2013, Valladolid, Spain (invited).

17. Janjić, T.: Data assimilation from global to convective scales: State of the art and future challenges, THORPEX High Impact Weather Workshop (HIW), Karslruhe, Germany, 18-19 March, 2013 (invited).

18. Janjić, T. , D. B. McLaughlin, S. E. Cohn: Preservation of physical properties with ensemble based Kalman filter algorithms, Mathematical and Algorithmic Aspects of Atmosphere-Ocean Data Assimilation, Mathematisches Forschungsinstitut Oberwolfach, December 2 - 8, 2012 (invited).

19. Janjć, T., A. Albertella, R. Savcenko, J. Schroeter, W. Bosch, R. Rummel, and O. Klatt: Dynamical ocean topography from satellite measurements and its impact on Southern Ocean circulation estimates, MIT, Cambridge, May 11th, 2012.