Andreas F. Prein

Curriculum Vitae

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Research Interests

I am committed to deepening our understanding of the complex physical mechanisms that underlie shifts in the frequency and intensity of extreme events within the warming climate system. I am particularly interested in process interactions across scales, ranging from synoptic to microscales. The central pillars of my research include:

- The role of mesoscale processes in the climate system
- Extreme events and their drivers
- Quantification of uncertainties
- Benefits and limitations of km-scale models

Education

7/11/2013 **PhD, magna cum laude**, *Institute of Physics, Karl-Franzens-University*, Graz, Austria, Thesis: *Added Value of Convection-Permitting Climate Simulations.*

10/14/2009 **Master of Science, cum laude**, *Institute of Physics, Karl-Franzens-University*, Graz, Austria, Thesis: *Uncertainties in the Driving Data of Regional Climate Models (RCMs) in the Alpine Region.*

10/11/2006 **Bachelor of Science**, *Institute of Physics, Karl-Franzens-University*, Graz, Austria, Theses: *Conceptional Climate Models; The Potential of Wind Energy in Austria.*

Research Appointments

since–09/2024 **Full Professor**, *ETH Zurich*, Institute for Atmosphere and Climate Science (IAC).

12/2022–08/2024 **Project Scientist 3**, *National Center for Atmospheric Research (NCAR), Boulder, USA*, Mesoscale & Microscale Meteorology Laboratory (MMM).

since–06/2022 **Deputy Director of the Capacity Center for Climate and Weather Extremes (C3WE)**, *National Center for Atmospheric Research (NCAR), Boulder, USA*, Mesoscale & Microscale Meteorology Laboratory (MMM).

since–11/2019 **Project Scientist 2**, *National Center for Atmospheric Research (NCAR), Boulder, USA*, Mesoscale & Microscale Meteorology Laboratory (MMM).

11/2016–11/2019 **Project Scientist 1**, *National Center for Atmospheric Research (NCAR), Boulder, USA*, Mesoscale & Microscale Meteorology Laboratory (MMM).

11/2014–11/2016 **Postdoctoral Scientist**, *National Center for Atmospheric Research (NCAR), Boulder, USA*, Advanced Study Program (ASP).

07/2013–11/2014 **Postdoctoral Scientist**, *Wegener Center for Climate and Global Change, Karl-Franzens-University, Graz, Austria.*

05/2008–07/2013 **Scientist**, *Wegener Center for Climate and Global Change, Karl-Franzens-University, Graz, Austria.*

Research Visits

10/2011–02/2012 **Visiting scientist**, *Regional Climate Group, MMM, NCAR, Boulder, CO, USA.*

09/2006–12/2006 **Exchange semester**, *University of Turku, Turku, Finland.*

Grants and Fellowships

Funded

2022 **Development of a decision support aid system connecting climate model downscaling and DoD infrastructure**, *DOD*, University of Iowa led, NCAR-PI.

6/2022 **Preparing for a new World of Weather and Climate Extremes**, *MIT*, MIT led, NCAR-PI.

9/2020 **The big data and climate FRONTIER: making sense of the explosive increase in climate data through smart designs and big data methods**, *Research Council of Norway*, NORCE led, NCAR-PI.

9/2019 **Convection-Permitting Modeling for Intense Precipitation Processes**, *U.S. Nuclear Regulatory Commission (NRC)*, NCAR led, PI.

6/2019 **Using ARM Observations to Evaluate Process-Interactions in MCS Simulations Across Scales**, *DOE*, NCAR led, PI.

5/2019 **Building an Integrative Geoengineering (Climate and Weather Intervention) Modeling Research Initiative**, *UCAR*, NCAR led, Co-PI.

9/2016 **Detecting, Interpreting, and Modeling Hydrologic Extremes to Support Flexible Water Management and Planning**, *BOR*, NCAR led, Co-PI.

9/2013 **Non-Hydrostatic Climate Modeling Phase-II**, *Austrian Science Fund (FWF)*, Uni Graz led, Co-PI.

9/2013 **High-End:Extremes**, *Co-Investigator*, Austrian Climate Research Program (ACRP), Uni Graz led.
Co-PI

Fellowships

12/2014 **Advanced Study Program (ASP) sholarship**, *Awarded by the National Center for Atmospheric Research (NCAR)*, Boulder, USA.

04/2011 **Marshall Plan Scholarship holder**, *Awarded by the Austrian Marshall Plan Foundation*, Vienna.

Peer-Reviewed Publications

2024

Michalek A, Villarini G, **Prein AF**, Done J, Johnson D, and Wang C (submitted) Precipitation and temperature driven future changes to flooding in Alaska GRL

Feng Z, et al. Mesoscale Convective Systems tracking Method Intercomparison (MCSMIP): Application to DYAMOND Global km-scale Simulations (submitted) Journal of Geophysical Research - Atmospheres

Kukulies J, **Prein AF**, Morrison H (submitted) Simulating precipitation efficiency across the deep convective gray zone Journal of Geophysical Research - Atmospheres

Blanc B, **Prein AF**, Jeggle K, Aellen N, Lohmann U (submitted) Improving our Understanding of Large Hail Hazards Using Machine Learning Artificial Intelligence for the Earth Systems

Swain D, **Prein AF**, et al. (submitted) Hydroclimate Volatility on a Warming Earth Nature Reviews Earth & Environment

Rehbein A, **Prein AF**, Ambrizzi T, Ikeda K, Liu C, Rasmussen RM (submitted) 20 Years of MCSs Simulations Over South America Using a Convection-Permitting Model Climate Dynamics

Towler E, Done JM, Ge M, Gilleland E, **Prein AF** (submitted) Seasonal predictability of the frequency of precipitation-based weather types over the United States Weather and Forecasting

Yu H, **Prein AF**, Qi D, Wang K (submitted) Kilometer-Scale Multi-Physics Simulations of Heavy Precipitation Events in the Northeast China Climate Dynamics

Zilli MT, Lemes MR, Hart NCG, Halladay K, Kahana R, Fisch G, **Prein AF**, Ikeda K, Liu C (submitted) The added value of using convective-permitting regional climate model simulations to represent cloud band events over South America Climate Dynamics

Hall A, Rahimi-Esfarjani S, Ban N, Siler N, Leung LL, Ullrich P, Reed K, **Prein AF**, Qian Y, Norris J (submitted) An Evaluation of Dynamical Downscaling Methods Used to Project Regional Climate Change JGR-A

Stoy P, Bromley G, **Prein AF**, Albeke J (2024) The Decline in Summer Fallow in the Northern Great Plains Cooled Near-Surface Climate but had Minimal Impacts on Precipitation JGR-A `https://doi.org/10.1029/2023JD040699`

Taereem K, Villarini G, Done JM, Johnson DR, **Prein AF**, Wang C (2024) Dominant sources of uncertainty for downscaled climate: a military installation perspective JGR-A `10.1029/2024JD040935`

Collier E et al. (2024) The first ensemble of kilometer-scale simulations of a hydrological year over the third pole Climate Dynamics, `10.1007/s00382-024-07291-2`

Stevens B et al. (2024) Earth Virtualization Engines (EVE) ESSDD

Prein AF et al. (2024) Km-Scale Simulations of Mesoscale Convective Systems (MCSs) Over South America – A Feature Tracker Intercomparison JGR-A, `http://dx.doi.org/10.1029/2023JD040254`

Martinez JA, Arias PA Dominguez F, **Prein AF** (2024) Mesoscale structures in the Orinoco basin during an extreme precipitation event in the tropical Andes. Frontiers in Earth Science, `https://doi.org/10.3389/feart.2023.1307549`

Huang, Y, Xue M, Hu X, Matin E, Novoa H, McPherson R, Liu C, Ikeda K, Rasmussen R, **Prein AF**, Perez A, Morales I, Ticona J, Flores AJ (submitted) Km-Characteristics of Precipitation and Mesoscale Convective Systems over the Peruvian Central Andes in Multi 5-Year Convection-Permitting Simulations JGR-A

Huang J, Dong F, Scussolini P, Jiang Q, **Prein AF** et al. (submitted) Increasing Extreme Precipitation Polarizes Spatial Patterns of Pluvial Flood Risks. PNAS

Martinez C, Simpson IR, Fasullo JT, and **Prein AF**(submitted) An Evaluation of the Seasonal Caribbean Hydroclimate in Low and High-Resolution CESM and other CMIP6 Models. Climate Dynamics

Matte D, et al. (2024) How to Engage and Adapt to Unprecedented Extremes BAMS, https://doi.org/10.1175/BAMS-D-24-0138.1

2023

Dominguez F, Rasmussen R, Liu C, Ikeda K, **Prein AF** et al. (2023) Advancing South American Hydroclimate Science Through Multi-Decadal Convection-Permitting Modeling. BAMS

Hoefler T, Stevens B, **Prein AF** et al. (2023) Earth Virtualization Engines - A Technical Perspective. IEEE CiSE, https://doi.org/10.48550/arXiv.2309.09002

Prein AF, Mooney P, and Done J (2023) The Multi-Scale Interactions of Atmospheric Phenomenon in Extreme and Mean Precipitation. Earth's Future, https://doi.org/10.1029/2023EF003534

Prein AF (2023) Intensification of Thunderstorm Downbursts with Climate Change. Nature Climate Change, http://doi.org/10.1038/s41558-023-01852-9

Li P, Song F, Chen H, Li L **Prein AF**, et al. (2023) Intensification of mesoscale convective systems in the East Asian rainband over the past two decades. GRL, http://doi.org/10.1029/2023GL103595

Lin Q, Chen J, Ou T, Lai H-W, **Prein AF**, and Chen D (2023) Performance of the WRF model at the convection-permitting scale in simulating snowfall and lake-effect snow over the Tibetan Plateau. Journal of Geophysical Research - Atmospheres, http://dx.doi.org/10.1029/2022JD038433

Rasmussen RM, Chen F, Liu CH, Ikeda K, **Prein AF**, et al. (2023) The NCAR-USGS 4-km long-term regional hydroclimate reanalysis over the CONUS. BAMS, https://doi.org/10.1175/BAMS-D-21-0326.1

Ramos-Valle AN, **Prein AF**, Ge M, Wang D, and Giangrande SE (submitted) Grid spacing sensitivities of simulated mid-latitude and tropical mesoscale convective systems in the convective gray zone. JGR: Atmospheres, http://dx.doi.org/10.1029/2022JD037043

Kukulies J, **Prein AF**, Curio J; Chen D (2023) Evaluating kilometer-scale multi-model and multi-physics ensemble simulations of a mesoscale convective system in the lee of the Tibetan Plateau. Journal of Climate, https://doi.org/10.1175/JCLI-D-22-0240.1

Dougherty E, **Prein AF**, Gutmann E, and Newman A (2023) Future Simulated Changes in Central U.S. Mesoscale Convective System Rainfall Caused by Changes in Convective and Stratiform Structure. JGR: Atmospheres , https://doi.org/10.1029/2022JD037537

2022

Chan CS, Kendon EJ, Fowler HJ, Kahraman A, Crook J, Ban N, **Prein AF** (2022) Large-scale dynamics moderate impact-relevant changes to organised convective storms. Communications Earth & Environment, https://doi.org/10.1038/s43247-022-00669-2

Prein AF et al. (2022) Convection-Permitting Third Pole Experiment – Towards Ensemble-Based Kilometer-Scale Climate Simulations over the Third Pole Region. Climate Dynamics https://doi.org/10.1007/s00382-022-06543-3

Wang D, **Prein AF**, Giangrande S, Ramos-Valle R, Ge M, and Jensen M (2022) Convective Updraft and Downdraft Characteristics of Mesoscale Convective Systems in the Model Gray Zone. GJR-A, http://dx.doi.org/10.1029/2022JD036746

Prein AF, Ge M, Ramos Valle A, Wang D, Giangrande SE (2022) Towards a Unified Setup to Simulate Mid-Latitude and Tropical Mesoscale Convective Systems at Kilometer-Scales Earth and Space Science, https://doi.org/10.1029/2022EA002295

Giorgi F, **Prein AF** (2022) Populated regional climate models (Pop-RCMs): the next frontier in regional climate modeling. PLOS Climate

Done J, Lackmann G, **Prein AF** (2022) The Response of Tropical Cyclone Intensity to Temperature Profile Change. Weather and Climate Dynamics, https://doi.org/10.5194/wcd-3-693-2022

Prein AF, Coen J, Jaye A (2022) The Character and Changing Frequency of Extreme California Fire Weather. Journal of Geophysical Research – Atmosphere, http://doi.org/10.1029/2021JD035350

Quintero F, Villarini G, **Prein AF**, Zhang W, Krajewski WF (2022) Discharge and Floods in Iowa Projected to Increase More Than Precipitation Extremes. Advances in Water Resources, http://dx.doi.org/10.1002/hyp.14738

Prein AF, Towler E, Ge M, Llewellyn D, Baker S, Tighi S, Barrett L (2022) Sub-Seasonal Predictability of North American Monsoon Precipitation. Geophysical Research Letters, https://doi.org/10.1029/2021GL095602

Quintero F, Villarini G, **Prein AF**, Witold FK, Wei Zhang (2022) On the Role of Atmospheric Simulations Horizontal Grid Spacing for Flood Modeling. , https://doi.org/10.1007/s00382-022-06233-0

Li Z, Gao S, Chen M, Gourley J, Liu C, **Prein AF**, and Hong Y (2022) The conterminous United States are projected to become more prone to flash floods in a high-end emissions scenario. Communications Earth & Environment, https://doi.org/10.1038/s43247-022-00409-6

2021

Tilmes S, et al. (2021) Developing a framework for an interdisciplinary and international climate intervention strategies research program. BAMS, https://doi.org/10.1175/BAMS-D-21-0053.1

Molina MJ, Gagne DJ, **Prein AF** (2021) Deep learning classification of potentially severe convective storms in a changing climate. Earth and Space Science, https://doi.org/10.1002/essoar.10504498.1

Scaff L, **Prein AF**, Li Y, Clark AJ, Krogh S, Taylor N, Liu C, Rasmussen RM, Ikeda K, Li Z (2021) Dryline characteristics in North America's historical and future climates. Climate Dynamics https://doi.org/10.1007/s00382-021-05800-1

Prein AF, Rasmussen RM, Wang D., Giangrande S. (2021) Sensitivity of Organized Convective Storms to Model Grid Spacing in Current and Future Climates. Phil. Trans. R. Soc. A; 379: 20190546. https://doi.org/10.1098/rsta.2019.0546

Prein AF, Mearns L (2021) U.S. Extreme Precipitation Weather Types Increased in Frequency During the 20th Century. Journal of Geophysical Research – Atmosphere https://doi.org/10.1029/2020JD034287

Fowler HJ, et al. (2021) Towards advancing scientific knowledge of climate change impacts on short-duration rainfall extremes. Philosophical Transactions of the Royal Society A., https://doi.org/10.1098/rsta.2019.0542

Fowler HJ, Lenderink G, **Prein AF**, et al. (2021) Anthropogenic intensification of short-duration rainfall extremes. Nature Reviews, https://doi.org/10.1038/s43017-020-00128-6

Kendon EJ, **Prein AF**, Senior CA, Stirling A (2021) Challenges and outlook for convection-permitting climate modelling. Philosophical Transactions of the Royal Society A., https://doi.org/10.1098/rsta.2019.0547

Poujol B, **Prein AF**, Molina MJ, Muller C (2021) Dynamic and Thermodynamic Impacts of Climate Change on Organized Convection in Alaska. Climate Dynamics, https://doi.org/10.1007/s00382-020-05606-7

Zhou X, Yang K, Ouyang L, Wang Y, Jiang Y, Li X, Chen D, **Prein AF** (2021) Added Value of Kilometer-scale Modeling over the Third Pole Region: A Pilot Study. Climate Dynamics, https://doi.org/10.1007/s00382-021-05653-8

2020

Poujol B, **Prein AF**, Newman AJ (2020) Kilometer-scale modeling projects a tripling of Alaskan convective storms in future climate. Climate Dynamics, https://doi.org/10.1007/s00382-020-05466-1

Li P, Moseley C, **Prein AF**, Chen H, Li J, Furtado K, Zhou T (2020) Mesoscale convective systems precipitation characteristics over East Asia. Part I: regional differences and seasonal variations. Journal of Climate, https://doi.org/10.1175/JCLI-D-20-0072.1

Prein AF, Heymefield AJ (2020) The Impacts of an Increasing Melting Level Height on Surface Precipitation Phase and Intensity. Nature Climate Change, https://doi.org/10.1038/s41558-020-0825-x

Pavlidis V, Katragkou E, **Prein AF**, Georgoulias AK, Kartsios S, Zanis P, Karacostas T (2020) Investigating the sensitivity to resolving aerosol interactions in downscaling regional model experiments with WRFv3.8.1 over Europe. Geoscientific Model Development, https://doi.org/10.5194/gmd-13-2511-2020

Molina MJ, Allen JT, **Prein AF** (2020) Moisture Attribution and Sensitivity Analysis of a Winter Tornado Outbreak. Weather and Forecasting, https://doi.org/10.1175/WAF-D-19-0240.1

Wang D, Giangrande1 SE, Feng Z, Hardin JC, **Prein AF** (2020) Updraft and Downdraft Core Size and Intensity as Revealed by Radar Wind Profilers: MCS Observations and Idealized Model Comparisons. Journal of Geophysical Research, ttps://doi.org/10.1029/2019JD031774

Jacob D, Teichmann C, Sobolowski S, et al. (2020) Regional climate downscaling over Europe: perspectives from the EURO-CORDEX community. Reg Environ Change 20, 51 (2020). https://doi.org/10.1007/s10113-020-01606-9

Towler E, Llewellyn D, **Prein AF**, Gilleland E (2020) Extreme-value analysis for the characterization of extremes in water resources: A generalized workflow and case study on New Mexico monsoon precipitation. Weather and Climate Extremes, https://doi.org/10.1016/j.wace.2020.100260

Lopez-Cantu TP, **Prein AF**, Samaras C (2020) Integrating uncertainties across U.S. rainfall projections can increase robustness in planning for climate resilience. Geophysical Research Letters, 10.1088/2634-4505/ac8a6c

Shen X, Huang DD, Wang W, **Prein AF**, and Togneri R (2020) Retrieval of Cloud Liquid Water Using Microwave Signals from LEO Satellites: a Feasibility Study through Simulations. Atmosphere, https://doi.org/10.3390/atmos11050460

Darwish MM, Tye MR, **Prein AF**, Fowler HJ, Blenkinsop S, Dale M, Duncan F (2020) New hourly extreme precipitation regions and regional annual probability estimates for the UK. International Journal of Climatology, https://doi.org/10.1002/joc.6639

Bromley GT, Gerken T, **Prein AF**, Stoy PC (2020) Recent trends in the near-surface climatology of the northern North American Great Plains. Journal of Climate, https://doi.org/10.1175/JCLI-D-19-0106.1

2019

Tamang SK, Ebtehaj AM, **Prein AF**, Heymsfield AJ (2019) Linking Global Changes of Snowfall and Wet-Bulb Temperature. Journal of Climate, https://doi.org/10.1175/JCLI-D-19-0254.1

Grabowski WW, **Prein AF** (2019) Separating dynamic and thermodynamic impacts of climate change on daytime convective development over land. Journal of Climate, https://doi.org/10.1175/JCLI-D-19-0007.1

Piazza M, **Prein AF**, Truhetz H, and Csaki A (2019) On the sensitivity of precipitation in convection-permitting climate simulations in the Eastern Alpine region. Meteorologische Zeitschrift, 0.1127/metz/2019/0941

Prein AF, Bukovsky MS, Mearns LO, Bruyère1 C, and Done JM (2019) Simulating North American Weather Types with Regional Climate Models. Frontiers, https://doi.org/10.3389/fenvs.2019.00036

Prein AF, AG Pendergrass (2019) Can we Constrain Uncertainty in Hydrologic Cycle Projections? Geophysical Research Letters, https://doi.org/10.1029/2018GL081529

Scaff L, **Prein AF**, Li Y, Liu C, Rasmussen R, and Ikeda K (2019) Simulating the diurnal cycle of convective precipitation in North America's current and future climate with a convection-permitting model. Climate Dynamics, https://doi.org/10.1007/s00382-019-04754-9

2018

Prein AF, GJ Holland (2018) Global Estimates of Damaging Hail Hazard. Weather and Climate Extremes, https://doi.org/10.1016/j.wace.2018.10.004

Musselman KN, Lehner F, Ikeda K, Clark M, **Prein AF**, Liu C, Barlage M, and Rasmussen R (2018) Projected increases and regime shifts in rain-on-snow flood potential over western North America. Nature Climate Change, 0.1038/s41558-018-0236-4

Blenkinsop S, Fowler HJ, Barbero R, Chan SC, Guerreiro SB, Kendon E, Lenderink G, Lewis E, Li X, Westra S, Alexander L, Allan RP, Berg P, Dunn RJD, Ekström M, Evans JP, Holland G, Jones R, Kjellström E, Klein-Tank A, Lettenmaier D, Mishra V, **Prein AF**, Sheffield J, Tye MR (2018) The INTENSE project: using observations and models to understand the past, present and future of sub-daily rainfall extremes. Advances in Science and Research, ttps://doi.org/10.5194/asr-15-117-2018

2017

KL Rasmussen, **AF Prein**, RM Rasmussen, K Ikeda, C Liu (2017) Changes in the convective population and thermodynamic environments in convection-permitting regional climate simulations over the United States. Climate Dynamics, https://doi.org/10.1007/s00382-017-4000-7

Prein AF, C Liu, K Ikeda, R Bullock, RM Rasmussen, GJ Holland, M Clark (2017) Simulating North American Mesoscale Convective Systems with a Convection-Permitting Climate Model. Climate Dynamics, doi:10.1007/s00382-017-3947-8

Aiguo D, RM Rasmussen, C Liu, K Ikeda, **AF Prein** (2017) A new mechanism for warm-season precipitation response to global warming based on convection-permitting simulations Climate Dynamics, https://doi.org/10.1007/s00382-017-3787-6

Púčik T, P Groenemeijer, AT Rädler, L Tijssen, G Nikulin, **AF Prein**, E van Meijgaard, R Fealy, C Teichmann, D Jacob (2017) Future changes in European severe convection environments in a regional climate model ensemble. Journal of Climate, https://doi.org/10.1175/JCLI-D-16-0777.1

PA Mooney, DC Broderick, CL Bruyere, FJ Mulligan, **AF Prein** (2017) The role of regional climate model physics in simulating the summertime diurnal cycle of precipitation over the contiguous United States. Journal of Climate, https://doi.org/10.1175/JCLI-D-16-0851.1

Prein AF, RM Rasmussen, G Stephens (2017) Challenges and Advances in Convection-Permitting Climate Modeling. BAMS, doi:10.1175/BAMS-D-16-0263.1

Prein AF, A Gobiet (2017) Impacts of uncertainties in European gridded precipitation observations on regional climate analysis. Int. J. Climatol., 37:305\T1\textendash327.doi:10.1002/joc.4706

Prein AF, RM Rasmussen, K Ikeda, C Liu, M Clark, GJ Holland (2017) The future intensification of hourly precipitation extremes. Nature Climate Change, 7(1):48--52;doi:10.1038/nclimate3168

2016

Liu C, K Ikeda, RM Rasmussen, M Barlage, AJ Newman, **AF Prein** et al. (2016), Continental-scale convection-permitting modeling of the current and future climate of North America. Climate Dynamics, doi:10.1007/s00382-016-3327-9

Prein AF, GJ Holland, RM Rasmussen, MP Clark, MR Tye (2016) Running dry: The US Southwest's drift into a drier climate state. Geophysical Research Letters, 43 (3), 1272-1279, https://doi.org/10.1002/2015GL066727

Prein AF, et al. (2016) Precipitation in the EURO-CORDEX 0.11° and 0.44° simulations: high resolution, high benefits? Climate Dynamics, 46 (1-2), 383-412, https://doi.org/10.1007/s00382-015-2589-y

Tobin I, Jerez S, Vautard R, Thais F, Van Meijgaard E, **Prein A**, Déqué M, Kotlarski S, Maule CF, Nikulin G, Noël T. (2016) Climate change impacts on the power generation potential of a European mid-century wind farms scenario. Environmental Research Letters. 2016 Mar 4;11(3):034013., 10.1088/1748-9326/11/3/034013

2015

Prein AF, et al. (2015) A review on regional convection-permitting climate modeling: demonstrations, prospects, and challenges. Reviews of Geophysics, 53, 323–361, https://doi.org/10.1002/2014RG000475

Jury MW, **Prein AF**, Truhetz H., Gobiet A. (2015) Evaluation of CMIP5 Models in the Context of Dynamical Downscaling over Europe. Journal of Climate, 28, 5575–5582, https://doi.org/10.1175/JCLI-D-14-00430.1

2013

Prein AF, A Gobiet, M Suklitsch, H Truhetz, NK Awan, K Keuler, G Georgievski (2013) Added Value of Convection Permitting Seasonal Simulations. Climate Dynamics, 41(9–10), 2655–2677., https://doi.org/10.1007/s00382-013-1744-6

Prein AF, GJ Holland, RM Rasmussen, J Done, K Ikeda, MP Clark, CH Liu (2013) Importance of Regional Climate Model Grid Spacing for the Simulation of Heavy Precipitation in the Colorado Headwaters. Journal of Climate, 26, 4848–4857., https://doi.org/10.1175/JCLI-D-12-00727.1

2011

Prein AF, A Gobiet and H Truhetz (2011) Analysis of Uncertainty in Large Scale Climate Change Projections Over Europe. Meteorologische Zeitschrift, 20(4), 383–395., https://doi.org/10.1127/0941-2948/2011/0286

Invited Talks

Prein AF Kilometer-Scale Climate Modeling - Advances, Challenges, and Opportunities; Radiation and Climate - Gordon Research Conference, Jul 27, 2023, | Bates College, Lewiston, ME, USA

Prein AF The Value and Challenges of Using km-Scale Models for PMP Estimates in Current and Future Climates; Modeling Extreme Precipitation for Modernizing PMP in a Changing Climate, National Academy of Sciences, May 10, 2023, virtual

Prein AF A Km-Scale Modeling at the National Center for Atmospheric Research; UK Met Office, May 16, 2023, virtual

Prein AF A Decade of Kilometer-Scale Climate Modeling: What Have We Learned and Where are we Going?; Predictability, Predictions, and Applications Interface Panel US CLIVAR, Jan 18, 2023, virtual

Prein AF Fixing Biases For Good The Long, Difficult, and Rewarding Task of Improving km-Scale Climate Models; 37th Session of the Working Group on Numerical Experimentation (WGNE), Nov 10, 2022, Boulder Colorado

Prein AF Kilometer-Scale Modeling of the Hydrologic Cycle: Lessons Learned and Challenges Ahead; US Climate Modeling Summit (USCMS), Water Cycle and Water Security, Aug 3, 2022, Maryland, USA

Prein AF Regional and Global Kilometer-Scale Modeling Activities at the National Center for Atmospheric Research (NCAR); Japan Geoscience Union Meeting 2022, May 23, 2022; Japan

Prein AF Modeling the Impacts of Climate Change on Extreme Precipitating Storm; Colloquium at the University of Vienna, March 22, 2022; Vienna, Austria

Prein AF, Rasmussen R, Liu C, and Ikeda K Convection-Permitting WRF Climate Modeling at Continental-Scales; WRF/MPAS Users' Workshop 2021, 9 June 2021, Boulder, CO, USA

Prein AF; Rasmussen R, Ikeda K, Liu C, Dominquez F The use of Convective Permitting Modeling in South America Research; AGU 2021 Fall Meeting, Dec. 17, 2021; New Orleans and Online

Prein AF; Ramos A, Ge M, Wang D, Giangrande S, Elsaesser G, Wu J Ensemble Based LES Simulations of Mesoscale Convective Systems; AGU 2021 Fall Meeting, Dec. 15, 2021; New Orleans and Online

Prein AF; Advances and challenges in global and regional climate modeling; WCRP Climate Research Forum - Climate research priorities for the next decade, May 11, 2021 https://www.wcrp-climate.org/images/activities_iniatives/WCRP-Climate-Research-Forum-NCACG-May2021.pdf

Prein AF; Modeling of Mesoscale-Convective Systems Downstream of Mountain Regions; EGU Annual Assembly, April 27, 2021, https://meetingorganizer.copernicus.org/EGU21/EGU21-1313.html

Prein AF, Jordan Powers, Erin Towler, and David Ahijevych; On the Applicability of Kilometer-Scale Heavy Precipitation in Flood Risk Assessments; Nuclear Regulatory Commission - Probabilistic Flood Hazard Assessment (PFHA) Research Workshop – 2021, Feb. 22, 2021

Prein AF, Roy M. Rasmussen, Kyoko Ikeda, Changhai Liu; What can Kilometer-Scale Models Tell Us About Climate Change Impacts on Extreme Precipitation?; University of Arizona, Department of Hydrology and Atmospheric Sciences, Tucson, Arizona, USA, October 1, 2020

Prein AF, Roy M. Rasmussen, Kyoko Ikeda, Changhai Liu; Towards Global Convection-Permitting Earth System Modeling?; NASA, ACCP webinar, USA, September 28, 2020

Prein AF, Die Wang, Basile Poujol, Roy Rasmussen, Scot Giangrande, Kyoko Ikeda, Changhai Liu, Mike Barlage, Alexandra Ramos Valle, Fei Cheng; International Workshop - Convection-Permitting Modeling for Climate Research - Current and Future Challenges?; Virtual Workshop, September 2–3, 2020

Prein AF; What can Storm-Scale Models Tell us About Climate Change Impacts on Extreme Rainfall?; Royal Society meeting on "Intensification of short-duration rainfall extremes and implications for flash flood risks", London, UK, February 3, 2020

Prein AF, Roy M. Rasmussen, Kyoko Ikeda, Changhai Liu; Simulating Organized Convective Storms in Climate Models; UK Met Office 4th Convective Scale Modelling Workshop, Boulder, Colorado, USA, January 30, 2020

Prein AF; Kilometer-Scale Climate Modeling in Mountain Regions: Advances, Challenges, and Opportunities; ICRC-CORDEX 2019, Beijing, China, October 17, 2019

Prein AF, Roy M. Rasmussen, Kyoko Ikeda, Changhai Liu, Mike Barlage, Die Wang, Scott Giangrande; The Effect of Model Resolution on Simulated Mesoscale Convective Systems Simulating Organized Convective Storms in Climate Models; Latsis Symposium 2019, ETH Zurich, Switzerland, August 23, 2019

Prein AF, Roy M. Rasmussen, Kyoko Ikeda, Changhai Liu; The Effect of Model Resolution on Simulated Mesoscale Convective Systems. Simulating Organized Convective Storms in Climate Models; Invited seminar at the German National Meteorological Service (DWD), Offenbach, Germany, August 19, 2019

Prein AF; Continental-Scale Convection-Permitting Climate Modeling at NCAR: Advances, Challenges, and Lessons Learned for S2S and Climate Predictions; International Workshop on Climate Prediction: Past, Present, and Future 2019, Taipei, Taiwan, June 3-4, 2019

Prein AF; Severe Convection In Climate Models. North American Hail Workshop. August 14, 2018, Boulder, CO.

Prein AF; North American Mesoscale Convective Systems Under Climate Change; AOGS annual meeting. June 4, 2018, Honolulu, Hawaii.

Prein AF et al.; North American Mesoscale Convective Systems Under Climate Change; University of Michigan, March. 8, 2018, Ann Arbor, Michigan.

Prein AF et al.; Mesoscale Convective Systems Under Climate Change: Results from North American Scale Convection-Permitting Climate Simulations; AGU Fall meeting, Dec. 11, 2017, New Orleans, Louisiana.

Prein AF; North American Scale Convection-Permitting Climate Modeling: Mesoscale Convective Systems Under Climate Change; AMS 17th Conference on Mesoscale Processes, July 27, 2017, San Diego, California.

Prein AF; North American Extreme Rainfall Events Under Climate Change; CNR-CWP annual science meeting, May 3, 2017, Montreal, Canada.

Prein AF et al.; Changing Characteristics of Convective Systems: Results from a Continental-Scale Convection-Permitting Climate Simulations; American Geophysical Union, Fall Meeting 2016, December 12, 2016, San Francisco, USA.

Prein AF et al.; Climate simulations on the impact-scale; Newcastle University, May 22, 2016, Newcastle, U.K.

Prein AF et al.; Regional Convection-Permitting Climate Modeling: Demonstrations, Prospects, and Challenges; International ICRC-CORDEX Conference, May 18, 2016, Stockholm, Sweden.

Prein AF et al.; A Review on Regional Convection-Permitting Climate Modeling: Demonstrations, Prospects, and Challenges; American Geophysical Union, Fall Meeting 2015, December 16, 2015, San Francisco, USA.

Prein AF, R Rasmussen, M. Clark, K, Ikeda, C. Liu; Continental-Scale Convection-Permitting Regional Climate Modeling. American Geophysical Union, Fall Meeting 2015, December 16, 2015, San Francisco, USA.

Prein AF et al.; Precipitation in the EURO-CORDEX 0.11° and 0.44° simulations: high resolution, high benefits?; American Geophysical Union, Fall Meeting 2014, December 17, 2014, San Francisco, USA.

Prein AF; The EURO-CORDEX Initiative: A new generation of regional climate scenarios for Europe; Seventh ICTP Workshop on the Theory and Use of Regional Climate Models, May 13, 2014. ICTP, Trieste, Italy.

Prein AF; Added Value of Convection Permitting Climate Simulations (CRCSs); Institut f. Atmosphäre und Klima, May 21, 2013, Zürich, Switzerland.

Honors, Awards, and Accomplishments

2022 & 23 **Clarivate Highly Cited Researcher**, In recognition of exceptional research performance demonstrated by production of multiple highly cited papers that rank in the top 1 % of field and year, Cross-Field.

2024 **Top Downloaded Article in Geophysical Research Letters**, Sub-Seasonal Predictability of North American Monsoon Precipitation.

11/2021 **NCAR & UCAR Outstanding Publication Award**, Prein AF, RM Rasmussen, K Ikeda, C Liu, M Clark, GJ Holland (2017) The future intensification of hourly precipitation extremes. Nature Climate Change; 7(1):48–52;doi:10.1038/nclimate3168.

04/2020 **Geophysical Research Letters - top downloaded article in 2018-2019**, Prein, A.F. and Pendergrass, A.G., 2019. Can We Constrain Uncertainty in Hydrologic Cycle Projections? Geophysical Research Letters, 46(7), pp.3911-3916..

07/2018 **Highlighted as a promising future leader in climate science by the World Climate Research Program (WCRP)**, https://www.wcrp-climate.org/future-science-leadership/spotlight-on-early-career-researchers.

06/2018 **Early Career Researcher Kamide Lecturer**, 15th AOGS annual meeting, Honolulu, HI.

06/2018 **Wiley top downloaded article in 2016-2017**, Prein and Gobiet 2017, Impacts of uncertainties in European gridded precipitation observations on regional climate analysis, Int. J. Climatol., 37: 305–327. doi:10.1002/joc.4706, 1380 downloads within the first 12 months of online publication.

05/2018 **Early Career Researcher presentation award**, 8th GEWEX Open Science Conference 2018, Canmore, CA.

03/2017 **AGU top-cited papers in 2015-2016**, Prein et al. 2015, A review on regional convection-permitting climate modeling: Demonstrations, prospects, and challenges, Reviews of Geophysics, 53, 323–361, Highlighted in Meteorology and Atmospheric Science quarterly newsletter, March 2017.

01/2017 **Cover story Nature Climate Change**, Prein et al. 2016, The future intensification of hourly precipitation extremes. Nature Climate Change, 7(1):48–52, In January 2017 issue.

05/2016 **Poster Award**, *International Conference on Regional Climate (ICRC)-CORDEX 2016*, Stockholm, Sweden.

11/2009 **Poster Award**, *3. Austrian Day of Meteorology*, November 5–6, 2009, Graz, Austria.

Professional Leadership and Development

08/2019 – current **Panel Member**, *GEWEX Hydroclimatology Panel*, `http://www.gewex.org/panels/gewex-hydroclimatology-panel/`.

11/2020 – current **Advisory Group Member**, *WCRP Digital Earths Lighthouse Activity*, `https://www.wcrp-climate.org/wcrp-ip-la`.

05/2023 – current **Associate Editor**, *Scientific Reports*, `https://www.nature.com/srep/`.

05/2022 – current **Associate Editor**, *Atmospheric Science (specialty section of Frontiers in Earth Science, Frontiers in Environmental Science and Frontiers in Physics)*, `https://www.frontiersin.org/journals/all/sections/atmospheric-science`.

09/2016 – current **Coordination of the annual CPM workshop series**, *Convection-Permitting Modeling (CPM) Workshops*, the 7th CPM workshop will be in Bergen, NO in Aug. 2023 `https://cpm2023.w.uib.no/`.

12/2021 – current **Affiliate member**, *WCRP Safe Landing Climates Lighthouse Activity*, `https://www.wcrp-climate.org/safe-landing-climates`.

10/2019 – current **Working Group Leader**, *WCRP CORDEX project - Convection-Permitting Third Pole (CPTP)*, `http://rcg.gvc.gu.se/cordex_fps_cptp/`.

08/2022 – current **Guest Editor**, *Journal of the Meteorological Society of Japan (JMSJ) and Scientific Online Letters on the Atmosphere (SOLA)*, Japan.

06/2019 – 06/2022 **Scientific Advisor**, *EU Horizon 2020 project - European Climate Prediction system (EUCP)*, `https://www.eucp-project.eu/`.

02/2020 – 09/2021 **Guest Editor**, *For the Philosophical Transactions of the Royal Society A*, London, UK.

11/2016 – 04/2020 **Associate Editor**, *For the international journal Climate Dynamics*, Springer, Germany.

10/2016 – 07/2020 **Coordinator**, *Climate Dynamics Special Issue on "Advances in Convection Permitting Climate Modeling"*, Springer, Germany.

10/2018 **Participant**, *High Impact Communication for Scientists, October 16–17, 2018*, Boulder, CO, CI International Training.

5/2016 **Coordinator**, *ICRC-CORDEX conference side event on Convection-Permitting Climate Modeling*, Stockholm, Sweden.

2016– **Organizer**, *"MMM Happy Hour Seminar"*, National Center for Atmospheric Research, Mesoscale and Microscale Meteorology Laboratory.

09/2015 **Participant**, *2015 Swiss Climate Summer School: Extreme events and climate*, Ascona, Switzerland.

2014–2016 **Organizer**, *"Thompson Lecture Series" seminar*, National Center for Atmospheric Research, Advanced Study Program.

02/2010– 11/2014 **Co-Coordinator**, *COSMO-CLM Convection Resolving Climate Simulation (CRCS) group.*

01/2012 **Participant**, *WRF tutorial*, Boulder, CO, USA.

02/2010 **Participant**, *COSMO/CLM Spring School 2010*, Langen, Germany.

06/2009 **Participant**, *Summer School on "Climate Variability & Climate Change: Estimating and Reducing Uncertainties"*., Visegrad, Hungary.

Outreach

2016– **Media Interviews**, *Regular interactions with various media outlets on topics related to extreme events and climate change.*

04/2022 **Press Release**, *On article "Sub-Seasonal Predictability of North American Monsoon Precipitation"*, Nationwide coverage in media outlets such as The Washington Post and National Geographic.

08/2018 **Press Conference**, *At the "1st North American Hail Workshop"*, Coverage of hail hazard in a changing climate.

05/2018 **NCAR Journalism Summit**, *Member on the panel about "Future storms, future risks".*

11/2017 **Press Release**, *On article "Increasing rainfall volume from future severe convective storms"*, Nationwide coverage in media outlets such as The Washington Post, NPR, CBS News, and Scientific American.

12/2016 **Press Release**, *On article "The future intensification of hourly precipitation extremes"*, Triggered more than 300 nationwide news articles in newspapers such as The New York Times, The Washington Post, or Physics Today.

2/2016 **Press Release**, *On article "Running dry: The U.S. Southwest's drift into a drier climate state"*, Nationwide coverage and interviews by reporters from multiple newspapers and radio stations.

2011– **Journal Reviewer**, Nature Climate Change, Bulletin of the American Meteorological Society (BAMS), Scientific Reports, Journal of Climate, Climate Dynamics, Journal of Geophysical Research: Atmosphere, Geophysical Research Letters, Weather and Climate Extremes, Journal of Hydrometeorology, International Journal of Climatology, Monthly Weather Review, Water Resources Research, Geoscientific Model Development, Environmental Research Letters, Tellus A, Quarterly Journal of the Royal Meteorological Society, Journal of Applied Meteorology and Climatology, Meteorologische Zeitschrift.

Early Career Science Mentorship

Ph.D. committee

current **Robert van der Drift**, *Massachusetts Institute of Technology*.

current **Grace Affram**, *Utah State University*.

current **Alexander Lojko** , *University of Michigan*.

current **Alan García Rosales**, *Central Michigan University*.

current **Hongyong Yu**, *Beijing Normal University*.

2021 **Gabriel Bromley**, *Montana State University*.

2020 **Tania Lopez Cantu**, *Carnegie Mellon University*.

Postdoc mentor

current **Julia Kukulies**, *NCAR*.

2023 **Carlos Martinez**, *NCAR*.

2023 **Diamond Tachera**, *NCAR*.

2021 **Annareli Morales**, *NCAR*.

2021 **Maria Molina**, *NCAR*.

Languages

German **Mother tongue**

English **Fluent**

Computer Skills

Platforms Linux, Windows

Programming Python, IDL, R, MATLAB, FORTRAN, Scripting

Editing Writing and editing of scientific documents with LaTeX