Lukas Brunner

curriculum vitae

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Current Position

05/2024 - presentt **Research Associate**
Climate Extremes group, Research Unit Sustainability and Climate Risks, Universität Hamburg

Previous Positions

01/2022 - 04/2024 **Senior scientist**
Group for Climate Dynamics and Modeling, Department of Meteorology and Geophysics, University of Vienna

05/2023 - 06/2023 **Visiting scientist**
Institute of Meteorology, Freie Universiät Berlin

10/2020 - 12/2021 **Postdoctoral scientist / Senior scientist**
Climate Physics group, Institute for Atmospheric and Climate Science, ETH Zurich

05/2018 - 09/2020 **Postdoctoral scientist**,
Climate Physics group, Institute for Atmospheric and Climate Science, ETH Zurich

04/2017 - 09/2017 **Visiting scientist**
Center for International Climate Research Oslo (CICERO), Norway

10/2015 - 03/2016 **Visiting scientist**
Chair of Climate System Science, School of Geosciences, University of Edinburgh

10/2014 - 03/2018 **Predoctoral scientist**
Research group ARSCliSys, Wegener Center, University of Graz

Education

03/2018 **Dr. rer. nat. in Climate physics**, University of Graz, Austria
Thesis A new perspective on atmospheric blocking – detection, analysis, and impacts

07/2014 **MSc. in Geophysics**, University of Graz, Austria
Thesis Stratospheric ozone and temperature evolution over the past decades

10/2012 **BSc. in Physics**, University of Graz, Austria
06/2008 School leaving examination

PI projects

2024 **High-resolution machine learning for the climate community in Austria**
Austrian Climate Research Programme (ACRP) 2023; 300.000 Euro, June 2024 to May 2027; Carried out at the University of Vienna; Partners: University of Innsbruck, GeoSphere Austria

Committee Work, Session Chair, and Volunteering

04/2024 **Session convener EGU24**
Regional Climate Modeling, Including CORDEX and Constraining Global Multi-Model Ensembles

04/2024 **Mentor in the EGU mentoring programme**

2023 - 2024 **Member in the University of Vienna sustainability advisory board**
University of Vienna

2022 - present **Member of the steering committee of the Austrian Climate Scenarios**
Klimaszenarien.AT

2021 - 2022 **Climate expert and participant at the Future of the Earth performance**
The Future of the Earth interactive theatre performance

2019 - 2021 **Board member (president in 2021)**
Club Alpbach Vorarlberg, European Forum Alpbach

2018 - 2021 **Mittelbau representative**
Insitute for Atmosphere and Climate, ETH Zurich

2018 - present **Reviewer for scientific journals**
50+ verified reviews on WoS, including for J. Climate, Nature, and Science Advances

Awards and Scholarships

2023 **Wissenschaftspreis des Landes Vorarlberg for young researchers**
Vorarlberger Landesregierung

2022 **Scholarhip as youth representative of the European Forum Alpbach at COP27**
European Forum Alpbach Foundation and Forum Alpbach Network

2018 **Performance scholarship for my PhD project**
University of Graz

2017 - 2018 **Member PRO SCIENTIA**
Österreichisches Studienförderungswerk

2016 - 2018 **Scholarships for the European Forum Alpbach**
Club Alpbach Vorarlberg: 2016 & 2017; European Forum Alpbach Foundation: 2018

2016 **Marietta Blau scholarship**
Austrian Exchange Service

Key Presentations

07/2024 Universität Freiburg, Freiburg (invited)

03/2024 Deutsche Klimatagung, Potsdam (keynote)

02/2024 Climate Analytics, Berlin (invited talk)

07/2023 IUGG General Assembly, Berlin (oral presentation)

05/2023 Colloquium Leipzig Institute for Meteorology, Leipzig University (invited)

05/2023 Institute for Meteorology colloquium, FU Berlin (invited)

05/2023 Climate statistics and extremes group, Universität Hamburg (invited)

03/2023 Global Carbon Budget workshop (keynote)

05/2022 EGU General Assembly (oral presentation)

01/2022 Colloquium Department of Meteorology and Geophysics, University of Vienna (invited)

11/2021 EC-Earth Consortium General Assembly 2021 (keynote)

10/2021 Wegener Center Common Space, University of Graz, Austria (invited)

04/2017 EGU General Assembly (oral presentation)

12/2015 AGU Fall Meeting (oral presentation)

Supervision and Courses

2024 - present **Climate Modeling**
Master course, Universität Hamburg (part of the course)

2024 - present **Weather and Climate Extremes**
Master course, Universität Hamburg (part of the course)

2022 - present **Numerische Methoden**
Bachelor course, University of Vienna (full course)

2022 - present **Modelling and Data Analysis**
Master course, University of Vienna (part of the course)

2022 - present **Exercises in Introduction to Computational Meteorology**
Master course, University of Vienna (full course)

2019 - present **Supervision of Bachelor and Master students**
Bachelor thesis: 4 finished; Master thesis: 2 finished, 2 ongoing

Selected Outreach activities

2023-2024 Guest lecture: Green Finance Seminar, Faculty of Law

10/2022 Public lecture: Inspirationstag der Katholischen Kirche Wien

10/2022 Interview: Ö1 Kinderuni
`https://oe1.orf.at/programm/20221027/695314/Wie-entstehen-Wolken`

11/2022 Article: Rudolphina
`https://rudolphina.univie.ac.at/klimakonferenz-cop27-hitze-duerre-flut-extremwetter-katastrophen`

11.2020 Mentioned in media: Ars Technica
`https://arstechnica.com/science/2020/11/newest-climate-models-shouldnt-raise-future-warming-projections`

02/2017 Mentioned in media: Der Standard (in German)
`https://www.derstandard.at/story/2000051806269/atmosphaerische-blockaden-fuehren-zu-kaelteeinbruechen-im-fruehjahr`

Publications

So far, I have published 18 peer-reviewed articles, which have been cited more than 1300 times according to Google Scholar. My current h-index is 15.

in review **Brunner L.**, Ghosh R., Haimberger L., Hohenegger C., Putrasahan D., Rackow T., Knutti R., and Voigt A.: Toward Digital Twins of Earth: Tracing three decades of climate model improvements, *Science Advances*

in review Nguyen V., Vorogushyn S., Nissen K., **Brunner L.**, and Merz B.: A non-stationary climate-informed weather generator for assessing of future flood risks, *Adv. Stat. Climatol. Meteorol. Oceanogr.*

in review Sobolowski S. et al. including **Brunner L.**: EURO-CORDEX CMIP6 GCM Selection & Ensemble Design: Best Practices and Recommendations, *BAMS*, preprint: `https://zenodo.org/doi/10.5281/zenodo.7673399`

04/2024 O'Reilly C., **Brunner L.**, Qasmi S., Nogherotto R., Ballinger A., Booth B., Befort D., Knutti R., Schurer A., Ribes A., Weisheimer A., Coppola E., and McSweeney C.: Assessing observational constraints on future European climate in an out-of-sample framework, *npj Climate and Atmospheric Science*, DOI: `https://doi.org/10.1038/s41612-024-00648-8`

03/2024 **Brunner L.** and Voigt A.: Pitfalls in diagnosing temperature extremes, *Nature Communications*, DOI: `https://doi.org/10.1038/s41467-024-46349-x`

08/2023 Merrifield A. L., **Brunner L.**, Lorenz R., Humphrey V., and Knutti R. (accepted): Climate model Selection by Independence, Performance, and Spread (ClimSIPS) for regional applications, *Geosci. Model Dev.*, DOI: `https://doi.org/10.5194/gmd-16-4715-2023`

06/2023 **Brunner L.** and S. Sippel (2023): Identifying climate models based on their daily output using machine learning, *Env. Data Sci.*, DOI: `https://doi.org/10.31223/X53M0J`

04/2023 Palmer T. E., C. F. McSweeney, B. B. B. Booth, M. D. K. Priestley, P. Davini, **L. Brunner**, L. Borchert, and M. B. Menary (2023): Performance based sub-selection of CMIP6 models for impact assessments in Europe, *Earth Syst. Dynam.*, DOI: `https://doi.org/10.5194/esd-14-457-2023`

10/2022 Gründemann G. J, N. van de Giesen, **L. Brunner**, and R. van der Ent (2022): Rarest rainfall events will see the greatest relative increase in magnitude under future climate change, *communications earth & environment*, DOI: `https://doi.org/10.1038/s43247-022-00558-8`

06/2021 Hegerl, G., A. P. Ballinger, B. Booth, L. F. Borchert, **L. Brunner**, M. Donat, F. Doblas-Reyes, G. Harris, J. Lowe, R. Mahmood, J. Mignot, J. Murphy, D. Swingedouw, and A. Weisheimer (2021): Toward Consistent Observational Constraints in Climate Predictions and Projections, *Front. Clim.*, 3, DOI: `https://doi.org/10.3389/fclim.2021.678109`

11/2021 Sperna Weiland, F. C., R. D. Visser, P. Greve, B. Bisselink, **L. Brunner**, and A. H. Weerts (2021): Estimating Regionalized Hydrological Impacts of Climate Change Over Europe by Performance-Based Weighting of CORDEX Projections. *Front. Water*, 3, DOI: `https://doi.org/10.3389/frwa.2021.713537`

11/2020 **Brunner, L.**, A. G. Pendergrass, F. Lehner, A. L. Merrifield, R. Lorenz, and R. Knutti: Reduced global warming from CMIP6 projections when weighting models by performance and independence. *Earth Syst. Dynam.*, 11(4), 995–1012, DOI: `https://doi.org/10.5194/esd-11-995-2020`

09/2020 **Brunner, L.**, C. McSweeney, A. P. Ballinger, D. J. Befort, M. Benassi, B. B. B. Booth, E. Coppola, H. de Vries, G. Harris, G. C. Hegerl, R. Knutti, G. Lenderink, J. Lowe, R. Nogherotto, C. O'Reilly, S. Qasmi, A. Ribes, P. Stocchi, and S. Undorf: Comparing Methods to Constrain Future European Climate Projections Using a Consistent Framework. *J. Climate*, 33(20), 8671–8692, DOI: https://doi.org/10.1175/jcli-d-19-0953.1

09/2020 Merrifield, A. L., **L. Brunner**, R. Lorenz, and R. Knutti: An investigation of weighting schemes suitable for incorporating large ensembles into multi-model ensembles. *Earth Syst. Dynam.*, 11, 807-834, DOI: https://doi.org/10.5194/esd-11-807-2020

05/2020 Lehner, F., C. Deser, N. Maher, J. Marotzke, E. Fischer, **L. Brunner**, R. Knutti, and E. Hawkins: Partitioning climate projection uncertainty with multiple Large Ensembles and CMIP5/6. *Earth Syst. Dynam.*, 11, 491-508, DOI: https://doi.org/10.5194/esd-11-491-2020

09/2019 **Brunner, L.**, R. Lorenz, M. Zumwald, and R. Knutti: Quantifying uncertainty in European climate projections using combined performance-independence weighting. *Env. Res. Let.* DOI: https://doi.org/10.1088/1748-9326/ab492f

06/2018 Unterberger, C., **L. Brunner**, S. Nabernegg, K. Steininger, A. K. Steiner, E. Stabentheiner, S. Monschein and H. Truhetz: Spring frost risk for regional apple production under a warmer climate. *PLoS ONE*, 13, DOI: https://doi.org/10.1371/journal.pone.0200201

01/2018 **Brunner, L.**, N. Schaller, J. Anstey, J. Sillmann and A. K. Steiner: Dependence of present and future European temperature extremes on the location of atmospheric blocking. *Geophys. Res. Lett.*, 45, DOI: https://doi.org/10.1029/2018GL077837

01/2017 **Brunner, L.** and A. K. Steiner: A global perspective on atmospheric blocking using GPS radio occultation – one decade of observations. *Atmos. Meas. Tech.*, 10, DOI: https://doi.org/10.5194/amt-10-4727-2017

11/2016 **Brunner, L.**, G. C. Hegerl and A. K. Steiner: Connecting atmospheric blocking to European temperature extremes in spring, *J. Climate*, 30.2, DOI: https://doi.org/10.1175/JCLI-D-16-0518.1

04/2016 **Brunner, L.**, A. K. Steiner, B. Scherllin-Pirscher and M. W. Jury: Exploring atmospheric blocking with GPS radio occultation observations, *Atmos. Chem. Phys.* 16, DOI: https://doi.org/10.5194/acp-16-4593-2016

Other publications

03/2020 **Brunner, L.**, M. Hauser, R. Lorenz, and U. Beyerle: The ETH Zurich CMIP6 next generation archive: technical documentation. DOI: http://doi.org/10.5281/zenodo.3734128

06/2018 Mohankumar, S. E. P., K. Mintz-Woo, M. Damert, **L. Brunner** and J. Eise: Blogging Climate Change: A Case Study, In: Addressing the Challenges in Communication Climate Change Across Various Audiences. DOI: https://doi.org/10.1007/978-3-319-98294-6

04/2018 **Brunner, L.**: A new perspective on atmopsheric blocking from observations – detection, analysis, and impacts (Dissertation). Wegener Center Verlag Graz, Scientific Report Nr. 76-2018, URL: https://wegcwww.uni-graz.at/publ/wegcreports/2018/WCV-SciRep-No76-LBrunner-Jun2018.pdf

06/2014 **Brunner, L.**: Stratospheric ozone and temperature evolution over the past decades (Master's thesis). Wegener Center Verlag Graz, Scientific Report Nr. 59-2014, DOI: http://wegcwww.uni-graz.at/publ/wegcreports/2014/WCV-SciRep-No59-LBrunner-Aug2014_1.pdf

Published Code and Data

Code **Brunner L.** (2024): Code for: "Pitfalls in diagnosing temperature extremes", https://github.com/lukasbrunner/running_window_bias

Dataset & Code **Brunner L.** and S. Sippel (2023): Data and code for "Identifying climate models based on their daily output using machine learning". https://doi.org/10.5281/zenodo.7998436

Dataset Liu, Y, P. Kalverla, F. Alidoost, S. Verhoeven, B. Vreede, B. Booth, E. Coppola, R. Nogherotto, **L. Brunner**, G. Harris, S. Qasmi, A. Ballinger, G. Hegerl, C. McSweeney, C. O'Reilly, T. Palmer, A. Ribes, and H. de Vries (2021): Pre-processed data of atlas in EUCP-WP2 (1.0.1). https://doi.org/10.5281/zenodo.5679560

Code **Climate Model Weighting by Independence and Performance (ClimWIP)**
https://github.com/lukasbrunner/ClimWIP (collaborative project)
https://docs.esmvaltool.org/en/latest/recipes/recipe_climwip.html

Code **A global blocking detection algorithm**
https://github.com/lukasbrunner/blocking

Dataset **Brunner L.**, M. Hauser, R. Lorenz, and U. Beyerle (2020): The ETH Zurich CMIP6 next generation archive: technical documentation. DOI: http://doi.org/10.5281/zenodo.3734128

Dataset **Gridded radio occultation satellite data**
Geopotential Height: https://hdl.handle.net/20.500.11756/e4f48220, Temperature: https://hdl.handle.net/20.500.11756/8245c63e, Specific Humidity: https://hdl.handle.net/20.500.11756/8245c63e