

Lukas Brunner

curriculum vitae

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Current Position

05/2024 - **Senior researcher**
presentt Climate Extremes group, Sustainability and Climate Risks, University of Hamburg

Previous Positions

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

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

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

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

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

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

10/2014 - **Predoctoral scientist**
03/2018 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

Funded Projects

2024 **High-resolution machine learning for the climate community in Austria**
Austrian Climate Research Programme; 300.000 Euro, June 2024 to May 2027
<https://klimaszenarien.at/projekte/datennutzbarkeit/>

Committee Work, Convening, and Volunteering

- 2024 - **Member ÖKS Scientific Advisory Board**
present Austrian Climate Scenarios (<https://klimaszenarien.at/mitwirkende/>)
- 2024 - **Member WCRP activity Atmospheric Temperature Changes and their Drivers**
present World Climate Research Programme (WCRP) project Atmospheric Processes And their Role in Climate (APARC) in the activity Atmospheric Temperature Changes and their Drivers (ATC) (<https://www.aparc-climate.org/activities/temperature-changes/>)
- 2024 **Session chair EGU24**
Regional Climate Modeling, Including CORDEX and Constraining Global Multi-Model Ensembles
- 2024 **Mentor EGU mentoring programme**
- 2023 - **Member University of Vienna sustainability advisory board**
2024 University of Vienna
- 2022 - **Member of the steering committee of the Austrian Climate Scenarios**
2024 Klimaszenarien.AT
- 2021 - **Climate expert and participant at the Future of the Earth performance**
2022 The Future of the Earth interactive theatre performance
- 2022 **Session chair CliMatters workshop**
Uncertainty in climate modeling and projections
- 2019 - **Board member (president in 2021)**
2021 Club Alpbach Vorarlberg, European Forum Alpbach
- 2018 - **Reviewer for scientific journals**
present 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 **Scholarship 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 - **Member PRO SCIENTIA**
2018 Österreichisches Studienförderungswerk
- 2016 - **Scholarships for the European Forum Alpbach**
2018 Club Alpbach Vorarlberg: 2016 & 2017; European Forum Alpbach Foundation: 2018
- 2016 **Marietta Blau scholarship**
Austrian Exchange Service

Key Presentations

- 10/2024 NCKF Climate Research Symposium, Copenhagen (keynote)
- 07/2024 Universität Freiburg, Freiburg (invited)
- 04/2024 EGU General Assembly, Vienna (oral presentation)
- 03/2024 Deutsche Klimatagung, Potsdam (keynote)

- 02/2024 Climate Analytics, Berlin (invited)
- 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, University of 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

Supervision

- ongoing **Land-atmosphere drivers of European heatwaves (working title)**
Supervision of Master's thesis with Jana Sillmann
- ongoing **Partitioning uncertainty in climate extreme indices (working title)**
Supervision of Master's thesis with Jana Sillmann
- 2024 **Effect of climate variability and extremes on heating and cooling energy demand in Canada**
Co-supervision of Master's thesis with Jana Sillmann
- 2024 **Exploring Classifier Skill in Distinguishing Climate Model and Observational Data**
Supervision of Master's thesis
- 2024 **Changes in heatwave properties under climate change**
Supervision of Master's thesis with Aiko Voigt
- 2024 **Extracting forced signals of climate change from daily temperature patterns across scales with CESM2**
Supervision of Bachelor's thesis
- 2024 **Analyse eines Fehlers in der Definition der Hitzemetrik Cumulative Heat**
Supervision of Bachelor's thesis
- 2021 **Interannual to decadal precipitation variability in a warming climate: spatial structure and underlying mechanisms**
Co-supervision of Master's thesis with Falvio Lehner
- 2020 **Assessing climate model uncertainties – an encounter with CMIP6**
Supervision of Bachelor's thesis
- 2019 **Changes in northern hemisphere blocking occurrence under $2\times\text{CO}_2$ based on CESM**
Supervision of Bachelor's thesis

Teaching

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

- 2024 - **Weather and Climate Extremes**
present Master course, Universität Hamburg (part of the course)
- 2023 - **Paper club**
- 2024 Master course, University of Vienna (part of the course)
- 2022 - **Numerische Methoden**
- 2024 Bachelor course, University of Vienna (full course)
- 2022 - **Modelling and Data Analysis**
- 2024 Master course, University of Vienna (part of the course)
- 2022 - **Exercises in Introduction to Computational Meteorology**
- 2024 Master course, University of Vienna (full course)

Selected Outreach Activities and Media Mentions

- 2025 School lecture: Wetter- und Klimaextreme im Kontext des Klimawandels
Wir wollen's wissen (<https://www.uni-hamburg.de/wissen-fuer-alle/wir-wollens-wissen.html>)
- 2024 Guest lecture, Klimarecht im intra- und interdisziplinären Dialog, Faculty of Law, University of Vienna
- 2024 Guest lecture, Green Finance Seminar, Faculty of Law, University of Vienna
- 2024 Mentioned in Media: Die Presse
“Irrtum der Experten: Es gibt mehr Hitzetage”, <https://www.diepresse.com/18290185/irrtum-der-experten-es-gibt-mehr-hitzetage>
- 2023 Discussion round: Food for thought, European Forum Alpbach
“Data sparks action: the role of information in tackling the climate crisis”; together with David Jablonski
- 2023 Guest lecture: Green Finance Seminar, Faculty of Law, University of Vienna
“Naturwissenschaftliche Grundlagen der Klimakrise”
- 2022 Climate expert and participant at the Future of the Earth interactive theatre performance, Basel
- 2022 Public lecture: Inspirationstag der Katholischen Kirche Wien
“Naturwissenschaftliche Grundlage der Klimakrise”
- 2022 Interview in Ö1 public radio
“Wie entstehen Wolken?”, <https://oe1.orf.at/programm/20221027/695314/Wie-entstehen-Wolken>
- 2022 Participation at the Vienna Kinderuni
- 2022 Article: Rudolphina
<https://rudolphina.univie.ac.at/klimakonferenz-cop27-hitze-duerre-flut-extremwetter-katastrophen>
- 2021 Climate expert at the Future of the Earth interactive theatre performance, Basel
- 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 20 peer-reviewed articles, which have been cited more than 1500 times according to Google Scholar. My current h-index is 16.

- in review **Brunner L.**, Ghosh R., Haimberger L., Hohenegger C., Putrasahan D., Rackow T., Knutti R., and Voigt A.: First climate models simulate global surface temperature patterns indistinguishable from observations, *Science Advances*
- in review Nicola M., Phillips A. S., Deser C., Inglin Wills R. C., Lehner F., Fasullo J., Caron J. M., **Brunner L.**, and Beyerle U.: The updated Multi-Model Large Ensemble Archive and the Climate Variability Diagnostics Package: New tools for the study of climate variability and change, *Geosci. Model Dev. Discuss.*
- in review Sobolowski S. et al. (with **Brunner L.**): EURO-CORDEX CMIP6 GCM Selection & Ensemble Design: Best Practices and Recommendations, *BAMS*
- 11/2024 Nguyen V. D., Vorogushyn S., Nissen K., **Brunner L.**, and Merz B.: A non-stationary climate-informed weather generator for assessing of future flood risks, *Advances in Statistical Climatology, Meteorology and Oceanography*, DOI: <https://doi.org/10.5194/asmo-10-195-2024>
- 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.: Climate model Selection by Independence, Performance, and Spread (ClimSIPS v1.0.1) for regional applications, *Geosci. Model Dev.*, DOI: <https://doi.org/10.5194/gmd-16-4715-2023>
- 07/2023 **Brunner L.** and S. Sippel: Identifying climate models based on their daily output using machine learning, *Env. Data Sci.*, DOI: <https://doi.org/10.1017/eds.2023.23>
- 04/2023 Palmer T. E., C. F. McSweeney, 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>
- 06/2022 Befort D. J., **Brunner L.**, Borchert L. F., O'Reilly C. H., Mignot J., Ballinger A. P., Hegerl G. C., Murphy J. M.: Combination of decadal predictions and climate projections in time: Challenges and potential solutions, *Geophys. Res. Lett.*, DOI: <https://doi.org/10.1029/2022GL098568>
- 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.*, 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*, 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.*, DOI: <https://doi.org/10.5194/esd-11-995-2020>
- 09/2020 **Brunner, L.**, C. McSweeney, A. P. Ballinger, D. J. Bafort, M. Benassi, 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*, 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.*, 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.*, 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. Lett.* DOI: <https://doi.org/10.1088/1748-9326/ab492f>
- 06/2018 Unterberger, C., **L. Brunner**, S. Nabernegg, K. Steininger, A. K. Steiner, E. Staben-theiner, S. Monschein and H. Truhetz: Spring frost risk for regional apple production under a warmer climate. *PLoS ONE*, 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.*, 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.*, 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*, 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.*, 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 atmospheric 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>