

Lukas Brunner

curriculum vitae

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Research Interests

I am passionate about understanding how modern climate models represent the climate system. My research ranges from investigating synoptic-scale atmospheric blocking and associated extreme events in climate models and observations, to assessing global climate model performance, and addressing questions of climate model dependence and its implications. I work with the latest climate models and I am an expert in processing and analysing climate model data from projects such as CMIP. I have published several code repositories and I am enthusiastic about all aspects of open science. My work also includes teaching, supervision, project coordination, and public outreach.

Current Position

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

Previous Positions

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

Committee Work and Volunteering

- 2023 - **Member in the University of Vienna sustainability advisory board**
present University of Vienna
- 2023 - **Member of the Environment and Climate Research Hub**
present University of Vienna
- 2022 - **Member of the steering committee of the Austrian Climate Scenarios**
present Klimaszenarien.AT
- 2021 - **Climate expert and participant at the Future of the Earth performance**
2022 The Future of the Earth interactive theatre performance
- 2019 - **Board member (president in 2021)**
2021 Club Alpbach Vorarlberg, European Forum Alpbach
- 2018 - **Mittelbau representative**
2021 Insitute for Atmosphere and Climate, ETH Zurich
- 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 **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 - **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

- 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 (invited 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 (invited 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

- 2023 - **Paper Club**
present Bachelor course, University of Vienna (together with Blaž Gasparini)
- 2022 - **Numerische Methoden**
present Bachelor course, University of Vienna (full course)
- 2022 - **Modelling and Data Analysis**
present Master course, University of Vienna (together with Blaž Gasparini and Daria Tatsii)
- 2022 - **Exercises in Introduction to Computational Meteorology**
present Master course, University of Vienna (full course)
- 2019 - **Supervision of Bachelor and Master students**
present Bachelor thesis: 2 finished, 2 ongoing; Master thesis: 1 finished, 2 ongoing

Published Code and Data

- Code **L. Brunner** (2023): Data and code for “Identifying climate models based on their daily output using machine learning” (v1.0), <https://doi.org/10.5281/zenodo.7998437>
- 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>

Selected Outreach activities

- 01/2023 Keynote: 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>

Publications

So far, I have published 16 peer-reviewed articles, which have been cited more than 1000 times according to Google Scholar. My current h-index is 13.

- 02/2024 **L. Brunner** and A. Voigt (accepted): Pitfalls in diagnosing temperature extremes, *Nature Commun.*
- 12/2023 Sobolowski, S., S. Somot, J. Fernandez, G. Eivin, S. Brands, D. Maraun, S. Kotlarski, M. Jury, R. E. Benestad, C. Teichmann, O. B. Christensen, K. Bülow, E. Buonomo, E. Katragkou, C. Steger, S. Sørland, G. Nikulin, C. McSweeney, A. Dobler, T. Palmer, R. Wilcke, J. Boé, **L. Brunner**, A. Ribes, S. Qasmi, P. Nabat, F. Sevault, T. Oudar: (accepted): EURO-CORDEX CMIP6 GCM Selection & Ensemble Design: Best Practices and Recommendations, *BAMS*, Pre-print: <https://doi.org/10.5281/zenodo.7673400>
- 08/2023 Merrifield A. L., **L. Brunner**, R. Lorenz, v. Humphrey, and R. Knutti (2023): Climate model Selection by Independence, Performance, and Spread (ClimSIPS v1.0.1) for regional applications, *Geosci. Model Dev. Diss.*, DOI: <https://doi.org/10.5194/gmd-16-4715-2023>
- 07/2023 **Brunner L.** and S. Sippel (2023): Identifying climate models based on their daily output using machine learning, *Env. Data Sci.*, DOI: <https://doi.org/10.1017/eds.2023.23>
- 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/fccli.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. Bafort, 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. 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*, 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 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