

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 climate models, such as CESM2, 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 KET3 of the FGGA faculty evaluation**
present Faculty of Earth Sciences, Geography and Astronomy, 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 40+ 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

- 2022 - **Numerische Methoden**
present Bachelor course, University of Vienna (full course)
- 2022 - **Modelling and Data Analysis**
present Master course, University of Vienna (part of the course)
- 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, 1 ongoing; Master thesis: 1 finished, 1 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 15 peer-reviewed articles, which have been cited more than 800 times according to Google Scholar. My current h-index is 12.

- submitted Merrifield A. L., **L. Brunner**, R. Lorenz, v. Humphrey, and R. Knutti (in review): CMIP subselection by performance, independence, and climatic mean state change spread for regional applicationse, *Geosci. Model Dev. Diss.*, DOI: <https://doi.org/10.5194/egusphere-2022-1520>
- accepted **Brunner L.** and S. Sippel (accepted): 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/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. Let.* 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