

# Curriculum Vitae of Stefan Brönnimann

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## 1. Personal information

Prof. Dr. Stefan Brönnimann  
Oeschger Centre for Climate Change Research  
Institute of Geography  
University of Bern  
Hallerstr. 12  
CH-3012 Bern  
Switzerland  
Tel.: +41 31 631 8885  
E-Mail: stefan.broennimann@giub.unibe.ch  
Scopus: 7003460432, ORCID: 0000-0001-9502-7991

## 2. Education

1997            Master in Geography, University of Bern, Switzerland  
2001            PhD, Faculty of Sciences, University of Bern, Switzerland

## 3. Employment history

2001            Postdoctoral scientist  
                  Institute of Geography, University of Bern, Switzerland  
2001 – 2004    Postdoctoral scientist  
                  Lunar and Planetary Laboratory, University of Arizona, Tucson, USA  
2004 – 2010    Swiss National Science Foundation Professor  
                  Institute for Atmospheric and Climate Science, ETH Zurich, Switzerland  
Since 2010-    Chair of Climatology, Institute of Geography, University of Bern

## 4. Institutional responsibilities

- Deputy Director of Institute of Geography, University of Bern (2012-2013, 2016)
- Managing Director of Institute of Geography, University of Bern (2014-2015)
- Member, Scientific Steering Commission Oeschger Centre for Climate Change Research, University of Bern (since 2010)

## 5. Approved research projects

- Partner in *11 European projects* (COST: HOME, 2008-2010, FAIRNESS, 2021-2025: FP7 ERA-CLIM, 2011-2013, ERA-CLIM2, 2014-2017, ERAnetRUS: ACPCA, 2012-2014, H2020: EUSTACE, 2015-2019, Copernicus Climate Change Services 311a, 2017-2021, C311c, 2018-2022, Lot 1, 2022-2025, ERC Advanced Grant PALAEO-RA, 2018-2023, healthRiskADAPT, 2024-2028)
- PI of *13 Swiss SNF projects* (EVALUATE, 2010-2013, NCCR Climate PALVAREX-III, 2010-2013, OpenNature and Open Nature Lab 2012-2016, EXTRA-LARGE, 2013-2017, TWIST, 2014-2016, R4D project DECADE, 2014-2018, RE-USE, 2016-2019, CHIMES, 2016-2019, WearR, 2020-2024, URBNET, 2023-2027, DVDW, 2024-2028, Andean Hydroclimate, 2025-2029)
- Co-PI in *2 Swiss SNF Sinergia projects* (FUPSOL, 2010-2013; FUPSOL2 2014-2017)
- *14 projects from other national or international funding* (TH-project CASTRO, 2005-2008, cogito project “The Year Without a Summer”, SDC/MeteoSwiss projects CLIMANDES 1 and 2, 2013-2018, FOEN project “Storm Risk Map”, 2012-2013, Bretscher Fund project “Historical Storms”, 2012-2014, EXAR project “Climate Data for EXAR”, 2015-2016, MeteoSwiss/GCOS projects “PhenoClass”, 2016-2018, “Long Meteorological Series” 2019-2021, ULUC, 2024-2027, Wyss-Academy project “Waldbrandmanagement”, 2021-2023, 3 projects under the Newton Fund/WCSSP)

- *Competitive person funding* (SNF Postdoc Mobility, 2001-2002, Holderbank Stiftung, 2002-2003, Janggen-Poehn Foundation, 2003-2004, SNF professorship, 2004-2010, ERC Advanced Grant PALAEO-RA, 2018-2023)
- *3 CPU time projects* at the Swiss Super Computer Centre (CCC400, 2010-2011, PALAEO-RA, 2019-2020, HIRES-PALAEO-RA, 2020-2022)

## 6. Supervision of junior researchers at graduate and postgraduate level

- Main supervisor of *23 PhD students* plus *9 ongoing PhD theses*
- Supervisor of *23 postdoctoral scientists*

## 7. Teaching activities

- Teaching at MSc level in the study programmes of Environmental Sciences and Climate Sciences, ETH Zurich (3 h per week), 2004-2010
- Teaching at BSc and MSc level in the study programmes of Geography and Climate Sciences, University of Bern, full teaching load (8 h per week), since 2010
- Producer or co-producer of e-learning tools (Virtueller Klimaweg, 2008; The Great Climate Poker, 2014; Climandes Climate Sciences e-learning, 2015; Weather Reconstruction, 2018)

## 8. Scientific activities

- Member OcCC (Swiss National Advisory Body on Climate Change, 2010-2012)
- Lead author, Chapter 2 of the contribution of Working Group I to the 5th assessment report of the Intergovernmental Panel on Climate Change (IPCC)
- Editor/coordinator of *Meteorologische Zeitschrift* (2006-2016), *Climate of the Past* (2012-2018), *Physik in unserer Zeit* since 2012, Editor of *Geographica Bernensia* since 2011
- President of the Commission for Atmospheric Chemistry and Physics (2013-2016), president of Berner Geographische Gesellschaft (since 2021)
- Member of funding body commissions: SNF Ambizione (since 2016), sc.nat commission on research networks (since 2016)
- Board of Trustees: Sigrist Stiftung, Bretscher Fonds, Sebastiana Stiftung
- Member of Energie- und Klimakommission der Stadt Bern (2021-)

## 10. Organisation of conferences

- *Climate variability and extremes during the past 100 years*, Gwatt (Switzerland), 24–26 July 2006
- *Variability of global atmospheric circulation during the past 100 years*, Monte Verità, 15-20 June 2008
- *Weather and Climate Extremes During the Past 100 years*, Diessenhofen (Switzerland), 7-9 June 2010
- *Bicentenary of the Great Tambora Eruption*, Bern (Switzerland), 7-10 April 2015
- *Early Instrumental Measurements*, Bern (Switzerland) 18-21 June 2018
- Local organizer of Swiss Geosciences Meetings 2012 and 2018, the conference of the European Society of Environmental History (Bern, 2023), organiser of symposium “Climate Reanalyses and Services for Society” 2017 (Bern), “Beating the Heat” (Bern, 2022, Zurich, 2023)
- Convener or co-convener of numerous sessions at EGU, EMS, or IGU Conferences and of annual sessions at the Swiss Geosciences Meeting

## 12. Research career breaks

- Reduced employment (80%) from July 2003 to August 2010 (childcare duties).

## Scientific Achievements of Stefan Brönnimann

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**Climate data science:** For many years, I have been working on climate data at the interface between past and present climate. One of the foundations is data rescue; we have digitized millions of meteorological measurements from the Swiss network, from other historical surface stations, and millions of upper-air profiles from all over the globe. My group is active in community initiatives related to data rescue such as the Atmospheric Circulation Reconstructions over the Earth initiative (ACRE). In addition to strong collaboration with MeteoSwiss, my group was involved in two completed Copernicus Climate Change Service contracts and is currently involved in one. This work included the formulation of meta data recommendations, the definition of data exchange formats, developing of quality control software and publication of “Best Practice Guidelines”. We have digitised and homogenised long meteorological records from Switzerland including Basel, Geneva, Zurich and Bern (Brugnara et al., *Clim. Past* **18** (2022), 2357, Brugnara & Brönnimann, *Met. Z.* (2023), accepted).

Based on historical data, I have developed new methods of climate and weather reconstruction. My group developed an Ensemble Kalman Filter-based reconstruction approach (Bhend et al., *Clim. Past* **8** (2012), 963) with which we produced the first global, monthly 3-D climate reconstruction back to 1600 (Franke et al., *Sci. Data* **4** (2017), 170076), followed by an improved version (Valler et al., *Geosc. D. J.* **9** (2022), 89). In my ERC Advanced Grant PALAEO-RA we have developed a new product using a new set of model simulations (Hand et al., *Geosci. Model Devel.* **16** (2023), 4853) based on new sea-surface temperature reconstructions (Samakinwa et al., *Scientific Data* **8** (2021), 261), much extended climate data input from documentary data (Burgdorf et al., *Scientific Data* **10** (2023), 402) and instrumental data (Lundstad et al., *Scientific Data*, **10** (2023), 44) back to 1421 (Valler et al. *Scientific Data*, revised). We have also reconstructed daily weather types (Schwander et al., *Int. J. Climatol.* **37** (2017), 30) and daily high-resolution fields for Switzerland (Pfister et al. (2020) *Clim. Past* **16**, 663, Imfeld et al., *Clim. Past*, **19** (2023), 703) back to 1763. I am a member of the “Twentieth Century Reanalysis project” which produced the first long reanalysis (Compo et al., *QJRM* **137** (2011), 1), the current version 20CRv3 (Slivinski et al. *QJRM* **145** (2019), 2876, and of the corresponding European efforts ERA-20C and CERA-20C reanalyses (Laloyaux et al., *JAMES* **10** (2018), 1172).

**Climate history and historical weather extremes:** Combining historical observations, reconstructions, reanalysis data and climate model simulations provides detailed insight into climate history of the past three or four centuries. I have written a synthesis on global climate variations since 1700 in book form (Brönnimann (2015) *Climatic Changes Since 1700*, Springer) and have written or co-authored numerous studies that addressed individual events or periods such as the Spörer Minimum, the „Year Without a Summer“ of 1816 following the eruption of Tambora, the early twentieth century global warming, the „Dust Bowl“ droughts of the 1930s, the 1920s to 1940s Arctic warming, hydroclimatic changes in the 1940s and 1950s in Europe, and the period of accelerated warming. My interest in history led me to author and co-author numerous works on science history, the latest contribution is the book “Humboldts Wetterwerkstatt” (by D. Erdmann and S. Brönnimann, 2023, Haupt).

Long reanalysis data sets can be used, among many other applications, to study past extreme events. My group has analysed storms in reanalysis data sets, which served as a basis to dynamically downscale past storms. We have downscaled ca. 100 storms and derived a storm risk map for Switzerland ([www.bafu.admin.ch/naturgefahren/01919/index.html](http://www.bafu.admin.ch/naturgefahren/01919/index.html)). We have also used these downscaled storms to model storm damage. Likewise, we have used impact models to simulate crop yields (Flückiger et al., *Env. Res. Lett.* **12** (2017), 074026) and runoff (Rössler and Brönnimann, *Sci. Tot. Env.* **627** (2018), 1218) in the „Year Without a Summer“ of 1816. As well as inundated areas for the flood event 1868.

**Dynamical climatology:** In several papers, I have demonstrated how studying past climatic episodes can reveal new insights into processes and mechanisms. Apart from studies of El Niño effects, one major research topic concerns volcanic eruptions. We showed a mechanism of how eruptions affect European summer precipitation (Wegmann et al., *J. Clim.* **27** (2014), 3683) and worked on a link between Arctic sea ice and midlatitude climate via moisture transport into Siberia (Wegmann et al., *Env. Res. Lett.* **10** (2015), 054015). I found that the northern tropical belt had been shifting southwards prior to the recent phase of expansion (Brönnimann et al., *Nat. Geosc.* **8** (2015), 974) and proposed effects of ozone depletion on tropical precipitation (Brönnimann et al., *Env. Res. Lett.* **12** (2017), 064011). Recent work analysed the

role of volcanic forcing, oceanic response, and Eurasian snow cover in the early 19<sup>th</sup> century, at the end of the Little Ice Age (Brönnimann et al., *Nat. Geosci.* **12** (2019), 650, Reichen et al., *Nat. Comm.* **13** (2022), 2116). Further, I analysed multidecadal variability in European floods over the past 200 years and was able to separate dynamic effects (causing cold, flood-rich periods in the 19<sup>th</sup> century) from thermodynamic effects (dominating recent flood occurrence, Brönnimann et al., *Clim. Past.* **18** (2022), 919–933).

**Urban climate:** Since around 2017 my group has become active in the area of urban climate. We have built up a temperature network in Bern (Gubler et al., *Urban climate*, **37** (2021), 100817) that started operation in 2018 and now has over 100 stations. Based on the measurements we have developed temperature maps using geostatistical methods (Burger et al., *Urban Climate* **38** (2021), 100885), and we have analysed urban climate of Bern using bicycle measurements and private weather stations (Meyer et al., *Meteorol. Z.* **31** (2022), 131). We are also using numerical models of different complexity (MUKLIMO-3, PALM) to study urban climate. My group performs several monitoring projects for the City of Bern, using in-situ measurements and thermal imaging from hand-held cameras and drones, related to ongoing climate adaptation projects (unsealing, greening, etc.).

**Outreach and Assessments:** I have given numerous presentations on climate change and related topics to the public and to decision makers (e.g., Climate Commission of Swiss Parliament, Assembly of Mayors of Canton of Bern, Cantonal Administrations of Bern and St. Gallen) at many occasions. I was member of OCCC, the Swiss Advisory Body on Climate Change, and I am currently in the Energy and Climate Advisory Board of the government of the city of Bern. In the IPCC Fifth Assessment Report I served as a lead author of Chapter 2. I am also a co-author of the corresponding Swiss activities (Swiss Academies Report, CH2018 Scenario Report).

My research resulted in numerous media contacts, including TV and radio interviews. I was active in the last three „Researcher’s nights“ and engaged in outreach activities in many other occasions. Recently we produced a series of video explaining how historical data can be used to create risk maps, what a reanalysis is, and how we can learn from downscaling historical events and use model chains: [youtu.be/Vw3dSUwbZ-w](https://youtu.be/Vw3dSUwbZ-w), [youtu.be/Ux46HVU7H\\_g](https://youtu.be/Ux46HVU7H_g), [youtu.be/l2AtsZWpsuU](https://youtu.be/l2AtsZWpsuU). I produced several films on the history of climate research at my institute (<https://youtu.be/rcjEkEPX5xE>, <https://youtu.be/QR6h2KBHfOI>) and my group was involved in a series of four videos of the University of Bern on urban climate (e.g., <https://www.youtube.com/watch?v=otBd4pbNcIc>).

**Teaching:** I enjoy teaching at all levels and carry the full teaching load at University of Bern, teaching courses to Geography and Climate Science students. Apart from teaching in the class room and in the field (4 one-week and 2 two-week field courses since 2010), I have also been active in producing electronic teaching resources. I was PI of the project „virtueller Klimaweg“ at ETH Zurich and was responsible for developing e-learning materials for the WMO Regional Training Centre in Peru (CLIMANDES Climate Science e-learning). My team was involved in capacity building (workshops) in Bolivia and in Peru. Our „Climate Poker“-website ([www.climatepoker.unibe.ch/](http://www.climatepoker.unibe.ch/)) has become a popular tool for high school education and outreach activities. I am recipient of an “Innovative Teaching” grant from our university to produce e-learning material on “Weather Reconstructions” (<http://ilublxl.unibe.ch/>).

I have authored several text books, the most important of which is *Klimatologie* (2018, UTB basics, Haupt, Bern, 320 pp.). My books *Ozon in der Atmosphäre* (2013 Haupt and Geographica Bernensia) and *Climatic Changes since 1700* (2015, Springer) were also designed to be used as text books.