Dr. Florian Börgel

florian.boergel@io-warnemuende.de https://florianboergel.github.io/

Professional Employment

since Dec. 2023 **Senior Scientist** Dynamics of regional climate systems, Leibniz Institute for Baltic Sea Research Warnemünde, Rostock, Germany

- Implementation of a ConvLSTM network architecture for river runoff prediction.
- Initiating and leading the development of a two-way nested configuration of the Baltic Sea using NEMO 4.2, aiming to improve the resolution and accuracy of simulations in the region.

2021 – 2023 **Tenure-track researcher** Dynamics of regional climate systems, Leibniz Institute for Baltic Sea Research Warnemünde, Rostock, Germany

- Regional climate variability and the teleconnection between the North Atlantic and Northern Europe
- Ocean oxygen variability during the last millennium

2019 - 2020 **Parental leave** 13 months, Berlin, Germany

2017 - 2020 **Research scientist** Dynamics of regional climate systems, Leibniz Institute for Baltic Sea Research Warnemünde, Rostock, Germany

2016 - 2017 **Research assistant** Biogeochemical modeling, Leibniz Institute for Baltic Sea Research Warnemünde, Rostock, Germany

2015 - 2016 **Research assistant** Energy Systems Analysis, Fraunhofer Institute for Manufacturing Technology and Applied Materials, Bremen, Germany

2014 - 2015 **Technical support** EWE Baskets Oldenburg, Oldenburg, Germany

2013 - 2014 **Student assistant** Engineering company for environment and climate action plans for cities, energieLenker GmbH, Münster, Germany

Education

09/2017 – 10/2020 **Ph.D., Physics** in Physical Oceanography, with honors (summa cum laude), Leibniz Institute for Baltic Sea Research Warnemünde
Thesis title: *Long-term climate variability of the Baltic Sea.*

10/2014 – 09/2017 **M.Sc. Engineering Physics** in Computational physics, very good (1.2), University of Oldenburg
Thesis title: *The influence of sea ice on Baltic inflows.*

09/2010 – 02/2014 **B.Eng. Energy Engineering**, good (2.0), Münster University of Applied Sciences
Thesis title: *Planning of a local area heating system in the historic city of Warendorf.*

Honors and relevant responsibilities

- **Member of the 'Pool of Experts'** of the third World Ocean Assessment (WOA III) by the United Nations.
- **Working group member 'Data Analysis' in the Coupled Model Intercomparison Project (CMIP)**, application through 'Fresh Eyes on CMIP', an early career working group of CMIP7.
- **Co-Speaker Baltic Earth Working Group** The international working group focuses on the impact of the North Atlantic on the Baltic Sea (see https://baltic.earth/working_groups/teleconnections/)

Honors and relevant responsibilities (continued)

- **Outstanding Early Career Scientist award** Ocean Science Division, European Geosciences Union, https://www.egu.eu/awards-medals/
- **IOW appointee for the Deutsches Klima-Konsortium (DKK)** The Deutsches Klima-Konsortium (DKK) represents the leading players of German climate and climate impact research.
- **Fulbright Scholarship** Full scholarship to study in the United States for one year (not attended for personal reasons)

External funding

- **BMUV proposal, lead PI, in preparation (3,000,000€)** KI-Leuchttürme für Umwelt, Klima, Natur und Ressourcen, joint application of University of Kiel, IOW and the Umweltbundesamt
- **DFG proposal, lead PI, Postdoctoral position, under review (262,000€)** Climate-BEAT: "Climate Linkages between the Baltic Sea region, Northern Europe and the Atlantic: Analyzing the Influence of Atlantic Multidecadal Variability and Teleconnections."
- **Computational resources at HLRN (266,184 €)**, several successful proposals to the HLRN supercomputing center for allocating computation time.
- **Google Cloud Research Grant (2,500€)**, forecasting river runoff using Recurrent Neural Network

Skills

Languages	German (native), English (C1), French (B1)
Coding	**Expert**: python, Matlab, Linux/Unix, git, HPC computing, Twitter API **Advanced**: R, Fortran, Pytorch, julia, docker **Basic**: Django, C, HTML, Java, Tensorflow
Methods	Singular value decomposition, low-frequency component analysis, multi-regression analysis for data prediction, time series prediction using recurrent neural networks, cluster analysis (k-Means), big data handling (TB), wavelet analysis

Software Development

pyTEF	**pyTEF** is a python package that can be used to apply the total exchange flow analysis framework to analyze the exchange flow of an estuary. `https://github.com/florianboergel/pyTEF`
Twitter API	**Twitter bot @ozeanforscher** was built using the Twitter API and posts job offers related to marine science. It has about 1,800 followers (see `https://twitter.com/ozeanforscher`)

Teaching

WS 2023/2024	**Climate of the Earth System** University of Rostock, master level, co-instructor (see `https://iow-lectures.pages.io-warnemuende.de/climateoftheearth/`)
WS 2022/2023	**Climate of the Earth System** University of Rostock, master level, co-instructor (see `https://iow-lectures.pages.io-warnemuende.de/climateoftheearth/`)
WS 2021/2022	**Baltic Earth Winter School** University of Rostock, master and Ph.D. students, Interactive lecture about wavelet analysis and statistics
WS 2021/2022	**Climate of the Ocean** University of Rostock, master level, co-instructor
WS 2020/2021	**Climate of the Ocean** University of Rostock, master level, co-instructor
WS 2018/2019	**Baltic Earth Winter School** University of Rostock, Interactive lecture about wavelet analysis
WS 2018/2019	**Climate of the Ocean** University of Rostock, master level, co-instructor

Supervising

2023 **Bachelor student** Marti Wolff, co-supervisor
Thesis title: *Analysis of Baltic Sea climate based on climate model data from 6000 BCE to 1850 CE*

since 2022 **PhD student** Leonie Barghorn, co-supervisor
Thesis title: *Understanding Baltic Sea saltwater inflow dynamics under changing climate*

Research Publications

Journal Articles

1. **Börgel, F.**, Karsten, S., Rummel, K., & Gräwe, U. (n.d.). From Weather Data to River Runoff: Leveraging Spatiotemporal Convolutional Networks for Comprehensive Discharge Forecasting. *Geophysical Model Development*. under review.
2. Dutheil, C., Lal, S., Lengaigne, M., Cravatte, S., Menkès, C., Receveur, A., … Meier, H. E. M. (n.d.[a]). The massive 2016 marine heatwave in the Southwest Pacific: an "El Niño - Madden-Julian Oscillation" compound event. *Sciences Advances*. under review.
3. Dutheil, C., **Börgel, F.**, Gröger, M., & Meier, H. E. M. (n.d.[b]). Changes in spatial structure of weather regimes dominate european precipitation changes since 1950. in prep.
4. Gröger, M., Dutheil, C., **Börgel, F.**, & Meier, H. E. M. (2024). Drivers of marine heatwaves in a stratified marginal sea. *Climate Dynamics*. doi:https://doi.org/10.1007/s00382-023-07062-5
5. Gröger, M., **Börgel, F.**, Karsten, S., Meier, H. M., Safonova, K., Dutheil, C., … Polte, P. (2024). Future climate change and marine heatwaves - projected impact on key habitats for herring reproduction. *Science of The Total Environment*, *951*, 175756. doi:https://doi.org/10.1016/j.scitotenv.2024.175756
6. Aue, L., & **Börgel, F.** (2023). From “Bangtan Boys” to “International Relations Professor”: Mapping Self-Identifications in the UN’s Twitter Public. *Politics and Governance*, *11*(3). doi:10.17645/pag.v11i3.6769
7. **Börgel, F.**, Gröger, M., Meier, H. E. M., Dutheil, C., Radtke, H., & Borchert, L. (2023). The impact of Atlantic Multidecadal Variability on Baltic Sea temperatures limited to winter. *npj Climate and Atmospheric Science*, *6*(1), 1–9. doi:10.1038/s41612-023-00373-8
8. Meier, H. E. M., Barghorn, L., **Börgel, F.**, Gröger, M., Naumov, L., & Radtke, H. (2023). Multidecadal climate variability dominated past trends in the water balance of the Baltic Sea watershed. *npj Climate and Atmospheric Science*, *6*(1), 1–9. doi:10.1038/s41612-023-00380-9
9. **Börgel, F.**, Neumann, T., Rooze, J., Radtke, H., Barghorn, L., & Meier, H. E. M. (2023). Deoxygenation of the baltic sea during the last millennium. *Frontiers in Marine Science*, *10*. doi:10.3389/fmars.2023.1174039
10. Dutheil, C., Meier, H. E. M., Gröger, M., & **Börgel, F.** (2022). Warming of Baltic Sea water masses since 1850. *Climate Dynamics*. doi:10.1007/s00382-022-06628-z
11. Gröger, M., Placke, M., Meier, M., **Börgel, F.**, Brunnabend, S.-E., Dutheil, C., … Väli, G. (2022). The Baltic Sea Model Inter-Comparison Project BMIP – a Platform for Model Development, Evaluation, and Uncertainty Assessment. *Geoscientific Model Development Discussions*, 1–34. Publisher: Copernicus GmbH. doi:10.5194/gmd-2022-160
12. **Börgel, F.**, Meier, H. E. M., Gröger, M., Rhein, M., Dutheil, C., & Kaiser, J. M. (2022). Atlantic Multidecadal Variability and the Implications for North European Precipitation. *Environmental Research Letters*, *17*(4), 044040. Publisher: IOP Publishing. doi:10.1088/1748-9326/ac5ca1
13. Meier, H. E. M., Kniebusch, M., Dieterich, C., Gröger, M., Zorita, E., Elmgren, R., … Zhang, W. (2022). Climate Change in the Baltic Sea Region: A Summary. *Earth System Dynamics*, *13*(1), 457–593. Publisher: Copernicus GmbH. doi:10.5194/esd-13-457-2022

14 Meier, H. E. M., Dieterich, C., Gröger, M., Dutheil, C., **Börgel, F.**, Safonova, K., … Kjellström, E. (2022). Oceanographic Regional Climate Projections for the Baltic Sea until 2100. *Earth System Dynamics*, *13*(1), 159–199. Publisher: Copernicus GmbH. doi:10.5194/esd-13-159-2022

15 Dutheil, C., Meier, H. E. M., Gröger, M., & **Börgel, F.** (2021). Understanding Past and Future Sea Surface Temperature Trends in the Baltic Sea. *Climate Dynamics*. doi:10.1007/s00382-021-06084-1

16 **Börgel, F.**, Frauen, C., Neumann, T., & Meier, H. E. M. (2020). The Atlantic Multidecadal Oscillation Controls the Impact of the North Atlantic Oscillation on North European Climate. *Environmental Research Letters*, *15*(10), 104025. Publisher: IOP Publishing. doi:10.1088/1748-9326/aba925

17 Meier, H. E. M., **Börgel, F.**, Frauen, C., & Radtke, H. (2020). Commentary: Lake or Sea? The Unknown Future of Central Baltic Sea Herring. *Frontiers in Ecology and Evolution*, *8*. Retrieved September 24, 2022, from https://www.frontiersin.org/articles/10.3389/fevo.2020.00055

18 Radtke, H., **Börgel, F.**, Brunnabend, S.-E., Eggert, A., Kniebusch, M., Meier, H. E. M., … Placke, M. (2019). Validator – a Web-Based Interactive Tool for Validation of Ocean Models at Oceanographic Stations. *Journal of Open Research Software*, *7*(1), 18. Number: 1 Publisher: Ubiquity Press. doi:10.5334/jors.259

19 Kniebusch, M., Meier, H. M., Neumann, T., & **Börgel, F.** (2019). Temperature Variability of the Baltic Sea Since 1850 and Attribution to Atmospheric Forcing Variables. *Journal of Geophysical Research: Oceans*, *124*(6), 4168–4187. doi:10.1029/2018JC013948

20 **Börgel, F.**, Frauen, C., Neumann, T., Schimanke, S., & Meier, H. E. (2018). Impact of the Atlantic Multidecadal Oscillation on Baltic Sea Variability. *Geophysical Research Letters*, *45*(18), 9880–9888. doi:10.1029/2018GL078943

Scientific Presentations

2024 **EGU**, Poster session, *The impact of Atlantic Multidecadal Variability on Baltic Sea temperatures limited to winter*

2023 **IUGG**, Speaker, *Tracing the fingerprint of multidecadal fluctuations in the Baltic Sea*

EGU General Assembly, Speaker - medal lecture, *Atlantic Multidecadal Variability and the Implications for North European climate*

2022 **Research Unit Climate Modeling, University of Hamburg**, Speaker, *Atlantic Multidecadal Variability and the implications for North European Climate*

Baltic Earth Conference, Speaker, *Atlantic Multidecadal Variability and the implications for North European Climate*

2021 **University of Bremen - physics seminar**, Speaker, *Atlantic Multidecadal Variability and the implications for North European Climate*

EGU General Assembly, Speaker, *The Atlantic Multidecadal Oscillation controls the impact of the North Atlantic Oscillation on North European climate*

2019 **EGU General Assembly**, Poster session, *The impact of the Atlantic Multidecadal Oscillation on Baltic Sea variability*

2018 **Baltic Earth Conference**, Speaker, *The impact of the Atlantic Multidecadal Oscillation on Baltic Sea variability*

2017 **Baltic Sea Science Congress**, Poster session, *The influence of sea ice on Baltic Inflows*

Outreach

2024 Leibniz im Bundestag - exchange with Ralph Lenkert, MdB and Ina Latendorf, MdB

Visit by Claudia Müller, Parliamentary State Secretary, BMEL at IOW

2023 Interview by the radio station MDR about the ongoing heatwave in the Baltic Sea and the North Sea (see mdr.de)

Outreach (continued)

- Visit of Steffi Lemke (Federal Minister for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection) and Bettina Martin (State Minister for Science, Culture, Federal and European Affairs). I presented the ongoing climate research. I was actively involved in the invitation of Steffi Lemke.
- Press release about my research on the seasonal impact of the AMV on the Baltic Sea region, (see: idw-online)

2022
- Visit of Katrin Zschau (Member of the German Bundestag), I presented the ongoing activities related to climate modeling

2021
- Contributor to the Baltic Sea Climate Change Fact Sheets published within EN-CLIME, a joint expert network by HELCOM and Baltic Earth

2020
- Visit of Dr. Ingrid Nestle (Member of the German Bundestag), I invited Dr. Nestle and organized her visit to the Leibniz Institute for Baltic Sea Research

2019
- Reviewer for the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)
- Coastal Research on Tour, I presented my research to a broad audience, organized by Helmholtz center Hereon
- Warnemünder Abende, Presenting my research to a broad audience, organized by Leibniz-Institute for Baltic Sea Research
- Rostock's Eleven, science communication challenge, nominee for the Leibniz Institute for Baltic Sea Research

2018
- Create your own #Scicomm bot, speaker, host of an interactive session at Forum Wissenschaftskommunikation (German forum science communication)

Volunteering

since 2024
- **Board Member and financial controlling**, Kindergarten Mischpoke e.V., Berlin

2021
- **Committee member**, urban development, City of Rostock

2020-2022
- **Deputy speaker**, state working group 'Energy and Climate', Bündnis 90/Die Grünen

2019-2022
- **Member** Radentscheid Rostock, citizen-initiated cycling referendum for the City of Rostock

2018
- **Co-organization**, young scientists event, Baltic Earth Conference