Peter Manshausen

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Education

since 2020 **Doctoral Studies**, *University of Oxford*, PhD in Atmospheric Physics.
Research on climate science and ML, focusing on aerosol-cloud interactions.

2019 – 2020 **Master**, *University of Cambridge*, Applied Mathematics (Part III), average grade 86.2%.
Fluid dynamics of climate, planetary physics, neural networks for analysis of nonlinear dynamics.

2015 – 2019 **Bachelor**, *Universität Heidelberg*, Physics, grade: 1.1, i.e. in the top 5%.
Theoretical physics, mathematics, programming, and environmental systems.

2017 – 2018 **Year abroad**, *ENS – Ecole Normale Supérieure, Paris*.
Climate physics, hydrodynamics, environment and society, ecology and evolution.

Research experience

since 2020 **Doctoral research**, *with Philip Stier, University of Oxford, UK*.
- Developed new method 'Invisible Ship Tracks' (see publication below) to quantify aerosols' impact on climate using satellite, reanalysis, and ship position data
- Science communication: article (link) in The Conversation about air pollution and climate
- Led iMIRACLI cohort's contribution to outreach event as part of European Researcher's night
- Co-organised conference on environmental data science link to bring together the community and present research in Lancaster, UK

Feb – April 2024 **NVIDIA, Global Climate Group**, *research intern*, Seattle, WA, USA.
Trained diffusion models in PyTorch on high-resolution analysis and implemented a pipeline to use the model for data assimilation of weather station observations (Manshausen et al., 2024).

2022 **GAF AG**, *research intern, Munich, Germany*.
Used Computer Vision for detection of heavy industry sites in high resolution satellite images, built data pipeline and trained CNN model in Keras/TensorFlow.

2020 **Master's essay**, *with Richard Kerswell, University of Cambridge, UK*, mark of 92%.
Set up an autoencoder-like neural network for solving nonlinear ODEs in Python with Keras.

2019 **Bachelor's dissertation**, *Group of Prof. Kurt Roth, Universität Heidelberg, Germany*.
Six-month project on evolution of cooperation among organisms with game theory, using C++, Python, Gitlab

2018 **ICMAB, ALBA synchrotron**, *research intern with Dr Ferran Macià, Barcelona*.
Studying spin conduction in novel materials for six weeks using X-ray dichroism (XMCD) and ferromagnetic resonance (FMR); data analysis in Python (publication Casals et al., see below)

2017 **University of St Andrews**, *research intern with Dr Michael Mazilu, UK*.
Worked on nonlinear optics and light propagation for six weeks using Matlab

Teaching Experience

since 2021 **Tutor (Teaching Assistant)**, *University of Oxford*.
- Taught Atmospheric and Oceanic physics for master's students
- Taught Vector Calculus and Fluid Dynamics for third year undergraduates
- Prepared engaging questions for discussion and revision, as well as marking example sheets
- Demonstrated on laboratory experiments and corrected protocols

2018 – 2019 **Tutor (Teaching Assistant)**, *Universität Heidelberg*.
- Taught Classical Mechanics for first year undergraduates
- Corrected example sheets and exams, devised additional exercises and revision classes
- Supervised laboratory work, demonstrated experiments and corrected protocols

Publications

2024 Manshausen et al.: "Generative Data Assimilation of sparse weather station observations at kilometer scales", in review, Journal of Advances in Modeling Earth Systems

2024 Tippett et al.: "Weak liquid water path response in ship tracks", in review, Atmospheric Chemistry and Physics

2023 Manshausen et al. "Rapid saturation of cloud water adjustments to shipping emissions", Atmospheric Chemistry and Physics Letters

2023 Manshausen et al.: "Pollution tracker: finding industrial sources of aerosol emission in satellite imagery", Environmental Data Science, 2.E21

2022 Manshausen et al.: "Invisible ship tracks show large cloud sensitivity to aerosol", Nature 610.7930

2022 Jesson et al.: "Scalable sensitivity and uncertainty analysis for causal-effect estimates of continuous-valued interventions", NeurIPS

2022 Watson-Parris et al.: "ClimateBench v1.0: A benchmark for data-driven climate projections", Journal of Advances in Modeling Earth Systems

2020 Harder et al.: "NightVision: generating nighttime satellite imagery from infra-Red observations", NeurIPS Tackling Climate Change with Machine Learning workshop

2020 Casals et al.: "Generation and imaging of magnetoacoustic waves over millimeter distances." Physical Review Letters 124.13: 137202.

Talks and conferences (selection)

2024 International Conference on Clouds and Precipitation, Jeju, South Korea: "What can (invisible) ship tracks teach us about geoengineering?", talk

2024 Climate Informatics 2024, London, UK: "Predicting visible ship tracks", talk, also presented at ACPC, London, UK

2023 Gordon Research Conference on Radiation and Climate, Bates College, Maine, USA: "Aerosol-Cloud interactions in ship tracks and ML approaches", poster

2023 Climate Informatics 2023, Cambridge, UK: "Pollution Tracker: Finding industrial sources of aerosol emission in satellite imagery", talk

2023 EGU 2023 General Assembly, Vienna, Austria: "Assessing cloud sensitivity to shipping aerosol across large emissions ranges", talk, also presented at Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop, Houston, Texas

2022 Invited seminar at Centre for Atmospheric Sciences, Cambridge, UK: "Invisible Ship Tracks: What can we learn about the aerosol effect on clouds and climate from previously unseen ship-polluted clouds?"

2022 Invited talk at Causal Methods in Environmental sciences, Cambridge, UK: "Instrumental Variables for Aerosol-Cloud Interactions"

2022 UK conference for environmental data science, Lancaster, UK: "Studying Convective Invigoration in the Southern Great Plains using Causal Inference", poster session

2022 EGU 2022 General Assembly, Vienna, Austria: "Invisible Ship Tracks as Opportunistic Experiments for Aerosol Cloud Interactions", talk, also presented at Aerosols, Clouds, Precipitation and Climate (ACPC) Workshop, online talk

Skills

Languages German (native), English (TOEFL: 118/120), French (C2), Spanish (C1), Russian (A2)

Programming Python, C++, ML libraries PyTorch, TensorFlow, Keras, and scikit-learn, data science libraries pandas, xarray, dask, collaborative coding in git

Scholarships and prizes

2022 – 2024, 2016 – 2020 *Studienstiftung des deutschen Volkes Scholarship* for undergraduate and master's, renewed for PhD, awarded to around 0.5 percent of German students for academic merit after an additional selection process. Includes a living allowance, additional support to study abroad, funded summer schools and language courses. Value: £60.000

2019 – 2020 *DAAD Graduate Scholarship* for study in the UK covering tuition fees and living expenses awarded after a competitive application process. Value: £15.000

2017, 2018 *DAAD RISE Scholarship* for research internships (Barcelona, St Andrews). Value: £2.000

2014 *zis-Stiftung Travel Grant* to undertake a study trip on conservation work in the south of England; won *Friedrich Karl Klausing Book Prize* for project and report.

Interests and Hobbies

Advocacy I act as a peer supporter in my college and department, providing welfare support for other students. In 2023/24, I was LGBTQ+ officer in the college graduate student committee. I co-organised the annual four day seminar of LGBTQ+ students in the Studienstiftung in 2019 (around 130 participants). I also co-author information material on male allyship for gender equality and I am currently involved in its distribution at universities, and in public spaces.

Hobbies I row for University College and enjoy hiking and cycling. I take a great interest in literature, languages, and photography.