Joshua Lanham

Polar physical oceanographer specialising in Southern Ocean circulation and water-mass variability. Experienced in multi-platform observational analysis, ocean models and state estimates. Research spans Antarctic and Arctic regions, with a background in meteorology.

PROFESSIONAL EXPERIENCE

University of Cambridge (DAMPT): Postdoctoral Research Associate Sep. 2025 – Present (*formal appt. April. 2026)*

- Conducting observational research on ocean circulation, meltwater pathways, and ice–ocean interactions in the Bellingshausen Sea, a climate-sensitive region with high basal melt rates.
- Responsible for processing, quality-controlling, and analysing multi-platform observational datasets from a 2025 Schmidt Ocean Institute expedition, including autonomous gliders, floats, and ship CTDs.
- Piloting autonomous gliders and supporting mission operations, including configuration, monitoring, troubleshooting, and post-deployment data handling.
- Ongoing analysis focuses on diagnosing meltwater export pathways, iceberg–ocean interactions, and downstream implications for Antarctic Bottom Water formation and climate feedbacks.
- Developing machine-learning-based gridded products of transient tracers (including CFCs), extending sparse observational records to support basin-scale analysis and climate diagnostics.

Oxford School of Geography and the Environment: Research Assistant June 2020 – Feb. 2021

- Funded by the Met Office Academic Partnership; analysis of link between thermal lows and Congo Air Boundary strength and regional rainfall; contributed to DRYCAB observational research programme**.**

EDUCATION AND QUALIFICATIONS

University of Cambridge: Oct. 2021 – Sep. 2025

- **PhD in Physical Oceanography:** Passed viva in Dec. 2025 (subject to minor corrections).
- Studied how Southern Ocean water mass structure and variability control ocean heat transport to the Antarctic shelf and ice-sheet stability, across basin-to-shelf scales.
- Developed a machine-learning-enabled water mass classification framework to extend observational analysis across sparse datasets and ocean state estimates (ECCO).
- Produced a circumpolar assessment of recent CDW redistribution using hydrographic sections and Argo data, revealing coherent poleward expansion near the Antarctic margin.
- Used a new high-resolution eddy-resolving model to identify seasonal regimes of CDW intrusion controlled by winds, bathymetry, and dense shelf-water formation.

University of Reading: Sep. 2020 – Sep. 2021

- **MSc in Applied Meteorology: Distinction** (**highest mark** in Cohort).
- Dissertation: Analysed Congo Air Boundary reformation dynamics using ERA5 reanalysis and Lagrangian parcel tracking, linking dry-air intrusions to mid-tropospheric Rossby-wave variability.

University of Oxford: Oct. 2017 - June 2020

- **BA Geography: 1st Class Honours** (mean mark **76, 2nd highest in cohort**).
- Preliminary examinations**: Distinction**; scholarship for outstanding academic performance.
- Dissertation: Linked projected southern African drying to subsidence using a CMIP ensemble.

St Mary Redcliffe and Temple School, Bristol: Sep. 2009 - July 2016

- A-Levels: **3 A*s** in Mathematics, Geography and Chemistry.

PUBLICATIONS

Lanham, J; Srinivasan, K; Cimoli, L; & Mashayek, A. (2026). Basin-wide Atlantic Ocean water mass classification and climatic variability from machine learning. JGR: Machine Learning and Computation, 3, e2025JH001182. https://doi.org/10.1029/2025JH001182

Lanham, J; Mazloff, M., Naveira Garabato, A.C. et al. Seasonal regimes of warm Circumpolar Deep Water intrusion toward Antarctic ice shelves. Commun Earth Environ 6, 168 (2025).

Oglethorpe, K; **Lanham, J**; Reiss, R; Mashayek, A & Boland E. Dataset of Arctic Ocean Water Masses from 40 Years of Observations. Sci Data 13, 456 (2026).

Lanham, J; Purkey, S; Srinivasan, K; Mazloff & Mashayek, A. Observational evidence for a poleward migration of warm Circumpolar Deep Water towards Antarctica. *Accepted at Commun Earth Environ.*

Cimoli, L, et al. Climatic Reach of Small-Scale Turbulence in the Ocean Interior. *Accepted at Nature Communications.*

RESEARCH EXPERTISE AND TECHNICAL SKILLS

Computational & Analytical Experience

- Python (primary), Matlab, FORTRAN; large-scale data workflows on HPC (CPU & GPU) for oceanographic observations and models (NetCDF, binary formats).
- Extensive experience with observational and reanalysis datasets (Argo, GLODAP/GO-SHIP, ERA5, Gliders, Floats) and ocean state estimates and models (ECCO, CMIP, MITgcm: SOHI, SOSE).
- Statistical and machine learning methods (NN, RF/DT, XGB, LGBM) for analysis; climate-specific skills including water mass analysis (eOMP, ML), EOF/PC analysis, budgets, particle tracking, and gridding.
- Use and development of data-processing pipelines for oceanographic observations, including CTD and autonomous glider (SLOCUM & Seaglider) datasets.
- Scientific visualisation of high-resolution 3D model data using Paraview/VTK.

Observational and Operational Experience

- Autonomous glider operations, including training in deployment, piloting, ballasting, troubleshooting, and post-deployment data processing.
- Experience with running the global coupled CESM2 model (model physics and forcing pathways), the ECMWF model at low resolution, and an idealised ocean circulation model (SAMBUCCA).
- Laboratory experience of using and calibrating a variety of atmospheric instrumentation, including net-radiometers, resistance thermometers and aneroid barometers. Proficiency with atmospheric radiosonde release and tephigram/skew-T log-P analysis, along with PIBAL tracking techniques.

AWARDS, ACHIEVEMENTS AND FUNDING

SIO/NSF funding for visiting researcher position at SIO, San Diego. **Spring/Summer 2023**

NCAR/NSF funding for 2022 CESM Workshop in Boulder, Colorado. **Summer 2022**

EPSRC full Doctoral Training Grant for doctoral study. **Autumn 2021**

Sutcliffe Prize for **top ranked** candidate in MSc cohort. **Sep. 2021**

Met Office/IMPALA Project funding of £3000 to carry out independent research project within Oxford African Climates research cluster. **Aug. 2020 – Feb. 2021**

Met Office Academic Partnership Prize, JCA Meldrum Prize **July 2020**
for undergraduate degree.

SELECTED TALKS

Ocean Sciences Meeting, Glasgow 2026. 'Poleward migration of upper 2000 m Circumpolar Deep Water'. *Oral Presentation.*

GO-SHIP Meeting, 2025. 'Observational evidence for a poleward migration in warm Circumpolar Deep Water towards Antarctica'. *Invited Talk.*

BACO, Busan 2025. 'Preliminary results from a SO expedition to the Bellingshausen Sea'. *Oral Presentation.*

Ocean Sciences Meeting, New Orleans 2024. 'Investigating seasonal Circumpolar Deep Water intrusions across Antarctica in a high-resolution model'. *Oral Presentation.*

UK Canari Project Meeting, 2023. 'Automating water mass classification with machine learning: examples from the Southern Ocean and application to Argo float data'. *Invited Talk.*

IEEF Institute, Cambridge 2023 & National Oceanography Centre, Southampton 2023. 'Investigating seasonal Circumpolar Deep Water intrusions across Antarctica in a high-resolution model'. *Invited Talk*.

TEACHING AND SUPERVISION

Graduate Teaching Assistant **Oct. 2021 – Sep. 2025**

- Co-supervised a PhD student, advising on application of a framework I developed for water mass classification to Arctic observational datasets.
- Supervised AI4ER MSc extended project on diagnosing abyssal overturning with machine learning.
- Taught Fluid Mechanics and Computational Methods modules to undergraduates at Imperial College.

Academic Consultant, BBC Winterwatch **Jan. 2024**

REFEREES

Prof. Ali Mashayek, University of Cambridge, am3158@cam.ac.uk.
Prof. Alberto Naveria Garabato, University of Southampton, acng@soton.ac.uk.