

Joshua Lanham

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Nationality: British

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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

British Antarctic Survey: Postdoctoral Research Associate Aug. 2025 – Present (formal appt. Feb. 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; 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. *Accepted at Nature Scientific Data*.

Lanham, J; Purkey, S; Srinivasan, K; Mazloff & Mashayek, A. Observational evidence for a poleward migration of warm Circumpolar Deep Water towards Antarctica. *In Review at Commun Earth Environ (2nd Round)*.

Lanham, J; Srinivasan, K; Cimoli, L & Mashayek, A. Basin-wide Atlantic Ocean water mass classification and climatic variability from machine learning. *In Review at JGR Machine Learning and Computation (2nd Round)*.

Cimoli, L, et al. Climatic Reach of Small-Scale Turbulence in the Ocean Interior. *In Review at Nature Communications (2nd Round)*.

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 for undergraduate degree.	July 2020

SELECTED TALKS

- 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 Talks*.

TEACHING AND SUPERVISION

Graduate Teaching Assistant	Oct. 2021 – Sep. 2025
<ul style="list-style-type: none">- 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
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REFEREES

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