

# ANDREW STYLES

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British Antarctic Survey  
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## EDUCATION

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2019 – 2023	<b>University of Oxford, UK</b> DPhil (PhD) in Physical Oceanography
2015 - 2019	<b>University of Oxford, UK</b> Master's degree in Physics (MPhys) Physics of the Atmospheres and Oceans major option Theoretical Physics major option First Class Honours (75%)

## RESEARCH EXPERIENCE

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2023 – Present	<b>OceanBound project</b> Polar Oceans group, British Antarctic Survey  Advisors: Prof. Chris Hughes and Dr. Emma Boland  <b>Project Aim:</b> To lead the adjoint component of the OceanBound project. Adjoint models are used to identify what forces boundary pressures are most sensitive to. Theoretical models are devised to understand how boundary pressures constrain basin or global scale circulation.
2019 – 2023	<b>DPhil Project</b> Ocean Physics group, University of Oxford  <i>‘Unravelling the Weddell Gyre: Exploring its dynamics and influence on Southern Ocean ventilation’</i> Supervisors: Prof. David Marshall and Dr. Mike Bell  <b>Project Aim:</b> To study the leading order dynamics of the Weddell Gyre. Vorticity budgets, idealized models, and Lagrangian trajectory analyses are used to identify internal forces and surface boundary conditions that constrain the horizontal circulation.
October 2018 - April 2019	<b>MPhys Project</b> Geophysical Fluid Dynamics group, University of Oxford  <i>‘A laboratory model of the oceanic meridional overturning circulation’</i> Supervisor: Prof. Peter Read  <b>Project Aim:</b> To study the dynamical processes in a laboratory annulus experiment acting as an analogue to the North Atlantic basin. Infrared imaging and particle imaging velocimetry are used to study the development and stability of western boundary currents.

July 2018 – September 2018

## Undergraduate Research Project

National Centre for Earth Observation, University of Leicester

*‘Investigating trace gas concentrations during the 2017 Boreal wildfire season’*

Supervisors: Dr. Jeremy Harrison and Dr. David Moore

**Project Aim:** To estimate trace gas concentrations during the 2017 Boreal wildfire seasons using the Reference Forward Model (RFM) and spectra collected by the Infrared Atmospheric Sounding Interferometer (IASI).

## PUBLICATIONS

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**Styles, A. F.**, MacGilchrist, G. A., Bell, M. J., & Marshall, D. P. (2024). Spatial and Temporal Patterns of Southern Ocean Ventilation. *Geophysical Research Letters*, 51, e2023GL106716.

<https://doi.org/10.1029/2023GL106716>

**Styles, A. F.**, Bell, M. J., & Marshall, D. P. (2023). The Sensitivity of an Idealized Weddell Gyre to Horizontal Resolution. *Journal of Geophysical Research: Oceans*, 128, e2023JC019711.

<https://doi.org/10.1029/2023JC019711>

Sallée, J. B., and co-authors including **Styles, A. F.** (2023). Southern Ocean Carbon and Heat Impact on Climate. *Philosophical Transactions of the Royal Society A*, 381(2249), 20220056.

<http://doi.org/10.1098/rsta.2022.0056>

**Styles, A. F.**, Bell, M. J., Marshall, D. P., & Storkey, D. (2022). Spurious forces can dominate the vorticity budget of ocean gyres on the C-grid. *Journal of Advances in Modeling Earth Systems*, 14, e2021MS002884.

<https://doi.org/10.1029/2021MS002884>

## AWARDS

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2024	<b>Wolfson College Research Associate Award</b> Awarded to members of the Cambridge research community who are committed to innovative research and activate engagement with present day issues.
2023	<b>Elsevier Presentation Award</b> Received award for an exceptional presentation at the NERC DTP student conference, sponsored by Elsevier.
2023	<b>Outstanding Student Presentation Award (OSPA)</b> Received outstanding presentation prize at the AGU 2022 Fall meeting.
2022	<b>Outstanding Presentation Award</b> Received best talk prize at the Challenger Society Ocean Modelling annual meeting.
2019 - 2023	<b>NERC Studentship</b> Awarded a fully funded place on the NERC Environmental Research DTP at the University of Oxford covering tuition, stipend, and research grant (Approx. £100,000).
2019 - 2023	<b>Met Office CASE Studentship</b> Awarded a minimum of £1000 per year towards my DPhil project. Access granted to Met Office computational resources and expertise.

July 2018 – September 2018	<b>SURE Summer Studentship</b> Awarded funding to carry out summer research project at the University of Leicester (approx £1500).
2015 – 2019	<b>Undergraduate Awards</b> Received the Met Office Academic Partnership prize (2019) for MPhys research project. Awarded a Lincoln College Exhibitioner prize (2016), a Scholarship prize (2017), and a Lord Crewe Scholarship prize (2018) for exceptional performance in examinations.

## RELEVANT RESEARCH SKILLS

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- Numerical modelling of geophysical flows using the *NEMO Community Ocean Model*, *MITgcm*, and *Oceananigans*
- Adjoint modelling of geophysical flows using *MITgcm*.
- Deploying and analyzing Lagrangian particle trajectories with *TRACMASS*.
- Data analysis and visualization in *Python*, including the use of *Dask* when handling large datasets.
- Open-source software development, including the use of *git* and automated testing.
- Creating and maintaining *neutralNEMO*, a module for efficient calculation of neutral density surfaces.
- Creating and maintaining *VCAN*, a library for diagnosing vorticity budgets in geophysical models.
- Experienced user of: *Python*, *Fortran*, *MATLAB*, *Julia*, *RStudio*, and *IDL*.
- Experienced user of Linux HPC systems such as *ARCHER2* and *Monsoon2*.
- Award-winning public speaker and finalist at Nottingham University's national debating competition.

## INVITED TALKS

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November 2024	University of Liverpool, Liverpool, UK
July 2024	SOFLUX webinar series (virtual)
May 2023	British Antarctic Survey, Cambridge, UK
April 2023	Met Office, Exeter, UK
March 2023	University of Liverpool, Liverpool, UK
November 2022	Sorbonne Université, Paris, France
October 2022	University of Exeter, Exeter, UK
May 2021	Met Office, Exeter, UK

## SUPERVISION & MENTORSHIP

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2025 – Present	<b>Quantitative Climate &amp; Environmental Science course</b> University of Cambridge  <i>'Where and when ventilation begins in the Southern Ocean'</i> Student: Zhenya Tumarking
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## TEACHING

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2020 – 2022	<b>Tutor at the University of Oxford</b> Conducted tutorials and classes for undergraduate students. Taught third-year fluid dynamics course for physicists and third-year vector calculus course for earth scientists. Responsible for the setting and marking of exams.
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2020 – 2022

### **Demonstrator at the University of Oxford**

Demonstrated for the postgraduate *Advanced Quantitative Methods* course. The course explores numerical methods used in contemporary and historic climate models.

February 2017 – March 2017

### **Teaching Physics in Schools**

Participated in a six week programme to research student misconceptions in physics at a local state school.

Taught A-level, GCSE, and Key Stage 3 classes.

## **OUTREACH**

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June 2024

### **World Ocean's Day: "Unexplored oceans"**

Collaborated with the National Maritime Museum to set up a polar 'base camp' at Greenwich Park. Introduced members of the public to the various tools used to explore the polar oceans including an ocean glider.

March 2023

### **Super Science Saturday: "Connected Planet"**

Organised an outreach activity at the Oxford University Museum of Natural History. Introduced primary school students to the idea of a connected ocean – focusing on coral reef connectivity and ocean plastics.

2017 – 2019

### **UNIQ Summer School**

Academic and pastoral responsibility for prospective physics students from disadvantaged backgrounds.

Lead workshops on university applications and interview skills.

## **SERVICE**

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2024 – Present

### **TACOMA Workshop Organizer**

Organizing and managing the annual TACOMA workshop. The workshop focusses on both the present-day challenges and future innovations of adjoint modelling.

2024 – Present

### **Wolfson College Research Associate**

Exploring and addressing urgent modern-day issues and contributing to the Wolfson College Interdisciplinary Research Hub.

2024 – Present

### **Cambridge Centre for Climate Science steering committee**

Encouraging interdisciplinary collaborations at Cambridge and representing the needs of the British Antarctic Survey.

2022 – Present

### **Peer Review**

Reviewer for the *Journal of Advances in Modeling Earth Systems* and *Ocean Dynamics*.

2022 – 2023

### **DPhil Student Representative**

Representing student interests on the Atmospheric, Oceanic and Planetary Physics sub-department committee.

2022 – 2023

### **Working Group on EDI**

Leading efforts to monitor and improve EDI within the Atmospheric, Oceanic and Planetary Physics sub-department.

2022 – 2023

### **Computing Committee**

Working to improve the computational resources available to the Atmospheric, Oceanic and Planetary Physics sub-department.

## GRADUATE COURSES

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- *Southern Ocean Summer School*, Institut d'Etudes Scientifiques de Cargese (2024)
- *Ocean Circulation*, University of Oxford (2020)
- *Geophysical Fluid Dynamics*, University of Oxford (2020)
- *Continuous Integration in Software Development*, University of Oxford (2020)
- *HPC: Introduction to Advanced Research Computing and Effective Cluster Use*, University of Oxford (2020)
- *Advanced Quantitative Methods*, University of Oxford (2019)
- *Scientific Writing and Presentations*, University of Oxford (2019)

## PRESENTATIONS (\*\* talk // \* poster)

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October 2024	TACOMA annual meeting 2024 ***
September 2024	Challenger Society Ocean Modelling meeting ***
September 2024	Challenger Society Conference 2024 ***
August 2024	CPT annual meeting: Ocean Transport and Eddy Energy ***
June 2024	UK Climate Dynamics Workshop ***
April 2024	EGU General Assembly 2024 ***
September 2023	Challenger Society Ocean Modelling meeting ***
December 2022	AGU General Assembly 2022 ***, *
September 2022	Challenger Society Ocean Modelling meeting ***
May 2022	EGU General Assembly 2022 ***
September 2021	Challenger Society Ocean Modelling meeting ***
April 2021	EGU General Assembly 2021 ***

## HOBBIES AND INTERESTS

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- Self-taught pianist, with a speciality in jazz and blues.
- Member of my local cricket team
- Organise fortnightly social events for my sub-department.

## REFEREES

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### Dr. Emma Boland

British Antarctic Survey,  
High Cross, Madingley Road, Cambridge, CB3 0ET  
[emmomp@bas.ac.uk](mailto:emmomp@bas.ac.uk)

### Prof. David Marshall

University of Oxford  
Parks Road, Oxford, OX1 3PU  
[david.marshall@physics.ox.ac.uk](mailto:david.marshall@physics.ox.ac.uk)

### Dr. Mike Bell

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