WILL GREGORY

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PROFILE

My research combines large-scale observational data, climate models, and data-driven approaches such as machine learning (ML) to better understand the polar climate system. My past work includes the first application of ML to real-time Arctic sea ice forecasts; I have also pioneered the development of ML tools for optimally combining data from different satellite altimeters, to dramatically improve observational coverage over sea ice. More recently, my work has leveraged satellite data and ML to make advances in "hybrid" sea ice modelling, in which ML is used overcome deficiencies in sea ice physics parameterisations. Through this work I have independently steered research outcomes into how data assimilation and ML can derive state-dependent model error representations and also improve online generalisation of ML-based parameterisations. Looking ahead, I am keen to explore how state-of-the-art remote-sensing data and ML can continue to drive progress in hybrid climate modelling, particularly with regard to model calibration and parameter estimation. I am also leading the development of an ML-based coupled ocean-sea-ice emulator, with the aim of leveraging its rapid inference capabilities to help create more robust numerical models. Finally, I am passionate about open science and strive to make all my data and code publicly available—see my GitHub for implementations ranging from data assimilation to principal component analysis, complex networks, and other ML methods.

EDUCATION

2017-2021	PhD in Polar Climate Science and ML, *Pass (no corrections)*	University College London (UCL)
2013-2014	MSc in Petroleum Geophysics, *Distinction*	Imperial College London
2010-2013	BSc in Geology with Geophysics, *1st class*	University of Leicester

EMPLOYMENT

2022-present — **Postdoctoral Researcher | Princeton University & Geophysical Fluid Dynamics Lab**

Funded by Multi-scale Machine Learning In coupled Earth System modeling (M^2LInES) initiative
Current/Past Responsibilities:
- Leading coupled ocean-sea-ice emulation development through M^2LInES–AI2 partnership
- Leading hybrid sea ice modelling development in M^2LInES and GFDL
- Lead organiser of the 2025 M^2LInES annual meeting
- Co-organiser of biweekly project meetings

2014-2017 — **Depth-imaging Geophysicist | Petroleum Geo-Services Ltd**

Client-facing role in the private sector, delivering geophysical services to oil and gas companies
Past Responsibilities:
- Develop sub-surface seismic velocity models using tomographic inversion techniques
- Deliver project presentations and lead data visualisation sessions with clients
- Develop and maintain Gantt charts, status reports, and end-of-project reports.
- Train new staff in sub-surface imaging theory and in-house software

INDEPENDENT FUNDING APPLICATIONS

2024	NERC Independent Research Fellowship	Submitted April 2025, outcome pending
2024	Marie Curie Postdoctoral Fellowship	Unsuccessful: score 93% and awarded European Commission Seal of Excellence
2023	NERC Independent Research Fellowship	Unsuccessful: score 7/10

SELECTED HONOURS

FELLOWSHIPS

2017-2021	London NERC Doctoral Training Partnership (DTP)	Funding for 4-yr PhD, amounting to over £91,000

2025	Wiley top viewed article award	Gregory et al in top 10% of most-viewed 2023 papers in *JAMES*
2015	Chancellor's Masters Scholarship, University of Sussex	£3,000 to study MSc Cosmology [declined]
2013	British Petroleum Scholarship, Imperial College London	£25,000 to study MSc Petroleum Geophysics
2013	Shell Geophysics Prize	Awarded for highest contributions to BSc Geophysics programme
2012	Academic excellence award	Awarded for 1st class grade in BSc Geophysics programme

Teaching & Mentoring

2020	TA in BSc Geodynamics, UCL	Class size: 15-20. Format: Tutorials
2020	TA in BSc Ocean Physics, UCL	Class size: 15. Format: Tutorials
2019	TA in BSc Principles of Climate, UCL	Class size: 10-15. Format: Tutorials
2018-2019	TA in BSc Foundations of Physical Geoscience, UCL	Class size: 10-12. Format: Lectures and Tutorials
2018-2020	TA in BSc Introduction to Matlab, UCL	Class size: 15-20. Format: Lectures and Tutorials

2024-2025	Mentored Surya Dheeshjith, a laboratory associate within the Courant Institute for Mathematical Sciences at New York University. Surya was tasked with building a data-driven 3D ocean emulator, with Prof. Laure Zanna. My responsibilities were to guide Surya in the understanding of climate physics and the manifestation of ocean biases in coupled models.
2022	With Marc Deisinroth, co-supervised Ronald MacEachern, a postgraduate student undertaking the MSc Machine Learning course within the Department of Computer Science at UCL. I designed the MSc dissertation project, which was titled "Sea Ice Freeboard Interpolation using Gaussian Process Regression". Ronald achieved a thesis grade of Distinction. I then led an international collaboration to build Ronald's work into an open-source Python library, GPSat, along with the *Nature Communications* paper Gregory et al 2024.

Public engagement & Outreach

2025	Early-career panelist at the Science Philanthropy Alliance meeting, titled "The Next Generation"
2023	"AI is transforming climate forecasts for melting sea ice," *Advanced Science News Article*
2023-2024	Project development chair for the Climatematch academy outreach program	Independently managed 4 individuals who were developing student project materials
2022-2023	Curriculum content reviewer for the Climatematch Academy outreach programme	Responsible for reviewing all content relating to fundamentals of climate science
2022	Presented on EDI progress within NOAA and GFDL, Princeton University and GFDL, NJ
2016	Delivered science outreach presentations to years 10-12, King Solomon Academy school, London UK
2012-2013	Assisted in the Department of Geology open days at the University of Leicester	Responsible for welcoming members of the public to the department and also talking to prospective students about the Geology with Geophysics BSc programme

Service

2024	AGU Fall Meeting Outstanding Student Presentation Award (OSPA) judge
2024	Reviewer for National Science Foundation (NSF) Arctic Natural Sciences program
2019-present	Peer reviewer for numerous international journals, including: The Cryosphere, Journal of Advances in Modeling Earth Systems, American Meteorological Society (AMS) Journal of Climate, Climate Dynamics, Quarterly Journal of the Royal Meteorological Society, AMS AI for Earth Systems, npj Climate and Atmospheric Science
2024	AGU Fall Meeting convener and chair for session: "Data Driven Science: Developments in Machine Learning Subgrid-Scale Parameterizations and in Reanalyses across Earth System Modeling"

Technical Skills & tools

- Ocean / Sea ice models: Modular Ocean Model version 6 (MOM6) / Sea Ice Simulator version 2 (SIS2)
- Coupled climate models: Seamless system for Prediction and EArth system Research (SPEAR)
- Statistical techniques: Gaussian processes, neural networks, principal component analysis, relevance vector machines, complex networks, data assimilation
- Programming languages: Python (incl. PyTorch and Tensorflow), Matlab, Fortran-90