

# WILL GREGORY

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## EDUCATION

2021	PhD in Polar Climate Science and Machine Learning	University College London (UCL)
2014	MSc in Petroleum Geophysics, <i>Distinction</i>	Imperial College London
2013	BSc in Geology with Geophysics, <i>1st class</i>	University of Leicester

## EMPLOYMENT

2022-present	Postdoctoral Researcher   Princeton University   Supervisor: Dr. M. Bushuk Developing machine learning tools to improve climate model simulations of sea ice Funded by Multi-scale Machine Learning In coupled Earth System modeling ( <b>M<sup>2</sup>LInES</b> ) initiative
2014-2017	Depth-imaging Geophysicist   Petroleum Geo-Services Ltd Client-facing role in the private sector, delivering geophysical services to oil and gas companies Developed sub-surface seismic velocity models using tomographic inversion techniques

## SELECTED HONOURS

	<b>FELLOWSHIPS</b>
2017	London NERC Doctoral Training Partnership (DTP)   4-yr funded PhD programme
	<b>AWARDS</b>
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

## SCIENTIFIC CONTRIBUTIONS

Publications	D Balwada, ..., <b>W Gregory</b> et al, " <a href="#">Learning machine learning with Lorenz-96</a> ," <i>Journal of Open Source Education</i> (7), 241 (2024)
	<b>W Gregory</b> , R MacEachern, S Takao, IR Lawrence, C Nab, M Deisenroth, M Tsamados, " <a href="#">Scalable interpolation of satellite altimetry data with probabilistic machine learning</a> ," <i>Nature Communications</i> (15), 7453 (2024)
	M Bushuk, ..., <b>W Gregory</b> et al, " <a href="#">Predicting September Arctic sea ice: a multi-model seasonal skill comparison</a> ," <i>Bulletin of the American Meteorological Society</i> (15), E1170-E1203 (2024)
	<b>W Gregory</b> , M Bushuk, YF Zhang, A Adcroft, L Zanna, " <a href="#">Machine learning for online sea ice bias correction within global ice-ocean simulations</a> ," <i>Geophysical Research Letters</i> (51), e2023GL106776 (2024)
	YF Zhang, M Bushuk, M Winton, W Hurlin, <b>W Gregory</b> , JC Landy, L Jia, " <a href="#">Improvements in September Arctic sea ice predictions via assimilation of summer CryoSat-2 sea ice thickness observations</a> ," <i>Geophysical Research Letters</i> (50), e2023GL105672 (2023)
	<b>W Gregory</b> , M Bushuk, A Adcroft, YF Zhang, L Zanna, " <a href="#">Deep learning of systematic sea ice model errors from data assimilation increments</a> ," <i>Journal of Advances in Modeling Earth Systems</i> (15), e2023MS003757 (2023)

C Nab, R Mallett, **W Gregory**, JC Landy, IR Lawrence, R Willatt, J Stroeve, M Tsamados, “[Synoptic variability in satellite altimeter-derived radar freeboard of Arctic sea ice](#),” *Geophysical Research Letters* (50), e2022GL100696 (2023)

**W Gregory**, J Stroeve, M Tsamados, “[Network connectivity between the winter Arctic Oscillation and summer sea ice in CMIP6 models and observations](#),” *The Cryosphere* (16), 1653–1673 (2022)

**W Gregory**, IR Lawrence, M Tsamados, “[A Bayesian approach towards daily pan-Arctic sea ice free-board estimates from combined CryoSat-2 and Sentinel-3 satellite observations](#),” *The Cryosphere* (15), 2857–287. (2021)

**W Gregory**, M Tsamados, J Stroeve, P Sollich, “[Regional September sea ice forecasting with complex networks and Gaussian processes](#),” *Weather and Forecasting* (35), 793–806. (2020)

#### Invited Talks

“From component to coupled: evaluating the performance of a machine-learned sea ice bias correction scheme in fully-coupled seasonal predictions,” Nansen SuperIce Webinar Series, Virtual (2024)

“Towards improving numerical sea ice predictions with data assimilation and machine learning,” NOAA Arctic All Hands, Virtual (2024)

“Applications of machine learning to sea ice data assimilation,” 10th US Climate modeling summit, Geophysical Fluid Dynamics Laboratory, Princeton, NJ (2024)

“Towards a machine-learned sea ice model parameterization from data assimilation increments,” Euro-Mediterranean Center on Climate Change (CMCC) Seminar, Bologna, Italy (2024)

“Deep learning of systematic sea ice model errors from data assimilation increments,” Courant Institute of Mathematical Sciences Guest Seminar Series, New York City, NY (2022)

“Machine learning tools for pattern recognition in polar climate science,” EGU General Assembly, Vienna, Austria (2021)

“Machine learning in climate science,” Government Digital Service, London, UK (2020)

#### Conference Talks

**W Gregory**, M Bushuk, YF Zhang, A Adcroft, L Zanna. “Machine-learned sea ice bias correction in a global fully-coupled climate model,” CESM Polar Working Group Meeting, Boulder, CO (2025)

**W Gregory**, M Bushuk, YF Zhang, A Adcroft, L Zanna. “Towards improving numerical sea ice predictions with data assimilation and machine learning,” Cross-VESRI Convening, Cambridge, UK (2024)

**W Gregory**, M Bushuk, YF Zhang, A Adcroft, L Zanna. “Towards improving numerical sea ice predictions with data assimilation and machine learning,” EGU General Assembly, Vienna, Austria (2024)

**W Gregory**, M Bushuk, YF Zhang, A Adcroft, L Zanna. “Machine learning for online sea ice bias correction within global ice-ocean simulations,” AGU Ocean Sciences Meeting, New Orleans, LA (2024)

L Zanna, A Sane, C Zhang, D Balwada, P Perezhogin, **W Gregory**, J Busecke, A Adcroft, B Reichl, M Bushuk, F Lu, R Abernathey, A Shao, C Fernandez-Granda. “The new generation of global climate models enhanced by machine learning,” AGU Fall Meeting, San Francisco, CA (2023)

R MacEachern, M Tsamados, **W Gregory**, IR Lawrence, S Takao. “Fast interpolation of satellite altimetry data with probabilistic machine learning and GPU,” EGU General Assembly, Vienna, Austria (2023)

**W Gregory**, M Bushuk, A Adcroft, YF Zhang, L Zanna. “Deep learning of systematic sea ice model errors from data assimilation increments,” EGU General Assembly, Vienna, Austria (2023)

**W Gregory**, M Bushuk, A Adcroft, YF Zhang, L Zanna. “Deep learning of systematic sea ice model errors from data assimilation increments,” EGU General Assembly, Vienna, Austria (2023)

**W Gregory**, M Bushuk, A Adcroft, YF Zhang, L Zanna. “Using deep learning to predict systematic model error from sea ice data assimilation increments in a fully-coupled climate model,” AGU Fall Meeting, Chicago, IL (2022)

**W Gregory**, IR Lawrence, M Tsamados. “A Bayesian approach towards daily pan-Arctic sea ice freeboard estimates from combined CryoSat-2 and Sentinel-3 satellite observations,” EGU General Assembly, Vienna, Austria (2021)

**W Gregory**, M Tsamados, J Stroeve, P Sollich. “Random walks through climate networks: sea ice prediction with Bayesian inference,” AGU Fall Meeting, San Francisco, CA (2019)

## 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-present	Co-supervising Surya Dheeshjith, a laboratory associate within the Courant Institute for Mathematical Sciences at New York University. Surya is tasked with building a data-driven 3D ocean emulator, with Prof. Laure Zanna. My responsibilities are to guide Surya in the understanding of climate physics and the manifestation of ocean biases in coupled models.
2022	Co-supervised Ronald MacEachern, a postgraduate student undertaking the MSc Machine Learning course within the Department of Computer Science at UCL. The primary supervisor was Prof. Marc Deisenroth, however I designed the MSc dissertation project, which was titled Sea Ice Freeboard Interpolation using Gaussian Process Regression. Ronald was a self-funded student and achieved a thesis grade of Distinction.

## PUBLIC ENGAGEMENT & OUTREACH

2023	<a href="#">“AI is transforming climate forecasts for melting sea ice,”</a> <i>Advanced Science News Article</i>
2023-2024	Project development chair for the <a href="#">Climatematch academy</a> outreach program   Responsible for managing individuals developing material for student projects
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 2024 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 2024 convener and chair for session: “NGO11-II. Data Driven Science: Developments in Machine Learning Subgrid-Scale Parameterizations and in Reanalyses across Earth System Modeling”