GRAEME MACGILCHRIST

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Research interests

I have broad research interests within high-latitude physical oceanography and the interaction between the ocean circulation and other components of the climate system. My PhD work has focussed on ocean ventilation, particularly on the mechanisms and variability of deep ocean ventilation in the North Atlantic, the impact of mesoscale variability on ventilation pathways, and the role of ventilation in the uptake of carbon in the Southern Ocean.

Education

DPhil Physical Oceanography University of Oxford, U.K. *2013 – 2017*
Thesis: Lagrangian perspectives on ocean ventilation
Supervisors: Prof. David Marshall and Dr. Helen Johnson

MSc Oceanography (with Distinction) University of Southampton, U.K. *2011 – 2012*
Dissertation: Quantifying carbon sequestration in the Arctic Ocean (84%)
Supervisor: Prof. Alberto Naveira Garabato

MMath Mathematics (Hons, 1st Class) Newcastle University, U.K. *2006 – 2010*
Broad degree incorporating applied maths, pure maths and statistics
Dissertation: Magnetic fields in accretion discs (78%)

Publications

MacGilchrist, G.A. et al. (in prep) Characteristics and variability of deep North Atlantic ocean ventilation in an eddy-permitting numerical ocean circulation model, to be submitted to *Journal of Climate*.

MacGilchrist, G.A. et al. (in prep) Reframing the polar Southern Ocean carbon cycle, to be submitted to *Nature Geoscience*.

van Sebille, E. et al. (2018) Lagrangian ocean analysis: Fundamentals and practices, *Ocean Modelling*, 121: 49-75.

Naveira Garabato, A.C., MacGilchrist, G.A et al. (2017) High latitude ocean ventilation and its role in Earth's climate transitions, *Philosophical Transactions of the Royal Society A*, 375: 20160324.

MacGilchrist, G.A. et al. (2017) Characterizing the chaotic nature of ocean ventilation. *Journal of Geophysical Research: Oceans,* 122: 7577-7594.

MacGilchrist, G.A. et al. (2014) Effect of enhanced pCO2 levels on the production of DOC and TEP in short term bioassay experiments. *Biogeosciences*, 11: 3695-3706.

MacGilchrist, G.A. et al. (2014) The Arctic Ocean carbon sink. *Deep Sea Research I,* 86: 39-55.

Awards and Scholarships

Doctoral studies	Natural Environment Research Council PhD studentship CASE studentship, NERC (linked to U.K. Met Office) Oxford-Radcliffe-Graduate Scholar, University College Sykes scholarship for travel in mainland China
Masters studies	School fees bursary, University of Southampton

	Educational Support Fund, Society for Underwater Technology
	John Raymont Fund for highest aggregate mark in MSc Oceanography
Undergraduate studies	Excellence in 1st three years, Newcastle University
	Individual awards for merit in 1st and 2nd years, Newcastle University

Invited Presentations

Ocean ventilation in the high-latitude North Atlantic	CASPO Seminar, Scripps Institution of Oceanography (San Diego, 2018) Physical Oceanography seminar, Ifremer (Brest, 2017) Ocean Modelling Group, Challenger Society (Exeter, 2017; Liverpool, 2016)
Characterising the chaotic nature of ocean ventilation	Ocean Sciences Meeting (Portland, 2018) MEOM Research Group seminar (Grenoble, 2017) Drakkar project meeting (Grenoble, 2017) Nanjing University Institute of Science and Technology (Nanjing, 2016) Ocean University of China (Qingdao, 2016) Peking University (Beijing, 2016) Physical Oceanography and Climate seminar, NOC (Southampton, 2016) Ocean Modelling Group, Challenger Society (Cambridge, 2015) Rapid-USAMOC International Science Meeting (Bristol, 2015) IUGG General Assembly (Prague, 2015) ResClim All-staff meeting (Norway, 2015)
The Arctic Ocean carbon sink	Advances in Marine Biogeochemistry, Challenger Society (Oxford, 2016) Ocean Sciences Meeting (Hawaii, 2014) GEOMAR (Kiel, 2012) Physical Oceanography and Climate seminar, NOC (Southampton, 2012) UK Polar Network Symposium (Bangor, 2012)

Workshops and Summer Schools

Advanced Climate Dynamics Course Newfoundland, Canada *2016*
Topic: Role of high latitudes in centennial to millennial scale climate variability.

Future of Lagrangian Ocean Modelling Workshop Imperial College, London, U.K. *2015*
Invitational international workshop, organised by Erik van Sebille.

Alpine Summer School Val d'Aosta, Italy *2014*
Topic: Dynamics, stochastics and predictability of the climate system.

Fluid Dynamics and Sustainability of the Environment Cambridge, U.K. *2014*
Broad topics in fluid dynamics, with focus on GFD.
Computational and laboratory-based practical components.

Relevant employment

Research assistant OSMOSIS project cruise JR090, RRS James Cook *2013*
Responsibilities: Operation of tethered microstructure profiler.
CTD sample collection and salinometer measurements.

Researcher University of Southampton, U.K. *2012 – 2013*
Responsibilities: Publication of MSc research, further work on ocean acidification.

Field Research Coordinator Madagascar Cultures and Nature, Ifotaka, Madagascar *2011*
Responsibilities: Lead researcher in survey of invasive plant species near Ifotaka.
Coordination of U.K. students, as part of Operation Wallacea.

Teaching experience

Tutor and demonstrator University of Oxford, U.K. *2013 – 2017*

Subjects: Vector Calculus, 3rd year undergraduate
Mathematics for Materials and Earth Science, 1st year undergraduate
Planet Earth, 1st year undergraduate
Physical Oceanography, 3rd year undergraduate

Responsibilities: Combination of small-group (2-5 students) tutorials and large-group (20+ students) problem classes and demonstrations.
Design and planning of weekly, hour-long tutorials.

Science outreach *2011-present*

Regular lectures and events to a wide range of audiences, University of Oxford.
Fluid dynamics demonstrations to students and general public, University of Oxford.
Outreach talks on fluid dynamics and oceanography at Cheney School, Oxford, and King's College School, London.
Society for Underwater Technology Christmas Lecture at the National Maritime Museum, Greenwich, 2013.
Tutoring with 'Science Plus Oxford', an initiative to introduce high school children to science and scientists.

Academic tutor and sports coach Future Hope, Kolkata, India *2006 & 2008*

Voluntary work with disadvantaged children and young adults.

Responsibilities: Daily tutoring and sports coaching with groups of between 10 and 30 children, aged between 4 and 20.

Extra-curricular and skills

Rugby	International honours	Scotland Under 18, 19 and 20, 2005-2007 Under 19 World Cup in Dubai, 2006
	Tynedale R.F.C.	Promotion to English National League 1, 2008 Northumberland County Cup Winner, 2008 – 2010
	Oxford University R.F.C.	Player in Varsity Match versus Cambridge, 2013-2016 Two full Blues.
I.T. Literacy	Proficient in MATLAB, Linux, Python, Fortran, R, TeX, and Microsoft Word.	
Research tools	Coding and analysing numerical simulations of a range of complexities. Applying dynamical systems theory to oceanographic problems. Lagrangian analysis of numerical simulations and observations. Budget calculations from box inversions.	
Languages	Native English speaker. Good spoken French.	
Music	Guitar, trumpet, piano, mandolin, ukulele.	

References

Prof. David Marshall, PhD supervisor, University of Oxford (david.marshall@physics.ox.ac.uk)
Prof. Alberto Naveira Garabato, MSc supervisor, University of Southampton (acng@noc.soton.ac.uk)
Dr. Helen Johnson, PhD supervisor, University of Oxford (helen.johnson@earth.ox.ac.uk)
Prof. Ric Williams, PhD examiner, University of Liverpool (ric@liverpool.ac.uk)