

# GRAEME MACGILCHRIST

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Atmospheric and Oceanic Science,  
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## Current employment

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**Postdoctoral Research Scholar** SOCCOM research project 2018 –  
Research focus: Dynamics of the Southern Ocean and its impact on tracer transport. present

## Education

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

## Publications

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MacGilchrist, G.A., H.L. Johnson, D.P. Marshall, C. Lique, M. Thomas, L. Jackson, R. Wood (submitted)  
Characteristics and variability of deep North Atlantic Ocean ventilation in an eddy-permitting  
numerical ocean circulation model, *Journal of Climate*.

MacGilchrist, G.A., A. C. Naveira Garabato, P. J. Brown, L. Jullion, S. Bacon, D.C.E. Bakker, M. Hoppema, M.P.  
Meredith, and S. Torres-Valdés (in press) Reframing the carbon cycle of the subpolar Southern Ocean,  
*Science Advances*.

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

Naveira Garabato, A.C., G.A. MacGilchrist, P.J. Brown, D.G. Evans, A.J.S. Meijers, and J.D. Zika (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., D.P. Marshall, H.L. Johnson, C. Lique, and M. Thomas (2017) Characterizing the chaotic  
nature of ocean ventilation. *Journal of Geophysical Research: Oceans*, 122: 7577-7594.

MacGilchrist, G.A., T. Shi, T. Tyrrell, S. Richier, C.M. Moore, C. Dumousseaud, and E.P. Achterberg (2014)  
Effect of enhanced pCO<sub>2</sub> levels on the production of DOC and TEP in short term bioassay  
experiments. *Biogeosciences*, 11: 3695-3706.

MacGilchrist, G.A., A.C. Naveira Garabato, T. Tsubouchi, S. Bacon, S. Torres-Valdés, K. Azetsu-Scott (2014)  
The Arctic Ocean carbon sink. *Deep Sea Research I*, 86: 39-55.

## Awards and Scholarships

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<b>Doctoral studies</b>	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
<b>Masters studies</b>	School fees bursary, University of Southampton Educational Support Fund, Society for Underwater Technology John Raymont Fund for highest aggregate mark in MSc Oceanography
<b>Undergraduate studies</b>	Excellence in 1 <sup>st</sup> three years, Newcastle University Individual awards for merit in 1 <sup>st</sup> and 2 <sup>nd</sup> years, Newcastle University

## Presentations

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<i>Reframing the carbon cycle of the subpolar Southern Ocean</i>	Institute for Marine and Antarctic Science, UTas (Hobart, 2019) Australian National University (Canberra, 2019) Geology and Geoscience Seminar, Yale University (Newhaven, 2018) AGU Fall Meeting (Washington, D.C., 2018)
<i>Ocean ventilation in the high-latitude North Atlantic</i>	CASPO Seminar, Scripps Institution of Oceanography (San Diego, 2018) Physical Oceanography seminar, Ifremer (Brest, 2017) Ocean Modelling Group, Challenger Society (Newcastle, 2018; Exeter, 2017; Liverpool, 2016)
<i>Characterising the chaotic nature of ocean ventilation</i>	Sources and Sinks of Mesoscale Eddy Energy workshop (Tallahassee, 2019) Ocean Sciences Meeting (Portland, 2018; New Orleans, 2016, <i>poster</i> ) Ocean ventilation and deoxygenation, Royal Society (London, 2017, <i>poster</i> ) 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)
<i>The Arctic Ocean carbon sink</i>	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

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<b>ECCO summer school</b>	Friday Harbour Laboratories, University of Washington, WA, U.S.A. Selective summer school on ocean state estimation, organised by Patrick Heimbach	2019
<b>Water Mass Transformation Workshop</b>	University of New South Wales, Sydney, Australia Invitational international workshop, organised by Sjoerd Groeskamp	2019
<b>Advanced Climate Dynamics Course</b>	Newfoundland, Canada Topic: Role of high latitudes in centennial to millennial scale climate variability.	2016

<b>Future of Lagrangian Ocean Modelling Workshop</b> Imperial College, London, U.K. Invitational international workshop, organised by Erik van Sebille.	2015
<b>Alpine Summer School</b> Val d'Aosta, Italy Topic: Dynamics, stochastics and predictability of the climate system.	2014
<b>Fluid Dynamics and Sustainability of the Environment</b> Cambridge, U.K. Broad topics in fluid dynamics, with focus on GFD. Computational and laboratory-based practical components.	2014

### Previous employment

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<b>Research assistant</b> OSMOSIS project cruise JR090, RRS James Cook Responsibilities: Operation of tethered microstructure profiler. CTD sample collection and salinometer measurements.	2013
<b>Researcher</b> University of Southampton, U.K. Responsibilities: Publication of MSc research, further work on ocean acidification.	2012 – 2013
<b>Field Research Coordinator</b> Madagascar Cultures and Nature, Ifotaka, Madagascar Responsibilities: Lead researcher in survey of invasive plant species near Ifotaka. Coordination of U.K. students, as part of Operation Wallacea.	2011

### Teaching experience

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<b>Supervisor</b> Princeton University, U.S.A. Project design and supervision for two undergraduate summer interns	2019
<b>Lecturer</b> Prison Teaching Initiative, NJ, U.S.A. Undergrad-level lecturing and tutoring at the Federal Correctional Institute, Fort Dix Subject: MAT125 Elementary Statistics	2019
<b>Demonstrator</b> Princeton University, U.S.A. Subjects: AOS578 Chemical Oceanography	2018 - present
<b>Tutor and demonstrator</b> University of Oxford, U.K. Subjects: Vector Calculus, 3 <sup>rd</sup> year undergraduate Mathematics for Materials and Earth Science, 1 <sup>st</sup> year undergraduate Planet Earth, 1 <sup>st</sup> year undergraduate Physical Oceanography, 3 <sup>rd</sup> 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.	2013 – 2017
<b>Science outreach</b> 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.	2011-present

**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

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<i>Rugby</i>	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>I.T. Literacy</i>	Proficient in MATLAB, Linux, Python, Fortran, R, TeX, and Microsoft Word.	
<i>Research tools</i>	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. Analysis in a watermass transformation framework.	
<i>Languages</i>	Native English speaker. Good spoken French.	
<i>Music</i>	Guitar, trumpet, piano, mandolin, ukulele.	

### References

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Dr. Stephen Griffies, Post-doc mentor, Princeton University (stephen.griffies@noaa.gov)

Prof. David Marshall, PhD supervisor, University of Oxford (david.marshall@physics.ox.ac.uk)

Dr. Helen Johnson, PhD supervisor, University of Oxford (helen.johnson@earth.ox.ac.uk)

Prof. Alberto Naveira Garabato, MSc supervisor, University of Southampton (acng@noc.soton.ac.uk)