

Eric D. Galbraith

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Canadian citizen

Born in Halifax, NS, Dec. 10 1974

Academic Appointments

Research Professor, Institució Catalana de Recerca i Estudis Avançats (ICREA).

September 2015 -

Associate Professor, Department of Mathematics, Universitat Autònoma de Barcelona.

September 2015 -

Adjunct Professor, Earth and Planetary Sciences, McGill University.

September 2015 -

Assistant Professor (Recommended for tenure), Earth and Planetary Sciences, McGill University.

July 2009 - August 2015

Associate Research Scholar, Atmospheric and Oceanic Sciences, Princeton University.

September 2007 - June 2009

Research Associate, Atmospheric and Oceanic Sciences, Princeton University.

March 2006 - August 2007

Education

Ph.D. 2006. Earth and Ocean Sciences, University of British Columbia, Canada.

Thesis: *Interactions between climate and the marine nitrogen cycle on glacial-interglacial timescales*. Advisor: Tom Pedersen.

B.Sc. 1997 (Honours, 1st class). Earth and Planetary Sciences, McGill University, Canada

Thesis: *Evidence for two magmas in the Sloko-Skukum volcanics, Yukon*.

Advisor: Don Francis.

Research and Publications

Summary: 68 publications, including 4 *Nature*, 6 *Nature Geoscience*, 2 *Nature Communications*, 2 *Nature Climate Change*, 1 *Nature Ecology and Evolution*, and 2 *Proceedings of the National Academy of Sciences*. 3573 citations, H-index: 31 (Google scholar).

ORCID: 0000-0003-4476-4232

Refereed Journal Articles (Trainees underlined)

Carozza, D.A., D. Bianchi and **E.D. Galbraith** (2018). Metabolic impacts of climate change on marine ecosystems: implications for fish communities and fisheries, *Global Ecology and Biogeography*.

McGee, D., E. Moreno-Chamarro, J. Marshall, and **E. D. Galbraith** (2018), Western U.S. lake expansions during Heinrich stadials linked to Pacific Hadley circulation, *Science Advances*, 4(11), eaav0118, doi: 10.1126/sciadv.aav0118.

Cartapanis, Olivier; **Galbraith, Eric D.**; Bianchi, Daniele; Jaccard, Samuel (2018). Carbon burial in deep-sea sediment and implications for oceanic inventories of carbon and alkalinity over the last glacial cycle. *Climate of the Past*, 14 (11), pp. 1819-1850.

Bryndum–Buchholz, Andrea; Tittensor, Derek P; Blanchard, Julia L; Cheung, William WL; Coll, Marta; **Galbraith, Eric D**; Jennings, Simon; Maury, Olivier; Lotze, Heike K (2018) 21st century climate change impacts on marine animal biomass and ecosystem structure across ocean basins, *Global Change Biology*.

Yamamoto, A., Palter J.B., Dufour C.O, Griffies S.M., Bianchi D., Claret M., Dunne J.P., Frenger I. and **Galbraith E.D.** (2018) Roles of the ocean mesoscale in the horizontal supply of mass, heat, carbon and nutrients to the Northern Hemisphere subtropical gyres, *Journal of Geophysical Research: Oceans*, 123. doi: 10.1029/2018JC013969

Hoogakker, B. A. A., Z. Lu, N. Umling, L. Jones, X. Zhou, R. E. M. Rickaby, R. Thunell, O. Cartapanis, and **E. Galbraith** (2018), Glacial expansion of oxygen-depleted seawater in the eastern tropical Pacific, *Nature*, 562(7727), 410-413, doi: 10.1038/s41586-018-0589-x.

Claret M, **Galbraith ED**, Palter JB, Bianchi D, Fennel K, Gilbert D, Dunne JP (2018). Rapid coastal deoxygenation due to ocean circulation shift in the northwest Atlantic. *Nature Climate Change*, doi:10.1038/s41558-018-0263-1

Kavanagh, L. and **E.D. Galbraith** (2018). Links between fish abundance and ocean biogeochemistry as recorded in marine sediments. *PLoS ONE* 13(8): e0199420, doi: 10.1371/journal.pone.0199420.

Eggleston, Sarah & **Eric D. Galbraith** (2018). The devil's in the disequilibrium: multi-component analysis of dissolved carbon and oxygen changes under a broad range of forcings in a general circulation model. *Biogeosciences*, 15, 3761-3777, doi:10.5194/bg-15-3761-2018.

Galbraith, Eric and Casimir de Lavergne (2018). Response of a comprehensive climate model to a broad range of external forcings: relevance for deep ocean ventilation and the development of late Cenozoic ice ages. *Climate Dynamics*, doi:/10.1007/s00382-018-4157-8

Frenger, I., Bianchi, D., Sührenberg, C., Oschlies, A., Dunne, J., Deutsch, C., **Galbraith, E.** and Schütte, F. (2018). Biogeochemical role of subsurface coherent eddies in the ocean: Tracer cannonballs, hypoxic storms, and microbial stewpots? *Global Biogeochemical Cycles*, 32, 226–249. doi.org/10.1002/2017GB005743

Derek P Tittensor, Tyler D Eddy, Heike K Lotze, **Eric D Galbraith**...et al. (2018). A protocol for the intercomparison of marine fishery and ecosystem models: Fish-MIP v1.0. *Geoscientific Model Development* (11) 1421-2442, doi.org/10.5194/gmd-11-1421-2018

McGee, David, Eduardo Moreno-Chamarro, Brian Green, **Eric Galbraith**, John Marshall, Louisa Bradtmiller (2018). Hemispherically asymmetric trade wind changes as signatures of past ITCZ shifts. *Quaternary Science Reviews* (180) 214-222, doi.org/10.1016/j.quascirev.2017.11.020

Frieler Katja, Stefan Lange, Franziska Piontek...**Eric Galbraith** et al. (2017) Assessing the impacts of 1.5 °C global warming – simulation protocol of the Inter-Sectoral Impact Model Inter-comparison Project (ISIMIP2b) *Geosci Model Dev* 10:4321-4345 doi:10.5194/gmd-10-4321-2017

Blanchard, Julia L., Reg A. Watson, Elizabeth A. Fulton... David A. Carozza, **Eric D. Galbraith** et al. (2017). Linked sustainability challenges and trade-offs among fisheries, aquaculture and agriculture. *Nature Ecology and Evolution*, doi: 10.1038/s41559-017-0258-8.

Andreas Schmittner, Helen C Bostock, Olivier Cartapanis, **Eric D Galbraith**...et al. (2017). Calibration of the Carbon Isotope Composition ($\delta^{13}\text{C}$) of Benthic Foraminifera. *Paleoceanography*, 32, 512-530, doi: 10.1002/2016PA003072.

Galbraith, E.D. and S. Eggleston (2017). A lower limit to CO₂ over the last 800,000 years. *Nature Geoscience*. doi: 10.1038/ngeo2888

Galbraith, E.D., D.A. Carozza, D. Bianchi (2017). A coupled human-Earth model perspective on long-term trends in the global marine fishery. *Nature Communications*. doi: 10.1038/ncomm-s14884

Elsworth, G., **E.D. Galbraith**, G. Halverson, S. Yang (2017). Enhanced weathering and CO₂ drawdown caused by latest Eocene strengthening of the Atlantic meridional overturning circulation. *Nature Geoscience*. doi: 10.1038/NGEO2888

Carozza DA, Bianchi D, **Galbraith ED** (2017). Formulation, General Features and Global Calibration of a Bioenergetically-Constrained Fishery Model. *PLoS ONE* 12(1): e0169763. doi: 10.1371/journal.pone.0169763

Mullon, C., P. Guillotreau, **E. Galbraith**, J. Fortilus, C. Chaboud, L. Bopp, O. Aumont, D. Kaplan (2017). Building scenarios for the futures of the global supply chain for tuna. *Deep Sea Research*.

Galbraith, E.D., T. Merlis and J.B. Palter (2016). Destabilization of glacial climate by the radiative impact of Atlantic Meridional Overturning Circulation disruptions. *Geophysical Research Letters*. doi: 10.1002/2016GL069846

Brown, Nicholas and **E.D. Galbraith** (2016). Hosed vs. unhosed: global response to interruptions of the Atlantic Meridional Overturning, with and without freshwater forcing. *Climate of the Past*. doi: 10.5194/cp-12-1663-2016

Carozza, David A., D. Bianchi and **E.D. Galbraith** (2016). The ecological module of BOATS-1.0: a bioenergetically-constrained model of marine upper trophic levels suitable for studies of fisheries and ocean biogeochemistry. *Geoscientific Model Development* (9) 1545–1565, doi:10.5194/gmd-9-1545-2016.

Cartapanis, O., D. Bianchi, S.L. Jaccard and **E.D. Galbraith** (2016). Global pulses of organic carbon burial in deep-sea sediments during glacial maxima. *Nature Communications*, doi: 10.1038/ncomms10796.

Jaccard, S.L., **E.D. Galbraith**, A. Martinez-Garcia, R.F. Anderson (2016). Covariation of deep Southern Ocean oxygenation and atmospheric CO₂ through the last ice age. *Nature*. doi:10.1038/nature16514.

Tagliabue, A., O. Aumont, R. DeAth, J.P. Dunne, S. Dutkiewicz, **E. Galbraith**, K. Misumi, J.K. Moore, A. Ridgwell, E. Sherman, C. Stock, M. Vichi, C. Völker, A. Yool (2016), How well do global ocean biogeochemistry models simulate dissolved iron distributions?, *Global Biogeochemical Cycles*, 29, doi:10.1002/2015GB005289

Galbraith, E.D., J.P. Dunne, A. Gnanadesikan, R.D. Slater, J.L. Sarmiento, C.O. Dufour, G.F. deSouza, D. Bianchi, M. Claret, K.B. Rodgers, S. Sedigh Marvasti (2015). Complex functionality with minimal computation: Promise and pitfalls of reduced-tracer ocean biogeochemistry models. *Journal of Advances in Modeling Earth Systems*, doi: 10.1002/2015MS000463.

Dufour, C. O., S. M. Griffies, G. F. de Souza, I. Frenger, A. K. Morrison, J. B. Palter, J. L. Sarmiento, **E. D. Galbraith**, J. P. Dunne, W. G. Anderson and R. D. Slater (2015). Role of mesoscale eddies in cross-frontal transport of heat and biogeochemical tracers in the Southern Ocean. *Journal of Physical Oceanography*, 45, 3057–3081. doi: <http://dx.doi.org/10.1175/JPO-D-14-0240.1>

Galbraith, E.D. and Adam Martiny (2015). A simple nutrient-dependence mechanism for predicting the stoichiometry of marine ecosystems. *Proceedings of the National Academy of Sciences*. doi: 10.1073/pnas.1423917112

Galbraith, E.D., D. Bianchi, M. Hain, E.Y. Kwon and J.L. Sarmiento (2015). The impact of atmospheric pCO₂ on carbon isotope ratios of the atmosphere and ocean. *Global Biogeochemical Cycles*. doi: 10.1002/2014GB004929

Galbraith, E.D. and S.L. Jaccard (2015). Coupling of the ocean biological pump with physical climate on deglaciation. *Quaternary Science Reviews*. doi: 10.1016/j.quascirev.2014.11.012

Bernardello, R., I. Marinov, J. B. Palter, **E. D. Galbraith**, and J. L. Sarmiento (2014), Impact of Weddell Sea deep convection on natural and anthropogenic carbon in a climate model, *Geophys. Res. Lett.*, 41, 7262–7269, doi:10.1002/2014GL061313.

D. Bianchi, Babbín, A., **Galbraith, E.D.** (2014). Enhancement of anammox by the excretion of diel vertical migrators. *Proceedings of the National Academy of Sciences*. doi/10.1073/pnas.1410790111

Delavergne, C., J. Palter, **E.D. Galbraith**, R. Bernadello and I. Marinov, 2014. Cessation of Southern Ocean deep convection under climate warming. *Nature Climate Change*, doi:10.1038/NCLIMATE2132.

Jaccard, S.L., **Galbraith, E.D.**, Frölicher, T.L. and Gruber, N, 2014. Ocean (de)oxygenation across the last deglaciation - Insights for the future. *Oceanography*, 27 (1), 26-35.

Palter, Jaime B., Stephen M. Griffies, **Eric D. Galbraith**, Anand Gnanadesikan, Bonita L. Samuels, Andreas Klocker, 2014. The deep ocean buoyancy budget and its temporal variability, *Journal of Climate*, 27 (2), 551-573.

Bernadello, R., I. Marinov, J.B. Palter, J.L. Sarmiento, **E.D. Galbraith**, R.D. Slater, 2013. Response of the Ocean Natural Carbon Storage to Projected 21st Century Climate Change. *Journal of Climate*.

Duteil, Olaf, W. Koeve, A. Oschlies, D. Bianchi, **E. Galbraith**, I. Kriest, and R. Matear, 2013. A novel estimate of ocean oxygen utilisation points to a reduced rate of respiration in the ocean interior. *Biogeosciences*, 10, 7723-7738.

Yang, S., **E. Galbraith** and J. Palter, 2013. Coupled climate impacts of the Drake Passage and the Panama Seaway. *Climate Dynamics*.

Daniele Bianchi, **Eric D. Galbraith**, David A. Carozza, K.A.S. Mislan and Charles Stock. Vertically migrating animals intimately linked with ocean oxygen minimum zones, 2013. *Nature Geoscience*, doi:10.1038/NGEO1837.

Galbraith, E., M. Kienast, A.L. Albuquerque, M. Altabet, D. Bianchi, S.C. Quintana, R. De Pol Holz, N. Dubois, R. Francois, T.-C. Hsu, T. Ivanochko, S. Jaccard, S.-J. Kao, T. Kiefer, S. Kienast, M. Lehmann, P. Martinez, M. McCarthy, J. Möbius, T. Pedersen, T.M. Quan, E. Ryabenko, A. Schmittner, R. Schneider, A. Schneider-Mor, M. Shigemitsu, D. Sinclair, C. Somes, A. Studer, J.-E. Tesdal, R. Thunell, J.-Y. Yang, 2013. Global nitrogen isotopic constraints on the acceleration of oceanic denitrification during deglacial warming. *Nature Geoscience*, doi:10.1038/NGEO1832.

Daniele Bianchi, Charles Stock, **Eric D. Galbraith** and Jorge L. Sarmiento, 2013. Diel vertical migration: ecological controls and impacts on the biological pump in a one-dimensional ocean model. *Global Biogeochemical Cycles* (27), doi:10.1002/gbc.20031.

Moore, C.M., M.M. Mills, K.R. Arrigo, I. Berman-Frank, L. Bopp, P.W. Boyd, **E.D. Galbraith**, R.J. Geider, C. Guieu, S.L. Jaccard, T.D. Jickells, J. LaRoche, T. Lenton, N.M. Mahowald, E. Marañón, I. Marinov, J.K. Moore, T. Nakatsuka, A. Oschlies, M.A. Saito, T.F. Thingstad, A. Tsuda, O. Ulloa, D. Wallace, 2013. Oceanic nutrient limitation: processes, patterns and potential for change. *Nature Geoscience*, doi:10.1038/NGEO1765.

Jaccard, S.L. and **E.D. Galbraith**, 2013. Direct ventilation of the North Pacific did not reach the deep ocean during the last deglaciation. *Geophysical Research Letters*, Vol. 40, 199-203.

Tesdal, J.-E., **E.D. Galbraith** and M. Kienast, 2013. Nitrogen isotopes in bulk marine sediment: linking seafloor observations with subseafloor records. *Biogeosciences* (10), 101-118.

Robinson, R., M. Kienast, A.L. Albuquerque, M. Altabet, S.C. Quintana, R. De Pol Holz, N. Dubois, R. Francois, **E. Galbraith**, T.-C. Hsu, T. Ivanochko, S. Jaccard, S.-J. Kao, T. Kiefer, S. Kienast, M. Lehmann, P. Martinez, M. McCarthy, J. Möbius, T. Pedersen, T.M. Quan, E. Ryabenko, A. Schmittner, R. Schneider, A. Schneider-Mor, M. Shigemitsu, D. Sinclair, C. Somes,

A. Studer, R. Thunell, J.-Y. Yang, 2012. A review of nitrogen isotopic alteration in marine sediments. *Paleoceanography* (27) PA4203. doi:10.1029/2012PA002321.

Duteil, O., W. Koeve, A. Oschlies, O. Aumont, D. Bianchi, L. Bopp, **E. Galbraith**, R. Matear, J.K. Moore, J. Sarmiento and J. Segschneider, 2012. Preformed and regenerated phosphate in ocean general circulation models: can right total concentrations be wrong? *Biogeosciences* (9), 1797-1807.

Andrew J. Pinsonneault, H. Damon Matthews, **Eric Galbraith**, Andreas Schmittner, 2012. Calcium carbonate production response to future ocean warming and acidification. *Biogeosciences*, (9) 2351-2364.

Kwon, E.Y., M.P. Hain, D.M. Sigman, **E.D. Galbraith**, J.L. Sarmiento, J.R. Toggweiler, 2012. North Atlantic ventilation of southern-sourced deep water in the ice age ocean. *Paleoceanography* (27) PA2208. doi:10.1029/2011PA002211

Daniele Bianchi, John P. Dunne, Jorge L. Sarmiento, **Eric D. Galbraith**, 2012. Data-based estimates of suboxia, denitrification and N₂O production in the ocean, and their sensitivities to change. *Global Biogeochemical Cycles* (26) GB2009. doi:10.1029/2011GB004209

Jaccard, S.L. and **E.D. Galbraith**. Large climate-driven changes of oceanic oxygen concentrations during the last deglaciation. *Nature Geoscience* (5), February 2012.

Rodgers, K.B., S.E.M. Fletcher, D. Bianchi, C. Beaulieu, **E.D. Galbraith**, A. Gnanadesikan, A.G. Hogg, D. Iudicone, B. Linter, T. Naegler, P.J. Reimer, J.L. Sarmiento, R.D. Slater, 2011. Inter-hemispheric gradient of atmospheric radiocarbon reveals natural variability of Southern Ocean winds. *Climate of the Past*, 7, 1123-1138.

Galbraith, Eric D, E.-Y. Kwon, A. Gnanadesikan, K.B. Rodgers, S. Griffies, D. Bianchi, J. Sarmiento, J. Dunne, J. Simeon, R.D. Slater, A. Wittenberg, I. Held, 2011. Climate Variability and Radiocarbon in the CM2Mc Earth System Model. *Journal of Climate* (24) 4230-4253.

Somes, C. J., A. Schmittner, **E. D. Galbraith**, M. F. Lehmann, M. A. Altabet, J. P. Montoya, R. M. Letelier, A. C. Mix, A. Bourbonnais, and M. Eby (2010). Simulating the global distribution of nitrogen isotopes in the ocean. *Global Biogeochemical Cycles*, 24, GB4019, doi:10.1029/2009GB003767

Jaccard, S.L., **Galbraith, E.D.**, Sigman, D.M. and Haug, G.H. (2010). A pervasive link between Antarctic ice cores and subarctic Pacific sediment records over the past 800 kyrs. *Quaternary Science Reviews*, 29, 206-212.

Galbraith, Eric D, Anand Gnanadesikan, John P Dunne, and Michael R Hiscock (2010). Regional impacts of iron-light colimitation in a global biogeochemical model. *Biogeosciences*, 7, 1043-1064.

Jaccard, Sam L, **Eric D Galbraith**, Daniel M Sigman, Gerald H Haug, Roger Francois and Tom F Pedersen (2009). Subarctic Pacific evidence for a glacial deepening of the oceanic respired carbon pool. *Earth and Planetary Science Letters*. doi:10.1016/j.epsl.2008.10.017.

Kienast, Markus, Moritz F Lehmann, Axel Timmermann, **Eric D Galbraith**, Timothy Bolliet, Anne Holbourn, Claire Normandeau and Carlos Laj (2008). A mid-Holocene transition in the nitrogen dynamics of the western equatorial Pacific: Evidence of a deepening thermocline? *Geophysical Research Letters*. doi:10.1029/2008GL035464.

Schmittner, Andreas and **Eric D Galbraith** (2008). Glacial greenhouse gas fluctuations controlled by ocean circulation changes. *Nature* 456, 373-376.

Galbraith, Eric D, Markus Kienast, Samuel L Jaccard, Tom F Pedersen, Brigitte G Brunelle, Daniel M Sigman and Thorsten Kiefer (2008). Consistent relationship between global climate and surface nitrate utilization in western Subarctic Pacific throughout last 500 ky. *Paleoceanography*, doi:10.1029/2007PA001518.

Schmittner, Andreas, Andreas Oeschlies, H Damon Matthews, and **Eric D Galbraith** (2008). Future changes in climate, ocean circulation, ecosystems and biogeochemical cycling simulated for a business-as-usual CO₂ emission scenario until year 4000 AD. *Global Biogeochemical Cycles*. Various sources, including NSF Funding to Schmittner.

Galbraith, Eric D, Samuel L Jaccard, Tom F Pedersen, Daniel M Sigman, Gerald H Haug, Mea Cook, John Southon and Roger Francois (2007). Carbon dioxide release from the North Pacific abyss during the last deglaciation. *Nature*, 449, 890-893.

Schmittner, Andreas, **Eric Galbraith**, Steven Hostetler, Tom Pedersen and Rong Zhang (2007). Large fluctuations of dissolved oxygen in the Indian and Pacific Oceans during Dansgaard-Oeschger oscillations caused by variations in North Atlantic deep water subduction. *Paleoceanography* 22, doi 10.1029/2006PA001384.

Meissner, Katrin, **Eric D Galbraith** and Christoph Völker (2005) Denitrification under glacial and interglacial conditions: a physical approach. *Paleoceanography* Vol. 20, doi. 10.1029/2004-PA001083.

Galbraith, Eric D, Markus Kienast, Tom F Pedersen, and Stephen E Calvert (2004). Glacial-interglacial modulation of the marine nitrogen cycle by oxygen-supply to intermediate waters. *Paleoceanography* Vol. 19, doi. 10.1029/2003PA001000.

Book Chapters

Galbraith, Eric D, Sigman, Daniel, Pedersen, Tom and Robinson, Rebecca S. Past changes in the marine nitrogen cycle. In *Nitrogen in the Marine Environment*, 2nd edition; Capone, D., Bronk, D., Mulholland, M. and Carpenter, E. (eds.), Elsevier 2008, pp 1497-1535. doi 10.1016/B978-0-12-372522-6.00034-7. (Invited chapter)

Non-refereed Articles

Jaccard, Samuel L and **Galbraith, Eric D**, 2018. Push from the Pacific. *Nature Geoscience* (News and Views). April, 2018.

Galbraith, Eric D, James Watson and Myron Peck. Predicting Fish From Physics: Strengths, Weaknesses and Ways Forward. *IMBER News* (27), 2014.

Kwon, Eun-Young and **Galbraith, Eric D**. When the Dust Settles. *Nature Geoscience* (News and Views). June, 2013.

Rafter, Patrick A., Jaccard, Samuel L., **Galbraith, Eric D**, Kienast, Markus and Kiefer, Thorsten, 2012. The nitrogen cycle in the ocean: 2nd NICOPP meeting. *PAGES news* (20) 48.

Galbraith, Eric D, Kienast, Markus and Kiefer, Thorsten, 2010. The nitrogen cycle in the ocean, past and present. *PAGES news* (18) 92-93.

Galbraith, Eric D and Jaccard, Samuel L, 2008. An increase in the ventilation of the abyssal North Pacific Ocean at the end of the last ice age. *PAGES news* (16) 13-14.

Selected Conference Presentations

Large changes in ocean oxygenation during the last ice age: observations, mechanisms and ecosystem responses to change. Ocean Deoxygenation: Drivers and consequences International Conference, Kiel, September 2018 (Keynote).

Getting the big picture in focus: assessing climate and human factors with global coupled human-ocean models. Effect of Climate Change on the World Oceans, Washington DC, June 2018 (Keynote).

How CO₂, ice sheets and astronomical forcings conspire to alter the strength of the AMOC, volume of NADW, and ocean carbon storage: Expectations from a coarse resolution model. Ocean Sciences meeting, Portland USA, February 2018. (Oral, invited)

Finding the sweet spot for abrupt climate change: Influences of atmospheric CO₂, orbital forcing and terrestrial ice sheets on AMOC stability. Eric Galbraith, Casimir deLavergne. PAGES Open Science Meeting, Zaragoza, Spain, May 2017. (Oral)

From Physics to Fishermen: Linking Climate to Biogeochemistry to Ecosystem to Humans. Eric Galbraith. Future Earth Days, Paris, December 2016. (Invited plenary)

The impacts of *p*CO₂, orbital forcing and terrestrial ice sheets on global climate and deep water formation in a suite of coupled model simulations. Eric Galbraith. International Conference on Paleoceanography, Utrecht, Netherlands, September 2016. (Poster)

Running hotter, faster, shallower: Acceleration of the marine nitrogen cycle from the Last Glacial Maximum, and implications for the future. Eric Galbraith. AGU Fall meeting, San Francisco, December 2015. (Oral, invited)

The Bioeconomic marine Trophic Size-spectrum model (BOATS). Eric Galbraith, David Carozza and Daniele Bianchi. CLIOTOP working group, San Sebastien, September 2015. (Oral)

Did a transient AMOC strengthening trigger Antarctic glaciation at the Eocene-Oligocene transition? Eric Galbraith, Genevieve Elsworth and Galen Halverson. AGU Joint Assembly, Montreal, May 2015. (Oral)

Does nitrogen limitation prevent runaway glaciations? Eric Galbraith. Leopoldina Symposium, Halle, Germany, March 2015. (Oral)

Climate impact on ocean oxygenation and nitrogen cycling. Eric Galbraith. ASLO Aquatic Sciences meeting, Granada, Spain, February 2015 (Keynote).

Stratification Boomerang: A nonlinear dependence of deep Southern Ocean ventilation on *p*CO₂. Eric Galbraith and Tim Merlis. AGU Fall Meeting, San Francisco, December 2014 (Oral).

Coupled roles of ocean ventilation and the marine ecosystem in the deglacial CO₂ rise. Eric Galbraith. Goldschmidt, Sacramento, CA, June 2014 (Keynote)

Missing the forest for the N:P? A simple model for community stoichiometry. Eric Galbraith. Ocean Sciences, Honolulu, Hawaii, February 2014. (Oral)

Enough with the Westerlies! The potential importance of deep Southern Ocean convection in past and present changes. Eric Galbraith, Casimir DeLavergne, Jaime Palter, Irina Marinov and Raffaele Bernardello. AGU Fall Meeting, San Francisco, December 2013. (Oral)

Deglacial changes in oxygen minimum zones: the role of physics, phytoplankton and...fish? Eric Galbraith and Daniele Bianchi. AGU Fall Meeting, San Francisco, December 2013. (Oral, invited)

The pH effect on reservoir ages and atmospheric $\Delta^{14}\text{C}$. Eric Galbraith, Daniele Bianchi and Jorge Sarmiento. Paleoclimate Model Intercomparison Workshop, Corvallis, December 2013. (Oral)

Two modes of variability in the ocean biological pump during the deglacial $p\text{CO}_2$ rise. Eric Galbraith. PAGES Open Science Meeting, Goa, India, February 2013. (Oral)

Linking biogeochemistry with fish and fisheries economics. Eric Galbraith. QuébecOceans conference, Montreal, November 2012. (Oral)

Upper ocean deoxygenation and denitrification at the end of the last ice age. Eric Galbraith and Sam Jaccard. Goldschmidt Montreal, 2012. (Oral, invited)

Testing the biogeochemical impacts of upper trophic levels with a structurally efficient global model. Galbraith, Eric, Daniele Bianchi, David Carozza. Ocean Sciences, Salt Lake City, 2012. (Oral)

Deglacial changes in the subarctic Pacific ecosystem: links to ocean circulation and deoxygenation. Galbraith, Eric, Taoufik Radi and Samuel Jaccard. American Geophysical Union Fall Meeting, San Francisco, CA, December 2011. (Oral, invited)

Vertical mixing, nutrients and the salty glacial abyss. Galbraith, Eric. International Conference on Paleoceanography, San Diego, CA, September 2010. (Oral, invited)

Replumbing the biological pump in global climate models. Galbraith, Eric. PAGES Open Science Meeting, Corvallis, Oregon, June 2009. (Oral, invited)

The spontaneous development of Fe-limited, Si-rich waters in polar oceans with rapid nutrient supply. Galbraith, Eric and Jorge Sarmiento. Goldschmidt Conference, Davos, CH, June 2009. (Oral)

Abrupt increase of N₂O production in the Indo-Pacific at the onset of the Bolling warm period. Galbraith, Eric, Andreas Schmittner and Samuel Jaccard. Goldschmidt Conference, Vancouver, July 2008. (Oral)

Variations of water column oxygenation over the last glacial-interglacial cycle: causes and impacts. Galbraith, Eric, Andreas Schmittner and Samuel Jaccard. Workshop on Novel Insight Into Redox and Nutrient Cycles in the Ocean, Kiel, Germany, October 2008. (Oral, invited)

Invited Academic Talks

LSCE, Gif-sur-Yvette, France, February 2018
CREAF, Barcelona, May 2017
National Oceanography Centre, Southampton, October 2016
Dalhousie University, July 2016
Harvard University, May 2016
Princeton University, March 2016
Instituto de Ciencias del Mar, Barcelona, February 2016
Cambridge University, February 2016
ETH-Zurich, November 2015
University of Bern, November 2015
Geophysical Fluid Dynamics Laboratory, May 2015
Georgia Institute of Technology, April 2015
University of South Carolina, November 2014
University of British Columbia, September 2014
University of Bergen, April 2014
University of Toronto, CGCS Distinguished Lecturer Series, January 2013
University of Quebec at Rimouski, June 2013
Dalhousie University, April 2013
University of Ottawa, November 2012
Princeton University, May 2012
University of South Florida, March 2012
University of California at Santa Cruz, February 2012
Stanford University, December 2011
LSCE, Gif-sur-Yvette, France, September 2011
Canadian Meteorological and Oceanographic Society, Ottawa, April 2011.
University of Washington, March 2011.
Cambridge University, November 2010.
ETH-Zurich, December 2009.
Instituto de Ciencias del Mar, Barcelona, November 2009.
Universitat Autònoma de Barcelona, November 2009.
University of Pennsylvania, October 2009.
Columbia University (Lamont-Doherty Earth Observatory), March, 2009.
Laval University, November 2008.
University of Quebec at Montreal, November 2008.
GEOMAR, Kiel, October 2008.
McGill University, April 2008.
Columbia University (NASA-GISS), October 2007.
Columbia University (Lamont-Doherty Earth Observatory), January 2007.
Dalhousie University, January 2007.
MIT, November 2006.
Rutgers University, October 2006.

University of Victoria, February 2006.
Princeton University, September 2005.
University of Bremen, July 2005.
University of Oregon (Corvallis), May 2005.

Successful Funding

- 2017-2020:** ISIpedia-marine ecosystems and fisheries (ERA-4CS / APCIN).
€99,200 over 3 years (sole applicant).
- 2016-2021:** European Research Council Consolidator Grant (BIGSEA project).
€1,600,000 over 5 years (sole applicant).
- 2013-2016:** NSERC CCAR (VITALS) (co-applicant with 22 others).
\$70,000 over 3 years (Galbraith portion of total \$5,000,000).
- 2013-2014:** Compute Canada Resource Allocation.
~\$232,000 equivalent in CPU hours (660 cpu-years) over 2 years.
- 2012-2015:** MEOPAR Network Centre of Excellence (co-applicant with 37 others)
\$112,000 over 4 years (Galbraith portion of total \$25,000,000).
- 2011-2015:** NSERC Discovery Grant Supplement for Early Career Researchers.
\$20,000 over 4 years.
- 2012-2014:** FQRNT New Researchers grant.
\$40,000 over 2 years.
- 2010-2014:** Canadian Institute for Advanced Research (CIFAR) Scholar research support.
\$125,000 over 5 years.
- 2010-2015:** NSERC Discovery Grant.
\$100,000 over 5 years.
- 2010-2013:** CFI Leaders Opportunity Fund.
\$259,000.
- 2010-2012:** Compute Canada Resource Allocation.
~\$150,000 equivalent in CPU hours, over 3 years.
- 2010:** NSERC Research tools and Infrastructure (co-applicant with three others, PI Mucci).
\$31,000.
- 2009-2012:** McGill Start-up.
\$103,600.
- 2007-2009:** National Oceanic and Atmospheric Administration (NOAA) / Co-operative Institute for Climate Science (CICS).

\$256,000 USD over 2 years.

2003-2005: NSERC PGS-B in support of Ph.D. project.

2001: NSERC / DFO supplement in support of Ph.D. project.

2000-2002: NSERC PGS-A in support of M.Sc. work (converted to Ph.D.).

Trainees

Undergraduate: Jan-Erik Tesdal (2010-2011 NSERC USRA)

Julia Stepanuk (2012-2013)

Nicolas Brown (2013-2014 NSERC USRA)

Alexa Haughan (2013-2014)

Gerard Solanes Hernandez (2018-)

Masters: Simon Yang (2011-2012)

Casimir DeLavergne (2012-2013, Mysak Fellowship, co-advised)

Geneviève Elsworth (2012-2014, Geotop & Leroy scholarships, co-advised)

Lucas Kavanagh (2013-2015, Canada Graduate Scholarship)

Doctoral: David Carozza (2010-2015, Canada Graduate Scholarship, Leroy scholarship)

Kim Scherrer (2016-)

Post-doctoral: Taoufik Radi (2010-2012, FQRNT fellowship, co-advised)

Daniele Bianchi (2011-2014, CIFAR fellowship)

Olivier Cartapanis (2012-2014)

Mariona Claret (2014-2016)

David Carozza (2015-2016)

Sarah Eggleston (2016-2017, Swiss Mobility Fellowship)

Jérôme Guiet (2016-2018)

Priscilla LeMezo (2017-)

Sara Miñarro (2017-)

Ian Hatton (2018-)

Ryan Heneghan (2018-)

Dan Zhu (2019-)

University Teaching

Earth System Applications, ESYS 500. McGill. 2014 (co-taught)

Climate and the Carbon Cycle , EPSC 513. McGill.	2014
Earth System Processes , ESYS 200. McGill.	2013, 2014, 2015 (co-taught)
Climates of the Cenozoic , EPSC 551. McGill.	2011, 2013
Understanding Planet Earth , EPSC 201. McGill.	2012
Ocean Biogeochemical Dynamics , EPSC 552. McGill.	2011, 2014
Field School 2 , EPSC 331. McGill.	2011 (co-taught)
Antarctic Field Study , EPSC 552. McGill.	2011
Sedimentary Geology , EPSC 455. McGill.	2010
The Ocean Ecosystem , EOSC 315. UBC.	2005 (co-taught)
The Ocean Environment , EOSC 314. UBC.	2005, 2004 (co-taught)

University Activities

Examination committees

McGill University

Jianghua Wu, Geography, PhD 2009.

Louis-Philippe Nadeau, Atmospheric and Oceanic Sciences, PhD 2011.

Stelly Lefort, Earth and Planetary Sciences, PhD 2012. (Internal examiner)

Marc-Olivier Brault, Atmospheric and Oceanic Sciences, MSc 2012. (External examiner)

Georgina Paull, Atmospheric and Oceanic Sciences, MSc 2013. (External examiner)

Christophe Simmons, Atmospheric and Oceanic Sciences, PhD 2013. (Internal examiner)

Thi Hao Bui, Earth and Planetary Sciences, PhD 2014.

Princeton University

Brigitte Brunelle, PhD 2009.

External examiner

University of Rhode Island

Matthew Horn, Oceanography, PhD 2011.

University of Bergen

Eirik Galaasen, Department of Earth Sciences, PhD 2014.

Cambridge University

Emma Freeman, Department of Earth Sciences, PhD 2016.

Université de Montpellier

Jérôme Guiet, Department of Earth Sciences, PhD 2016.

University of Southampton

Andrew Gravelle, National Oceanography Centre, PhD 2016.

ETH Zurich

Simon Yang, Environmental Physics, PhD 2017.

Advisory committees

Universitat Autònoma de Barcelona

Maria Raja Sánchez, PhD (2015-)

Sven Pallacks, PhD (2018-)

University of Alberta

Laura Castro de la Guardia (2014-)

McGill University

Jian Zhou, Geography, MSc (2009-2011)

Michael Patterson, Earth and Planetary Sciences, PhD (2009-2014)

Qiang Chen, Earth and Planetary Sciences, MSc (2009-2012)

Christopher Simmons, Atmospheric and Oceanic Sciences, PhD (2009-2013)

Gregor Lucic, Earth and Planetary Sciences, PhD. (2010-2015)

Lucie Hubert-Théou, Earth and Planetary Sciences, PhD (2010-2013)

Jesse Colangelo-Lillis, Earth and Planetary Sciences, PhD (2012-2016)

Peter Crockford, Earth and Planetary Sciences, PhD (2013-2015)

Julien Jodoin, Biology, MSc (2014-2015)

Concordia University

Andrew Pinnosault, MSc (2009-2011)

Academic committees

Universitat Autònoma de Barcelona

Scientific steering committee, ICTA Maria de Maeztu Excellence Program (2015 -)

Guarantor, ICTA Maria de Maeztu Excellence Program (2017 -)

McGill University

Earth and Planetary Science seminar coordinator, 2009-2014

Faculty of Science Committee on Student Standing. 2011-. (as Chair, 2013-.)

Atmospheric and Oceanic Sciences, Physical Oceanographer Search. 2010.

Earth and Planetary Science Undergraduate Curriculum Review Committee. 2012.

Earth and Planetary Science Scholarship Committee. 2013.

Earth and Planetary Science Undergraduate Recruitment/Outreach. 2013-

Pro-Dean, Bio-medical Engineering, November 2011.

Pro-Dean, Biology, October 2014.

General lectures

Soup and Science mini-lecture, September 2009,2012; McGill Goes to Antarctica, March 2011;

STARS Antarctic expedition, May 2012; McGill Food for Thought lecture, October 2014.

Scholastic Awards

2005: Outstanding student poster award, AGU Fall Meeting, San Francisco

2004: Outstanding student poster award, International Conference on Paleoceanography 8, Biarritz, France

2002: Thomas and Marguerite MacKay scholarship from the University of British Columbia

2001: Outstanding student poster award, AGU Fall Meeting, San Francisco; Outstanding student poster award, International Conference on Paleoceanography 7, Sapporo, Japan

2000: Grant-in-aid awarded by the American Association of Petroleum Geologists; Egil H. Lorentzen Scholarship from the University of British Columbia

1997: Logan Gold Medal from McGill University

1996: Geological Association of Canada student internship prize; R.P.D. Graham scholarship from McGill University

1995: Reinhardt Scholarship from McGill University; Quebec Association of Geologists and Geophysicists bursary; Canadian Mineralogical Society student prize

External Activities

Working group co-leader

Global model co-ordinator, Fish Model Intercomparison Project (FishMIP)

Nitrogen Cycle in the Ocean, Past and Present (NICOPP) (on hiatus)

Workshop leadership / participation

October 2018. FishMIP workshop convenor. Institut de Ciències del Mar, Barcelona. Co-leader of 3-day workshop (with Derek Tittensor).

October 2017. Critical Constraints on the marine ecosystem, IMBER IMBIZO V, Woods Hole USA. Co-leader of week-long workshop (with Laurent Bopp).

May 2017. Global Fishing Watch workshop. Madrid, Spain.

October 2016. Quaternary Interglacial Working Group (QUIGS) meeting. Montreal, Canada.

September 2016. ICES SICCOME workshop on Modelling Effects of Climate Change on Fish and Fisheries, Riga, Latvia.

July 2016. Paleogenie: Earth System Coevolution. Bristol, UK.

June 2016. Intersectoral Integrated Model Intercomparison Project (ISIMIP) workshop, Potsdam, Germany.

December 2013. Paleoclimate Model Intercomparison Project (Phase 3). Corvallis, OR.

July 2011. Nitrogen Cycle in the Ocean, Past and Present (NICOPP). Halifax, NS.

November 2010. IGBP Fast-track initiative on nutrient limitation in the ocean. Southampton, UK.

July 2010. Princeton University/GFDL Climate Process Meeting,

May 2010. Canadian Institute for Advanced Research (CIFAR) Oceans workshop, Montreal, QC.

May 2010. Nitrogen Cycle in the Ocean, Past and Present (NICOPP). Montreal, QC. *Workshop organizer and fundraiser.*

March 2010. Ocean deoxygenation workshop. NASA Ames, California.

October 2009. Agouron nitrogen workshop. Scottsdale, Arizona.

May 2006. Corewall workshop. International Ocean Drilling Program (IODP) headquarters, Washington DC.

Session Convener

Known Unknowns and Unknown Unknowns: What are we missing, and how much impact lies in the gaps? Impacts 2017 conference, Potsdam, Germany.

Gordon Conference on Chemical Oceanography, 2017, New London, NH, USA. (Discussion leader.)

Geophysical Union Joint Meeting, 2015, Montreal. Silicate weathering through Earth history.

Integrated Marine Biogeochemistry and Ecosystem Research Conference, Bergen, Norway, 2014. Predicting Fish from Physics: Strengths, weaknesses, and ways forward.

International Conference on Paleoceanography, Sitges, Spain, 2013. Ocean biogeochemistry and ecosystems. (in absentia)

American Geophysical Union Fall Meeting, 2012. Quantifying fluxes in the marine nitrogen cycle, past and present.

Goldschmidt, Montreal, 2012. Past and future changes in ocean circulation.

American Geophysical Union Fall Meeting, 2008. Past changes in the biological pump: Integrating Theory with Observations.

Reviewer

Journals: Nature, Nature Geoscience, Science, Science Advances, Proceedings of the National Academy of Sciences, Nature Communications, Geology, PLOS ONE, WIREs Climate Change, Global Biogeochemical Cycles, Paleoceanography, Journal of Climate, Climate Dynamics, Biogeosciences, G-cubed, Geophysical Research Letters, Earth and Planetary Science Letters, Marine Geology, Quaternary Science Reviews, Geoscientific Model Development, Ecological Modeling, Fish and Fisheries, Marine Chemistry, Deep-Sea Research, Oceanography, Progress in Oceanography, American Geophysical Union Monographs, Scientia Marina, Nature Education, Scientific Reports.

Funding Agencies: National Science Foundation (NSF), Natural Science and Engineering Research Council of Canada (NSERC), Natural Environment Research Council (NERC), Netherlands Organisation for Scientific Research (NWO), Swiss National Science Foundation (SNF).

Memberships

Member of the American Geophysical Union (AGU) and Association for Limnology and Oceanography (ASLO).

Summer school lecturer

Redfield was right, Redfield was wrong: simplifications in a sea of flexible stoichiometry. Margalef Summer Colloquium, Barcelona, July 2017.

Ocean Biogeochemistry: Teaching a numerical ocean to breathe. European Earth System and Climate Modelling School (E2SCMS), Helsinki, June 2016

Global Modelling, and Past records of biogeochemistry. IMBER ClimECO summer school, Shanghai, August 2014.

Biogeochemical Modelling, and Biogeochemistry on Long Timescales. SOLAS summer school, Corsica, September 2011.

International Advisory Boards

Scientific Advisory Board, PalMod German Climate Modeling Initiative (2016 -).

Committees

Reseau Québec Maritime scientific evaluation committee, 2018.

Canadian Consortium for Ocean Drilling, 2009-2013. McGill representative.

Compute Canada National Resource Allocation Committee. 2012, 2013.

GEOTOP scholarship selection committee, 2010-2011.

Scientific cruises

Margin of North America (MONA) sediment coring campaign, May-July 2002.

Educational/media outreach

Accompanied high school students on eight 2-week educational cruises to Antarctica (4) and the arctic (4) as an Earth science expert and zodiac driver, with the award-winning non-profit group Students on Ice; between Dec. 2005 and August 2012.

Three spanish and catalan radio interviews on a lower limit to CO₂ levels (Galbraith and Eggleston, 2017) and two on future impacts of fishing technology (Galbraith et al., 2017).

Media coverage of deep Southern Ocean convection (De Lavergne et al., 2014) included: Scientific American, the Smithsonian, the Christian Science Monitor, Radio Canada International, CTV, Grist

National Public Radio (NPR) Academic Minute on changes in the nitrogen cycle, past and future, Nov. 2013.

Interviewed by CTV and CBC television regarding orca trapped in arctic ice (January, 2013).

Volunteer 'Climate Expert' for media education with the American Geophysical Union.

Invited plenary speaker at IPY Polar Educators conference, April 2012.

Appeared in the Water Brothers special on melting arctic ice (TV Ontario, 2011).

Software development

Ongoing development, maintenance and community support for a global climate model, CM2Mc, a marine biogeochemistry module, BLING, and a global model of fish and fisheries, BOATS.