

PETER M. J. DOUGLAS

McGILL UNIVERSITY
DEPARTMENT OF EARTH AND PLANETARY SCIENCES
3450 RUE UNIVERSITY
MONTREAL, QC
TEL: (514) 398-3677 • PETER.DOUGLAS@MCGILL.CA

EDUCATION

- 2014** **Yale University, New Haven, CT, USA Ph.D. Geology and Geophysics**
▪ Dissertation: *Plant-wax isotopes in Neotropical lake sediments and their insights into the ancient Maya civilization*
- 2009** **Yale University, New Haven, CT, USA M.Phil. Geology and Geophysics**
- 2005** **Pomona College, Claremont, CA, USA B.A. Geology, *summa cum laude***

EMPLOYMENT

- 2016-** **Assistant Professor**
McGill University, Montreal, QC, Canada
Department of Earth and Planetary Sciences
- 2014-2016** **Postdoctoral Fellow in Geochemistry**
California Institute of Technology, Pasadena, CA, USA
Division of Geological and Planetary Sciences

PEER-REVIEWED PUBLICATIONS (*In Reverse Chronological Order; italics indicate graduate student advisee author*)

- [18] **Douglas, P.M.J.**, Gonzalez Moguel, R., Walter Anthony, K. M., Wik, M., Crill, P.M., Dawson, K. S., Smith, D.A., Yanay, E., Lloyd, M.K., Stolper, D.A., Eiler, J. M., & Sessions, A.L., Clumped isotopes link older carbon substrates with slower rates of methanogenesis in northern lakes, (2020) *Geophysical Research Letters*, v. 47, e2019GL086756
- [17] Kang, M., Dong, Y., Liu, Y., Williams, J. P., **Douglas, P. M. J.**, & McKenzie, J. M. Potential increase in oil and gas well leakage due to earthquakes. (2019) *Environmental Research Communications*, v. 1, 121004.
- [16] **Douglas, P. M. J.**, Pagani, M., Eglinton, T. I., Brenner, M., Curtis, J. H., Breckinridge, A., and Johnston, K. A long-term decrease in the persistence of soil carbon caused by ancient Maya land use. (2018) *Nature Geoscience* v. 11, p. 645-649.
- [15] Shau, Y., **Douglas, P. M. J.**, Zhang, S., Stolper, D. A., Lewan, M., Lawson, M., Ellis, G., Mi, J., He, K., Hu, G., and Eiler, J. M. Equilibrium and non-equilibrium

- controls on the abundances of clumped isotopologues of methane during thermogenic formation; Implications for the chemistry of pyrolysis and the origin of natural gases. (2018) *Geochimica et Cosmochimica Acta* v. 223, p. 159-174.
- [14] Shau, Y., Etiope, G., Zhang, S., **Douglas, P. M. J.**, Huang, L., and Eiler, J. M. Methane clumped isotopes in Songliao Basin (China): New insights into abiotic vs biotic hydrocarbon distribution. (2018) *Earth and Planetary Science Letters* v. 482, p. 213-221.
- [13] Stolper, D. A., Lawson, M., Formolo, M. J., Davis, C. L., **Douglas, P. M. J.**, Sessions, A. L., Eiler, J. M. The utility of methane clumped isotopes to constrain the origins of methane in natural gas accumulations (2017) *Geological Society of London Special Publications* v. 468, p. 23-52.
- [12] **Douglas, P. M. J.**, Stolper, D. A., Eiler, J. M., Sessions, A. L., Lawson, M., Shau, Y., Bishop, A., Podlaha, O. G., Ferreira, A. A., Santos Neto, E. V., Niemann, M., Steen, A. S., Huang, L., Chimiak, L., Valentine, D. L., Fiebig, J., Luhmann, A. J., Seyfried Jr., W. E., Etiope, G., Schoell, M., Inskeep, W. P., Moran, J. J., and Kitchen, N. Clumped isotopes in methane; Progress and potential for a new isotopic tracer (2017) *Organic Geochemistry* v. 113, p. 262-282.
- [11] **Douglas, P. M. J.**, Stolper, D. A., Walter Anthony, K. M., Wik., M., Crill, P., Winterdahl, M., Paull, C., Dallimore, S., Smith, D. A., Sessions, A. L., Eiler, J. M. (2016) Diverse origins of Arctic and Subarctic methane point source emissions identified with multiply-substituted isotopologues: *Geochimica et Cosmochimica Acta* v.188, p. 163-188.
- [10] **Douglas, P. M. J.**, Demarest, A. A., Brenner, M., Canuto, M. A. Drought Impacts on the Lowland Maya civilization (2016) *Annual Reviews of Earth and Planetary Science* v. 44, p. 613-645.
- [9] **Douglas, P. M. J.**, Brenner, M., Curtis, J. H. (2016) Methods and future directions for paleoclimatology in the Maya Lowlands: *Global and Planetary Change* v. 138, p. 3-24.
- [8] **Douglas, P. M. J.**, Pagani, M., Eglinton, T. I., Brenner, M., Hodell, D. A., Curtis, J. H., and Canuto M. A. (2015) Drought, agricultural adaptation and sociopolitical collapse in the Maya Lowlands: *Proceedings of the National Academy of Sciences*, v. 112, p. 5607-5612.
- [7] Stolper, D. A., Martini, A. M., Clog, M., **Douglas, P. M. J.**, Shusta, S. S., Valentine, D. L., Sessions, A. L., and Eiler, J. M. (2015) Distinguishing and understanding thermogenic and biogenic sources of methane using multiply substituted isotopologues: *Geochimica et Cosmochimica Acta*, v. 161, p. 219-247.
- [6] Coutros, P., and **Douglas, P. M. J.** (2015) Coring Lake Fati and settlement archaeology of the Middle Niger Lakes Region: *African Archaeological Review*, v. 32, p. 249-266.
- [5] **Douglas, P. M. J.**, Pagani, M., Eglinton, T. I., Brenner, M., Hodell, D. A., Ma, K. F., Curtis, J. H., and Breckinridge, A. (2014) Pre-aged plant waxes in tropical lake sediments and their influence on molecular paleoclimate proxy records: *Geochimica et Cosmochimica Acta*, v. 141, p. 346-364.

- [4] Sijp, W. P., Dijkstra, H. A., Floegel, S., von der Heydt, A. S., **Douglas, P. M. J.**, and Bijl, P.K. (2014) The role of ocean gateways on cooling climate on long time scales: *Global and Planetary Change*, v. 119, p. 1-22.
- [3] **Douglas, P. M. J.**, Affek, H. P., Ivany, L. C., Houben, A. J. P., Sijp, W. P., Sluijs, A., Schouten, S., and Pagani, M. (2014) Pronounced zonal heterogeneity in Eocene southern high-latitude sea surface temperatures: *Proceedings of the National Academy of Sciences*, v. 111, p. 6582-6587.
- [2] **Douglas, P. M. J.**, Pagani, M., Brenner, M., Hodell, D. A., and Curtis, J. H. (2012) Aridity and vegetation composition are important determinants of leaf-wax δD values in southeastern Mexico and Central America: *Geochimica et Cosmochimica Acta*, v. 97, p. 24-45.
- [1] Keating-Bitonti, C. R., Ivany, L. C., Affek, H. P., **Douglas, P. M. J.**, and Samson, S. D. (2011) Warm, not super-hot, temperatures in the early Eocene subtropics: *Geology*, v. 39, p.771-774.

SUBMITTED PUBLICATIONS IN REVIEW OR REVISION (*italics indicate graduate student advisee author*)

- [19] *Bourque, R., **Douglas, P.M.J.**, & Larsson, H., Reconstruction of changes in carbon and water cycling and plant ecology across the Cretaceous-Paleogene boundary in western Canada using plant wax lipid distributions and isotopic measurements, in review for Palaeogeography, Palaeoclimatology, Palaeoecology*
- [20] *Preskienis, V., Laurion, I., Bouchard, F., **Douglas, P.M.J.**, Billett, M.F., Fortier, D., & Xu, X., Seasonal patterns in greenhouse gas emissions from lakes and ponds on a High Arctic polygonal landscape, in revision for Limnology and Oceanography*

INVITED PRESENTATIONS (Past five years)

- New isotopic approaches to understanding carbon-cycling in freshwater sediments. *University of Ottawa, Department of Earth and Environmental Sciences, Ottawa, ON, Canada (November 2017)*
- What plant waxes in lake sediments can tell us about the Ancient Maya. *Geotop, Université du Québec à Montréal, Département des Sciences de la Terre et de l'atmosphère, Montreal, QC, Canada (April 2017)*
- Clumped isotopes as a new tracer of methane sources and sinks. *Université du Québec à Montréal, Département des Sciences Biologiques, Montreal, QC, Canada (February 2017)*
- Clumped isotopes as a new tracer of methane sources and sinks. *McGill University, Atmospheric and Ocean Sciences Department, Montreal, QC, Canada (November 2016)*
- Applying clumped isotopes to understand high-latitude climate change in the past and present. *St. Andrews University, Earth and Environmental Sciences Department, St. Andrews, United Kingdom (January 2016)*

- Using clumped isotopes to understand Arctic methane emissions. *McGill University, Earth and Planetary Sciences Department, Montreal, QC, Canada (December 2015)*
- Plant wax isotopes in tropical lake sediments and what they tell us about the ancient Maya civilization. *University of Kentucky, Earth and Environmental Sciences Department, Lexington, KY, USA (March 2015)*
- Plant wax isotopes in tropical lake sediments and what they tell us about the ancient Maya. *University of Michigan, Earth and Environmental Sciences Department, Ann Arbor, MI, USA (October 2014)*
- What molecules in mud tell us about the ancient Maya. *Geology Department Colloquium, Pomona College, Claremont, CA, USA (April 2014)*

SELECTED RECENT CONFERENCE PRESENTATIONS

[Past 5 years, only including presentations by myself or student advisees; underlining denotes undergraduate student advisee; *italics denote graduate student advisee.*]

- **Douglas, P.M.J.**, Stratigopoulos, E., & Park, J.. Global patterns in the hydrogen isotope composition of methane from freshwater ecosystems with implications for source apportionment and methanogenesis pathways. *American Geophysical Union Fall Meeting 2019 San Francisco, USA.*
- *Gonzalez Moguel, R.*, Douglas, **P.M.J.**, Bass, A., Pilote, M., & Garnett, M. (Radiocarbon Data from Permafrost Peatland Lakes Indicate Dissolved Methane is Dominantly Modern while Particulate Matter and Ebullition Methane Contain Older Carbon. *2019 American Geophysical Union Fall Meeting 2019 San Francisco, USA.*
- *Keenan, B., Fabre, E.*, **Douglas, P.M.J.**, Breckenridge, A., Johnston, K., & Obrist-Farner, J. (2019). Determining the controls on faecal stanol concentrations and ratios in tropical lake sediments. *American Geophysical Union Fall Meeting 2019 San Francisco, USA.*
- *Ni, J., Leveille, R. J.*, & **Douglas, P.M.J.** (2019). Examining possibilities for speleothem biosignatures in Mars lava tubes based on Californian lava tubes. *American Geophysical Union Fall Meeting 2019 San Francisco, USA.*
- **Douglas, P.M.J.**, *Gonzalez Moguel, R.*, Walter Anthony, K. M., Wik, M., Crill, P.M., Dawson, K. S., Smith, D.A., Yanay, E., Lloyd, M.K., Stolper, D.A., Eiler, J. M., & Sessions, A.L. Isotopic Evidence that Older Carbon Substrates Lead to Slower Rates of Methane Production in Permafrost Associated Lakes. *2019 International Union of Geodesy and Geophysics General Assembly, Montreal, Canada.*
- *Keenan, B.*, **Douglas, P.M.J.**, Breckenridge, A., Johnston, K., & Obrist-Farner, J. (2019). Faecal stanols from a tropical lake core as a proxy for population change at Itzan in the southwestern Maya Lowlands. *22nd GMPCA Colloquium, Montreal, Canada.*
- *Bourque, R.*, **Douglas, P.M.J.**, & Larsson, H., Cretaceous-Paleogene Boundary Climate Proxies using Carbon and Hydrogen Isotopes from Plant-wax Lipids. *2019 International Union of Geodesy and Geophysics General Assembly, Montreal, Canada.*

- **Bourque, R., Douglas, P.M.J., & Larsson, H.**, Latest Cretaceous Climate Proxies Using Carbon and Hydrogen Isotopes from Plant-wax lipids. *2019 Canadian Society for Vertebrate Paleontology Assembly, Grande Prairie, AB.*
- **Douglas, P.M.J., Gonzalez Moguel, R., Crill, P., Wik, M., Walter Anthony, K., Eiler, J., Sessions, A.** Methane Radiocarbon and Clumped Isotope Measurements in Lakes from Permafrost Landscapes Link Methanogenesis Kinetics with the Age of Carbon Substrates. *American Geophysical Union Fall Meeting, Washington, DC, USA (2018).*
- **Ni, J., Leveille, R.J., and Douglas, P. M. J** Biogeochemical signatures in coralloid speleothems in basaltic lava tubes. *American Geophysical Union Fall Meeting, Washington, DC, USA (2018).*
- **Keenan, B., Douglas, P. M. J., Breckenridge, A.J., and Johnston, K.**, Using faecal stanols from a tropical lake core to reconstruct human population dynamics in the southwestern Maya Lowlands. *American Geophysical Union Fall Meeting, Washington, DC, USA (2018).*
- **Douglas, P.M.J., Stratigopoulos, E., Park, J., and Keenan, B.** Isotopic insights into organic matter transport and transformation across hydrological interfaces in a temperate forest catchment. *Canadian Geophysical Union Annual Meeting, Niagara Falls, ON (2018).*
- **Ni, J., Leveille, R.J., and Douglas, P. M. J.** Identification of mineral-organic relation in coralloid speleothems in lava tubes. *Astrobiology Australasia Meeting, Rotarua, New Zealand (2018).*
- **Ni, J., Leveille, R.J., and Douglas, P. M. J.** Astrobiology Training in Lava Tubes (ATiLT): Characterizing coralloid speleothems in basaltic lava tubes as a Mars analogue. *American Geophysical Union Fall Meeting, New Orleans, LA USA (2017).*
- **Lin, Y.R., Douglas, P. M. J.** and Wing, B. Bacterial growth rates and sulfur isotope fractionation. *Geobiology Society Conference, Banff, AB (2017).*
- **Douglas, P. M. J., Pagani, M., Eglinton, T. I., Brenner, M., Curtis, J. H., Hodell, D.A., Breckinridge, A., and Johnston, K.** Ancient Maya land use reduced the residence time of carbon in tropical forest soils. *V. M. Goldschmidt Meeting, Paris, France (2017).*
- **Douglas, P. M. J., Stolper, D. A., Lawson, M., Shuai, Y., Walter Anthony, K.M., Eiler, J.E., and Sessions, A.L.** The use of methane clumped isotopes as a new tool to understand the formation of natural gas reservoirs. *Geological Association of Canada-Mineralogical Association of Canada Meeting, Kingston, ON (2017).*
- **Douglas, P. M. J., Walter Anthony, K.M., Stolper, D.A., Wik, M., Crill, P., Winterdahl, M., Eiler, J.E., and Sessions, A.L.** Clumped isotopes as a new tracer for methane emitted from northern lakes. *Society of Canadian Limnologists Meeting, Montreal, QC (2017).*
- **Douglas, P. M. J., Walter Anthony, K.M., Dawson, K., Lloyd, M., Smith, D.A., Yanay, E., Eiler, J.E., and Sessions, A.L.** Steps towards identifying a biogeochemical signal in non-equilibrium methane clumped isotope measurements. *American Geophysical Union Fall Meeting, San Francisco, CA, USA (2016).*

- **Douglas, P. M. J.**, Walter Anthony, K.M., Dawson, K., Smith, D.A., Yanay, E., Wik, M., Crill, P., Winterdahl, M., Stolper, D.A., Eiler, J.E., and Sessions, A.L.. Variability in non-equilibrium clumped isotope values in microbial methane from cultures and natural ecosystems. *Gordon Research Conference in Organic Geochemistry, Holderness, NH, USA (2016)*.
- **Douglas, P. M. J.**, Walter Anthony, K.M., Smith, D.A., Wik, M., Crill, P., Winterdahl, M., Paull, C., Dallimore, S., Stolper, D.A., Eiler, J.E., and Sessions, A.L. Diverse origins of Arctic methane emissions identified with multiply substituted isotopologues. *American Chemical Society National Meeting, San Diego, CA, USA (2016)*.
- **Douglas, P. M. J.**, Stolper, D. A., Eiler, J. M., Sessions, A. L., Walter Anthony, K. M., Wik, M., Crill, P., Winterdahl, M., Paull, C., Dallimore, S., Smith, D. A., Ponton, C. Insights into methane formation temperatures, biogenic methanogenesis, and natural methane emissions from clumped isotopes. *American Geophysical Union Fall Meeting, San Francisco, CA, USA (2015)*
- **Douglas, P. M. J.**, Stolper, D. A., Eiler, J. M., Sessions, A. L., Walter Anthony, K. M. The application of methane clumped isotope measurements to determine the source of large methane seeps in Alaskan lakes. *American Geophysical Union Fall Meeting, San Francisco, CA, USA (2014)*
- **Douglas, P. M. J.**, Pagani, M., Eglinton, T. I., Brenner, M., Hodell, D. A., Curtis, J. H., Ma, K. F., Breckenridge, A. Plant-wax ages in tropical lake sediments and soils: New insights into age distributions, transport and residence times. *Gordon Research Conference in Organic Geochemistry, Holderness, NH, USA (2014)*.
- **Douglas, P. M. J.**, Pagani, M., Eglinton, T. I., Brenner, M., Curtis, J. H., Hodell, D. A., Canuto, M. A. Plant-wax isotope records of drought and ancient societal adaptation in the Maya Lowlands. *V.M. Goldschmidt Conference, Sacramento, CA, USA (2014)*.

STUDENT SUPERVISION:

Current Graduate Students: Benjamin Keenan (PhD2); Regina Moguel (PhD2); Robert Bogue (Co-supervised; PhD2)

Current Undergraduate Students: Sophia Chen (Earth Systems Science Honour's Thesis, U3); Dawson Phan (Summer Research Course 2017, Earth Systems Science U2)

Completed Graduate Students: Ying Ran Lin (Co-supervised; MSc 2017); Louise-Marie Meunier (Co-supervised; PhD 2018); Robert Borque (MSc 2019) Jenny Ni (Co-supervised; MSc 2019);

Previous Undergraduate Students: Emerald Stratigopoulos (SURA, U2, 2017); Jenny Park (SURA, U3, 2017)

Visiting Graduate Student Interns: Emma Fabre (MSc, ENS Lyon, Summer 2019)

TEACHING EXPERIENCE

2017-Present McGill University

- *Earth System Processes (ESYS 200; 2017, 2018, 2019, 2020)*
- *Isotope Geology (EPSC 519; 2017, 2019)*
- *Applied Geochemistry Seminar (EPSC 590; 2019)*
- *Cold Regions Earth Science (EPSC 550; 2018)*
- *Independent Study Courses: Isotope Geochemistry in Estuaries; Isotope Tracers in Soils and Sediments; Carbon Isotopes and the Global Carbon Cycle*

AWARDS

- McGill Institute for Science and Public Policy Trottier Fellowship 2017
- Yale Geology and Geophysics William E. Ford Prize 2014
- Yale Geology and Geophysics Hammer Prize 2012
- National Science Foundation Graduate Research Fellowship 2008

RESEARCH GRANTS

- FRQNT Team Grant (lead PI; total amount totals \$200,000 over three years) 2020
- Geotop Research Centre Collaborative Grants (lead PI; total amount \$25,000 over two years) 2020
- McGill Sustainable Systems Initiative Ideas Fund (co-PI; total amount \$50,000 over one year) 2019
- Geotop Research Centre Collaborative Grants (2) (co-PI; total amount \$50,000 over two years) 2019
- FRQNT New Researchers Grant (\$70,000 over two years) 2018
- Geotop Research Centre Collaborative Grant (co-PI; total amount \$25,000 over two years) 2018
- McGill Sustainable Systems Initiative Ideas Fund (co-PI; total amount \$50,000 over one year) 2018
- Trottier Institute for Science and Public Policy Fellowship (\$90,000 over two years) 2017
- Natural Sciences and Engineering Research Council Discovery Grant (\$27,000 per year for five years) 2017
- Natural Sciences and Engineering Research Council Northern Research Supplementary Grant (\$15,000 per year for five years) 2017

- Natural Sciences and Engineering Research Council Research Tools and Instruments (co-PI on two awards for a total of \$248,644) 2017
- Canadian Fund for Innovation, John R. Evans Leaders Fund (\$618,000) 2017

SERVICE

Departmental and University Administrative Service:

- 2019-2020: EPS Facilities Chair; EPS Advisor on Royal Victoria Project; Faculty of Science CGS Master's and Doctoral Awards Selection Committees; Trottier Institute for Science and Public Policy Fellow Selection Committee
- 2018-2019: EPS Chair's Advisory Committee; Seminar Coordination Committee; Graduate Student Orientation Committee; Faculty of Science Internal RTI Selection Committee
- 2017-2018: EPS Chair's Advisory Committee; Graduate Student Awards Committee; Seminar Coordination Committee; Graduate Student Orientation Committee
- 2016-2017: EPS Department Geobiology Faculty Search Committee; Seminar Coordination Committee; Geography Department Soil Biogeochemistry Faculty Search Committee (External Member)

Academic Community Service:

- **Scientific Session Convenor:**
 - American Geophysical Union Fall Meeting 2018 (*Understanding the Interactions Between Hydrological and Biogeochemical Dynamics in Permafrost Environments with Observations and Models*);
 - Goldschmidt Conference 2019 (*Advances in Isotopic Approaches to Understand the Sources and Fates of Environmental Pollutants*);
 - American Geophysical Union Fall Meeting 2018 (*Interactions between hydrological and biogeochemical change in permafrost environments*);
 - American Geophysical Union Fall Meeting 2014 (*Molecular biomarkers: From source to sink to environmental reconstruction*);
 - V.M. Goldschmidt Conference 2012 (*Paleotemperature proxies: Processes and comparisons*);
- **Workshop Organizer**
 - *Re-thinking National Methane Emissions Quantification and Mitigation*, Montreal, September 2019, Workshop funded by the Trottier Institute for Science and Public Policy and the Trottier Institute for Sustainable Design
 - *New Perspectives on Past Climate Change and Societal Disruption*, Urbino, Italy, June 2014, Workshop funded by the Italian Ministry of the Environment

- **Proposal Reviewer** for 49 proposals from international funding agencies, including the Natural Sciences and Engineering Research Council (Discovery Grants; RTI); U.S. National Science Foundation (Sedimentology and Paleobiology; Geobiology and Low-Temperature Geochemistry; Past Perspectives on Climate Change; Antarctic Sciences; and Archaeology); American Chemical Society Petroleum Research Fund; U.K. Natural Environment Research Council; European Research Council; Netherlands Organization for Scientific Research; Graduate Women in Science Fellowship.
- **Manuscript Reviewer** for 46 manuscripts from a diverse set of journals including *Applied Geochemistry*; *Climate of the Past*; *Earth and Planetary Science Letters*; *Earth Science Reviews*; *Geochemistry, Geophysics, Geosystems*; *Geochimica et Cosmochimica Acta*; *Geoderma*; *Geology*; *Journal of Geophysical Research–Biogeosciences*; *Journal of Paleolimnology*; *Nature Geoscience*; *Nuclear Instruments and Methods in Physics Research*; *Organic Geochemistry*; *Paleoceanography*; *PLOS One*; *Proceedings of the National Academy of Sciences*; *Radiocarbon*; *Quaternary Research*; *Quaternary Science Reviews*; *Science Advances*; *Water Resources Research*
- Awarded 2017 Certificate for Excellence in Reviewing from the Journal of Paleolimnology.