

Gretchen Keppel-Aleks

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EDUCATION **California Institute of Technology**, Pasadena, CA USA
Ph.D., Environmental Science and Engineering, May 2011
Thesis: "Constraints on the global carbon budget from variations in total column carbon dioxide"

California Institute of Technology, Pasadena, CA USA
M.S., Environmental Science and Engineering, June 2006

Massachusetts Institute of Technology, Cambridge, MA USA
S.B., Chemical Engineering, June 2004
Thesis: "The role of soot in tropospheric cloud processes"

ACADEMIC EMPLOYMENT Assistant Professor: Climate and Space Sciences and Engineering, 2013 – present
University of Michigan

NOAA Climate and Global Change Postdoctoral Fellow, 2011–2013
University of California – Irvine
Advisor: James T. Randerson

Graduate Research Assistant, 2004–2011
California Institute of Technology
Advisors: Paul O. Wennberg and Tapio Schneider

Undergraduate Research Assistant, 2001–2004
Massachusetts Institute of Technology
Thesis advisor: Mario J. Molina

PUBLICATIONS Graduate and undergraduate students are underlined; *Postdoctoral scholars have an asterisk.

Submitted or in review

*Gerlein-Safdi, C., **G. Keppel-Aleks**, F. Wang, S. Frohking, and D. L. Mauzerall, Satellite monitoring of natural reforestation efforts in China's drylands, *submitted*.

Torres, A. D., **G. Keppel-Aleks**, S. C. Doney, M. A. Fendrock, K. Luis, M. De Mazière, F. Hase, C. Petri, D. F. Pollard, C. M. Roehl, R. Sussmann, V. A. Velazco, T. Warneke, and D. Wunch, A geostatistical framework for quantifying the imprint of mesoscale atmospheric transport on satellite trace gas retrievals, *in review*.

Lawrence, D. M., R.A., Fisher, C. D. Koven, K. W. Oleson, S. C. Swenson, G. Bonan, N. Collier, B. Ghimire, L. van Kampenhout, D. Kennedy, E. Kluzen, P. J. Lawrence, F. Li, H. Li, D. Lombardozzi, W. J. Riley, W. J. Sacks, M. Shi, M. Vertenstein, W. R. Wieder, C. Xu, A. A. Ali, A. M. Badger, G. Bisht, M. A. Brunke, S. P. Burns, J. Buzan, M. Clark, A. Craig, K. Dahlin, B. Drewniak, J. B. Fisher, M. Flanner, A. M. Fox, P. Gentine, F. Hoffman, **G. Keppel-Aleks**, R. Knox, S. Kumar, J. Lenaerts, L. R.

Leung, W. H. Lipscomb, Y. Lu, A. Pandey, J. D. Pelletier, J. Perket, J. T. Randerson, D. M. Ricciuto, B. M. Sanderson, A. Slater, Z. M. Subin, J. Tang, R. Q. Thomas, M. Val Martin, and X. Zeng, The Community Land Model version 5: Description of new features, benchmarking, and impact of forcing uncertainty, *in review*.

Zhu, P., S. J. Cheng, Z. Butterfield, G. Keppel-Aleks, A. L. Steiner, The Global Influence of Cloud Optical Thickness on Terrestrial Carbon Uptake, *in review*.

Peer-reviewed (20 total; h-index = 15)

Collier, N., F. M. Hoffman, D. M. Lawrence, G. Keppel-Aleks, C. D. Koven, W. J. Riley, M. Mu, and J. T. Randerson, (2018), The ILAMB benchmarking system: Design, theory, and implementation, *J. Advances in Modeling Earth Systems*, 10, 2731-2754, doi://10.1029/2018MS001354.

*Hamilton, M., P. Fischer, S. Guikema, and G. Keppel-Aleks, (2018), Behavioral adaptation to climate change in fire-prone ecosystems, *WIREs Climate Change*, 9, doi://10.1002/wcc.553.

Keppel-Aleks, G., S. J. Basile, and F. M. Hoffman (2018), A functional response metric for the temperature sensitivity of tropical ecosystems, *Earth Interactions*, doi:10.1175/EI-D-17-0017.1.

*Liptak, J., G. Keppel-Aleks, and K. Lindsay (2017), Drivers of multi-century trends in the atmospheric CO₂ mean annual cycle in a prognostic ESM, *Biogeosciences*, 14(6), 1383–1401, doi:10.5194/bg-14-1383-2017.

Keppel-Aleks, G., and R. A. Washenfelder (2016), The effect of atmospheric sulfate reductions on diffuse radiation and photosynthesis in the United States during 1995–2013, *Geophys. Res. Lett.*, 43(18), 9984–9993, doi:10.1002/2016GL070052..

Keppel-Aleks, G., *A. S. Wolf, M. Mu, S. C. Doney, D. C. Morton, P. S. Kasibhatla, J. B. Miller, E. J. Dlugokencky, and J. T. Randerson (2014), Separating the influence of temperature, drought, and fire on interannual variability in atmospheric CO₂, *Global Biogeochem. Cycles*, 28(11), 1295–1310, doi:10.1002/2014GB004890.

Keppel-Aleks, G., J. T. Randerson, K. Lindsay, B. B. Stephens, J. Keith Moore, S. C. Doney, P. E. Thornton, N. M. Mahowald, F. M. Hoffman, C. Sweeney, P. P. Tans, P. O. Wennberg, and S. C. Wofsy (2013), Atmospheric carbon dioxide variability in the Community Earth System Model: Evaluation and transient dynamics during the twentieth and twenty-first centuries, *J. Climate*, 26(13), 4447–4475, doi:10.1175/JCLI-D-12-00589.1.

Keppel-Aleks, G., P. O. Wennberg, C. W. O'Dell, and D. Wunch (2013), Towards constraints on fossil fuel emissions from total column carbon dioxide, *Atmos. Chem. Phys.*, 13(8), 4349–4357, doi:10.5194/acp-13-4349-2013.

Wunch, D., P. O. Wennberg, J. Messerschmidt, N. C. Parazoo, G. C. Toon, N. M. Deutscher, G. Keppel-Aleks, C. M. Roehl, J. T. Randerson, T. Warneke, and J. Notholt (2013), The covariation of northern hemisphere summertime CO₂ with surface temperature in boreal regions, *Atmos. Chem. Phys.*, 13(18), 9447–9459, doi:10.5194/acp-13-9447-2013.

Keppel-Aleks, G., P. O. Wennberg, R. A. Washenfelder, D. Wunch, T. Schneider, G. C. Toon, R. J. Andres, J.-F. Blavier, B. Connor, K. J. Davis, A. R. Desai, J. Messerschmidt, J. Notholt, C. M. Roehl, V. Sherlock, B. B. Stephens, S. A. Vay, and S. C. Wofsy (2012), The imprint of surface fluxes and transport on variations in total column carbon dioxide, *Biogeosciences*, *9*(3), 875–891, doi10.5194/bg-9-875-2012.

Keppel-Aleks, G., P. O. Wennberg, and T. Schneider (2011), Sources of variations in total column carbon dioxide, *Atmos. Chem. Phys.*, *11*, 3581–3593, doi10.5194/acp-11-3581-2011.

Butz, A., S. Guerlet, O. Hasekamp, D. Schepers, A. Galli, I. Aben, C. Frankenberg, J. M. Hartmann, H. Tran, A. Kuze, **G. Keppel-Aleks**, G. Toon, D. Wunch, P. Wennberg, N. Deutscher, D. Griffith, R. Macatangay, J. Messerschmidt, J. Notholt, and T. Warneke (2011), Toward accurate CO₂ and CH₄ observations from GOSAT, *Geophys. Res. Lett.*, *38*, L14812, doi:10.1029/2011GL047888.

Wunch, D., P. O. Wennberg, G. C. Toon, B. J. Connor, B. Fisher, G. B. Osterman, C. Frankenberg, L. Mandrake, C. O’Dell, P. Ahonen, S. C. Biraud, R. Castano, N. Cressie, D. Crisp, N. M. Deutscher, A. Eldering, M. L. Fisher, D. W. T. Griffith, M. Gunson, P. Heikkinen, **G. Keppel-Aleks**, E. Kyrö, R. Lindenmaier, R. Macatangay, J. Mendonca, J. Messerschmidt, C. E. Miller, I. Morino, J. Notholt, F. A. Oyafuso, M. Rettinger, J. Robinson, C. M. Roehl, R. J. Salawitch, V. Sherlock, K. Strong, R. Sussmann, T. Tanaka, D. R. Thompson, O. Uchino, T. Warneke, and S. C. Wofsy (2011), A method for evaluating bias in global measurements of CO₂ total columns from space, *Atmos. Chem. Phys.*, *11*(23), 12,317–12,337, doi:10.5194/acp-11-12317-2011.

Reuter, M., H. Bovensmann, M. Buchwitz, J. P. Burrows, B. J. Connor, N. M. Deutscher, D. W. T. Griffith, J. Heymann, **G. Keppel-Aleks**, J. Messerschmidt, J. Notholt, C. Petri, J. Robinson, O. Schneising, V. Sherlock, V. Velazco, T. Warneke, P. O. Wennberg, and D. Wunch (2011), Retrieval of atmospheric CO₂ with enhanced accuracy and precision from SCIAMACHY: Validation with FTS measurements and comparison with model results, *J. Geophys. Res.-Atmos.*, *116*, D04301, doi:10.1029/2010JD015047.

Wunch, D., G. C. Toon, P. O. Wennberg, S. C. Wofsy, B. B. Stephens, M. L. Fischer, O. Uchino, J. B. Abshire, P. Bernath, S. C. Biraud, J. F. L. Blavier, C. Boone, K. P. Bowman, E. V. Browell, T. Campos, B. J. Connor, B. C. Daube, N. M. Deutscher, M. Diao, J. W. Elkins, C. Gerbig, E. Gottlieb, D. W. T. Griffith, D. F. Hurst, R. Jimenez, **G. Keppel-Aleks**, E. A. Kort, R. Macatangay, T. Machida, H. Matsueda, F. Moore, I. Morino, S. Park, J. Robinson, C. M. Roehl, Y. Sawa, V. Sherlock, C. Sweeney, T. Tanaka, and M. A. Zondlo (2010), Calibration of the Total Carbon Column Observing Network using aircraft profile data, *Atmos. Meas. Tech.*, *3*(5), 1351–1362, doi:10.5194/amt-3-1351-2010.

Deutscher, N. M., D. W. T. Griffith, G. W. Bryant, P. O. Wennberg, G. C. Toon, R. A. Washenfelder, **G. Keppel-Aleks**, D. Wunch, Y. Yavin, N. T. Allen, J. F. Blavier, R. Jimenez, B. C. Daube, A. V. Bright, D. M. Matross, S. C. Wofsy, and S. Park (2010), Total column CO₂ measurements at Darwin, Australia - site description and calibration against in situ aircraft profiles, *Atmos. Meas. Tech.*, *3*(4), 947–958, doi:10.5194/amt-3-947-2010.

Wunch, D., P. O. Wennberg, G. C. Toon, **G. Keppel-Aleks**, and Y. G. Yavin (2009), Emissions of greenhouse gases from a North American megacity, *Geophys. Res. Lett.*, *36*, L15,810, doi:10.1029/2009GL039825.

Keppel-Aleks, G., G. C. Toon, P. O. Wennberg, and N. M. Deutscher (2007), Reducing the impact of source brightness fluctuations on spectra obtained by Fourier-transform spectrometry, *Applied Optics*, 46(21), 4774–4779.

Yang, Z., R. A. Washenfelder, **G. Keppel-Aleks**, N. Y. Krakauer, J. T. Randerson, P. P. Tans, C. Sweeney, and P. O. Wennberg (2007), New constraints on Northern Hemisphere growing season net flux, *Geophys. Res. Lett.*, 34, L12807, doi:10.1029/2007GL029742.

Zuberi, B., K. S. Johnson, **G. K. Aleks**, L. T. Molina, M. J. Molina, and A. Laskin (2005), Hydrophilic properties of aged soot, *Geophys. Res. Lett.*, 32(1), L01807, doi: 10.1029/2004GL021496.

TEACHING AND
MENTORING

University of Michigan

Instructor for AOSS 466: Carbon-Climate Interactions, Winter 2014, Fall 2015, Fall 2017

Instructor for Climate 422: Boundary Layer Meteorology, Fall 2014, Fall 2016

Instructor for Climate 350: Atmospheric Thermodynamics, Winter 2015, Winter 2016, Winter 2017, Winter 2019

Instructor for AOSS 749: Climate and Space Seminar, Fall 2015, Winter 2016

Undergraduate research mentor:

- Allison Hogikyan (July 2017 – July 2018)
- Emily Gargulinski (Winter 2017)
- Alana Noone (Summer 2015)
- Minsung Kwon (summer 2014)
- Jack Simmons (winter 2014)
- Morgan Gorris (2013-2014)
- Srishti Pilutla (UROP; 2013-2014)

Masters research mentor:

- Stephen Barr (CLASP MEng student) – Winter 2018 – Fall 2018
- Emily Gargulinski (CLASP MEng student) – Fall 2017
- Luis Sagastume (Applied Physics Bridge MS student), Summer 2014 – Winter 2015

Doctoral research mentor:

- Matthew Wozniak, Climate and Space Sciences and Engineering, PhD expected May 2019 (co-chair)
- Samantha Basile, Climate and Space Sciences and Engineering, PhD expected August 2019 (chair)
- Zachary Butterfield, Climate and Space Sciences and Engineering, PhD expected May 2020 (chair)
- Anthony Torres, Climate and Space Sciences and Engineering, PhD expected May 2020 (chair)
- Morgan Cheatham, Applied Physics, PhD expected May 2022 (chair)
- Yifan Guan, Climate and Space Sciences and Engineering, PhD expected May 2023 (chair)

PhD Dissertation Committee:

- Rebekah Stein (Earth and Environmental Science), expected May 2021
- Phoebe Aron (Earth and Environmental Science), expected May 2020
- Christina Reynolds (Civil and Environmental Engineering), June 2019

- Sandro Gvakharia (Applied Physics), March 2019
- Lizz Ultee (Climate and Space Sciences and Engineering), July 2018
- Juan Crespo (Climate and Space Sciences and Engineering), February 2018
- Yang Li (Climate and Space Sciences and Engineering), April 2017
- David Wright (Climate and Space Sciences and Engineering), June 2016
- Justin Perket (Applied Physics), July 2015

Postdoctoral mentor:

- Ke Xu (November 2018 – present)
- Xin Lin (June 2018 – present)
- Cynthia Gerlein-Safdi (Fall 2017 – present; co-advising with Chris Ruf)
- Matthew Hamilton (2016-2018; co-advising with Paige Fischer and Seth Guikema)
- Jessica Liptak (2014-2017); currently a scientific computing specialist at Engility/Geophysical Fluid Dynamics Laboratory (GFDL)

California Institute of Technology

Teaching Assistant and guest lecturer for *Climate Change*, Fall 2005, Fall 2008

Teaching Assistant and guest lecturer for *Biogeochemical Cycles*, Spring 2008

Research Mentor, Summer Undergraduate Research Fellowship Program, Summer 2007

Residential Advisor, Caltech Avery House, 2007-2008

INVITED
PRESENTATIONS

AGU Chapman Conference on Understanding Carbon-Climate Feedbacks, August 2019

JPL Workshop on Ecosystems-Air Quality Interactions, January 2019

American Geophysical Union Fall Meeting, December 2018

National Academy of Science – Kavli Frontiers of Science Chinese-American Symposium, October 2018

McGill University, Atmospheric and Oceanic Sciences, September 2018

Ecological Society of America Annual Meeting, August 2018

American Meteorological Society Annual Meeting, January 2018

University of California: Berkeley Atmospheric Science Consortium, October 2017

Carbon Data Development for the Next Generation meeting, Norwich, UK, July 2017

American Association for the Advancement of Science, panelist, February 2017

Lawrence Berkeley Laboratory, Climate and Ecosystem Sciences Division, November 2016

Colorado State University, Atmospheric Sciences, October 2016

University of Toronto, Atmospheric Physics, April 2016

North American Carbon Project: Developing Predictive Carbon Cycle Science workshop, March 2016

American Geophysical Union Fall Meeting, December 2015

University of Wisconsin Atmospheric and Ocean Sciences Seminar, November 2015

American Chemical Society, May 2015

Tel Aviv University Geophysics and Planetary Science Seminar, November 2014
Weizmann Institute Earth and Planetary Science Seminar, November 2014
University of Michigan Ecology and Evolutionary Biology Seminar, March 2014
University of Michigan Atmospheric, Oceanic, and Space Sciences Seminar, March 2013
Dartmouth College Department of Geography Seminar, February 2013
University of Chicago Department of Geophysical Sciences Seminar, February 2013
University of Michigan Earth and Environmental Sciences Seminar, February 2013
Washington University in St Louis, Earth and Planetary Science Seminar, January 2013
Scripps Institution of Oceanography CASPO seminar, November 2012
University of California, Irvine Earth System Science seminar, November 2012
NASA Jet Propulsion Laboratory Earth science division seminar, October 2012
Harvard University Atmospheric Science Seminar, December 2010
NCAR Atmospheric Chemistry Division Seminar, March 2010
NOAA Global Monitoring Division Seminar, August 2008
NASA JPL Atmospheric Chemistry and Kinetics Seminar, March 2008

CONTRIBUTED
ORAL
PRESENTATIONS

Basile, S. J., W. R. Wider, M. D. Hartman, G. Keppel-Aleks, Quantifying the Impact of Heterotrophic Respiration on Variability in the Global Carbon Dioxide Growth Rate, Washington D. C., AGU Fall Meeting, December 2018.

Moore, D. J., S. R. Cooley, S. R. Alin, D. E. Butman, D. W. Clow, N. H. French, R. A. Feely, Z. Johnson, **G. Keppel-Aleks**, S. E. Lohrenz, I. Ocko, E. H. Shadwick, A. J. Sutton, C. S. Potter, Y. Takatsuka, R. Yu, Biogeochemical Effects of Rising Atmospheric CO₂ on Terrestrial and Ocean Systems, Washington D. C., AGU Fall Meeting, December 2018.

Torres, A. D., G. Keppel-Aleks, S. C. Doney, M. A. Fendrock, K. Luis, M. De Mazière, F. Hase, C. Petri, D. F. Pollard, C. M. Roehl, R. Sussmann, V. A. Velasco, T. Warneke, and D. Wunch, A geostatistical framework for quantifying the imprint of mesoscale atmospheric transport on satellite trace gas retrievals, Boulder, OCO-2 Science Team Meeting, October 2018.

Butterfield, Z. T., Barr, S., G. Keppel-Aleks, PhotoSpec Observations at the University of Michigan Biological Station, Boulder, OCO-2 Science Team Meeting, October 2018.

Torres, A. D., G. Keppel-Aleks, S. C. Doney, S. Feng, T. Lauvaux, M. Fendrock, J. Rheuben: Quantifying the imprint of mesoscale and synoptic-scale atmospheric transport on total column carbon dioxide me, New Orleans, AGU Fall Meeting, December 2017.

Butterfield, Z., A. Hogikyan, S. Kulawik, G. Keppel-Aleks: Satellite-derived SIF and CO₂ Observations Show Coherent Responses to Interannual Climate Variations, New Orleans, AGU Fall Meeting, December 2017.

Keppel-Aleks, G., S. Doney, A. D. Torres, M. Fendrock, K. Luis: Developing a variance budget for OCO-2 data, Boulder, OCO-2 Science Team Meeting, October 2017.

Keppel-Aleks, G., *J. Liptak, and A. S. Wolf: CESM Annual Meeting, July 2017.

Keppel-Aleks, G. and A. D. Torres: Diurnal cycles in land carbon fluxes and imprint on atmospheric CO₂, CESM Working Group Meeting, March 2017.

Keppel-Aleks, G. and R. A. Washenfelder: The effect of atmospheric sulfate reductions on diffuse radiation and photosynthesis in the eastern United States, San Francisco, AGU Fall Meeting, December 2016.

Cheng, S. J., P. Zhu, **G. Keppel-Aleks**, Z. Butterfield, and A. L. Steiner: The Global Influence of Cloud Optical Thickness on Terrestrial Carbon Uptake, American Geophysical Union, San Francisco, December 2016.

*Liptak, J. and **G. Keppel-Aleks**: Separating the effects of tropical Atlantic and Pacific SST-driven climate variability on Amazon Carbon Exchange, American Geophysical Union, December 2016.

Keppel-Aleks, G.: Leveraging atmospheric CO₂ observations to constrain the climate sensitivity of terrestrial ecosystems, American Geophysical Union, San Francisco, December 2015.

*Liptak, J. and **G. Keppel-Aleks**: Drivers of the Increasing Mean Annual CO₂ Cycle in the CESM, American Geophysical Union, San Francisco, December 2015.

Butterfield, Z. and **G. Keppel-Aleks**: Using chlorophyll fluorescence to assess the impact of agriculture on Northern Hemisphere CO₂ seasonality, American Geophysical Union, San Francisco, December 2015.

Basile, S. and **G. Keppel-Aleks**: Tropical precipitation-carbon cycle links in the CMIP5 Earth System Models, American Geophysical Union, San Francisco, December 2015.

Keppel-Aleks, G. and R. Washenfelder: Aerosol impacts on North American carbon uptake in CESM, 20th Annual CESM Workshop, Breckenridge, CO, June 2015. *Liptak, J. and Keppel-Aleks, G., 2015: Does Water Limit Terrestrial Productivity in the CESM after 2100?, 20th Annual CESM Workshop, Breckenridge, CO, June 2015.

Keppel-Aleks, G. The impact of diagnostic and timescale on emergent constraints from CMIP5 models, CESM Biogeochemistry Working Group Meeting, Boulder, CO, March 2015.

*Liptak, J. and **Keppel-Aleks, G.**: Atmospheric Impacts on Arctic Terrestrial Carbon Exchange beyond 2100 in the CESM, CESM Biogeochemistry Working Group Meeting, Boulder, CO, March 2015.

Mu, M., F. Hoffman, D. Lawrence, W. Riley, **G. Keppel-Aleks**, C. Koven, E. Kluzek, J. Mao, and J.T. Randerson: Design and application of a Community Land Benchmarking System for Earth System Models, American Geophysical Union, San Francisco, December 2015.

Keppel-Aleks, G: Drivers of interannual variability in atmospheric CO₂ across CMIP5 and implications for future feedbacks, CESM Annual Meeting, Breckenridge, June 2014.

Keppel-Aleks, G: Constraining long-term carbon cycle feedbacks with atmospheric observations, Carbon Assimilation Workshop, Toronto, May 2014.

Keppel-Aleks, G: Constraints on ecosystem functional responses from atmospheric CO₂, Biogeochemistry Working Group, Boulder, February 2014.

Keppel-Aleks, G, J. T. Randerson; M. Mu; S. C. Doney; G. van der Werf; G. J. Collatz; D. C. Morton: Terrestrial ecosystem regulation of interannual variability in atmospheric CO₂, AGU Fall meeting, San Francisco, December 2013.

Keppel-Aleks, G., J. T. Randerson, M. Mu, S. Doney, G. J. Collatz, L. Giglio, D. C. Morton, and G. van der Werf: Fingerprints of climate variability on atmospheric CO₂, International Carbon Dioxide Conference (ICDC 9), Beijing, China, June 2013.

Keppel-Aleks, G., and J. T. Randerson: Interannual variability in atmospheric CO₂ from generalized surface fluxes, 6th International GEOS-Chem Meeting, Cambridge, Massachusetts, May 2013.

Keppel-Aleks, G., and J. T. Randerson: Interannual variability in atmospheric CO₂ from generalized surface fluxes, Climate Extremes and Biogeochemical Cycles Workshop, Seefeld, Austria, April 2013.

Keppel-Aleks, G., J. T. Randerson, K. Lindsay, B. B. Stephens, J. K. Moore, S. C. Doney, P. E. Thornton, N. M. Mahowald, F. M. Hoffman, C. Sweeney, P. P. Tans, P. O. Wennberg, S. C. Wofsy: Evaluating carbon dioxide variability in the Community Earth System Model against atmospheric observations, AGU Fall Meeting, San Francisco, California, December 2012.

Keppel-Aleks, G., and P.O. Wennberg: Constraints on regional fossil fuel emissions from XCO₂, International Workshop on Greenhouse Gas Measurements from Space, Pasadena, California, June 2012.

Keppel-Aleks, G. and J.T. Randerson: Evolution of atmospheric CO₂ variations in a coupled carbon-climate model, NOAA ESRL Annual Meeting, Boulder Colorado, May 2012.

Keppel-Aleks, G., J.T. Randerson and coauthors: Evolution of the three-dimensional structure of atmospheric carbon dioxide during the 21st century, CESM Biogeochemistry Working Group Meeting, Boulder Colorado, March 2012.

Keppel-Aleks, G., P.O. Wennberg, J.T. Randerson: Total column constraints on regional fossil fuel emissions, AGU Fall Meeting, San Francisco, California, December 2011.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, D. Wunch, C.M. Roehl, S.A. Vay: Total column constraints on northern hemisphere carbon dioxide surface exchange, International Carbon Dioxide Conference (ICDC 8), Jena, Germany, September 2009.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, N.Q. Honsowetz, S.A. Vay: Total column constraints on Northern Hemisphere carbon dioxide surface exchange, AGU Fall Meeting, San Francisco, California, December 2008.

Keppel-Aleks, G., P.O. Wennberg, G.C. Toon, D.W. Griffith, N.M. Deutscher, D. Wunch: Total Carbon Column Observing Network: Variability in CO₂ and CO, NOAA ESRL Annual Meeting, Boulder, Colorado, May 2008.

Keppel-Aleks, G., P. O. Wennberg, T. Schneider, W. Peters, S.C. Wofsy, G.C. Toon: The impact of large-scale dynamics on the variability of total column CO₂, AGU Fall Meeting, San Francisco, California, December 2007.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, G.C. Toon: Diagnosing model behavior using column CO₂ observations from WLEF, Chequamegon Ecosystem Atmospheric Study (ChEAS) Annual Meeting, Woodruff, Wisconsin, May 2007.

Keppel-Aleks, G., P.O. Wennberg, and G.C. Toon: Improvements to gas retrievals through correction of DC interferograms, Network for the Detection of Atmospheric Composition Change Infrared Working Group Annual Meeting, Tskuba, Japan, May 2006.

Keppel-Aleks, G., G.C. Toon, R.A. Washenfelder, and P.O. Wennberg: Measurement of aerosol optical properties using Fourier Transform Spectrometry, Network for the Detection of Atmospheric Composition Change Infrared Working Group Annual Meeting, Tskuba Japan, May 2006.

CONTRIBUTED
POSTER
PRESENTATIONS

Keppel-Aleks, G. Model-data fusion to understand the carbon cycle response to inter-annual climate variations , Phoenix, AMS Annual Meeting, January 2019.

*Birch, L., **G. Keppel-Aleks**, C. R. Schwalm, *X. Lin, B. M. Rogers, Addressing Arctic-Boreal Plant Functional Type biases in carbon cycling in the Community Land Model, Washington D. C., AGU Fall Meeting, December 2018.

Butterfield, Z. T., **G. Keppel-Aleks**, W. Buermann, Decomposing patterns of inter-annual variability in remote sensing vegetation, Washington D. C., AGU Fall Meeting, December 2018.

*dos Santos, T., **G. Keppel-Aleks**, A. L. Steiner, Understanding Soil Moisture In The Temperate To Boreal Transition Zone Using SMAP And CLM Model Simulations, Washington D. C., AGU Fall Meeting, December 2018.

*Lin, X., **G. Keppel-Aleks**, B. M. Rogers, *L. Birch, Insights on carbon cycle dynamics using spatially resolved Northern Hemisphere CO₂ variations from seasonal to multi-decadal timescales, Washington D. C., AGU Fall Meeting, December 2018.

Torres, A. D., **G. Keppel-Aleks**, S. C. Doney, M. A. Fendrock, and K. Luis: Quantifying the imprint of atmospheric transport on total column-average CO₂ observations from OCO-2, Washington D. C., AGU Fall Meeting, December 2018.

Wozniak, M. C., A. L. Steiner, **G. Keppel-Aleks**, G. B. Bonan, The role of vegetation canopy structure in the variability of the terrestrial carbon sink, Washington D. C., AGU Fall Meeting, December 2018.

Keppel-Aleks., G., Z. Butterfield, S. C. Doney, E. J. Dlugokencky, J. B. Miller, D.C. Morton: Quantifying the impact of El Nio-driven variations in temperature and precipitation on regional atmospheric CO₂ growth rate variations, New Orleans, AGU Fall Meeting, December 2017.

Basile, S. J., W. R. Wieder, M. D. Hartman, **G. Keppel-Aleks**: Quantifying the Interannual Variability in Global Carbon Fluxes from Heterotrophic Respiration using a Testbed and Pulse Response Modeling Approach, New Orleans, AGU Fall Meeting, December 2017.

Collier, N., F. M. Hoffman, **G. Keppel-Aleks**, D. M. Lawrence, M. Mu, W. Riley, J. T. Randerson: Scoring Methods in the International Land Benchmarking (ILAMB) Package, New Orleans, AGU Fall Meeting, December 2017.

Butterfield, Z. and **G. Keppel-Aleks**: Satellite-derived SIF observations show coherent response to climate variations, Boulder, OCO-2 Science Team Meeting, October 2017.

Torres, A. D., **G. Keppel-Aleks**, S. C. Doney, M. Fendrock, K. Luis: Quantifying the imprint of mesoscale and synoptic scale transport on X_{CO_2} observations, Boulder, OCO-2 Science Team Meeting, October 2017.

Keppel-Aleks, G., Z. Butterfield, A. Hogikyan, E. Gargulinski, Separating temperature- and moisture-driven variations in terrestrial carbon uptake using multiple remote sensing constraints, International Carbon Dioxide Conference, Interlaken, Switzerland, August 2017.

Basile, S. J., and **G. Keppel-Aleks**: Tropical Carbon Response to Seasonal Phasing and Intensity of Precipitation in CMIP5 Earth System Models, American Geophysical Union, December 2016.

Torres, A. D., **G. Keppel-Aleks**, S. C. Doney, and M. Fendrock: Identifying temporal and spatial synoptic-scale variability of total column carbon dioxide measurements, American Geophysical Union, December 2016.

*Liptak, J. and **G. Keppel-Aleks**: Separating the effects of tropical Atlantic and Pacific SST-driven climate variability on Amazon Carbon Exchange, American Geophysical Union, December 2016.

Keppel-Aleks, G., A. D. Torres, M. Fendrock, and S. C. Doney: Mesoscale variations in X_{CO_2} , OCO-2 Science Team Meeting, October 2016.

Keppel-Aleks, G. and F. Hoffman: Constraining carbon cycle feedbacks using atmospheric CO_2 growth rate fluctuations, American Geophysical Union, San Francisco, December 2014.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, D. Wunch, G.C. Toon, J.-F. Blavier, C.M. Roehl, B. Connor, V. Sherlock, J. Notholt, and J. Messerschmidt, T. Warneke, D. Crisp, C. E. Miller, C. O'Dell, S. C. Wofsy, and S. A. Vay: Flux estimates from large-scale gradients in total column CO_2 , North American Carbon Program Meeting, New Orleans, Louisiana, February 2011.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, D. Wunch, G.C. Toon, J.-F. Blavier, C.M. Roehl, V. Sherlock, J. Notholt, and J. Messerschmidt: A new look at spatial gradients in column CO_2 from ground-based observations, AGU Fall Meeting, San Francisco, California, December 2010.

Keppel-Aleks, G., R.A. Washenfelder, G.C. Toon, A.R. Desai, K.J. Davis, and P.O. Wennberg: Net ecosystem exchange inferred from eddy covariance flux and total column measurements, NASA Terrestrial Ecosystems Workshop, La Jolla, California, March 2010.

Keppel-Aleks, G., P.O. Wennberg, D. Wunch, G.C. Toon, C.M. Roehl, N.M. Deutscher, and D.W. Griffith: Coincident retrievals of CO and CO_2 from high resolution solar absorption spectrometry, AGU Fall Meeting, San Francisco, California, December 2009.

Keppel-Aleks, G., P.O. Wennberg, T. Schneider, and S.A. Vay: High Latitude Carbon Exchange Estimated From Co-Variation of CO₂ and Potential Temperature, NOAA ESRL Annual Meeting, Boulder Colorado, May 2009.

Keppel-Aleks, G., P.O. Wennberg, and G.C. Toon: Total Carbon Column Observing Network: CO₂ Variability and Implications for Global Modeling, NASA Carbon Cycle and Ecosystems Workshop, College Park, Maryland, April 2008..

Keppel-Aleks, G., R.A. Washenfelder, Z. Yang, G.C. Toon, T. Schneider., and P.O. Wennberg: Use of tracers to examine variability in column CO₂ measurements at Park Falls, Wisconsin, AGU Fall Meeting, San Francisco, California, December 2006.

Keppel-Aleks, G., G.C. Toon, R.A. Washenfelder, P.O. Wennberg, and A. Clarke: Aerosol Extinction and Angstrom Exponent Retrieved From Ground-Based Near-Infrared Solar Absorption Spectra, AGU Fall Meeting, San Francisco, California, December 2005.

GRANTS

11 funded projects; \$2.87M total to Keppel-Aleks

Current

PI: Detecting and Attributing Interannual Variations in Land and Ocean Fluxes from OCO-2, NASA OCO-2 Science Team: 4/2018 – 3/2021. Total Award \$647,822; UM Share \$368,542.

Institutional PI: Quantifying Feedbacks and Uncertainties of Biochemical Processes in Earth System Modeling RUBISCO SFA, Department of Energy: 10/2017 – 9/2020. UM Award: \$224,992.

PI: Quantifying Drivers of Sub-Seasonal Variations in Total Carbon Column Dioxide for Improved Flux Estimation, NASA Earth and Space Science Fellowship: 9/2017-8/2020. Total Award:\$135,000.

PI: Developing a Mechanistic Understanding of Variability in the Atmospheric CO₂ Growth Rate Owing to Interannual Climate Oscillations, NASA Interdisciplinary Science: 6/2017 – 5/2020. Total Award: \$1,015,006; UM Share:\$672,181.

Institutional PI: Chlorophyll Fluorescence and Soil Moisture Observations to Characterize Terrestrial Vegetation Photosynthesis and Biosphere Carbon, NASA Interdisciplinary Science: 6/2017 – 5/2020. UM Award: \$152,361.

Institutional PI: Understanding the Causes and Implications of Enhanced Seasonal CO₂ Exchange in Boreal and Arctic Ecosystems, NASA Carbon Cycle Science: 1/2017 – 12/2019. UM Award: \$325,773.

Institutional PI: Evaluating Crop Productivity using Solar Induced Chlorophyll Fluorescence Measured from Ground and Space, NASA Carbon Cycle Science: 1/2017 – 12/2019. UM Award: \$152,501.

Co-Investigator: Leveraging SMAP to Improve Understanding of Carbon-Water-Climate Interactions, NASA SMAP Science Utilization Team: 5/2016–4/2019. UM Award \$492,387.

PI: Constraining Atmospheric Transport Influence on OCO-2 Data for Improved Inference of Southern Hemisphere Carbon Fluxes, NASA OCO-2 Science Team: 4/2015 – 3/2018. Total Award \$693,383; UM Share \$374,876.

Past

Institutional PI: Quantifying Feedbacks and Uncertainties of Biochemical Processes in

Earth System Modeling, Department of Energy: 1/2015 – 10/2017 (extended to 6/2018).
UM Award \$223,153.

Institutional PI: PhotoSpec-Comprehensive Ground-Based Studies of Solar-Induced Chlorophyll Fluorescence - tracking seasonal, diurnal and fine spatial patterns of photosynthesis, Keck Institute for Space Sciences, 10/2014 – 8/2017. UM Award \$49,973.

AWARDS AND
HONORS

Kavli Fellow (National Academy of Sciences), 2018
NASA Group Achievement Award (OCO-2 Science Team), August 2018
North Campus Martin Luther King Spirit Award nominee, 2018
University of Michigan Golden Apple Award nominee, 2017
Department of Energy research highlight, October 2013
NOAA Climate and Global Change Postdoctoral Fellowship, 2011-2013
American Association of University Women dissertation fellowship, 2009-2010
NSF Graduate Research Fellowship, 2006-2009
Vito Vanoni Caltech Institute Fellowship, 2004-2005
Tau Beta Pi Engineering Honor Society, 2003
MIT William Rousseau Scholar, 2000-2004
MIT Club of Chicago Scholarship, 2000-2004

PROFESSIONAL
SERVICE

National Service

- Co-Chair of North American Carbon Project PI meeting (scheduled for summer 2020)
- Co-Chair of the Community Earth System Model Biogeochemical Working Group, October 2017 – September 2020
- Co-author on State of the Carbon Cycle Report (SOCCR-2); Chapter 17
- Session Chair, North American Carbon Project meeting, March 2017
- Co-Organizer of the International Land Model Benchmarking workshop, May 2016
- Co-Organizer of the North American Carbon Project: Developing Predictive Carbon Cycle Science workshop, March 2016

University of Michigan; University level

- Institute for Global Change Biology Steering Committee (Fall 2018 – present)
- School for Environment and Sustainability; Themes Working Group (Winter 2017)
- Panelist for the *Professional Advancement Initiative* for URM Postdocs (May 2015)

University of Michigan; College of Engineering

- Panelist for M-PACE (August 2018)
- Selection Committee for Dow Sustainability Fellowships for professional masters (October 2017)
- Towner Dissertation Prize judge (2017)
- Engineering Graduate Symposium poster judge (2013, 2015)

University of Michigan; Climate and Space Sciences and Engineering

- Curriculum Committee (Fall 2013 – present), Committee Chair (Fall 2018 – present)
- Qualifying Exam Committee (Fall 2018 – present)
- Alumni and Friends Committee (Fall 2017 – present)
- Faculty Search Committee (Fall 2016 – Winter 2017)
- Seminar Organizer (Fall 2015 – Winter 2016)

Journal Reviewer:

Applied Optics; Atmospheric Chemistry and Physics; Atmospheric Measurement Techniques; Biogeosciences; Earth System Dynamics; Global Biogeochemical Cycles; Geophysical Research Letters; Journal of Climate; Journal of Geophysical Research-Atmospheres; Journal of Geophysical Research-Biosphere; Journal of Quantitative Spectroscopy and Radiative Transfer; Nature Geoscience, Proceedings of the National Academy of Sciences; Remote Sensing of Environment, Tellus

Proposal Reviewer and Panelist:

National Science Foundation, Biology directorate
Department of Energy Terrestrial Ecosystem Sciences
NASA (Carbon Cycle Sciences, Terrestrial Ecology, Carbon Monitoring System)
NOAA (Atmospheric Chemistry, Carbon, and Climate)

Educational and Outreach activities:

- CLaSP representative for MIRA “Conversations on Inclusion and Equity”; organized seminars + outreach activities for AY 2016/17, 2018/19.
- ADVANCE Book Club Discussion leader (December 2017)
- Research discussion leader for CoE Honors Students (Fall 2016, Winter 2017, Fall 2017)
- Participant in CLaSP Ladies’ Lunch and CoE Society of Women Engineers events (ongoing)
- Visiting Scientist at Green Hills School, May 2014
- Keynote speaker at Green Hills School Earth Day event, April 2014
- Keynote speaker at Ypsilanti Public Library Earth Day event, April 2014
- Keynote speaker and panelist at Clean Water Action and Organizing for Action event, November 2013
- Reviewer for History Compass
- Presenter at NASA Jet Propulsion Laboratory public Climate Change Symposium, October 2010
- Contributor for AGU Climate Q&A service 2009-2011