

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Climate and Space Sciences and Engineering

Gretchen Keppel-Aleks, assistant professor of climate and space sciences and engineering, Department of Climate and Space Sciences and Engineering, College of Engineering, and assistant professor of Earth and environmental sciences, Department of Earth and Environmental Sciences, College of Literature, Science, and the Arts, is recommended for promotion to associate professor of climate and space sciences and engineering, with tenure, Department of Climate and Space Sciences and Engineering, and associate professor of Earth and environmental sciences, without tenure, Department of Earth and Environmental Sciences, College of Literature, Science, and the Arts.

Academic Degrees:

Ph.D.	2011	California Institute of Technology, Environmental Science and Engineering, Pasadena, CA
B.S.	2004	Massachusetts Institute of Technology, Chemical Engineering, Cambridge, MA

Professional Record:

2013 – present	Assistant Professor, Department of Climate and Space Sciences and Engineering, University of Michigan
2013 – present	Assistant Professor, Department of Earth and Environmental Sciences, University of Michigan
2010 – present	Undergraduate Research Assistant, Earth, Atmosphere, and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA

Summary of Evaluation:

Teaching: Professor Keppel-Aleks has an outstanding record of teaching and advising, with excellent scores and students eager to participate in her classes. The student letters clearly show how her availability to advise and assist outside of the classroom benefited and impressed them. She mentors undergraduate, masters, and graduate students in her research groups with purposeful diversity with regard to race, gender, culture, and socio-economic background. Her new Ph.D. level course on Carbon Climate Interactions has attracted students from several different schools across the university. Professor Keppel-Aleks currently advises five Ph.D. students with two of those expected to graduate this year. In addition, she co-advised two students who graduated in 2019.

Research: Professor Keppel-Aleks' research is focused on the global carbon cycle, analyzing the interplay of many complex factors in the retention of carbon dioxide (CO₂) in the atmosphere, which is the primary cause of planetary warming. Her early research sought to understand the role of atmospheric transport in the variability of the total amount of CO₂ in the vertical column above any point on the surface. She has extended this work to include interpretation of new satellite observations as well as numerous other data sources and types, a portfolio of simulation tools, and investigation of physical and biological processes. This line of research is recognized

in the climate science community as highly impactful, yielding well-evaluated outcomes that have challenged long-held pre-conceptions. The quality of her publications is high, and her funding profile is consistent with increased and sustained productivity. Her research efforts have been recognized with awards such as a 2018 Kavli Fellowship from the National Academy of Sciences, the 2018 NASA Group Achievement Award (OCO-2 Science Team), and a 2019 American Geophysical Union Global Environmental Change Early Career Award.

Recent and Significant Publications:

Torres, A. D., Keppel Aleks, G., Doney, S. C., Fendrock, M., Luis, K., De Mazière, M., et al. (2019), "A geostatistical framework for quantifying the imprint of mesoscale atmospheric transport on satellite trace gas retrievals," *Journal of Geophysical Research: Atmospheres*, 124, 9773-9795.

Keppel-Aleks, G., S. J. Basile, F. M. Hoffman, "A functional response metric for the temperature sensitivity of tropical ecosystems," *Earth Interactions*, 2018.

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

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

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

Service: Professor Keppel-Aleks is active in her professional community. She serves as the co-chair of the Biogeochemistry Working Group for the Community Earth System Model, which is a leading U.S. climate model led by the National Center for Atmospheric Research. She is also the co-chair of the North-American Carbon Project, which outlines themes and activities for the federal Carbon Cycle Interagency Working Group. Internally, Professor Keppel-Aleks has taken on several major service activities. As a member of the CoE curriculum committee and the chair of CLASP's curriculum committee, she has been actively working to improve the undergraduate and graduate program in the department, particularly in the areas of computing and practical experience. Professor Keppel-Aleks has also been highly involved in initiatives aimed at recruiting and diversifying the student body in CLaSP and the College.

External Reviewers:

Reviewer A: "Her work is highly regarded in our discipline and by her peers, noted by a much deserved and prestigious American Geophysical Union (AGU) Global Environmental Change early career award and selection as a National Academy of Sciences (NAS) Kavli Fellow."

Reviewer B: "What distinguishes Professor Keppel-Aleks' work is not only the breadth—in terms of spatial scope, disciplines, tools—but also her scholarship, incisiveness and keen intuition about Earth processes."

Reviewer C: "...global and regional modeling focus, linking satellite measurements with field measurements, provides a unique environment for training graduate students and postdocs. It

introduces the students and postdocs to cutting-edge tools to address key questions related to the global carbon cycle and climate change.”

Reviewer D: “I would place Dr. Keppel-Aleks among the top 5% of her peer group in terms of the quality, quantity, and diversity of her work. There are few other researchers at her level who are willing and able to tackle this breadth of work. Having seen her and her students grow in recent years, I believe she is making remarkable progress.”

Reviewer E: “Through her work leading atmospheric contributions to ILAMB and IOMB, Dr. Keppel-Alek performs a large service to the climate modeling community. Designing scale appropriate benchmarks is a task that requires great command of both modeling and measurement characteristics and uncertainties.”

Summary of Recommendation: Professor Keppel-Aleks has demonstrated excellence in her approach to teaching and mentoring both undergraduate and graduate students. Her research and productivity are impactful in a variety of interconnected disciplines within the atmospheric sciences, which has garnered attention on an international scale. Her service to the department, the college, and the university, is remarkable. It is with the support of the College of Engineering Executive Committee that we recommend Gretchen Keppel-Aleks for promotion to associate professor of climate and space sciences and engineering, with tenure, Department of Climate and Space Sciences and Engineering, College of Engineering, and associate professor of Earth and environmental sciences, without tenure, Department of Earth and Environmental Sciences, College of Literature, Science, and the Arts.



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