

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

Shasha Zou, associate professor of climate and space sciences and engineering, with tenure, Department of Climate and Space Sciences and Engineering, College of Engineering, is recommended for promotion to professor of climate and space sciences and engineering, with tenure, Department of Climate and Space Sciences and Engineering, College of Engineering

Academic Degrees:

Ph.D. 2009 University of California, Space Physics, Los Angeles, CA
M.S. 2006 University of California, Space Physics, Los Angeles, CA
B.S. 2004 University of Science and Technology of China, Space Physics, Hefei, China

Professional Record:

2020 – present Associate Professor with tenure, Department of Climate and Space Sciences and Engineering, University of Michigan
2015 – 2020 Associate Professor without tenure, Department of Climate and Space Sciences and Engineering, University of Michigan
2010 – 2015 Assistant Research Scientist, Department of Climate and Space Sciences and Engineering, University of Michigan
2009 – 2010 Research Fellow, Department of Climate and Space Sciences and Engineering, University of Michigan
2009 – 2009 Post-Doctoral Fellow, Atmospheric and Oceanic Sciences, University of California at Los Angeles, Los Angeles, CA

Summary of Evaluation:

Teaching: Professor Zou is a talented and energetic classroom instructor. Her classroom experience includes a variety of courses at different levels and class sizes. Students appreciate her enthusiasm for the material, her engaging style, her openness to flipping the classroom into discussion sessions, and her willingness to open her research laboratory for class projects. She is a dedicated advisor and mentor of student research projects at both the undergraduate and graduate levels. She has mentored five Ph.D. students as chair or co-chair. In addition, she has served as a member for 11 other Ph.D. students and advises masters and undergraduate students.

Since joining the teaching faculty in 2015, Professor Zou has taught five different courses including some of our core undergraduate (SPACE 103 Intro to Space Weather and SPACE 370 Solar-Terrestrial Relationship) and graduate (SPACE 495 Ionospheres and SPACE 595 Magnetospheres) space physics courses. The department's Ionospheres course (SPACE 495) is one of the key core courses for our space students and has been taught for decades. Professor Zou took it over and completely revamped the course to update not only the content, but also infusing real-world examples into the course work.

Research: Professor Zou's research focuses on the study of the interactions between the upper parts of the atmosphere (thermosphere), the ionized part of the atmosphere (ionosphere), and the inner parts of the space environment (magnetosphere). Her research methodology portfolio is substantial. She uses satellite measurements both from low-altitude and magnetospheric missions together with radars and other ground-based instruments. She is an active user (and contributes to the development) of the UM Space Weather Modeling Framework, which is a versatile tool to study the Sun-Earth system. Together with a faculty member in the Department of Statistics, she has developed AI-based methods to analyze and predict the space environment behavior during strong space weather disturbances. She has wide collaboration networks within the department, the University of Michigan, nationally and internationally.

Professor Zou has authored more than 65 papers and has been cited more than 1,600 times, with a strongly increasing trend in the annual number of citations. She received the American Geophysical Union's Fred L. Scarf Award in 2010 and the URSI Young Scientist Award in 2014, two of the most distinguished awards for early-career scientists in the field of space physics. She also received the Ted Kennedy Family Faculty Team Excellence Award from the College of Engineering in 2019. Her research funding is exemplary (13 past grants and contracts with her share of \$1.8M and eight current contracts with her share of \$1.9M). Her standing among her peers is exceptional, shown in the many projects and studies she is asked to collaborate in, and the leadership positions that she has held.

Recent and Significant Publications:

Ercha A, S. Zou, A Ridley, S Zhang, A J Coster, P J Erickson, S Liu, and J Ren, "Merging of storm time midlatitude traveling ionospheric disturbances and equatorial plasma bubbles," *Space Weather*, 17, 285-298. 2019.

Zou S, Ren J, Wang Z, Sun H, and Chen Y, "Impact of Storm-Enhanced Density (SED) on Ion Upflow Fluxes During Geomagnetic Storm," *Front. Astron. Space Sci.*, 8, 746429. 2021.

Wang, Z., Zou, S., Coppeans, T., Ren, J., Ridley, A., & Gombosi, T, "Segmentation of SEB by boundary, flows associated with westward drifting partial ring current," *Geophysical Research Letters*, 46, 7920-7928, 2019.

Zou, S., A. Ridley, X. Jia, E. Boyd, M. Nicolls, A. Coster, E. Thomas, and J. M. Ruohoniemi, "PFISR observation of intense ion upflow fluxes associated with an SED during the 1 June 2013 geomagnetic storm," *J. Geophys. Res. Space Physics*, 122,2589-2604, 2017.

Zou, S., M. B. Moldwin, A.J. Ridley, M. J. Nicolls, A.J. Coster, E. G. Thomas, and J. M. Ruohoniemi, "On the generation/decay of the storm-enhanced density plumes: Role of the convection flow and field-aligned ion flow," *J. Geophys. Res. Space Physics*, 119, 8543-8559, 2014.

Service: Professor Zou has chaired two departmental committees including the Graduate Admissions Committee and the STEP Committee whose role is to help foster an inclusive culture within the department. At the national level, in addition to refereeing, and serving as a proposal panel reviewer, she has been a leader in the NSF GEM and CEDAR communities. She now serves as an associate editor of the American Geophysical Union's journal *Space Weather*, an extremely prestigious position. Professor Zou is co-chairing the science organizing committee for the NASA Heliophysics 2050 Workshop and she is a member of the NASEM (National Academies for Science, Engineering and Medicine) Space Weather Roundtable. These

leadership roles within the department, and US and international professional communities clearly indicates Professor Zou's stellar reputation.

External Reviewers:

Reviewer A: "...she is widely recognized as a leading expert in her field, as evidenced by the high-profile positions and panels she is invited to participate in.... I believe that Prof. Zou has met and exceeded the research, teaching, mentoring, service, and leadership criteria required for promotion to the full professor level, and I give her promotion case my very strong recommendation."

Reviewer B: "...She has an outstanding research record and continues to make significant contributions. She has excellent potential for continuing to do so. She is a leader of her peers, and has an outstanding service record."

Reviewer C: "Prof. Zou is one of the most eminent experts and recognized leaders in ionospheric physics with the emphasis on solar wind-magnetosphere-ionosphere-thermosphere coupling. Her research work contributes significantly to the understanding [sic] the linkage between space regions and systems. Prof. Zou's research also has profound space weather applications."

Reviewer D: "Shasha is an extremely talented and prolific scientist. Her work has addressed an unusually broad range of topics in geospace physics."

Reviewer E: "Prof. Zou is a leading expert in magnetosphere-ionosphere-thermosphere coupling. She maintains an active research program and continues to publish outstanding results in the field. She is also involving more graduate students in her research who are publishing their results in leading scientific journals."

Summary of Recommendation: Professor Zou is a rising superstar. She has made outstanding contributions to the field of magnetosphere-ionosphere-thermosphere physics; she is an effective teacher and mentor; and she is a leader who contributes both in external and internal service. It is with the support of the College of Engineering Executive Committee that I recommend Shasha Zou for promotion to professor of climate and space sciences and engineering, with tenure, Department of Climate and Space Sciences and Engineering, College of Engineering.



Alec D. Gallimore, Ph.D.
Robert J. Vlasic Dean of Engineering
College of Engineering

May 2023