

Daniel Yiu Wah Lo

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Education

<i>Doctor of Philosophy, Planetary Sciences</i>	2021
Lunar and Planetary Laboratory, The University of Arizona, USA Minor: Optical Sciences	
<i>Master of Science, Planetary Sciences</i>	2017
Lunar and Planetary Laboratory, The University of Arizona, USA	
<i>Bachelor of Science with Honors, Double major in Physics and Planetary Science</i>	2014
California Institute of Technology, USA Minor: Philosophy	

Honors and Awards

<i>American Geophysical Union Outstanding Student Presentation Award</i>	2020
<i>The University of Arizona College of Science Galileo Circle Scholarship</i>	2019
<i>NASA Group Achievement Award – MAVEN Mission Team</i>	2018
<i>The University of Arizona Graduate and Professional Student Council Travel Grant</i>	2018
<i>Lunar and Planetary Institute Career Development Award</i>	2018
<i>NASA Group Achievement Award – MAVEN Science Team</i>	2016
<i>NASA Robert Hutchings Goddard Exceptional Achievement for Science – MAVEN Science Team</i>	2016
<i>The University of Arizona Lunar and Planetary Laboratory Lieutenant Colonel Kenneth Rondo Carson and Virginia Bryan Carson Graduate Fellowship</i>	2014
<i>California Institute of Technology Fritz Burns Prize in Geology</i>	2013
<i>Singapore Science and Engineering Fair Silver Award</i>	2004

Publications

h-index: 20 (as of 26 August 2024)

Mars Atmospheric Composition, Chemistry and Escape

27. **Lo D. Y.**, et al. (2024). *Evaluating atmospheric and surface drivers for the O₂ variations at Gale crater observed by MSL SAM*. The Planetary Science Journal, 5 (65). doi:10.3847/PSJ/ad251b
26. Thomas T. B., Hu R., & **Lo D. Y.** (2023). *Constraints on the size and composition of the ancient Martian atmosphere from coupled CO₂–N₂–Ar isotopic evolution models*. The Planetary Science Journal, 4 (3), 41. doi:10.3847/PSJ/acb924
25. **Lo D. Y.**, et al. (2022). MAVEN/IUVS observations of C I 156.1 nm and 165.7 nm dayglow: Direct detection of carbon and implications on photochemical escape. Icarus, 371, doi: j.icarus.2021.114664
24. **Lo D. Y.**, Yelle R. V., Lillis R. J., & Deighan J. I. (2021). *Carbon photochemical escape rates from the modern Mars atmosphere*. Icarus, 360, 114371. doi:10.1016/j.icarus.2021.114371
23. **Lo D. Y.**, Yelle R. V., & Lillis R. J. (2020). *Carbon photochemistry at Mars: Updates with recent data*. Icarus, 352, 114001. doi:10.1016/j.icarus.2020.114001
22. Chaffin M. S., et al. (2021). *Martian water loss to space enhanced by regional dust storms*. Nature Astronomy, 5, 1036–1042. doi:10.1038/s41550-021-01425-w
21. Stone S. W., Yelle R. V., Benna, M., **Lo D. Y.**, et al. (2020). *Hydrogen escape from Mars is driven by seasonal and dust storm transport of water*. Science, 370 (6518), 824–831. doi:10.1126/science.aba5229
20. Ajello J. M., et al. (2019). *UV study of the Fourth Positive Band system of CO and O I 135.6 nm from electron impact on CO and CO₂*. Journal of Geophysical Research: Space Physics, 124, 2954–2977. doi:10.1029/2018ja026308
19. Jakosky B. M., et al. (2018). *Loss of the Martian atmosphere to space: Present-day loss rates determined from MAVEN observations and integrated loss through time*. Icarus, 315, 146–157. doi:10.1016/j.icarus.2018.05.030

Mars Atmospheric Tides

18. England S. L., Liu G., Withers P., Yiğit E., **Lo D. Y.**, et al. (2016). *Simultaneous observations of atmospheric tides from combined in situ and remote observations at Mars from the MAVEN spacecraft*. Journal of Geophysical Research: Planets, 121, 594–607. doi:10.1002/2016JE004997
17. **Lo D. Y.**, et al. (2015). *Nonmigrating tides in the Martian atmosphere as observed by MAVEN IUVS*. Geophysical Research Letters, 42 (21), 9057–9063. doi:10.1002/2015GL066268

MAVEN

16. Evans J. S., et al. Soto E., Jain S. K., Deighan J. I., Stevens M. H., Chaffin S. M., **Lo D. Y.**, et al. (2023). *Dayside temperature maps of the upper mesosphere and lower thermosphere of*

- Mars retrieved from MAVEN IUVS observations of O I 297.2 nm emission.* Journal of Geophysical Research: Planets, 128 (2), e2022JE007325. doi:10.1029/2022JE007325
15. Schneider N. M., et al. (2018). *Global aurora on Mars during the September 2017 space weather event.* Geophysical Research Letters, 45 (15), 7391–7398. doi:10.1029/2018GL077772
 14. Jain S. K., et al. (2018). *Martian thermospheric response to an X8.2 solar flare on September 10, 2017 as seen by MAVEN/IUVS.* Geophysical Research Letters, 45, 7312–7319. doi:10.1029/2018GL077731
 13. Deighan J. I., et al. (2018). *Discovery of a proton aurora at Mars.* Nature Astronomy, 2, 802–807. doi:10.1038/s41550-018-0538-5
 12. Stiepen A., et al. (2017). *Nitric oxide nightglow and Martian mesospheric circulation from MAVEN/IUVS observations and LMD-MGCM predictions.* Journal of Geophysical Research: Space Physics, 122 (5), 5782–5797. doi:10.1002/2016JA023523
 11. Stevens M. H., et al. (2017). *Martian mesospheric cloud observations by IUVS on MAVEN: Thermal tides coupled to the upper atmosphere.* Geophysical Research Letters, 44 (10), 4709–4715. doi:10.1002/2017GL072717
 10. Medvedev A. S., et al. (2016). *Comparison of the Martian thermospheric density and temperature from IUVS/MAVEN data and general circulation modeling.* Geophysical Research Letters, 43 (7), 3095–3104. doi:10.1002/2016GL068388
 9. Jakosky B. M., et al. (2015). *MAVEN observations of the response of Mars to an interplanetary coronal mass ejection.* Science, 350 (6261), aad0210. doi:10.1126/science.aad0210
 8. Schneider N. M., et al. (2015). *Discovery of diffuse aurora on Mars.* Science, 350 (6261), aad0313. doi:10.1126/science.aad0313
 7. Bougher S. W., et al. (2015). *Early MAVEN Deep Dip campaign reveals thermosphere and ionosphere variability.* Science, 350 (6261), aad0459. doi:10.1126/science.aad0459
 6. Thiemann E. M. B., et al. (2015). *Neutral density response to solar flares at Mars.* Geophysical Research Letters, 42 (21), 8986–8992. doi:10.1002/2015GL066334
 5. Jain S. K., et al. (2015). *The structure and variability of Mars upper atmosphere as seen in MAVEN/IUVS dayglow observations.* Geophysical Research Letters, 42 (21), 9023–9030. doi:10.1002/2015GL065419
 4. Evans J. S., et al. (2015). *Retrieval of CO₂ and N₂ in the Martian thermosphere using dayglow observations by IUVS on MAVEN.* Geophysical Research Letters, 42 (21), 9040–9049. doi:10.1002/2015GL065489
 3. Stevens M. H., et al. (2015). *New observations of molecular nitrogen in the Martian upper atmosphere by IUVS on MAVEN.* Geophysical Research Letters, 42 (21), 9050–9056. doi:10.1002/2015GL065319

Waterfall Plunge Pools

2. Scheingross J. S., **Lo D. Y.**, & Lamb M. P. (2017). *Self-formed waterfall plunge pools in homogeneous rock*. Geophysical Research Letters, 44 (1), 200–208. doi:10.1002/2016GL071730
1. Scheingross J. S., Brun F., **Lo D. Y.**, Omerdin K., & Lamb M. P. (2014). *Experimental evidence for fluvial bedrock incision by suspended and bedload sediment*. Geology, 42 (6), 523–526. doi:10.1130/G35432.1

Presentations

MSL SAM Measurements of Martian Atmospheric Composition: An Update. Tenth International Conference on Mars 2024.

Recent observations of the Martian atmospheric composition by Curiosity SAM. American Geophysical Union Fall Meeting 2023.

Observing the Martian atmosphere in the ultraviolet: Science updates from MAVEN IUVS. Asia Oceania Geosciences Society 19th Annual Meeting 2023.

Evaluating atmospheric and surface drivers for the O₂ variations observed by MSL SAM at Gale crater. Asia Oceania Geosciences Society 19th Annual Meeting 2023.

Curiosity and the four seasons. Caltech Yuk Lunch Seminar. With Melissa Trainer.

Evaluating atmospheric and surface drivers for atmospheric O₂ variations at Gale crater as observed by MSL SAM. Lunar and Planetary Science Conference 2023.

Evaluating atmospheric and surface drivers for O₂ variations at Gale crater as observed by MSL SAM. American Geophysical Union Fall Meeting 2022.

What can drive the atmospheric O₂ variations observed by MSL SAM? Asia Oceania Geosciences Society 19th Annual Meeting 2022.

Carbon at Mars: Inventory and loss. (Invited). April 2022. Jet Propulsion Laboratory Mars Forum.

What can drive the atmospheric O₂ variations observed by MSL SAM? Lunar and Planetary Science Conference 2022.

Carbon photochemical escape from the Martian atmosphere: Updates and future directions. (Invited). American Geophysical Union Fall Meeting 2021.

Direct detection of atomic carbon and implications on photochemical escape from MAVEN/IUVS observations of C I 156.1 nm and 165.7 nm dayglow. American Geophysical Union Fall Meeting 2021.

Carbon photochemical escape rates from the modern Mars atmosphere. American Geophysical Union Fall Meeting 2020.

Carbon photochemical escape rates from the modern Mars atmosphere. American Geophysical Union Fall Meeting 2019.

An ultraviolet perspective of the dynamic atmosphere of Mars: Highlights from four years of observations from the MAVEN Imaging UltraViolet Spectrograph. Asia Oceania Geosciences Society 16th Annual Meeting 2019.

Modern carbon photochemical escape rates at Mars based on MAVEN Observations. Asia Oceania Geosciences Society 16th Annual Meeting 2019.

Carbon photochemistry and densities in the Martian atmosphere under MAVEN Deep Dip 2 conditions. American Geophysical Union Fall Meeting 2018.

Carbon production and densities in the Martian atmosphere under MAVEN Deep Dip 2 conditions. Lunar and Planetary Science Conference 2018.

MAVEN IUVS observations of C I Emissions at 156.1 nm and 165.7 nm. Mars Aeronomy Conference 2017.

Twilight limb observations of the Martian north polar hood by MAVEN IUVS. Division of Planetary Science/European Planetary Science Conference 2016.

Twilight limb observations of clouds in the Martian atmosphere by MAVEN IUVS. Lunar and Planetary Science Conference 2016.

Tides in the Martian atmosphere as observed by MAVEN IUVS. American Geophysical Union Fall Meeting 2015.

Research Experience

Mars Science Laboratory / Curiosity 2021–
Science team collaborator

Mars Atmosphere and Volatile Evolution (MAVEN) 2014–
Science team member

Research Fellow, University of Michigan, USA 2021–
Advisor: Sushil K. Atreya, University of Michigan, USA

Graduate Research Associate, The University of Arizona, USA 2017–2021
Advisor: Roger V. Yelle, The University of Arizona, USA

Graduate Research Assistant, The University of Arizona, USA 2014–2017
Advisor: Roger V. Yelle, The University of Arizona, USA

California Institute of Technology Summer Undergraduate Research Fellowship 2013
Project: Electron response of STEREO High Energy Telescope through GEANT4 modeling
Mentors: Edward C. Stone and Mark E. Wiedenbeck, California Institute of Technology, USA
Named Fellowship: Homer J. Stewart Summer Undergraduate Research Fellow

California Institute of Technology Summer Undergraduate Research Fellowship 2012
Project: Waterfall plunge pools evolution under constant forcing: A study using low temperature polyurethane foam
Mentor: Michael P. Lamb, California Institute of Technology, USA

<i>California Institute of Technology Summer Undergraduate Research Fellowship</i>	2011
Project: Atmospheric features at the Jupiter North Pole from Cassini images	
Mentor: Andrew P. Ingersoll, California Institute of Technology, USA	
Named Fellowship: Homer J. Stewart Summer Undergraduate Research Fellow	
<i>Science Research Programme</i>	2006
Project: Degradation of ascorbic acid	
Mentor: Leong Lai Peng, National University of Singapore, Singapore	
<i>Science Mentorship Programme</i>	2004
Project: Polynomials over \mathbb{Z}_p^n	
Mentor: Lang Mong Lung, National University of Singapore, Singapore	
Obtained Distinction in Poster Category at national Youth Science Conference	

Teaching Experience

<i>Lunar and Planetary Laboratory, The University of Arizona, USA</i>	
Member of Curriculum Development Committee	2016–2017
Teaching assistant for ASTR/PTYS 170B2 (The Universe and Humanity: Origin and Destiny), conducted by Renu Maholtra	2017
Teaching assistant for ASTR/PTYS 170B2 (The Universe and Humanity: Origin and Destiny), conducted by Kat Volk	2015
<i>Raffles Institution, Singapore</i>	2010
Trainer for the Raffles Institution team to the Singapore Junior Physics Olympiad	
<i>National University of Singapore, Singapore</i>	2010
Coach for the Singapore national team to the International Young Physicists' Tournament. The team eventually obtained the top position in the competition.	
<i>Raffles Institution, Singapore</i>	2009-2010
Coach for the four Raffles Institution teams to the Singapore Young Physicists' Tournament. All four teams eventually obtained the top positions in the competition, leading to subsequent employment in a similar job as the coach for the national team.	

Planetary Exploration Mission Experience

<i>Mars Science Laboratory / Curiosity</i>	2021–
Science team collaborator	
<i>Mars Atmosphere and Volatile Evolution (MAVEN)</i>	2014–
Science team member	
<i>Jet Propulsion Laboratory Planetary Science Summer School</i>	2024
Played role of Project Manager in student team	

RASC-AL Exploration Robo-Ops (Team Second) **2012**

Project Manager in a team for a competition organized by the US National Institute of Aerospace for graduate and undergraduate students to design and build a remotely controlled planetary rover that can perform a series of competitive tasks.

Caltech Space Challenge (Team First) **2011**

Science instrumentation team member for a competition involving graduate and undergraduate students from various universities internationally to design a manned sample return mission to a Near Earth Asteroid.

Xichang Astronautics Winter Camp **2006**

A week of activities for high school students that provided introduction to the Chinese space program

Academic Service

Journal Peer Reviews

2023: Nature Astronomy (1), Journal for Geophysical Research (1)

2022: Geophysical Research Letters (1)

2021: Journal for Geophysical Research (2)

2019: Journal for Geophysical Research (1)

ICPAE webinar series **2022**

Member of 3-person team for organizing monthly webinars showcasing research on planetary and exoplanetary atmospheres from scientists across the world

NASA Review Panel

Executive secretary (2019)

Mars Students Lunch at Lunar and Planetary Science Conference **2017–2019**

Sole organizer for social lunch event bringing together students studying Mars from across the world attending the Lunar and Planetary Science Conference

The University of Arizona Lunar and Planetary Laboratory Career Development Seminars Committee **2015–2018**

Organized seminars involving people inside and outside the department to furnish students with career-relevant skills and expose them to non-traditional career paths

The University of Arizona Lunar and Planetary Laboratory Curriculum Development Committee **2015–2018**

Concurrent role in Career Development Seminars Committee revealed the importance and interest in formal training in career-relevant skills

Motivated and helped inform the design for PTYS 595B (Career Development) courses

Science Outreach

Cassini Scientist for a Day (Singapore Edition)

2013

US Coordinator

Students for the Exploration and Development of Space (SEDS)

2010-2013

President (2012–2013) for the Caltech chapter

Professional Affiliations

American Geophysical Union; American Astronomical Society; International Commission on Planetary Atmospheres and Evolution

Skills

Scientific: hypothesis testing, experimental design, physical modeling, data analysis, big data analysis, instrument development

Computer Languages: Python, MATLAB, IDL, Java, Fortran, C++, JavaScript, HTML, CSS, LaTeX, SQL

Software: Adobe Illustrator, Adobe Photoshop, Adobe Lightroom, Adobe InDesign, Adobe Premiere Pro, Adobe Audition, Adobe DreamWeaver, Adobe Acrobat, IGOR Pro, Wolfram Mathematica, Zotero, JMars, ArcGIS, ENVI, Github, Apache Subversion (SVN), SolidWorks, Avid Sibelius, Microsoft Office