

Paul O. Hayne

University of Colorado, Boulder
Astrophysical & Planetary Sciences Department
391 UCB
Boulder, CO 80309

Paul.Hayne@Colorado.edu
<https://www.colorado.edu/aps/paul-hayne>
Office: Duane Physics D321 || LASP-SPSC N294
Phone: (303) 735-6399 [O] (720) 390-9276 [M]

Summary	My research focuses on the surfaces and atmospheres of icy planets and moons. I develop computational models, missions, and instrumentation to better understand these planetary bodies. Teaching, mentoring, and public engagement are also fundamental to my work.
Positions Held	University of Colorado, Boulder 2024 – present <i>Associate Professor</i> (with tenure) 2018 – 2024 <i>Assistant Professor</i> Astrophysical & Planetary Sciences Department, and Laboratory for Atmospheric & Space Physics
	NASA – Jet Propulsion Laboratory , California Institute of Technology 2012 – 2017 <i>Research Scientist</i>
	California Institute of Technology 2011 – 2012 <i>Postdoctoral Scholar</i> (Supervisor: O. Aharonson)
Education	University of California, Los Angeles <i>Ph.D.</i> , Geophysics & Space Physics, 2010 (Advisor: D. A. Paige)
	Stanford University <i>M.S.</i> , Geophysics, 2005 (Advisors: N. H. Sleep & J. J. Lissauer) <i>B.S.</i> , Geophysics, 2003
Mission Experience	Emirates Mission to the Asteroid belt (EMA) , UAE Space Agency and Laboratory for Atmospheric & Space Physics <i>Project Scientist</i> (2021–present)
	NASA Lunar Compact Infrared Imaging System (L-CIRIS) <i>Principal Investigator</i> (2019–present), CLPS-CP22 lunar south polar mission
	NASA Lunar-Vulkan Imaging and Spectroscopy Explorer (Lunar-VISE) <i>Co-Investigator</i> (2019–present) <i>Investigation Lead</i> , Lunar-VISE Compact Infrared Imaging System (LV-CIRIS)
	NASA Europa Clipper <i>Co-Investigator</i> (2017–present) and <i>Investigation Scientist</i> (2015–2018) Europa Thermal Emission Imaging System (E-THEMIS)
	NASA Janus <i>Co-Investigator</i> and <i>Investigation Lead</i> (2019–2024) Thermal IR Camera
	NASA Mars Reconnaissance Orbiter <i>Co-Investigator</i> (2017–present) Mars Climate Sounder

Mission Experience (cont.)	NASA Lunar Flashlight <i>Co-Investigator</i> (2012–2023)
	NASA Lunar Reconnaissance Orbiter <i>Co-Investigator</i> (2011–present) Diviner Lunar Radiometer Experiment
<i>Science Team Affiliate: NASA CLPS/IM-2 South Pole Moon3D camera (2024-present)</i>	
NASA OSIRIS-REx (2018–2020), NASA Dawn (2016–2019),	
NASA/ESA Cassini-Huygens (2006–2014)	
Selected External Grants & Contracts	<p>2025–2027 <i>Advanced 3-d Thermophysical Model to Enable Europa Clipper Interdisciplinary Science</i> PI: P. Hayne NASA Precursor Science Investigations for Europa \$261k</p> <p>2019–2028 <i>Lunar Vulkan Imaging and Spectroscopy Explorer (Lunar-VISE)</i> PI: K. Donaldson Hanna (Co-I/Instrument Lead: P. Hayne) NASA Payloads and Research Investigations on the Surface of the Moon (PRISM) \$35M (\$2.2M subaward to LASP)</p> <p>2019–2028 <i>Lunar Compact Infrared Imaging System (L-CIRIS)</i> PI: P. Hayne NASA Lunar Science and Instrument Technology Payloads / \$4.1M</p> <p>2015–2034 <i>Europa Thermal Emission Imaging System</i> PI: P. Christensen (Co-I: P. Hayne) NASA Europa Clipper Mission / ~\$600k subaward to LASP for Phases D–E</p> <p>2016–2025 <i>Lunar Reconnaissance Orbiter Extended Missions 3–5</i> PI: D. Paige (Co-I: P. Hayne) NASA Discovery Program / ~\$2.2M allocation for Co-I Hayne</p> <p>2016–2025 <i>Mars Reconnaissance Orbiter Extended Missions 4–6</i> PI: A. Kleinböhl (Co-I: P. Hayne) NASA Mars Program / ~\$1.5M allocation for Co-I Hayne</p> <p>2019–2024 <i>Janus Mission</i> PI: D. Scheeres (Co-I/Instrument Lead: P. Hayne) NASA SIMPLEx Program / ~ \$400k subaward to LASP</p> <p>2013–2023 <i>Lunar Flashlight Science Investigation</i> PI: B. Cohen (Co-I: P. Hayne) NASA Advanced Exploration Systems / ~\$900k allocation for Co-I Hayne</p> <p>2018–2021 <i>Boulders on Bennu: Modeling Thermal Emission from Boulders for Yarkovsky Effect and Thermal Inertia Investigations</i> PI: P. Hayne (Science PI: C. Elder) NASA OSIRIS-REx Participating Scientist Program / \$346k</p> <p>2017–2018 <i>Unlocking the Climate Record Stored within Mars' Polar Layered Deposits</i> PI: P. Hayne W. M. Keck Institute for Space Studies / \$50k</p>

Grants Cont.	2015–2018	<i>Inter-seasonal and Inter-annual Surface Dust Fluxes on Mars</i> PI: P. Hayne (Science PI: S. Piqueux) NASA Mars Data Analysis Program / \$331k
	2013–2017	<i>Volatile Regolith Thermal Investigation Consortium for Exploration and Science (VORTICES)</i> PI: A. Rivkin (Co-I: P. Hayne) NASA Solar System Exploration Research Virtual Institute / ~\$120k
	2014–2016	<i>Thermal Infrared Observations of the Moon during Lunar Eclipse</i> PI: P. Lucey (Co-I: P. Hayne) NASA Planetary Astronomy / \$143k allocation for P. Hayne
	2013–2014	<i>New Approaches to Lunar Ice Detection and Mapping</i> PI: P. Hayne W. M. Keck Institute for Space Studies / \$50k
National Service	Europa ICONS <i>Member of NASA's Program Definition Tiger Team (2023–2024)</i>	
	NASA Artemis <i>Course Developer, Astronaut Training – Lunar Surface Environment (2024–present)</i>	
	Keck Institute for Space Studies , California Institute of Technology <i>Study Co-Lead</i>	
	2017–2018: Unlocking the Climate Record Stored within Mars' Polar Layered Deposits	
	2013–2014: New Approaches to Lunar Ice Detection and Mapping	
	American Astronomical Society , Division for Planetary Sciences <i>Editorial Board Member, Icarus (2020–present)</i> <i>Member of the Federal Relations Subcommittee (2017–2022)</i> <i>Local Organizing Committee, Annual Meeting (2016)</i> <i>Panelist, Annual Meeting (2015)</i>	
	American Geophysical Union <i>Session Co-organizer (Mars Atmosphere), Annual Meeting (2014–2024)</i>	
	Early-Career Planetary Explorers <i>Co-founder (2012) and Co-leader (2012–2020)</i> World-wide advocacy organization for early-career planetary scientists	
	NASA Science Mission Directorate <i>Appointed Member, Mars Exploration Program:</i> Ice and Climate Evolution Science Assessment Group (2018–2019) <i>Review Panel Member (2012–present)</i>	
	National Research Council – Space Studies Board <i>Raconteur, Planetary Science Decadal Survey (2009–2010)</i>	
	Referee for major scientific journals: <i>Journal of Geophysical Research, Geophysical Research Letters, Icarus, Astrophysical Journal, Planetary & Space Science, Advances in Space Research, Space Science Reviews, Geology, Science Advances, Nature Astronomy, Nature, PNAS</i>	

Departmental & LASP Service	<i>Committee Membership (APS Department):</i>
	2024/2025 McCray Fellowship Committee
	2024/2025 Sommers-Bausch Observatory/Fiske Planetarium Committee
	2024/2025 Faculty Search Committee
	2024/2025 Graduate Curriculum and Concerns Committee
	2024/2025 Beyond Boulder (Graduate School Info Session)
	2023/2024 Graduate Admissions Committee (Vice Chair)
	2023/2024 Faculty Search Committee
	2023/2024 Social Committee
	2022/2023 Outreach & Development Committee
	2022/2023 Friday Lunch Seminar Committee
	2022/2023 Graduate Admissions Committee (Chair)
	2021/2022 Graduate Admissions Committee
	2021/2022 Faculty Search Committee
	2021/2022 Outreach & Development Committee
	2020/2021 Fall Semester/COVID Planning Committee
	2020/2021 Grad Welcome and Social Committee
	2019/2020 Social Committee (Chair)
	2019/2020 Colloquium Committee
	2019/2020 Undergraduate Curriculum and Concerns Comm.
	2019/2020 Graduate Admissions Committee
	2018/2019 Social Committee (Acting Chair)
	2018/2019 Colloquium Committee

Committee Membership (LASP):

2023–present	LASP Research Scientist promotion committees
2024–2025	LASP Internal Research and Development Committee
2023–2024	LASP Strategic Planning Team

Departmental Mentoring:

2018–present	APS Department Undergraduate Student Mentor
2018–present	APS Department Graduate Student Mentor

Additional Service:

2018–2019	Co-organizer: “Planet Lunch”	CU Boulder
2018–2020	Organizer: Natural Sciences New Faculty Coffee	CU Boulder

Visiting Appointments	Lawrence Livermore National Laboratory <i>Visiting Scientist (2017)</i> Planetary Defense Program / Weapons and Complex Integration (WCI)
--------------------------	--

Weizmann Institute of Science, Israel

<i>Visiting Scientist (2015, 2016)</i>
The Helen Kimmel Center for Planetary Science

Honors & Awards	2022 <i>RIO Faculty Fellow</i> , CU Research & Innovation Office
	2013 <i>NASA Group Achievement Award</i> , Diviner Lunar Radiometer science team
	2011 <i>NASA Group Achievement Award</i> , Mars Climate Sounder science team
	2010 <i>Best Student Paper Award</i> , NASA Lunar Science Forum
	2010 <i>NASA Group Achievement Award</i> , Diviner Lunar Radiometer operations team
	2010 <i>NASA Group Achievement Award</i> , Diviner Lunar Radiometer science team
	2008 <i>Simon Latimer Award for Service</i> , UCLA
	2006 <i>Graduate Fellowship</i> , Institute of Geophysics and Planetary Physics
	2006 <i>Chancellor’s Prize</i> , UCLA
	2003 <i>Graduate Fellowship</i> , Dept. of Geophysics, Stanford University
	2001 <i>Summer Research Fellowship</i> , Dept. of Physics, Stanford University

Exam Committees & Defenses	<i>Graduate Comprehensive Examinations:</i>		
	2024	James Crowley	CU / APS
	2024	Michael Rothman	CU / APS
	2024	Sam Cartwright	CU / GEOL
	2023	Robert Stevens*	CU / APS *Primary Advisor
	2023	Helle Skjetne	CU / GEOL
	2023	Kris Laferriere	Purdue U.
	2022	Harry Brodsky	CU / GEOL
	2022	Patrick Behr	CU / APS
	2022	Dahlia Baker	CU / AES
	2021	Kya Sorli*	CU / APS *Primary Advisor
	2020	E. Fernando Cruz	CU / APS Non-advocate Chair
	2020	Rachel Hoover	CU / GEOL
	2019	Eryn Cangi	CU / APS
	2019	Noora Alsaeed	CU / APS Non-advocate Chair
	2019	Raven Larson*	CU / APS *Primary Advisor
	2019	Andrew Wilcoski*	CU / APS *Primary Advisor
	2019	Perianne Johnson	CU / APS Non-advocate Chair
	2019	William Waalkes	CU / APS
	2018	Momchil Molnar	CU / APS
	2018	Arika Egan	CU / APS

Ph.D. Dissertation Defenses:

2024	Dr. Koundinya (Ken) Kuppa	CU / AES
2024	Dr. Lucas Lange	Sorbonne Université / LMD
2022	Dr. Noora Alsaeed*	CU / APS *Primary Advisor
2022	Dr. Andrew Wilcoski*	CU / APS *Primary Advisor
2022	Dr. Chase Chivers	Georgia Tech / EAS
2022	Dr. Christopher Kremer	Brown U. / DEEPS
2019	Dr. Marek Slipski	CU / GEOP

Undergraduate Honors Thesis Defenses:

2019	Carlos Eytan Gary Bicas*	CU / APS *Primary Advisor
2018	Amanda Alexander	CU / GEOL

Teaching

University of Colorado Boulder

ASTR 1030: Accel. Introductory Astronomy (Fall, 2018)

Instructor for undergraduate majors course (115 students)

ASTR 3400: Research Methods (Spring, 2023; Spring, 2024)

Instructor for undergraduate majors course (30 students)

ASTR 3720: Planets and their Atmospheres (Spring, 2018)

Instructor for upper-division undergraduate course (84 students)

ASTR 3750: Planets, Moons, and Rings (Fall, 2020; Fall, 2021; Fall, 2022; Fall, 2024)

Instructor for undergraduate majors course (~100 students)

ASTR 5800: Planetary Surfaces & Interiors (Fall, 2019; Fall, 2021; Fall, 2023)

Instructor for graduate course (~15 students)

ASTR 5830: Remote Sensing of Planetary Surfaces and Atmospheres (Spring, 2025)

Instructor for graduate course (~10 students)

ASTR 5835: Seminar in Planetary Science (Spring, 2023; Fall, 2024)

Co-Instr. for grad. seminar (~25 students): “Asteroids” and “Ocean Worlds”

Teaching (cont.)	<p>California Institute of Technology <i>Ge 151: Planetary Surfaces</i> (2011) Co-Instructor & Lecturer for graduate course (~6 students)</p> <p>University of California, Los Angeles <i>ESS 10: Exploring Mars</i> (2008) Teaching Assistant and Lecturer for undergraduate course (60 students)</p> <p>Stanford University <i>Geophysics 150: Physics of the Earth</i> (2004, 2005) Teaching Assistant for graduate course (~6 students)</p> <p><i>Physics 50: Observational Astronomy</i> (2002, 2003) Teaching Assistant for undergraduate course (~20 students)</p>
Mentoring	<p>Laboratory for Atmospheric and Space Physics</p> <p><i>Postdocs</i></p> <p>2023–present: Dr. Harish 2022–present: Dr. Patrick O’Brien 2019–2020: Dr. Margaret Landis (now: faculty member, ASU)</p> <p><i>Graduate Students</i></p> <p>2023–present: Heshani Pieris (APS Dept., U. Colorado) 2022–present: Robert Stevens (APS Dept., U. Colorado) 2020–present: Kya Sorli (APS Dept., U. Colorado) *NSF Fellow 2020–2022: Noora Alsaeed, <i>Ph.D. — Dec. ‘22</i> (APS Dept., U. Colorado) 2018–2022: Andrew Wilcoski, <i>Ph.D. — Dec. ‘22</i> (APS Dept., U. Colorado) 2019–2020: Raven Larson, <i>M.S. — May ‘20</i> (APS Dept., U. Colorado)</p> <p><i>Undergraduate Students</i></p> <p>2024–present: Maya Nussbaumer (APS Dept., CU Boulder) 2024 (summer): Matthew Perkins (NASA Europa ICONS) 2023 (summer): Fahad Alawadhi (AES Dept., CU Boulder) 2023 (summer): Alia Almansoori (U. Edinburgh) 2023 (summer): Tyler Jx Bellison (Fort Lewis College) 2022–2024: Isabella Wise (APS Dept., CU Boulder) 2022–2023: Sam Aberbook (Physics Dept., CU Boulder) 2018–2021: Tara Tomlinson (CU Boulder, B.S. → Dartmouth College, Ph.D.) 2019–2020: Shaelyn Raposa (CU Boulder, B.S. → N. Ariz. U., Ph.D.) 2018–2019: Carlos Eytan Gary Bicas (CU Boulder, B.S. → Stony Brook U., Ph.D.) 2018–2019: Tyler Horvath (CU Boulder, B.S. → UCLA, Ph.D.)</p> <p>Caltech Summer Undergraduate Research Fellows (SURF)</p> <p>2017: James Haber (Cornell University, B.S. → Purdue U., Ph.D.) 2015: Léa Bonnefoy (Cornell University, B.S. → U. Arizona, Ph.D.) 2014: Clifford Watkins (Carleton College, B.S. → U. Hawaii, Ph.D.) 2011: Michael Lauria (Caltech, B.S.)</p> <p>Maximizing Student Potential (MSP)</p> <p>2015–2018: José Martínez Camacho (Citrus College → SMU, Ph.D.)</p> <p>Caltech Postdoctoral Fellows at JPL</p> <p>2017–2018: Dr. Quentin Vinckier (now: JPL Technologist) 2016–2018: Dr. Catherine M. Elder (now: JPL Scientist)</p>

Invited	2025 National Academy of Sciences / U.S.-Africa Frontiers Symposium
Invited	2024 L'Space / Arizona State University
	2023 Brown University (postponed)
	2021 Purdue University
	2020 Planetary Science Decadal Survey
	2020 Observatoire de la Côte d'Azur
	2020 NASA Lunar Surface Science Workshop
	2019 University of California, Los Angeles
	2018 Applied Physics Laboratory, Johns Hopkins University
	2017 Lawrence Livermore National Laboratory
	2017 University of Colorado, Boulder
	2016 Lunar & Planetary Institute
	2016 Weizmann Institute of Science (Israel)
	2015 International Space Exploration Coordination Group,
	2015 NASA Exploration Science Forum
	2015 University of California - Santa Cruz
	2014 SETI Institute
	2013 Lunar & Planetary Institute
	2012 California Institute of Technology
	2012 NASA – Jet Propulsion Laboratory

Outreach
& Public
Engagement

CU Outreach Grant

Faculty Award Co-Recipient, “Engaging Underserved Students with CU’s Cutting-edge Space Research” (2021–2022)

Ad Astra Academy

Co-founder and Co-leader, 2015–present
Brazil (2015, 2017), Kenya (2016), Colorado (2021, 2024)
Science and exploration program for underserved student populations

Media Interviews
& Popular Writing

Space.com: Sunny days on Mars come with a weather warning (Dec. 2024)
Also reported in: *Forbes* and other media outlets
The Conversation: Scientists suspect there's ice hiding on the Moon (Nov. 2023)
Reprinted in: *5 Essential Reads on Modern Lunar Missions* (Dec. 2023)
Popular Science: We finally have a detailed map of water on the moon (Mar. 2023)
The Atlantic: It snows on Mars (Jan. 2023)
Science Daily: ... Sweater weather on the Moon (Jul. 2022)
The Conversation: A rocket crashes into the Moon (Mar. 2022)
Space.com: How a rocket crash on the Moon will help impact physics (Mar. 2022)
CNN: Ancient volcanoes ... a rare resource for lunar explorers (May 2022)
Wired: A clever way to map the Moon's surface: using shadows (Oct. 2022)
The New York Times: Life on the planet Mercury? (Mar. 2020)
Smithsonian: The Moon has more hidden water (Oct 2020)
Popular Science: Europa is the new Mars (Jun. 2013)

Quirks & Quarks (podcast interview):
The Moon's a wetter place than we thought (Oct. 2020)
AirTalk (radio interview):
Studies confirm longstanding theory that there's water on the Moon (Oct. 2020)

Professional Affiliations	American Astronomical Society - Division for Planetary Sciences American Geophysical Union European Geosciences Union Asia Oceania Geosciences Society
Skills & Training	Remote sensing & spacecraft instrumentation, Modeling and numerical simulation Computer programming languages Proficient/expert: C/C++, Python, MATLAB, IDL Familiar: Fortran 90/95, shell scripting, etc.
	Mission formulation experience <i>Team-X</i> , NASA Jet Propulsion Laboratory <i>Team-A</i> , NASA Jet Propulsion Laboratory <i>Capture Lead Training</i> , NASA Jet Propulsion Laboratory Co-I and Deputy PI on mission proposals to NASA's <i>Discovery</i> and <i>New Frontiers</i> Successful PI on multiple instrument proposals to NASA mission programs
	Additional training <i>NASA Astrobiology Winter School and Field Course</i> (2011) <i>International Astrobiology Summer School</i> (2008) <i>PADI Open Water Diver</i> scuba certification (50+ dives) <i>Eagle Scout</i> (1998), BSA Troop 676, Issaquah, WA

Paul O. Hayne: Refereed Journal Articles

Number of peer-reviewed publications: 96 (as of January, 2025)

First-author: 10 / Student-supervised first-author: 14 / Postdoc-supervised first-author: 9

h-index: 31 ([ADS](#)), 35 ([Google Scholar](#))

i100-index (# papers cited \geq 100 times): 17 (6 as first-author)

Total citations: 4,088 (ADS), 6,089 (Google Scholar)

(*) indicates ([U,G](#)) student or ([P](#)) postdoc supervised or co-supervised by Hayne

2024

1. *(G) Alsaeed, N. R., **Hayne, P. O.**, & Concepcion, V. (2024), Seasonal and inter-annual variability in the polar vortex and snowfall on Mars, *J. Geophys. Res.*, 129(12), e2024JE008397.
2. Gallinger, C. L., Williams, J-P., Neish, C. D., Powell, T. M., Elder, C. M., Ghent, R. R., **Hayne, P. O.**, & Paige, D. A. (2024), Thermophysical Diversity of Young Lunar Crater Ejecta Revealed with LRO Diviner Observations, *Planet. Sci. J.*, 5(11), 261.
3. O'Brien, P., Scully, J. E. C., *(P) Landis, M. E., Schörghofer, N., **Hayne, P. O.** (2024), Enhancement of the Cerean Exosphere by Sublimation from Complex Craters, *Planet. Sci. J.*, 5(9), 199.
4. Cohen, B. A., Petersburg, R. R., Cremons, D. R., Russell, P. S., **Hayne, P. O.**, Greenhagen, B. T., Paige, D. A., et al. (2024), Lunar Flashlight science ground and flight measurements and operations using a multi-band laser reflectometer, *Icarus*, 413, 116013.
5. Hoover, R. H., Robbins, S. J., Hynek, B. M., & **Hayne, P. O.** (2024), Depth-to-diameter Ratios of Fresh Craters on the Moon and Implications for Surface Age Estimates, *Planet. Sci. J.*, 5(1), 26.
6. *(P) Landis, M. E., Dundas, C. M., McEwen, A. S., Daubar, I. J., **Hayne, P. O.**, Byrne, S., et al. (2024), New, dated small impacts on the South Polar Layered Deposits (SPLD), Mars, and implications for shallow subsurface properties, *Icarus*, 115977.
7. *(U) Bürger, J., **Hayne, P. O.**, Gundlach, B., Läuter, M., Kramer, T., & Blum, J. (2024), A microphysical thermal model for the lunar regolith: Investigating the latitudinal dependence of regolith properties, *J. Geophys. Res.*, 129(3), e2023JE008152.
8. Daubar, I. J., Hayes, A. G., Collins, G. C., Craft, K. L., Rathbun, J. A., Spencer, J. R., ... **Hayne, P. O.**, et al. (2024), Planned geological investigations of the Europa Clipper Mission, *Space Sci. Rev.*, 220(1), 18.
9. Piqueux, S., Kass, D. M., Kleinböhl, A., Slipski, M., **Hayne, P. O.**, McCleese, D. J., Schofield, J. T., & Heavens, N. (2024), Mars thermal inertia and surface temperatures by the Mars Climate Sounder, *Icarus*, 419, 115851.
10. Christensen, P. R., Spencer, J. R., Mehall, G. L., Patel, M., ... **Hayne, P. O.**, et al. (2024), The Europa Thermal Emission Imaging System (E-THEMIS) Investigation for the Europa Clipper Mission, *Space Sci. Rev.*, 220(4), 1-65.

11. *(P) **Burnett, E. R., & Hayne, P. O.** (2023) Spin-orbit coupling of Europa's ice shell and interior, *Icarus*, 406, doi: [10.1016/j.icarus.2023.115731](https://doi.org/10.1016/j.icarus.2023.115731).
12. Elder, C. M., Ghent, R. R., Haber, J., **Hayne, P. O.**, et al. (2023), The variability of lunar mare basalt properties from surface rock abundance, *Planet. Sci. J.*, 4(12), 244, doi: [10.3847/PSJ/ad06a8](https://doi.org/10.3847/PSJ/ad06a8).
13. *(G) **Wilcoski, A. X., Hayne, P. O., & Elder, C. M.** (2023) Thermal environments and volatile stability within lunar pits and caves, *J. Geophys. Res.*, e2023JE007758. doi: [10.1029/2023JE007758](https://doi.org/10.1029/2023JE007758)
14. Osinski, G. R., Melosh, H. J., ..., **Hayne, P. O.**, et al. (2023), Lunar impact features and processes, *Reviews in Mineralogy and Geochemistry*, 89(1), 651–690, doi: [10.2138/rmg.2023.89.08](https://doi.org/10.2138/rmg.2023.89.08).
15. Plescia, J. B., Cahill, J., ..., **Hayne, P. O.**, et al. (2023), Lunar surface processes, *Reviews in Mineralogy and Geochemistry*, 89(1), 651–690, doi: [10.2138/rmg.2023.89.15](https://doi.org/10.2138/rmg.2023.89.15).
16. Hurley, D. M., Siegler, M. A., ..., **Hayne, P. O.**, et al. (2023), Surface volatiles on the Moon, *Reviews in Mineralogy and Geochemistry*, 89(1), 787–827, doi: [10.2138/rmg.2023.89.18](https://doi.org/10.2138/rmg.2023.89.18).
17. Byron, B. D., Elder, C., ..., **Hayne, P. O.**, et al. (2023), Evidence for fine-grained material at lunar red spots: Insights from thermal infrared and radar data sets, *Planet. Sci. J.*, 4(9), 182, doi: [10.3847/PSJ/acf134](https://doi.org/10.3847/PSJ/acf134).
18. Hansen, C. J., Byrne, S., Calvin, W. M., Diniega, S., Dundas, C. M., **Hayne, P. O.**, et al. (2023), A comparison of CO₂ seasonal activity in Mars' northern and southern hemispheres, *Icarus*, in press, doi: [10.1016/j.icarus.2023.115801](https://doi.org/10.1016/j.icarus.2023.115801)
19. Roberts, J. H., McKinnon, W. B., ..., **Hayne, P. O.**, et al. (2023), Exploring the interior of Europa with the Europa Clipper, *Space Sci. Rev.*, 219(6), 46, doi: [10.1007/s11214-023-00990-y](https://doi.org/10.1007/s11214-023-00990-y).
20. Magaña, L. O., Retherford, K. D., ..., **Hayne, P. O.**, et al. (2023), LRO-LAMP lunar south pole cold traps: Assessment of H₂O and potential CO₂ and NH₃ reserves, *J. Geophys. Res.*, 128, 8, e2023JE007863, doi: [10.1029/2023JE007863](https://doi.org/10.1029/2023JE007863).
21. Nesnas, I. A. D., Kerber, L., ..., **Hayne, P.**, et al. (2023), Moon Diver: Exploring a Pit's exposed strata to understand lunar volcanism, *Acta Astronautica*, 211, 163–176, doi: [10.1016/j.actaastro.2023.05.042](https://doi.org/10.1016/j.actaastro.2023.05.042).
22. Piqueux, S., **Hayne, P. O.**, Kleinböhl, A., Kass, D. M., Schreier, M., McCleese, D. J., ... & Shirley, J. H. (2023), Atmospheric CO₂ depletion near the surface in the martian polar regions, *J. Geophys. Res.*, e2022JE007386. doi: [10.1029/2022JE007332](https://doi.org/10.1029/2022JE007332)
23. Powell, T. M., Horvath, T., Robles, V. L., Williams, J. P., **Hayne, P. O.**, Gallinger, C. L., ... & Paige, D. A. (2023), High-resolution nighttime temperature and rock abundance mapping of the Moon using the Diviner Lunar Radiometer Experiment with a model for topographic removal, *J. Geophys. Res.*, 128(2), e2022JE007532. doi: [10.1029/2022JE007532](https://doi.org/10.1029/2022JE007532)

24. *(G) Alsaeed, N. R. & Hayne, P. O. (2022), Transport of water into the polar regions of Mars through scavenging by CO₂ snowfall, *J. Geophys. Res.*, e2022JE007386. doi: [10.1029/2022JE007386](https://doi.org/10.1029/2022JE007386)
25. Bapst, J., Piqueux, S., Edwards, C. S., Wolfe, C., Hayne, P. O., Kass, D. M., & Kleinböhl, A. (2022), Surface dust redistribution on Mars from interannual differences in temperature and albedo, *J. Geophys. Res.*, e2022JE007365. doi: [10.1029/2022JE007365](https://doi.org/10.1029/2022JE007365)
26. Magaña, L. O., Rutherford, K. D., Byron, B. D., Hendrix, A. R., Grava, C., Mandt, K. E., Raut, U., Czajka, E., Hayne, P. O., Hurley, D. M., Gladstone, G. R., Poston, M. J., Greathouse, T. K., Pryor, W., Cahill, J. T., & Stickle, A. (2022), LRO-LAMP survey of lunar south pole cold traps: implication for the presence of condensed H₂O, *J. Geophys. Res.*, e2022JE007301. doi: [10.1029/2022JE007301](https://doi.org/10.1029/2022JE007301)
27. *(U) Horvath, T., Hayne, P. O., & Paige, D. A. (2022), Thermal and illumination environments of lunar pits and caves: models and observations from the Diviner Lunar Radiometer Experiment, *Geophys. Res. Lett.*, e2022GL099710. doi: [10.1029/2022GL099710](https://doi.org/10.1029/2022GL099710)
28. *(U) Tomlinson, T. C. & Hayne, P. O. (2022), Composition and possible origins of dark crater ejecta on Europa, *Icarus*, 115037. doi: [10.1016/j.icarus.2022.115037](https://doi.org/10.1016/j.icarus.2022.115037)
29. *(U) Innanen, A. C., Landis, M. E., Hayne, P. O., & Moores, J. E. (2022), Possible atmospheric water vapor contribution from Martian Swiss cheese terrain, *Planet. Sci. J.*, 3. doi: [10.3847/PSJ/ac979e](https://doi.org/10.3847/PSJ/ac979e)
30. *(G) Wilcoski, A. X. & Hayne, P. O., & Landis, M. E. (2022), Polar ice accumulation from volcanically induced transient atmospheres on the Moon, *The Planetary Science Journal*, 3(5), 99. doi: [10.3847/PSJ/ac649c](https://doi.org/10.3847/PSJ/ac649c)
31. Williams, J. P., Pathare, A. V., Costello, E. S., Gallinger, C. L., Hayne, P. O., et al. (2022), The effects of terrain properties upon the small crater population distribution at Giordano Bruno: implications for lunar chronology, *Journal of Geophysical Research*, e2021JE007131. doi: [10.1029/2021JE007131](https://doi.org/10.1029/2021JE007131)
32. *(P) Landis, M. E., Hayne, P. O., Williams, J. P., Greenhagen, B. T., & Paige, D. A. (2022), Spatial distribution and thermal diversity of surface volatile cold traps at the lunar poles, *The Planetary Science Journal* 3 (2), 39. doi: [10.3847/PSJ/ac4585](https://doi.org/10.3847/PSJ/ac4585)
33. *(P) Landis, M. E., Castillo-Rogez, J. C., Hayne, P. O., et al. (2022), The case for a Themis asteroid family spacecraft mission, *Planetary and Space Science* 212, 105413. doi: [10.1016/j.pss.2021.105413](https://doi.org/10.1016/j.pss.2021.105413)
34. Williams, J. P., Greenhagen, B. T., ..., Hayne, P. O., & Sullivan, M. T. (2022), Temperatures of the Lacus Mortis region of the Moon, *Earth and Space Science*, 9(2). doi: [10.1029/2021EA001966](https://doi.org/10.1029/2021EA001966)
35. Byron, B. D., Elder, C. M., Williams, J-P., Ghent, R. R., Gallinger, C. L., Hayne, P. O., & Paige, D. A. (2022), Thermophysical properties of lunar irregular mare patches from LRO Diviner Radiometer data, *J. Geophys. Res.*, e2022JE007214. doi: [10.1029/2022JE007214](https://doi.org/10.1029/2022JE007214)
36. Lucey, P. G., Petro, N., ..., Hayne, P. O., et al. (2022), Volatile interactions with the lunar surface, *Geochemistry*, 125858. doi: [10.1016/j.chemer.2021.125858](https://doi.org/10.1016/j.chemer.2021.125858)

2021

37. *(G) **Burnett, E. R.** & **Hayne, P. O.** (2021), Europa's hemispheric color dichotomy as a constraint on non-synchronous rotation, *Icarus*, 364. doi: [10.1016/j.icarus.2021.114438](https://doi.org/10.1016/j.icarus.2021.114438)
38. **Hayne, P. O.**, Aharonson, O., & Schörghofer, N. (2021), Micro cold traps on the Moon, *Nature Astron.*, 1-7. doi: [10.1038/s41550-020-1198-9](https://doi.org/10.1038/s41550-020-1198-9)
39. Lucey, P. G., **Hayne, P. O.**, Costello, E. S., Green, R., Hibbitts, C. A., Goldberg, A., ... & Honniball, C. (2021), The spectral radiance of indirectly illuminated surfaces in regions of permanent shadow on the Moon, *Acta Astronautica*, 180, 25-34. doi: [10.1016/j.actaastro.2020.11.032](https://doi.org/10.1016/j.actaastro.2020.11.032)
40. Wu, Y., ..., & **Hayne, P. O.** (2021), Chang'E-4 rover spectra revealing micro-scale surface thermophysical properties of the Moon, *Geophys. Res. Lett.*, 48, 4. e2020GL089226.
41. Ahrens, C. J., Paige, D. A., Eubanks, T. M., Blase, W. P., Mesick, K. E., Zimmerman, W., Petro, N., **Hayne, P. O.**, & Price, S. (2021), Small penetrator instrument concept for hte advancement of lunar surface science, *Planet. Sci. J.*, 2(1), p. 38.
42. Avdellidou, C., Munaibari, E., *(G) **Larson, R.**, ... **Hayne, P. O.**, et al. (2021), Impacts on the Moon: analysis methods and size distribution of impactors, *Planet. & Space Sci.*, 200.

2020

43. *(G) **Wilcoski, A. X.** & **Hayne, P. O.** (2020), Surface roughness evolution and implications for the age of the North Polar Residual Cap of Mars, *J. Geophys. Res.*, 125(12), e2020JE006570.
44. *(U) **Gary-Bicas, C. E.**, **Hayne, P. O.**, *(U) **Horvath, T.**, Heavens, N. G., Kass, D. M., Kleinböhl, A., Piqueux, S., Shirley, J., & McCleese, D. J. (2020), Asymmetries in snowfall, emissivity and albedo of Mars' seasonal polar caps: Mars Climate Sounder observations. *J. Geophys. Res.*, 125(5), e2019JE006150.
45. Feng, J., Siegler, M. A., & **Hayne, P. O.** (2020), New constraints on thermal and dielectric properties of lunar regolith from LRO Diviner and CE-2 Microwave Radiometer, *J. Geophys. Res.*, 125(1), e2019JE006130.
46. Siegler, M. A., Feng, J., Lucey, P. G., Ghent, R. R., **Hayne, P. O.**, & White, M. N. (2020), Lunar titanium and frequency dependent microwave loss tangent as constrained by the Chang'E-2 MRM and LRO Diviner Lunar Radiometers, *J. Geophys. Res.*, e2020JE006405.
47. Cohen, B. A., **Hayne, P. O.**, Greenhagen, B., Paige, D. A., Seybold, C., & Baker, J. (2020), Lunar Flashlight: illuminating the lunar south pole, *IEEE Aerospace and Electronic Systems*, 35(3), 46-52.
48. Smith, I. B., **Hayne, P. O.**, Byrne, S., Becerra, P., Kahre, M., Calvin, W., ... & Horgan, B. (2020), The Holy Grail: A road map for unlocking the climate record stored within Mars' polar layered deposits, *Planet. Space Sci.*, 184, 104841.
49. Lyra, W., ... **Hayne, P. O.**, & Marlow, J. (2020), Ad Astra Academy: Using Space Exploration to Promote Student Learning and Motivation in the City of God, Rio De Janeiro, Brazil, *Comm. Astron. with the Public*, 27, 5-13.

2019

50. Buhler, P. B., Ingersoll, A. P., Piqueux, S., Ehlmann, B. E., **Hayne, P. O.** (2019), Coevolution of Mars's atmosphere and massive south polar CO₂ ice deposit. *Nature Astron.*, 4(4), 364-371. doi: [10.1038/s41550-019-0976-8](https://doi.org/10.1038/s41550-019-0976-8)
51. *(P) Hofgartner, J. D., Buratti, B. J., **Hayne, P. O.**, Young, L. A. (2019), Ongoing resurfacing of KBO Eris by volatile transport in local, collisional, sublimation atmosphere regime. *Icarus*, 334, 52–61. doi: [10.1016/j.icarus.2018.10.028](https://doi.org/10.1016/j.icarus.2018.10.028)
52. Piqueux, S., ..., **Hayne, P. O.** (2019), Widespread shallow water ice on Mars at high latitudes and midlatitudes. *Geophys. Res. Lett.*, 46, 14,290–14,298. doi: [10.1029/2019GL083947](https://doi.org/10.1029/2019GL083947)
53. Farrell, W. M., Hurley, D. M., Poston, M. J., **Hayne, P. O.**, Szalay, J. R., & McLain, J. L. (2019), The young age of the LAMP-observed frost in lunar polar cold traps. *Geophys. Res. Lett.*, in press. doi: [10.1029/2019GL083158](https://doi.org/10.1029/2019GL083158)
54. Sefton-Nash, E., Williams, J. P., Greenhagen, B. T., Warren, T. J., Bandfield, J. L., Aye, K. M., Leader, F., Siegler, M. A., **Hayne, P. O.**, & Paige, D. A. (2019), Evidence for ultra-cold traps and surface water ice in the lunar south polar crater Amundsen. *Icarus*, 332, 1-13. doi: [10.1016/j.icarus.2019.06.002](https://doi.org/10.1016/j.icarus.2019.06.002)
55. Hendrix, A. R., Hurley, D. M., Farrell, W. M., Greenhagen, B. T., **Hayne, P. O.**, Rutherford, K. D., ... & Liu, Y. (2019), Diurnally migrating lunar water: evidence from ultraviolet data, *Geophys. Res. Lett.*, 46(5), 2417-2424. doi: [10.1029/2018GL081821](https://doi.org/10.1029/2018GL081821)
56. Jordan, A. P., Stubbs, T. J., Shusterman, M. L., Izenberg, N. R., Wilson, J. K., **Hayne, P. O.**, ... & Spence, H. E. (2019), How dielectric breakdown may contribute to the global weathering of regolith on the moon, *Icarus*, 319, 785-794. doi: [10.1016/j.icarus.2018.10.025](https://doi.org/10.1016/j.icarus.2018.10.025)
57. Bapst, J., Byrne, S., Bandfield, J. L., & **Hayne, P. O.** (2019), Thermophysical properties of the north polar residual cap using MGS TES, *J. Geophys. Res.*, in press. doi: [10.1029/2018JE005786](https://doi.org/10.1029/2018JE005786)
58. *(P) Vinckier, Q., Hardy, L., Gibson, M., Smith, C., Putman, P., **Hayne, P. O.**, & Sellar, R. G. (2019), Design and characterization of the multi-band SWIR receiver for the Lunar Flashlight CubeSat Mission, *Remote Sensing*, 11(4), 440. doi: [10.3390/rs11040440](https://doi.org/10.3390/rs11040440)
59. Landis, M. E., Byrne, S., Combe, J. P., Marchi, S., Castillo-Rogez, J., Sizemore, H. G., Schörghofer, N., Prettyman, T. H., **Hayne, P. O.**, Raymond, C. A., & Russell, C. T. (2019), Water vapor contribution to Ceres' exosphere from observed surface ice and postulated ice-exposing impacts, *J. Geophys. Res.*, 124(1), 61-75.

2018

60. Williams, J-P., Bandfield, J. L., Paige, D. A., Powell, T. M., Greenhagen, B. T., Taylor, S., **Hayne, P. O.**, Speyerer, E. J., Ghent, R. R., & Costello, E. S. (2018), Lunar cold spots and crater production on the Moon, *Journal of Geophysical Research: Planets*, 123 (9), 2380–2392. doi: [10.1029/2018JE005652](https://doi.org/10.1029/2018JE005652).
61. Heavens, N. G., Kleinböhl, A., Chaffin, M. S., Halekas, J. S., Kass, D. M., **Hayne, P. O.**, McCleese, D. J., Piqueux, S., Shirley, J. H., & Schofield, J. T. (2018), Hydrogen escape from Mars enhanced by deep convection in dust storms, *Nature Astronomy*, 2, 126–132. doi: [10.1038/s41550-017-0353-4](https://doi.org/10.1038/s41550-017-0353-4).
62. Li, S., Lucey, P. G., Milliken, R. E., **Hayne, P. O.**, Fisher, E., Williams, J-P., Hurley, D. M., Elphic, R. C. (2018), Direct evidence of surface exposed water ice in the lunar polar regions, *Proceedings of the National Academy of Sciences*, 115 (36), 8907–8912. doi: [10.1073/pnas.1802345115](https://doi.org/10.1073/pnas.1802345115).

- 2017 63. **Hayne, P. O.**, Bandfield, J. L., Siegler, M. A., Vasavada, A. R., Ghent, R. R., et al. (2017), Global regolith thermophysical properties of the Moon from the Diviner Lunar Radiometer Experiment, *J. Geophys. Res.*, *122*, 2371–2400. doi: [10.1002/2017JE005387](https://doi.org/10.1002/2017JE005387)
64. *(P) **Elder, C. M., Hayne, P. O.**, Bandfield, J. L., Ghent, R. R., Williams, J.-P., Donaldson Hanna, K. L., & Paige, D. A. (2017), Young lunar volcanic Features: Thermophysical properties and formation, *Icarus*, *290*, 224–237. doi: [10.1016/j.icarus.2017.03.004](https://doi.org/10.1016/j.icarus.2017.03.004)
65. Mitri, G., Postberg, F., Soderblom, J. M., ..., **Hayne, P. O.**, et al. (2017), Explorer of Enceladus and Titan (E²T): Investigating ocean worlds' evolution and habitability in the solar system, *Planetary and Space Science*, doi: [10.1016/j.pss.2017.11.001](https://doi.org/10.1016/j.pss.2017.11.001)
66. Landis, M. E., Byrne, S., Schörghofer, N., Schmidt, B. E., **Hayne, P. O.**, Castillo-Rogez, J., ... Russell, C. T. (2017), Conditions for sublimating water ice to supply Ceres' exosphere, *J. Geophys. Res.*, *122*, 1984–1995. doi: [10.1002/2017JE005335](https://doi.org/10.1002/2017JE005335)
67. Davies, A. G., Gunapala, S., Soibel, A., Ting, D., Rafol, S., Blackwell, M., **Hayne, P. O.**, & Kelly, M. (2017), A novel technology for measuring the eruption temperature of silicate lavas with remote sensing: Application to Io and other planets, *J. Volcanology & Geothermal Res.*, *343*, 1–16. doi: [10.1016/j.jvolgeores.2017.04.016](https://doi.org/10.1016/j.jvolgeores.2017.04.016)
68. Fisher, E. A., Lucey, P. G., Lemelin, M., Greenhagen, B. T., Siegler, M. A., Mazarico, E., Aharonson, O., Williams, J.-P., **Hayne, P. O.**, Neumann, G. A., Paige, D. A., Smith, D. E., & Zuber, M. T. (2017), Evidence for surface water ice in the lunar polar regions using reflectance measurements from the Lunar Orbiter Laser Altimeter and temperature measurements from the Diviner Lunar Radiometer Experiment, *Icarus*, *292*, 74–85. doi: [10.1016/j.icarus.2017.03.023](https://doi.org/10.1016/j.icarus.2017.03.023)
- 2016
69. Piqueux, S., Kleinböhl, A., **Hayne, P. O.**, Heavens, N. G., Kass, D. M., McCleese, D. J., ... & Shirley, J. H. (2016), Discovery of a widespread low-latitude diurnal CO₂ frost cycle on Mars, *J. Geophys. Res.*, *121*, 1174–118. doi: [10.1002/2016JE005034](https://doi.org/10.1002/2016JE005034)
70. Greenhagen, B. T., Neish, C. D., Williams, J. P., Cahill, J. T., Ghent, R. R., **Hayne, P. O.**, ... & Bandfield, J. L. (2016), Origin of the anomalously rocky appearance of Tsiolkovskiy crater, *Icarus*, *273*, 237–247. doi: [10.1016/j.icarus.2016.02.041](https://doi.org/10.1016/j.icarus.2016.02.041)
71. Bennett, K. A., Horgan, B. H., Gaddis, L. R., Greenhagen, B. T., Allen, C. C., **Hayne, P. O.**, ... & Paige, D. A. (2016), Complex explosive volcanic activity on the Moon within Oppenheimer crater, *Icarus*, *273*, 296–314. doi: [10.1016/j.icarus.2016.02.007](https://doi.org/10.1016/j.icarus.2016.02.007)
72. *(U) **Bonnefoy, L. E.**, A. G. Hayes, **P. O. Hayne**, et al. (2015), Compositional and spatial variations in Titan dune and interdune regions from Cassini VIMS and RADAR, *Icarus*, *270*, 222–237, doi: [10.1016/j.icarus.2015.09.014](https://doi.org/10.1016/j.icarus.2015.09.014)

2015

73. Hayne, P. O., and Oded Aharonson (2015), Thermal stability of ice on Ceres with rough topography, *J. Geophys. Res.*, 120, 1567–1584, doi: [10.1002/2015JE004887](https://doi.org/10.1002/2015JE004887)
74. Heavens, N. G., Cantor, B. A., Hayne, P. O., et al. (2015), Extreme detached dust layers near Martian volcanoes: Evidence for dust transport by mesoscale circulations forced by high topography, *Geophys. Res. Lett.*, 42, 10, 3730–3738. doi: [10.1002/2015GL064004](https://doi.org/10.1002/2015GL064004)
75. Hayne, P. O., A. R. Hendrix, E. Sefton-Nash, P. G. Lucey, K. D. Retherford, J-P. Williams, et al. (2015), Evidence for exposed water ice in the Moon's south polar regions from Lunar Reconnaissance Orbiter ultraviolet albedo and temperature measurements, *Icarus*, 255, 58–69, doi:[10.1016/j.icarus.2015.03.032](https://doi.org/10.1016/j.icarus.2015.03.032)
76. Glotch, T. D., Bandfield, J. L., Lucey, P. G., Hayne, P. O., et al. (2015), Formation of lunar swirls by magnetic field standoff of the solar wind, *Nature Communications*, 6. doi: [10.1038/ncomms7189](https://doi.org/10.1038/ncomms7189)
77. Piqueux, S., Kleinböhl, A., Hayne, P. O., Kass, D. M., Schofield, J. T., & McCleese, D. J. (2015), Variability of the Martian seasonal CO₂ cap extent over eight Mars Years, *Icarus*, doi:[10.1016/j.icarus.2014.10.045](https://doi.org/10.1016/j.icarus.2014.10.045)
78. Bandfield, J. L., Hayne, P. O., Williams, J. P., Greenhagen, B. T., & Paige, D. A. (2015), Lunar surface roughness derived from LRO Diviner Radiometer observations, *Icarus*, 248, 357–372. doi: [10.1016/j.icarus.2014.11.009](https://doi.org/10.1016/j.icarus.2014.11.009)

2014

79. Hayne, P. O., McCord, T. B., & Sotin, C. (2014), Titan's surface composition and atmospheric transmission with solar occultation measurements by Cassini VIMS, *Icarus*, 243, 158–172. doi: [10.1016/j.icarus.2014.08.045](https://doi.org/10.1016/j.icarus.2014.08.045)
80. Hayne, P. O., D. A. Paige, N. G. Heavens (2014), The role of snowfall in forming the seasonal ice caps of Mars: Models and constraints from the Mars Climate Sounder, *Icarus* 231, 122–130. doi: [10.1016/j.icarus.2013.10.020](https://doi.org/10.1016/j.icarus.2013.10.020)
81. Ghent, R. R., Hayne, P. O., Bandfield, J. L., Campbell, B. A., Allen, C. C., Carter, L. M., & Paige, D. A. (2014), Constraints on the recent rate of lunar ejecta breakdown and implications for crater ages, *Geology*, 42(12), 1059–1062. doi: [10.1130/G35926.1](https://doi.org/10.1130/G35926.1)
82. Bandfield, J. L., E. Song, P. O. Hayne, B. D. Brand, R. R. Ghent, A. R. Vasavada, D. A. Paige (2014), Lunar cold spots: Granular flow features and extensive insulating materials surrounding young craters, *Icarus* 231, 221–231. doi: [10.1016/j.icarus.2013.12.017](https://doi.org/10.1016/j.icarus.2013.12.017)
83. Ingersoll, R. V., Pratt, M. J., Davis, P. M., Caracciolo, L., Day, P. P., Hayne, P. O., ... & Hendrix, E. D. (2014), Paleotectonics of a complex Miocene half graben formed above a detachment fault: The Diligence basin, Orocopia Mountains, southern California, *Lithosphere*, 6(3), 157–176. doi: [10.1130/L334.1](https://doi.org/10.1130/L334.1)

2013

84. Barnes, J. W., B. J. Buratti, E. P. Turtle, J. Bow, P. A. Dalba, J. Perry, R. H. Brown, S. Rodriguez, S. Le Mouelic, K. H. Baines, C. Sotin, R. D. Lorenz, M. J. Malaska, T. B. McCord, R. N. Clark, R. Jaumann, P. O. Hayne, et al. (2013), Precipitation-Induced Surface Brightenings Seen on Titan by Cassini VIMS and ISS, *Planetary Science*, 2, p. 1. doi: [10.1186/2191-2521-2-1](https://doi.org/10.1186/2191-2521-2-1)

2012

85. **Hayne, P. O.**, D. A. Paige, J. T. Schofield, D. M. Kass, A. Kleinböhl, N. G. Heavens, and D. J. McCleese (2012), Carbon dioxide snow clouds on Mars: South polar winter observations by the Mars Climate Sounder, *J. Geophys. Res.*, 117, E08014, doi: [10.1029/2011JE004040](https://doi.org/10.1029/2011JE004040)
86. Vasavada, A. R., J. L. Bandfield, B. T. Greenhagen, **P. O. Hayne**, et al. (2012), Lunar Equatorial Surface Temperatures and Regolith Properties from the Diviner Lunar Radiometer Experiment, *J. Geophys. Res.* 117, E00H18. doi: [10.1029/2011JE003987](https://doi.org/10.1029/2011JE003987)

2010

87. **Hayne, P. O.**, B. T. Greenhagen, M. C. Foote, M. A. Siegler, A. R. Vasavada, and D. A. Paige (2010), Diviner Lunar Radiometer Observations of the LCROSS Impact, *Science*, 330, 477. doi: [10.1126/science.1197135](https://doi.org/10.1126/science.1197135)
88. Paige, D. A., M. A. Siegler, J. A. Zhang, **P. O. Hayne**, et al. (2010), Diviner Observations of Cold Traps in the Lunar South Polar Region: Spatial Distribution and Temperature, *Science* 330, 479. doi: [10.1126/science.1187726](https://doi.org/10.1126/science.1187726)
89. Greenhagen, B. T., P. G. Lucey, M. B. Wyatt, T. D. Glotch, C. C. Allen, J. A. Arnold, J. L. Bandfield, N. E. Bowles, K. L. Hanna, **P. O. Hayne**, E. Song, I. R. Thomas, and D. A. Paige (2010), Global Silicate Mineralogy of the Moon from the Diviner Lunar Radiometer, *Science* 329, 1507. doi: [10.1126/science.1192196](https://doi.org/10.1126/science.1192196)
90. McCord, T. B., Hansen, G. B., Combe, J-P., & **P. O. Hayne** (2010), Hydrated minerals on Europa's surface: An improved look from the Galileo NIMS investigation, *Icarus* 209, 639–650. doi: [10.1016/j.icarus.2010.05.026](https://doi.org/10.1016/j.icarus.2010.05.026)

2009

91. Barnes, J. W., ..., **P. O. Hayne**, et al. (2009), VIMS Spectral Mapping Observations of Titan during the Cassini Prime Mission, *Planet. and Space Sci.*, 57, 1950–1962. doi: [10.1016/j.pss.2009.04.013](https://doi.org/10.1016/j.pss.2009.04.013)

2008

92. McCord, T. B., **P. Hayne**, et al. (2008), Titan's surface: Search for spectral diversity and composition using the Cassini VIMS investigation, *Icarus*, 194, 212–242. doi: [10.1016/j.icarus.2007.08.039](https://doi.org/10.1016/j.icarus.2007.08.039)

Publications: Book Chapters & Reports

1. Smith, I. B., Byrne, S., **Hayne, P. O.**, & 34 co-authors (2018), “Unlocking the Climate Record Stored in Mars’ Polar Layered Deposits,” *Keck Institute for Space Studies Report*. [\[PDF\]](#)
2. Aharonson, O., A. Hayes, **P. O. Hayne**, R. Lopes, A. Lucas, J. T. Perron, (2012), Titan’s Surface Geology, in: C. G. Mueller-Wodarg, T. Cravens and E. Lellouch (Ed.), *Titan: Surface, Atmosphere and Magnetosphere*, Cambridge University Press, Cambridge, UK.
3. **Hayne, P. O.**, A. P. Ingersoll, D. A. Paige, & 32 co-authors (2014), “New approaches to lunar ice detection and mapping,” *Keck Institute for Space Studies Report*. [\[PDF\]](#)

Publications: Commentaries

1. **Hayne, P. O.** (2013), Abandoned frontier, *Nature Geosci.*, 6(3), 155-156. doi: [10.1038/ngeo1753](https://doi.org/10.1038/ngeo1753)