Paul O. Hayne

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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 *Associate Professor* (with tenure)
2018 – 2024 *Assistant Professor*
Astrophysical & Planetary Sciences Department,
and Laboratory for Atmospheric & Space Physics

NASA – Jet Propulsion Laboratory, California Institute of Technology
2012 – 2017 *Research Scientist*

California Institute of Technology
2011 – 2012 *Postdoctoral Scholar* (Supervisor: O. Aharonson)

Education

University of California, Los Angeles
Ph.D., Geophysics & Space Physics, 2010 (Advisor: D. A. Paige)

Stanford University
M.S., Geophysics, 2005 (Advisors: N. H. Sleep & J. J. Lissauer)
B.S., Geophysics, 2003

Mission Experience

Emirates Mission to the Asteroid belt (EMA), UAE Space Agency
and Laboratory for Atmospheric & Space Physics
Project Scientist (2021–present)

NASA Lunar Compact Infrared Imaging System (L-CIRiS)
Principal Investigator (2019–present), CLPS-CP22 lunar south polar mission

NASA Lunar-Vulkan Imaging and Spectroscopy Explorer (Lunar-VISE)
Co-Investigator (2019–present)
Investigation Lead, Lunar-VISE Compact Infrared Imaging System (LV-CIRiS)

NASA Europa Clipper
Co-Investigator (2017–present) and *Investigation Scientist* (2015–2018)
Europa Thermal Emission Imaging System (E-THEMIS)

NASA Janus
Co-Investigator and *Investigation Lead* (2019–2024)
Thermal IR Camera

NASA Mars Reconnaissance Orbiter
Co-Investigator (2017–present)
Mars Climate Sounder

Mission Experience (cont.)

NASA Lunar Flashlight
Co-Investigator (2012–2023)

NASA Lunar Reconnaissance Orbiter
Co-Investigator (2011–present)
Diviner Lunar Radiometer Experiment

Science Team Affiliate: **NASA CLPS/IM-2 South Pole** Moon3D camera (2024-present)
NASA OSIRIS-REx (2018–2020), **NASA Dawn** (2016–2019),
NASA/ESA Cassini-Huygens (2006–2014)

Selected External Grants & Contracts

2025–2027 *Advanced 3-d Thermophysical Model to Enable Europa Clipper Interdisciplinary Science*
PI: P. Hayne
NASA Precursor Science Investigations for Europa
$261k

2025–2027 *Topographic Modeling to Simulate Multi-scale Roughness for Europa Clipper Investigations and Science*
Co-I: P. Hayne
NASA Working Models for Europa Clipper / JPL / $75k

2025–2026 *Moon3D Thermophysical Modeling*
Co-I: P. Hayne
NASA RESOURCE: Resource Exploration on the Moon / ARC / $90k

2025–2026 *LunarAssay via Small Satellite Orbiter Phase 1A*
PI: P. Hayne
DARPA LASSO Payload / $299k

2019–2028 *Lunar Vulkan Imaging and Spectroscopy Explorer (Lunar-VISE)*
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)

2019–2028 *Lunar Compact Infrared Imaging System (L-CIRiS)*
PI: P. Hayne
NASA Lunar Science and Instrument Technology Payloads / $4.1M

2015–2034 *Europa Thermal Emission Imaging System*
PI: P. Christensen (Co-I: P. Hayne)
NASA Europa Clipper Mission / ∼$600k subaward to LASP for Phases D–E

2016–2025 *Lunar Reconnaissance Orbiter Extended Missions 3–5*
PI: D. Paige (Co-I: P. Hayne)
NASA Discovery Program / ∼$2.2M allocation for Co-I Hayne

Grants (cont.)

2016–2025 *Mars Reconnaissance Orbiter Extended Missions 4–6*
PI: A. Kleinböhl (Co-I: P. Hayne)
NASA Mars Program / ∼$1.5M allocation for Co-I Hayne

2019–2024 *Janus Mission*
PI: D. Scheeres (Co-I/Instrument Lead: P. Hayne)
NASA SIMPLEx Program / ∼ $400k subaward to LASP

2013–2023 *Lunar Flashlight Science Investigation*
PI: B. Cohen (Co-I: P. Hayne)
NASA Advanced Exploration Systems / ∼$900k allocation for Co-I Hayne

2018–2021 *Boulders on Bennu: Modeling Thermal Emission from Boulders for Yarkovsky Effect and Thermal Inertia Investigations*
PI: P. Hayne (Science PI: C. Elder)
NASA OSIRIS-REx Participating Scientist Program / $346k

2017–2018 *Unlocking the Climate Record Stored within Mars' Polar Layered Deposits*
PI: P. Hayne
W. M. Keck Institute for Space Studies / $50k

2015–2018 *Inter-seasonal and Inter-annual Surface Dust Fluxes on Mars*
PI: P. Hayne (Science PI: S. Piqueux)
NASA Mars Data Analysis Program / $331k

2013–2017 *Volatile Regolith Thermal Investigation Consortium for Exploration and Science (VORTICES)*
PI: A. Rivkin (Co-I: P. Hayne)
NASA Solar System Exploration Research Virtual Institute / ∼$120k

2014–2016 *Thermal Infrared Observations of the Moon during Lunar Eclipse*
PI: P. Lucey (Co-I: P. Hayne)
NASA Planetary Astronomy / $143k allocation for P. Hayne

2013–2014 *New Approaches to Lunar Ice Detection and Mapping*
PI: P. Hayne
W. M. Keck Institute for Space Studies / $50k

National Service

Europa ICONS
Member of NASA's Program Definition Tiger Team (2023–2024)

NASA Artemis
Course Developer, Astronaut Training – Lunar Surface Environment (2024–present)

International Workshop on Instrumentation for Planetary Missions
Science Organizing Committee (2025)

Keck Institute for Space Studies, California Institute of Technology
Study Co-Lead
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
Editorial Board Member, Icarus (2020–present)
Member of the Federal Relations Subcommittee (2017–2022)
Local Organizing Committee, Annual Meeting (2016)
Panelist, Annual Meeting (2015)

American Geophysical Union
Session Co-organizer (Mars Atmosphere), Annual Meeting (2014–2024)

Early-Career Planetary Explorers
Co-founder (2012) and *Co-leader* (2012–2020)
World-wide advocacy organization for early-career planetary scientists

NASA Science Mission Directorate
Appointed Member, Mars Exploration Program:
Ice and Climate Evolution Science Assessment Group (2018–2019)
Review Panel Member (2012–present)

National Research Council – Space Studies Board
Raconteur, Planetary Science Decadal Survey (2009–2010)

Referee for major scientific journals:
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

Departmental & LASP Service

Committee Membership (APS Department):

2025/2026	Tenure-track Faculty Search Committee
2025/2026	Graduate Curriculum and Concerns Committee
2025	Primary Unit Evaluation Committee (Kazachenko)
2024/2025	McCray Prize Postdoctoral Fellowship Committee
2024/2025	Sommers-Bausch Observatory Advisory Committee (Chair)
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
2025	LASP Strategic Planning Committee
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
Visiting Scientist (2017)
Planetary Defense Program / Weapons and Complex Integration (WCI)

Weizmann Institute of Science, Israel
Visiting Scientist (2015, 2016)
The Helen Kimmel Center for Planetary Science

Honors & Awards

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

Exam Committees & Defenses

Graduate Comprehensive Examinations:

2025	Mirielle Caradonna	CU / APS	
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:

2025	**Dr. Kya Sorli***	CU / APS	*Primary Advisor
2025	**Dr. Heshani Pieris***	CU / APS	*Primary Advisor
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 5810: Planetary Atmospheres (Spring, 2026)
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"

California Institute of Technology

Ge 151: Planetary Surfaces (2011)
Co-Instructor & Lecturer for graduate course (∼6 students)

University of California, Los Angeles

ESS 10: Exploring Mars (2008)
Teaching Assistant and Lecturer for undergraduate course (60 students)

Stanford University

Geophysics 150: Physics of the Earth (2004, 2005)
Teaching Assistant for graduate course (∼6 students)

Physics 50: Observational Astronomy (2002, 2003)
Teaching Assistant for undergraduate course (∼20 students)

Mentoring

Laboratory for Atmospheric and Space Physics

Postdocs

2023–present: Dr. Harish
2022–present: Dr. Patrick O'Brien
2019–2020: Dr. Margaret Landis (now: faculty member, ASU)

Graduate Students

2024–present: Rhali Attar (APS, CU)
2022–present: Robert Stevens (APS, CU)
2023–2025: **Heshani Pieris, *Ph.D.* — *'25*** (APS, CU → LASP Researcher)
2020–2025: **Kya Sorli, *Ph.D.* — *'25*** (APS, CU → U. Oxford) *NSF Fellow
2020–2022: **Noora Alsaeed, *Ph.D.* — *Dec. '22*** (APS, CU)
2018–2022: **Andrew Wilcoski, *Ph.D.* — *Dec. '22*** (APS, CU)
2019–2020: **Raven Larson, *M.S.* — *May '20*** (APS, CU)

Undergraduate Students

2024–present: Maya Nussbaumer (APS Dept., CU Boulder)
2024–2025: Bethany Fuhrman (CU Boulder, B.S. → U. Hawaii, Ph.D.)
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.)

Caltech Summer Undergraduate Research Fellows (SURF)

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.)

Maximizing Student Potential (MSP)

2015–2018: José Martínez Camacho (Citrus College → SMU, Ph.D.)

Caltech Postdoctoral Fellows at JPL

2017–2018: Dr. Quentin Vinckier (now: JPL Technologist)
2016–2018: Dr. Catherine M. Elder (now: JPL Scientist)

Invited Talks

2026	NASA Artemis Science Series
2025	NASA Europa Clipper Science Series
2025	National Academy of Sciences / U.S.-Africa Frontiers Symposium
2025	L'Space / Arizona State University
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
Team-X, NASA Jet Propulsion Laboratory
Team-A, NASA Jet Propulsion Laboratory
Capture Lead Training, NASA Jet Propulsion Laboratory
Co-I and Deputy PI on mission proposals to NASA's *Discovery* and *New Frontiers*
Successful PI on multiple instrument proposals to NASA mission programs

Additional training
NASA Astrobiology Winter School and Field Course (2011)
International Astrobiology Summer School (2008)
PADI Open Water Diver scuba certification (50+ dives)
Eagle Scout (1998), BSA Troop 676, Issaquah, WA

Paul O. Hayne: Refereed Journal Articles

Number of peer-reviewed publications: 106 (as of February, 2026)
First-author: 10 / Student-supervised first-author: 16 / Postdoc-supervised first-author: 11
h-index: 35 (ADS), 40 (Google Scholar)
i100-index (# papers cited $\geq$ 100 times): 14 (ADS), 20 (Google Scholar)
Total citations: 4,980 (ADS), 7,462 (Google Scholar)
(*) indicates (U,G) student or (P) postdoc supervised or co-supervised by Hayne

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2026

1. Skjetne, H. L., Singer, K. N., Stopar, J. D., Crow, C. A., & **Hayne, P. O.** (2026), Ejecta Fragment Transport Across the Moon: Implications for Lunar Sample Provenance, *J. Geophys. Res.*, doi: 10.1029/2025JE009198.

2025

2. *(G) Sorli, K. C., **Hayne, P. O.**, Cueva, R. H., Long, C. J., McMahon, J. W., & Scheeres, D. J. (2025), A 3D thermophysical model for binary asteroid systems: Application to the BYORP effect on (175706) 1996 FG3, *Icarus, 434*, 116527.

3. Deutsch, A. N., **Hayne, P. O.**, & Bauch, K. E. (2025), Modeling Cold Spots on Mercury: Opportunities for BepiColombo Observations, *Geophys. Res. Lett., 52*(3), 2024GL111215.

4. Buie, M. W., AlMazmi, H., **Hayne, P. O.**, Marciniak, A., Keeney, B. A., *(U) Alawadhi, F., *(U) Almansoori, A., *(G) Alsaeed, N. R., et al. (2025), Occultation-based Size and Shape of (269) Justitia, *Planet. Sci. J., 6*(3), 61.

5. *(P) Harish, **Hayne, P. O.**, Emery, J. P., Bottke, W. F., Edwards, C. S., El-Maarry, M. R., AlMazmi, H., & the EMA Science Team (2025), Surface Composition of Asteroid 269 Justitia: Insights from Spectral Mixture Modeling, *Astrophys. J., 992*, 125.

6. Powell, T. M., Williams, J-P., Greenhagen, B. T., **Hayne, P. O.**, & Paige, D. A. (2025), Discovery of a Lunar Cold Spot at Apollo 16's South Ray Crater, *Geophys. Res. Lett.*, doi: 10.1029/2025GL116606.

7. Formisano, M., Raponi, A., Teodori, M., Bertoli, S., Ciarniello, M., De Angelis, S., De Sanctis, M. C., Filacchione, G., Frigeri, A., **Hayne, P. O.**, Maggioni, L., Magni, G., & *(G) Sorli, K. C. (2025), The role of self-heating and roughness in micro cold trap stability: implications for lunar poles, *Mon. Not. Roy. Astron. Soc., 543*(4), 4187–4197.

8. *(G) Stevens, R. W., **Hayne, P. O.**, Kleinböhl, A., & Kass, D. M. (2025), Thermal Precursors to Regional Dust Storms on Mars: Observations With Mars Climate Sounder, *J. Geophys. Res.*, doi: 10.1029/2025JE009216.

9. Wakayama, S., Candela, A., **Hayne, P. O.**, & Ahmed, N. (2025), Active Inference for Bandit-Based Autonomous Robotic Exploration With Dynamic Preferences, *IEEE Trans. Robotics*, 3841–3851.

2024

10. *(P) Landis, M. E., Acharya, P. J., *(G) Alsaeed, N. R., Andres, C., Becerra, P., Calvin, W. M., Cangi, E. M., Cartwright, S. F. A., Chaffin, M. S., Diniega, S., Dundas, C. M., Hansen, C. J., **Hayne, P. O.**, Herkenhoff, K. E., Kass, D. M., Khuller, A. R., McKeown, L. E., Russell, P. S., Smith, I. B., Sutton, S. S., & Whitten, J. L. (2024), Polar science results from Mars Reconnaissance Orbiter: Multiwavelength, multiyear insights, *Icarus, 419*, 115794.

11. *(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.

12. 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.

13. 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.

14. 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.

15. 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.

16. *(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.

17. *(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.

18. 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.

19. 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.

20. 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.

21. *(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.

22. 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.

23. *(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

24. 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.

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