Manar Al Asad

PhD Candidate
Department of Earth, Environmental, and Planetary Sciences,
Brown University.
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Education

Ph.D in Geophysics, Brown University — 2025 (expected)
Transferred from UC Berkeley. Advisor: Asst. Prof. Harriet Lau — *Providence, RI*

Ph.D in Geophysics, University of California, Berkeley — 2020-2022
Transferred to Brown University. Advisor: Asst. Prof. Harriet Lau — *Berkeley, CA*

Bachelor of Science in Geophysics, Minor in Mathematics — 2014
Graduated with Distinction. Advisor: Prof. Catherine Johnson — *Vancouver, BC*

Selected Publications – 4 First Author

- **Al Asad, M.** and Lau, H. C. P. "Coupled Fates of Earth's Mantle and Core: Early Sluggish-Lid Tectonics and a Long-lived Geodynamo Consequences of a coupled core-mantle evolution". Science Advances, 10(31), eadp1991.
- **Al Asad, M.**, Lau, H. C. P., Crowley, J. W., & Lenardic, A. (2023). "Modes of mantle convection, their stability, and what controls their existence". Journal of Geophysical Research: Solid Earth, 128, e2023JB027274.
- Jawin, E. R., Ballouz, R. L., Ryan, A. J., Kaplan, H. H., McCoy, T. J., **Al Asad, M. M.**, ... & Keller, L. P. (2023). "Boulder Diversity in the Nightingale Region of Asteroid (101955) Bennu and Predictions for Physical Properties of the OSIRIS-REx Sample". Journal of Geophysical Research: Planets, 128(12), e2023JE008019.
- Ernst, C. M., Daly, R. T., Gaskell, R. W., Barnouin, O. S., Nair, H., Hyatt, B. A., ... & Hoch, K. K. (2023). "High-resolution shape models of Phobos and Deimos from stereophotoclinometry". Earth, Planets and Space, 75(1), 103.
- Perry, M. E., Barnouin, O. S., Daly, R. T., Bierhaus, E. B., Ballouz, R. L., Walsh, K. J., ... & Lauretta, D. S. (2022). "Low surface strength of the asteroid Bennu inferred from impact ejecta deposit". Nature Geoscience, 15(6), 447-452.
- Delbo, M., Walsh, K. J., Matonti, C., Wilkerson, J., Pajola, M., **Al Asad, M. M.**, ... & Lauretta, D. S. (2022). "Alignment of fractures on Bennu's boulders indicative of rapid asteroid surface evolution". Nature Geoscience, 15(6), 453-457.
- Barnouin, O. S., Jawin, E. R., Daly, R. T., Ballouz, R. L., Daly, M. G., Seabrook, J. A., ... & Lauretta, D. S. (2022). "Geologic context of the OSIRIS-REx sample site from high-resolution topography and imaging". The Planetary Science Journal, 3(4), 75.
- Barnouin, O. S., Daly, M. G., Seabrook, J. A., Zhang, Y., Thuillet, F., Michel, P., ... & Lauretta, D. S. (2022). "The formation of terraces on asteroid (101955) Bennu". Journal of Geophysical Research: Planets, 127(4), e2021JE006927.
- **Al Asad, M. M.**, Johnson, C. L., & Philpott, L. C. (2021). "Bifurcated current sheets in Mercury's magnetotail: Observations and implications". Journal of Geophysical Research: Space Physics, 126, e2021JA029417.
- **Al Asad, M. M.**, Philpott, L. C., Johnson, C. L., Barnouin, O. S., Palmer, E., Weirich, J. R., ... & Lauretta, D. S. (2021). "Validation of stereophotoclinometric shape models of asteroid (101955) Bennu during the OSIRIS-REx mission". The Planetary Science Journal, 2(2), 82.
- DellaGiustina, D. N., Kaplan, H. H., Simon, A. A., Bottke, W. F., Avdellidou, C., Delbo, M., ... & Lauretta, D. S. (2021). "Exogenic basalt on asteroid (101955) Bennu". Nature Astronomy, 5(1), 31-38.
- DellaGiustina, D. N., Burke, K. N., Walsh, K. J., Smith, P. H., Golish, D. R., Bierhaus, E. B., ... & Lauretta, D. S. (2020). "Variations in color and reflectance on the surface of asteroid (101955) Bennu". Science, 370(6517), eabc3660.

- Daly, M. G., Barnouin, O. S., Seabrook, J. A., Roberts, J., Dickinson, C., Walsh, K. J., ... & Lauretta, D. S. (2020). "Hemispherical differences in the shape and topography of asteroid (101955) Bennu". Science Advances, 6(41), eabd3649.
- Ballouz, R. L., Walsh, K. J., Barnouin, O. S., DellaGiustina, D. N., **Al Asad, M.**, Jawin, E. R., ... & Lauretta, D. S. (2020). "Bennu's near-Earth lifetime of 1.75 million years inferred from craters on its boulders". Nature, 587(7833), 205-209.
- Lauretta, D. S., Hergenrother, C. W., Chesley, S. R., Leonard, J. M., Pelgrift, J. Y., Adam, C. D., ... & Wolner, C. W. V. (2019). "Episodes of particle ejection from the surface of the active asteroid (101955) Bennu". Science, 366(6470), eaay3544.
- Barnouin, O. S., Daly, M. G., Palmer, E. E., Johnson, C. L., Gaskell, R. W., **Al Asad, M.**, ... & Lauretta, D. S. (2020). "Digital terrain mapping by the OSIRIS-REx mission". Planetary and Space Science, 180, 104764.
- Winslow, R. M., Lugaz, N., Philpott, L., Farrugia, C. J., Johnson, C. L., Anderson, B. J., ... & **Al Asad, M.** (2020)." Observations of extreme ICME ram pressure compressing Mercury's dayside magnetosphere to the surface". The Astrophysical Journal, 889(2), 184.
- Barnouin, O. S., Daly, M. G., Palmer, E. E., Gaskell, R. W., Weirich, J. R., Johnson, C. L., ... & Lauretta, D. S. (2019). "Shape of (101955) Bennu indicative of a rubble pile with internal stiffness". Nature geoscience, 12(4), 247-252.
- Korth, H., Tsyganenko, N. A., Johnson, C. L., Philpott, L. C., Anderson, B. J., **Al Asad, M. M.**, ... & McNutt Jr, R. L. (2015). "Modular model for Mercury's magnetospheric magnetic field confined within the average observed magnetopause". Journal of Geophysical Research: Space Physics, 120(6), 4503-4518.
- Johnson, C. L., Purucker, M. E., Korth, H., Anderson, B. J., Winslow, R. M., **Al Asad, M. M.**, ... & Solomon, S. C. (2012). MESSENGER observations of Mercury's magnetic field structure. Journal of Geophysical Research: Planets, 117(E12).

Invited Seminars

Solid Earth seminar	Harvard University, 05/2024
Geophysics Lunch Bunch	Brown University, 05/2024

Conferences & Presentations

"Sudden vs. Gradual Transitions in Earth's Convective Regime"	AGU Fall Meeting 2023
"Heat Loss from Earth's Center to Surface"	AGU Fall Meeting 2022
"How Good are our Efforts? Evaluating the Stereophotoclinometry-Derived shape model of Bennu"	LPSC, 2019
"The Topology and Dynamics of Mercury's Tail Plasma and Current Sheets"	Mercury 2018 Meeting

Awards

Study of the Earth's Deep Interior Section Award for Graduate Research	2024
AAAS/Science Program for Excellence in Science	2024
PI office personal appreciation award from OSIRIS-REx PI	2019
PI office group appreciation award for Altimetry Working Group (OSIRIS-REx)	2019
NASA group achievement award for MESSENGER magnetic team	2018
Dean's Honour List (UBC)	2014
President's Entrance Scholarship (UBC)	2009

Mission Involvement

OSIRIS-REx Mission to asteroid Bennu (NASA)	Deputy Instrument Scientist and Collaborator, 2016–2020
MESSENGER Mission to Mercury (NASA)	Participant in science team meetings, 2012–2014

Work Experience

Planetary Research Scientist 2016-2020
University of British Columbia *Vancouver, BC*

- Quantitative analysis of global magnetic fields and solar wind interactions and mapping of plasma environment
- Co-supervision of F. Rossmann, then an undergraduate RA, in characterizing roughness of asteroid Bennu
- Creation of global and local shape models of asteroid Bennu and the development of tools for the quality control of the data products for the OSIRIS-REx Mission

OLA Deputy Instrument Scientist - OSIRIS-REx Mission 2019 – 2020
University of British Columbia *Vancouver, BC*

- Creation and supervision of the implementations of science plans to achieve mission objectives
- Troubleshooting irregularities with instrument performance and investigations into their causes
- Liaising with mission engineers during instrument operations

Sessional Lecturer 2017, 2018
University of British Columbia *Vancouver, BC*

Exploration Geophysicist 2014, 2016
Saudi Aramco *Dhahran, Saudi Arabia*

Teaching

Teaching Assistanat: Sea level Rise and Fall (EEPS 1470)	Brown University, 2023
Planetary Magnetic Fields: 4th IAGIA School	Station de biologie des Laurentides, Montreal, 2019
Potential Fields in Earth and Planetary Sciences (EOSC450)	Lecturer, UBC, Fall 2017, 2018
Computer Methods in Earth, Ocean, and Atmospheric Science (EOSC211)	Substitute Lecturer, UBC, Fall 2017

Skills

Languages: Arabic, English
Programing Languages: Matlab, Python