Al **Emran**

JPL Postdoc Fellow

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Education

University of Arkansas *Fayetteville, AR 72701*

PhD in Space and Planetary Sciences *August, 2019 - December, 2022*

- *Thesis: Deciphering Surfaces of Trans-Neptunian and Kuiper Belt Objects using Radiative Scattering Models, Machine Learning, and Laboratory Experiments*
- Advisor: Vincent F. Chevrier

Auburn University *Auburn, AL 36849*

MS in Geography [Planetary Geoscience] *August, 2017 - August, 2019*

- *Thesis: Surficial Investigations of Hargraves Crater and Siloe Patera, Mars*
- Advisor: Luke J. Marzen and David T. King Jr.

University of Dhaka *Dhaka, Bangladesh*

MS in Physical Geography and Environment *May, 2012 - Nov, 2014*

- *Thesis: Spatio-temporal Changes in Hydro-morphology of Sandwip Island, Bangladesh*
- Advisor: Md. Abdur Rob

University of Dhaka *Dhaka, Bangladesh*

BS in Geography and Environment *April, 2008 - April, 2012*

- Minors in Geology
- *Honors thesis: Morphological Investigation of Mono River, Bangladesh*

Professional Experience

2023 -	**JPL Postdoc Fellow**, NASA Jet Propulsion Laboratory, California Institute of Technology
2021 - 2022	**Graduate Assistant**, Data Science Program, University of Arkansas
2021	**Graduate Assistant**, Center for Space and Planetary Sciences, University of Arkansas
2020	**Graduate Teaching Assistant**, Department of Physics, University of Arkansas
2019 - 2020	**Graduate Assistant**, Center for Space and Planetary Sciences, University of Arkansas
2017 - 2019	**Graduate Assistant**, Department of Geosciences, Auburn University
2015 - 2017	**Research Assistant**, Department of Architecture, BRAC University
2014 - 2015	**Graduate Teaching Assistant**, Department of Geography and Environment, University of Dhaka

Publications

Published

Emran, A., Dalle Ore, C. M., Ahrens, C. J., Khan, K., Chevrier, V.F., and Cruikshank, D. P., 2023. Pluto's Surface Mapping using Unsupervised Learning from Near-Infrared Observations of LEISA/Ralph. Planetary Science Journal [accepted]

Emran, A., Chevrier, V.F., 2023. Discrepancy in Grain Size Estimation of H_2O ice in the Outer Solar System. Res. in Astronomy and Astrophysics [accepted]

Emran, A., and Chevrier, V.F., 2022. Uncertainty in Grain Size Estimation of Volatiles on Trans-Neptunian Objects and Kuiper Belt Objects. AJ 163, 196.

Emran, A., Marzen, L.J., King, D.T., Chevrier, V.F., 2020. Thermophysical and Compositional Analyses of Dunes at Hargraves Crater, Mars. Planet. Sci. J. 2(6):218.

Emran, A., Marzen, L.J., King, D.T., 2020. Semiautomated Identification and Characterization of Dunes at Hargraves Crater, Mars. Earth and Space Science 7, e2019EA000935.

Emran, A., Roy S., et al., 2018. Assessing topographic controls on vegetation characteristics in CHT from remotely sensed data. Rem. Sens. App.: Soc.and Env. 11, 198–208.

Emran, A., Rob M.A., Kabir M.H., 2017. Coastline change and erosion-accretion evolution of Sandwip Island, Bangladesh. International Journal of Applied Geospatial Research 8(2):3.

Emran, A., Rob M.A., Kabir M.H, Islam M.N., 2016. Modeling spatio-temporal shoreline and areal dynamics of coastal island using geospatial technique. Mod. Earth Sys. and Env. 2(4).

In Prep

Emran, A., Dalle Ore, C. M., Cruikshank, D. P. et al., 2023. Surface Composition of Pluto's Kiladze area and Relationship to Cryovolcanism

Emran, A., Chevrier, V.F., 2022. The Outer Solar System Astrophysics Lab: A New Experimental Facility for Spectral and Thermal Investigations of Ices at Cryogenic Temperatures

Awards, Fellowships, & Grants

2022	**Outer Planets Assessment Group (OPAG) Participant Stipend**, Lunar and Planetary Institute, Houston, Texas	*$ 1,000*
2022	**GPSC Travel Fellowship**, University of Arkansas	*$ 1,000*
2022	**GSIE Travel Fellowship**, University of Arkansas	*$ 5,00*
2021	**GPSC Travel Fellowship**, University of Arkansas	*$ 1,000*
2020	**GPSC Travel Fellowship**, University of Arkansas	*$ 1,000*
2020	**GSIE Travel Fellowship**, University of Arkansas	*$ 5,00*
2019	**LPI Career Development Award**, Lunar and Planetary Institute, Houston, Texas	*$ 1,000*
2019	**Collage of Science and Mathematics Travel Fellowship**, Auburn University	*$ 1,000*
2019	**Graduate School Travel Fellowship**, Auburn University	*$ 8,000*
2018	**Collage of Science and Mathematics Travel Fellowship**, Auburn University	*$ 1,000*
2018	**Geoscience and GSC Travel Fellowship**, Auburn University	*$ 1,000*

Presentations

** presenting author; + mentored undergraduate*

Invited/ Graduate Student Talks

Summer 2022. *Mapping Pluto's Surface from New Horizons*. Invited talk: Presented at New Horizons Surface Composition Science Team Meeting.

Spring 2018. *Geologic Origin of Siloe Patera, Mars*. Invited talk: Presented at Collage of Science and Mathematics Graduate Research Symposium, Auburn University.

Conference Presentations

Emran, A. and Chevrier VF .2022. Single Scattering Albedo Induced Uncertainty in Grain Size Estimation of Surface Volatile on TNOs and KBOs. 53rd LPSC, Houston, Abstract No. 1092.

Emran, A, Chevrier VF, and Ahrens C .2021. A New Methane Spectral Index from NASA's New Horizons Ralph/MVIC Instrument. 5th Planetary Data and PSIDA, Abstract No. 7007.

Emran, A, Chevrier VF, and Ahrens C .2020. CH4 Snowline in the Mountains of Pluto during NASA's New Horizons Flyby. 51st LPSC, Houston, Abstract No. 1616.

Emran, A, Marzen LJ, and King Jr. DT .2019. Automated Object-Based Identification of Dunes at Hargraves Crater, Mars. 50th LPSC, Houston, Abstract No. 1157.

Emran, A, Marzen LJ, and King Jr. DT .2018. Thermophysical characterization of Jezero crater and NE Syrtis, Mars. 49th LPSC, Houston, Abstract No. 1874.

Emran, A, DT King Jr. and LJ Marzen .2018. Surficial Geology of Siloe Patera at Arabia Terra, Mars. AGU Fall Meeting 2018, Washington, D.C., Abstract No. 437616.

Emran, A, DT King Jr., LJ Marzen, CW Coker, and SP Wright .2018. Remote Sensing Characterization of Siloe Patera, Mars. PGM, U of Tennessee, Knox., Abstract No. 7017.

Teaching Experience

Fall 2022/ 2021	**DASC 2113 - Principles and Techniques of Data Science**, Teaching Assistant	*U of Arkansas*
Spring 2021	**DASC 3203 - Optimization Methods in Data Science**, Teaching Assistant	*U of Arkansas*
Fall/ Spring 2020	**ASTR 2001L - Astronomy Lab (Survey of Universe)**, Teaching Assistant	*U of Arkansas*
Spring 2019	**GEOL 3060 - Lunar and Planetary Geology** , Teaching Assistant	*Auburn U*
Fall 2018	**GEOG 6820 and 5820 - Remote Sensing** , Teaching Assistant	*Auburn U*
Spring 2019	**GEOG 6830 and 5830 - GIS** , Teaching Assistant	*Auburn U*

Skills and Expertise

Planets Studied/ Working On: Earth, Mars, Pluto, Saturn System (Rings, Iapetus, Phoebe, Hyperion, Enceladus, adn Rhea), Jupiter, Trans-Neptunian Objects, Kuiper Belt Objects, Exoplanet

Spacecraft Mission/ Instrument Data:
Earth: Landsat Series and SRTM
Mars: Mars Global Surveyor (MOLA, TES), Mars Odyssey (THEMIS), Mars Reconnaissance Orbiter (HiRISE, CTX, CRISM)
Pluto: New Horizons (MVIC, LORRI, LEISA)
Saturn System: Cassini (VIMS)
Jupiter: Galileo (SSI)
Exoplanet: Transiting Exoplanet Survey Satellite (TESS)

Technique/ Methods: Spacecraft Image Analysis, Multi-spectral and Hyperspectral Data, Physical Models, Spectroscopy, Mineralogy, Thermophysical Properties, Radiative Transfer Models, Photometric Models, Icy Bodies, Cryogenic Experiments, Thermal Properties of Ices, Geomorphology, Remote Sensing, Mapping, GIS

Relevant Coursework:
AT Arkansas: Astrophysics I, Astronautics, Astroinformatics, Astrobiology, Planetary Surfaces, Planetary Atmospheres, Spectrochemical Methods, Scientific Computation, Remote Sensing, Meteorology
AT Auburn: Lunar and Planetary Geology, Impact and Planetary Geology, Remote Sensing of Planetary Surfaces, Fundamentals of Remote Sensing, Advanced GIS

Astronomy/ Planetary software: DS9, JMARS, ISISv3, Ames Stereo Pipeline (ASP), ENVI, ERDAS Imagine, eCognition, ArcGIS, QGIS, GDAL

Basic programming: Python, R, Davinci, LaTeX

Machine Learning/ Data Science:
Algorithms: Principal Component Analysis (PCA), Whitens/Dnoise Image Cube, Savitzky Golay Filtering, Minimum Noise Fraction (MNF), t-distributed stochastic neighbor embedding (t-SNE), Factor Analysis, Unsupervised Learning (K-means, Gaussian Mixture Models, Spectral Clustering, DBSCAN), Supervised Classification (Maximum Likelihood, Minimum Distance), Support Vector Machines (SVM), Random Forest Classifier
Bayesian Statistics: Markov Chain Monte Carlo (MCMC)

Modules: NumPy, SciPy, Pandas, MatplotLib, Astropy, SkLearn

OS/ Basic software: Windows, MacOS, Linux, Microsoft Word, Excel, Powerpoint

Laboratory skill: Cryogenic experimental design, Laboratory building

Outreach & Professional Development

Service and Outreach

2019-2022 **Member: Space Hog**, Astronomy and Planetary Science Outreach — *University of Arkansas*

Development

Workshop Participant: Outer Planets Assessment Group (OPAG), Sagan Exoplanet Summer Workshop 2021/2022

Peer Review Services

External reviewer of NASA's Planetary Data Archiving, Restoration, and Tools (PDART) Proposal
Journal Reviewer: Earth and Space Science

Professional Memberships

American Geophysical Union (AGU)
Geological Society of America (GSA)

References

Katie S. Morgan
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4800 Oak Grove Dr, Pasadena, CA, 91109
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