

# Dr. Donald R. Hood

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**CAREER GOAL** I work in geological remote sensing to explore the physical and chemical process that have, in the past or present, shaped planetary surfaces. I use a combination of remote imaging, optical spectroscopy, and gamma spectroscopy as well as statistical and spatial analysis to examine processes occurring on a global scale. I supplement this remote work with fieldwork done here on Earth in geologically analogous locations. I am currently seeking a position as a tenure-track professor at an R1 university.

**HIGHLIGHTS**

- Expert in geological **remote sensing** of planetary bodies
- Emphasis on **volcanic and surface processes** of rocky planets
- Develops **python-based** tools for geological studies
- Expertise in written and visual communication through scientific manuscripts, public lectures, and poster presentations.

**EDUCATION**

*Bachelor of Science, Physics, 2014*  
Emphasis on Condensed Matter Physics  
Carnegie Mellon University, Pittsburgh, PA

*Ph.D., Geology, 2019*  
Dissertation Advisor: Suniti Karunatillake  
Dissertation Title: *Exploring Planetary Surfaces with Remote Sensing*  
Louisiana State University, Baton Rouge, LA

**PUBLICATIONS** *h-index: 5, i10-index 2, Citations: 56*<sup>1</sup>

## Selected Publications

*Preservation of Pre-Existing Topography in Lunar Impact Craters* In Prep  
D.R. Hood, Brennan W. Young, Aviv L. Cohen-Zada, Peter B. James,  
Ryan C. Ewing, Jeff Lee

- Topographic survey of **Lunar crater** rim morphology
- Informs physical models of **planetary cratering processes**

*The Martian Boulder Automatic Recognition System, MBARS* 2022  
D.R.Hood, S.F. Sholes, S. Karunatillake, C.I. Fassett, J. Levy  
*Earth and Space Science*, DOI: 10.1029/2022EA002410

- **Feature detection algorithm** for the Martian surface
- **Open-source, python-based** technique

*Assessing the Geologic Evolution of Greater Thaumasia, Mars* 2016  
D.R. Hood, T. Judice, S. Karunatillake, D. Rogers, J.M. Dohm, D. Susko, L. Carnes

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<sup>1</sup>From Google Scholar, current as of 9/13/2023

- Combines **chemical, mineralogical, morphological data** at regional scale
- Support **regional volcanic evolution** possibly tied to mantle evolution

*Supervolcanic Resurfacing in Northwestern Arabia Terra, Mars* 2022  
A. Bates, S. Goosens, J. M. Lorenzo, L. Ojha, D.R. Hood, S. Karunatillake, S. Kobs  
Nawotniak, T. Paladino  
*Icarus*, DOI: 10.1016/j.icarus.2022.115303

**First Author**

*Limits on Polygonal Organization of Boulders in the Martian Northern Lowlands* Under Review  
D.R. Hood, A. Cohen-Zada, R.C. Ewing, S. Karunatillake  
*Icarus*

*Inferring Airflow across Martian Dunes from Ripple Pattern and Dynamics* 2021  
*Frontiers in Earth Sciences*, DOI:10.3389/feart.2021.702828  
D.R. Hood, R.C. Ewing, K.P. Roback, K. Runyon, J.-P. Avouac, M. McEnroe

*Contrasting Regional Soil Alteration across the Topographic Dichotomy of Mars* 2019  
D.R. Hood, S. Karunatillake, O. Gasnault, A. Williams, B. Dutrow, L. Ojha, S. Kobs, K. Kim, J. Heldmann, C. Fralick  
*Geophysical Research Letters*, DOI: 10.1029/2019GL084483

**Co-Author**

*Linking boulder spatial distribution patterns and surface properties in the Martian northern lowlands* In prep  
A. Cohen-Zada, D.R. Hood, R.C. Ewing, S. Karunatillake

*Evidence for Bulk Mafic Mineralogy and Limited Hydrothermal Lacustrine Activity in Eridania Basin, Mars* Submitted, 2023  
E.B. Hughes, J. Wray, S. Karunatillake, D.R. Hood, G. Fanson

*Ancient Volcanism May Have Influenced Patterns of Hydrated Regolith on Mars* Submitted, 2023  
T. Paladino, S. Kobbs Nowatniak, E. Millour, S. Karunatillake, D.R. Hood, A. Bates  
*Icarus*

*Topographic Analysis for Mapping Dunes and Assessing Dune Field Resilience using Multitemporal LiDAR at White Sands, New Mexico* Submitted, 2023  
B. W. Young, D. R. Hood, M. P. Bishop, R. C. Ewing, D. Bustos  
*Aeolian Research*

*Consolidated Chemical Provinces on Mars: Implications for Geologic Interpretations* 2022  
A. Rani, A. Basu Sarbadhikari, D.R. Hood, O. Gasnault, S. Nambiar, S. Karunatillake  
*Geophysical Research Letters*, DOI: 10.1029/2022GL099235

*Multiphase Volatilization of Halogens at the Soil-Atmosphere Interface on Mars* 2021  
X. Wang, Y. S. Zhao, D.R. Hood, S. Karunatillake, D. Lacznik, M.E. Schmidt, M. Vithanage

*Journal of Geophysical Research: Planets*, DOI: 10.1029/2021JE006929

*Disambiguating the Soils of Mars* 2020  
G. Certini, S. Karunatillake, Y. S. Zhao, P. Meslin, A. Cousin, D.R. Hood, R. Scalenghe  
*Planetary and Space Science*, DOI: 10.1016/j.pss.2020.104922

### **Contributions**

*Geochemical Interpretations Using Multiple Remote Datasets* 2017  
S. Karunatillake, L. Carter, H.B. Franz, L. Hallis, J.A. Hurowitz  
Chapter 17 in *Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces*  
Cambridge University Press

## **GRANTS**

**NASA Planetary Data, Archiving, Restoration, and Tools** *Submitted, 2023*  
*Expanding the Mars Boulder Database*  
**Role:** Principal Investigator, Baylor University  
**Contribution:** Conceptual Development, Lead Author, Investigation Design  
Total Funds: \$300,658

**NASA Martian Moon eXploration (MMX) Participating Scientist Program** *Declined, 2022*  
*Deciphering Phobos Red and Blue Units with Combined MEGANE and MIRS Regolith Modeling*  
**Role:** Principal Investigator, Baylor University  
**Contribution:** Conceptual Development, Lead Author, Investigation Design  
Total Funds: \$450,275

**NASA Planetary Data Archiving, Restoration, and Tools** *Declined, 2020*  
*Creating the Mars Boulder Database*  
**Role:** Science Principal Investigator\*, Texas A&M University  
**Contribution:** Conceptual Development, Lead Author, Investigation Design  
Institutional PI: Ryan Ewing  
Total Funds: \$342,003

**NASA Mars Data Analysis Program** *Awarded, 2020*  
*Investigating Boulder Pattern Formation in the Martian Northern Lowlands using Spatial Analysis of HiRISE Images*  
**Role:** Science Principal Investigator\*, Texas A&M University  
**Contribution:** Conceptual Development, Lead Author, Investigation Design  
Institutional PI: Ryan Ewing, Collaborator: Suniti Karunatillake  
Total Funds: \$294,998

**NASA Mars Data Analysis Program** *Declined, 2019*  
*Investigating Boulder Pattern Formation in the Martian Northern Lowlands using Spatial Analysis of HiRISE Images*  
**Role:** Science Principal Investigator\*, Texas A&M University  
**Contribution:** Conceptual Development, Lead Author, Investigation Design  
Institutional PI: Ryan Ewing, Collaborator: Suniti Karunatillake  
Total Funds: \$228,600

Note\*: Science PIs are designated when a University does not allow non-permanent faculty to act as PIs

**TEACHING**      *GEO 4V9R Undergraduate Research*      Spring 2023  
*Introduction to Geographic Information Systems, GEO 4485*      Fall 2021

**HONORS & SERVICE**      Session Chair, LPSC 2023, *Mars Cold as Ice 2: Glaciers and Subsurface Ice*      2023  
Mentorship Chair, Baylor Association of Women Geologists      2022-2023  
President, Baylor University Postdoc Association      2022-2023

**FIELD STUDIES**      *Geophysical Exploration of Kentland Crater, Kentland, IN*

- Aided in **magnetotelluric deployment** in and near Kentland Crater
- Worked with municipal governance for site access and permissions

*Remote and in-situ characterization of Serpentinite bodies in Sri Lanka*

- Planned and guided **soil and rock sampling** campaign in Sri Lanka
- Used **Landsat 8** data to identify field sites
- Successfully adapted field plan opportunistically to maximize sample diversity

*Geophysical Exploration of the Brushy Creek structure, St. Helena Parish, LA*

- Possible young, late Pleistocene **impact structure**
- **Co-leader** of geophysical survey of Brushy Creek Structure
- Performed **Ground Penetrating Radar** and **Subsurface Resistivity** surveys of structure

**EXPERIENCE**      *Postdoctoral Research Associate*      June 2021 - Present  
*Baylor University Geosciences, Waco, TX*

- Served as Science PI of NASA MDAP Grant (2021-2023)
- Submitted two NASA grants (2022, 2023)
- Set science goals for other postdoctoral and graduate researchers
- Instructor of Record for 4000-level GIS course (Fall 2021)
- Led undergraduates in research efforts generating conference-worthy work (Spring 2023)

*Postdoctoral Research Associate*      July 2020 - May 2021  
*Texas A&M Geology and Geophysics, College Station, TX*

- Analyzed geomorphology of dunes and aeolian structures on Earth and Mars
- Used spatial statistics to examine dunefield-scale patterns in morphology
- Composed technical reports and scientific manuscripts on findings

*Graduate Research Assistant*      Dec 2017 - Dec 2019  
*LSU Geology and Geophysics, Baton Rouge, LA*

- Carried out pilot research in support of NASA proposals
- Member of successful proposal to NASA Mars Data Analysis Program
- Wrote and reviewed multiple funding proposals

Graduate Teaching Assistant  
LSU Geology and Geophysics, Baton Rouge, LA

Aug 2014 - Dec 2017

- Taught introductory-level geology courses, GEOL 1601
- Taught Sophomore level geology major courses, GEOL 2081 (Mineralogy), GEOL 3041 (Petrology)
- Developed course material (quizzes, presentations, etc.)
- Graded coursework
- Managed administration of multiple class sessions

**TALKS &  
POSTERS**

**Presentation at the Planetary Crater Consortium** **2023**  
*Preservation of Pre-existing Topography in Lunar Impact Craters*

**Lightning Talk and Poster at the Texas Area  
Planetary Science Meeting** **2023**  
*Preservation of Pre-existing Topography in Lunar Impact Craters*  
Presented by Co-Author, Peter B. James

**Seminar at SpaceX Rocket Development & Test Facility,  
McGregor, TX** *Invited, 2023*  
*The Martian Surface for Rocketeers*

**Oral Presentation at Lunar and Planetary Science Conference** **2023**  
*Lack of Boulder Sorting in the Martian Northern Lowlands Supports  
Dry Environment, No CO<sub>2</sub> Ice Ratcheting, Abstract 1552*

**Seminar at Louisiana State University** *Invited, 2022*  
*Connecting Patterns to Processes in Martian Boulder Fields*

**Seminar for Machine Learning for Planetary Science  
and Space Physics (ML4PSP)** *Invited, 2022*  
*Automated Boulder Detection on the Martian Surface with MBARS*

**Seminar at Baylor University** *Invited, 2021*  
*Remote Sensing Geology in a Low-Pressure Frozen Desert*

**Seminar at Texas A&M University** *Invited, 2021*  
*Remote Sensing Geology in a Low-Pressure Frozen Desert*

**Oral Presentation at Lunar and Planetary Science Conference** **2019**  
*Contrasting Regional Soil Hydration Processes Across the  
Topographic Dichotomy of Mars, Abstract 1887*  
Don R. Hood, S. Karunatillake, O.Gasnault, A. Williams, B. Dutrow, L. Ojha, S.  
Kobs, K. Kim, J.L. Heldmann, C. Fralick

**Lecture at National Institute of Fundamental Studies** *Invited, 2018*  
**Kandy, Sri Lanka**  
*Hydration and Alteration of Martian Soil*

**Lecture at University of Sri Jayawardenepura** *Invited, 2018*  
**Nugegoda, Sri Lanka**  
*Alteration and Habitability of Martian Soil*

**Lecture at Lunar and Planetary Institute, Houston, Texas** *Invited, 2016*  
*Assessing the Geologic Evolution of Greater Thaumasia, Mars*

**Oral presentation at the ISLPS, Wuhan, China** **2016**  
International Symposium on Lunar and Planetary Science  
*Martian Bulk Soil Hydration Revealed by Principal Component Analysis of Regional Chemical Data*

**Poster Presentations**

**Lunar and Planetary Science Conference** **2023**  
*Compositional and Morphometric Exploration of Van De Graaff Crater on the Lunar Farside, Abstract 1658*

**Lunar and Planetary Science Conference** **2022**  
*The Martian Boulder Automatic Recognition System: Comparison to Old and New Tools for Large-Scale Automatic Boulder Measurement, Abstract 1483*

*Don R. Hood, R.C. Ewing, S. Karunatillake, S.F. Sholes, C.I. Fassett, P. James*

**Lunar and Planetary Science Conference** **2021**  
*Interpreting Airflow Dynamics from Ripple Patterns and Migration Rates on Mars, Abstract 2106*

*Don R. Hood, R.C. Ewing, K.P. Roback, K. Runyon, J-P. Avouac, M. McEnroe*

**Lunar and Planetary Science Conference** **2019**  
*Verification of Automatically Measured Boulder Populations in HiRISE Images, abstract 1893*

*Don R. Hood, S. Karunatillake, C.I. Fassett, S.F. Sholes*

**Lunar and Planetary Science Conference** **2018**  
*Automated Boulder Detection and Measuring in HiRISE images, abstract 2437*

*Don R. Hood, S. Karunatillake, C.I. Fassett, S.F. Sholes*

**American Geophysical Union Fall Meeting** **2017**  
*Mapping of Boulder Ejecta around Late Amazonian Impact Craters on Mars, Abstract 208687*

*Don R. Hood, S. Karunatillake, C. Fassett*

**Lunar and Planetary Science Conference** **2017**  
*Semi-Automated Measurement of Boulder Clustering in the Martian Northern Plains, Abstract 2640*

*Don R Hood, S. Karunatillake*

**Lunar and Planetary Science Conference** **2016**  
*Assessing Martian Bulk Soil Hydration through Principal Component Analysis of Regional Chemical Data, Abstract 2124*

*Don R. Hood, S. Karunatillake, D. Susko*

*Assessing the Geologic Evolution of Greater Thaumasia, Mars with Chemistry and Mineralogy, Abstract 2737*

*Don R. Hood, T. Judice, S. Karunatillake, D. Rogers, J. Dohm, J.R. Skok*