CHRISTINA SINGH

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SUMMARY

I am a Ph.D. student at the Lunar and Planetary Laboratory pursuing a career in planetary geology. I am interested in remote sensing, image processing, planetary mapping, fluvial, periglacial, and glacial processes. I aim to produce planetary datasets and geospatial maps of planetary surfaces and to use modeling to study the geologic processes and paleoclimates of terrestrial planets.

EDUCATION

Ph.D. Lunar and Planetary Laboratory, The University of Arizona, expected 2030
Ph.D. in Planetary Science
Minor(s): Remote Sensing, Geomorphology
Advisor: Dr. Shane Byrne

B.S. Department of Physics, Astronomy, and Geophysics, Connecticut College, 2023
Major: Physics (concentration: Astrophysics); Minor(s): Mathematics, Geoscience

RESEARCH SKILLS

Computer Software: MaxIm DL, Microsoft Office (Word, Excel, PowerPoint), LaTeX, QGIS, ArcGIS (Desktop and Pro), JMARS, Google Earth Pro, SOCET SET, Ames Stereo Pipeline (ASP), Agisoft Metashape, Integrated Software for Imagers and Spectrometers (ISIS), Geospatial Data Abstraction Library (GDAL)
Dataset Experience: THEMIS, CTX, CRISM, HiRISE, MOLA
Computer Languages: Python, MATLAB
Computer Operating Systems: Windows 11, MacOS, Linux

RESEARCH EXPERIENCE

Tucson, AZ
September 2023 - Present

Lunar and Planetary Laboratory (LPL), The University of Arizona
Description: Postbac planetary geology research to determine the size frequency distribution of boulders on top of martian ice sheets and determine whether these boulders were resurfaced by impact cratering or through periglacial processes.
- Visually analyzes HiRISE images to compile suitable images to test boulder detection algorithms on in Python
- Generates maps of rock size frequency distributions using ArcGIS Pro
- Develops MATLAB code to create cumulative fractional area plots of boulder populations

Advisor: Dr. Shane Byrne

Pasadena, CA
June – August 2023

Lunar and Planetary Institute (LPI) Summer Undergraduate Program for Planetary Research (SUPPR), NASA's Jet Propulsion Laboratory (JPL)
Description: Planetary geology research to better characterize potential landing sites for future sample return missions to collect cores left behind by the Mars 2020 Perseverance Rover.
- Characterized the surface terrain of a potential sample return landing sites
- Mapped rock size frequency distributions using ArcGIS Pro
- Developed MATLAB code to determine cumulative fractional areas

Advisor: Dr. Matthew Golombek
Co-advisor: Dr. Nathan Williams

Atlanta, GA May - July 2022	**Georgia Tech Broadening Participation in Atmospheric Science, Oceanography, and Geosciences Research Experience for Undergraduates (REU), Georgia Institute of Technology** Description: Planetary geology research with an emphasis on remote sensing, Mars geomorphology, stratigraphy, sedimentology, and paleoenvironments. • Investigated the geomorphology of a distal remnant of the Hypanis delta • Characterized stratigraphic layers of this deposit in QGIS • Developed Python code to compute orientations of layers Advisor: Dr. Frances Rivera-Hernández Co-advisor: Dr. Jacob Adler
New London, CT January 2020 – August 2021	**Active Galactic Nuclei Research Group, Connecticut College** Description: Extragalactic independent study research, continued over the summer through a Summer Science Research Institute internship, of active galactic nuclei with the goal of better understanding the structure of these objects and investigating the source of their immense energy production. • Data reduction and calibration of astronomical images • Differential photometry in the optical and near-infrared regime • Analyzed light curves of optical and gamma-ray AGN output • Visually analyzed time delays in different wavebands to monitor activity Advisor: Dr. Leslie Brown

CONFERENCE PRESENTATIONS[1]

***** - poster ** - talk

Houston, TX March 2025, *	**Singh C.**, Byrne S., Golombek M. P., Trautman M. R., Dundas C. M., Vona M. A., Williams. N. R. (2024). The Boulder Content of Midlatitude Ground Ice on Mars**.** *56th Annual Lunar and Planetary Science Conference [Abstract #2613]*. The Woodlands, TX.
Pasadena, CA July 2024, *	**Singh C.**, Byrne S., Golombek M. P., Trautman M. R., Dundas C. M., Williams. N. R. (2024). Machine Vision Boulder Detections on Martian Ice Sheets**.** *Tenth International Conference on Mars [Abstract #3433]*. Pasadena, CA.
Houston, TX March 2024, *	**Singh C.**, Byrne S., Golombek M. P., Trautman M. R., Dundas C. M., Crocco R., Williams. N. R. (2024). The Origin of Boulders on Martian Ice Sheets**.** *55th Annual Lunar and Planetary Science Conference [Abstract #2755]*. The Woodlands, TX.
Houston, TX March 2024, *	**Singh C.**, Biassey-Bogart S., Morris M. M., Williams. N. R., Golombek M. P., Do S., Calef III F. J. (2023). Hazard Analysis: Potential Mars Sample Return Landing Sites. *55th Annual Lunar and Planetary Science Conference [Abstract #2719]*. The Woodlands, TX.
New London, CT October 2022, *	**Singh C.**, Adler J. B., Rivera-Hernández F. (2022). Characterizing A Potential Remnant of the Hypanis Delta. *Summer Science Research Symposium, Connecticut College.*

[1] All posters, PowerPoint files and/or video recordings are available upon request.

Atlanta, GA July 2022, *, **	**Singh C.**, Adler J. B., Rivera-Hernández F. (2022). Characterizing A Potential Remnant of the Hypanis Delta. *Georgia Tech Broadening Participation in Atmospheric Science, Oceanography, and Geosciences Research Experience for Undergraduates (REU), Georgia Institute of Technology*
New London, CT February 2022, *	**Singh C.**, Brown L. F (2022). The Optical Monitoring of the Gamma-ray Bright Active Galactic Nucleus 3C345. *Summer Science Research Institute Symposium, Connecticut College.*
New London, CT July 2021, *	**Singh C.**, Carbonell W., Modaressi A., Mears W., Brown L. F. (2021). Optical and Gamma-Ray Photometric Monitoring of Active Galactic Nuclei. *Summer Science Research Institute Symposium, Connecticut College.*
Virtual November 2020, **	**Singh C.**, Carbonell W., Brown L. F. (2020). The Blazar BL Lacertae: 2018-2020 V, R, and I Band CCD Photometry. *Summer Science Research Institute Symposium, Connecticut College.*

FIELD WORK EXPERIENCE

Planetary Geology Field Studies (PTYS 590) – University of Arizona, Fall 2024

- Channeled Scablands, eastern Washington state:
  - Obtained drone imagery of boulders and boulder fields to create 3d boulder maps and perform spatial analyses of boulder fields in GIS
  - Collected ground penetrating radar (GPR) data measurements of a linguoid bar and gravel dunes using GSSI equipment and equal interval techniques.
  - Recorded boulder compositions and measured boulder heights and diameters to use as ground truth data for remote sensing technique validation

Geomorphology Labs (GEO 202) – Connecticut College, Fall 2022

- Waterford Beach, Waterford, CT:
  - Used a stadia rod, a tripod, survey tape, and an automatic level to survey coastal area
  - Created a plot of elevation vs. distance to analyze the topography of the area
- Candlewood Hill, Groton, CT:
  - Used a rebound hammer to determine the strength of rock in a ridge-valley system
  - Located and visually analyzed faults in ridge-valley system to interpret formation of area
- Lantern Hill, North Stonington, CT:
  - Used a clinometer to determine the shadow angle and angle of a talus slope
  - Measured rock sizes along talus slope to detect evidence of rock sorting
- Salmon River, Colchester, CT:
  - Located features like meandering channels, terraces, point bars, cut banks, and knickpoints
  - Collected soil cores in various locations and compared samples
- Glacial Park, Ledyard, CT:
  - Examined overall morphology of a local moraine
  - Discriminated between fluvial and glacial processes such as avulsion and sediment sorting

Plate Tectonics Lab (GEO 201) – Connecticut College, Spring 2022

- Arboretum Ravine, Connecticut College, New London, CT:
  - • Worked to detect the presence of a horst and graben system in the area
  - • Collected strike and dip measurements of fault zones using a Brunton compass

SERVICE

Geoscience Fieldwork Assistant, Connecticut College

September 2022 - November 2022

- • Worked in the Connecticut College Arboretum with introductory geology students to complete weekly lab exercises
- • Led group hikes to field sites
- • Assisted students in the mastery of basic geology field techniques
- • Collaborated with course professor to prepare for field exercises

Academic Resource Center (ARC) Peer Tutor, Connecticut College

January 2022 - May 2023

- • Ran tutoring sessions for introductory astronomy students
- • Created a safe, supportive environment while tutoring students
- • Collaborated with course professor to ensure help sessions met student needs

Geoscience Assistant, Connecticut College

January 2022 - May 2023

- • Organized the Connecticut College rock and mineral collection
- • Helped photograph and catalog specimens

Physics Student Advisory Board, Connecticut College

August 2020 – May 2023

- • Elected as chair to serve as a trusted liaison between students and faculty
- • Planned departmental gatherings and activities for students and faculty

OUTREACH

Tucson Gem and Mineral Show (TGMS), Lunar and Planetary Laboratory

Tucson, AZ
February 2024

- • Ran glove box demonstration to simulate OSIRIS-REx sample analysis
- • Led an activity to educate the public about meteor identification

WORKSHOPS

NASA Planetary Data Training Workshop: GIS, Image Processing, and Data Management, Arizona State University (ASU), School of Earth and Space Exploration (SESE)

Tempe, AZ
May 2024

- • Performed radiometric and geometric corrections on raw data products in ISIS
- • Enhanced ArcGIS Pro and JMARS software and data management proficiency

NASA Planetary Data Training Workshop: Photogrammetry, University of Arizona (UA), Lunar and Planetary Laboratory (LPL)

Tucson, AZ
April 2024

- • Utilized preprocessed images to create DTMs in BAE's SOCET SET
- • Learned how to generate DTMs using the Ames Stereo Pipeline tool in ISIS

ORGANIZATIONS

- • The Society of Physics Students (SPS)
  Member
- • The American Physical Society (APS)
  Member
- • The American Astronomical Society (AAS)
  Member
- • The American Geophysical Union (AGU)
  Member