

**Alexander Mark Kling**  
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## **Education**

**Ph.D. Earth, Atmospheric, and Planetary Science** **2020 – Present**  
Concentration: Planetary Science  
Purdue University, West Lafayette, IN

**B.S. Geology *magna cum laude*** **2016 – 2020**  
Stony Brook University, Stony Brook, NY

## **Research Interests**

I am interested in the study of planetary materials and linking this to modelling and spacecraft data to understand the formation and evolution of planetary body surfaces. Currently, I am working to understand the processes by which water may be formed and stored on the lunar surface in association with space weathering. I tackle these problems using a combination of analytical and in situ experimental techniques such as transmission electron microscopy, electron energy loss spectroscopy, and atom probe tomography. This work is directly applicable to understanding volatile cycling on the lunar surface and other airless bodies and may inform future missions targeting lunar volatiles such as Lunar Trailblazer and the VIPER rover.

## **Research Experience**

**Graduate Research Assistant** **Aug 2020 – Present**  
Department of Earth, Atmospheric, and Planetary Sciences, Purdue University  
*Thesis Advisor:* Dr. Michelle Thompson  
*Dissertation:* Understanding the behavior of volatiles formed by space weathering on the Moon via analyses of returned samples and laboratory experiments

**Undergraduate Research Assistant** **May 2017 – May 2020**  
Center for Planetary Exploration (CPEX), Stony Brook University  
*Mentors:* Dr. Timothy D. Glotch and Dr. A. Deanne Rogers  
*Projects:* Temperature dependence of visible to near-infrared spectral properties of minerals under simulated airless body conditions,  
Development of VNIR and TIR spectral libraries relevant to Bennu in preparation for OSIRIS-REx,  
Raman and micro-FTIR spectral mapping of shocked basalts

**NSF REU Research Intern** **June 2019 – Aug 2019**  
Department of Astronomy and Planetary Science, Northern Arizona University  
*Mentors:* Dr. Jean-Francois Smekens and Dr. Christopher S. Edwards  
*Project:* Laboratory spectroscopy of terrestrial volcanic ash and potential applications to Martian remote sensing

**NSF REU Research Intern** **June 2018 – Aug 2018**  
Department of Earth and Planetary Sciences, American Museum of Natural History  
*Mentor:* Dr. Denton S. Ebel  
*Project:* Modal abundances of EH3 chondrites using image analysis of x-ray maps

**Undergraduate Research Assistant** **Jan 2017 – May 2017**  
Facility for Isotope Research & Student Training (FIRST), Stony Brook University

*Mentors:* Dr. Steven S. Jaret and Dr. E. Troy Rasbury

*Project:* Determining the ages and provenance of detrital zircons in SBU campus loess using U-Pb dating

## **Publications**

Breitenfeld, L. B., Rogers, A. D., Glotch, T. D., Hamilton, V. E., Christensen, P. R., Lauretta, D. S., Gemma, M., Howard, K. T., Ebel, D. S., Kim, G., **Kling, A. M.**, Nekvasil, H., Lindsley, D. H., DiFrancesco, N. J. (2021). Machine learning mid-infrared spectral models for modal mineralogy predictions of CI/CM chondrite asteroids and Bennu. *Journal of Geophysical Research: Planets*, 126, e2021JE007035. <https://doi.org/10.1029/2021JE007035>

Glotch, T. D., Edwards, C. S., Yesiltas, M., Shirley, K. A., McDougall, D. S., **Kling, A. M.**, et al. (2018). MGS-TES spectra suggest a basaltic component in the regolith of Phobos. *Journal of Geophysical Research: Planets*, 123, 2467-2484. <https://doi.org/10.1029/2018JE005647>

## **Manuscripts in preparation:**

**Kling, A. M.**, Greer, J., Thompson, M.S., Heck, P. R., Isheim, D., Seidman, D. N. Nanoscale reservoirs store solar wind-derived water on the lunar surface. *Manuscript in preparation.*

Dyar, M. D., Lane, M. D., Glotch, T. D., Breitenfeld, L. B., Clark, R. N., Pearson, N., Sklute, E. C., Hendrix, A., Weller, B., **Kling, A.**, and McDougall, D. Spectroscopy of the Hamburg meteorite, Michigan H4 chondrite, Met. Planet. Sci. *Manuscript in preparation.*

## **Conference Abstracts and Presentations**

\* = undergraduate advisee

**Kling, A. M.** & Thompson, M. S. (2024). Solar wind neon stored in space weathering signatures in mature lunar soils. 55<sup>th</sup> Lunar and Planetary Science Conference. Abstract 1567. *Oral.*

Sycko, K. \*, **Kling, A.** & Thompson, M. (2023). Characterizing the effects of space weathering on the surface of lunar grains using scanning electron microscopy. Purdue University Spring Undergraduate Research Conference. *Poster.*

**Kling, A. M.**, Greer, J., Thompson, M.S., Heck, P. R., Isheim, D., Seidman, D. N. (2023). Solar Wind-Sourced Water Stored in Nanoscale Reservoirs in Lunar Soil Grains. 54th Lunar and Planetary Science Conference. Abstract 1710. *Oral.*

Sycko, K\*. & **Kling, A.** (2022). Characterizing the effects of space weathering on lunar grains using scanning electron microscopy. Purdue University Fall Undergraduate Research Expo. *Poster.*

**Kling, A. M.**, Greer, J., Thompson, M.S., Heck, P. R. (2022). Coordinated TEM and APT analyses to understand the distribution of solar wind-sourced hydrogen and water in space weathered lunar soils. 85<sup>th</sup> Annual Meeting of the Meteoritical Society. Abstract 6332. *Oral.*

Greer, J., **Kling, A. M.**, Isheim, D., Seidman, D. N., Thompson, M. S., Heck, P. R. (2022). Nanoscale analyses of space weathered mature lunar soil 79221. 85<sup>th</sup> Annual Meeting of the Meteoritical Society. Abstract 6303. *Oral.*

**Kling, A. M.**, Greer, J., Thompson, M.S., Heck, P. R. (2022). Identification of solar wind-sourced water in the space weathered rims of lunar soils. 53rd Lunar and Planetary Science Conference. Abstract 1504. *Oral.*

- Greer, J., **Kling, A. M.**, Isheim, D., Seidman, D. N., Thompson, M. S., Heck, P. R. (2022). Nanoscale analyses of vesicles in space-weathered lunar soil silicates and ilmenite. 53rd Lunar and Planetary Science Conference. Abstract 1508. *Oral*.
- Kling, A. M.**, Benner, M. C., Thompson, M. S., Greer, J., Diaz, R. E., Heck, P. R. (2021). The Search for Water in Lunar Soils Through Coordinated Analysis of Space Weathering Characteristics in an Apollo 17 Sample. 84<sup>th</sup> Annual Meeting of the Meteoritical Society. Abstract #6241. *Poster*.
- Kling, A. M.**, Thompson, M.S., Greer, J., Heck, P. R. (2021). Coordinated Analysis of Space Weathering Characteristics in Lunar Samples to Understand Water Distribution on the Moon. Microscopy and Microanalysis Meeting. *Poster, virtual*.
- Kling, A. M.**, Thompson, M. S., Greer, J., Heck, P. R. (2021). Coordinated Analysis of Space Weathering Characteristics in Lunar Samples to Understand Water Distribution on the Moon. Annual V. M. Goldschmidt Conference. *Poster, virtual*.
- Kling, A. M.** and Ebel, D. S. (2019). Modal abundances of EH3 chondrites using image analysis of X-ray maps. 50<sup>th</sup> Lunar and Planetary Science Conference. Abstract 1698. *Poster*.
- Breitenfeld, L. B., **Kling, A.**, Kim, G., Rogers, A. D., Glotch, T. D., Hamilton, V. E., Christensen, P. R., Lauretta, D. S., and the OSIRIS-REx Team (2019). VNIR and TIR spectra of fine-grained minerals under ambient and simulated asteroid environment conditions with applications to OSIRIS-REx. 50<sup>th</sup> Lunar and Planetary Science Conference. Abstract 1866. *Poster*.
- Kling, A. M.**, Shirley, K. A., Glotch, T. D. (2018). Temperature dependence of visible to near-infrared spectral properties of minerals under simulated airless body conditions. NASA Exploration Science Forum. *Poster*.
- Rogers, D., Glotch, T., McDougall, D., **Kling, A.**, Hamilton, V., Lauretta, D. (2018). Determining Modal Mineralogy of Fine-Particulate Surfaces on Bennu Using Partial Least Squares (PLS) Analyses of OSIRIS-rex OTEs and OVIRS Spectra. 15<sup>th</sup> Annual Meeting Asia and Oceania Geosciences Society. *Poster*.
- Kling A.**, Jaret S., Rasbury E. T. (2017). U-Pb Ages for Zircons from SBU Campus Loess. 24th Conference on "Geology of Long Island and Metropolitan New York." *Oral*.
- Kling A.**, Cobo C., Gil L., Tang S. (2015). The Effect of Road Salt on Soil pH. 22nd Conference on "Geology of Long Island and Metropolitan New York." *Oral*.

## **Awards and Honors**

### **Graduate:**

<b>Graduate Student Conference Support</b> , EAPS Department, Purdue University (\$400)	<b>2024</b>
<b>Future Investigators in NASA Earth and Space Science and Technology (FINESST) Fellowship</b> , NASA (\$150,000 over three years)	<b>2023-2026</b>
<b>NASA Indiana Space Grant Doctoral Fellowship</b> , Indiana Space Grant Consortium, (\$12,000)	<b>2023</b>
<b>LPI Career Development Award</b> , Lunar and Planetary Institute (\$1,000)	<b>2023</b>
<b>College of Science Graduate Student International Travel Grant</b> , College of Science, Purdue University (\$800)	<b>2022</b>
<b>Joseph Goldstein Scholar Award</b> , Microanalysis Society (\$1,000)	<b>2022</b>

<b>Meteoritical Society Meeting Travel Grant</b> , O. Richard Norton Fund (\$1,500)	<b>2022</b>
<b>Darrell Leap Hydrology Graduate Research Award</b> , Department of Earth, Atmospheric, and Planetary Sciences, Purdue University (\$500)	<b>2022</b>
<b>College of Science Graduate Student International Travel Grant</b> , College of Science, Purdue University (\$800)	<b>2022</b>
<b>1-Min Research Madness Blitz Student Winner</b> , Department of Earth, Atmospheric, and Planetary Sciences, Purdue University	<b>2021</b>
<b>NASA US Students Award</b> , Universities Space Research Association (\$1,150)	<b>2021</b>
<b>Goldschmidt Conference Grant</b> , Geochemical Society (\$150)	<b>2021</b>

### **Undergraduate:**

<b>Oliver Schaeffer Award</b> , Department of Geosciences, Stony Brook University	<b>2020</b>
<b>Provost's Award for Academic Excellence</b> , Stony Brook University (\$100)	<b>2020</b>
<b>AIPG National Undergraduate Scholarship</b> , American Institute of Professional Geologists (\$1,000)	<b>2020</b>
<b>Barry Goldwater Scholar</b> , Barry Goldwater Scholarship and Excellence in Education Foundation (\$7,500)	<b>2019</b>
<b>USRA Distinguished Undergraduate, Honorable Mention</b> , Universities Space Research Association	<b>2019</b>
<b>Angelo Tagliacozzo Memorial Geological Scholarship</b> , American Institute of Professional Geologists, Northeast Section (\$2,000)	<b>2019</b>
<b>October 2018 Researcher of the Month</b> , Undergraduate Research Experience and Creative Arts (URECA), Stony Brook University	<b>2018</b>
<b>Presidential Scholarship</b> , Stony Brook University (\$4,500 annually)	<b>2016 – 2020</b>
<b>Dean's List</b> , College of Arts and Sciences, Stony Brook University (8 semesters)	<b>2016 – 2020</b>

### **Invited Talks**

“From the grain scale to the global scale: How space weathering influences the behavior of water on the lunar surface.” *NASA Lunar Trailblazer science team meeting, virtual.* **May 2023**

### **Teaching Experience**

**Guest Instructor for SEM Lab** **Fall 2022, 2023**  
 EAPS 243: Earth Materials I (Mineralogy)  
 Department of Earth, Atmospheric, and Planetary Sciences, Purdue University

**Undergraduate Teaching Assistant** **Fall 2019**  
 GEO 347/547: Remote Sensing  
 Department of Geosciences, Stony Brook University

### **Mentorship and Training**

Undergraduate Students Advised:

Kaitlyn Sycko '24 Geology & Geophysics and Planetary Sciences, Purdue University	Fall 2022 – Present
Kasidi Lowry '25 Planetary Sciences, Purdue University	Summer 2022
Daniel Garcia '25 Planetary Sciences, Purdue University	Summer 2022
Vincent Soldano '23 Geology, University of Nevada, Reno via the Geosciences Education & Mentorship Support (GEMS) program (now a PhD student at Penn State University)	Fa 2021 – Sp 2022
Victor Garcia '24 Planetary Sciences, Purdue University	Fall 2021
Maizey Benner '21 Planetary Sciences and Physics, Purdue University (now a PhD student at the University of Arizona)	Spring 2021

Training on Hitachi TM4000 Benchtop Scanning Electron Microscope:  
Ten undergraduates and four graduate students

### **Selected Proposals**

**NASA Facility for Astromaterials Research (NFAR) Proposal, ARES/NASA JSC**  
*Developing procedures for in situ FIB liftout and transfer of space weathered lunar grains for in situ TEM heating experiments*  
PI: Alexander Kling

### **Outreach**

Lil LEAPS Planetary Science Outreach Series with the Lafayette Boys and Girls Club	Dec 2021 – May 2022
Elementary school campus visit science activities, Purdue University	May 2022
Earth Day event in partnership with Imagination Station, Department of Earth Atmospheric, and Planetary Sciences, Purdue University	May 2022
Passport Day, Department of Earth Atmospheric, and Planetary Sciences, Purdue University	February 2022
Homecoming booth outreach activities, Department of Earth Atmospheric, and Planetary Sciences, Purdue University	October 2021
AstroFest, Stony Brook Astronomy Club	April 2017, 2018, 2019
Solar observing and tabling at Stony Brook University Earth Stock event for Earth Day, Stony Brook Astronomy Club	April 2018, 2019
Mercury transit public telescope observing, Stony Brook Astronomy Club	November 2019
All About Astronomy event in collaboration with oSTEM at Stony Brook University, Stony Brook Astronomy Club	October 2019
International Observe the Moon Night event, Stony Brook Astronomy Club	October 2019
Department of Geosciences Booth at CommUniversity Day, Stony Brook University	September 2019
SSERVI RISE2 table at NASA STEM Day, Fenway Park	September 2019
Mid-Autumn Festival telescope observations of the Moon in collaboration	September 2018, 2019

with ChinaBlue, Stony Brook Astronomy Club

## **Professional Development Workshops and Courses**

Preparing Future Faculty course through the Purdue Graduate School	Fall 2023
Arizona State University Winter School on High Resolution Electron Microscopy	January 2023
Future Mentor's Program, John Martinson Honors College, Purdue University	Fall 2022
Gatan EELS and EFTEM Analysis School	May 2022
Science Communication course through the Alan Alda Center for Communicating Science at Stony Brook University	Fall 2018

## **Professional Service**

Executive Secretary on NASA review panel	
Student Panel Member, LEAG-ExMAG Specific Action Team, Cold Conditioned and Volatiles Samples Sub-Panel	2024
Manuscript Reviewer: Nature Astronomy	2023
Session Chair, 85 <sup>th</sup> Annual Meeting of the Meteoritical Society	2022
Session Moderator, 53 <sup>rd</sup> Lunar and Planetary Science Conference	2022
Dwornik Award Judge, Lunar and Planetary Science Conference	2022

## **University Service**

Graduate Committee, Department of Earth, Atmospheric, and Planetary Sciences, Purdue University	Fall 2021 – Present
Professional Development Committee, EAPS Graduate Student Association, Purdue University	Fall 2021 – Present
Graduate Curriculum and Academic Policy committee, College of Science, Purdue University	Fall 2021 – Present
Panelist, "Ask a Scholar: Goldwater Scholars' Advice for Current Applicants," National and International Scholarships Office, Purdue University	Fall 2020, 2021
Academic Career and Success Committee, Tabler Quad, Stony Brook University	Aug 2018 – May 2019
Guest Speaker, SSO 102: The Undergraduate Researcher, Stony Brook University	2019
Student representative for the Department of Geosciences at the Major/Minor Networking Event, Stony Brook University	2019

## **Technical Skills**

### **Laboratory Techniques**

- Transmission Electron Microscopy (TEM)
- Scanning Transmission Electron Microscopy (STEM)
- Electron Energy-Loss Spectroscopy (EELS)
  - Monochromated EELS
- Focused Ion Beam Scanning Electron Microscopy (FIB-SEM)

- Scanning Electron Microscopy (SEM)
- Ultramicrotomy
- Small particle handling
- Visible to Near-Infrared (VNIR) Reflectance Spectroscopy
- Thermal Infrared (TIR) Reflectance and Emission Spectroscopy
- Raman Spectroscopy
- Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS)

### **Programming Languages and Computer Experience**

- Software: Digital Micrograph, Velox, INCA, Adobe Illustrator, ImageJ, ENVI, JMARS, Microsoft Suite (Word, Excel, PowerPoint)
- Coding: Python (intermediate), MATLAB (intermediate), Davinci (beginner), Processing (intermediate), IDL (beginner)

### **Other Leadership Experience**

<b>President</b> , Stony Brook University Astronomy Club	August 2019 – May 2020
<b>Resident Assistant</b> , Campus Residences, Stony Brook University	August 2018 – May 2020
<b>Secretary</b> , Stony Brook University Astronomy Club	August 2017 – May 2019
<b>President</b> , Wagner College Hall Council, Stony Brook University	August 2017 – May 2018

### **Professional Affiliations**

Meteoritical Society  
 Microanalysis Society  
 Microscopy Society of America

### **Press**

[LPI Announces the Recipients of the 2023 Career Development Award](#), *Lunar and Planetary Institute*, 2/24/2023

[May 2020 Graduate Profile](#), *SBU College of Arts and Sciences*, 5/20/20

Interviewed for [the twelfth episode of the “Sprouting in STEM” podcast](#), a show about early career scientists, 11/24/2019

[Three seawolves receive prestigious Goldwater Scholarships](#), *SBU News*, 5/8/2019

[SBU researchers make new discoveries about creation of Mars’ moons](#), *Stony Brook Statesman*, 10/30/2018

[Alexander Kling ’20 takes research from Earth to Mars](#), *SBU News*, 10/3/2018

[Martian moon may have come from impact on home planet, new study suggests](#), *AGU*, 9/24/2018