

Zoë E. Wilbur

Smithsonian Our Unique Planet (OUP) Postdoctoral Fellow • FINESST Graduate Fellow

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Education

PhD in Planetary Science

University of Arizona – Awarded December 2024

Advisor: Dr. Jessica Barnes

Masters en Route in Planetary Science

University of Arizona – Awarded May 2022

Advisor: Dr. Jessica Barnes

BSc in Geology, University Honors and Department Honors, Summa Cum Laude

University of Nevada, Las Vegas – December 2018

Advisor: Dr. Arya Udry

Research Experience

Geologist, Postdoctoral Research Fellow, Smithsonian National Museum of Mineral Sciences (Feb. 2025 to present; Hours per week: 40)

Inform on the petrogenesis of Bennu samples returned by the OSIRIS-Rex mission through petrographic and isotopic analyses, including a detailed study of brecciation and aqueous alteration events.

Mentors: Dr. Timothy McCoy and Dr. Catherine Corrigan

Graduate Associate at the Lunar and Planetary Laboratory, UA (Aug. 2019 to Dec. 2024; Hours per week: 40)

Investigate the magmatic, volcanic, and eruption histories of Apollo 15 and 17 basalts [as well as Apollo Next Generation Sample Analysis (ANGSA) Program samples] utilizing a coordinated analysis campaign, including the analysis of 2D and 3D modal mineralogy and grain measurements, mineral chemistry, 3D vesicle morphologies, and H isotopes.

Research Advisor: Dr. Jessica Barnes

Curation Laboratory Assistant for *Jacobs*- NASA Johnson Space Center (Feb. 2019- July 2019; Hours per week: 40)

Utilize X-ray computed tomography to investigate the 3D modal mineralogy, porosity, and internal structures of meteorites and Apollo lunar samples. A 3D visualization of an Apollo 11 sample scanned for the 50th anniversary of the Apollo missions can be viewed here: <https://ares.jsc.nasa.gov/projects/astromaterials-3d/>.

Manager: Dr. Darren Locke

Planetary Geochemist Intern for *Jacobs*- NASA Johnson Space Center (Jan. 2018- Dec. 2018; Hours per week: 40)

Investigate element partitioning of moderately volatile elements present in silicate, sulfide, and metal phases in highly reduced meteorites. Examine the petrogenesis of aubrite meteorites. Utilize the electron microprobe to analyze the major and minor elements in highly reduced mineral phases.

Mentors: Dr. Arya Udry, Dr. Kathleen Vander Kaaden, and Dr. Francis McCubbin

Undergraduate Research Assistant (Aug. 2017- Dec. 2017; Hours per week: 20)

Synthesize high-pressure inclusions in minerals to understand terrestrial mantle processes.

Research Advisors: Dr. Oliver Tschauner, Dr. Shichun Haung

Fellowships

Future Investigators in NASA Earth and Space Science and Technology (FINESST)

Investigating Degassing Histories of Apollo 15 and 17 Lunar Basalts with 3D Visualization and Coordinated Microanalysis. Role: FI. Proposal Period: 2021-2023.

Hevey Mineral Sciences Graduate Fellowship, Smithsonian Institution

Investigation of Volatile-Bearing Sulfides in Reduced Meteorites. Summer 2022.

Amelia Earhart Fellow

For demonstrating superior academic record conducting research applied to space sciences. 2023.

Women's Philanthropic Education Organization (P.E.O.) Scholar

For academic excellence and achievement in a doctoral program, demonstrating the ability to make significant contributions to the field of study. 2023.

Honors & Awards

Nininger Meteorite Award

For student achievement in meteoritics embodied by original research paper, 2021/2022

Invited Speaker for *Klaus Keil Memorial Symposium: Quantitative Analysis of Planetary Materials*

Microscopy and Microanalysis Meeting, 2023

McKay Award for Top Oral Presentation

Meteoritical Society, 2023

Wiley Award for Top Oral Presentation

Meteoritical Society, 2022

Meteoritical Society Meeting Travel Award

Meteoritical Society, 2022

Hitachi Electron Microscopy Scholarship

University of Arizona, 2022

Galileo Circle Scholarship

University of Arizona, 2021

Lunar and Planetary Institute Career Development Award

Lunar and Planetary Institute, 2019

UNLV Honors College Outstanding Student Service Award

University of Nevada, Las Vegas, 2018

University of Nevada, Las Vegas Summer Undergraduate Research Funding

College of Sciences, 2018

University of Nevada, Las Vegas Research and Development Award

College of Sciences, 2017

Peer-Reviewed Journal Articles

[7] Wilbur, Z. E., Barnes, J. J., Eckley, K., Domanik, S. A., Zeigler, R. A. (2025). Evaluating the crystallization and eruptive histories of low-titanium basalts with 2D and 3D studies. *Geochimica et Cosmochimica Acta*. 389, 110-124.

[6] Wilbur, Z. E., McCoy, T. J., Corrigan, C., Brown, S. V., Barnes, J. J., Udry, A. (2024). The formation of volatile-

bearing djerfisherite in reduced meteorites. *Meteoritics & Planetary Science*. 1-15.

[5] **Z. E. Wilbur**, J.J. Barnes, S.A. Eckley, I. J. Ong, M. Brounce, C.A. Crow, T. Erickson, J. J. Kent, J.W. Boyce, J.L. Mosenfelder, T. Hahn Jr., F. M. McCubbin, T. Zega, and the ANGSA Science Team (2023) Volatiles, vesicles, and vugs: Unraveling the magmatic and eruptive histories of Steno Crater basalts. *Meteoritics and Planetary Science*. 58(11), 1600-1628.

[4] Gignac, P. M., [...] **Wilbur, Z. E.**, et al. (2024) The Non-Clinical Tomography Users Research Network: Why it Matters. *Journal of Tomography of Materials and Structures*.

[3] S. R. Ramsey, A. M. Ostwald, A. Udry, E. O'Neal, J. M. D. Day, **Z. E. Wilbur**, J. J. Barnes, S. Griffin (2023) Northwest Africa 13669, a Reequilibrated Nakhilite from a Previously Unsampld Portion of the Nakhilite Igneous Complex. *Meteoritics and Planetary Science*. 59(10), 134-170.

[2] **Z. E. Wilbur**, A. Udry, F. M. McCubbin, K. E. Vander Kaaden, K. Ziegler, C. Defelice, T. J. McCoy, J. Gross, B. D. Turrin, N. J. Dygert, and C. McCoy (2022) The effects of highly reduced magmatism revealed through aubrites. *Meteoritics and Planetary Science*. 57(7), 1387-1420.

[1] A. Udry, **Z. E. Wilbur**, R. R. Rahib, F. M. McCubbin, K. E. Vander Kaaden, T. J. McCoy, K. Ziegler, J. Gross, C. Defelice, L. M. Combs, B. D. Turrin (2019) Reclassification of four aubrites as enstatite chondrite impact melts: Potential geochemical analogues for Mercury. *Meteoritics and Planetary Science*, 54 (40), 785-810.

Articles in Preparation

Wilbur, Z. E., Tatsch, A., Barnes, J. J., Stadermann, A. C., Eckley, S. A., Erickson, T. M., Gross, J., Shearer, C. K., Zeigler, R. A., McCubbin, F. M. (In Preparation). Slowly cooled and chemically diverse basalt clasts identified in the ANGSA core 73001. *To be submitted to Journal of Geophysical Research: Planets*.

Barnes, J.J., Nguyen, A. N., [...] **Wilbur, Z. E.** et al. (In Review) Diversity and origin of materials accreted by Bennu's parent asteroid. *Submitted to Nature Astronomy*.

Conference Abstracts

Wilbur, Z. E., Tatsch, A., Barnes, J., Eckley, T. Erickson, Brounce, M., Crow, C., Boyce, J., Mosenfelder, J., Stadermann, A. C., Gross, J. & ANGSA Science Team (2024) Petrologic Comparison of High- and Low-Titanium Basalt Clasts Derived from ANGSA Core 73001. 55th Lunar and Planetary Science Conference, Abstract #1138.

Baird, M., Barnes, J. J., **Wilbur, Z. E.**, Kerrison, N., Domanik, K., Hill, D. (2024) Assessing the lithological Diversity of Lunar Meteorite Northwest Africa (NWA) 10203. 55th Lunar and Planetary Science Conference.

Barnes, J. J., Haenecour, P., Smith, L. R., Ong, I. J., **Wilbur, Z. E.**, Jourdan, F., King, A. J., McCoy, T. J. , Russell, S. S., Keller, L. P. , Timms, N. E., Rickard, W. D. A., Bland, P., Saxey, D., Reddy, S., Ireland, T., Yurimoto, H., Chaves, L., Bloch, E., Franchi, I. A., Zhao, X. , Zega, T. J., Thompson, M. S., Jones, R., Nguyen, A., Connolly Jr, H. C., Lauretta, D. S. (2024) Coordinated Analysis of Phosphates in Samples from Asteroid (101955) Bennu. 55th Lunar and Planetary Science Conference, Abstract #1532.

Wilbur, Z. E., McCoy, T., Corrigan, C., Barnes, J., Udry, A., Brown, S. V. (2023a) Unraveling the volatile story of reduced meteorites through djerfisherite. 86th Annual Meeting of the Meteoritical Society, Abstract #6117. Oral.

Wilbur, Z. E., McCoy, T., Corrigan, C., & Barnes, J. (2023b). Vapor Phase Metasomatism on the Aubrite Parent Body Evidenced by the Volatile-Bearing Sulfide Djerfisherite. 2023 Microscopy and Microanalysis Meeting. Oral.

Lowers, H., Thompson, J., Carpenter, P., **Wilbur, Z. E.**, & Irving, A. (2023). Hyperspectral Cathodoluminescence and Quantitative EPMA Mapping of Angrite Northwest Africa 15507. 2023 Microscopy and Microanalysis Meeting.

Thompson, D., Boyce, J., Dudley, J.-M., Barnes, J., & **Wilbur, Z.** (2023). Thermodynamic Modeling of the Vapor in Equilibrium With Apollo 17 Basalts. 54th Lunar and Planetary Science Conference.

- Cannon, K., Rampe, E., Malaret, E., King, I., Chen, J., Gross, J., Yen, A., **Wilbur, Z. E.**, Ewing, R., & McNally, P. (2022). Mineralogical, Elemental, and Tomographic Reconnaissance Investigation for CLPS (METRIC): A Proposed Mission to the Lunar South Pole-Aitken Basin. 54th Lunar and Planetary Science Conference (LPSC).
- Wilbur, Z. E.**, Barnes, J., Eckley, S., Brounce, M., Pomeroy, S., Crow, C., Boyce, J., Mosenfelder, J., Zega, T., & Angsa Science Team. (2022). From Source to Surface: An Investigation of Magmatic Lunar Volatiles. 2678, 1701.
- Wilbur, Z. E.**, Barnes, J., Eckley, S., & Zeigler, R. (2022a). Magmatic and Volcanic Histories of Apollo 17 Basalts. LPI Contributions, 2704, 2026.
- Wilbur, Z. E.**, Barnes, J., Eckley, S., & Zeigler, R. (2022b). Volcanic Histories of Lunar Basalts Revealed Via 3D Visualization. LPI Contributions, 2695, 6400.
- Barnes, J. J., **Wilbur, Z. E.**, Brounce, M., Crow, C. A., Pomeroy, S., Ong, L. J., Hahn, T., Mosenfelder, J., Boyce, J. W., & Erickson, T. (2022). From Source to Surface: Tracing the Volatile Record of High-Titanium Mare Basalts. 2022 Goldschmidt Conference.
- Barnes, J., **Wilbur, Z. E.**, Ong, L., Eckley, S., Brounce, M., Pomeroy, S., Crow, C., Boyce, J., Mosenfelder, J., & Erickson, T. (2022). A Multifaceted Approach to Investigating the Magmatic and Post-Magmatic History of Volatiles in Basalts from the Rim of Steno Crater. LPI Contributions, 2704, 2051.
- Brounce, M., Barnes, J., Crow, C., Economos, R., Erickson, T., Boyce, J., **Wilbur, Z. E.**, McCubbin, F., Mosenfelder, J., & Zega, T. (2022). Measuring the Oxidation State of Sulfur in Apatites in Thin Sections of Meteorites versus Apollo Rocks. LPI Contributions, 2678, 2260.
- Ong, I., Barnes, J., **Wilbur, Z. E.**, Stadermann, A., Domanik, K., & McCubbin, F. (2022). Identification of an Unusual Iron Rich Lithology in Luna 24 Soil. 2678, 2883.
- Pomeroy, S., Crow, C., **Wilbur, Z. E.**, Barnes, J., Boyce, J., Mosenfelder, J., Brounce, M., Erikson, T., & Zega, T. (2022). Chronology of Steno Crater Basalts. 2678, 1755.
- Rampe, E., Blake, D., Cannon, K., Sarrazin, P., Obbard, R., Lucey, P., Bergman, D., Taylor, G. J., & Vaniman, D. (2022). Mineralogical, Elemental and Tomographic Reconnaissance Investigation for CLPS ("METRIC"). 44th COSPAR Scientific Assembly. Held 16-24 July, 44, 287.
- Wilbur, Z. E.**, Barnes, J., Eckley, S., Boyce, J., Brounce, M., Crow, C., Mosenfelder, J., Zega, T., & Angsa Science Team. (2021). Investigating the Magmatic History of Volatiles in Apollo 17 Basalts, Apollo Next Generation Sample Analysis. 2548, 1497.
- Wilbur, Z. E.**, Barnes, J., Eckley, S., & Zeigler, R. (2021). Investigating the Petrogenesis and Eruption Histories of Apollo 15 and Apollo 17 Basalts. 84(2609), 6130.
- Wilbur, Z. E.**, Barnes, J. J., Eckley, S. A., & Zeigler, R. A. (2021). Investigating the Eruption Histories of Apollo 17 Basalts Using 3D Data. Goldschmidt2021• Virtual• 4-9 July.
- Barnes, J., **Wilbur, Z. E.**, & Domanik, K. (2021). Phosphate Chemistry in Brachinites and Brachinite Like Meteorites. 84(2609), 6300.
- Brounce, M., Barnes, J., Boyce, J., **Wilbur, Z. E.**, McCubbin, F., Crow, C., Mosenfelder, J., Zega, T., & Angsa Science Team. (2021). The Oxidation State of Sulfur in Apollo Samples 71035 and 71055. 2548, 1572.
- Morin, S., Barnes, J., **Wilbur, Z. E.**, Stadermann, A., Domanik, K., & McCubbin, F. (2021). Assessing the Volatile Inventory of Basaltic Fragments in Luna Soils. 84(2609), 6229.
- Wilbur, Z. E.**, Barnes, J., Eckley, S., Boyce, J., Brounce, M., Crow, C., Mosenfelder, J., & Zega, T. (2020). Investigating the Magmatic History of Volatiles in Apollo 17 Basalts, Apollo Next Generation Sample Analysis. 2326, 2236.
- Wilbur, Z. E.**, Udry, A., McCubbin, F. M., Vander Kaaden, K. E., Zeigler, R., Ziegler, K., & DeFelice, C. (2019). Investigating the History of Aubrites Using X-Ray Computed Tomography and Bulk Partition Coefficients. 82(2157), 6180.
- Wilbur, Z. E.**, Udry, A., Zeigler, R. A., McCubbin, F. M., Vander Kaaden, K. E., Ziegler, K., DeFelice, C., & McCoy, T. (2019). The Geochemistry of Aubrites: Investigating Reduced Parent Bodies. JSC-E-DAA-TN64787.
- Wilbur, Z. E.**, Udry, A., Zeigler, R., Vander Kaaden, K., McCubbin, F., Zeigler, K., & Defelice, C. (2019). A New Look at Aubrites: Investigating 3D Modal Mineralogy with X-Ray Computed Tomography.
- Udry, A., **Wilbur, Z. E.**, McCubbin, F. M., Vander Kaaden, K. E., Ziegler, K. G., DeFelice, C., McCoy, T., Gross, J., & Turrin, B. D. (2019). Aubrite meteorites as geochemical analogues to Mercury. 2019, P11B-01.
- Welzenbach, L., **Wilbur, Z. E.**, & Fries, M. (2019). Cold Curation Techniques: X-Ray Computed Tomography of the

- Hamburg Meteorite. 82(2157), 6496.
- Zeigler, R., & **Wilbur, Z.** (2019). Using X-Ray Computed Tomography as a Tool for Preliminary Examination Tool of Current and Future Extraterrestrial Sample Return Missions. 82(2157), 6264.
- Wilbur, Z. E.**, Udry, A., Rahib, R. R., Combs, L. M., & Defelice, C. J. (2018). Potential Mercurian Analogues: Aubrite and Enstatite Chondrite Impact Melt Meteorites.
- Wilbur, Z. E.**, Udry, A., Coleff, D., McCubbin, F., & Vander Kaaden, K. (2018). Calculating the Modal Mineralogy of Aubrite Meteorites Using X-Ray Computed Tomography. JSC-E-DAA-TN58862.
- Wilbur, Z. E.**, Udry, A., McCubbin, F., Combs, L., Rahib, R., McCoy, T., & McCoy, C. (2018). Aubrite and Enstatite Chondrite Impact Melt Meteorites as Potential Analogs to Mercury. 2083, 1355.
- Wilbur, Z. E.**, Udry, A., Mccubbin, F. M., McCubbin, F., Combs, L., Rahib, R., McCoy, C., & McCoy, T. (2018). Aubrite and Impact Melt Enstatite Chondrite Meteorites as Potential Analogs to Mercury. JSC-E-DAA-TN52119.
- Wilbur, Z. E.**, Udry, A., McCubbin, F., Vander Kaaden, K., Rahib, R., & McCoy, T. (2018). Aubrite and Enstatite Chondrite Impact Melt Meteorites: Analogs to Mercury? JSC-E-DAA-TN54582.

Training and Workshops

The University of Arizona Sample Preparation and Polishing Workshop (June 2024), taught by David Mann, Mesa Petrographics

- Hands-on training to mount chondrite and achondrite samples in epoxy, epoxy impregnate the surface of samples, and polish prepared samples using a variety of methods.

Arizona State University Secondary Ion Mass Spectrometry (SIMS) Workshop (Jan. 2024)

- Training to process spot- and imaging-mode isotopic analyses collected by SIMS instruments, operate Cameca SIMS IMS 6f-GEO, interpret and present on isotopic data.

Fourth Annual Small-Particle Handling Workshop, NASA Johnson Space Center, Houston, TX (Oct. 2019)

- Hands-on training in handling and the manipulation of small extraterrestrial samples

The University of Texas High-Resolution X-ray CT Facility Short Course for XRXCT data (June 2019)

- Training in the 3D visualization and analysis of high-resolution XCT data. Delves into 3D visualization, surface extraction, and segmentation.

Skills and Analytical Equipment

- Analytical Equipment: Nikon XTH 320 micro-X-ray computed tomography machine; Petrographic microscope in reflected and transmitted light; JEOL and Cameca electron microprobes and scanning electron microscopes used for mineral major and minor element analyses.
- Software: Proficient in CT Agent and CT 3D Pro reconstruction software, Volume Graphics Studio (myVGL) software, Dragonfly, Blob 3D and Quant 3D, Adobe Illustrator, Image J, Adobe Photoshop, and Microsoft Word, PowerPoint, Publisher, and Excel.

Students Mentored

- **Shavonne Morin** – Graduate Mentor, BSc (2021)
- **Nicole Kerrison** – Graduate Mentor, BSc (2022)
- **Angela Tatsch** – Graduate Mentor, BSc (in progress)

Outreach

- **NASA SUITS** (Spacesuit User Interface Technologies for Students) Geology Team Lead, 2021-2022
- **PLANETS** (PLANetary Agender, Non-binary, womEn and Trans Scientists and Staff) Coordinator, 2022-present
- **PLANETS** (PLANetary Agender, Non-binary, womEn and Trans Scientists and Staff) Member, 2019-2022
- **Houston Symphony Apollo Anniversary Volunteer**, 2019
- **SWAN** (Supporting Women at NASA) Organization Member, 2019

Professional Service

- **Panel Member** for Lunar Exploration Analysis Group (LEAG) Specific Action Team (SAT) on Volatile Samples and Cold Curation
- **Proposal Reviewer** for the French National Research Agency (2023)
- **Reviewer** for Meteoritics and Planetary Science Journal (2023)
- **Meteoritical Website Committee co-editor** of collection histories and initiatives directed towards non-academic members of the website (2020- 2023)
- **Executive Secretary** for NASA proposal selection panel (2021)

Press Coverage

- [“USC and UA Students are Developing an AR Interface to Inform Lunar Astronauts of Location, Vitals”](#) by USC Viterbi Staff, USC
- [“A Rockin’ Time for Space Missions”](#) by Katherine Wright; Physics
- [“Sweating the small stuff: UArizona scientists have begun to study samples from asteroid Bennu”](#) by Daniel Stolte, University Communications