

**Dr. Alexander Sehlke**  
*Curriculum Vitae*

**NASA Ames Research Center,  
Building N245, MS N245-3, Rm 301  
Moffett Field, CA 94035**

**Email:** [alexander.sehlke@nasa.gov](mailto:alexander.sehlke@nasa.gov)  
**Phone:** 650-604 3651



## **CURRENT POSITION**

Research Scientist at NASA Ames Research Center, contracting through the Bay Area Environmental Research Institute, Moffett Field, CA 94035  
Office Phone: (650) 604-3651, Email: alexander.sehlke@nasa.gov



## **RESEARCH INTERESTS**

Planetary Geology, Volcanism, Terrestrial Analogs, Thermoluminescence, New Technology and Instrument Development, Space Resources, Robotic and Human Space Exploration



## **EDUCATION**

- 2015** | **Ph.D. in Geological Science with Minor in College Teaching**  
**University of Missouri, Columbia MO**  
Thesis Title: *"The Rheological Evolution of Planetary Basalts During Cooling and Crystallization"*. Thesis Advisor: Dr. A.G. Whittington
- 2011** | **Diploma in Geosciences**  
**Leibniz University of Hannover, Germany**  
Undergraduate Thesis Title: *H<sub>2</sub>O Diffusion in natural Beryl and Cordierite by micro-Raman Spectroscopy*. Thesis Advisor: Dr. H. Behrens



## **PROFESSIONAL APPOINTMENTS**

- since** | **Research Scientist**  
**2019** | NASA Ames Research Center/ BAER Institute, Moffett Field CA  
NASA Technical Monitor: Dr. J.L. Heldmann
- 2019** | **NASA Post-doctoral Fellow**  
**-2016** | NASA Ames Research Center, Moffett Field CA  
Supervisors: Drs. J.L. Heldmann and D.S.S. Lim



## PUBLICATIONS

28 Peer-reviewed publications, 614 Citations, h-index: 14, [Google Scholar](#), [Student Interns\\*](#)

- 2023** | Sears, D.W.G, **Sehlke, A.**, and the ANGSA Science Team (2023) Thermoluminescence and Apollo 17 ANGSA lunar samples: NASA's fifty-year experiment and prospecting for cold traps. *JGR Planets ANGSA special Issue*, in review
- Sehlke, A.**, Sears, D.W.G, and the ANGSA Science Team (2023) The Apollo 17 Regolith: Induced Thermoluminescence Evidence for Formation by a Single Event ~100 Million Years Ago and Possibly the Presence of Tycho Material. *JGR Planets ANGSA special Issue*, in review
- 2022** | Sears, D. W. G., **Sehlke, A.**, Hughes S., Kobs-Nawotniak S. E. (2022) Ejecta blocks around the Kings Bowl phreatomagmatic crater in Idaho: An indication of subsurface water amounts with implications for Mars. *Planetary and Space Science* 222. <https://doi.org/10.1016/j.pss.2022.105564>
- Rader, E., Ackiss S., **Sehlke, A.**, Bishop, J., Orrill B., Odegaard, K., Meier, M., Doloughan, A. (2022) Average VNIR reflectance: A rapid, sample-free method to estimate glass content and crystallinity of fresh basaltic lava. *Icarus Volume 383*. <https://doi.org/10.1016/j.icarus.2022.115084>
- 2021** | Whittington, A. G. & **Sehlke, A.** (2021) Spontaneous Reheating of Crystallizing Lava: An Experimental Study. *Geology*, Volume 49, Issue 12. <https://doi.org/10.1130/G49148.1>
- Jenniskens, P., Gabadirwe, M., Yun, Q. Z., with **Sehlke, A.** among 61 (2021) The impact and recovery of asteroid 2018 LA. *Meteoritics & Planetary Science* 1-50. <https://doi.org/10.1111/maps.13653>
- Sears, D. W. G., **Sehlke, A.**, & Hughes, S. S. (2021). Induced thermoluminescence as a method for dating recent volcanism: The Blue Dragon flow, Idaho, USA and the factors affecting induced thermoluminescence. *Planetary and Space Science*, 195, 105129. <https://doi.org/10.1016/j.pss.2020.105129>
- 2020** | Brady, A. L., Gibbons, E., **Sehlke, A.**, *Renner, C. J\**, Kobs Nawotniak, S. E., Lim, D. S. S., & Slater, G. F. (2020). Microbial community distribution in variously altered basalts: Insights into astrobiology sample site selection. *Planetary and Space Science*, 194, 105107.

<https://doi.org/10.1016/J.PSS.2020.105107>

Hughes, S. S., Garry, W. B., **Sehlke, A.**, Christiansen, E. H., Kobs Nawotniak, S. E., Sears, D. W. G., Elphic, R. C., Lim, D. S. S., & Heldmann, J. L. (2020). Basaltic fissure types on Earth: Suitable analogs to evaluate the origins of volcanic terrains on the Moon and Mars? *Planetary and Space Science*, 193, 105091. <https://doi.org/10.1016/J.PSS.2020.105091>

**Sehlke, A.**, Hofmeister, A. M., & Whittington, A. G. (2020). Thermal properties of glassy and molten planetary candidate lavas. *Planetary and Space Science*, 193, 105089. <https://doi.org/10.1016/J.PSS.2020.105089>

**Sehlke, A.**, & Whittington, A. G. (2020). Rheology of a KREEP Analog Magma: Experimental Results Applied to Dike Ascent through the Lunar Crust. *Planetary and Space Science*, 187. <https://doi.org/https://doi.org/10.1016/j.pss.2020.104941>

Morrison, A. A., Whittington, A., Smets, B., Kervyn, M. and **Sehlke, A.** (2020) The Rheology of Crystallizing basaltic lavas from Nyiragongo and Nyamuragira volcanoes, D.R.C. *Volcanica*, 3(1), pp. 1-28. <https://doi.org/10.30909/vol.03.01.0128>

**2019** **Sehlke, A.**, Mirmalek, Z., *Burt, D.*\*, Haberle, C. W., Santiago-Materese, D., Kobs Nawotniak, S. E., Hughes, S. S., Garry, W. B., Bramall, N., Brown, A. J., Heldmann, J. L., & Lim, D. S. S. (2019). Requirements for Portable Instrument Suites during Human Scientific Exploration of Mars. *Astrobiology*, 19(3), 401–425. <https://doi.org/10.1089/ast.2018.1841>

Hughes, S. S., Haberle, C. W., Kobs Nawotniak, S. E., **Sehlke, A.**, Garry, W. B., Elphic, R. C., Payler, S. J., Stevens, A. H., Cockell, C. S., Brady, A. L., Heldmann, J. L., & Lim, D. S. S. (2019). Basaltic Terrains in Idaho and Hawai'i as Planetary Analogs for Mars Geology and Astrobiology. *Astrobiology*, 19(3), 260–283. <https://doi.org/10.1089/ast.2018.1847>

Cockell, C. S., Harrison, J. P., Stevens, A. H., Payler, S. J., Hughes, S. S., Kobs Nawotniak, S. E., Brady, A. L., Elphic, R. C., Haberle, C. W., **Sehlke, A.**, Beaton, K. H., Abercromby, A. F. J., Schwendner, P., Wadsworth, J., Landenmark, H., Cane, R., Dickinson, A. W., Nicholson, N., Perera, L., & Lim, D. S. S. (2019). A Low-Diversity Microbiota Inhabits Extreme Terrestrial Basaltic Terrains and Their Fumaroles: Implications for the Exploration of Mars. *Astrobiology*, 19(3), 284–299. <https://doi.org/10.1089/ast.2018.1870>

- Kobs Nawotniak, S. E., Miller, M. J., Stevens, A. H., Marquez, J. J., Payler, S. J., Brady, A. L., Hughes, S. S., Haberle, C. W., **Sehlke, A.**, Beaton, K. H., Chappell, S. P., Elphic, R. C., & Lim, D. S. S. (2019). Opportunities and Challenges of Promoting Scientific Dialog throughout Execution of Future Science-Driven Extravehicular Activity. *Astrobiology*, 19(3), 426–439. <https://doi.org/10.1089/ast.2018.1901>
- Brady, A. L., Kobs Nawotniak, S. E., Hughes, S. S., Payler, S. J., Stevens, A. H., Cockell, C. S., Elphic, R. C., **Sehlke, A.**, Haberle, C. W., Slater, G. F., & Lim, D. S. S. (2019). Strategic Planning Insights for Future Science-Driven Extravehicular Activity on Mars. *Astrobiology*, 19(3), 347–368. <https://doi.org/10.1089/ast.2018.1850>
- Lim, D. S. S., Abercromby, A. F. J., Kobs Nawotniak, S. E., Lees, D. S., Miller, M. J., Brady, A. L., Miller, M. J., Mirmalek, Z., **Sehlke, A.**, Payler, S. J., Stevens, A. H., Haberle, C. W., Beaton, K. H., Chappell, S. P., Hughes, S. S., Cockell, C. S., Elphic, R. C., Downs, M. T., & Heldmann, J. L. (2019). The BASALT Research Program: Designing and Developing Mission Elements in Support of Human Scientific Exploration of Mars. *Astrobiology*, 19(3), 245–259. <https://doi.org/10.1089/ast.2018.1869>
- 2018** | Sears, D. W. G., **Sehlke, A.**, Friedrich, J. M., Rivers, M. L., & Ebel, D. S. (2018). X-ray computed tomography of extraterrestrial rocks eradicates their natural radiation record and the information it contains. *Meteoritics and Planetary Science*, 53(12), 2624–2631. <https://doi.org/10.1111/maps.13183>
- Sears, D. W. G., Sears, H., **Sehlke, A.**, & Hughes, S. S. (2018). Induced thermoluminescence as a method for dating recent volcanism: Hawaii County, Hawaii, USA. *Journal of Volcanology and Geothermal Research*, 349. <https://doi.org/10.1016/j.jvolgeores.2017.09.022>
- 2017** | Sears, D. W. G., Sears, H., **Sehlke, A.**, & Hughes, S. S. (2017). Induced thermoluminescence as a method for dating recent volcanism: Eastern Snake River Plain, Idaho, USA. *Journal of Geophysical Research: Solid Earth*, 122(2). <https://doi.org/10.1002/2016JB013596>
- 2016** | Hofmeister, A. M., **Sehlke, A.**, Avard, G., Bollasina, A. J., Robert, G., & Whittington, A. G. (2016). Transport properties of glassy and molten lavas as a function of temperature and composition. *Journal of Volcanology and Geothermal Research*, 327. <https://doi.org/10.1016/j.jvolgeores.2016.08.015>
- Sehlke, A.**, & Whittington, A. G. (2016). The viscosity of planetary tholeiitic melts: A configurational entropy model. *Geochimica et Cosmochimica Acta*, 191. <https://doi.org/10.1016/j.gca.2016.07.027>

- Soldati, A., **Sehlke, A.**, Chigna, G., & Whittington, A. G. (2016). Field and experimental constraints on the rheology of arc basaltic lavas: the January 2014 Eruption of Pacaya (Guatemala). *Bulletin of Volcanology*, 78(6). <https://doi.org/10.1007/s00445-016-1031-6>
- 2015** | **Sehlke, A.**, & Whittington, A. G. (2015). Rheology of lava flows on Mercury: An analog experimental study. *Journal of Geophysical Research E: Planets*, 120(11). <https://doi.org/10.1002/2015JE004792>
- 2014** | Hofmeister, A. M., **Sehlke, A.**, & Whittington, A. G. (2014). Thermal diffusivity of Fe-rich pyroxene glasses and their melts. *Chemical Geology*, 384. <https://doi.org/10.1016/j.chemgeo.2014.06.018>
- Sehlke, A.**, Whittington, A. G., Robert, B., Harris, A., Gurioli, L., Médard, E., & Sehlke, A. (2014). Pāhoehoe to `a`ā transition of Hawaiian lavas: An experimental study. *Bulletin of Volcanology*, 76(11). <https://doi.org/10.1007/s00445-014-0876-9>
- Robert, B., Harris, A., Gurioli, L., Médard, E., **Sehlke, A.**, & Whittington, A. G. (2014). Textural and rheological evolution of basalt flowing down a lava channel. *Bulletin of Volcanology*, 76(6), 1-21. <https://doi.org/10.1007/s00445-014-0824-8>



## AWARDS AND HONORS

- 2020** | NASA Ames Honor Award – Contractor Employee
- 2020** | NASA Ames Honor Award – Partnership with RESOURCE
- 2020** | NASA Ames Honor Award – Team/Group with BASALT
- 2018** | NASA Ames Honor Award – Team/Group with FINESSE



## GRANTS AND FELLOWSHIPS

- 2022** | **1-Year Funded Extension, Thermoluminescence Studies on Frozen Apollo 17 Samples: Temperature Estimates of Shaded and Illuminated Lunar Surfaces.** NASA ROSES Science Mission Directorate Single-Source – By invitation only (2022). PI: Alexander Sehlke, Co-I: Derek Sears. \$113,000
- 2021** | **1-Year Funded Extension, Thermoluminescence Studies on Frozen Apollo 17 Samples: Temperature Estimates of Shaded and Illuminated Lunar Surfaces.** NASA ROSES Apollo Next Generation Sample Analysis (ANGSA) PI: Alexander Sehlke, Co-I: Derek Sears. \$103,359
- 2021** | **THEIA – Thermal History Exploration Instrument for Artemis.** NASA Ames Center Innovation Funds. PI: Jennifer L. Heldmann, Co-I Alexander Sehlke, Co-I Derek Sears.

- 2020 SSERVI RESOURCE (Resources for Exploration & Science of OUR Cosmic Environment).** NASA SSERVI CAN-3. PI: Jennifer L. Heldmann, Deputy PIs: Alexander Sehlke\* & Matt Deans. Co-Is: 16 in Academia, Federal Agencies and Private Sector. \$7,452,467  
\*Joined as Deputy PI in 2020
- 2019 Thermoluminescence Studies on Frozen Apollo 17 Samples: Temperature Estimates of Shaded and Illuminated Lunar Surfaces.** NASA ROSES Apollo Next Generation Sample Analysis (ANGSA)  
PI: Alexander Sehlke, Co-I: Derek Sears. \$348,050
- 2019 Fast and/or Furious? Nature and Emplacement History of Lavas Erupted on Mars.** NASA ROSES Solar System Workings (SSW)  
PI: Alexander Sehlke, Co-I: Alan Whittington. \$490,705
- 2018 IceCrystal: Portable instrument protocol to delineate ancient ice and water on Mars using microcrystallinity of volcanic products.** NASA ROSES PSTAR (Planetary Science and Technology from Analog Research).  
PI: Erika Rader, Co-I: Alexander Sehlke, Janice Bishop. \$874,012
- 2018 NASA Postdoctoral Fellowship 3rd-year extension at NASA Ames Research Center, Moffett Field, CA.** National Aeronautics and Space Administration, \$86,866.
- 2017 Orbit to Core Research Grant** for Collaboration between NASA/USGS Menlo Park, CA. Funds from NASA Ames Research Center. \$2,800
- 2016 NASA Postdoctoral Fellowship** at NASA Ames Research Center, Moffett Field, CA. National Aeronautics and Space Administration, \$149,248.
- 2012 Travel Awards** for Chapman Conference on Hawaiian volcanoes in August 2012. Funds by American Geophysical Union, Graduate Student Association of the University of Missouri – Columbia. Graduate Professional Council (GPC) at the University of Missouri – Columbia. Total \$1,527



## ABSTRACTS AND PRESENTATIONS

### Invited Talks

- 2022 Requirements for Handheld VNIR and XRF Instruments during Human Exploration Missions.** Lunar Petrology and Landed Instrument Interchange Workshop, Jet Propulsion Laboratory, Pasadena CA

- 2021 | Exploration of our Solar System: Earth-based Science Investigations in Preparation for NASA's 'Moon to Mars' Campaign. Graduate Student Seminar. Dept. of Geological Science, University of Texas at San Antonio, TX (virtual)
- 2020 | Rheological and Thermal Evolution of Magmatic Systems: Insights into the Volcanic Past of our Solar System. University of California - Santa Cruz CA
- 2019 | Rheological and Thermal Evolution of Magmatic Systems: Insights into the Volcanic Past in our Solar System. GeoMünster Conference, Münster, Germany - Keynote
- 2017 | Anatomy of the Blue Dragon: Changes in Lava Flow Morphology and Physical Properties Observed in an Open Channel Lava Flow as a Planetary Analogue. Geological Society of America Annual Meeting, Seattle WA
- 2017 | Designing Future Human Spaceflight. Sensors Expo 2017 San Jose CA - Keynote
- 2017 | Straight outta morphologies: Understanding the magmatic history of lava terrains on Earth and other rocky worlds in our Solar System. San Jose State University, CA
- 2017 | The morphological transition from pāhoehoe to 'a'ā of basaltic lavas: Combining field studies and experimental work to interpret the volcanic past on Earth and other planets and moons. USGS Menlo Park, CA

#### Recent First-Author Conference Abstracts (Past 5 Years)

- 2023 | **Sehlke, A.**, Sears, D.W.G. and the ANGSA Science Team (2023) Lunar Regolith Thermoluminescence Glow Curve Fitting to Extract Its Most Important Kinetic Parameters. 54th Lunar and Planetary Science Conference, Abstract #1870. **Oral Presentation**
- Sehlke, A.** and Whittington, A. G. (2023) New Model to Calculate Lava Viscosity During Disequilibrium Crystallization for a Wide Range in Cooling and Strain Rates. 54th Lunar and Planetary Science Conference, Abstract #2677. **Poster Presentation**
- 2022 | **Sehlke, A.** and Sears, D.W.G. (2022) Thermal Histories of Lunar Cold Traps: Prospecting for Volatiles by Thermoluminescence. Lunar Polar Volatiles Conference, Abstract #5024. **Poster Presentation**



- Sehlke, A.**, Sears, D.W.G. and the ANGSA Science Team (2022) A Fifty-Year Experiment, the Natural TL Kinetics of Apollo 17 Regolith, and Prospecting for Water and Other Volatiles on the Moon. Apollo 17 ANGSA Workshop, Abstract #2030. **Oral Presentation**
- Sehlke, A.**, Sears, D.W.G., and Heldmann J. L. (2022) THEIA – A Thermal History Exploration Instrument for Artemis. Annual Meeting of the Lunar Exploration Analysis Group, Abstract #5005. **Poster Presentation**
- Sehlke, A.**, Sears, D.W.G., and Heldmann J. L. (2022) In-Situ Thermoluminescence Measurements on the Moon Using THEIA - Thermal History Exploration Instrument for Artemis. NASA SSERV Exploration Science Forum. **Poster Presentation**
- Sehlke, A.**, Sears, D.W.G. and the ANGSA Science Team (2022) Five Decades of Thermoluminescence Studies on Lunar Samples: First Results of NASA's Unique 46-Year Experiment and Implications for Resource Prospecting on the Moon. 53rd Lunar and Planetary Science Conference, Abstract #1267. **Oral Presentation**
- Sehlke, A.** and Whittington, A. G. (2022) High-Temperature Rheology Measurements on Planetary Analog Magmas and Lavas. 53rd Lunar and Planetary Science Conference, Abstract #1171. **Poster Presentation**
- 2021** | **Sehlke, A.**, Leija J., Kobs Nawotniak, S. E. et al. (2021) Lava Surface Roughness and Morphologies: A New Remote-Sensing Method To Estimate Physical Properties of Lava Flows on Earth, the Moon and Mars. Workshop on Terrestrial Analogs for Planetary Exploration, Virtual. **Oral Presentation**
- Sehlke, A.**, Sears, D.W.G. and the ANGSA Science Team (2021) Natural Thermoluminescence of Lunar Samples: Review and Update. 52nd Lunar and Planetary Science Conference, LPI Contrib. No. 2548. Virtual Conference. **Oral Presentation**
- 2020** | **Sehlke, A.** and Sears, D.W.G. (2020) A luminescence-based Instrument to Explore the History and Nature of the Lunar Surface. American Geophysical Union 2020 Fall Meeting. Abstract #V013-0006. Virtual Conference. **Oral Presentation**
- Sehlke, A.** and Sears, D.W.G. (2020) Looking Backwards to Look Forward: A Fifty-Year Experiment in the Kinetics of Thermoluminescence of Lunar Samples and the Apollo Next Generation Sample Analysis Program (ANGSA). LPI Contrib. No. 1147. **Oral Presentation** (Conference Cancelled)



- 2019** | **Sehlke A**, Hofmeister AM, and Whittington AG (2019). **Thermal Properties of Glassy and Molten Planetary Candidate Lavas**. American Geophysical Union Annual Fall Meeting, San Francisco, CA. **Poster Presentation**
- 2018** | **Sehlke A**, Mirmalek Z, Burt D, Haberle CW, Santiago-Materese D, Kobs Nawotniak SE, Hughes SS, Bramall N, Garry WB, Brown A, Heldmann JL, Lim DSS. (2018) **Requirements for portable instrument suites during human scientific exploration of Mars**. NASA Exploration Science Forum, NASA Ames Research Center, Moffett Field CA. **Oral Presentation**



## TEACHING EXPERIENCE

### University of Missouri – Columbia, MO

- 2015** | Course Instructor – **The Moon**. Undergraduate
- 2015** | Teaching Assistant – **Regional Geology Field Course**. Undergraduate
- 2014** | Teaching Assistant/Lab Experiments – **Igneous Petrology**. Graduate
- 2013** | Teaching Assistant – **Mineralogy**. Undergraduate
- 2012** | Teaching Assistant – **Mineralogy**. Undergraduate
- 2011** | Teaching Assistant – **Mineralogy**. Undergraduate



## RESEARCH EXPERIENCE

### Since 2019 | Full-time Research Scientist

- 2019** | NASA Ames Research Center/ BAER Institute, Moffett Field CA
- ☐ ANGSA (Apollo Next Generation Sample Analysis) Consortium
  - ☐ SSSERVI RESOURCE (Resources for Exploration & Science of OUR Cosmic Environment)
  - ☐ THEIA – Thermal History Exploration Instrument for Artemis
  - ☐ NASA VIPER Mission
  - ☐ Handheld Spectrometers for Human Exploration Missions
  - ☐ Rheology of Planetary Lavas

### 2018 | Post-doctoral Researcher

- 2016** | NASA Ames Research Center, Moffett Field CA
- ☐ SSERVI FINESSE (Field Investigations to Enable Solar System Science and Exploration)
  - ☐ BASALT (Biologic Analog Science Associated with Lava Terrains)

### 2015 | Graduate Student Research Assistant

- 2011** | University of Missouri, Columbia MO

### 2010 | Undergraduate Student Research Assistant

- 2006** | Leibniz University of Hannover, Germany

### Field Work Leadership

United States: Cascade Volcanic Arc, Eastern Snake River Plains, Hawaii

Central America: Guatemala, Costa Rica

Europe: Iceland



## MENTORING EXPERIENCE

since  
2017

### NASA Internship at NASA Ames Research Center

- ☐ Summer 2023, Adriana Ariza Pardo, Graduate at UT San Antonio
- ☐ Spring 2021, Iyare Oseghae. Undergraduate at UT San Antonio
- ☐ Fall 2020, Brianna Orrill, Undergraduate at Arizona State University
- ☐ Fall 2020, Javier Leija, Undergraduate at Sam Houston University
- ☐ Summer 2018, Caleb Renner, Undergraduate at Idaho State University
- ☐ Spring 2017, David Burt, Undergraduate at Whitman College

2015  
-2012

### University of Missouri, Columbia MO

- ☐ Laboratory Supervisor for Undergraduate and Graduate Students, Visiting Researchers



## COMMUNITY SERVICE

### Peer-Review

since  
2015

### Manuscript Review (anonymous)

AGU, JVGR, Icarus – once/twice per year

since  
2016

### NASA Review Panels

FINESST student research proposals in NASA's Planetary and Earth Science Division, ~twice per year; Solar System Workings and Planetary Data Archiving, Restoration, and Tools - once per year

### Public Outreach Events

Current  
- 2022

### ExMASS (Exploration of the Moon and Asteroids by Secondary Students) Advisor

Logos Charter School, Medford OR – virtual

2019

### Silicon Valley Comic Con, San Jose, CA

Panel Discussion: The Artemis Generation: NASA's Journey Forward to the Moon.

2017

### Fremont Peak Observatory, San Juan Bautista, CA

Public lecture titled "Volcanism Across the Solar System"

2017

### NASA Total Solar Eclipse Event, Arco ID

Science demonstration related to volcanism

<b>2015</b>	<b>Rockbridge High School, Columbia MO</b>
<b>-2012</b>	Volunteering at the STEM expo. Engaging elementary school students in activities related to volcanology, including rock and mineral samples, microscopy and lava flow rheology with food analogs.