

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
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: *H₂O 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** | 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 SSERVI 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

- | | |
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| since
2017 | NASA Internship at NASA Ames Research Center <ul style="list-style-type: none">• 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 <ul style="list-style-type: none">• Laboratory Supervisor for Undergraduate and Graduate Students, Visiting Researchers |



COMMUNITY SERVICE

- | | |
|-------------------------------|---|
| <u>Peer-Review</u> | |
| since
2015 | Manuscript Review (anonymous)
AGU, JVGR, Icarus – once/twice per year |
| <u>Peer-Review</u> | |
| 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 |
| <u>Public Outreach Events</u> | |
| 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 |
| 2015
-2012 | Rockbridge High School, Columbia MO
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. |

