

Steven F. Sholes

Curriculum Vitae

Contact Information

email: sfsholes@uw.edu
phone: (315) 398-3838
website: www.sfsholes.xyz

mail: Johnson Hall Rm-070, Box 351310
Seattle, WA 98195-1310
office: Johnson Hall Rm-240

Education

University of Washington, *Seattle, WA* June 2019
Dual-title Ph.D. in Earth and Space Sciences and Astrobiology
Cornell University, *Ithaca, NY* May 2013
B.A. in Astronomy; Minor in Mathematics, *cum laude*

Publications

- Sholes, S.F.**, K.J. Zahnle, and D.C. Catling. 2019. "Time-dependent Response of the Martian Atmosphere to Volcanic Inputs: Formation of Sulfate, Nitrate, and Perchlorate Salts." (*in preparation*, to be submitted to *Icarus* in Aug. 2019).
- Sholes, S.F.**, D.R. Montgomery, E.S. Amador, R. Pretlow, and D.C. Catling. 2019. "Global investigation of hypothesized ocean shoreline sites on Mars." (*in preparation*, to be submitted to *Geophysical Research Letters* in May 2019).
- Sholes, S.F.**, D.R. Montgomery, and D.C. Catling. 2019. "Quantitative High-Resolution Re-examination of a Hypothesized Ocean Shoreline in Cydonia Mensae on Mars." *Journal of Geophysical Research: Planets* 124: 316-336. [doi:10.1029/2018JE005837](https://doi.org/10.1029/2018JE005837)
- Sholes, S.F.**, J. Krissansen-Totton, and D.C. Catling. 2019. "A Maximum Subsurface Biomass on Mars from Untapped Free Energy: CO and H₂ as Potential Antibiosignatures." *Astrobiology* 19(5) (*in press*). [doi:10.1089/ast.2018.1835](https://doi.org/10.1089/ast.2018.1835)
- Sholes, S.F.**, M.L. Smith, M.W. Claire, K.J. Zahnle, and D.C. Catling. 2017. "Anoxic atmospheres on early Mars driven by volcanism: Implications for the early environment and life." *Icarus* 290: 46-62. [doi:10.1016/j.icarus.2017.02.022](https://doi.org/10.1016/j.icarus.2017.02.022)
- Misra, A., J. Krissansen-Totton, M.C. Koehler, and **S. Sholes**. 2015. "Detecting Volcanism on Exoplanets using Transient Sulfate Aerosols." *Astrobiology* 15(6): 462-477. [doi:10.1089/ast.2014.1204](https://doi.org/10.1089/ast.2014.1204)
- Thomas, P.C., W. Calvin, P. Gierasch, R. Haberle, P.B. James, and **S. Sholes**. 2013. "Time Scales of Erosion and Deposition Recorded in the Residual South Polar Cap of Mars." *Icarus* 225(2): 923-932. [doi:10.1016/j.icarus.2012.08.038](https://doi.org/10.1016/j.icarus.2012.08.038)

Selected Conference Abstracts

- Hood, D.R., S. Karantillake, C. Fassett, and **S.F. Sholes**. "Verification of Automatically Measured Boulder Populations in HiRISE Images." *50th Lunar and Planetary Science Conference*, Abstract #1893. 21 Mar 2019. (poster) [ads:2019LPI...50.1893H](https://ads.lpl.arizona.edu/ads/2019LPI...50.1893H)
- Sholes, S.F.**, J. Krissansen-Totton, and D.C. Catling. "Biomass Limits on Subsurface Martian Life from Atmospheric Gases." *Mars Extant Life: What's Next?* Abstract #5019, Jan 2019. (**invited talk**) <https://www.hou.usra.edu/meetings/lifeonmars2019/pdf/5019.pdf>

Steven F. Sholes

Curriculum Vitae

- Hood, D.R., S. Karuantillake, C. Fassett, and **S.F. Sholes**. “Automated Boulder Detection and Measuring in HiRISE Images.” *49th Lunar and Planetary Science Conference*, Abstract #2437, 20 Mar 2018. (poster) [ads:2018LPI...49.2437H](#)
- Sholes, S.F.**, A. Mushkin, and D.C. Catling. “Boulder-size Distributions as Indicators for Depositional Process on Earth and Mars.” *Geological Society of America Annual*, Abstract #304073, 25 Oct 2017. (talk). [doi:10.1130/abs/2017AM-304073](#)
- Sholes, S.F.**, J. Krissansen-Totton, and D.C. Catling. “How Many Blue Whales on Mars? Obtaining a Maximum Extant Biomass Using CO Antibiosignatures.” *Astrobiology Science Conference 2017*, Abstract #3189, 27 Apr 2017. (talk). <http://www.hou.usra.edu/meetings/abscicon2017/pdf/3189.pdf>
- Sholes, S.F.**, D.C. Catling, and D.R. Montgomery. “Quantified Identification of Paleo-Terraces Along a Proposed Martian Ocean Contact.” *48th Lunar and Planetary Science Conference*, Abstract #1764, 23 Mar 2017. (talk). [ads:2017LPI...48.1764S](#)
- Sholes, S.F.**, M.L. Smith, M.W. Claire, K.J. Zahnle, and D.C. Catling. “An Anoxic Atmosphere on Early, Volcanically Active Mars and its Implications for Life.” *Astrobiology Science Conference 2015*, Abstract #7455, 15 Jun 2015. (talk). www.hou.usra.edu/meetings/abscicon2015/pdf/7455.pdf
- Sholes, S.F.**, D.C. Catling, R. Pretlow, and D.R. Montgomery. “High-Resolution Examination of the Geomorphology of Proposed Ocean Shorelines on Mars.” *8th International Conference on Mars*, Abstract #1014, 14 Jul 2014. (poster). [ads:2014LPICo1791.1014S](#)
- Sholes, S.F.**, V.F. Chevrier, and J.A. Tullis. “Object Based Image Analysis for Remote Sensing of Planetary Surfaces.” *44th Lunar and Planetary Science Conference*, Abstract #1527, 17 Mar 2013. (poster). [ads:2013LPI...44.1527S](#)

Teaching and Professional Experience

Teaching Assistant, University of Washington, <i>Seattle, WA</i>	
ESS 454 – Hydrogeology, <i>Michael Brown</i>	Spr. 2019
ESS 310 – Earth Science Mathematics, <i>Gerard Roe</i>	Spr. 2019
ESS 213 - Evolution of the Earth, <i>Roger Buick</i>	Spr. 2016, Spr. 2018
ESS 101 - Geology & Society, <i>Terry Swanson</i>	Spr. 2015, Win. 2018
ESS 106 - Living with Volcanoes, <i>Mike Harrell</i>	Aut. 2017
ESS 102 – Space and Space Travel, <i>Erika Harnett</i>	Spr. 2017
ESS 421 – Intro. to Geological Remote Sensing, <i>Steven Walters</i>	Win. 2017
ASTBIO 115 – Intro. to Astrobiology, <i>Roger Buick</i>	Aut. 2016
ESS 455 – Stratigraphy, <i>Ethan Hyland, Charlotte Schrieber</i>	Win. 2016
Graduate Research Assistant, University of Washington, <i>Seattle, WA</i>	2013 - Present
PI: David Catling	
REU Intern, University of Arkansas, <i>Fayetteville, AR</i>	2012
PI: Vincent Chevrier and Jason Tullis	
Undergraduate Research Assistant, Cornell University, <i>Ithaca, NY</i>	2011 – 2012
PI: Peter Thomas	
Collections Assistant, Paleontological Research Institute, <i>Ithaca, NY</i>	2010 - 2012
PI: Judith Nagel-Myers and Greg Dietl	
K-12 Substitute Teacher & Tutor, Hannibal CSD, <i>Hannibal, NY</i>	2009 - 2011

Steven F. Sholes

Curriculum Vitae

Workshops Attended

Science Communication Fellowship, *Pacific Science Center, Seattle, WA* Autumn 2015
Nordic Astrobiology Summer School, *Reykjavik, Iceland*
Water, Ice, and the Origin of Life in the Universe Summer 2015
University of Washington Astrobiology Workshops
Pacific Ocean Research Cruise (Oceanography/Microbiology) Autumn 2014
Yellowstone National Park (Geology/Microbiology) Autumn 2015
NASA's Jet Propulsion Laboratory (Astronomy/Planetary Science) Spring 2018

Selected Honors

2018 – Mars Student Travel Grant, Mars Extant Life: What's Next? (\$1,300)
2018 – George Edward Goodspeed Geology Fellowship and the Peter Misch Fellowship
(1 qrt. RA support)
2017 - Robert G. and Nadine E. Bassett Endowed Fund in ESS, Howard and Leila Coombs
Endowed Fellowship in Geological Sciences, and Marie Ferrel Endowment Fund
(1 qrt. RA support)
2017 – “Why do We Care? Award” ESS Research Gala Presentation (\$150)
2017 – UW College of the Environment Student Travel Grant (\$500)
2016 – Goodspeed Geology Fellowship and the Kenneth C. Robbins Fellowship
(1 qrt. RA support)
2015 – Best Space/Planetary Oral Presentation, ESS Research Gala (\$150)
2015 – Robert M. and Jennifer J. Winglee Graduate Student Support Fund
(Co-I, awarded to Matthew Koehler, \$800)
2014 – Mars Student Travel Grant, 8th International Conference on Mars (\$1,000)

Professional Service

2017 - 2018: Geological Science of America Member
2017 : UW ESS GSA Alumni Gala Volunteer
2017 : ESS Planetary Sciences Research Assistant Professor Hiring Committee Member
2016 – 2017 : Science Advisor, UW's University Rover Challenge
2015 – 2018 : Science Communications Fellow, Pacific Science Center
2014 – Present : Head of the Prelim Examination Feedback Committee, UW ESS Department
2015 : Integration Team Member, Human Exploration on Mars, 8th Intern. Conf. on Mars

Invited Class Lectures

“*Volcanism on Mars,*” ESS 106: Living with Volcanoes Dec. 2017
“*Water on Mars,*” ESS 495: NASA Research Seminar May. 2017
“*Planetary Stratigraphy,*” ESS 455: Stratigraphy May. 2016

Field Trips Led/Co-Led

Eastern Washington (Evolution of the Cascades), *ESS 213* May 2016, '18
Kitsap Peninsula (Turbidites and Stratigraphy), *ESS 213* Apr. 2016, '18
Eastern Washington (Columbia Plateau), *ESS 101* Mar. 2018
Eastern Washington (Frenchman Coulee), *CWU Mars Week* Aug. 2016
Mt. St. Helens (Blast Zone), *ESS 101* May 2015
Eastern Washington (Missoula Floods), *Field Work/ESS 590* Apr. 2015

Steven F. Sholes

Curriculum Vitae

Education and Public Outreach (EPO)

Pacific Science Center Fellow

“Oceans on Mars,” Meet a Scientist, Seattle, WA	May 2017
“Challenges in Astrobiology,” Teen Science Café, Redmond, WA	Dec. 2016
“Oceans on Mars,” Meet a Scientist, Seattle, WA	Dec. 2016
“Oceans on Mars,” Meet a Scientist – AstronoMay, Seattle, WA	May 2016
Mars/Temperature Exhibit, Polar Science Weekend, Seattle, WA	Mar. 2014

ESS Rocking Out

Mars Rovers/Identifying Powders, Cougar Ridge ES, Bellevue, WA	May 2017
Design a Mission to Mars, Homeschool Group, Seattle, WA	Dec. 2016
Design a Mission to Mars, Aki Kurose MS, Seattle, WA	Jun. 2016
Design a Mission to Mars, Emerson ES, Seattle, WA	Mar. 2016
Mars Rovers/Identifying Powders, Cougar Ridge ES, Bellevue, WA	Mar. 2015
Dinosaurs Week, ESS 100 / Burke Museum, Seattle, WA	Mar. 2015
Identifying Rocks, Open Window School, Bellevue, WA	Oct. 2014
What is a Rock, Crystal Springs ES, Bothell, WA	Apr. 2014
Mars/Temperature Exhibit, ESS Family Fun Day, Seattle, WA	Apr. 2014
Rocks and Minerals, Key Peninsula MS, Lakebay, WA	Jan. 2014

UW Astrobiology EPO

“Hunting for Oceans on Mars,” Lakewood HS, Seattle, WA	May 2018
“Oceans on Mars,” Lakewood HS, Seattle, WA	May 2016
Intro. To Astrobiology, The Harbor School, Vashon, WA	Dec. 2015
“What is Life?” Lister ES, Tacoma, WA	Nov. 2014
Intro. To Astrobiology, The Harbor School, Vashon, WA	Oct. 2014

Hometown Outreach

Astronomy & Paleontology Q&A, M.W. Cuyler ES, Red Creek, NY	Jun. 2013
Astronomy Q&A, M.W. Cuyler ES, Red Creek, NY	2009, '10, '11
Inventive Minds Judge, M.W. Cuyler ES, Red Creek, NY	Mar. 2011
Reach for the Stars Afterschool Program, Hannibal ES, Hannibal, NY	2008, '09
Div. B Science Olympiad Regional Judge, Syracuse, NY	2008, '09

The Sholesonian (www.sholesonian.com)

Science Collections, Family Fun Day, Museum of the Earth, Ithaca, NY	Sep. 2011
5th Annual Summer Symposium, PRI, Ithaca, NY	Aug. 2011

Other EPO

Carl Sagan’s <i>Cosmos</i> Mars Update, Astronomy on Tap, Seattle, WA	Nov. 2016
Mars Week + Fieldtrip, Central Washington University, Ellensburg, WA	Jul. 2016

Undergraduate Research Mentees

William (Bill) Keller , <i>Earth and Space Sciences</i>	Spr. 2017
Caitlin Schaefer , <i>Electrical Engineering and Information Sciences</i>	Spr., Aut. 2017
Emily Johnson , <i>Earth and Space Sciences</i>	Spr. 2017 - Present
Elizabeth McKinnie , <i>Computer Science and Applied and Computational Mathematical Sciences</i> <i>NASA Washington Space Grant Summer Intern</i>	Sum. 2017
Arielle Michelman , <i>High School Student</i>	Sum. 2017 - Win. 2018
Ken Aragon , <i>Aeronautics and Astronautics</i>	Aut. 2017 – Sum. 2018

Steven F. Sholes

Curriculum Vitae

Selected Press Articles

[A New Way to Analyze Evidence of Martian Oceans.](#) *AGU Eos* (2019).

[Martian Life Must be Rare as Free Energy Source Remains Untapped.](#) *NewScientist* (2017).

[Volcanic Activity on Ancient Mars May Have Produced Organic Life.](#) *Seeker* (2017).

[The Red Planet's Blue Past.](#) *The Daily* (2016).

[Volcanoes Light Up Atmospheres of Small Exoplanets.](#) *Astrobiology Magazine* (2016).

[Atmospheric Signs of Volcanic Activity Could Aid Search for Life.](#) *UW News* (2015).