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## BIOGRAPHICAL STATEMENT

Steve Ruff earned a B.S. in Geology from the University of Wisconsin, Madison in 1985. Following four years of professional employment as an exploration geologist, he went on to earn a Ph.D. in Geology from Arizona State University in 1998 with an emphasis on thermal infrared emission spectroscopy of geologic materials. This work involved pioneering the instrumentation and techniques to acquire quantitative spectral data that serve as the basis for analysis of spectral data from Mars. As a graduate student and post-doctoral researcher with Professor Phil Christensen from 1991 to 1999, he was involved in the operations and analysis of data from the Thermal Emission Spectrometer on the Mars Global Surveyor mission. This work continued with a Faculty Research Associate appointment at ASU in 2000 and involvement in the Thermal Emission Imaging System on the 2001 Mars Odyssey mission. Beginning in 2004, he spent nearly seven years as the operations lead for the Miniature Thermal Emission Spectrometer on the Mars Exploration Rover *Spirit* and another eight years on the *Opportunity* rover mission. During this time and in the years since, he has continued to pursue laboratory spectroscopy and techniques to support the analysis of spectral data from Mars. In 2013 he was promoted to Associate Research Professor in ASU's School of Earth and Space Exploration. Based on fieldwork initiated in 2014, he recognized evidence of potential biosignatures on Mars discovered with the Spirit rover, which led to research oriented toward astrobiology that continues to the present.

Dr. Ruff has been the lead PI on seven NASA-funded grants since 2006 oriented toward Mars exploration, including laboratory and field studies. He is an active contributor to the efforts of the Mars exploration community as a reviewer of more than 100 scientific manuscripts, through his participation in over 25 NASA review panels, involvement in all NASA Mars rover landing site workshops, and active role in committees appointed by NASA and the Mars Exploration Program Analysis Group to study the scientific benefits and requirements of a Mars sample return mission (ND-SAG, E2E-ISAG, JSWG, 2020 Mars Rover Science Definition Team). In 2021 he was inspired to share with the public this wealth of Mars exploration expertise and experience through the creation of a YouTube channel called Mars Guy, which now has 34K subscribers and over 7M views.

## PUBLICATIONS


Nersezova, E. E., M. C. Rowe, K. A. Campbell, A. Ang, S. Matthews, S. W. Ruff, A. Meghwal, L. Adam, N. Galligan, and T. Loho (2023), Exploring the internal textures and physical properties of digitate sinter in hot springs: Implications for remote sampling on Mars, Planetary and Space Science, 238, 105786, doi:10.1016/j.pss.2023.105786.

Rogers, A. D., S. W. Ruff, and M. D. Smith (2023), Thermal infrared spectral characteristics of martian dust deposits and evidence for atmosphere-regolith interactions, Icarus, 404, 115687, doi:10.1016/j.icarus.2023.115687.

Ruff, S. W. (2022), Martian Dust, in Oxford Research Encyclopedia, edited, Oxford University Press.

Ruff, S. W., V. E. Hamilton, A. D. Rogers, C. S. Edwards, and B. H. N. Horgan (2022), Olivine and carbonate-rich bedrock in Gusev crater and the Nili Fossae region of Mars may be altered ignimbrite deposits, Icarus, 380, 114974, doi.org/10.1016/j.icarus.2022.114974.

Ruff, S. W., and V. E. Hamilton (2021), A Novel Atmospheric Removal Technique for TES Spectra Applied to Olivine and Carbonate-Rich Bedrock in the Nili Fossae Region, Mars, Journal of Geophysical Research: Planets, 126(8), e2021JE006822, doi:10.1029/2021JE006822.

Ruff, S. W., K. A. Campbell, M. J. Van Kranendonk, M. S. Rice, and J. D. Farmer (2020), The Case for Ancient Hot Springs in Gusev Crater, Mars, Astrobiology, 20(4), 475-499, doi:10.1089/ast.2019.2044.

Sriaporn, C., K. A. Campbell, M. Millan, S. W. Ruff, M. J. Van Kranendonk, and K. M. Handley (2020), Stromatolitic digitate sinters form under wide-ranging physicochemical conditions with diverse hot spring microbial communities, Geobiology, 18(5), 619-640, doi:10.1111/gbi.12395.

Teece, B. L., S. C. George, T. Djokic, K. A. Campbell, S. W. Ruff, and M. J. Van Kranendonk (2020), Biomolecules from Fossilized Hot Spring Sinters: Implications for the Search for Life on Mars, Astrobiology, doi:10.1089/ast.2018.2018.

Ruff, S. W., J. L. Bandfield, P. R. Christensen, T. D. Glotch, V. E. Hamilton, and A. D. Rogers (2019), Thermal Infrared Remote Sensing of Mars from Rovers Using the Miniature Thermal Emission Spectrometer, in Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces, edited by J. F. Bell Iii, J. L. Bishop and J. E. Moersch, pp. 499-512, Cambridge University Press, Cambridge.

Hamilton, V. E., P. R. Christensen, J. L. Bandfield, A. D. Rogers, C. S. Edwards, and S. W. Ruff (2019), Thermal Infrared Spectral Analyses of Mars from Orbit Using the Thermal Emission Spectrometer and Thermal Emission Imaging System, in Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces, edited by J. F. Bell Iii, J. L. Bishop and J. E. Moersch, pp. 484-498, Cambridge University Press, Cambridge.

Ruff, S. W., and V. E. Hamilton (2017), Wishstone to Watchtower: Amorphous alteration of plagioclase-rich rocks in Gusev crater, Mars, American Mineralogist, 102, 235-251, doi:10.2138/am-2017-5618.

Rivera-Hernandez, F., J. L. Bandfield, S. W. Ruff, and M. J. Wolff (2015), Characterizing the thermal infrared spectral effects of optically thin surface dust: Implications for remote-sensing and in situ measurements of the martian surface, Icarus, 262, 173-186, doi:10.1016/j.icarus.2015.07.001.

Arvidson, R. E., S. W. Squyres, J. F. Bell III, J. G. Catalano, B. C. Clark, L. S. Crumpler, P. A. de Souza, Jr., A. G. Fairen, W. H. Farrand, V. K. Fox, et al. (2014), Ancient aqueous environments at Endeavour crater, Mars, Science, 343.

Ruff, S. W., P. B. Niles, F. Alfano, and A. B. Clarke (2014), Evidence for a Noachian-aged ephemeral lake in Gusev crater, Mars, Geology, 42(4), 359-362, doi:10.1130/G35508.1.

Ruff, S. W., A. A. Pankine, and G. Barta (2014), Aeolian Dust Deposits, in Encyclopedia of Planetary Landforms, edited by A. Kereszturi and H. Hargitai, Springer Science, New York.

Ehlmann, B. L., G. Berger, N. Mangold, J. R. Michalski, D. C. Catling, S. W. Ruff, E. Chassefiere, P. B. Niles, V. Chevrier, and F. Poulet (2013), Geochemical consequences

of widespread clay mineral formation in Mars' ancient crust, Space Science Reviews, 174(1-4), 329-364, doi:10.1007/s11214-012-9930-0.

Grott, M., D. Baratoux, E. Hauber, B. Sautter, J. Mustard, O. Gasnault, S. W. Ruff, S.-I. Karato, V. Debaille, M. Knapmeyer, et al. (2013), Long-term evolution of the Martian crust-mantle-system, Space Science Reviews, 174(1-4), 49-111, doi:10.1007/s11214-012-9948-3.

Huang, J., C. O. Edwards, S. W. Ruff, and P. R. Christensen (2013), A new method for the semiquantitative determination of major rock-forming minerals with thermal infrared multispectral data: Application to THEMIS infrared data, Journal of Geophysical Research, 118, 2146-2152, doi:10.1002/jgre.20160.

Mustard, J. F., M. Adler, A. Allwood, D. S. Bass, D. W. Beaty, J. F. Bell III, W. B. Brinckerhoff, M. Carr, D. J. Des Marais, B. Drake, et al. (2013), Report of the Mars 2020 Science Definition TeamRep., 154 pp, Mars Exploration Program Analysis Group (MEPAG), http://mepag.jpl.nasa.gov/reports/MEP/Mars_2020_SDT_Report_Final.pdf.

Niles, P. B., D. C. Catling, G. Berger, E. Chassefiere, B. L. Ehlmann, J. R. Michalski, R. V. Morris, S. W. Ruff, and B. Sutter (2013), Geochemistry of carbonates on Mars: Implications for climate history and nature of aqueous environments, Space Science Reviews, 174(1-4), 301-328, doi:10.1007/s11214-012-9940-y.

Ehlmann, B. L., D. L. Bish, S. W. Ruff, and J. F. Mustard (2012), Mineralogy and chemistry of altered Icelandic basalts: Application to clay mineral detection and understanding aqueous environments on Mars, Journal of Geophysical Research, doi:10.1029/2012JE004156.

Hamilton, V. E., and S. W. Ruff (2012), Distribution and characteristics of Adirondack-class basalt as observed by Mini-TES in Gusev crater, Mars and its possible volcanic source, Icarus, 218(2), 917-949, doi:10.1016/j.icarus.2012.01.011.

Squyres, S. W., R. E. Arvidson, J. F. Bell III, F. Calef III, B. C. Clark, B. A. Cohen, L. S. Crumpler, P. A. de Souza, Jr., W. H. Farrand, R. Gellert, et al. (2012), Ancient impact and aqueous processes at Endeavour Crater, Mars, Science, 336, 570-576, doi:10.1126/science.1220476.

Crumpler, L. S., R. E. Arvidson, S. W. Squyres, T. McCoy, A. Yingst, S. Ruff, W. Farrand, H. Y. McSween Jr., M. Powell, D. W. Ming, et al. (2011), Field reconnaissance geologic mapping of the Columbia Hills, Mars, based on Mars Exploration Rover Spirit and MRO HiRISE observations, Journal of Geophysical Research, 116(E00F24), doi:10.1029/2010JE003749.

Ruff, S. W., J. D. Farmer, W. M. Calvin, K. E. Herkenhoff, J. R. Johnson, R. V. Morris, M. S. Rice, R. E. Arvidson, J. F. Bell, III, P. R. Christensen, et al. (2011), Characteristics, distribution, origin, and significance of opaline silica observed by the Spirit rover in Gusev crater, Mars, Journal of Geophysical Research, 116(E00F23), doi:10.1029/2010JE003767.

Arvidson, R. E., J. F. Bell, III, P. Bellutta, N. A. Cabrol, J. G. Catalano, J. Cohen, L. S. Crumpler, D. J. Des Marais, T. Estlin, W. Farrand, et al. (2010), Spirit Mars Rover mission: Overview and selected results from the northern Home Plate winter haven to the side of Scamander crater, Journal of Geophysical Research, 115(E00F03), doi:10.1029/2010JE003633.

Morris, R. V., S. W. Ruff, R. Gellert, D. W. Ming, R. E. Arvidson, B. C. Clark, D. C. Golden, K. Siebach, G. Klingelhöfer, C. Schröder, et al. (2010), Identification of carbonate-rich

outcrops on Mars by the Spirit rover, Science, 329(5990), 421-424, doi:10.1126/science.1189667.

Rice, M. S., J. F. Bell, III, E. A. Cloutis, A. Wang, S. W. Ruff, M. A. Craig, D. T. Baily, J. R. Johnson, P. A. de Souza, Jr., and W. H. Farrand (2010), Silica-rich deposits and hydrated minerals at Gusev Crater, Mars: Vis-NIR spectral characterization and regional mapping, Icarus, 205(doi:10.1016/j.icarus.2009.03.035), 375-395.

Schmidt, M. E., W. H. Farrand, J. R. Johnson, C. Schroder, J. A. Hurowitz, T. J. McCoy, S. W. Ruff, R. E. Arvidson, D. J. Des Marais, K. W. Lewis, et al. (2009), Spectral, mineralogical, and geochemical variations across Home Plate, Gusev Crater, Mars indicate high and low temperature alteration, Earth Planet. Sci. Lett., 281, 258-266.

Arvidson, R. E., S. W. Ruff, R. V. Morris, D. W. Ming, L. S. Crumpler, A. S. Yen, S. W. Squyres, R. J. Sullivan, J. F. Bell, III, N. A. Cabrol, et al. (2008), Spirit Mars Rover mission to the Columbia Hills, Gusev Crater: Mission overview and selected results from the Cumberland Ridge to Home Plate, Journal of Geophysical Research, 113(E12S33), doi:10.1029/2008JE003183.

McSween, H. Y., S. W. Ruff, R. V. Morris, R. Gellert, G. Klingelhofer, P. R. Christensen, T. J. McCoy, A. Ghosh, J. E. Moersch, B. A. Cohen, et al. (2008), Mineralogy of volcanic rocks in Gusev Crater, Mars: Reconciling Mössbauer, Alpha Particle X-Ray Spectrometer, and Miniature Thermal Emission Spectrometer spectra, Journal of Geophysical Research, 113(E06S04), doi:10.1029/2007JE002970.

Ruff, S. W., P. R. Christensen, T. D. Glotch, D. L. Blaney, J. E. Moersch, and M. B. Wyatt (2008), The mineralogy of Gusev crater and Meridiani Planum derived from the Miniature Thermal Emission Spectrometers on the Spirit and Opportunity rovers, in The Martian Surface: Composition, Mineralogy, and Physical Properties, edited by J. Bell, pp. 315-338, Cambridge University Press, Cambridge.

Schmidt, M. E., S. W. Ruff, T. J. McCoy, W. H. Farrand, J. R. Johnson, R. Gellert, D. W. Ming, R. V. Morris, N. A. Cabrol, K. W. Lewis, et al. (2008), Hydrothermal origin of halogens at Home Plate, Gusev Crater, Journal of Geophysical Research, 113( E06S12), doi:10.1029/2007JE003027.

Schröder, C., D. S. Rodionov, T. J. McCoy, B. L. Jolliff, R. Gellert, L. R. Nittler, W. H. Farrand, J. R. Johnson, S. W. Ruff, J. W. Ashley, et al. (2008), Meteorites on Mars observed by the Mars Exploration Rovers, Journal of Geophysical Research, doi:10.1029/2007JE002990.

Squyres, S. W., R. E. Arvidson, S. W. Ruff, R. Gellert, R. V. Morris, D. W. Ming, L. S. Crumpler, J. D. Farmer, D. J. Des Marais, A. S. Yen, et al. (2008), Detection of Silica-Rich Deposits on Mars, Science, 320, 1063-1067, doi:10.1126/science.1155429.

Wang, A., J. F. Bell, III, R. Li, J. R. Johnson, W. H. Farrand, E. A. Cloutis, R. E. Arvidson, L. S. Crumpler, S. W. Squyres, S. M. McLennan, et al. (2008), Light-toned salty soils and co-existing Si-rich species discovered by the Mars Exploration Rover Spirit in Columbia Hills, Journal of Geophysical Research, 113(E12S40), doi:10.1029/2008JE003126.

Clark, B. C., R. E. Arvidson, R. Gellert, R. V. Morris, D. W. Ming, L. Richter, S. W. Ruff, J. R. Michalski, W. H. Farrand, A. S. Yen, et al. (2007), Evidence for montmorillonite or its compositional equivalent in Columbia Hills, Mars, Journal of Geophysical Research, 112(E06S01), doi:10.1029/2006JE002756.

Ruff, S. W., and P. R. Christensen (2007), Basaltic andesite, altered basalt, and a TES-based search for smectite clay minerals on Mars, Geophysical Research Letters, 34(L10204), doi:10.1029/2007GL029602.

Squyres, S. W., O. Aharonson, B. C. Clark, B. A. Cohen, L. S. Crumpler, P. A. de Souza, Jr., W. H. Farrand, R. Gellert, J. A. Grant, J. P. Grotzinger, et al. (2007), Pyroclastic activity at Home Plate in Gusev Crater, Mars, Science, 316, 738-742, doi:10.1126/science.1139045.

Grant, J. A., S. A. Wilson, S. W. Ruff, M. P. Golombek, and D. L. Koestler (2006), Distribution of rocks on the Gusev plains and on Husband Hill, Mars, Geophysical Research Letters, 33(L16202), doi:10.1029/2006GL026964.

McSween, H. Y., Jr., S. W. Ruff, R. V. Morris, J. F. Bell, III, K. E. Herkenhoff, R. Gellert, K. R. Stockstill, L. L. Tornabene, P. R. Christensen, S. W. Squyres, et al. (2006), Alkaline volcanic rocks from the Columbia Hills, Gusev crater, Mars, Journal of Geophysical Research, 111(E09S91), doi:10.1029/2006JE002698.

McSween, H. Y., Jr., M. B. Wyatt, R. Gellert, J. F. Bell, III, R. V. Morris, K. E. Herkenhoff, L. S. Crumpler, K. A. Milam, K. R. Stockstill, L. L. Tornabene, et al. (2006), Characterization and petrologic interpretation of olivine-rich basalts at Gusev Crater, Mars, Journal of Geophysical Research, 111(E02S10), doi:10.1029/2005JE002477.

Ming, D. W., D. W. Mittlefehldt, R. V. Morris, D. C. Golden, R. Gellert, A. S. Yen, B. C. Clark, S. W. Squyres, W. H. Farrand, S. W. Ruff, et al. (2006), Geochemical and mineralogical indicators for aqueous processes in the Columbia Hills of Gusev crater, Mars, Journal of Geophysical Research, 111(E02S12), doi:10.1029/2005JE002560.

Ruff, S. W., P. R. Christensen, D. L. Blaney, W. H. Farrand, J. R. Johnson, J. R. Michalski, J. E. Moersch, S. P. Wright, and S. W. Squyres (2006), The rocks of Gusev Crater as viewed by the Mini-TES instrument, Journal of Geophysical Research, 111(E12S18), doi:10.1029/2006JE002747.

Squyres, S. W., R. E. Arvidson, D. L. Blaney, B. C. Clark, L. S. Crumpler, W. H. Farrand, S. Gorevan, K. E. Herkenhoff, J. Hurowitz, A. Kusack, et al. (2006), Rocks of the Columbia Hills, Journal of Geophysical Research, 111(E02S11), doi:10.1029/2005JE002562.

Christensen, P. R., H. Y. McSween Jr., J. L. Bandfield, S. W. Ruff, A. D. Rogers, V. E. Hamilton, N. Gorelick, M. B. Wyatt, B. M. Jakosky, H. H. Kieffer, et al. (2005), Evidence for magmatic evolution and diversity on Mars from infrared observations, Nature, 436(7050), 504-509.

Christensen, P. R., S. W. Ruff, R. L. Fergason, N. Gorelick, B. M. Jakosky, M. D. Lane, A. A. McEwen, H. Y. McSween Jr., G. L. Mehall, K. A. Milam, et al. (2005), Mars Exploration Rover candidate landing sites as viewed by THEMIS, Icarus, 176, 12-43.

Haskin, L. A., A. Wang, B. L. Jolliff, H. Y. McSween Jr., B. C. Clark, D. J. Des Marais, S. M. McLennan, N. J. Tosca, J. A. Hurowitz, J. D. Farmer, et al. (2005), Water alteration of rocks and soils on Mars at the Spirit rover site in Gusev crater, Nature, 436, 66-69.

McLennan, S. M., J. F. Bell, III, W. M. Calvin, P. R. Christensen, B. C. Clark, P. A. de Souza, Jr., J. D. Farmer, W. H. Farrand, D. A. Fike, R. Gellert, et al. (2005), Provenance and diagenesis of the evaporate-bearing Burns formation, Meridiani Planum, Mars, Earth Planet. Sci. Lett., 240, 95-121.

Christensen, P. R., and S. W. Ruff (2004), Formation of the hematite-bearing unit in Meridiani Planum: Evidence for deposition in standing water, Journal of Geophysical Research, 109(E08003), doi: 10.10292003JE10002233.

Christensen, P. R., S. W. Ruff, R. L. Fergason, A. T. Knudson, S. Anwar, R. E. Arvidson, J. L. Bandfield, D. L. Blaney, C. Budney, W. Calvin, et al. (2004), Initial Results from the Mini-TES Experiment in Gusev Crater from the Spirit Rover, Science, 305, 837-842.

Christensen, P. R., M. B. Wyatt, T. D. Glotch, A. D. Rogers, S. Anwar, R. E. Arvidson, J. L. Bandfield, D. L. Blaney, C. Budney, W. M. Calvin, et al. (2004), Mineralogy at Meridiani Planum from the Mini-TES experiment on the Opportunity Rover, Science, 306(5702), 1733-1739.

Grant, J. A., R. E. Arvidson, J. F. Bell, III, N. A. Cabrol, M. H. Carr, P. R. Christensen, L. S. Crumpler, D. J. Des Marais, B. L. Ehlmann, J. D. Farmer, et al. (2004), Surficial deposits at Gusev crater along Spirit rover traverses, Science, 305(807-810).

Greeley, R., S. W. Squyres, R. E. Arvidson, P. Bartlett, J. F. Bell, D. Blaney, N. A. Cabrol, J. Farmer, B. Farrand, M. P. Golombek, et al. (2004), Wind-Related Processes Detected by the Spirit Rover at Gusev Crater, Mars, Science, 305(5685), 810-813, doi:doi:10.1126/science.1100108.

McSween, H. Y., Jr., R. E. Arvidson, J. F. Bell, III, D. Blaney, N. A. Cabrol, P. R. Christensen, B. C. Clark, J. A. Crisp, L. S. Crumpler, D. J. Des Marais, et al. (2004), Basaltic rocks analyzed by the Spirit Rover in Gusev Crater, Science, 305, 842-845.

Ruff, S. W. (2004), Spectral evidence for zeolite in the dust on Mars, Icarus, 168(131-143).

Christensen, P. R., J. L. Bandfield, J. F. Bell, III, N. Gorelick, V. E. Hamilton, A. Ivanov, B. M. Jakosky, H. H. Kieffer, M. D. Lane, M. C. Malin, et al. (2003), Morphology and composition of the surface of Mars: Mars Odyssey THEMIS results, Science, 300, 2056-2061.

Ruff, S. W., and P. R. Christensen (2002), Bright and dark regions on Mars: Particle size and mineralogical characteristics based on Thermal Emission Spectrometer data, J. Geophys. Res., 107(E12), 5127, doi:5110.1029/2001JE001580.

Christensen, P. R., J. L. Bandfield, V. E. Hamilton, S. W. Ruff, H. H. Kieffer, T. N. Titus, M. C. Malin, R. V. Morris, M. D. Lane, R. L. Clark, et al. (2001), Mars Global Surveyor Thermal Emission Spectrometer experiment: Investigation description and surface science results, J. Geophys. Res., 106, 23,823-823,871.

Johnson, J. R., S. W. Ruff, J. Moersch, T. Roush, K. Horton, J. Bishop, N. A. Cabrol, C. Cockell, P. Gazis, H. E. Newsom, et al. (2001), Geological characterization of remote field sites using visible and infrared spectroscopy: Results from the 1999 Marsokhod field test, Journal of Geophysical Research, 106, 7683-7711.

Ruff, S. W., P. R. Christensen, R. N. Clark, H. H. Kieffer, M. C. Malin, J. L. Bandfield, B. M. Jakosky, M. D. Lane, M. T. Mellon, and M. A. Presley (2001), Mars' "White Rock" lacks evidence of an aqueous origin: Results from Mars Global Surveyor, J. Geophys. Res., 106, 23,921-923,927.

Christensen, P. R., J. L. Bandfield, R. N. Clark, K. S. Edgett, V. E. Hamilton, T. Hoefen, H. H. Kieffer, R. O. Kuzmin, M. D. Lane, M. C. Malin, et al. (2000), Detection of crystalline hematite mineralization on Mars by the Thermal Emission Spectrometer: Evidence for near-surface water, Journal of Geophysical Research, 105(E4), 9623-9642.

Christensen, P. R., J. L. Bandfield, V. E. Hamilton, D. A. Howard, M. D. Lane, J. L. Piatek, S. W. Ruff, and W. L. Stefanov (2000), A thermal emission spectral library of rock forming minerals, J. Geophys. Res., 105, 9735-9739.

Ruff, S. W., P. R. Christensen, P. W. Barbera, and D. L. Anderson (1997), Quantitative thermal emission spectroscopy of minerals: A laboratory technique for measurement and

calibration, Journal of Geophysical Research-Solid Earth, 102(B7), 14899-14913, doi:10.1029/97jb00593.

**ABSTRACTS (first author only)**

Ruff, S. W., B. D. Brand, and A. D. Rogers (2023), Investigating Hydrothermal Carbonate in Terrestrial Ignimbrite Deposits for Application to Mars, AGU 2023 Fall Meeting, San Francisco, abstract ID P53C-2776.

Ruff, S. W., B. D. Brand, and A. D. Rogers (2023), Overlooked Evidence for Ignimbrite Deposits in Gusev and Jezero Craters, Mars, Lunar Planet. Sci. Conf., 54, abstract #1765.

Ruff, S. W., V. E. Hamilton, A. D. Rogers, C. S. Edwards, and B. H. N. Horgan (2022), Olivine and carbonate-rich bedrock in Gusev crater and the Nili Fossae Region of Mars may be altered ignimbrite deposits, Lunar Planet. Sci. Conf., 53, abstract #1578.

Ruff, S. W., and V. E. Hamilton (2021), A novel atmospheric removal technique for TES spectra applied to rocks in the Nili Fossae region, Mars, in Geological Society of America Abstracts with Programs, edited.

Ruff, S. W. (2020), Linking Hydrated Silica to Habitability and Preservation Potential on Mars: Lessons Learned, Lunar Planet. Sci. Conf., 51, abstract #2929.

Ruff, S. (2019), Looking back at the first hyperspectral instruments on the surface of another planet and forward to the next ones, Geological Society of America Abstracts with Programs, 51(5, ISSN 0016-7592), doi:10.1130/abs/2019AM-338132.

Ruff, S. W. (2019), Clues to the habitability of Mars in its first billion years from an Earth-like hydrothermal system in Gusev crater, The First Billion Years: Habitability 2019 (LPI Contrib. No. 2134), Abstract #1036.

Ruff, S. W. (2019), Are Olivine/carbonate-rich Rocks on Mars Indicators of Once Habitable Conditions?, AGU 2019 Fall Meeting, San Francisco, abstract ID 608439.

Ruff, S. W., J. L. Bandfield, P. R. Christensen, T. D. Glotch, V. E. Hamilton, and A. D. Rogers (2019), Thermal Infrared Remote Sensing of Mars from Rovers Using the Miniature Thermal Emission Spectrometer, in Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces, edited by J. F. Bell Iii, J. L. Bishop and J. E. Moersch, pp. 499-512, Cambridge University Press, Cambridge.

Ruff, S. W., K. A. Campbell, M. J. Van Kranendonk, M. S. Rice, and J. D. Farmer (2019), Recognizing hot spring silica sinter on Mars via terrestrial analog studies, Astrobiology Science Conference, Bellevue, WA, 24-28 June, Abstract 305-8.

Ruff, S. W., V. E. Hamilton, A. D. Rogers, C. S. Edwards, and B. Horgan (2019), Olivine-rich, carbonate-bearing ash deposits link Jezero And Gusev craters, Lunar and Planetary Science Conference, 50(abstract #2775).

Ruff, S. W., V. E. Hamilton, A. D. Rogers, C. S. Edwards, B. Horgan, and P. B. Niles (2019), On the trail of Martian carbonates, Ninth International Conference on Mars, LPI Contrib. No. 2089, abstract 6366.

Ruff, S. W. (2018), An ancient hydrothermal setting on Mars with features resembling modern examples on Earth: Implications for Astrobiology, AOGS 15th Annual Meeting, abstract #PS09-04-A042.

Ruff, S. W., J. D. Farmer, and M. Juarez Rivera (2018), Testing alternative hypotheses for the origin of hydrothermal silica at Home Plate, Mars with implications for astrobiology, Lunar and Planetary Science Conference, abstract #2367.
Ruff, S. W., J. D. Farmer, M. J. Van Kranendonk, K. A. Campbell, T. Djokic, B. Damer, and D. W. Deamer (2018), Seeking signs of life preserved in Martian silica, 2nd International Mars Sample Return Conference, LPI Contrib. No. 2071, Abstract #6093.
Ruff, S. W., and V. E. Hamilton (2018), Lithification and diagenesis of ultramafic volcanic ash deposits on Mars Abstract P43A-09 presented at 2018 Fall Meeting, AGU, Washington, D.C., 10-14 Dec.
Ruff, S. W. (2017), Investigating the floor of paleolake Jezero by way of Gusev crater, Fourth Conference on Early Mars, LPI Contrib. No. 2014.
Ruff, S. W., and J. D. Farmer (2017), The case for silica sinter in the Columbia Hills of Mars and why it matters, Lunar and Planetary Science Conference, Abstract 2879.
Ruff, S. W., and J. D. Farmer (2017), A silica-producing hydrothermal system on Mars and its microbially inhabited analog at El Tatio, Chile, Astrobio. Sci. Conf., LPI Contrib. No. 1965, Abstract 3400.
Ruff, S. W., and V. E. Hamilton (2017), The context of carbonates in Gusev and Jezero craters 2017 Fall Meeting, AGU, New Orleans, LA, 11-15 Dec., Abstract P33C-2887.
Ruff, S. W., and J. D. Farmer (2016), Noachian-Age Silica Deposits on Mars with Features Resembling Modern Hot Spring Biosignatures at El Tatio, Chile, Abstract P11B-1861 presented at 2016 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
Ruff, S. W., and J. D. Farmer (2016), Opaline silica occurrences in the Columbia Hills of Mars: A case study in the hunt for biosignatures, Biosignature Preservation and Detection in Mars Analog Environments, Lake Tahoe, NV, Abstract 2024.
Ruff, S. W., and J. D. Farmer (2016), Evidence for an Alkali Chloride Hydrothermal System in the Columbia Hills, Mars, Lunar and Planetary Science Conference, 47, abstract #2896.
Ruff, S. W., and R. V. Morris (2016), Evidence for mixed magnesium and iron carbonates in the Comanche outcrops of the Columbia Hills, Mars. , Lunar Planet. Sci. Conf., 47, abstract #2827.
Ruff, S. W. (2015), Gusev crater postmortem: Ongoing exploration five years after Spirit, Geo. Soc. Amer. Abstracts, 47(7), 601.
Ruff, S. W. (2015), New observations reveal a former hot spring environment with high habitability and preservation potential in Gusev crater, Mars, Lunar Planet. Sci., 46(abstract #1613).
Ruff, S. W. (2015), Assessing the astrobiological potential of silica occurrences on Mars, Astrobio. Sci. Conf.(abstract #7562).
Ruff, S. W., and J. D. Farmer (2015), Micro-digitate Silica Structures on Earth and Mars: Potential Biosignatures Revealed in the Geyser Field of El Tatio, Chile, Abstract P24A-01 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 14-18 Dec.
Ruff, S. W., J. Farmer, R. E. Milliken, P. B. Niles, F. Alfano, A. B. Clarke, M. D. Kraft, and C. Hardgrove (2014), Investigating the Habitability and Preservation Potential of Two Aqueous Settings in Gusev Crater, Mars, Abstract P32A-08 presented at 2014 Fall Meeting, AGU, San Francisco, Calif., 15-19 Dec.
Ruff, S. W., and V. E. Hamilton (2014), Wishstone to Watchtower: Alteration of plagioclase-rich rocks in Gusev crater, Mars, in 2014 AGU Fall Meeting, edited, San Francisco, CA.

Ruff, S. W., P. B. Niles, F. Alfano, and A. B. Clarke (2014), Evidence for a Noachian-aged ephemeral lake in Gusev crater, Mars, Lunar Planet. Sci., 45, abstract #1739.
Ruff, S. W. (2013), The enigmatic bench unit of Endeavour crater rim in Meridiani Planum, Mars, Abstract P23F-1857 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
Ruff, S. W., and V. E. Hamilton (2013), Amorphous Mars: Interpreting Growing Evidence for Poorly/Non-Crystalline Phases in Martian Materials, 44th Lunar and Planetary Science Conference, Abstract #1753.
Ruff, S. W. (2012), Evidence for an extended carbonate-bearing unit in the Columbia Hills of Gusev crater, Mars, Lunar Planet. Sci., 43, Abstract #2898.
Ruff, S. W. (2012), The Early History of Gusev Crater Revisited, in Third Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life, edited, p. Abstract #7042, Lunar and Planetary Institute, Houston.
Ruff, S. W. (2012), A traverse through Hesperian ridged plains on Mars: Extending the work of Ron Greeley in Gusev crater, Geo. Soc. Amer. Abstracts, 44(7), 64.
Ruff, S. W., R. E. Milliken, J. D. Farmer, V. W. Mills, and K. M. Robertson (2012), Investigating the Origin of Silica Occurrences on Mars through Laboratory Observations, Abstract P11F-05 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
Ruff, S. W. (2011), Is Comanche carbonate evidence for a lake in Gusev crater, Mars?, Lunar Planet. Sci., 42, Abstract #2708.
Ruff, S. W., J. D. Farmer, R. E. Milliken, V. W. Mills, and E. L. Shock (2011), Hydrothermal occurrences in Gusev crater, Abstract P31G-02 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
Ruff, S. W., and J. L. Bandfield (2010), Refinement and discovery with Mini-TES spectra in Gusev crater, Lunar and Planetary Science Conference, 41, Abstract #2411.
Ruff, S. W., and R. V. Morris (2010), Mini-TES Observations of Comanche Carbonate and its Distribution, Abstract P54A-05 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec.
Ruff, S. W. (2009), Gusev-style Alteration: Unique or Ubiquitous on Mars?, Workshop on Modeling Martian Hydrous Environments, Lunar and Planetary Institute, Houston, TX.
Ruff, S. W. (2009), The Extent and Significance of Opaline Silica Outcrops in Gusev Crater, Mars, Abstract P43D-1461 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 13-18 Dec., P43D-1461.
Ruff, S. W., and V. E. Hamilton (2009), New Insights into the Nature of Mineralogic Alteration on Mars from Orbiter, Rover, and Laboratory Data, Lunar Planet. Sci., XL([CD-ROM]), abstract #2160.
Ruff, S. W., J. D. Farmer, R. E. Arvidson, S. W. Squyres, P. R. Christensen, and Team (2008), The nature and distribution of silica at Home Plate in Gusev Crater, Mars: Evidence for a hydrothermal system, Lunar Planet. Sci., XXXIX([CD-ROM]), abstract #2213.
Ruff, S. W., A. A. McEwen, and A. S. Team (2007), An emerging view of the stratigraphy of the Columbia Hills in Gusev crater from HiRISE and Mini-TES data, Lunar Planet. Sci., 38(Abstr. #2063).
Ruff, S. W. (2003), Basaltic andesite or weathered basalt: A new assessment, Sixth International Conference on Mars, Lunar and Planetary Institute, Houston, Pasadena, CA.

Ruff, S. W., and P. R. Christensen (2003), Identifying compositional heterogeneity in Mars' Nili Patera Caldera using THEMIS and TES data, Lunar Planet. Sci., XXXIV, Abstract #2068 [CD-ROM].
Ruff, S. W. (2002), Spectral evidence for zeolite in the dust on Mars, Eos, 83 (Spring Supplement), 1059.
Ruff, S. W., and P. R. Christensen (2002), THEMIS Multi-spectral views of compositional heterogeneity in Nili Patera Caldera, Eos Trans. AGU, 83(47)(Fall Meet. Suppl.), Abstract P11B-10.
Ruff, S. W., A. T. Knudson, T. G. Graff, T. D. Glotch, and J. R. Michalski (2002), Expanded coverage: Mid-infrared field spectroscopy through a range of distances and viewing angles, Eos Trans. AGU, 83(47)(Fall Meet. Suppl.), Abstract P62B-10.
Ruff, S. W. (2001), Mapping the dust on Mars: Results from MGS TES, Eos Trans. AGU, 82(47)(Fall Meet. Suppl.), Abstract P42A-0543.
Ruff, S. W., and P. R. Christensen (2001), A spectrally-based global dust cover index for Mars from Thermal Emission Spectrometer data, First Landing Site Workshop for 2003 Mars Exploration Rovers, NASA Ames Research Center, Mountain View, CA.
Ruff, S. W., and V. E. Hamilton (2001), Mineralogical anomalies in Mars' Nili Patera caldera observed with Thermal Emission Spectrometer data, LPSC XXXII, Houston, TX.
Ruff, S. W. (1999), Development of thermal infrared emission spectroscopy for geological investigations of Earth and Mars, Thermal Emission Spectroscopy and Analysis of Dust, Disks, and Regoliths, Astronomical Society of the Pacific, Lunar and Planetary Institute, Houston, TX, April 28-30, 1999.
Ruff, S. W., and P. R. Christensen (1999), Thermal-infrared spectral characteristics of Martian albedo features: Clues to composition, The Fifth International Conference on Mars, Pasadena, CA.
Ruff, S. W. (1996), Interpretation of TIMS Imagery using Laboratory Thermal Emission Spectroscopy: Application to Geologic Mapping, Second International Airborne Remote Sensing Conference and Exhibition, San Francisco, CA.
Ruff, S. W., and P. R. Christensen (1996), Mapping with Heat: Airborne and Laboratory Based Thermal Infrared Measurements Applied to Geologic Mapping, Geological Society of America, Denver, CO.
Ruff, S. W. (1995), Discrimination of Alkalinity in Granitoid Rocks: A Potential TIMS Application, JPL Airborne Earth Science Workshop, JPL.
Ruff, S. W. (1995), New Clues on the Origin of the Martian Sinuous Ridges, Lunar Planet. Sci., Houston, TX.
Ruff, S. W. (1994), Comparison of Mars Sinuous Ridges with Terrestrial Linear Dunes: Observations from the Field, Lunar and Planet. Sci, XXV, 1171-1172.