Curriculum Vitae for William J. Abbey

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EDUCATION

1997 M.Sc. Geology, George Washington University, Washington, D.C.

POSITIONS

Technologist, Planetary Science Section, Jet Propulsion Laboratory (2001 – present)

- 2018 – present. Collaborator, SHERLOC Science Team, Mars 2020 *(Perseverance Rover)*
- 2014 – present. Surface Sampling System Scientist, Mars Science Laboratory *(Curiosity Rover)*

Research Assistant, California Institute of Technology (2000 – 2001)

RESPONSIBILITIES

- TATOOINE PSTAR (*PI: Wilhelm*). Co-I acting as Field and Safety Co-Lead for field operations in the Bristol Dry Lake region of the Mojave Desert. Scouted potential field sites, acquired appropriate permissions, and evaluated field hazards prior to initial deployment. Currently assist in field campaigns and with the mineralogical & geological characterization of the team's field sites.
- SHERLOC Science Team (*PI: Hand*). Currently serve during Tactical Operations as both engineering & science Payload Uplink/Downlink Specialist, as well as representing payload interests during Campaign Implementation discussions. Also act as manager for SHERLOC analog instrumentation lab. Previously served team as Spectroscopy Ops Lead and as Team Rep to Mars 2020 Landing Site Working Group. Participated in selection of Jezero Crater and assisted in preliminary geologic mapping of crater floor.
- MSL Science Team (*PI: Vasavada*). Currently act as Surface Sampling System Scientist aiding team in selection of high value targets that can be safely sampled, processed, and delivered to MSL instruments. Prior to landing, helped plan and execute Fast Motion Field Test and Rover Thread Test training exercises designed to simulate Rover Science Operations. Since landing, contributed to the development of Feed-Extended Drilling & Feed-Extended Sample Transfer to circumvent malfunctioning drill feed mechanism.
- Consult on various projects that require geologic expertise, mineral characterization, X-ray diffraction, and/or field planning. Have provided logistical planning and support for field investigations to the Mojave Desert, the San Francisco Volcanic Field in Arizona, and Death Valley National Park, as well as the Atacama Desert in Chile, Svalbard, Norway in the Arctic, as well as Russell Glacier and Summit Station on the Greenland ice sheet.

NASA/JPL AWARDS

IO - 2023 Mars Solar Conjunction Team, JPL Team Bonus Award, 2024
SHERLOC Operations Team, JPL Team Bonus Award, 2023
Mars 2020 Pre-Landing Strategic Science Group, NASA Honor Group Achievement Award, 2022
SHERLOC Science & Operations Team, NASA Silver Achievement Award, 2022
Mars 2020 Science Team, NASA Honor Group Achievement Award, 2022
Mars 2020 SHERLOC SOX Operations Team, JPL Team Bonus Award, 2021
Mars 2020 Mars Time Instrument Operations, JPL Team Bonus Award, 2021
MSL's Surface Sampling Science Team, JPL Team Bonus Award, 2021
Mars 2020 Instrument Operations Development Team, NASA Honor Group Achievement Award, 2021
MSL Surface Sampling System Development Team, NASA Honor Group Achievement Award, 2020
MSL FED/FEST Team, JPL Team Bonus Award, 2019
MSL Non-Percussive Drilling Development Team, NASA Honor Group Achievement Award, 2017
MSL Extended Mission-1 Science & Operations Team, NASA Honor Group Achievement Award, 2017
Greenland PSTAR WATSON Trip, JPL Team Bonus Award, 2017
MSL Surface Sampling System Scientist Team, JPL Team Bonus Award, JPL Team Bonus Award, 2015
MSL Prime Mission Science & Operations Team, NASA Honor Group Achievement Award, 2015
MSL Science Office Development & Operations Team, NASA Honor Group Achievement Award, 2013
MSL Project Operations Team, NASA Honor Group Achievement Award, 2013
In Situ Sample Processing Team, JPL Team Bonus Award, 2005

PEER-REVIEWED PUBLICATIONS

Murphy, A.E., Uckert, K., Hand, K. Bhartia, R., Bykov, S.V., Hickman-Lewis, K... **Abbey, W.J.,** *et al*., Spatially resolved complex organic matter detected in an ancient valley in Jezero crater, *submitted to* Proceedings of the National Academy of Sciences, 2025.

Srivastava, A., Steele, A., Kah, L.C., Conrad, P.G., Sharma, S., Phua, Y.Y... **Abbey, W.J.,** *et al.,* In situ identification of hydrated carbonate in Jezero crater, Mars, *accepted in* Science Advances, 2025.

Fornaro, T., Sharma, S., Jakubek, R.S., Poggiali, G., Brucato, J.R., Bhartia, R… **Abbey, W.J,** *et al*., Potential detection of polycyclic aromatic hydrocarbons in sulfates by Perseverance's deep UV Raman spectrometer in an ancient delta-lake system at Jezero crater, Mars, *accepted in* Nature Astronomy, 2025.

Jakubek, R., Bhartia, R., Steele, A., Asher, S., **Abbey, W.,** Bykov, S., Czaja, A., et al., Improving Detection Limits with Multi-Pixel Signal-to-Noise Ratio Calculations: Application to the SHERLOC Instrument aboard the Perseverance Rover, *accepted in* Analytica Chimica Acta, 2025.

Sharma, S., Pascuzzo, A., Uckert, K., **Abbey, W.,** Bhartia, R., Berger, E., Gomez, F., Multi-instrument Image Correlation for *In Situ* Planetary Science on Mars 2020, 2024 IEEE Aerospace Conference, Big Sky, MT, USA, 2024.

Siljestrom, S., Czaja, A.D., Corpolongo, A., Berger, E., Li, A., Cardarelli, E., **Abbey, W.,** *et al.*, Evidence of Sulfate-Rich Fluid Alteration in Jezero Crater Floor, Mars, Journal of Geophysical Research – Planets 129 (1), 2024.

Wogsland, B., Minitti, M., Kah, L., Yingst, R., **Abbey, W.,** Bhartia, R., Beegle, L., *et al.,* Science and Science-Enabling Activities of the SHERLOC and WATSON Imaging Systems in Jezero Crater, Mars, Earth and Space Science 10 (11), 2023.

Sharma, S., Roppel, R., Murphy, A., Beegle, B., Bhartia, R., Steele, A… **Abbey, W**., *et al*., Diverse organic-mineral associations in Jezero crater, Mars, Nature 619 (7971), 724-732, 2023.

Corpolongo, A., Jakubek, R.S., Burton, A.S., Brown, A.J., Yanchilina, A., Czaja, A.D… **Abbey, W.,** SHERLOC Raman mineral detections of the Mars 2020 Crater Floor Campaign, Journal of Geophysical Research – Planets 128 (3), 2023.

Scheller, E.L., Razzell Hollis, J., Cardarelli, E.L., Steele, A., Beegle, L.W., Bhartia, R... **Abbey, W**., *et al.,* Aqueous alteration processes and implications for organic geochemistry in Jezero crater, Mars, Science 378 (6624), 2022.

Razzell-Hollis, J., Sharma, S., **Abbey, W.,** Bhartia, R., Fries, M., Beegle, L., Fries, M., Hein, J., Monacelli, B., Nordman, A.D., A Deep-Ultraviolet Raman and Fluorescence Spectral Library of 51 Organic Compounds for the SHERLOC instrument onboard Mars 2020, Astrobiology 23 (1), 2022.

Fries, M.D., Lee, C., Bhartia, R., Razzell Hollis, J., Beegle, L.W., Uckert, K., Graff, T.G., **Abbey, W.,** *et al*., The SHERLOC Calibration Target on the Mars 2020 Perseverance Rover: Design, Operations, Outreach, and Future Crewed Exploration Functions, Space Science Reviews 218 (46), 2022.

Razzell Hollis, J., Moore, K.R., Sharma, S., Beegle, L., Grotzinger, J., **Abbey, W.,** Allwood, A., et al., The power of paired proximity science observations: Co-located data from SHERLOC and PIXL on Mars, Icarus 387, 115179, 2022.

Razzell-Hollis, J., **Abbey, W.,** Beegle, L., Bhartia, R., Ehlmann, B., Miura, J., Monacelli, B., Moore, K., Nordman, A., Scheller, E., Wu, Y-H., A Deep-Ultraviolet Raman and Fluorescence Spectral Library of 62 Minerals for the SHERLOC instrument onboard Mars 2020, Planetary and Space Science 209, 105356, 2021.

Fox, V.K., Kupper, R., Ehlmann, L.B., Catalano, J.G., Razzell-Hollis, J., **Abbey, W.J.,** Schild, D.J., Nickerson, R.D., Peters, J., Katz, S.M., White, A.A., Synthesis and characterization of Fe (III)-Fe (II)-Mg-Al smectite solid solutions and implications for planetary science, American Mineralogist 106 (6), 964-982, 2021.

Holm-Alwmark, S., Kinch, K.M, Hansen, M.D., Shahrzad, S., Svennevig, K., **Abbey, W.J.,** Anderson, R.B., *et al.,* Stratigraphic relationships in Jezero Crater, Mars – Constraints on the timing of fluvial-lacustrine activity, Journal of Geophysical Research – Planets 126 (7), 2021.

Bhartia, R., Beegle, L.W., DeFlores, L., **Abbey, W.,** Razzell-Hollis, J., Uckert, K., Monacelli, B., *et al.,* Perseverance's Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals (SHERLOC) Investigation, Space Science Review, 217 (58), 2021.

Stack, K.M., Williams, N.R., Calef, F., Sun, V., Williford, K.H., Farley, K.A... **Abbey, W**., *et al.,* Photo-geologic Map by the Perseverance Rover Field Site in Jezero Crater Constructed by the Mars 2020 Science Team, Space Science Review 216 (8), 1-47, 2020.

Uckert, K., Parness, A., Chanover, N., Eshelman, E., Abcouwer, N., Nash, J... **Abbey, W**., *et al.,* Investigating habitability with an integrated rock-climbing robot and astrobiology instrument suite, Astrobiology 20 (12), 2020.

Razzell-Hollis, J., Ireland, S., **Abbey, W**., Bhartia, R., Beegle, L., Deep-Ultraviolet Raman Spectra of Mars-Relevant Evaporite Minerals under 248.6 nm Excitation, Icarus 351, 2020.

Abbey, W., Anderson, R., Beegle, L., Peters, G., Morookian, J.M., Collins, C., Feldman, J., *et al*., A Look Back II: The Drilling Campaign of the Curiosity Rover during the Mars Science Laboratory's Second and Third Martian Years, Icarus 350, 2020.

Malaska, M.J., Bhartia, R., Manatt, K.S., Priscu, J.C., **Abbey, W.J.,** Mellerowicz, B., Palmowski, J., Zacny, K., Eshelman, E.J., D'Andrilli, J., Subsurface *In-Situ* Detection of Microbes and Diverse Organic Matter Hotspots in the Greenland Ice Sheet, Astrobiology 20 (10), 1185-1211, 2020.

Carrier, B., **Abbey, W.J.,** Beegle, L.W., Bhartia, R., Liu, Y., Attenuation of Ultraviolet Radiation in Rocks & Minerals: Implications for Mars Science, Journal of Geophysical Research – Planets 124 (10), 2599-2612, 2019.

Eshelman, E., Malaska, M., Manatt, K., Doloboff, I., Wanger, G., Willis, M., **Abbey, W**., Beegle, L., Priscu, J., Bhartia, R., WATSON: In situ organic detection in subsurface ice using deep-UV fluorescence spectroscopy, Astrobiology 19 (6), 771-784, 2019.

Abbey, W., Anderson, R.C., Beegle, L., Horowitz, J., Williford, K., Peters, G., Morookian, J.M., *et al*., A Look Back: The Drilling Campaign of the Curiosity Rover during the Mars Science Laboratory's Prime Mission, Icarus 319, 1-13, 2019.

Peters, G.H., Carey, E.M., Anderson, R.C., **Abbey, W.J.,** Kinnet, R., Watkins, J.A., Schemel, M., *et al*., Uniaxial compressive strengths of rocks drilled at Gale Crater, Mars, Geophysical Research Letters 45, 108-116, 2018.

Flannery, D., Allwood, A.C., Summons, R.E., Williford, K.E., **Abbey, W.,** Matys, E.D., Ferralis, N., Spatially-resolved isotopic study of carbon trapped in ~3.43 Ga Strelly Pool Formation Stromatolites, Geochimica et Cosmochimica Acta 223, 21-35, 2017.

Abbey, W. J., Bhartia, R., Beegle, L., DeFlores, L., Paez, V., Sijapati, K., Sijapati, S., Williford, K., Tuite, M., Hug, W., Reid, R., Deep UV Raman Spectroscopy for Planetary Exploration: The Search for In Situ Organics, Icarus 290, 201-214, 2017.

Beegle, L.C., Bhartia, R., White, M., DeFlores, L., **Abbey, W.,** Wu, J., *et al.* SHERLOC: Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals, paper presented at IEEE Aerospace Conference, 1-11, 2015.

Anderson, R.C., Beegle, L.C., Hurowitz, J., Hanson, C., **Abbey, W.,** Sybold, C., *et al*. The Mars Science Laboratory Scooping Campaign at Rocknest: A Comparison Between Pre-Launch Terrestrial Testing and Mars, Icarus 256, 66-77, 2015.

Douglas, S., Perry, M.E., **Abbey, W.J**., Tanaka, Z., Chen, B., McKay, C.P., The structure and chemical layering of Proterozoic stromatolites in the Mojave Desert, International Journal of Astrobiology 14 (03), 517-526, 2015.

Pitman, K.M., Noe Dobrea, E.Z., Jamieson, C.S., Dalton, J.B., **Abbey, W.J.,** Joseph, E.C.S., What lurks in the martian rocks and soil? Investigations of sulfates, phosphates, and perchlorates. Reflectance spectroscopy and optical functions for hydrated Fe-sulfates, American Mineralogist 99 (8-9), 1593-1603, 2014.

Noell, A.C., **Abbey, W.J.,** Anderson, R.C., Ponce, A., Radiocarbon Dating of Glacial Dust Layers and Soils at Kilimanjaro's Northern Ice Field, The Holocene 24 (10), 1398-1405, 2014.

Wagstaff, K.L, Thompson, D.R., **Abbey, W.,** Allwood, A., Bekker, D., Cabrol, N.A., Fuchs, T., Smart, texture-sensitive instrument classification for in situ rock and layer analysis, Geophysical Research Letters 40, 1-6, 2013.

Abbey, W., Salas, E., Bhartia, R., Beegle, L.W., The Mojave Vadose Zone: A Subsurface Biosphere Analog for Mars, Astrobiology 13 (7), 637-646, 2013.

Peters, G.H., **Abbey, W.,** Bearman, G.H., Mungas, G.S., Smith, J.A., Anderson, R.C., Douglas, S., and Beegle, L.W., Mojave Mars simulant - Characterization of a new geologic Mars analog, Icarus 197, 470-479, 2008.

Bhartia, R., Hug, W.F., Salas, E.C., Reid, R.D., Sijapati, K.K., Tsapin, A., **Abbey, W.,** Conrad, P.G., Nealson, K.H., and Lane, A.L., Classification of Organic and Biological Materials with Deep UV Excitation, Applied Spectroscopy 62 (10), 46-53, 2008.

Douglas, S., **Abbey, W.,** Mielke, R., and Conrad, P. and Kanik, I., Textural and mineralogical biosignatures in an unusual microbialite from Death Valley, California, Icarus 193, 620-636, 2008.