

# Nina Lanza

Updated March 2024

## RESEARCH EXPERIENCE

- 2021 – present     **Principal Investigator, ChemCam instrument**  
*NASA Mars Science Laboratory (Curiosity) rover mission*  
Leading international team of 90+ scientists and engineers to operate, maintain, and analyze data from ChemCam instrument onboard the NASA Mars Science Laboratory (MSL) rover.
- 2024 – present     **Staff Scientist (Scientist IV)**  
*ISR-1 (Space Science & Applications), Los Alamos National Laboratory, Los Alamos, NM.*  
Studying biosignature potential of manganese-rich materials with LIBS; quantifying LIBS ablation rates in geological materials using LIBS spectral and acoustic data; supporting ChemCam operations for Mars Science Laboratory rover mission.
- 2019 – 2023       **Team Lead, Space and Planetary Exploration Team / Staff Scientist (Scientist III/IV)**  
*ISR-6 (Space Remote Sensing & Data Science), Los Alamos National Laboratory, Los Alamos, NM.* Team lead of planetary team in ISR-6 (previously ISR-2)
- 2018 – 2019       **Deputy Team Lead, Space and Planetary Exploration Team / Staff Scientist (Scientist III)**  
*ISR-2 (Space and Remote Sensing), Los Alamos National Laboratory, Los Alamos, NM*
- 2014 – 2018       **Staff Scientist (Scientist II)**  
*ISR-2 (Space and Remote Sensing), Los Alamos National Laboratory, Los Alamos, NM*  
Led study of manganese in Gale crater, Mars and quantified manganese abundance in LIBS spectral data for ChemCam and SuperCam; supporting ChemCam operations for Mars Science Laboratory rover mission.
- 2012 – 2014       **Postdoctoral Research Associate**  
*ISR-2 (Space and Remote Sensing), Los Alamos National Laboratory, Los Alamos, NM*  
Studied geological materials related to rock-soil-atmosphere interactions including surface coatings and rinds with laser-induced breakdown spectroscopy; supported ChemCam operations for Mars Science Laboratory rover mission.

## EDUCATION

- 2011               **Doctor of Philosophy**, Earth and Planetary Sciences, Institute of Meteoritics, University of New Mexico, Albuquerque, NM
- 2006               **Master of Arts**, Earth and Environmental Sciences, Wesleyan University, Middletown, CT
- 2001               **Bachelor of Arts**, Astronomy, Smith College, Northampton, MA

## SELECTED GRANTS AND FELLOWSHIPS

- 2023 – 2026       **Co-Investigator, LANL LDRD Directed Research award.** “Planetary Exploration Beyond Mars: Advanced Geologic and Astrobiological Scientific Investigations” (PI: A. Ollila + S. Clegg).
- 2023 – 2024       **Principal Investigator, NASA Analog Activities to Support Artemis Lunar Operations.** “Communication structures for science activities during human surface missions.” Member of Joint EVA Test Team 5 (JETT5).
- 2023               **Co-Investigator, LANL LDRD Reserve Funds award.** “Planetary Science Investigations” (PI: S. Clegg).
- 2021 – 2022       **Principal Investigator, Explorers Club Discovery Expedition Grant / ALDGS PD funds.** “Finding Life on Mars from Above: Testing the GRAPE Mission Concept at Haughton Crater, Canada.” <https://explorers.org/about/explorers-club-discovery-expedition-grants>

2020 – 2023	<b>Principal Investigator, LANL LDRD Exploratory Research award.</b> “Listening for rock coatings on Mars: Using acoustic signals from laser-induced breakdown spectroscopy.”
2020 – 2023	<b>Co-Investigator, LANL LDRD Directed Research award.</b> “Uncertainty Quantification for Robust Machine Learning” (PI: D. Oyen).
2019 – 2020	<b>Principal Investigator, LANL LDRD Exploratory Research award.</b> “Boron and Ribose in Clay: a Precursor for Life on Earth and Mars?”
2019 – 2020	<b>Principal Investigator, NASA Exobiology.</b> “Discovering biosignatures in manganese deposits on Mars with rover payload instruments.”
2020	<b>Co-Investigator, LANL LDRD Reserve Funds award.</b> “Active sensing for short-range remote detection and characterization.” (PI: A. Ollila).
2019	<b>Principal Investigator, LANL LDRD Reserve Funds award.</b> “Using acoustic signals from LIBS plasma shock waves to identify rock coatings on Mars.”
2018	<b>Principal Investigator, LANL Science Investment Small Equipment grant.</b> “Benchtop Raman and fluorescence spectroscopy.”
2017 – 2020	<b>Collaborator, NASA Mars Data Analysis Program.</b> “Understanding diversity in martian magmatism: Modeling the formation of felsic and alkaline igneous compositions from in-situ data collected on Mars.” (PI: A. Udry, UNLV).
2016 – 2019	<b>Co-Principal Investigator, LANL LDRD Exploratory Research award.</b> “Life on the Edge: Microbes in Rock Varnish.” (PI: C. Yeager, LANL).
2016 – 2018	<b>Principal Investigator, LANL LDRD Early Career Award.</b> “Discovering Biosignatures in Manganese Deposits on Mars.”

## AWARDS AND HONORS

- NASA Silver Group Achievement Award, SuperCam science (2023).
- NASA Group Achievement Award, Mars 2020 Pre-landing Strategic Science Group (2022).
- Explorers Club Citation of Merit (2022), awarded to the NASA Curiosity ChemCam engineering team, <https://discover.lanl.gov/news/0413-chemcam-engineering-team/>
- NASA Group Achievement Award, SuperCam Science, Engineering, and Operations Team (2022).
- NASA Group Achievement Award, SuperCam Development Team (2021).
- Elected as a Fellow National, The Explorers Club (2021). <https://explorers.org/>
- Selected as a Department of Energy Woman @ Energy, <https://www.energy.gov/articles/women-energy-dr-nina-lanza> (2020).
- LANL Distinguished Performance Award, SuperCam Mars Rover Instrument Team (2019).
- Selected as one of NNSA’s “Women integral to the nuclear security enterprise,” Women’s History Month campaign, <https://nnsa.energy.gov/blog/women-integral-nuclear-security-enterprise> (2017).
- Rising Stars of Nuclear Science and Engineering, Massachusetts Institute of Technology (2015).
- Selected as a LANL “Woman Who Inspires” (2014).
- LANL Postdoc Distinguished Performance Award (2013).
- Winner, LANL Postdoc Research Day (2013).
- NASA Group Achievement Award, MSL ChemCam Instrument Development and Science Team (2013).
- LANL Large Team Distinguished Performance Award, ChemCam project (2012).

## LEADERSHIP

- Principal Investigator, ChemCam instrument, NASA Mars Science Laboratory rover (2021 – present).
- Acting Deputy Group Leader, ISR-6 (Space Remote Sensing & Data Science) (2023).
- Team Lead, Space and Planetary Exploration Team, ISR-2/ISR-6 (2019 – 2023).
- Deputy Team Lead, Space and Planetary Exploration Team, ISR-2 (2018 – 2019).
- LANL NASA Program Point of Contact for Planetary Sciences (2017 – present).
- LANL Center for Space and Earth Studies Planetary Science seminar series (2017 – 2023).
- LANL Center for Space and Earth Studies Planetary Science Focus Area Lead (2019).
- Mars 2020 Landing Site Working Group Co-Lead, NE Syrtis megabreccia group (2017).
- Member, Research Library Advisory Board, LANL, Los Alamos, NM (2013 – 2020).

## OPERATIONS AND FIELD EXPERIENCE

- Led Explorers Club Discovery Expedition Grant field study in Mars analog terrestrial field site in Houghton crater, Canada to develop novel neutron and gamma ray spectroscopy for planetary applications; testing concept of operations for uncrewed aircraft systems (UAS). Featured on “Tales from the Explorers Club” (*Discovery*) (2022). <https://www.facebook.com/Discovery/videos/dr-nina-lanza-ales-from-the-explorers-club/826938431639402/>
- Supporting current MSL spacecraft operations as ChemCam Payload Uplink Lead and Payload Downlink Lead and Payload Element Lead for Mars Science Laboratory surface operations on Mars (science and engineering roles); continuously staffing instrument operations role from landing in 2012 to present.
- Contributed to Mars 2020 Rover Operations Activities for Science Team Training test (ROASTT) (2019). Analyzed SuperCam data as Payload Downlink Lead, acted as SuperCam instrument representative in Campaign Implementation group.
- Field team member, Antarctic Search for Meteorites (ANSMET), 2015 – 2016 season. Recovered meteorites from remote field locations in the Miller Range, Antarctica. <https://caslabs.case.edu/ansmet/>
- NASA Desert Research and Technology Studies (Desert RATS) field exercise, Johnson Space Center, Houston, TX (2011). Acted as Geolab Scicom and EV1 context documentarian. [https://www.nasa.gov/exploration/analog/desertrats/drats2011\\_midway-report.html](https://www.nasa.gov/exploration/analog/desertrats/drats2011_midway-report.html)
- Mars Science Laboratory Fast Motion Field Test (2011). Analyzed and interpreted ChemCam data of unknown Mars analog field site in preparation for Mars surface operations.
- NASA Desert Research and Technology Studies (Desert RATS) field exercise, Flagstaff, AZ (2010). Participated in tactical, strategic, and field operations. [https://www.nasa.gov/exploration/analog/desertrats/desert\\_rats\\_2010.html](https://www.nasa.gov/exploration/analog/desertrats/desert_rats_2010.html)
- Mars Science Laboratory Slow Motion Field Test (2007). Acted as ChemCam Payload Downlink Lead in preparation for Mars surface operations.

## SELECTED OUTREACH ACTIVITIES

### Television/Streaming

“Dispatches from the Well.” *Big Think* (2023).

Trailer: <https://youtu.be/R8GoBFy1DgQ?si=QKakMFCaSv08642> (2 min 22 s)

Host of Lift the Ice episode 4: “The Ice is Alien.” *Curiosity Stream* (2023).

<https://curiositystream.com/video/6074>

How the Universe Works, Seasons 4, 5, 6, 7, 8, 9, 10, and 11 (2014-2023). *The Science Channel*.

<http://www.sciencechannel.com/tv-shows/how-the-universe-works/>

“Mankind’s first sample return,” *Cosmic Front* (in Japanese), *NHK* (aired 16 February 2023).

<https://www.nhk.jp/p/cosmic/ts/WXVJVPGLNZ/>

“Highest Highs, Lowest Lows,” *Tales from the Explorers Club*, season 1, episode 1. *Discovery Channel*.

<https://www.facebook.com/Discovery/videos/dr-nina-lanza-ales-from-the-explorers-club/826938431639402/>

“Is There Life on Mars?” *Science’s Greatest Mysteries*, Season 1, Episode 5, *BBC* (2022).

<https://www.bbcselect.com/watch/sciences-greatest-mysteries/>

“Finding Life on Mars,” *Secrets of the Universe*, Season 1, Episode 6, *Curiosity Stream* (2022).

<https://curiositystream.com/video/4271>

“Is there life on Mars?” *Global Exploration Summit*, Season 1, Episode 6, *Discovery+* (2021).

<https://www.discoveryplus.com/show/the-explorers-club>

“Mars: One Day on the Red Planet,” *National Geographic TV* (special) (2020).

<https://www.natgeotv.com/za/shows/natgeo/mars-one-day-on-the-red-planet>

“Space Rock Hunter,” *Daily Planet* (Discovery Canada), *Treasure Seekers Week*, season 21 episode 73

(aired 13 April 2016). <https://www.bellmedia.ca/the-lede/press/shiver-me-timbers-daily-planet-uncovers-extraordinary-finds-during-all-new-treasure-seekers-week-beginning-april-11-on-discovery/>

### Video

“Revealing the martian soundscape,” *GLEX Summit 2023*, Terceira, Azores, 14 June 2023:

<https://www.youtube.com/watch?v=7je0RqbUjAc> (12 min 54 s)

“Why we are testing autonomous drones in the Arctic to improve future Mars research,” 26 April 2023:

- <https://www.youtube.com/watch?v=FQaJ3r12BgE> (4 min 09 s)
- “10 years on Mars: The Curiosity rover’s journey,” 5 August 2022:  
[https://www.youtube.com/watch?v=NEtOKvyQw\\_I](https://www.youtube.com/watch?v=NEtOKvyQw_I) (2 min 51 s)
- “NASA’s Perseverance rover captures the sounds of Mars,” 18 October 2021:  
<https://youtu.be/GHenFGnixzU> (3 min 15 s)
- “What do sounds sound like on Mars?” TikTok video for National Space Day with CBS Unstoppable and Department of Energy, 7 May 2021:  
<https://twitter.com/LosAlamosNatLab/status/1390710905911054336> (44 s).
- “Perseverance: What music sounds like on Mars,” 18 February 2021:  
<https://www.youtube.com/watch?v=Z7C4mR588d0> (2 min 55 s)
- “Life on Mars? Rock varnish could hold the answer,” 4 December 2018:  
<https://www.youtube.com/watch?v=gNm9HCj--Q0&t=4s> (2 min 10 s)
- Santa Fe March for Science 2017*, Santa Fe, NM, 22 April 2017:  
<https://www.youtube.com/watch?v=WHfmaL2vIL8> (7 min 47 s)
- “ChemCam update: Manganese oxides on Mars,” 30 June 2016:  
<https://www.youtube.com/watch?v=oayVInNUq8w> (1 min 40 s)
- “Los Alamos Science in 60,” 8 December 2015:  
[https://www.youtube.com/watch?v=i\\_Qs7Arnff4](https://www.youtube.com/watch?v=i_Qs7Arnff4) (1 min 22 s)
- Los Alamos Women Who Inspire*, 6 May 2014:  
<https://www.youtube.com/watch?v=bLmY9EDYWW0> (3 min 30 s)
- NASA Curiosity Rover Report*, Pasadena, CA, 26 October 2012:  
<http://www.youtube.com/watch?v=iDgv14Qt1lc&noredirect=1> (2 min 20 s)

### **Podcasts**

- “This is what Mars sounds like, with Nina Lanza,” *Gravity Assist*, 17 June 2022 (22 min 27 s):  
<https://www.nasa.gov/mediacast/gravity-assist-this-is-what-mars-sounds-like-with-nina-lanza>
- “Explorers Club – Nina Lanza,” *Curiosity Daily*, 10 June 2022 (16 min 6 s):  
<https://www.discovery.com/podcasts/curiosity-daily-podcast/nina-lanza>
- “Nina Lanza and Tony Nelson,” *Unconventional Engineering (ep.5)*, 8 April 2022:  
<https://soundcloud.com/user-583367487/unconventional-engineering-ep-5-nina-lanza-and-tony-nelson>
- “Life’s Tough, but Explorers are Tougher,” 4 March 2021 (20 min 27 s):  
<https://www.youtube.com/watch?v=4NspwsxtOak>
- “Diamonds in the Ice,” *On A Mission (JPL)*, 26 November 2019 (40 min 36 s):  
<https://www.jpl.nasa.gov/podcast/on-a-mission/s2/e8/>
- “Meteorite Hunting in Antarctica,” *Third Pod From the Sun (AGU)*, 7 November 2019 (episode 23) (14 min 27 s):  
<https://thirdpodfromthesun.com/2019/11/07/e23-bonus-clip-meteorite-hunting-in-antarctica/>
- “9<sup>th</sup> International Mars Conference (feat. Nina Lanza),” *WeMartians* (47 min 20 s):  
<https://www.wemartians.com/episode063/>
- “The Meteorite Hunter,” *Undiscovered*, 16 March 2017 (32 min 32 sec):  
<http://www.undiscoveredpodcast.org/the-meteorite-hunter.html>

### **Radio**

- NPR Morning Edition*, 25 February 2021 (6 min 43 s): <https://www.npr.org/2021/02/25/971261718/nasas-mars-mission-goal-find-evidence-of-past-life-on-the-red-planet>
- BBC Radio 4 Broadcasting House*, 21 February 2021 (starting at 19:40, 5 min):  
<https://www.bbc.co.uk/sounds/play/m000sgvc>
- NPR Morning Edition*, 11 February 2021 (3 min 48 s): <https://www.npr.org/2021/02/11/966757175/microphones-on-nasas-rover-will-record-audible-sounds-on-mars>
- Radio Café, KUNM*, Albuquerque, NM, 12 April 2017 (41 min 37 sec):  
<http://radiocafe.media/?s=lanza>
- Santa Fe Radio Café, KSFR*, Santa Fe, NM 1 March 2016 (32 min 16 s):  
<http://www.santaferadiocafe.org/science/2016/03/01/nina-lanza/>

Science Friday, 29 January 2016:

<http://www.sciencefriday.com/segments/confessions-of-a-meteorite-hunter/> (16 min 49 s)

New Mexico People Places and Ideas, KUNM, Albuquerque, NM, 6 February 2015:

<http://www.stephenspitz.com/2015/02/> (28 min 30 s)

## **Writing**

“Designing a drone that can search for life on other planets.” *Space.com*, 3 March 2023:

<https://www.space.com/designing-drone-search-alien-life-op-ed>

“Why Premature Claims of Life on Mars Hurt Science.” *Scientific American, Observations blog*, 14 January 2020:

<https://blogs.scientificamerican.com/observations/why-premature-claims-of-life-on-mars-hurt-science/>

“Did Life Sign the Guestbook on Mars?” *Scientific American, Observations blog*, 18 July 2019 (with C. Yeager):

<https://blogs.scientificamerican.com/observations/did-life-sign-the-guest-book-on-mars/>

## **Social media**

- Blog Tsarina for ANSMET field team (2015 – 2016 season). <https://caslabs.case.edu/ansmet/2015/>
- Official microblogger, Lunar and Planetary Science Conference, 2013-2018 (@marsninja).

## **REFEREED BOOK CHAPTERS (2)**

**Lanza, N.L.**, Wiens, R.C., Maurice, S., and Johnson, J. (2020). “Elemental Analyses of Mars from Rovers with Laser-Induced Breakdown Spectroscopy by ChemCam and SuperCam,” in *Remote Compositional Analysis: Techniques for Understanding Spectroscopy, Mineralogy, and Geochemistry of Planetary Surfaces*, Eds: Janice L. Bishop, Jeffrey Moersch, and James F. Bell, III, Cambridge University Press.

**Lanza, N.L.** and Newsom, H.E. (2013). Extraterrestrial Hillslope Processes. In: Stoffel, M. and Marston, R. (Eds.), *Treatise on Geomorphology v.7: Mountain and Hillslope Geomorphology*. Elsevier, Amsterdam, 382-396.

## **REFEREED JOURNAL PUBLICATIONS (78)**

Gasda, P.J., **Lanza, N.L.**, Meslin, P.-Y., Lamm, S.N., Cousin, A., Anderson, R., Forni, O., Swanner, E., L’Haridon, J., Frydenvang, J., Thomas, N., Gwizd, S., Stein, N., Fischer, W.W., Hurowitz, J., Sumner, D., Rivera-Hernandez, F., Crossey, L., Ollila, A., Essunfeld, A., Newsom, H.E., Clark, B., Wiens, R.C., Gasnault, O., Clegg, S.M., Maurice, S., Delapp, D., and Reyes-Newell, A. Manganese-rich sandstones as an indicator of ancient oxic lake water conditions in Gale crater, Mars (in revision). *Journal of Geophysical Research Planets*.

Garczynski, B.J., Horgan, B.H.N., Johnson, J.R., Rice, M.A., Mandon, L., Chide, B., Bechtold, A., Beck, P., Bell III, J.F., Dehouck, E., Fairen, A., Gomez, F., Mslin, P.-Y., Paar, G., Sephton, M.A., Simon, J.I., Traxler, C., Vaughan, A.F., Wiens, R.C., Bertrand, T., Beyssac, O., Brown, A.J., Cardarelle, E.L., Cloutis, E., Duflo, L., Flannery, D.T., Gasda, P.J., Hayes, A.G., Herd, C., Kah, L.C., Kinch, K.M., **Lanza, N.L.**, Merusi, M., Million, C., Nunez, J.I., Ollila, A.M., Royer, C., St. Clair, M., Tate, C., and Yanchilina, A.G. (in revision). Rock coatings as evidence for late surface alteration on the floor of Jezero crater, Mars. *Journal of Geophysical Research Planets*.

Beck, P., Meslin, P.-Y., Fau, A., Gasnault, O., Lasue, J., Cousin, C., Schroder, S., Maurice, S., Rapin, W., Wiens, R.C., Ollila, A.M., Dehouck, E., Mangold, N., Garcia, B., Schwartz, S., Goetz, W., and **Lanza, N.** (2024). Detectability of carbon with ChemCam LIBS: Distinguishing sample from Mars atmospheric carbon, and application to Gale crater. *Icarus* 408, 115840, <https://doi.org/10.1016/j.icarus.2023.115840>.

Rapin, W., G. Dromart, B.C. Clark, J. Schieber, E.S. Kite, L.C. Kah, L.M. Thompson, O. Gasnault, J. Lasue, P.-Y. Meslin, P.G. Gasda, and **N.L. Lanza** (2023). Sustained wet-dry cycling on early Mars. *Nature* 620, doi: 10.1038/s41586-023-06220-3.

Trieman, A.H., **Lanza, N.L.**, et al. (2023). Manganese-iron nodules at the Groken site, Gale crater, Mars. *Minerals* 13(9), 1122. doi.org/10.3390/min13091122.

Chide, B. **Lanza, N.L.**, et al. (2023). Measurements of sound propagation in Mars' lower atmosphere. *Earth and Planetary Science Letters* 615 (118200). <https://doi.org/10.1016/j.epsl.2023.118200>

Manelski, H.T., R.Y. Sheppard, A.A. Fraeman, R.C. Wiens, J.R. Johnson, E.B. Rampe, J. Frydenvang, **N.L. Lanza**, and O. Gasnault (2023). Compositional Variations in Sedimentary Deposits in Gale Crater as

- Observed by ChemCam Passive and Active Spectra, *Journal of Geophysical Research Planets* 128(3), doi: 10.1029/2022JE007706.
- Nellessen, M.A., Gasda, P., Crossey, L., Peterson, E., Ali, A., Zhang, J., Zhou, W., Hao, M., Spilde, M., Newsom, H., **Lanza, N.**, Reyes-Newell, A., Legett, S., Das, D., Delapp, D., Yeager, C., Labouriau, A., Clegg, S., and R.C. Wiens (2023). Boron adsorption in clay minerals: Implications for martian groundwater chemistry and boron on Mars, *Icarus* 401, article 115599, doi: 10.1016/j.icarus.2023.115599.
- Goetz, W., E. Dehouck, P.J. Gasda, J.R. Johnson, P.-Y. Meslin, **N.L. Lanza**, R.C. Wiens, W. Rapin, J. Frydenvang, V. Payré, and O. Gasnault, Detection of copper by the ChemCam instrument along Curiosity's traverse in Gale crater, Mars: Elevated abundances in Glen Torridon (2023). *Journal of Geophysical Research Planets* 128(3), doi: 10.1029/2021JE007101.
- Alvarez-Llamas, C., **Lanza, N.L.**, and 35 coauthors (2023). The sound of geological targets on Mars from the absolute intensity of laser-induced sparks shock waves. *Spectrochimica Acta B: Atomic Spectroscopy* 205, 106687.
- Wiens, R.C., **Lanza, N.**, and 92 coauthors (2022). Compositionally and density stratified igneous terrain in Jezero crater, Mars, *Science Advances* 8(34), doi: 10.1126/sciadv.abo3399.
- Chide, B., Bertrand, T., Lorenz, R.D., Munguira, A., Hueso, R., Sanches-Lavega, A., Martinez, G., Spiga, A., Jacob X., de la Torre Juarez, M., Lemmon, M.T., Banfield, D., Newman, C.E., Murdoch, N., Stott, A., Viudez-Moreiras, D., Pla-Garcia, J. Larmat, C., **Lanza, N.L.**, Rodriguez-Manfredi, J.A., and Wiens, R.C. (2022). Acoustics reveals short-term air temperature fluctuations near Mars' surface. *Geophysical Research Letters* 49(21), e2022GL100333.
- Wiens, R.C., Udry, A., Beyssac, O., Quantin-Natad, C., Mangold, N., Cousin, A., Mandon, L., Bosak, T., Forni, O., McLennan, S.M., Sautter, V., Brown, A., Benzerara, K., Johnson, J.R., Mayhew, L., Maurice, S., Anderson, R.B., Clegg, S.M., Crumpler, L., Gabriel, T.S.J., Gasda, P., Hal, J., Horgan, B.H.N., Kah, L., Legett IV, C., Madariaga, J.-M., Meslin, P.-Y., Ollila, A.M., Poulet, F., Royer, C., Sharma, S.K., Siljestrom, S., Simon, J.I., Acosta-Maeda, T.E., Alvarez-Llamas, C., Angel, S.M., Arana, G., Beck, P., Bernard, S., Bertrand, T., Bousquet, B., Castro, K., Chide, B., Clave, E., Cloutis, E., Connell, S., Dehouck, E., Dromart, G., Fischer, W., Fouchet, T., Francis, R., Frydenvang, J., Gasnault, O., Gibbons, E., Gupta, S., Hausrath, E.M., Jacob, X., Kalucha, H., Kelly, E., Knutsen, E., **Lanza, N.**, Laserna, J., Lasue, J., Le Mouelic, S., Leveille, R., Lopez Reyes, G., Lorenz, R., Manrique, J.A., Martinez-Frias, J., McConnochie, T., Melikechi, N., Mimoun, D., Montmessin, F., Moros, J., Murdoch, N., Pilleri, P., Pilorget, C., Pinet, P., Rapin, W., Rull, F., Schroder, S., Shuster, D.L., Smith, R.J., Stott, A.E., Tarnas, J., Turenne, N., Veneranda, M., Vogt, D.S., Weiss, B.P., Willis, P., Stack, K.M., Williford, K.H., Farley, K.A., and the SuperCam Team (2022). Compositionally and density stratified igneous terrain in Jezero crater, Mars. *Science Advances* 8(34), doi: 10.1126/sciadv.abo3399.
- Anderson, R.B., O. Forni, A. Cousin, R.C. Wiens, S.M. Clegg, J. Frydenvang, T.S.J. Gabriel, A. Ollila, S. Schröder, O. Beyssac, E. Gibbons, D.S. Vogt, E. Clavé, J.-A. Manrique, C. Legett IV, P. Pilleri, R.T. Newell, J. Sarrao, S. Maurice, G. Arana, K. Bezerara, P. Bernardi, S. Bernard, B. Bousquet, A.J. Brown, C. Alvarez-Llamas, B. Chide, E. Cloutis, J. Comellas, S. Connell, E. Dehouck, D. Delapp, A. Essunfeld, C. Fabre, T. Fouchet, C. Garcia-Florentino, L. García-Gómez, P. Gasda, O. Gasnault, E.M. Hausrath, **N.L. Lanza**, J. Laserna, J. Lasue, G. Lopez, J.A. Madariaga, L. Mandon, N. Mangold, P.-Y. Meslin, A.E. Nelson, H. Newsom, A.L. Reyes-Newell, S. Robinson, F. Rull, S. Sharma, J.I. Simon, P. Sobron, I.T. Fernandez, A. Udry, D. Venhaus, S.M. McLennan, D.V. Morris, and B. Ehlmann (2022). Post-landing major element quantification using SuperCam laser induced breakdown spectroscopy. *Spectrochimica Acta Part B* 188, 106347, <https://doi.org/10.1016/j.sab.2021.106347>.
- Maurice, S., B. Chide, N. Murdoch, R. D. Lorenz, D. Mimoun, R. C. Wiens, A. Stott, X. Jacob, T. Bertrand, F. Montmessin, **N. L. Lanza**, C. Alvarez-Llamas, S. M. Angel, M. Aung, J. Balam, O. Beyssac, A. Cousin, G. Delory, O. Forni, T. Fouchet, O. Gasnault, H. Grip, M. Hecht, J. Hoffman, J. Laserna, J. Lasue, J. Maki, J. McClean, P.-Y. Meslin, S. Le Mouélic, A. Munguira, C. E. Newman, J. A. Rodríguez Manfredi, J. Moros, A. Ollila, P. Pilleri, S. Schröder, M. de la Torre Juárez, T. Tzanetos, K. M. Stack, K. Farley, K. Williford, and the SuperCam team (2022). In situ recording of Mars soundscape. *Nature* 605, 653–658.
- VanBommel, S.J., R. Gellert, J.A. Berger, M.A. McCraig, C.D. O'Connell-Cooper, L.M. Thompson, A.S. Yen, N.I. Boyd, **N.L. Lanza**, and A.M. Ollila (2022). Constraining the chemical depth profile of a manganese-rich surface layer in Gale crater, Mars. *Spectrochimica Acta Part B: Atomic Spectroscopy* 191, article 106410, doi: 10.1016/j.sab.2022.106410.

- Gasda, P.J., J. Comellas, A. Essunfeld, D. Das, A. B. Bryk, E. Dehouck, S. P. Schwenzer, L. Crossey, K. Herkenhoff, J. R. Johnson, H. Newsom, **N. L. Lanza**, W. Rapin, W. Goetz, P.-Y. Meslin, J. C. Bridges, R. Anderson, G. David, S. M. R. Turner, M. T. Thorpe, L. Kah, J. Frydenvang, R. Kronyak, G. Caravaca, A. Ollila, S. Le Mouélic, M. Nellessen, M. Hoffman, D. Fey, A. Cousin, R. C. Wiens, S. M. Clegg, S. Maurice, O. Gasnault, D. Delapp, and A. Reyes-Newell (2022). Overview of the Morphology and Chemistry of Diagenetic Features in the Clay-Rich Glen Torridon Unit of Gale Crater, Mars. *Journal of Geophysical Research Planets* 127(12), doi: 10.1029/2021JE007097.
- Caravaca, G., N. Mangold, E. Dehouck, J. Schieber, L. Zaugg, A.B. Bryk, C.M. Fedo, S. Le Mouélic, L. Le Deit, S.G. Banham, S. Gupta, A. Cousin, W. Rapin, O. Gasnault, F. Rivera-Hernández, R.C. Wiens, and **N.L. Lanza**. From Lake to River: Documenting an Environmental Transition across the Jura/Knockfarril Hill Members Boundary in Glen Torridon Region of Gale crater (Mars). *Journal of Geophysical Research Planets* 127(9), doi: 10.1029/2021JE007093.
- Dehouck, E., A. Cousin, N. Mangold, J. Frydenvang, O. Gasnault, O. Forni, W. Rapin, P.J. Gasda, G. Caravaca, G. David, C.C. Bedford, J. Lasue, P-Y Meslin, K. Rammelkamp, M. Desjardins, S. Le Mouélic, M. T. Thorpe, V.K. Fox, K.A. Bennett, A.B. Bryk, **N.L. Lanza**, S. Maurice, and R.C. Wiens (2022). Bedrock geochemistry and alteration history of the clay-bearing Glen Torridon region of Gale crater, Mars *Journal of Geophysical Research Planets* 127(12), doi: 10.1029/2021JE007103.
- David, G., E. Dehouck, P.-Y. Meslin, W. Rapin, A. Cousin, O. Forni, O. Gasnault, J. Lasue, N. Mangold, P. Beck, S. Maurice, R.C. Wiens, G. Berger, S. Fabre, P. Pinet, B.C. Clark, J.R. Smith, and **N.L. Lanza** (2022). Evidence for Amorphous Sulfates as the Main Carrier of Soil Hydration in Gale Crater, Mars. *Geophysical Research Letters* 49(21), doi: 10.1029/2022GL098755.
- Lingappa, U.F., Yeager, C.M., Sharma, A, **Lanza, N.L.**, Morales, D.P., Xie, G., Atencio, A.D., Chadwick, G.L., Monteverde, D.R., Magyar, J.S., Webb, S.M., Valentine, J.S., Hoffman, B.M., Fischer, W.W. (2021). Manganese in rock varnish derives from Cyanobacteria. *Proceedings of the National Academy of Sciences* 118 (25), e2025188118, <https://doi.org/10.1073/pnas.2025188118>.
- Liu, Y., Fischer, W.W., Ma, C., Beckett, J.R., Guan, Y., Lingappa, U.F., Webb, S.M., Tschauner, O., Prakapenka, V.B., Hu, J., **Lanza, N.**, Agee, C. (2021). Manganese oxides in Martian meteorites Northwest Africa (NWA) 7034 and 7533. *Icarus* 364, 114471, <https://doi.org/10.1016/j.icarus.2021.114471>.
- Clark, B.C., Kolb, V.M., Steele, A., House, C.H., **Lanza, N.L.**, Gasda, P.J., VanBommel, S.J., Newsom, H.E., and Martinez-Frias, J. (2021). Origin of life on Mars: Suitability and Opportunities. *Life* 11 (6), 539, <https://doi.org/10.3390/life11060539>.
- Caravaca, G., Le Mouélic, S., Rapin, W., Dromart, G., Gasnault, G., Fau, A., Newsom, H.E., Mangold, N., Le Diet, L., Maurice, S., Wiens, R.C., and **Lanza, N.L.** (2021). Long-distance 3D reconstructions using photogrammetry with Curiosity's ChemCam remote micro-imager in Gale crater (Mars). *Remote Sensing* 13, 4068, <https://doi.org/10.3390/rs13204068>.
- Gasda, P.J, Anderson, R., Cousin, A., Forni, O., Clegg, S., Ollila, A., **Lanza, N.**, Frydenvang, F., Lamm, S., Wiens, R., Maurice, S., Gasnault, O., Beal, R., Reyes-Newell, A., Delapp. D. (2021). Quantification of Manganese for ChemCam Mars and Laboratory Spectra Using a Multivariate Model, *Spectrochimica Acta Part B* 181, 106223, <https://doi.org/10.1016/j.sab.2021.106223>.
- Wiens, R.C., **Lanza, N.L.**, and 129 coauthors (2021). The SuperCam instrument suite on the NASA Mars 2020 rover: Body unit and combined system tests. *Space Science Reviews* 217 (article 4), <https://link.springer.com/article/10.1007/s11214-020-00777-5>.
- Maurice, S., **Lanza, N.**, and 162 coauthors (2021). The SuperCam instrument on the Mars 2020 rover: Science objectives and mast-unit description. *Space Science Reviews* 217 (47), <https://doi.org/10.1007/s11214-021-00807-w>.
- Castorena, J., Oyen, D., Ollila, A., Legget, C., and **Lanza, N.** (2021). Deep spectral CNN for laser induced breakdown spectroscopy. *Spectrochimica Acta B: Atomic Spectroscopy* 178, 106125, <https://doi.org/10.1016/j.sab.2021.106125>.
- Wiens, R.C., Esgett, K.S., Stack, K.M., Dietrich, W.E., Bryk, A.B., Mangold, N., Bedford, C., Gasda, P., Farién, A., Thompson, L., Johnson, J., Gasnault, O., Clegg, C., Cousin, A., Forni, O., Frydenvang, J., **Lanza, N.**, Maurice, S., Newsom, H., Ollila, A., Payre, V., Rivera-Hernandez, F., and Vasavada, A. (2020). Origin and composition of three heterolithic boulder- and cobble-bearing deposits overlying the Murray and Stimson formations, Gale crater, Mars. *Icarus* 350, <https://doi.org/10.1016/j.icarus.2020.113897>.
- L'Haridon, J., Mangold, N., Fraeman, A.A., Johnson, J.R., Cousin, A., Rapin, W., David, G., Dehouck, E., Sun, V.,

- Frydenvang, J., Gasnault, O., Gasda, P., **Lanza, N.**, Forni, O., Meslin, P.-Y., Schwenzer, S., Bridges, J., Horgan, B., House, C.H., Salvatore, M., Maurice, S., and Wiens, R.C. (accepted). Iron mobility during diagenesis at the Vera Rubin Ridge, Gale crater, Mars. *Journal of Geophysical Research Planets*, <https://doi.org/10.1029/2019JE006299>.
- Frydenvang, J., Mangold, N., Wiens, R.C., Fraeman, A.A., Edgar, L.A., Fedo, C., L'Haridon, J., Bedford, C.C., Gupta, S., Grotzinger, J.P., Bridges, J.C., Clark, B.C., Rampe, E.B., Gasnault, O., Maurice, S., Gasda, P.J., **Lanza, N.L.**, Ollila, A.M., Meslin, P.-Y., Payré, V., Calef, F., Salvatore, M., and House, C.H. (2020). The chemostratigraphy of the Murray formation and role of diagenesis at Vera Rubin ridge in Gale crater, Mars, as observed by the ChemCam instrument. *Journal of Geophysical Research: Planets* 125(9), <https://doi.org/10.1029/2019JE006320>.
- Carrier, B.L, **Lanza, N.L.**, and 59 coauthors (2020). Mars Extant Life: What's Next? Conference Report. *Astrobiology* 20(6), 785-814.
- Yousefzadeh, R., Oyen, D., and **Lanza, N.** (2019). Learning Diverse Gaussian Graphical Models and Interpreting Edges. *Proceedings of the 2019 SIAM International Conference on Data Mining*, 405-413, <https://doi.org/10.1137/1.9781611975673.46>.
- Payré, V., Sautter, V., Gasnault, O., Forni, O., Maurice, S., Lasue, J., Goetz, W., Meslin, P.-Y., **Lanza, N.**, Nachon, M., Mangold, N., Le Deit, L., Rapin, W., Clark, B. (2019). Copper enrichments in the Kimberley formation in Gale crater, Mars: Evidence for a Cu deposit at the source. *Icarus* 321, 736-751.
- Salvatore, M., Truitt, K., Roszell, K., Wiens, R., Clegg, S., Mangold, N., **Lanza, N.**, Rampe, E., Dehouck, E. (2019). Investigating the role of anhydrous oxidative weathering on sedimentary rocks in the Transantarctic Mountains and implications for the modern weathering of sedimentary lithologies on Mars. *Icarus* 319, 669-684.
- Lasue, J., Cousin, A., Meslin, P.-Y., Mangold, N., Wiens, R.C., Berger, G., Dehouck, E., Forni, O., Goetz, W., Gasnault, O., Rapin, W., Schroeder, S., Ollila, A., Johnson, J., Le Mouelic, S., Maurice, S., Anderson, R., Blaney, D., Clark, B., Clegg, S.M., d'Uston, C., Fabre, C., **Lanza, N.**, Madsen, M. B., Martin-Torres, J., Melikechi, N., Newsom, H., Sautter, V., Zorzano, M.P. (2018). Martian eolian dust probed by ChemCam. *Geophysical Research Letters* 45,
- Wagstaff, K. L., Francis, R., Gowda, T., Lu, Y., Riloff, E., Singh, K., and **Lanza, N. L.** (2018). Mars target encyclopedia: Rock and soil composition extracted from the literature. In *32nd AAAI Conference on Artificial Intelligence*, 7861-7866
- Gasda, P.J., Haldeman, E.B., Wiens, R.C., Rapin, W., Bristow, T.F., Bridges, J.C., Schwenzer, S.P., Clark, B., Herkenhoff, K., Frydenvang, J., **Lanza, N.L.**, Maurice, S., Clegg, S., Delapp, D.M., Sanford, V.L., Bodine, M.R., and McInroy, R. (2017). In situ detection of boron by ChemCam on Mars. *Geophysical Research Letters*, doi: 10.1002/2017GL074480.
- Rampe, E., Ming, D.W., Blake, D.F., Bristow, T.F., Chipera, S.J., Grotzinger, J.P., Morris, R.V., Morrison, S.M., Vaniman, D.T., Yen, A.S., Achilles, C.N., Craig, P.I., Des Marais, D.J., Downs, R.T., Farmer, J.D., Fendrich, K.V., Gellert, R., Hazen, R.M., Kah, L.C., Morookian, J.M., Peretyazhko, T.S., Serrazin, P., Treiman, A.H., Berger, J.A., Eigenbrode, J.L., Farién, A.G., Forni, O., Gupta, S., Hurowitz, J.A., **Lanza, N.L.**, Schmidt, M.E., Siebach, K., Sutter, B., and Thompson, L.M. (2017). Mineralogy of an ancient lacustrine mudstone succession from the Murray formation, Gale crater, Mars. *Earth and Planetary Science Letters* 431, 172-185.
- Cousin, A., Dehouck, E., Meslin, P. Y., Forni, O., Williams, A. J., Stein, N., Gasnault, O., Bridges, N., Ehlmann, B., Schröder, S., Payré, V., Rapin, W., Pinet, P., Sautter, V., **Lanza, N.**, Lasue, J., Maurice, S., and Wiens, R. C. (2017). Geochemistry of the Bagnold dune field as observed by ChemCam and comparison with other aeolian deposits at Gale Crater. *Journal of Geophysical Research Planets* 122(10), 2144-2162.
- Frydenvang, F., Gasda, P., Hurowitz, J., Grotzinger, J., Wiens, R., Newsom, H.E., Edgett, K., Watkins, J., Bridges, J., Maurice, S., Fisk, M., Ehlmann, B., Johnson, J., Rapin, W., Stein, N., Clegg, S., Schwenzer, S., Bedford, Candice, Edwards, P., Mangold, N., Cousin, A., Anderson, R., Payré, V., Vaniman, D., Blake, D.F., **Lanza, N.**, Gupta, S., Van Beek, J., Sautter, V., Meslin, P.-Y., Rice, M., Milliken, R., Gellert, R., Thompson, L., Clark, B., Sumner, D., Fraeman, A., Kinch, K., Madsen, M., Mitrofanov, I., Jun, I., Calef, F., and Vasavada, A. (2016). Diagenetic silica enrichment and late-stage groundwater activity in Gale crater, Mars. *Geophysical Research Letters* 44, 4716-4724.



- Payré, V., Fabre, C., Cousin, A., Sautter, V., Wiens, R.C., Forni, O., Gasnault, O., Mangold, N., Meslin, P.-Y., Lasue, J., Ollila, A., Rapin, W., Maurice, S., Nachon, M., Le Deit, L., **Lanza, N.**, and Clegg, S. (2017). Alkali trace elements in Gale crater, Mars with ChemCam: Calibration update and geological implications. *Journal of Geophysical Research Planets* 122, 650-679.
- Rice, M.S., Gupta, S., Treiman, A.H., Stack, K.M., Calef, F., Edgar, L.A., Grotzinger, J., **Lanza, N.**, Le Deit, L., Lasue, J., Siebach, K.L., Vasavada, A., Wiens, R.C., and Williams, J. (2017). Geologic overview of the Mars Science Laboratory rover mission at The Kimberley, Gale crater, Mars. *Journal of Geophysical Research Planets* 122(1), 2-20.
- Nachon, M., Mangold, N., Forni, O., Kah, L.C., Cousin, A., Wiens, R.C., Anderson, R., Blaney, D., Blank, J.G., Calef, F., Clegg, S.M., Fabre, C., Fisk, M.R., Gasnault, O., Grotzinger, J., Kronyak, R., **Lanza, N.L.**, Lasue, J., Le Deit, L., Le Mouelic, S., Maurice, S., Meslin, P.-Y., Oehler, D.Z., Payre, V., Rapin, W., Schroder, S., Stack, K., Sumner, D. (2017). Chemistry of diagenetic features analyzed by ChemCam at Pahrump Hills, Gale crater, Mars. *Icarus* 281, 121-136.
- Lanza, N.L.**, Wiens, R.C., Arvidson, R.E., Clark, B.C., Fischer, W.W., Gellert, R., Grotzinger, J.P., Hurowitz, J.A., McLennan, S.M., Morris, R.V., Rice, M.S., Bell III, J.F., Berger, J.A., Blaney, D.L., Bridges, N.T., Calef III, F., Campbell, J.L., Clegg, S.M., Cousin, A., Edgett, K.S., Fabre, C., Fisk, M.R., Forni, O., Frydenvang, J., Hardy, K.R., Hardgrove, C., Johnson, J.R., Lasue, J., Le Mouélic, S., Malin, M.C., Mangold, N., Martín-Torres, J., Maurice, S., McBride, M.J., Ming, D.W., Newsom, H.E., Schröder, S., Thompson, L.M., Treiman, A.H., VanBommel, S., Vaniman, D.T., Zorzano, M.-P. (2016). Oxidation of manganese in an ancient aquifer, Kimberley formation, Gale Crater, Mars. *Geophysical Research Letters* 43 (14), 7398-7407, doi: 10.1002/2016GL069109. **[Journal cover]**
- Wagstaff, K. L., Riloff, E., **Lanza, N. L.**, Mattmann, C. A., and Ramirez, P. M. (2016). Creating a Mars target encyclopedia by extracting information from the planetary science literature. In *Workshops of the Thirtieth AAAI Conference on Artificial Intelligence* (WS-16-10: Knowledge Extraction from Text), 532-536.
- Oyen, D. and **Lanza, N.** (2016). Interactive discovery of chemical structure in ChemCam targets using Gaussian graphical models. In *Workshops of the International Joint Conference on Artificial Intelligence* (IJCAI).
- Maurice, S., Clegg, S., Wiens, R., Gasnault, O., Rapin, W., Forni, O., Cousin, A., Sautter, V., Mangold, N., Le Deit, L., Nachon, M., Anderson, R.B., **Lanza, N.**, Fabre, C., Payre, V., Lasue, J., Meslin, P.-Y., Leveille, R., Barraclough, B., Beck, P., Bender, S., Berger, G., Bridges, J., Dyar, M.D., Francis, R., Frydenvang, J., Gondet, B., Ehlmann, B., Herkenhoff, K., Johnson, J., Langevin, Y., Madsen, M., Melikechi, N., Lacour, J.-L., Le Mouelic, S., Lewin, E., Newsom, H., Ollila, A., Pinet, P., Schroder, S., Sirven, J.-B., Tokar, R., Toplis, M., d'Uston, L., Vaniman, D., and Vasavada, A. (2016). ChemCam activities and discoveries during the nominal mission of Mars Science Laboratory in Gale crater, Mars. *Journal of Analytical Atomic Spectrometry*, doi: 10.1039/c5ja00417a
- Lasue, J., Clegg, S., Forni, O., Cousin, A., Wiens, R., **Lanza, N.**, Mangold, N., Le Deit, L., Gasnault, O., Maurice, S., Berger, J., Stack, K., Blaney, D., Fabre, C., Goetz, W., Johnson, J., Le Mouelic, S., Nachon, M., Payre, V., Rapin, W., Sumner, D. (2016). Observation of > 5 wt % zinc at the Kimberley outcrop, Gale crater, Mars. *Journal of Geophysical Research Planets* 121, 338-352, doi:10.1002/2015JE004946.
- Le Deit, L., Mangold, N., Forni, O., Cousin, A., Lasue, J., Schroder, S., Wiens, R., Sumner, D., Fabre, C., Stack, K., Anderson, R.B., Blaney, D., Clegg, S., Dromart, G., Fisk, M., Gasnault, O., Grotzinger, J., Gupta, S., **Lanza, N.**, Le Mouelic, S., Maurice, S., McLennan, S., Meslin, P.-Y., Nachon, M., Newsom, H.E., Payre, V., Rapin, W., Rice, M., Sautter, V., and Treiman, A. (2016). The potassic sedimentary rocks in Gale crater, Mars as seen by ChemCam onboard Curiosity. *Journal of Geophysical Research Planets* 121, 784–804, doi:10.1002/2015JE004987.
- Mezzacappa, A., Melikechi, M., Cousin, A., Wiens, R.C., Lasue, J., Clegg, S.M., Tokar, R., Bender, S., **Lanza, N.L.**, Maurice, S., Berger, G., Forni, O., Gasnault, O., Dyar, M.D., Boucher, T., Lewin, E., Fabre, C., and the MSL Science Team (2016). Application of distance correction to ChemCam laser-induced breakdown spectroscopy measurements. *Spectrochimica Acta Part B* 120, 1929.
- Oyen, D., **Lanza, N.**, and Porter, R. (2015). Discovering compositional trends in Mars rock targets from ChemCam spectroscopy and remote imaging. In *IEEE Applied Imagery Pattern Recognition Workshop* (AIPR-15).

- Sautter, V., Toplis, M.J., Wiens, R.C., Cousin, A., Fabre, C., Gasnault, O., Forni, O., Lasue, J., Ollila, A., Bridges, J.C., Mangold, N., Le Mouélic, S., Fisk, M., Meslin, P.-Y., Beck, P., Pinet, P., Le Deit, L., Rapin, W., Stolper, E.M., Newsom, H., Dyar, D., **Lanza, N.**, Vaniman, D., Clegg, S., and Wray, J.J. (2015). In situ evidence for continental crust on early Mars. *Nature Geoscience* 8, 605-609.
- Forni, O., Gaft, M., Toplis, M.J., Clegg, S.M., Maurice, S., Wiens, R.C., Mangold, N., Gasnault, O., Sautter, V., Le Mouélic, S., Meslin, P.-Y., Nachon, M., McInroy, R.E., Ollila, A.M., Cousin, A., Bridges, J.C., **Lanza, N.L.**, and Dyar, M.D. (2015). First detection of fluorine on Mars: Implications for Gale Crater's geochemistry. *Geophysical Research Letters* 42 (4), 1020-1028.
- Mangold, N., Forni, O., Dromart, G., Stack, K., Wiens, R. C., Gasnault, O., Sumner, D. Y., Nachon, M., Meslin, P. Y., Anderson, R. B., Barraclough, B., Bell, J. F., Berger, G., Blaney, D. L., Bridges, J. C., Calef, F., Clark, B., Clegg, S. M., Cousin, A., Edgar, L., Edgett, K., Ehlmann, B., Fabre, C., Fisk, M., Grotzinger, J., Gupta, S., Herkenhoff, K. E., Hurowitz, J., Johnson, J. R., Kah, L. C., **Lanza, N.**, Lasue, J., Le Mouélic, S., Lévillé, R., Lewin, E., Malin, M., McLennan, S., Maurice, S., Melikechi, N., Mezzacappa, A., Milliken, R., Newsom, H., Ollila, A., Rowland, S. K., Sautter, V., Schmidt, M., Schröder, S., D'Uston, C., Vaniman, D., and Williams, R. (2015). Chemical variations in Yellowknife Bay formation sedimentary rocks analyzed by ChemCam on board the Curiosity rover on Mars. *Journal of Geophysical Research Planets* 120(3), 452-482.
- Lanza, N.L.**, Ollila, A.M., Cousin, A., Wiens, R.C., Clegg, S., Mangold, N., Bridges, N.T., Cooper, D., Schmidt, M., Berger, J., Arvidson, R., Melikechi, N., Newsom, H.E., Tokar, R., Hardgrove, C., Mezzacappa, A., Jackson, R., Clark, B., Forni, O., Maurice, S., Nachon, M., Anderson, R.B., Blank, J., Deans, M., Delapp, D., Leveille, R., McInroy, R., Martinez, R., Meslin, P.-Y., and Pinet, P. (2015). Understanding the signature of rock coatings in laser-induced breakdown spectroscopy data. *Icarus* 249, 62-73.
- Lanza, N.L.**, Fischer, W.W., Grotzinger, J., Wiens, R.C., Anderson, R.B., Ollila, A.M., Cousin, A., Mangold, N., Nachon, M., Clark, B.C., Schmidt, M., Berger, J., Forni, O., Melikechi, N., Newsom, H.E., Le Mouélic, S., Sautter, V., and Maurice, S. (2014). High manganese concentrations in rocks at Gale crater, Mars. *Geophysical Research Letters* 41 (16), 5755-5763. **[EOS Research Highlight, 18 November 2014]**
- Anderson, R.B., Bridges, J.C., Williams, A., Edgar, L., Ollila, A., Williams, J., Nachon, M., Mangold, N., Schieber, J., Gupta, S., Dromart, G., Wiens, R., Le Mouélic, S., Forni, O., **Lanza, N.**, Mezzacappa, A., Sautter, V., Fisk, M., Blaney, D., Clark, B., Clegg, S.M., Gasnault, O., Lasue, J., Lévillé, R., Lewin, E., Lewis, K.W., Maurice, S., Newsom, H., Schwenzer, S.P., and Vaniman, D. (2015). ChemCam results from the Shaler outcrop in Gale crater, Mars. *Icarus* 249, 2-21.
- Cousin, A., Meslin, P.-Y., Wiens, R.C., Rapin, W., Mangold, N., Fabre, C., Gasnault, O., Forni, O., Tokar, R., Ollila, A., Schröder, S., Lasue, J., Maurice, S., Sautter, V., Newsom, H., Vaniman, D., Le Mouélic, S., Dyar, D., Berger, G., Blaney, D., Nachon, M., Dromart, G., **Lanza, N.**, Clark, B., Clegg, S., Goetz, W., Barraclough, B., Delapp, D., and the MSL Science Team (2015). Compositions of coarse and fine particles in martian soils at Gale: A window into the production of soils. *Icarus* 249, 22-42.
- Lévillé, R.J., Bridges, J., Wiens, R.C., Mangold, N., Cousin, A., **Lanza, N.**, Forni, O., Ollila, A., Grotzinger, J., Clegg, S.M., Siebach, K., Berger, G., Clark, B., Fabre, C., Anderson, R.B., Gasnault, O., Blaney, D., Deflores, L., Leshin, L., Maurice, S., and Newsom, H. (2014). Chemistry of fracture-filling raised ridges in Yellowknife Bay, Gale Crater: Window into past aqueous activity and habitability on Mars. *Journal of Geophysical Research Planets* 119, 2398-2415.
- Arvidson, R.E., Newsom, H.E., Garvin, J.B., Johnson, J.R., **Lanza, N.L.**, Mangold, N., Calef, F.J., Bellutta, P., Fraeman, A., Hamilton, V., Vasavada, A.R., Morris, R.V., Ming, D.W., Grant, J., Iagnemma, K., Bridges, N.T., and Edgett, K. (2014). Terrain physical properties derived from orbital data and the first 360 sols of Mars Science Laboratory Curiosity rover observations in Gale crater. *Journal of Geophysical Research Planets* 119, 1322-1344.
- Melikechi, N., Mezzacappa, A., Cousin, A., **Lanza, N.L.**, Lasue, J., Clegg, S.M., Berger, G., Wiens, R.C., Maurice, S., Tokar, R.L., Bender, S., Forni, O., Beves, E.A., Dyar, M.D., Frydenvang, J., Delapp, D., Gasnault, O., Newsom, H., Ollila, A.M., Lewin, E., Clark, B.C., Ehlmann, B.L., Blaney, D., Fabre, C., and the MSL Science Team (2014). Correcting for variable laser-target distances of LIBS measurements with ChemCam using emission lines of Martian dust spectra. *Spectrochimica Acta B* 96, 51-60.
- Bridges, N.T., Calef, F.J., Hallet, B., Herkenhoff, K.E., **Lanza, N.L.**, LeMouélic, S., Newman, C.E., Blaney, D.L., de Pablo, M.A., Kocurek, G.A., Langevin, Y., Lewis, K.W., Maurice, S., Meslin, P.-Y., Pinet, P.,

- Rice, M.S., Richardson, M.E., Wiens, R.C., and Yingst, R.A. (2014). The rock abrasion record at Gale Crater: Results from Bradbury Landing to Rocknest. *Journal of Geophysical Research Planets* 119, 1374- 1389.
- Ollila, A.O., Newsom, H.E., Clark, B., Wiens, R.C., Cousin, A., Blank, J.G., Mangold, N., Sautter, V., Maurice, S., Clegg, S.M., Gasnault, O., Forni, O., Tokar, R., Lewin, E., Dyar, M.D., Lasue, J., Anderson, R., McLennan, S.M., Bridges, J., Vaniman, D., **Lanza, N.**, Fabre, C., Melikechi, N., Perrett, G.M., Campbell, J.L., King, P.L., Barraclough, B., Delapp, D., Johnstone, S., Meslin, P.-Y., Rosen-Gooding, A., Williams, J., and the MSL Science Team (2014). Trace element geochemistry (Li, Ba, Sr, and Rb) using Curiosity's ChemCam: Early results for Gale crater from Bradbury Landing Site to Rocknest. *Journal of Geophysical Research Planets* 119, 1-31.
- Blaney, D. L., Wiens, R. C., Maurice, S., Clegg, S. M., Anderson, R. B., Kah, L. C., Le Mouélic, S., Ollila, A., Bridges, N., Tokar, R., Berger, G., Bridges, J. C., Cousin, A., Clark, B., Dyar, M. D., King, P. L., **Lanza, N.**, Mangold, N., Meslin, P. Y., Newsom, H., Schröder, S., Rowland, S., Johnson, J., Edgar, L., Gasnault, O., Forni, O., Schmidt, M., Goetz, W., Stack, K., Sumner, D., Fisk, M., and Madsen, M. B. (2014). Chemistry and texture of the rocks at Rocknest, Gale Crater: Evidence for sedimentary origin and diagenetic alteration. *Journal of Geophysical Research Planets* 119(9), 2109-2131.
- Wagstaff, K., **Lanza, N.**, Thompson, D., Dietterich, T., and Gilmore, M. (2013). Guiding scientific discovery with explanations using DEMUD. *Proceedings of the Twenty-Seventh Conference on Artificial Intelligence (AAAI-13)*.
- Meslin, P.-Y., Gasnault, O., Forni, O., Schröder, S., Cousin, A., Berger, G., Clegg, S., Lasue, J., Maurice, S., Sautter, V., Le Mouélic, S., Wiens, R., Fabré, C., Goetz, W., Bish, D., Mangold, N., Ehlmann, B., **Lanza, N.**, Harri, A.-M., Anderson, R., Rampe, E., McConnochie, T.H., Pinet, P., Blaney, D., Léveillé, R., Archer, D., Barraclough, B., Bender, S., Blake, D., Blank, J. G., Bridges, N., Clark, B. C., DeFlores, L., Delapp, D., Dromart, G., Dyar, M.D., Fisk, M., Gondet, B., Grotzinger, J., Herkenhoff, K., Johnson, J., Lacour, J.-L., Langevin, Y., Leshin, L., Lewin, E., Madsen, M.B., Melikechi, N., Mezzacappa, A., Mischna, M. A., Moores, J.E., Newsom, H., Ollila, A., Perez, R., Renno, N., Sirven, J.-B., Tokar, R., de la Torre, M., d'Uston, L., Vaniman, D., Yingst, A., and the MSL Science Team (2013). Soil diversity and hydration as observed by ChemCam at Gale crater, Mars. *Science* 341, 1476, full text online <http://dx.doi.org/10.1126/science.1238670>.
- Wiens, R.C., Maurice, S., Lasue, J., Forni, O., Anderson, R.B., Clegg, S., Bender, S., Blaney, D., Barraclough, B.L., Cousin, A., Deflores, L., Delapp, D., Dyar, M.D., Fabré, C., Gasnault, O., **Lanza, N.**, Mazoyer, J., Melikechi, N., Meslin, P.-Y., Newsom, H., Ollila, A., Perez, R., Tokar, R., and Vaniman, D. (2013). Pre-flight calibration and initial data processing for the ChemCam laser-induced breakdown spectroscopy instrument for the Mars Science Laboratory rover. *Spectrochimica Acta B* 82, 1-27.
- Wiens, R.C., Maurice, S., Barraclough, B., Saccoccio, M., Barkley, W., Bell, J., Bender, S., Bernardin, J., Blaney, D., Blank, J., Bouyé, M., Bridges, N., Bultman, N., Caïs, P., Clanton, R., Clark, B., Clegg, S., Cousin, A., Cremers, D., Cros, A., DeFlores, L., Delapp, D., Dingler, R., D'Uston, C., Elliott T., Enemark, D., Fabre, C., Flores, M., Forni, O., Gasnault, O., Hale, T., Hays, C., Herkenhoff, K., Holm, R., Kan, E., Kirkland, L., Kouach, D., Landis, D., Langevin, Y., **Lanza, N.**, LaRocca, F., Lasue, J., Latino, J., Limonadi, D., Lindensmith, C., Little, C., Mangold, N., Manhes, G., Mauchien, P., McKay, C., Miller, E., Mooney, J., Morrison, L., Nelson, T., Newsom, H., Ollila, A., Ott, M., Pares, L., Perez, R., Provost, C., Reiter, J., Roberts, T., Romero, F., Sautter, V., Salazar, S., Simmonds, J., Stiglich, R., Storms, S., Streibig, N., Thocaven, J.-J., Trujillo, T., Ulibarri, M., Vaniman, D., Warner, N., Waterbury, R., Whitaker, R., Witt, J., and Wong-Swanson, B. (2012). The ChemCam instrument suite on the Mars Science Laboratory (MSL) rover: Body unit and combined system tests. *Space Science Reviews* 170, 167-227.
- Vaniman, D., Dyar, M.D., Wiens, R., Ollila, A., **Lanza, N.**, Lasue, J., Rhodes, M., Clegg, S., and Newsom, H. (2012). Ceramic ChemCam calibration targets on Mars Science Laboratory. *Space Science Reviews* 170, 229-255.
- Lanza, N.L.**, Clegg, S.M., McInroy, R.E., Wiens, R.C., Newsom, H.E., and Deans, M.D. (2012). Examining natural rock varnish and weathering rinds with laser-induced breakdown spectroscopy for application to ChemCam on Mars. *Applied Optics* 51 (7), B74-B82.
- Okubo, C.H., Tornabene, L.L., and **Lanza, N.L.** (2011). Constraints on mechanisms for the growth of gully alcoves in Gasa crater, Mars, from two-dimensional stability assessments of rock slopes. *Icarus* 211,

207-221.

- Lanza, N.L.**, Wiens, R.C., Clegg, S.M., Ollila, A.M., Humphries, S.D., Newsom, H.E., Barefield, J.E., and the ChemCam Team (2010). Calibrating the ChemCam laser-induced breakdown spectroscopy instrument for carbonate minerals on Mars. *Applied Optics* 49 (13), C211-C217.
- Lanza, N.L.**, Meyer, G.A., Okubo, C.H., Newsom, H.E., and Wiens, R.C. (2010). Evidence for debris flow gully formation initiated by shallow subsurface water on Mars. *Icarus* 205, 103-112.
- Newsom, H.E., **Lanza, N.L.**, Ollila, A.M., Wiseman, S.M., Roush, T.L., Marzo, G.A., Tornabene, L.L., Okubo, C.H., Osterloo, M.M., Hamilton, V.E., and Crumpler, L.S. (2010). Inverted channel deposits on the floor of Miyamoto crater, Mars. *Icarus* 205, 64-72.
- Eppler, D., Adams, B., Archer, D., Baiden, G., Brown, A., Carey, W., Cohen, B., Condit, C., Evans, C., Fortezzo, C., Garry, B., Graff, T., Gruener, J., Heldmann, J., Hodges, K., Hörz, F., Hurtado, J., Hynek, B., Isaacson, P., Juranek, C., Klaus, K., Kring, D., **Lanza, N. L.**, Lederer, S., Lofgren, G., Marinova, M., May, L., Meyer, J., Ming, D., Monteleone, B., Morisset, C., Noble, S., Rampe, E., Rice, J., Schutt, J., Skinner, J., Tewksbury-Christle, C. M., Tewksbury, B. J., Vaughan, A., Yingst, A. & Young, K. (2010). Desert Research and Technology Studies (DRATS) 2010 science operations: Operational approaches and lessons learned for managing science during human planetary surface missions. *Acta Astronautica* 90(2), 224-241.
- Marzo, G.A., Roush, T.L., **Lanza, N.L.**, McGuire, P.C., Newsom, H.E., Ollila, A.M., and Wiseman, S.M. (2009). Association of phyllosilicates and the inverted channel in Miyamoto crater, Mars. *Geophysical Research Letters* 36, L11204, doi:10.1029/2009GL038703.
- Wiseman, S.M., Arvidson, R.E., Andrews-Hanna, J.C., Clark, R.N., **Lanza, N.L.**, DesMarais, D., Marzo, G.A., Morris, R.V., Murchie, S.L., Newsom, H., Noe Dobrea, E.Z., Ollila, A.M., Poulet, F., Roush, T.L., Seelos, F.P., and Swayze, G.A. (2008). Phyllosilicate-bearing and sulfate-hematite deposits within Miyamoto Crater in southern Sinus Meridiani, Mars. *Geophysical Research Letters* 35, L19204, doi:10.1029/2008GL035363.