SHOSHANA Z. WEIDER, PhD

Planetary Scientist

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Education

PhD, Planetary Sciences 2007–2010	**Birkbeck College, University of London & Rutherford Appleton Laboratory, UK** Thesis: Studies in lunar geology using existing remote sensing datasets and new orbital X-ray fluorescence spectroscopy from C1XS on Chandrayaan-1
MEarthSci, Earth Sciences 2003–2007	**Worcester College, University of Oxford, UK** Thesis: Palaeomagnetic estimation of pyroclastic flow deposit emplacement temperatures at Volcán de Colima, Mexico
Certificate, Science Communication 2016	**University of the West of England, UK** 10-week online course with units in: the historical and social contexts of science communication; understanding audiences; project planning; project management; designing face-to-face activities; facilitation skills; presentation skills; working with the media; and evaluation.

Employment

2018–Present	**Senior Principal Research Scientist,** NASA Headquarters / ASRC Federal (Washington DC) As **Executive Officer** (Planetary Science Division): Provide executive support, subject matter expertise, and strategic guidance to Division Director for all external engagements with partners and stakeholders Develop and prepare key strategic messaging and presentations; write articles and speeches for a variety of audiences Lead a variety of PSD operations, including government reporting, award nominations, liaising with NASA senior leaders and Agency points of contact As **Program Scientist**: Lead several PSD Research and Analysis Programs (lunar-and Mercury-science focused) Program Scientist for Strofio payload on ESA/JAXA-led BepiColombo mission NASA Liaison to the Mercury Exploration Assessment Group (MExAG)
2016–2018	**Communications Manager,** Institute for Molecular Science and Engineering (Imperial College London)
2012–2016	**Freelance Science Writer & Editor** Form & Content Media (International Society for Optics and Photonics and the Society of Plastics Engineers) Diamond Light Source London Cyber Security Zinkerz

	Network Rail
2015	**Intern,** Science Media Center (London)
2014	**Science & Technical Publications Editor,** European Space Agency (The Netherlands)
2011–2014	**MESSENGER Postdoctoral Fellow,** Department of Terrestrial Magnetism, Carnegie Science (Washington DC)

Books

Forthcoming	*Space Explorers: Earth*, DK Children's
2025	*The Magic & Mystery of Space*, DK Children's
2024	*Mars*, DK Children's (consultant)
2019	*Moon landings*, DK Children's

Peer-reviewed publications (including book chapters)

2023	36. Nittler, L.R., Boujibar A., Crapster-Pregont, E., Frank, E.A., McCoy, T.J., McCubbin, F.M., Starr, R.D., Vorburger, A., Weider, S.Z., 2023. Chromium on Mercury: New results from the MESSENGER X-Ray Spectrometer and implications for the innermost planet's geochemical evolution. *JGR Planets*. https://doi.org/10.1029/2022JE007691
2022	35. Ernst, C.M., Chabot, N.L., Klima, R.L., Kubot, S., Rogers, G., Byrne, P.K., Hauck II, S.A., Vander Kaaden, K.E., Vervack, Jr., R.J., Besse, S., Blewett, D.T., Denevi, B.W., Goossens, S., Indyk, S.J., Izenberg, N.R., Johnson, C.L., Jozwiak, L.M., Korth, H., McNutt, Jr., R.L., Murchie, S.L., Peplowski, P.N., Raines, J.M., Rampe, E.B., Thompson, M.S., Weider, S.Z., 2022. Science goals and mission concept for a landed investigation of Mercury. *Planetary Science Journal*. https://doi.org/10.3847/PSJ/ac1c0f
2020	34. Nittler, L.R., Frank, E.A., Weider, S.Z., Crapster-Pregont, E., Vorburger, A. Starr, R., D., Solomon, S.C., 2020. Global major-element maps of Mercury from four years of MESSENGER X-Ray Spectrometer observations. *Icarus.* https://doi.org/10.1016/j.icarus.2020.113716
	33. Cartier, C., Namur, O., Nittler, L.R., Weider, S.Z., Crapster-Pregont, E., Vorburger, A., Frank, E.A., Charlier, B., 2020. No FeS layer in Mercury? Evidence from Ti/Al measured by MESSENGER. *Earth and Planetary Science Letters*. https://doi.org/10.1016/j.epsl.2020.116108
2019	32. Weider, S.Z., 2019. Petrology and geochemistry of Mercury. *Oxford Research Encyclopedia of Planetary Science*, Oxford University Press. https://doi.org/10.1093/acrefore/9780190647926.013.127

	31. Hankin, A., Guillén Gosálbez, G., Kelsall, G., Mac Dowell, N., Shah, N., Weider, S.Z., Brophy, K., 2019. Assessing the economic and environmental value of carbon capture and utilisation in the UK. *Institute for Molecular Science and Engineering Briefing Paper Series*.
	30. L. R. Nittler, L.R. & Weider, S.Z., 2019. The surface composition of Mercury. *Elements Magazine*. https://doi.org/10.2138/gselements.15.1.33
2018	29. McCoy, T.J., Peplowski, P. N., McCubbin, F. M., Weider, S.Z., 2018. The geochemical and mineralogical diversity of Mercury. In: S. C. Solomon, L. R. Nittler, and B. Anderson (Eds) *Mercury: The View after MESSENGER*, Cambridge University Press, Cambridge. https://doi.org/10.1017/9781316650684.008
2017	28. Wu, B., Myant, C., Weider, S.Z., 2017. The value of additive manufacturing: future opportunities. *Institute for Molecular Science and Engineering Briefing Paper Series*.
	27. Adjiman, C.S. Harrison, N.M., Weider, S.Z., 2017. Molecular science and engineering: a powerful transdisciplinary approach to solving grand challenges. *Institute for Molecular Science and Engineering Briefing Paper Series.*
	26. K. E. Vander Kaaden, F. M. McCubbin, L. R. Nittler, P. N. Peplowski, S. Z. Weider, E. A. Frank, T. J. McCoy, 2017. Geochemistry, mineralogy, and petrology of boninitic and komatiitic rocks on the mercurian surface: Insights into the mercurian mantle. *Icarus*. https://doi.org/10.1016/j.icarus.2016.11.041
2016	25. Weider, S.Z., Nittler, L.R., Murchie, S.L., Peplowski, P.N., McCoy, T.J., Kerber, L., Klimczak, C., Ernst, C.M., Goudge, T.A., Starr, R.D., Izenberg, N.R., Klima, R.L., Solomon, S.C., 2016. Evidence from MESSENGER for sulfur- and carbon-driven explosive volcanism on Mercury. *Geophysical Research Letters*. https://doi.org/10.1002/2016GL068325
2015	24. Weider, S.Z., Nittler, L.R., Starr, R.D., Crapster-Pregont, E.J., Peplowski, P.N., Denevi, B.W., Head, J.W., Byrne, P.K., Hauck II, S.A., Ebel, D.S., Solomon, S.C. 2015. Evidence for geochemical terranes on Mercury: Global mapping of major elements with MESSENGER's X-Ray Spectrometer. *Earth and Planetary Science Letters*. https://doi.org/10.1016/j.epsl.2015.01.023
	23. Peplowski, P.N., Lawrence, D.J., Feldman, W.C., Goldsten, J.O., Bazell, D., Evans, LG., Head, J.W., Nittler, L.R., Solomon, S.C., Weider, S.Z., 2015. Geochemical terranes of Mercury's northern hemisphere as revealed by MESSENGER neutron measurements. *Icarus*. https://doi.org/10.1016/j.icarus.2015.02.002
	22. Peplowski, P.N., Lawrence, D.J., Evans, L.G., Klima, R.L., Blewett, D.T., Goldsten, J.O., Murchie, S.L., McCoy, T.J., Nittler, L.R., Solomon, S.C., Starr, R.D., Weider, S.Z., 2015. Constraints on the abundance of carbon in near-surface materials on Mercury:

Results from the MESSENGER Gamma-Ray Spectrometer. *Planetary and Space Science*. https://doi.org/10.1016/j.pss.2015.01.008

21. Evans, L.G., Peplowski, P.N., McCubbin, F.M., McCoy, T.J., Nittler, L.R., Zolotov, M.Y., Ebel, D.S., Lawrence, D.J., Starr, R.D., Weider, S.Z., Solomon, S.C., 2015. Chlorine on the surface of Mercury: MESSENGER gamma-ray measurements and implications for the planet's formation and evolution. *Icarus*. https://doi.org/10.1016/j.icarus.2015.04.039

2014

20. Weider, S.Z., Nittler L.R., Starr, R.D., McCoy, T.J., Solomon, S.C., 2014. Variations in the abundance of iron on Mercury's surface from MESSENGER X-Ray Spectrometer observations. *Icarus*. https://doi.org/10.1016/j.icarus.2014.03.002

19. Weider, S.Z., Joy, K.H., Crawford, I.A., Kellett, B.J., Swinyard, B.M., Howe, C.J., 2014. Western Oceanus Procellarum as seen by C1XS on Chandrayaan-1. *Icarus*. https://doi.org/10.1016/j.icarus.2013.11.019

18. Domingue, D.L. Chapman, C.R., Killen, R.M., Zurbuchen, T.H., Gilbert, J.A., Sarantos, M., Benna, M., Slavin, J.A., Schriver, D., Trávníček, P.M., Orlando, T.M., Sprague, A.L., Blewett, D.T., Gillis-Davis, J.J., Feldman, W.C., Lawrence, D.J., Ho, G.C., Ebel, D.S., Nittler, L.R., Vilas, F., Pieters, C.M., Solomon, S.C., Johnson, C.L., Winslow, R.M., Helbert, J., Peplowski, P.N., Weider, S.Z., Mouawad, N., Izenberg, N.R., McClintock, W.E., 2014. Mercury's weather-beaten surface: Understanding Mercury in the context of lunar and asteroidal space weathering studies. *Space Science Reviews*. https://doi.org/10.1007/s11214-014-0039-5

17. Peplowski, P.N., Evans, L.G., Stockstill-Cahill, K.R., Lawrence, D.J., Goldsten, J.O., McCoy, T.J., Nittler, L.R., Solomon, S.C., Sprague, A.L., Starr, R.D., Weider, S.Z., 2014. Enhanced sodium abundance in Mercury's north polar region revealed by the MESSENGER Gamma-Ray Spectrometer. *Icarus*. https://doi.org/10.1016/j.icarus.2013.09.007

2013

16. Weider, S.Z. & Nittler, L.R., 2013. The surface composition of Mercury as seen from MESSENGER. *Elements Magazine*, 9, 90–91.

15. Lawrence, D.J., Feldman, W.C., Goldsten, J.O., Maurice, S., Peplowski, P.N., Anderson, B.J., Bazell, D., McNutt Jr., R.L., Nittler, L.R., Prettyman, T.H., Rodgers, D.J., Solomon, S.C., Weider, S.Z., 2013. Evidence for water ice near Mercury's north pole from MESSENGER Neutron Spectrometer measurements. *Science*. https://doi.org/10.1126/science.1229953

14. Zolotov, M.Y., Sprague, A.L., Hauck II, S.A., Nittler, L.R., Solomon S.C., Weider, S.Z., 2013. The redox state, FeO content, and origins of sulfur-rich magmas Mercury. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004274

2012

13. Weider, S.Z., Nittler, L.R., Starr, R.D., McCoy, T.J., Stockstill-Cahill, K.R., Byrne, P.K., Denevi, B.W., Head, J.W., Solomon, S.C., 2012. Chemical heterogeneity on Mercury's surface revealed by the MESSENGER X-Ray Spectrometer. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004153

12. Weider, S. Z., Kellett, B.J., Swinyard, B.M., Crawford, I.A., Joy, K.H., Grande, M., Howe, C.J., Huovelin, J., Narendranath, S., Alha, L., Anand, M., Athiray, P.S., Bhandari, N., Carter, J.A., Cook, A.C., d'Uston, L.C., Fernandes, V.A., Gasnault, O., Goswami, J.N., Gow, D., Holland, A.D., Koschny, D., Lawrence, D.J., Maddison, B.J., Maurice, S., McKay, D.J., Okada, T., Pieters, C., Rothery, D.A., Russell, S.S., Shrivastava, A., Smith, D.R., Wieczorek, M., 2012. The Chandrayaan-1 X-ray Spectrometer: First results. *Planetary and Space Science*. https://doi.org/10.1016/j.pss.2011.08.014

11. Evans, L.G., Peplowski, P.N., Rhodes, E.A., Lawrence, D.J., McCoy, T.J., Nittler, L.R., Solomon, S.C., Sprague, A.L., Stockstill-Cahill, K.R., Starr, R.D., Weider, S.Z., Boynton, W.V., Hamara, D.K., Goldsten, J.O., 2012. Major-element abundances on the surface of Mercury: Results from the MESSENGER Gamma-Ray Spectrometer. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004178

10. Peplowski, P.N., Lawrence, D.J., Rhodes, E.A., Sprague, A.L., McCoy, T.J., Denevi, B.W., Evans, L.G., Head, J.W., Nittler, L.R., Solomon, S.C., Stockstill-Cahill, K.R., Weider, S.Z., 2012. Variations in the abundances of potassium and thorium on the surface of Mercury: Results from the MESSENGER Gamma-Ray Spectrometer. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004141

9. Starr, R.D., Schriver, D., Nittler, L.R., Weider, S.Z., Byrne, P.K., Ho, G.C., Rhodes, E.A., Schlemm II, C.E., Solomon, S.C., Trávníček, P., 2012. MESSENGER detection of electron-induced X-ray fluorescence from Mercury's surface. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004118

8. Stockstill-Cahill, K.R., McCoy, T.J., Nittler, L.R., Weider, S.Z., Hauck II, S.A., 2012. Magnesium-rich crustal compositions on Mercury: Implications for magmatism from petrologic modeling. *Journal of Geophysical Research: Planets*. https://doi.org/10.1029/2012JE004140

7. *A Global Lunar Landing Site Study to Provide the Scientific Context for Exploration of the Moon* (Kring & Durda, Eds.), 2012. 40 authors including Weider, S.Z., LPI contribution No. 1694

2011

6. Weider, S.Z., Swinyard, B.M., Kellett, B.J., Howe, C.J., Joy, K.H., Crawford, I.A., Gow, J., Smith, D.R., 2011. Planetary X-ray fluorescence analogue laboratory experiments and an elemental abundance algorithm for C1XS. *Planetary and Space Science*. https://doi.org/10.1016/j.pss.2011.05.005

	5. Narendranath, S., Athiray, P.S., Sreekumar, P., Kellett, B.J., Alha, L., Howe, C.J., Joy, K.H., Grande, M., Huovelin, J., Crawford, I.A., Unnikrishnan, U., Lalita, S., Subrmaniam, S., Weider, S.Z., Nittler, L.R., Gasnault, O., Rothery, D., Fernandes, V.A., Bhandari, N., Goswami, J.N., Wieczorek, M.A., 2011. Lunar X-ray fluorescence observations by the Chandrayaan-1 X-ray Spectrometer (C1XS): Results from the nearside southern highlands. *Icarus*. https://doi.org/10.1016/j.icarus.2011.04.010
	4. Nittler, L.R., Starr, R.D., Weider, S.Z., McCoy, T.J., Boynton, W.V., Ebel, D.S., Ernst, C.M., Evans, L.G., Goldsten, J.O., Hamara, D.K., Lawrence, D.J., McNutt Jr., R.L., Schlemm II, C.E., Solomon, S.C., Sprague, A.L., 2011. The major-element composition of Mercury's surface from MESSENGER X-ray Spectrometry. *Science*. https://doi.org/10.1126/science.1211567
2010	3. Weider, S.Z., Crawford, I.A., Joy, K.H., 2010. Individual lava flow thicknesses in Oceanus Procellarum and Mare Serenitatis determined from Clementine multispectral data. *Icarus*. https://doi.org/10.1016/j.icarus.2010.05.010
	2. Narendranath, S., Sreekumar, P., Maddison, B.J., Howe, C.J., Kellett, B.J., Wallner, M., Erd, C., Weider, S.Z., 2010. Calibration of the C1XS instrument on Chandrayaan-1. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*. https://doi.org/10.1016/j.nima.2010.04.049
	1. Paterson, G. A., Roberts, A.P., Mac Niocaill, C., Muxworthy, A.R., Lucia, G., Viramonté, J.G., Navarro, C., Weider, S.Z, 2010. Paleomagnetic determination of emplacement temperatures of pyroclastic deposits: An under-utilized tool. *Bulletin of Volcanology*. https://doi.org/10.1007/s00445-009-0324-4

Selected articles, interviews, and events

2021	Frank, E., Byrne, P.K., Weider, S.Z., Elkins-Tanton, L., 2021. Normalizing non-academic career paths in planetary science. White Paper submitted to Planetary Science and Astrobiology Decadal Survey 2023–2032. https://doi.org/10.3847/25c2cfeb.b6de7d9d
2014–2016	Postcards from Planet Earth blog posts
2017	Article for Oxford University Department of Earth Sciences Magazine (*Rewriting the Book on Mercury*)
2015	Science 'Stand up' at *Science Showoff* in London
2015	Interviewed for Shrinking Space's *Minds' Eye* exhibition and *Little Atoms* podcast
2013	Featured on NPR's *All Things Considered*

Invited talks and seminars

2024	**National Academies of Sciences, Engineering, and Medicine, Washington DC** The 1924: A Science Speakeasy
2024	**Amity Club of Washington** NASA's Exploration of the Solar System
2023	**Geological Society of Washington, Washington DC** Mercury Exploration: Past, Present, Future (voted 2nd Best Paper of 2023)
2017	**Royal Observatory Greenwich, London** Look, but don't touch! Exploring Mercury from Orbit
2015	**Joint MESSENGER-BepiColombo Workshop, Berlin** Geochemistry of Mercury's surface: Results from MESSENGER
2014	**Center for Planetary Sciences, University College London** Mercury after 3.5 years of MESSENGER's orbital mission
2013	**Lunar and Planetary Institute, Houston** The surface composition of Mercury from MESSENGER data
2013	**Joint MESSENGER-BepiColombo Workshop, Chicago** The surface composition of Mercury from MESSENGER data
2013	**Geological Society of America, Denver** The distribution of magnesium on Mercury's surface as measured by the MESSENGER X-Ray Spectrometer
2013	**European Planetary Science Congress, Madrid** Regional-scale chemical heterogeneity on Mercury
2012	**Department of Terrestrial Magnetism, Carnegie Science** What on Earth is Mercury made of? Geochemical results from MESSENGER
2012	**Center for Planetary Sciences, University College London** What on Earth is Mercury made of? Geochemical results from MESSENGER
2012	**Department of Geology, University of Maryland** What on Earth is Mercury made of? Geochemical results from MESSENGER
2011	**American Museum of Natural History, New York** Dead, Grey, and… boring?
2010	**Center for Planetary Science, University College London** Impact craters: Windows through lava flows

Selected service activities

2024	**Speaker at STEAMClipse event, Waco, TX**

	The Moon's Moment in the Sun
2009–2018	**Journal Reviewer** for: Earth and Planetary Science Letters; Icarus; Journal of Geophysical Research: Planets; Journal of Quantitative Spectroscopy and Radiative Transfer; Cambridge University Press
2012–2021	**Research Grant Reviewer** for: several programs in NASA's Science Mission Directorate; Space Technology Mission Directorate NASA Innovative Advanced Concepts program; and UK Science and Technology Facilities Council Solar and Planetary Studies program.
	Reviewer for Student Spaceflight Experiments Program
2009–present	School talks and events at elementary/high schools in Washington DC and London
2012–2014	Volunteer at the US Science and Engineering Festival
2013–2019	Undergraduate mentor at the Lunar and Planetary Science Conference
2013–2014	Volunteer subject matter expert for DC College Bound Program and sciLIFE-DC

Teaching

2017	**Institute for Molecular Science and Engineering, Imperial College London** Lecturer in Effective Science Communications (for graduate students)
2010	**University College London** Guest Lecturer: Geology of Planetary Bodies
2009	**Royal Holloway, University of London** Guest Lecturer: Planetary Geology
2008	**Birkbeck College, University of London** Teaching assistant: Geology of the Solar System

Awards

2023	NASA Group Achievement Award, Dual Anonymous Peer Review Development Team
2021	NASA Headquarters Honor Unsung Hero Award, PSD Virtual Review Implementation Team
2017	NASA Group Achievement Award, MESSENGER Project Team
2010	Barringer Crater Student Travel Award
2010	NASA Lunar Science Institute Travel Grant
2008	UCL Graduate School Student Conference Award

2007	Science and Technology Facilities Council CASE PhD student fellowship
2005	Weizmann Institute Summer Research Internship
2005	Worcester College Oppenheimer Award
2005	Worcester College Travel Award
2005	Batya Lyons Memorial Fund Award

Administrative and fundraising experience

2000–2014	Various roles: personal assistant for managing directors and senior personnel in several non-profit organizations, an independent book publisher, property companies, and a public sector office
2008–2010	Administrator for the Oxford University Jewish Society Alumni Network
2005	President of the Oxford University Jewish Society