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Education

2004 UC Berkeley, Ph.D., Geophysics, Thesis Title: “Deep Earth Seismic Structure and Earthquake Source Processes from Long Period Waveform Modelling”
1999 Indiana University, B.S., Geological Sciences

Experience

2017-present Research Scientist, Geophysics and Planetary Geosciences, Jet Propulsion Lab/California Institute of Technology
2008-2017 Assistant Professor, Dept. of Geological Sciences, University of Florida
2006-2008 Postdoctoral Fellow, Department of Geosciences, Princeton University
2004-2006 Postdoctoral Researcher, Berkeley Seismological Lab/Space Sciences Lab
1999-2004 Graduate Student Researcher/Instructor, University of California, Berkeley
1999 Research Assistant, Indiana University

Honors

2021 JPL Voyager Award, For leading the selected Farside Seismic Suite
2019 JPL Voyager Award, Outstanding science leadership in planetary seismometry
2018 JPL Voyager Award, For the selection of Dragonfly
2006 Princeton University Teaching Postdoctoral Fellowship in Science and Engineering, Council on Science & Technology
1999 Berkeley Fellowship, University of California, Berkeley
1998 Faculty Scholarship Award, Dept. of Geological Sciences, Indiana University

Services and Memberships

2017-2019 Chair, Lehmann Medal selection committee, American Geophysical Union
2015-2016 Member, Lehmann Medal selection committee, American Geophysical Union
2013-2014 President, American Geophysical Union SEDI focus group
2012-2014 Member, IRIS Global Seismic Network Standing Committee
2010-2012 Vice-Chair, American Geophysical Union SEDI focus group
2010-2014 Leadership Council, American Geophysical Union
2008-2010 Program Committee, American Geophysical Union Fall Meeting
2003-2018 Executive Committee, American Geophysical Union SEDI focus group (http://www.agu.org/focus_group/SEDI/index.html)

Peer Reviewed Publications

1. M. Knapmeyer, S. C. Stähler, I. Daubar, F. Forget, A. Apiga, T. Pieron, M. van Driel, D. Banfield, E. Hauber, M. Grott, N. Müller, C. Perrin, A. Jacob, A. Lucas, B. Knapmeyer-Endrun, C. Newman, **M. P. Panning**, R. C. Weber, F. J. Calef, M. Böse, S. Ceylan, C. Charalambous, J. F. Clinton, N. Dahmen, D. Giardini, A. Horleston, T. Kawamura, A. Khan, G. Mainsant, M. Plasman, M. Lemmon, R. Lorenz, W. T. Pike, J.-R. Scholz, P. Lognonné, and W. B. Banerdt, “Seasonal seismic activity on Mars”, *Earth Plan. Sci. Lett.*, **576**, 117171, doi: 10.1016/j.epsl.2021.117171, 2021.
2. N. L. Dahmen, G. Zenhäusern, J. F. Clinton, D. Giardini, S. C. Stähler, S. Ceylan, C. Charalambous, M. van Driel, K. J. Hurst, S. Kedar, P. Lognonné, N. Murdoch, R. Myhill, **M. P. Panning**, W. T. Pike, M. Schimmel, C. Schmelzbach, J.-R. Scholz, A. E. Stott, E. Stutzmann and W. B. Banerdt, “Resonances and lander modes observed by InSight on Mars (1-9 Hz)”, *Bull. Seism. Soc. Am.*, **111**, 2924-2950, doi: 10.1785/0120210056, 2021.
3. D. Kim, P. Davis, V. Lekić, R. Maguire, N. Compaire, M. Schimmel, E. Stutzmann, J. C. E. Irving, P. Lognonné, J.-R. Scholz, J. Clinton, G. Zenhäusern, N. Dahmen, S. Deng, A. Levander, **M. P. Panning**, R. F. Garcia, D. Giardini, K. Hurst, B. Knapmeyer-Endrun, F. Nimmo, W. T. Pike, L. Pou, N. Schmerr, S. C. Stähler, B. Tauzin, R. Widmer-Schmidrig and W. B. Banerdt, “Potential pitfalls in the analysis and structural interpretations of seismic data from the Mars InSight mission”, *Bull. Seism. Soc. Am.*, **111**, 2982-3002, doi: 10.1785/0120210123, 2021.
4. D. Kim, V. Lekić, J. C. E. Irving, N. Schmerr, B. Knapmeyer-Endrun, R. Joshi, **M. P. Panning**, B. Tauzin, F. Karakostas, R. Maguire, Q. Huang, S. Ceylan, A. Khan, D. Giardini, M. A. Wieczorek, P. Lognonné, and W. B. Banerdt, “Improving constraints on planetary interiors with PPs receiver functions”, *J. Geophys. Res.*, **126**, e2021JE006983, doi: 10.1029/2021JE006983, 2021.
5. G. Choblet, G. Tobie, A. Buch, O. Čadež, L. M. Barge, M. Behoukova, E. Camprubi, C. Freissinet, M. Hedman, G. Jones, V. Lainey, A. Le Gall, A. Lucchetti, S. Mackenzie, G. Mitri, M. Neveu, F. Nimmo, K. Olsson-Francis, **M. P. Panning**, F. Postberg, J. Saur, J. Schmidt, Y. Sekine, T. Shibuya, C. Sotin, O. Soucek, C. Szopa, T. Usui, S. Vance, and T. Van Hoolst, “Enceladus as a potential oasis for life: Science goals and investigations for future explorations”, *Exp. Astron.*, doi: 10.1007/s10686-021-09808-7, 2021.
6. M. Drilleau, H. Samuel, A. Rivoldini, **M. P. Panning**, and P. Lognonné, “Bayesian inversion of the Martian structure using geodynamics constraints”, *Geophys. J. Int.*, **226**, 1615-1644, doi: 10.1093/gji/ggab105, 2021.
7. R. D. Lorenz, H. Shiraishi, **M. P. Panning**, and K. Sotzen, "Wind and surface roughness considerations for seismic instrumentation on a relocatable lander for Titan", *Plan. Space Sci.*, **206**, 105320, doi: 10.1016/J.PSS.2021.105320, 2021.
8. A. G Marusiak, S. Vance, **M. P. Panning**, M. Behoukova, P. K. Byrne, G. Choblet, M. Melwani Daswani, K. Hughson, B. Journaux, A. H. Lobo, B. E. Schmidt, K. P. Sladkova, K. M. Soderlund, W. Song, O. Soucek, G. Steinbrügge, A. F. Thompson, and S. Wang, "Exploration of Icy Ocean Worlds Using Geophysical Approaches", *Plan. Sci. J.*, **2**, 150, doi: 10.3847/PSJ/ac1272, 2021.
9. S. C. Stähler, A. Khan, W. B. Banerdt, P. Lognonné, D. Giardini, S. Ceylan, M. Drilleau, A. C. Duran, R. F. Garcia, Q. Huang, D. Kim, V. Lekic, H. Samuel, M. Schimmel, N. Schmerr, D. Sollberger, E. Stutzmann, Z. Xu, D. Antonangeli, C. Charalambous, P. M. Davis, J. C. E. Irving, T. Kawamura, M. Knapmeyer, R. Maguire, A. G. Marusiak, **M. P. Panning**, C. Perrin, A.-C. Plesa, A. Rivoldini, C. Schmelzbach, G. Zenhäusern, E. Beucler, J. F. Clinton, N. Dahmen, M. van Driel, T. Gudkova, A. Horleston, W. T. Pike, M. Plasman, and S. E. Smrekar, "Seismic detection of the martian core", *Science*, **373**, 443-448, doi: 10.1126/science.abi7730, 2021.

10. B. Knapmeyer-Endrun, **M. P. Panning**, F. Bissig, R. Joshi, A. Khan, D. Kim, V. Lekic, B. Tauzin, S. Tharimena, M. Plasman, N. Compaire, R. F. Garcia, L. Margerin, M. Schimmel, E. Stutzmann, N. Schmerr, E. Bozdog, A.-C. Plesa, M. A. Wiczorek, A. Broquet, D. Antonangeli, S. M. McLennan, H. Samuel, C. Michaut, L. Pan, S. E. Smrekar, C. L. Johnson, N. Brinkman, A. Mittelholz, A. Rivoldini, P. M. Davis, P. Lognonné, B. Pinot, J.-R. Scholz, S. C. Stähler, M. Knapmeyer, M. van Driel, D. Giardini, and W. B. Banerdt, "Thickness and structure of the martian crust from InSight seismic data", *Science*, **373**, 438-443, doi: 10.1126/science.abf8966, 2021.
11. A. Khan, S. Ceylan, M. van Driel, D. Giardini, P. Lognonné, H. Samuel, N. C. Schmerr, S. C. Stähler, A. C. Duran, Q. Huang, D. Kim, A. Broquet, C. Charalambous, J. F. Clinton, P. M. Davis, M. Drilleau, F. Karakostas, V. Lekic, S. M. McLennan, R. R. Maguire, C. Michaut, **M. P. Panning**, W. T. Pike, B. Pinot, M. Plasman, J.-R. Scholz, R. Widmer-Schmidrig, T. Spohn, S. E. Smrekar, and W. B. Banerdt, "Upper Mantle Structure of Mars from Seismic Data", *Science*, **373**, 434-448, doi: 10.1126/science.abf2966, 2021.
12. M. Schimmel, E. Stutzmann, P. Lognonné, N. Compaire, P. Davis, M. Drilleau, R. F. Garcia, D. Kim, B. Knapmeyer-Endrun, V. Lekic, L. Margerin, **M. P. Panning**, N. Schmerr, J.-R. Scholz, A. Spiga, B. Tauzin, and W. B. Banerdt, "Seismic Noise Autocorrelations on Mars", *Earth Space Sci.*, **8**, e2021EA001755, doi: 10.1029/2021EA001755, 2021.
13. N. Brinkman, S. C. Stähler, D. Giardini, C. Schmelzbach, A. Khan, A. Jacob, N. Fuji, C. Perrin, P. Lognonné, E. Beucler, M. Böse, S. Ceylan, C. Charalambous, J. F. Clinton, M. van Driel, F. Euchner, A. Horleston, T. Kawamura, B. Knapmeyer-Endrun, G. Mainsant, **M. P. Panning**, W. T. Pike, J.-R. Scholz, J. O. A. Robertsson, and W. B. Banerdt, "First Focal Mechanisms of Marsquakes", *J. Geophys. Res.*, **126**, e2020JE006546, doi: 10.1029/2020JE006546, 2021.
14. S. L. Wang, **M. P. Panning**, S. D. Vance, and W. Song, "Underground Microseismic Event Monitoring and Localization within Sensor Networks", *Sensors*, **21**, 2830, doi: 10.3390/s21082830, 2021.
15. S. Kedar, **M. P. Panning**, S. E. Smrekar, S. C. Stähler, S. D. King, M. P. Golombek, M. Manga, B. R. Julian, B. Shiro, C. Perrin, J. A. Power, C. Michaut, S. Ceylan, D. Giardini, P. Lognonné, and W. B. Banerdt, "Analyzing Low Frequency Seismic Events at Cerberus Fossae as Long Period Volcanic Quakes", *J. Geophys. Res.*, **126**, e2020JE006518, doi: 10.1029/2020JE006518, 2021.
16. H. T. Xu, C. Beghein, **M. P. Panning**, M. Drilleau, P. Lognonné, M. van Driel, S. Ceylan, M. Böse, N. Brinkman, J. F. Clinton, F. Euchner, D. Giardini, A. Horleston, T. Kawamura, B. Kenda, N. Murdoch, and S. C. Stähler, "Measuring Fundamental and Higher Mode Surface Wave Dispersion on Mars From Seismic Waveforms", *Earth Space Sci.*, **8**, e2020EA001263, doi: 10.1029/2020EA001263, 2021.
17. C. Nunn, W. T. Pike, I. M. Standley, S. B. Calcutt, S. Kedar, and **M. P. Panning**, "Standing on Apollo's shoulders: A microseismometer for the Moon", *Plan. Sci. J.*, **2**, 36, doi: 10.3847/PSJ/abd63b, 2021.
18. E. Stutzmann, M. Schimmel, P. Lognonné, A. Horleston, S. Ceylan, M. van Driel, S. C. Stähler, W. B. Banerdt, M. Calvet, C. Charalambous, J. F. Clinton, M. Drilleau, L. Fayon, R. F. Garcia, D. Giardini, K. Hurst, A. Jacob, T. Kawamura, B. Kenda, L. Margerin, N. Murdoch, **M. P. Panning**, W. T. Pike, J.-R. Scholz, and A. Spiga, "The Polarization of Ambient Noise on Mars", *J. Geophys. Res.*, **126**, e2020JE006545, doi: 10.1029/2020JE006545, 2021.

19. S. Ceylan, J. F. Clinton, D. Giardini, M. Böse, C. Charalambous, M. van Driel, A. Horleston, T. Kawamura, A. Khan, G. Orhand-Mainsant, J.-R. Scholz, S. C. Stähler, F. Euchner, W. B. Banerdt, P. Lognonné, D. Banfield, E. Beucler, R. F. Garcia, S. Kedar, **M. P. Panning**, W. T. Pike, S. E. Smrekar, A. Spiga, N. L. Dahmen, K. Hurst, A. E. Stott, R. D. Lorenz, M. Schimmel, E. Stutzmann, J. ten Pierick, V. Conejero, C. Pardo, and C. Perrin, "Companion guide to the marsquake catalog from InSight, Sols 0-478: Data content and non-seismic events", *Phys. Earth Planet. Int.*, **310**, 106597, doi: 10.1016/j.pepi.2020.106597, 2021.
20. J. F. Clinton, S. Ceylan, M. van Driel, D. Giardini, S. C. Stähler, M. Böse, C. Charalambous, N. L. Dahmen, A. Horleston, T. Kawamura, A. Khan, G. Orhand-Mainsant, J.-R. Scholz, F. Euchner, W. B. Banerdt, P. Lognonné, D. Banfield, E. Beucler, R. F. Garcia, S. Kedar, **M. P. Panning**, C. Perrin, W. T. Pike, S. E. Smrekar, A. Spiga, and A. E. Stott, "The Marsquake catalogue from InSight, sols 0-478", *Phys. Earth Planet. Int.*, **310**, 106595, doi: 10.1016/j.pepi.2020.106595, 2021.
21. M. Drilleau, E. Beucler, P. Lognonné, **M. P. Panning**, B. Knapmeyer-Endrun, W. B. Banerdt, C. Beghein, S. Ceylan, M. van Driel, R. Joshi, T. Kawamura, A. Khan, S. Menina, A. Rivoldini, H. Samuel, S. C. Stähler, H. T. Xu, M. Bonnin, J. Clinton, D. Giardini, B. Kenda, V. Lekic, A. Mocquet, N. Murdoch, M. Schimmel, S. E. Smrekar, E. Stutzmann, B. Tauzin, and S. Tharimena, "MSS/1: Single-Station and Single-Event Marsquake Inversion", *Earth Space Sci.*, **7**, e2020EA001118, doi: 10.1029/2020EA001118, 2020.
22. **M. P. Panning**, W. T. Pike, P. Lognonné, W. B. Banerdt, N. Murdoch, D. Banfield, C. Charalambous, S. Kedar, R. D. Lorenz, A. G. Marusiak, J. B. McClean, C. Nunn, S. C. Stähler, A. E. Stott, and T. Warren, "On-deck seismology: Lessons from InSight for future planetary seismology", *J. Geophys. Res.*, 2020, **125**, e2019JE006353, doi: 10.1029/2019JE006353, 2020.
23. T. A. Hurford, W. G. Henning, R. Maguire, V. Lekic, N. Schmerr, **M. P. Panning**, V. J. Bray, M. Manga, S. A. Kattenhorn, L. C. Quick, A. R. Rhoden, "Seismicity on tidally active solid-surface worlds", *Icarus*, **338**, doi: 10.1038/s41561-020-0544-y, 2020.
24. W. B. Banerdt, S. E. Smrekar, D. Banfield, D. Giardini, M. P. Golombek, C. L. Johnson, P. Lognonné, A. Spiga, T. Spohn, C. Perrin, S. C. Stähler, D. Antonangeli, S. Asmar, C. Beghein, N. Bowles, E. Bozdag, P. T. Chi, U. Christensen, J. F. Clinton, G. S. Collins, I. Daubar, V. Dehant, M. Drilleau, M. Fillingim, W. Folkner, R. F. Garcia, J. Garvin, J. Grant, M. Grott, J. Grygorczuk, T. Hudson, J. C. E. Irving, G. Kargl, T. Kawamura, S. Kedar, S. King, B. Knapmeyer-Endrun, M. Knapmeyer, M. Lemmon, R. D. Lorenz, J. N. Maki, L. Margerin, S. M. McLennan, C. Michaut, D. Mimoun, A. Mittelholz, A. Mocquet, P. Morgan, N. T. Mueller, N. Murdoch, S. Nagihara, C. Newman, F. Nimmo, **M. P. Panning**, W. T. Pike, A.-C. Plesa, S. Rodriguez, J. A. Rodriguez-Manfredi, C. T. Russell, N. Schmerr, M. Siegler, S. Stanley, E. Stutzmann, N. Teanby, J. Tromp, M. van Driel, N. Warner, R. C. Weber, and M. Wieczorek, "Initial results from the InSight mission on Mars", *Nature Geoscience*, **13**, 183-189, doi: 10.1038/s41561-020-0544-y, 2020.
25. D. Giardini, P. Lognonné, W. B. Banerdt, W. T. Pike, U. Christensen, S. Ceylan, J. F. Clinton, M. van Driel, S. C. Stähler, M. Böse, R. F. Garcia, A. Khan, **M. P. Panning**, C. Perrin, D. Banfield, E. Beucler, C. Charalambous, F. Euchner, A. Horleston, A. Jacob, T. Kawamura, S. Kedar, G. Mainsant, J.-R. Scholz, S. E. Smrekar, A. Spiga, C. Agard, D. Antonangeli, S. Barkaoui, E. Barrett, P. Combes, V. Conejero, I. Daubar, M. Drilleau, C. Ferrier, T. Gabsi, T. Gudkova, K. Hurst, F. Karakostas, S. King, M. Knapmeyer, B. Knapmeyer-Endrun, R. Llorca-Cejudo, A. Lucas, L. Luno, L. Margerin, J. B. McClean, D. Mimoun, N. Murdoch, F. Nimmo, M. Nonon, C. Pardo, A. Rivoldini, J. A. Rodriguez Manfredi, H. Samuel, M. Schimmel, A. E. Stott, E. Stutzmann, N. Teanby, T. Warren, R. C. Weber, M. Wieczorek, and C. Yana, "The seismicity of Mars", *Nature Geoscience*, **13**, 205-212, doi: 10.1038/s41561-020-0539-8, 2020.

26. P. Lognonné, W. B. Banerdt, W. T. Pike, D. Giardini, U. Christensen, R. F. Garcia, T. Kawamura, S. Kedar, B. Knapmeyer-Endrun, L. Margerin, F. Nimmo, **M. P. Panning**, B. Tauzin, J. R. Scholz, D. Antonangeli, S. Barkaoui, E. Beucler, F. Bissig, N. Brinkman, M. Calvet, S. Ceylan, C. Charalambous, P. Davis, M. van Driel, M. Drilleau, L. Fayon, R. Joshi, B. Kenda, A. Khan, M. Knapmeyer, V. Lekic, J. McClean, D. Mimoun, N. Murdoch, L. Pan, C. Perrin, B. Pinot, L. Pou, S. Menina, S. Rodriguez, C. Schmelzbach, N. Schmerr, D. Sollberger, A. Spiga, S. C. Stähler, A. Stott, E. Stutzmann, S. Tharimena, R. Widmer-Schmidrig, F. Andersson, V. Ansan, C. Beghein, M. Böse, E. Bozdogan, J. F. Clinton, I. Daubar, P. Delage, N. Fuji, M. P. Golombek, M. Grott, A. Horleston, K. Hurst, J. Irving, A. Jacob, J. Knollenberg, S. Krasner, C. Krause, R. D. Lorenz, C. Michaut, R. Myhill, T. Nissen-Meyer, J. ten Pierick, A. C. Plesa, C. Quantin-Nataf, J. Robertsson, L. Rochas, M. Schimmel, S. Smrekar, T. Spohn, N. Teanby, J. Tromp, J. Vallade, N. Verdier, C. Vrettos, R. C. Weber, D. Banfield, E. Barrett, M. Bierwirth, S. Calcutt, N. Compaire, C. L. Johnson, D. Mance, F. Euchner, L. Kerjean, G. Mainsant, A. Mocquet, J. A. Rodriguez Manfredi, G. Pont, P. Laudet, T. Nebut, S. de Raucourt, O. Robert, C. T. Russell, A. Sylvestre-Baron, S. Tillier, T. Warren, M. Wiczorek, C. Yana, and P. Zweifel, “Constraints on the shallow elastic and anelastic structure of Mars from InSight seismic data”, *Nature Geoscience*, **13**. 213-220, doi: 10.1038/s41561-020-0536-y, 2020.
27. S. L. Wang, F. Y. Li, **M. P. Panning**, S. Tharimena, S. D. Vance, and W.Z. Song, "Ambient Noise Tomography With Common Receiver Clusters in Distributed Sensor Networks", *IEEE Trans. Signal Info. Proc. Networks*, **6**, 656-666, doi: 10.1109/TSIPN.2020.3019328, 2020.
28. H. Samuel, P. Lognonné, **M. P. Panning**, and V. Lainey, “The rheology and thermal history of Mars revealed by the orbital evolution of Phobos”, *Nature*, **569**, 523-527, doi: 0.1038/s41586-019-1202-7, 2019.
29. M. van Driel, S. Ceylan, J. F. Clinton, D. Giardini, H. Alemany, A. Allam, D. Ambrois, J. Balestra, W. B. Banerdt, D. Becker, M. Böse, M. S. Boxberg, N. Brinkman, T. Casademont, J. Cheze, I. Daubar, A. Deschamps, F. Dethof, M. Ditz, M. Drilleau, D. Essing, F. Euchner, B. Fernando, R. Garcia, T. Garth, H. Godwin, M. P. Golombek, K. Grunert, C. Hadziioannou, C. Haindl, C. Hammer, I. Hochfeld, K. Hosseini, H. Hu, S. Kedar, B. Kenda, A. Khan, T. Kilchling, B. Knapmeyer-Endrun, A. Lamert, J. X. Li, P. Lognonne, S. Mader, L. Marten, F. Mehrkens, D. Mercerat, D. Mimoun, T. Moller, N. Murdoch, P. Neumann, R. Neurath, M. Paffrath, **M. P. Panning**, F. Peix, L. Perrin, L. Rolland, M. Schimmel, C. Schroer, A. Spiga, S. C. Stähler, R. Steinmann, E. Stutzmann, A. Szenicer, N. Trumpik, M. Tsekhmistrenko, C. Twardzik, R. C. Weber, P. Werdenbach-Jarklowski, S. Zhang, and Y. C. Zheng, “Preparing for InSight: Evaluation of the blind test for Martian seismicity”, *Seism. Res. Lett.*, **90**, 1518-1534, doi: 10.1785/0220180379, 2019.
30. S. C. Stähler, **M. P. Panning**, C. Hadziioannou, R. D. Lorenz, S. D. Vance, K. Klingbeil, and S. Kedar, “Seismic signal from waves on Titan's seas”, *Earth Plan. Sci. Lett.*, **520**, 250-259, doi: 10.1016/j.epsl.2019.05.043, 2019.
31. S. R. James, H. A. Knox, R. E. Abbate, **M. P. Panning**, and E. J. Screaton, “Insights into permafrost and seasonal active-layer dynamics from ambient seismic noise monitoring”, *J. Geophys. Res.*, **124**, 1798-1816, doi: 10.1029/2019JF005051, 2019.
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