Douglas Hemingway – Curriculum Vitae

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RESEARCH INTERESTS

Evolution of planetary interiors and surfaces, especially as revealed by their gravitational and magnetic fields; the geodynamical processes that govern this evolution and the diversity we see across our solar system and beyond.

EDUCATION

2010–2015	PhD, Earth & Planetary Sciences, University of California Santa Cruz, USA
2008–2009	MSc, *cum laude*, Space Studies, International Space University, Strasbourg, France
1996–2001	BASc, *first class honours*, Systems Design Engineering, University of Waterloo, Canada

EMPLOYMENT & RESEARCH EXPERIENCE

2018–2020	Postdoctoral Research Fellow, Carnegie Institution for Science - *Department of Terrestrial Magnetism (Host: Peter Driscoll)*
2015–2018	Postdoctoral Research Fellow, Miller Institute for Basic Research in Science, University of California Berkeley - *Department of Earth & Planetary Science (Faculty Host: Michael Manga)*
2010–2015	Graduate Student Researcher, University of California Santa Cruz - *Lunar magnetism and space weathering (Advisor: Ian Garrick-Bethell)* - *Icy satellite gravity, topography, and interiors (Advisor: Francis Nimmo)*
2009	Graduate Student Intern, JAXA Institute of Space and Astronautical Science (ISAS), Sagamihara, Japan - *Autonomous navigation for planetary exploration rovers (Advisor: Takashi Kubota)*
2001–2010	Operations & Controls Engineering, MDA Space Missions, Brampton, Canada - *Kinematics, trajectory tracking, and performance analysis, International Space Station robotic servicing system* - *Engineering Support Lead at Mission Operations Centre, Canadian Space Agency, Montreal, Canada* - *Hubble Space Telescope (HST) robotic servicing mission design, lab-based analysis and demonstrations at NASA Goddard Space Flight Center, Greenbelt, Maryland, USA*
1997–2001	Undergraduate Student Researcher, University of Waterloo, Waterloo, Canada - *Lead developer for autonomous helicopter artificial vision and intelligence systems, Waterloo Aerial Robotics Group (Advisor: David Wang)*

SELECTED AWARDS

2018–2020	Carnegie Postdoctoral Fellowship, Carnegie Institution for Science
2015–2018	Miller Research Fellowship, University of California Berkeley
2014	Student's choice award for outstanding TA, Honorable Mention
2013	Waters Award for outstanding PhD research proposal
2012	Dwornik Award for best graduate student oral presentation at 43rd LPSC
2010–2011	Chancellor's Fellowship, University of California Santa Cruz
2008–2009	European Space Agency full scholarship award, International Space University
2005	NASA Goddard Space Flight Center Outstanding Teamwork Award, and MDA Innovation Award for initial concept development and demonstrations of robotic servicing capability for the Hubble Space Telescope

TEACHING & OUTREACH

2015	Instructor, UC Santa Cruz, Earth & Planetary Sciences, *EART110C (Upper Division Geophysics)*
2014	Teaching Assistant, UC Santa Cruz, Earth & Planetary Sciences, *EART110C (Upper Division Geophysics)*
2004	Trained NASA and ESA astronauts to carry out tele-robotic servicing of the Hubble Space Telescope
2002–	Space sciences and engineering outreach talks and activities for students in grades 4-12
2000–2005	Interviewed for Discovery Channel specials including "Airbots" and "Hubble and Beyond"

PROFESSIONAL ACTIVITIES

2014 NASA JPL Planetary Science Summer School
2013– *Cassini* team associate (RADAR and Radio Science)
2013– Peer Review: NASA's LDAP, DDAP programs; PDS archives; *GRL*; *JGR: Planets; Icarus; EPSL*
2010– American Geophysical Union
2009– Planetary Society

INVITED SEMINARS

2018 California Institute of Technology, *Division of Geological & Planetary Sciences*
Rutgers University, *Department of Earth and Planetary Sciences*
Harvard University, *Department of Earth and Planetary Sciences*
University of California Berkeley, *Center for Integrative Planetary Science*
Cornell University, Department of Astronomy

2017 San Francisco State University, *Department of Earth & Climate Sciences*
California Institute of Technology, *Division of Geological & Planetary Sciences*
Fresno State University, *Department of Earth & Environmental Sciences*
University of California Berkeley, *Department of Earth & Planetary Science*
San Jose State University, *Geology Club*
Massachusetts Institute of Technology, *Department of Earth, Atmospheric, and Planetary Sciences*

2016 NASA *Jet Propulsion Laboratory*
University of California Berkeley, *Space Sciences Laboratory / Space Physics Seminar*
University of California Berkeley, *Center for Integrative Planetary Science*

2015 University of California Berkeley, *Berkeley Seismo Lab*

2013 Lunar and Planetary Institute

REFEREED PUBLICATIONS

(2018) **Hemingway, D. J.** & Mittal, T. (submitted). Enceladus' ice shell structure as a window on internal heat production.

2018 **Hemingway, D. J.** & Tikoo, S. (2018). Lunar swirl morphology constrains the geometry, magnetization, and origins of lunar magnetic anomalies. *Journal of Geophysical Research: Planets, 123,* 2223-2241.

Citron, R. I., Manga, M., and **Hemingway, D. J.** (2018). Timing of oceans on Mars from shoreline deformation. *Nature 555*, 643-646.

Hemingway, D. J., Iess, L., Tajeddine, R., Tobie, G. (2018). The Interior of Enceladus, in *Enceladus and the Icy Moons of Saturn*, pp. 57-77, *Space Science Series*, University of Arizona Press.

2017 **Hemingway, D. J.**, & Matsuyama, I. (2017). Isostatic equilibrium in spherical coordinates and implications for crustal thickness on the Moon, Mars, Enceladus, and elsewhere, *Geophysical Research Letters 44*, 7695–7705.

Black, B.A., Perron, J.T., **Hemingway, D.**, Bailey, E., Nimmo, F., Zebker, H. (2017). Global drainage patterns and the origins of topographic relief on Earth, Mars, and Titan, *Science 356* (6339), 727-731.

Nayak, M., **Hemingway, D. J.**, Garrick-Bethell, I. (2017). Magnetization in the South Pole-Aitken Basin: Implications for the lunar dynamo and true polar wander, *Icarus 286,* 153-192.

2016 Hurford, T., Asphaug, E., Spitale, J., **Hemingway, D.**, Rhoden, A., Henning, W., Bills, B., Kattenhorn, S., & Walker, M. (2016). Tidal disruption of Phobos as the cause of surface fractures, *Journal of Geophysical Research: Planets, 121*, 1054-1065.

Poppe, A., Fatemi, S., Garrick-Bethell, I., **Hemingway, D. J.**, Holmström, M. (2016). Solar wind interaction with the Reiner Gamma crustal magnetic anomaly: Connecting source magnetization to surface weathering. *Icarus 266*, 261-266.

Tortora, P., Zannoni, M., **Hemingway, D.**, Nimmo, F., Jacobson, R. A., Iess, L., Parisi, M. (2016). Rhea gravity field and interior modeling from Cassini data analysis. *Icarus 264,* 264-273.

2015 **Hemingway, D. J.**, Garrick-Bethell, I., Kreslavsky, M. A. (2015). Latitudinal variation in spectral properties of the lunar maria and implications for space weathering. *Icarus 261*, 66-79.

2014 Iess, L., Stevenson, D. J., Parisi, M., **Hemingway, D.**, Jacobson, R. A., Lunine, J. I., Nimmo, F., Armstrong, J. W., Asmar, S. W., Ducci, M., Tortora, P. (2014). The Gravity Field and Interior Structure of Enceladus. *Science 344* (6179), 78-80.

2013 **Hemingway, D.**, Nimmo, F., Zebker, H., & Iess, L. (2013). A rigid and weathered ice shell on Titan. *Nature 500* (7464), 550-552.

2013 Garrick-Bethell, I., Lin, R. P., Sanchez, H., Jaroux, B. S., Bester, M., Brown, P., Cosgrove, D., Dougherty, M. K., Halekas, J. S., **Hemingway, D.**, Lozano, P. C., Martel, F., Whitlock, C. W. (2013). Lunar magnetic field measurements with a cubesat. *Proceedings of SPIE Defense, Security, and Sensing*, paper 8739-2.

2012 **Hemingway, D.** & Garrick-Bethell, I. (2012). Magnetic field direction and lunar swirl morphology: Insights from Airy and Reiner Gamma. *Journal of Geophysical Research: Planets, 117,* E10012.

SELECTED PRESENTATIONS

2017 **Hemingway, D. J. (invited)** Isostasy on a small icy moon: implications for Enceladus's ice shell structure. *Geological Society of America Fall Meeting*, October 2017, Seattle, Washington.

Hemingway, D. J. & Tikoo, S. Lunar crustal magnetization inferred from characteristics of lunar swirls. *48th Lunar and Planetary Science Conference*, March 2017, Houston, Texas.

2016 **Hemingway, D. J.** Structure of Enceladus' Ice Shell. *AGU Fall Meeting*, December 2016, San Francisco, California.

Hemingway, D. (invited), Iess, L., Tajeddine, R., & Tobie, G. Interior of Enceladus. *Enceladus and the Icy Moons of Saturn*, July 2016, Boulder, Colorado.

Hemingway, D., Zannoni, M., Tortora, P., Nimmo, F., & Asmar, S. Dione's Internal Structure Inferred from *Cassini* Gravity and Topography. *47th Lunar and Planetary Science Conference*, March 2016, Houston, Texas.

2015 **Hemingway, D.**, Garrick-Bethell, I., & Kreslavsky, M., Latitudinal Variation in the Color of the Lunar Maria and Implications for Space Weathering. *Poster at AGU Fall Meeting*, December 2015, San Francisco, California.

Hemingway, D., Garrick-Bethell, I., & Kreslavsky, M., Latitudinal Variation in Spectral Properties of the Lunar Maria and Implications for Space Weathering. *Workshop on Space Weathering of Airless Bodies*, November 2015, Houston, Texas.

Hemingway, D., Nimmo, F., Tortora, P., Zannoni, M., Iess, L., Parisi, M., Thomas, P. Rhea's Internal Structure Inferred from *Cassini* Gravity and Topography. *46th Lunar and Planetary Science Conference*, March 2015, Houston, Texas.

2014 Pieters, C., Garrick-Bethell, I., & **Hemingway, D.**, Magnetic Sorting of the Regolith on the Moon: Lunar Swirls. *AGU Fall Meeting*, December 2014, San Francisco, California.

Hemingway, D. (invited), Garrick-Bethell, I., & Kreslavsky, M., Space Weathering at Lunar Swirls and at High Lunar Latitudes. *Lunar Science Workshop, Kyung Hee University*, May 2014, South Korea.

Hemingway, D., Garrick-Bethell, I., & Kreslavsky, M., Space Weathering at Lunar Swirls and at High Lunar Latitudes. *45th Lunar and Planetary Science Conference*, March 2014, Houston, Texas.

2013 **Hemingway, D.**, Nimmo, F., & Iess, L., Enceladus' interior structure inferred from Cassini-derived gravity and topography. *AGU Fall Meeting*, December 2013, San Francisco, California.

Hemingway, D., Nimmo, F., Zebker, H., & Iess, L., A rigid and weathered ice shell on Titan. *Titan Surface Workshop, MIT*, August 2013, Cambridge, Massachusetts.

Hemingway, D., Nimmo, F., Zebker, H., & Iess, L., Elastic thickness of Titan's ice shell estimated from a combined study of gravity and topography. *44th Lunar and Planetary Science Conference*, March 2013, Houston, Texas.

2012 **Hemingway, D.** & Garrick-Bethell, I., Insights into Lunar Swirl Morphology and Magnetic Source Geometry: Models for the Reiner Gamma and Airy Anomalies. *43rd Lunar and Planetary Science Conference*, March 2012, Houston, Texas.

2011 **Hemingway, D.** & Garrick-Bethell, I., How magnetic field direction influences lunar swirl morphology. *Poster at AGU Fall Meeting*, December 2011, San Francisco, California.

NON-REFEREED PUBLICATIONS

2009 **Hemingway, D.** (2009). An Autonomous Navigation System for Lunar and Planetary Exploration Rovers. *JAXA Internship Project Report for the Master of Space Studies, International Space University*, Strasbourg, France.

Hemingway, D. (2009). Mitigating the Lunar Dust Hazard. *Research Project for the Master of Space Studies, International Space University*, Strasbourg, France.