

CURRICULUM VITAE

Wesley Andrés Watters Farfán
Associate Professor

Whitehead Chair of Critical Thought (2023-2025)
Department of Physics and Astronomy, Whitin Observatory, Wellesley College
106 Central St., Wellesley, MA 02481
wwatters@wellesley.edu, (781) 283-2170

Education

Massachusetts Institute of Technology, Cambridge, MA, USA

- Bachelor of Science (S.B.) in Mathematics, June 1999
- Bachelor of Science (S.B.) in Physics, Sept. 1999;
Thesis: *The Spitzer Mass Stratification Instability in Dense Star Clusters*
- Master of Science (S.M.) in Earth & Planetary Sciences, Jan. 2000;
Thesis: *Digital Reconstruction of Fossil Morphologies, Nama Group, Namibia*
- Doctor of Philosophy (Ph.D.) in Planetary Science and Planetary Geophysics, Dept. Earth, Atmospheric & Planetary Sciences (EAPS); Defense date: Dec. 11, 2008;
Thesis: *Hypervelocity Impacts and the Evolution of Planetary Surfaces and Interiors*

Publications

Articles in review

- Domine L., A. Biswas, R. Cloete, A. Delacroix, A. Fedorenko, L. Jacaruso, E. Kelderman, E. Keto, S. Little, A. Loeb, E. Masson, M. Prior, F. Schultz, M. Szenher, **W. A. Watters**, A. White (2024) Commissioning An All-Sky Infrared Camera Array for Detection Of Airborne Objects. Submitted to *Sensors* (MDPI)

Articles in press

- Keto, E., **W.A. Watters** (2024) Velocity Analysis of Moving Objects in Earth Observation Satellite Images Using Multi-Spectral Push Broom Scanning. *Journal of Astronomical Instrumentation*.
- Keto, E., **W.A. Watters** (2024) Detection of Moving Objects in Earth Observation Satellite Images: Verification. *International Journal of Remote Sensing*

Published articles (peer-reviewed)

- Cloete, R., P. Bridgham, S. Dobroshinsky, C. Ezell, A. Fedorenko, F. Laukien, S. Little, A. Loeb, E. Masson, M. Szenher, **W.A. Watters**, and A. White (2023) Integrated computing platform for detection and tracking of unidentified aerial phenomena (UAP). *Journal of Astronomical Instrumentation*, 12(01), p.2340008.

- **Watters, W. A.**, A. Loeb, F. Laukien, R. Cloete, A. Delacroix, S. Dobroshinsky, B. Horvath, E. Kelderman, S. Little, E. Masson, A. Mead, M. Randall, F. Schultz, M. Szenher, F. Vervelidou, A. White,* A. Ahlstrom, C. Cleland, S. Dockal,* N. Donahue, M. Elowitz, C. Ezell, A. Gersznowicz, N. Gold, M. G. Hercz, E. Keto, K. Knuth, A. Lux, G. J. Melnick, A. Moro-Martin, J. Martin-Torres, D. Llusa Ribes, P. Sail, M. Teodorani, J. J. Tedesco, G. T. Tedesco, M. Tu,* M.-P. Zorzano (2023) The Scientific Investigation of Unidentified Aerial Phenomena (UAP) Using Multimodal Ground-based Observatories. *Journal of Astronomical Instrumentation*, 12(01), p.2340006. <https://doi.org/10.1142/S2251171723400068>
- Randall, M., A. Delacroix, C. Ezell, E. Kelderman, S. Little, A. Loeb, E. Masson, **W. A. Watters**, A. White, R. Cloete (2023) SkyWatch: A Passive Multistatic Radar Network for the Measurement of Object Position and Velocity. *Journal of Astronomical Instrumentation*, 12(01), p.2340004 <https://doi.org/10.1142/S2251171723400044>
- Keto, E., **W. A. Watters** (2023) Detection of Moving Objects in Earth Observation Satellite Images. *Journal of Astronomical Instrumentation*, 12(01), p.2340007. <https://doi.org/10.1142/S225117172340007X>
- Mead, A., S. Little, P. Sail, M. Tu,* **W. A. Watters**, A. White,* GP Team (2023) Multi-Band Acoustic Monitoring of Aerial Signatures. *Journal of Astronomical Instrumentation*, 12(01), p.2340005. <https://doi.org/10.1142/S2251171723400056>
- Siraj, A., A. Loeb, A. Moro-Martin, M. Elowitz, A. White,* **W. A. Watters**, G. J. Melnick, R. Cloete, J. Grindlay, F. Laukien (2023) Physical Considerations for an Intercept Mission to a 1I/'Oumuamua-like Interstellar Object. *Journal of Astronomical Instrumentation*, 12(01), p.2340001. <https://doi.org/10.1142/S2251171723400019>
- Szenher, M., A. Delacroix, E. Keto, S. Little, M. Randall, **W. A. Watters**, E. Masson, R. Cloete (2023) A Hardware and Software Platform for Aerial Object Localization. *Journal of Astronomical Instrumentation*, 12(01), p.2340002. <https://doi.org/10.1142/S2251171723400020>
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- Tornabene, L.L., **W.A. Watters**, G.R. Osinski, J.M. Boyce, T.N. Harrison, V. Ling, A.S. McEwen. (2018), A Depth vs. Diameter Relationship for the Best-Preserved Melt-Bearing Complex Craters on Mars. *Icarus* 299, pp. 68-83.
- Robbins, S.J., **W.A. Watters**, J.E. Chappelow, V.J. Bray, I.J. Daubar, R.A. Craddock, R.A. Beyer, M. Landis, L.R. Ostrach, L.L. Tornabene, J. Riggs, B.P. Weaver. (2017), Measuring Impact Crater Depth Throughout the Solar System. *Meteoritics & Planet. Sci.*, 53 (4), pp. 583-637.
- **Watters, W.A.**, C. Hundal,* A. Radford,* G. S. Collins, L. L. Tornabene. (2017), Dependence of Secondary Crater Characteristics on Downrange Distance: High-Resolution Morphometry and Simulations. *J. of Geophys. Res.: Planets*. 122, doi:10.1002/2017JE005295.
- Fassett, C.I., M.C. Crowley, C. Leight, D. Dyar, D. Minton, M. Hirabayashi, B. Thomson, **W.A. Watters**. (2017), Evidence for Rapid Topographic Evolution and Crater Degradation

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- **Watters, W.A.**, L. M. Geiger,* M. Fendrock,* R. Gibson,* C. Hundal.* (2017), The Role of Strength Defects in Shaping Impact Crater Planforms. *Icarus*, 286, pp. 15-34.
- **Watters, W.A.**, L. M. Geiger,* M. Fendrock,* R. Gibson.* (2015), Morphometry of Small Recent Impact Craters on Mars: Size and Terrain Dependence, Short-term Modification. *J. of Geophys. Res.: Planets*. 120, pp. 226-254.
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- El-Maarry, M.R., **W. A. Watters**, N.K. McKeown, J. Carter, E. Noe Dobrea, J.L. Bishop, A. Pommerol, N. Thomas. (2014), Potential Desiccation Cracks on Mars: A Synthesis from Modeling, Analogue-Field Studies, and Global Observations. *Icarus*, 241, pp. 248-268.
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- **Watters, W.A.**, M.T. Zuber, B. H. Hager. (2009), Thermal Perturbations caused by Large Impacts and Consequences for Mantle Convection. *J. Geophys. Res.: Planets*, 114, E02001, doi:10.1029/2007JE002964.
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 - Fleury, V., **W.A. Watters**, A. Levy, T. Devers. (2002), Rapid Electroplating of Insulators. *Nature*, 416, pp. 716-719.
 - **Watters, W.A.**, J.P. Grotzinger. (2001), Digital Reconstruction of Calcified Early Meta-zoans, Nama Group, Namibia. *Paleobiology*, 27 (1), pp. 159-171.
 - **Watters, W.A.**, K. Joshi, R.A. Rasio. (2000), Thermal and Dynamical Equilibrium in

Two-Component Star Clusters. *The Astrophysical Journal*, 539, pp. 331-341.

- Grotzinger, J.P., **W.A. Watters**, and A.H. Knoll. (2000), Calcified Metazoans in Thrombolite-Stromatolite Reefs of the Terminal Proterozoic Nama Group, Namibia. *Paleobiology*, 26 (3), pp. 334-359.
- **ArXiv only (not peer-reviewed):**
Feder, J., H., Nordhagen, **W. A. Watters**. (2005) Dynamic Scaling in Stick-Slip Friction. arXiv:nlin/0504034v1.

*Wellesley College student coauthor (or recent alum).

Abstracts: upcoming meetings

- W. A. Watters, A. Loeb, S. Africk, M. Ashman, P. Bridgham, N. Christian, R. Cloete, A. Delacroix, S. Dockal*, L. Domine, N. Donahue, A. Fedorenko, B. Fields, M. Hercz, D. Julian, E. Kelderman, F. Laukien, D. Lavoie, S. Little, D. Lavoie, A. Lux, E. Keto, K. H. Knuth, E. Masson, A. Mead, G. Melnick, A. Nenstiel, I. Porritt, M. Prior, P. Sail, F. Schultz, A. Sen, M. Szenher, G. Tedesco, J. Tedesco, M. Tu*, F. Vervelidou, A. White*, and the Galileo Project Team. (2024) Methods and instrumentation for detecting and characterizing Unidentified Aerial Phenomena. *European Astrobiology Institute fall meeting; special session: Scientific, societal and cultural approaches and implications of UAP*. Kiruna, Sweden, 2024-09-23—2024-09-25.

Abstracts: past meetings

- W. A. Watters, A. Loeb, S. Africk, M. Ashman, P. Bridgham, N. Christian, R. Cloete, A. Delacroix, S. Dockal*, L. Domine, N. Donahue, A. Fedorenko, B. Fields, M. Hercz, D. Julian, E. Kelderman, F. Laukien, D. Lavoie, S. Little, D. Lavoie, A. Lux, E. Keto, K. H. Knuth, E. Masson, A. Mead, G. Melnick, A. Nenstiel, I. Porritt, M. Prior, P. Sail, F. Schultz, A. Sen, M. Szenher, G. Tedesco, J. Tedesco, M. Tu*, F. Vervelidou, A. White*, and the Galileo Project Team. (2024) Detection and Characterization of Unidentified Aerial Phenomena (UAP) Using Ground-based Observatories and Satellite Imagery. 2nd annual Society for UAP Studies conference (SUAPS), 2024-08-16—2024-08-18. †
- Knuth, K. H., M. Cifone, and W.A. Watters (2024) Rational Responses to Extraordinary Hypotheses. *MaxEnt 2024: 43rd International Workshop on Bayesian Inference and Maximum Entropy Methods in Science and Engineering*, Ghent, Belgium.
- Watters, W.A. (2023) Thunderstones and Meteorites: from Fairy Tale to Scientific Object; submitted as part of book proposal for compendium about anomalies in the history of science (Editors Carol Cleland of U. Colorado Boulder, and Michael Dietrich of U. Pittsburgh); presented at the *Rethinking Anomalies in Science* workshop at U. Pittsburgh, 2023-10-27—2023-10-28
- Watters, W.A., C.I. Fassett (2023) Shape Distribution and Modification Sequence of Simple Craters in Lunar Maria. *Lunar and Planetary Science Conference*, vol. 54, p. 2773.†
- Watters, W.A. and the Galileo Project team (2023) The Scientific Investigation of Unidentified

Aerial Phenomena. *Inaugural Symposium of the Society for UAP Studies*, 2023-02-03—2023-02-05.[†]

- Watters, W.A. (2022) The Scientific Investigation of Unidentified Aerial Phenomena. *VASCO 2022 Workshop: Vanishing & Appearing Sources during a Century of Observations* Nordic Institute for Theoretical Physics (Nordita; Stockholm, Sweden). 2022-12-12—2022-12-13.[†]
- Chin,* L. R., W.A. Watters, E.T. Chickles,* C.I. Fassett (2022) Application of Support Vector Regression to Derive Crater Depth/Diameter from Satellite Images. *Lunar and Planetary Science Conference*, vol. 53, No. 2678, p. 2157.[†]
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- Watters, W.A., E.T. Chickles,* C.I. Fassett, C.B. Hundal,* H. Pimperl* (2021) Relating Thermal Inertia to Crater Shape Characteristics in Equatorial Mars. *Lunar and Planetary Science Conference*, vol. 52, No. 2548, p. 2115.[†]
- Fassett, C.I., W.A. Watters, E.T. Chickles* (2021) Slow Hillslope Processes on Equatorial Mars as Revealed by the Topographic Diffusivity of Km-Scale Crater Rims. *Lunar and Planetary Science Conference*, vol. 52, No. 2548, p. 1571.[†]
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- Fassett, C. I., W.A. Watters, C.B. Hundal,* M. Zanetti. (2020) Spatial Variation in Erosion Rates in Mars Equatorial Regions Inferred from Ejecta Retention of 1-3 Km Diameter Craters. *Lunar and Planetary Science Conference*, vol. 51 (abstract published; conference canceled).
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- Hundal, C. H., W.A. Watters, C.I. Fassett, J. Maciuch (2018) Characterizing the Modification Sequence of Simple Impact Craters on Mars, in *Lunar and Planetary Science Conference*,

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- Bina, A., L. L. Tornabene, J. L. Piatek, N. G. Barlow, G. R. Osinski, S. J. Robbins, and W. A. Watters (2017), Visible and Thermophysical Mapping of Craters with Transitional Morphologies: Insights into the Nature and Extent of Crater Degradation on Mars, in *Lunar and Planetary Science Conference*, vol. 48, p. 2856.
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- Watters, W.A., M. Marlette,* K. Jaramillo,* and D. Jerolmack. Decameter-scale Impact-related Aeolian Features Surrounding Well-preserved Impact Craters on Mars. (2016), *Planetary Crater Consortium meeting*, Brown University, Providence, RI, USA. Aug. 15-17.
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- Watters, W. A., C. I. Fassett, R. Gibson,* and C. Hundal* (2016), Morphometric Characterization of Crater Modification in Diverse Settings on Mars, in *Lunar and Planetary Science Conference*, vol. 47, p. 2972.
- Watters, W. A., L. Geiger,* M. Fendrock,* R. Gibson,* and A. Radford* (2015), Statistical Morphometry of Small Martian Craters: New Methods and Results, in *Issues in Crater Studies and the Dating of Planetary Surfaces, LPI Contributions*, vol. 1841, p. 9032.
- Watters, W. A., and G. S. Collins (2015), Measured and Modeled Morphometry of Simple Impact Craters, in *Bridging the Gap III: Impact Cratering In Nature, Experiments, and Modeling, LPI Contributions*, vol. 1861, p. 1083.
- Watters, W. A., L. Geiger,* M. Fendrock,* R. Gibson,* and C. Hundal.* (2015), Planform Morphometry of Well-preserved Martian and Lunar Impact Craters. *Planetary Crater Consortium (PCC) meeting*, USGS Flagstaff, AZ, USA, Aug. 12-15.
- Watters, W. A., L. Geiger,* M. Fendrock,* and R. Gibson* (2015), Morphometry of Recent Simple Impact Craters on Mars: Size and Terrain Dependence, in *Lunar and Planetary Science Conference*, vol. 46, p. 2465.
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- El Maarry, M. R., W. Watters, N. K. McKeown, J. Carter, E. Noe Dobrea, J. L. Bishop, A. Pommerol, and N. Thomas (2014), Potential Desiccation Cracks on Mars as Indicators of Paleolacustrine Sites: Implications for Future Exploration, *European Planetary Science Congress 2014, EPSC Abstracts, Vol. 9, id. EPSC2014-394, 9*, EPSC2014-394.
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- El-Maarry, M. R., W. Watters, N. K. McKeown, J. Carter, E. Noe Dobrea, J. L. Bishop, A. Pommerol, and N. Thomas (2014), Potential Desiccation Cracks on Mars: A Review of Global Observations Using HiRISE, in *Eighth International Conference on Mars, LPI Contributions*, vol. 1791, p. 1230.
- Watters, W. A., L. Geiger,* and M. Fendrock* (2013), Shape Distribution of Fresh Martian Impact Craters from High-Resolution DEMs, in *Lunar and Planetary Science Conference*, vol. 44, p. 3081.
- Cole, S. B., W. A. Watters, F. Aron, and S. W. Squyres (2013), Reconstructed Paleotopography of the Columbia Hills, Mars, *AGU Fall Meeting Abstracts*.
- Cole, S. B., W. A. Watters, and S. W. Squyres (2012), Structure of Husband Hill and the West Spur of the Columbia Hills, Gusev Crater, in *Lunar and Planetary Science Conference*, vol. 43, p. 1134.
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*Wellesley College student coauthor (or recent alum).

† Presentation and attendance was virtual.

Awards & External Grants

- Whitehead Chair of Critical Thought, 2023-2025 (Wellesley College)
- Pinanski Teaching Prize, 2018 (Wellesley College)
- Apgar Award for excellence in teaching, 2016 (Wellesley College)
- NASA Mars Data Analysis grant (PI), 2015-2018 (shared with co-I Caleb Fassett; NASA-Huntsville); *Modification of impact craters in diverse environments on Mars*
- NASA Lunar Data Analysis grant (co-I), 2016-2019 (subcontract from PI Caleb Fassett; NASA-Huntsville); *High resolution topography and radar observations of lunar craters and cratered surfaces*
- Diana Chapman Walsh assistant professorship, 2014-2017 (Wellesley College)
- Editors’ Citation for Excellence in Refereeing for JGR-Planets, 2011 (American Geophysical Union)
- NSF Graduate Research Fellow, 2001-2003 (U.S. National Science Foundation)
- Fulbright Fellow, 2000-2001 (U.S. Fulbright Foundation; U. of Oslo, Norway)
- Goldwater Scholar, 1998 (in mathematics and science, U.S. Barry Goldwater Foundation)

- Burchard Scholar, 1998 (in the humanities, MIT Dept. of Humanities & Social Sciences)
- Sigma Pi Sigma Physics Honor Society, elected 1998 (MIT Physics Dept.)
- First Place in Mathematics for *W-System Curves: A New Fractal Geometry*, International Science and Engineering Fair (ISEF); Birmingham, AL, 1994.

Invited talks & colloquia

- State University of New York at Albany, Dept. Physics, weekly seminar; host: Matthew Szydagis. 2022-10-07
- Princeton University, Dept. Geosciences, Solid earth seminar; host: Adam Maloof. 2019-03-01
- Brown University, Dept. Earth, Environmental, & Planetary Science; planetary sciences seminar; host: Prof. James Head III. 2016-10-27
- Massachusetts Institute of Technology, Dept. Earth, Atmospheric & Planetary Science; planetary sciences seminar; host: Dr. Jason Soderblom. 2015-02-19
- Harvard University, Dept. Earth & Planetary Science; department seminar; host: Prof. Francis MacDonald. 2013-11-18.
- U. Pennsylvania, Dept. Earth & Environmental Science; departmental seminar; host: Prof. Douglas Jerolmack. 2012-11-30.
- Wesleyan University, Dept. Earth & Environmental Sciences; departmental seminar; host: Prof. Martha Gilmore. 2012-11-15.
- Binghamton University, Dept. of Geological Sciences and Environmental Studies; departmental seminar; host: Prof. Timothy Lowenstein. 2011-04-08
- Caltech Division of Planetary Sciences; division seminar; host: Prof. Edward Stolper, 2009-11-11.

Professional service

- Advisory board member, Society for UAP Studies (May 2023+)
- NASA Lunar Data Analysis review panel (June 2018)
- External reviewer for NASA's Solar System Workings program (2016, 2017) and Lunar Data Analysis Program (2017, 2019)
- Chair of the Planetary Nomenclature Subcommittee of the Planetary Crater Consortium (2015-2018)
- Reviewer for articles for the journals *Icarus*, *Earth and Planetary Science Letters*, *Physics of the Earth & Planetary Interiors*, and *Journal of Geophysical Research-Planets*, (2011–present).
- NASA Mars Fundamental Research review panel (Oct. 18-22, 2010)

Other academic work experience (post-doctoral)

- **Dept. Astronomy, Cornell University, Ithaca, NY, USA** (2009-June, 2011): Post-doctoral Research Associate. Evolution of the Meridiani and Gusev landing sites, especially the origin of polygonal fracturing at both locations via a combination of numerical modeling, morphometric analysis, and field-work in Death Valley, California. Part of my work involved leading an effort to gather observations required for a structural analysis of Santa Maria Crater near the MER-Opportunity landing site at Meridiani Planum (Supervisor: Prof. Steve Squyres, with funding from the MER and HiRISE missions.)