Dr. David A. Minton

Associate Professor

Purdue University • Department of Earth, Atmospheric, and Planetary Sciences
550 Stadium Mall Drive • West Lafayette, IN 47907 • (765) 494-3292
daminton@purdue.edu • github.com/profminton

Employment

2018–Pres.	**Associate Professor with Tenure**, Purdue University, West Lafayette, IN.
2011–2018	**Assistant Professor**, Purdue University, West Lafayette, IN.
2009–2011	**Research Scientist**, Southwest Research Institute, Boulder, CO.

Education

2005–2009	**Ph.D. in Planetary Sciences**
	The University of Arizona, Tucson, AZ.
	Dissertation: *Dynamical History of the Asteroid Belt and Implications for Terrestrial Planet Bombardment*
	Advisor: Renu Malhotra
2003–2005	University of Maryland, College Park, MD.
	Project: *Magnetohydrodynamic control of incipient boundary layer separation in supersonic flow*
	Advisors: Mark Lewis and David Van Wie
2001–2003	**B.S. in Aerospace Engineering - Summa Cum Laude**
	North Carolina state University, Raleigh, NC.
1999–2000	**A.S. in College Transfer**
	Central Piedmont Community College, Charlotte, NC.

Internships

2003	NASA Langley Aerospace Research Summer Scholar, Hampton, VA.

Refereed Publications

[43] Du J, **Minton D**, Blevins A, Fassett C, Huang YH. (2025). Spectral Analysis of the Morphology of Fresh Lunar Craters II: Two-Dimensional Surface Elevations of the Continuous Ejecta, Wall, and Floor *JGR:Planets.* In Review.

[42] Ćuk M, Anand, K, **Minton D**. (2024). Two Possible Orbital Histories of Phobos. *Planet. Sci. J.* In Review.

[41] Blevins A, **Minton D**, Du J, Huang YH, Tremblay, M, Fassett, C. (2024). Apollo Impact Melts Record a Rapidly Declining Impact Rate in the Late Imbrian. *JGR:Planets.* In Review.

[40] Hirabayashi, M., Fassett, C.I., Costello, E.S., **Minton, D.A.**, (2024). Crater Equilibrium State Characterization given Crater Production from a Single Power Law. *Planet. Sci. J.* 5:250.

[39] Du J, **Minton D**, Blevins A, Fassett C, Huang YH. (2024). Spectral Analysis of the Morphology of Fresh Lunar Craters I: Rim Crest, Floor, and Rim Flank Outlines. *JGR:Planets.* 129:11, e2024JE008357

[38] Hayes C, **Minton D**, Kloos J, Moores J. (2024). Topography-enhanced ultra-cold trapping at the LCROSS impact site. *JGR: Planets* 129, e2023JE007925.
[37] Huang YH, Riedel C, Soderblom J, Brown S, Orgel C, Conrad J, Hirabayashi M, and **Minton D**. (2024) Global lunar crater density using buffered non-sparseness correction. *Planet. Sci. J.* 5, 155.
[36] Osinski G, Melosh HJ, Andrews-Hanna J, Baker D, Denevi B, Dhingra D, Ghent R, Hayne P, Hill P, James P, Jaret S, Johnson B, Kenkmann T, Kring D, Mahanti P, **Minton D**, Neish C, Neumann G, Plescia J, Potter R, Richardson J, Silber E, Soderblom J, Zanetti M, Zellner N. (2023). Lunar Impact Features and Processes. *Reviews in Mineralogy and Geochemistry* 89, 339.
[35] Ćuk M, Hamilton D, **Minton D**, Stewart S. (2023). Sesquinary Catastrophe for Close-in Moons with Dynamically Excited Orbits. *ApJ* 957, 62.
[34] Wishard C, Pouplin J, Elliott J, Singh D, Anand K, **Minton D**. (2023). Swiftest: An N-body Integrator for Gravitational Systems. *Journal of Open Source Software*, 8, 5409.
[33] Fassett C, Beyer R, Deutsch A, Hirabayashi M, Leight C, Mahanti P, Nypaver C, Thomson B, **Minton D**. (2022). Topographic Diffusion Revisited: Small Crater Lifetime on the Moon and Implications for Volatile Exploration. *JGR:Planets* 127, e2022JE007510.
[32] Huang YH, Soderblom J, **Minton D**, Hirabayashi M, Melosh HJ. (2022). Bombardment history of the Moon constrained by crustal porosity. *Nat. Geosci.* 15(7)
[31] Safrit T, Steckloff J, Bosh A, Nesvorný D, Walsh K, Brasser R, **Minton D**, (2021). The Formation of Bilobate Comet Shapes through Sublimative Torques. *Planet. Sci. J.* 2, 14.
[30] Ćuk M, **Minton D**, Pouplin J, Wishard, C. (2020). Evidence for a Past Martian Ring from the Orbital Inclination of Deimos. *Astrophys. J. Lett.*, 896, L28.
[29] Riedel C, **Minton D**, Michael G, Orgel C, van der Bogert C, Hiesinger H. (2020) Degradation of Small Simple and Large Complex Lunar Craters: Not a Simple Scale Dependence. *J. Geophys. Res. Planets*, 125, e2019JE006273.
[28] Richardson J, Steckloff J, **Minton D**. (2020) Impact-produced seismic shaking and regolith growth on asteroids 433 Eros, 2867 Šteins, and 25143 Itokawa. *Icarus.* 347, 113811.
[27] **Minton D**, Fassett C, Hirabayashi M, Howl B, Richardson J. (2019) The equilibrium size-frequency distribution of small craters reveals the effects of distal ejecta on lunar landscape morphology. *Icarus*, 326:63.
[26] Graves K, **Minton D**, Molaro J, Hirabayashi M. (2019). Resurfacing Asteroids from Thermally Induced Surface Degradation. *Icarus*, 322, 1–12
[25] Hesselbrock A, **Minton D**. (2019). Three Dynamical Evolution Regimes for Coupled Ring-satellite Systems and Implications for the Formation of the Uranian Satellite Miranda. *The Astronomical Journal, 157*(1), 30.

[24] Huang YH, **Minton D**, Zellner N, Hirabayashi M, Richardson J, Fassett C. (2018). No Change in the Recent Lunar Impact Flux Required Based on Modeling of Impact Glass Spherule Age Distributions. *Geophys. Res. Lett.*, *45*(14), 6805.
[23] Elliott J, Huang YH, **Minton D**, Freed A. (2018). The length of lunar crater rays explained using secondary crater scaling. *Icarus*, *312*, 231.
[22] Hirabayashi M, Howl B, Fassett C, Soderblom J, **Minton D**, Melosh H (2018). The Role of Breccia Lenses in Regolith Generation From the Formation of Small, Simple Craters: Application to the Apollo 15 Landing Site. *JGR:Planets*, *123*(2), 527.
[21] Graves K, **Minton D**, Hirabayash M, DeMeo F, Carry B. (2018). Resurfacing asteroids from YORP spin-up and failure. *Icarus*, *304*, 162–171.
[20] Huang YH, **Minton D**, Hirabayashi M, Elliott J, Richardson J, Fassett C, Zellner N. (2017). Heterogeneous impact transport on the Moon. *JGR:Planets*, *122*(6), 1158.
[19] Fassett C, Crowley M, Leight C, Dyar M, **Minton D**, Hirabayashi M, Thompson B, Watters, W. (2017). Evidence for rapid topographic evolution and crater degradation on Mercury from simple crater morphometry. *GRL*, *44*(11), 5326.
[18] Hesselbrock A, **Minton D**. (2017). An ongoing satellite–ring cycle of Mars and the origins of Phobos and Deimos. *Nat. Geosci.*, *10*(4), 266–269.
[17] Hirabayashi M, **Minton D**, Fassett C. (2017). An analytical model of crater count equilibrium. *Icarus*, *289*, 134.
[16] Johnson B, Collins G, **Minton D**, Bowling T, Simonson B, Zuber M. (2016). Spherule layers, crater scaling laws, and the population of ancient terrestrial impactors. *Icarus*, *271*, 350.
[15] Johnson B, Walsh K, **Minton D**, Krot A, Levison H. (2016). Timing of the formation and migration of giant planets as constrained by CB chondrites. *Science Advances*, *2*(12), e1601658–e1601658.
[14] Morbidelli, A., Walsh, K. J., O'Brien, D. P., **Minton, D.A.**, & Bottke, W. F. (2015). The Dynamical Evolution of the Asteroid Belt. In *Asteroids IV* (pp. 493–507). University of Arizona Press. Tucson.
[13] Steckloff J, Johnson B, Bowling T, Melosh HJ, **Minton D**, Lisse C, Battams K. (2015). Dynamic sublimation pressure and the catastrophic breakup of Comet ISON. *Icarus*, *258*, 430–437.
[12] **Minton D**, Richardson J, Fassett C. (2015). Re-examining the main asteroid belt as the primary source of ancient lunar craters. *Icarus*, *247*(0), 172.
[11] Johnson B, **Minton D**, Melosh HJ, Zuber M. (2015). Impact jetting as the origin of chondrules. *Nature*, *517*(7), 339–341.
[10] **Minton D**, Levison H. (2014). Planetesimal-driven migration of terrestrial planet embryos. *Icarus*, *232*(0), 118–132.
[9] Fassett C, **Minton D**. (2013). Impact bombardment of the terrestrial planets and the early history of the Solar System. *Nat. Geosci.*, *6*(7), 520.
[8] Yue Z, Johnson B, **Minton D**, Melosh HJ, Di K, Hu W, Liu Y. (2013). Projectile

remnants in central peaks of lunar impact craters. *Nat. Geosci.*, *6*(6), 435.
[7] Bottke W, Vokrouhlický D, **Minton D**, Nesvorný D, Morbidelli A, Brasser R, Simonson B, Levison H. (2012). An Archaean heavy bombardment from a destabilized extension of the asteroid belt. *Nature,* 485(7396), 78.

[6] **Minton D**, Malhotra R. (2011). Secular Resonance Sweeping of the Main Asteroid Belt During Planet Migration. *Astrophys. J.*, *732*(1), 53–64.
[5] **Minton D**, Malhotra R. (2010). Dynamical erosion of the asteroid belt and implications for large impacts in the inner Solar System. *Icarus*, *207*(2), 744–757.
[4] **Minton D**, Malhotra R. (2009). A record of planet migration in the main asteroid belt. *Nature*, *457*(7233), 1109–1111.
[3] Malhotra R, **Minton D**. (2008). Prospects for the Habitability of OGLE-2006-BLG-109L. *Astrophys. J. Lett.*, *683*(1), L67–L70.
[2] **Minton D**. (2008). The topographic limits of gravitationally bound, rotating sand piles. *Icarus*, *195*(2), 698–704.
[1] **Minton D**, Malhotra R. (2007). Assessing the Massive Young Sun Hypothesis to Solve the Warm Young Earth Puzzle. *Astrophys. J.*, *660*(2), 1700–1706.

Funding

2025-Pres.	*Understanding how Distal Ejecta Shapes the Lunar Surface Through Observations and Modeling*. NASA Lunar Data Analysis Program PI: David Minton · Total Budget: $873k
2024-Pres.	*Origin and Evolution of the Martian Moon System* NASA Emerging Worlds Program PI: Matija Ćuk · Co-I Minton's Budget: $475k
2023-Pres.	*Lunar Structure, Composition and Processes for Exploration (LunaSCOPE)* NASA Solar System Exploration Research Institute (SSERVI) PI: Alexander Evans · Co-I Minton's Budget: $36k
2022-Pres.	*Using Lunar Topography Data to Model Realistic Crater Morphology* NASA Lunar Data Analysis Program PI: David Minton · Total Budget: $695k
2020-2024	*Investigating a Ring Formation Mechanism for Centaurs and TNOs* NASA Solar System Workings Program PI: Julie Brisset · Co-I Minton's Budget: $296k
2018-2021	*Constraining Lunar Bombardment History by Modeling Age Distributions of Ancient Impact Melts* NASA Solar System Workings Program PI: Oleg Abramov · Co-I Minton's Budget: $294k
2019-2021	*Early Dynamics of the Inner Solar System*

NASA Emerging Worlds Program
PI: Matija Ćuk · Co-I Minton's Budget: $105k

2017-2018 *Chariot to the Moons of Mars*
NASA Planetary Science Deep Space SmallSat Program
PI: David Minton · Total Budget: $411k

2016-2020 *High resolution topography and radar observations of lunar craters and cratered surfaces*
NASA Lunar Data Analysis Program
PI: Caleb Fassett · Co-I Minton's Budget: $104k

2016-2020 *Constraining lunar crater saturation by modeling GRAIL porosity*
NASA Lunar Data Analysis Program
PI: David Minton · Total Budget: $546k

2016-2019 *Stop hitting yourself: Did most terrestrial impactors originate from terrestrial planets?*
NASA Emerging Worlds Program
PI: Alan Jackson · Co-I Minton's Budget: $263k

2016-2016 *Modeling the formation of Phobos and Deimos from a debris disk with impacts*
NASA Earth and Space Sciences Fellowship
PI: David Minton · Student: Andrew Hesselbrock · Total Budget: $90k

2015-2020 *Modeling regolith evolution during post-basin epoch of lunar history*
NASA Solar System Workings Program
PI: David Minton · Total Budget: $566k

2015-2018 *Tidal dissipation during close encounters*
NASA Earth and Space Sciences Fellowship
PI: David Minton · Student: Kevin Graves · Total Budget: $90k

2015-2018 *Modeling the evolution of lunar impact glasses*
NASA Earth and Space Sciences Fellowship
PI: David Minton · Student: Ya Huei Huang · Total Budget: $90k