

# Jeffrey C. Andrews-Hanna

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## EMPLOYMENT

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<b>University of Arizona, Lunar and Planetary Laboratory (Tucson, AZ)</b>	
Associate Professor	January 2017 – present
<b>Southwest Research Institute (Boulder, CO)</b>	January 2016–January 2017
<b>Colorado School of Mines, Department of Geophysics (Golden, CO)</b>	
Assistant Professor	August, 2008 – April, 2014
Associate Professor	April, 2014 – Dec., 2015
<b>Massachusetts Institute of Technology (Cambridge, MA)</b>	
Postdoctoral Research Associate, Advisor: Prof. Maria Zuber	June, 2006 – August, 2008

## EDUCATION

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<b>Washington University (St Louis, MO)</b>	Fall 2001 – Spring 2006
Dept. of Earth and Planetary Sciences	
Doctor of Philosophy, 2006; Advisor: Prof. Roger Phillips; Thesis title: “ <i>The hydrology of Mars: An integrated climatic, tectonic, magmatic, and geodynamic approach.</i> ”	
<b>University of Colorado at Boulder (Boulder, CO)</b>	Fall 2000 – Spring 2001
<b>Cornell University (Ithaca, NY)</b>	Fall 1995 – Spring 2000
Bachelor of Arts Degree in Astronomy, 2000	

## RESEARCH INTERESTS

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My research focuses on the evolution of the solid planets and moons in the Solar System. I take an interdisciplinary approach to my research, focusing on the interactions between a broad suite of processes acting on the surfaces and interiors of the planets. My research includes both mission involvement and basic theory and data analysis. I was a guest scientist on the GRAIL mission, and am a co-investigator on the VERITAS mission. I combine various numerical modeling techniques with analysis of gravity, topography, spectral data, and geomorphology. My primary research emphases are in the areas of planetary geodynamics, tectonics, volcanism, impacts, hydrology, and climate evolution. My lunar research focuses on the analysis of gravity and topography data to investigate the early history of the Moon, the structure of impact basins, volcanic and tectonic structures, and the large-scale structure of the planet. Areas of Mars research include volcanic processes, mantle plumes, the hydrology and the formation of sedimentary deposits, and the early geophysical evolution and bombardment history of the planet. Research on Saturn’s moon Titan focused on hydrologic and climatic factors controlling lake stability. Venus research includes analysis of gravity and topography data and tectonic modeling. Pluto research is aimed at understanding the structure of Sputnik basin and implications for the evolution of the interior.

## FUNDING

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Since 2009, I have been awarded 20 grants (14 as PI, 6 as co-I) totaling over \$5M (including only my portion of the budget on co-I proposals)

*Only grants with JCAH as PI are listed, additional Co-I grants available upon request*

- NASA Discovery Program ongoing  
*Venus Emissivity, Radar, InSAR, Topography, And Spectroscopy (VERITAS) mission*

## Jeffrey C. Andrews-Hanna - Curriculum Vitae (continued)

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- Co-Investigator*
- NASA Solar System Workings Program 2022-2025  
*Mars during the pre-Noachian*  
P.I. Andrews-Hanna, Co-Is William Bottke and Robert Craddock
  - NASA Lunar Data Analysis Program 2022-2025  
*A GRAIL gravity investigation of lunar magmatic and tectonic structures*  
P.I. Andrews-Hanna
  - NASA FINESST Program (student grant to S. M. Moruzzi) 2022-2025  
*Structure and tectonics of Pluto's Sputnik basin*  
P.I. Andrews-Hanna, F.I. Moruzzi
  - NASA New Frontiers Data Analysis Program 2019-2023  
*Structure and compensation of Pluto's Sputnik basin*  
P.I. Andrews-Hanna
  - NASA SSW Program 2017-2022  
*Climatic control of volcanism on Mars*  
P.I. Andrews-Hanna, Co-I Alejandro Soto (SwRI) and Mark Richardson (Ashima)
  - NASA SSW Program 2018-2022  
*Early Mars hydrology: Meridiani Planum and Gale Crater*  
P.I. Andrews-Hanna, Co-I Alejandro Soto (SwRI) and Reed Maxwell (CSM)
  - NASA Lunar Data Analysis Program 2017-2020  
*A GRAIL gravity investigation of density anomalies in the lunar subsurface as records of early geodynamics and tectonics*  
P.I. Andrews-Hanna
  - NASA Planetary Geology and Geophysics Program 2014-2017  
*Compressional tectonics and global strain on Mars, the Moon, and Mercury*  
P.I. Andrews-Hanna
  - NASA Mars Data Analysis Program 2014-2017  
*Recent explosive volcanism on Mars*  
P.I. Andrews-Hanna
  - NASA Gravity Recovery and Interior Laboratory Guest Scientist Program 2012-2016  
*A GRAIL gravity investigation of multi-ring basins and mascons: Forward and inverse modeling, and gravity gradiometry*  
P.I. Andrews-Hanna
  - NASA Outer Planets Research Program 2011-2014  
*The hydrology of Titan: An integrated topographic, geomorphic, and modeling approach*  
P.I. Andrews-Hanna, Co-I's Karl Mitchell and Bryan Stiles (JPL), Claire Newman (Ashima)
  - NASA Lunar Advanced Science and Exploration Research Program 2011-2014  
*Crustal structure and formation mechanism of lunar multi-ring basins*  
P.I. Andrews-Hanna, Co-I Richard Krahenbuhl (CSM) and Yaoguo Li (CSM)
  - NASA Mars Fundamental Research Program 2010-2014  
*Mars tectonics: Valles Marineris and the South Tharsis Ridge Belt*  
P.I. Andrews-Hanna
  - NASA Mars Data Analysis Program 2009-2014  
*The Sedimentary Record of Arabia Terra: Remote Sensing and Hydrologic-Climatic Modeling*  
P.I. Andrews-Hanna, Co-I's Ray Arvidson and Sandra Wiseman (Washington University), and Mark Richardson (Ashima Research)

### MISSION INVOLVEMENT

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- NASA Venus Emissivity, Radio science, InSAR, Topography, and Spectroscopy (VERITAS) mission – Co-investigator 2022-present

- NASA Gravity Recovery and Interior Laboratory (GRAIL) Guest Scientist 2012-2015

## RESEARCH TOOLS

- Numerical modeling:
  - Finite difference modeling of groundwater flow and heat transfer
  - Boundary element modeling of tectonics
  - Monte Carlo modeling
  - Finite element modeling of viscoelastic deformation
  - Spherical harmonic modeling of lithosphere loading and membrane-flexural deformation
  - Programming in FORTRAN, MATLAB, Python
- Data analysis
  - Analysis of gravity and topography using custom software in FORTRAN and MATLAB
  - Analysis of image, topography, and spectral data using ENVI and image editors

## TEACHING

- PTYS 512 Planetary global tectonics (graduate geodynamics) Fall 2020, 2022
- PTYS 598 Evolution of the terrestrial planets (graduate seminar) Fall 2019
- PTYS 206 Exploring the Solar System (non-majors) Spring 2018-2023
- GPGN 320 Continuum Mechanics (Solid Earth Geophysics) (Spring 2014)
- GPGN 470/570 Applications of Satellite Remote Sensing (Spring 2009-2014)
- GPGN 475/575 Planetary Geophysics (Fall 2009-2014)
- GPGN 576 Special Topics in Planetary Science (Fall 2010-Fall 2014)
- GPGN 438 Senior Design (advised multiple student projects 2009-2014)
- CSM Geophysics Department Field Camp (1 week each in summers 2010-2013)
- Planetary Geophysics Lab Summer Field Trip (Summer 2012)
- EPSC 171 The Solar System (Summer, 2004-2005, co-Instructor at Washington University)

## STUDENT AND POST-DOC MENTORING

I currently lead a research group consisting of one post-doc, two graduate students, and one undergraduate student. Past group members have gone on to a faculty position at Brown University (Evans), a faculty position at the University of Arizona (Moitra), a research scientist position at the Southwest Research Institute (Soto), a research scientist position at the Planetary Science Institute (Horvath), and a number of other positions in science and industry.

### *Postdocs*

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|---------------------|--------------------------------|--------------|
| • Adrien Broquet    | Mars and Moon geodynamics      | 2020-present |
| • Pranabendu Moitra | Mars volcanology               | 2018-2020    |
| • Alex Evans        | Mars and Moon geodynamics      | 2015-2018    |
| • David Horvath     | Mars hydrology and volcanology | 2017-2020    |
| • Alejandro Soto    | Mars climate and hydrology     | 2012         |

### *Graduate students*

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|-----------------------------------|----------------------------|--------------|
| • Samantha Moruzzi (PhD student)  | Pluto geodynamics          | 2020-present |
| • Weigang Liang (PhD student)     | Moon geodynamics           | 2018-present |
| • Luke Ranieri (graduate student) | Martian tectonics          | 2017-2018    |
| • Tyler Meng (graduate student)   | Martian volcanology        | 2015-2016    |
| • Johanna Jansen (PhD student)    | Gravity of the Moon        | 2012-2018    |
| • David Horvath (PhD student)     | Methane hydrology of Titan | 2011-2017    |

## Jeffrey C. Andrews-Hanna - Curriculum Vitae (continued)

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• Stevie Francies (grad student)	Martian volcanism	2013-2013
• Yaser Kattoum (MS student)	Lunar impact basins	2010-2012
• Ezgi Karasozen (MS student)	South Tharsis Ridge Belt, Mars	2010-2012
• Brian Davis (MS student)	Valles Marineris, Mars	2010-2013
• Kelsey Zabrusky (MS student)	Martian sedimentary deposits	2009-2011
• Alex Evans (PhD student, MIT)	Martian geodynamics	2007-2008
• Junlun Li (PhD student, MIT)	Martian polar caps	2007-2008
<i>Undergraduate students</i>		
• Morgan Cryder	Martian tectonics	2020-present
• Uno Vaaland	Lunar impact basins	2014
• Hank Cole	Martian tectonics	2013-2015
• Zachary Norman	Lunar impact basins	2012
• Matthew Emmett	Impact craters	2012
• Lauren Jozwiak	Olympus Mons, Mars	2010
• Ryan Isherwood	Olympus Mons, Mars	2010-2012
• Joyce Hoopes	Titan topography and lakes	2008-2010

## UNIVERSITY ACTIVITIES AND SERVICE

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- Co-leader of committee to develop an undergraduate major in Planetary Geoscience (2020-present)
- Chair, Department Life Committee on diversity, equity, and inclusion issues (2020-2022)
- Committee service: Graduate Admissions and Advising Committee (UArizona, 2017-2020), Department Life Committee (2018-2022), Faculty Peer Evaluation Committee (2019-2022)
- Co-founder and director of the Space and Planetary Science and Engineering undergraduate concentration at CSM (2009-2016)
- Co-founder and organizer of the CSM Summer Space Internship, an undergraduate internship sponsored by the Colorado Space Grant (2010-2012; 2014)
- Search committee member for positions in Geology (2010) and Geophysics (2011, 2013, 2014)
- Department of Geophysics Graduate Advisory Committee, chair (2013-2014)
- Department of Geophysics representative to university Graduate Council (2013-2014)
- Department of Geophysics Undergraduate Advisory Committee, member (2008-2012)
- Library Advisory Committee, member (2009-2014)
- Writing Across the Curriculum Liaison (2010-2014)
- Frequent participant in student recruitment and orientation activities (2008-present)

## PROFESSIONAL ACTIVITIES AND SERVICE

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- Served on 15 NASA review panels (4 as group chief)
- Co-Investigator – NASA VERITAS mission (2022-present)
- Guest scientist – NASA Gravity Recovery and Interior Laboratory (GRAIL) mission (2012-2015)
- NASA Planetary Data System-Geosciences Node Advisory Panel, member (2008 – 2015)
- Planning committee for the Lunar and Planetary Science Conference (LPSC), group lead for the Dynamics and Tectonics category (Clear Lake, TX, 1/17/12-1/20/12)
- Session chair, LPSC (2009, 2010)
- External reviewer on numerous proposals for NASA MFRP, MDAP, PGG, and other programs
- Reviewer for international proposals (Swiss National Science Foundation; German Research Foundation, and others)

- Reviewer for numerous papers in *Nature*, *Science*, *Nature Geoscience*, *Geophysical Research Letters*, *Earth and Planetary Science Letters*, *J. Geophysical Research*, *Physics of Earth and Planetary Interiors*, *Icarus*, *Geology*, *Geological Society of America Bulletin*, *Geomorphology*, and others
- Frequent interviews provided to popular science media (BBC, NPR, National Geographic, Science News, Nature News, and others) on planetary topics
- Judge, Stephen E. Dworkin Award at the 37<sup>th</sup> - 39<sup>th</sup> LPSC (2006-8)

#### SELECT AWARDS AND RECOGNITION

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- CSM teaching excellence award (2014, 2015)
- Dworkin award to undergraduate student Hank Cole for best poster presentation at the Lunar and Planetary Science Conference (2015)
- Order of Omega Outstanding Faculty Member award (2013)
- NASA group achievement award for contributions to the MRO Gravity Science Team (2011)
- Dworkin award to graduate student Kelsey Zabrusky for best oral presentation at the Lunar and Planetary Science Conference (2011)
- First prize overall award to graduate student Brian Davis in the CSM Graduate Student Research Fair poster competition (2011)
- Editor's Citation for Excellence in Refereeing for *Geophysical Research Letters* (2010) and *Icarus* (2015)
- Stephen E. Dworkin Planetary Geoscience Student Paper Award for Best Oral Presentation at the 36<sup>th</sup> Lunar and Planetary Science Conference (2005)

#### SELECT INVITED TALKS

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- *Decadal Survey Mars Panel*, Deep and crustal geology on Mars (2/16/2021)
- *Decadal Survey Moon Panel*, Structure of the lunar crust (1/29/2021)
- *Fall AGU Meeting*, Subsurface hydrology and water-rock interactions on early Mars (12/2019)
- *Various departmental colloquia* (Brown University, University of Colorado, Lunar and Planetary Institute, University of Arizona, Stanford, Caltech, University of Illinois-Chicago, University of Texas-Austin, Cornell University, Princeton University, University of Chicago, Harvard University, Cassini Science Team)

#### PEER-REVIEWED PUBLICATIONS

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\*Student or postdoc mentored by J.C.A.-H.

H-index 32 (H-index 23 including only papers led by my group members) *data from Google Scholar*

- 1) Andrews-Hanna, J.C. and 10 others (2022), Structure and evolution of the lunar interior, *New Views Moon 2*, *in press*,
- 2) \*Broquet, A. and J. C. Andrews-Hanna (2022), Geophysical evidence for an active mantle plume underneath Elysium Planitia, Mars, *Nature Astronomy* – *in press*, doi:/10.1038/s41550-022-01836-3.
- 3) \*Broquet, A. and J. C. Andrews-Hanna (2022), Plume-Induced Flood Basalts on Hesperian Mars: An Investigation of Hesperia Planum, *Icarus* *in press*.
- 4) \*Moruzzi, S.M., W.S. Kiefer, and J.C. Andrews-Hanna (2022), Thrust faulting on Venus: Tectonic modeling of the Vedma Dorsa ridge belt, *Icarus*, *in press*.
- 5) Andrews-Hanna, J.C. and \*A. Broquet (2022), The history of strain and geodynamics on Mars, *Icarus* – *in revision*.
- 6) Bjonnes, E., B.C. Johnson, and J.C. Andrews-Hanna (2022), Basin Crustal Structure at the Multiring Basin Transition, *J. Geophys. Res.* – *in revision*.

- 7) Siegler, M. A., J.C. Andrews-Hanna, and seven others (2022) Remote Detection of a Lunar Granitic Batholith at Compton-Belkovich, *Nature – under review*.
- 8) \*Liang, W., J.C. Andrews-Hanna and A.J. Evans (2022), The missing craters and basin rings beneath the lunar maria, *in preparation for submission to Icarus (available upon request)*.
- 9) \*Moruzzi, S.M., J.C. Andrews-Hanna, P. Schenck, and B. Johnson (2022), Pluto’s Sputnik Basin as a Peak-Ring Basin: A Comparative Study, *in preparation for submission to Icarus (available upon request)*.
- 10) Jones, M. J., A. J. Evans, B. C. Johnson, M. B. Weller, J. C. Andrews-Hanna, S. M. Tikoo, and J. T. Keane (2022), A South Pole–Aitken impact origin of the lunar compositional asymmetry, *Sci. Adv.*, 8, eabm8475, doi:10.1126/sciadv.abm8475.
- 11) \*Liang, W. and J. C. Andrews-Hanna (2022), Probing the source of ancient gravity anomalies on the Moon, *Icarus*, 380, 114978, doi:10.1016/j.icarus.2022.114978
- 12) Hood, L.L., Oliveira, J.S., Andrews-Hanna, J., Wieczorek, M.A., Stewart, S.T., 2021. Magnetic Anomalies in Five Lunar Impact Basins: Implications for Impactor Trajectories and Inverse Modeling. *J. Geophys. Res. Planets* 126, e2020JE006668. doi:<https://doi.org/10.1029/2020JE006668>
- 13) \*Horvath, D. G., P. Moitra, C. W. Hamilton, R. A. Craddock, and J. C. Andrews-Hanna (2021), Evidence for geologically recent explosive volcanism in Elysium Planitia, Mars, *Icarus*, 365, 114499, doi:10.1016/j.icarus.2021.114499.
- 14) \*Horvath, D. G., and J. C. Andrews-Hanna (2021), The hydrology and climate of Mars during the sedimentary infilling of Gale crater, *Earth Planet. Sci. Lett.*, 568, 117032, doi:<https://doi.org/10.1016/j.epsl.2021.117032>.
- 15) \*Moitra, P., D. G. Horvath, and J. C. Andrews-Hanna (2021), Investigating the roles of magmatic volatiles, ground ice and impact-triggering on a very recent and highly explosive volcanic eruption on Mars, *Earth Planet. Sci. Lett.*, 567, 116986, doi:<https://doi.org/10.1016/j.epsl.2021.116986>.
- 16) Andrews-Hanna, J. C. (2020), The tectonic architecture of wrinkle ridges on Mars, *Icarus*, 351, 113937, doi:10.1016/j.icarus.2020.113937.
- 17) \*Jansen, J. C., J. C. Andrews-Hanna, C. Milbury, J. W. Head III, Y. Li, H. J. Melosh, and M. T. Zuber (2019), Radial gravity anomalies associated with the ejecta of the Orientale basin, *Icarus*, 319, doi:10.1016/j.icarus.2018.09.034.
- 18) Andrews-Hanna, J.C., Head, J.W., Johnson, B.C., Keane, J.T., Kiefer, W.S., McGovern, P.J., Neumann, G.A., Wieczorek, M.A., Zuber, M.T., 2018. Ring faults and ring dikes around the Orientale basin on the Moon. *Icarus* doi:10.1016/j.icarus.2017.12.012.
- 19) \*Evans, A. J., J. C. Andrews-Hanna, J. W. Head, J. M. Soderblom, S. C. Solomon, and M. T. Zuber (2018), Reexamination of Early Lunar Chronology With GRAIL Data: Terranes, Basins, and Impact Fluxes, *J. Geophys. Res. Planets*, 123(7), 1596–1617, doi:10.1029/2017JE005421.
- 20) \*Evans, A. J., S. M. Tikoo, and J. C. Andrews-Hanna (2018), The Case Against an Early Lunar Dynamo Powered by Core Convection, *Geophys. Res. Lett.*, 45(1), doi:10.1002/2017GL075441.
- 21) \*Horvath, D. G., and J. C. Andrews-Hanna (2017), Reconstructing the past climate at Gale crater, Mars, from hydrological modeling of late-stage lakes, *Geophys. Res. Lett.*, 44, 8196–8204, doi:10.1002/2017GL074654, doi:10.1002/2017GL074654.Received.
- 22) Johnson, B. C., J. C. Andrews-Hanna, G. S. Collins, A. M. Freed, H. J. Melosh, and M. T. Zuber (2018), Controls on the Formation of Lunar Multiring Basins, *J. Geophys. Res. Planets*, 123(11), 3035–3050, doi:<https://doi.org/10.1029/2018JE005765>.
- 23) \*Horvath, D. G. and J. C. Andrews-Hanna (2017), Reconstructing the past climate at Gale crater, Mars, from hydrological modeling of late-stage lakes. *Geophys. Res. Lett.*, 44, doi:10.1002/2017GL074654.
- 24) Bottke, W. F., and J. C. Andrews-Hanna (*joint first-authorship*) (2017), A post-accretionary lull in large impacts on early Mars, *Nat. Geosci.*, 10, 344–348, doi:10.1038/NGEO2937.

- 25) \*Cole, H. M., and J. C. Andrews-Hanna (2017), The anatomy of a wrinkle ridge revealed in the wall of Melas Chasma, Mars, *J. Geophys. Res. Planets*, 122, 889–900, doi:10.1002/2017JE005274.
- 26) \*Jansen, J. C., J. C. Andrews-Hanna, Y. Li, P. G. Lucey, G. J. Taylor, S. Goossens, F. G. Lemoine, E. Mazarico, J. W. Head, C. Milbury, W. S. Kiefer, J. M. Soderblom, and M. T. Zuber (2017), Small-scale density variations in the lunar crust revealed by GRAIL, *Icarus*, 291, 107–123, doi:10.1016/j.icarus.2017.03.017.
- 27) Ehlmann, B. L., J.C. Andrews-Hanna, and 44 others (2016), The sustainability of habitability on terrestrial planets: Insights, questions, and needed measurements from Mars for understanding the evolution of Earth-like worlds, *J. Geophys. Res. Planets*, 121(10), doi:10.1002/2016JE005134.
- 28) \*Evans, A. J., J. M. Soderblom, J. C. Andrews-Hanna, S. C. Solomon, and M. T. Zuber (2016), Identification of buried lunar impact craters from GRAIL data and implications for the nearside maria, *Geophys. Res. Lett.*, 43, 2445–2455, doi:10.1002/2015GL067394.
- 29) Johnson, B.C., Blair, D.M., Collins, G.S., Melosh, H.J., Freed, A.M., Taylor, G.J., Head, J.W., Wieczorek, M.A., Andrews-Hanna, J.C., Nimmo, F., Keane, J.T., Miljković, K., Soderblom, J.M., Zuber, M.T., 2016. Formation of the Orientale lunar multiring basin. *Science* 354. doi:10.1126/science.aag0518
- 30) \*Horvath, D. G., J. C. Andrews-Hanna, C. E. Newman, K. L. Mitchell, and B. W. Stiles (2016), The influence of subsurface flow on lake formation and north polar lake distribution on Titan, *Icarus*, 277, 103–124, doi:10.1016/j.icarus.2016.04.042.
- 31) \*Karasözen, E., J. C. Andrews-Hanna, J. M. Dohm, and R. C. Anderson (2016), The formation of the South Tharsis Ridge Belt: Basin and Range-style extension on early Mars? *J. Geophys. Res. Planets*, 121, doi:10.1002/2015JE004936.
- 32) Zuber, M.T., Smith, D.E., Neumann, G.A., Goossens, S., Andrews-hanna, J.C., Head, J.W., Kiefer, W.S., Asmar, S.W., Konopliv, A.S., Lemoine, F.G., Matsuyama, I., Melosh, H.J., McGovern, P.J., Nimmo, F., Phillips, R.J., Solomon, S.C., Taylor, G.J., Watkins, M.M., Wieczorek, M.A., Williams, J.G., Jansen, J.C., Johnson, B.C., Keane, J.T., Mazarico, E., Miljkovi, K., Park, R.S., Soderblom, J.M., Yuan, D., 2016. Gravity field of the Orientale basin from the Gravity Recovery and Interior Laboratory Mission. *Science* 354, 438–441.
- 33) Soderblom, J. M., A. J. Evans, B. C. Johnson, H. J. Melosh, K. Miljković, R. J. Phillips, J. C. Andrews-Hanna, C. J. Bierson, J. W. Head III, C. Milbury, G. A. Neumann, F. Nimmo, D. E. Smith, S. C. Solomon, M. M. Sori, M. A. Wieczorek, and M. T. Zuber (2015), The fractured Moon: Production and saturation of porosity in the lunar highlands from impact cratering, *Geophys. Res. Lett.*, 42, 6939–6944, doi:10.1002/2015GL065022.
- 34) Andrews-Hanna, J. C., J. Besserer, J. W. Head, C. J. A. Howett, W. S. Kiefer, P. J. Lucey, P. J. McGovern, H. J. Melosh, G. A. Neumann, R. J. Phillips, R. J. Phillips, P. M. Schenk, D. E. Smith, S. C. Solomon, and M. T. Zuber (2014), Structure and evolution of the lunar Procellarum region as revealed by GRAIL gravity data, *Nature*, 514, 68-71.
- 35) Besserer, J., Nimmo, F., Wieczorek, M.A., Weber, R.C., Kiefer, W.S., McGovern, P.J., Andrews-Hanna, J.C., Smith, D.E., Zuber, M.T., 2014. GRAIL gravity constraints on the vertical and lateral density structure of the lunar crust. *Geophys. Res. Lett.* 41, 5771–5777. doi:10.1002/2014GL060240
- 36) Williams, J.G., Konopliv, A.S., Boggs, D.H., Park, R.S., Yuan, D.-N., Lemoine, F.G., Goossens, S., Mazarico, E., Nimmo, F., Weber, R.C., Asmar, S.W., Jay Melosh, H., Neumann, G.A., Phillips, R.J., Smith, D.E., Solomon, S.C., Watkins, M.M., Wieczorek, M.A., Andrews-Hanna, J.C., Head, J.W., Kiefer, W.S., Matsuyama, I., McGovern, P.J., Jeffrey Taylor, G., Zuber, M.T., 2014. Lunar interior properties from the GRAIL mission. *J. Geophys. Res. Planets* 119. doi:10.1002/2013JE004559
- 37) Andrews-Hanna, J. C., S. W. Asmar, J. W. Head III, W. S. Kiefer, A. S. Konopliv, F. G. Lemoine,

- I. Matsuyama, E. Mazarico, P. J. McGovern, H. J. Melosh, G. A. Neumann, F. Nimmo, R. J. Phillips, D. E. Smith, S. C. Solomon, G. J. Taylor, M. A. Wieczorek, J. G. Williams, and M. T. Zuber (2013), Ancient igneous intrusions and early expansion of the Moon revealed by GRAIL gravity gradiometry, *Science*, 339, 675-678.
- 38) \*Isherwood, R. J., \*J. M. Jozwiak, \*J. C. Jansen, and J. C. Andrews-Hanna (2013), The volcanic history of Olympus Mons from paleo-topography and flexural modeling, *Earth Plan. Sci. Lett.*, 363, 88-96.
- 39) \*Kattoum, Y. N., and J. C. Andrews-Hanna (2013), Evidence for ring-faults around the Orientale basin on the Moon from gravity, *Icarus*, 226, 694-707.
- 40) Andrews-Hanna, J. C. (2013), The origin of the non-mare mascon gravity anomalies in lunar basins, *Icarus*, 222, 159-168.
- 41) Melosh, H.J., Freed, A.M., Johnson, B.C., Blair, D.M., Andrews-Hanna, J.C., Neumann, G.A., Phillips, R.J., Smith, D.E., Solomon, S.C., Wieczorek, M.A., Zuber, M.T., 2013. The origin of lunar mascon basins. *Science* 340, 1552–1556.
- 42) \*Zabusky, K. J., J. C. Andrews-Hanna, and S. M. Wiseman (2012), Reconstructing the distribution and depositional history of the sedimentary deposits of Arabia Terra, Mars, *Icarus*, 220, 311-330.
- 43) \*Li, J. (*\*student mentored while I was a postdoc*), J. C. Andrews-Hanna, Y. Sun, R. J. Phillips, J. J. Plaut, and M. T. Zuber (2012), Density variations within the south polar layered deposits of Mars, *J. Geophys. Res.*, 117, E04006, doi:04010.01029/02011JE003937.
- 44) Andrews-Hanna, J. C. (2012), The formation of Valles Marineris: 1. Tectonic architecture and the relative roles of extension and subsidence, *J. Geophys. Res.*, 117, E03006 doi:03010.01029/02011JE003953.
- 45) Andrews-Hanna, J. C. (2012), The formation of Valles Marineris: 2. Stress focusing along the buried dichotomy boundary, *J. Geophys. Res.*, 117, E04009, doi:04010.01029/02011JE003954.
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