



Kelsi N. Singer

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Education:

- 2013 Ph.D. Earth and Planetary Sciences, Washington University in St. Louis
Icy Satellite Tectonic, Geodynamic, and Mass Wasting Surface Features: Constraints on Interior Processes and Evolution
- 2008 M.A. Earth and Planetary Sciences, Washington University in St. Louis
- 2006 B.A. Astronomy and Anthropology, University of Colorado at Boulder
(Magna Cum Laude, with Honors)

Research:

- July 2014– Present *Southwest Research Institute*
- 2018–Present: Senior Research Scientist
 - 2014–2017: Postdoctoral Researcher with New Horizons
 - Geology and geophysics of Pluto and Charon
 - New Horizons mission operations
 - Co-I on New Horizons Extended Mission
- 2013–2014 *Washington University – Postdoctoral Associate with Professor Brad Jolliff*
- Empirical investigations of cratering physics with LROC data
- 2006–2013 *Washington University – Graduate Thesis Research with Professor Bill McKinnon*
- Secondary craters on Ganymede and Europa – characterization of ejecta fragment size-velocity distributions
 - Analysis of pits, spots, uplifts and small chaos regions on Europa
 - Stress field from despinning of Iapetus and correlation with linear features
 - Large landslides and surface material properties on Iapetus
 - Viscously relaxed craters on Ganymede and Enceladus and heat flow
 - Ring-graben around large impact basins on Europa and heat flow
- 2006 *University of Colorado – Summer Undergraduate Research Assistant*
- Ground truth from the Opportunity Rover for Mars thermal inertia data
- 2005 *Australian Centre for Astrobiology, Macquarie University – Undergraduate Research Assistant*
- Investigation of cyclic rhythmites as a paleorecord of earth's tidal dissipation
 - Reduction of IR images of Venus' cloud structure and observations at the AAT
- 2002–2003 *University of Colorado/NOAA – Undergraduate Research Assistant*
- Observations of Solar Flares and analysis of SOONSPOT data

Fellowships and Honors:

- 2017 Editors' Citation for Excellence in Refereeing - Geophysical Research Letters
- 2017 Asteroid named in honor, 10698 Singer
- 2017 New Horizons Project Scientist Trainee under Hal Weaver
- 2017 NASA Group Achievement Award – New Horizons
- 2016 NASA Early Career Fellow
- 2013 Wash U. Student Marshal Award for Exemplary Graduate Work and Service
- 2010–2013 NASA Earth and Space Science Fellowship (NESSF)
- 2010 Stephen E. Dwornik Award for Best Graduate Poster Presentation at LPSC

2008	GIS Symposium Poster Contest – 1 st place
2008	TA Recognition Award – Washington University
2006–2010	Washington University Olin Fellowship
2006	Phi Beta Kappa of Colorado Crisp Fellowship
2006	National Science Foundation Graduate Fellowship Honorable Mention
2005–2006	Barry M. Goldwater Excellence in Education Scholarship
2002–2006	University of Colorado Norlin Scholarship

Publications:

-- In Progress Manuscripts --

- Singer, K. N.**, and the New Horizons Team (201X) Impact craters on **Pluto and Charon** reveal a deficit of small Kuiper belt objects. *Science*, *under review*.
- Singer, K. N.**, Jolliff, B. L., McKinnon, W. B., and McEwen, A. S. (201X). Scale-dependent Trends in **Lunar** Ejecta from High-resolution Mapping of Secondary Craters. *JGR-Planets*. Under review.
- Singer, K. N.**, McKinnon, W.B., Schenk, P.M. (201X) Ice Shell Thickness and Endogenic Processes on **Europa** from Mapping and Topographic Analyses of Pits, Uplifts and Small Chaos Features. *In preparation*.
- Singer, K. N.** et al. (201X) **Pluto's** cryovolcanic constructs. *In preparation*.
- Silber, **Singer**, et al. (201X) Formation of **Europa's** impact basin ring-graben. *In preparation*.

-- Published Papers --

Note: New Horizons publications are only listed if I made a specific contribution.

- Singer, K. N.**, Bland, M. T., Schenk, P. M., McKinnon, W. B., (2018) Relaxed impact craters on **Ganymede**: Regional variation and high heat flows. *Icarus* 306, 214-224.
doi:10.1016/j.icarus.2018.01.012
- Bierhaus, E. B., et al., (2018) Secondary craters and ejecta across the solar system: Populations and effects on impact-crater based chronologies. *Meteoritics & Planetary Science*, accepted.
doi:10.1111/maps.13057
- Robbins, S. J., Runyon, K., **Singer, K. N.** et al., (2018) Investigation of **Charon's** Craters with Abrupt Terminus Ejecta, Comparisons with Other Icy Bodies, and Formation Implications. *JGR-Planets*, accepted. doi:10.1002/2017je005287
- Moore, J. M., et al., (2018) Bladed Terrain on **Pluto**: Possible origins and evolution. *Icarus* 300, 129-144. doi:10.1016/j.icarus.2017.08.031
- Bland, M. T., **Singer, K. N.**, McKinnon, W. B., Schenk, P. M., (2017) Viscous relaxation of **Ganymede's** impact craters: Constraints on heat flux. *Icarus* 296, 275-288.
doi:10.1016/j.icarus.2017.06.012
- Stern, S.A. et al. (2017) Past Epochs of Significantly Higher Pressure Atmospheres on **Pluto**. *Icarus*, 287, 47-53.
- Robbins, S. J., **Singer, K. N.** et al., (2017) Craters of the **Pluto-Charon** System. *Icarus*, 287, 187-206.
doi:10.1016/j.icarus.2016.09.027
- Beyer, R. A. et al. (2017) **Charon** Tectonics. *Icarus*, 287, 161-174.
- White, O. L. et al. (2017) Geological Mapping of Sputnik Planitia on **Pluto**. *Icarus*, 287, 261-286.
- Cataldi, G. et al., (2017) Searching for biosignatures in **exoplanetary** impact ejecta. *Astrobiology*, 17, 721-746. doi:10.1089/ast.2015.1437.
- Astrobiology** Primer 2.0 (2016) ... **Singer, K. N.** – Editor on two chapters and author of several sections ... [Available open access](#) on the *Astrobiology* website.
- Grundy, W. M., et al. (2016) The formation of **Charon's** red poles from seasonally cold-trapped volatiles. *Nature* 539, 65-68.

- Moore et al. (2016) The geology of **Pluto and Charon** through the eyes of New Horizons. *Science Special Issue on New Horizons*, 351, 6279, 1284-1293. DOI: 10.1126/science.aad7055
- Weaver et al. (2016) The **small satellites of Pluto** as observed by New Horizons. *Science Special Issue on New Horizons*, 351, 6279, aae0030. DOI: 10.1126/science.aae0030
- Singer, K.N.**, Stern, S.A. (2015) On the Provenance of **Pluto's** Nitrogen (N₂). *ApJ Letters*, 808, L50. doi:10.1088/2041-8205/808/2/L50.
- Robbins, S. J., ... **Singer, K.N.**, et al. (2014) The variability of crater identification among expert and community crater analysts. *Icarus*, 234, 109-131.
- Singer, K.N.**, McKinnon, W.B., and Nowiki, L.T. (2013) Secondary Craters from Large Impacts on **Europa and Ganymede**: Ejecta Size-velocity Distributions on Icy Worlds, and the Scaling of Ejected Blocks. *Icarus*, 226, 1, 865-884, doi:10.1016/j.icarus.2013.06.034.
- Singer, K.N.**, McKinnon, W.B., Schenk, P.M., and Moore, J.M. (2012) Massive ice avalanches on **Iapetus** caused by friction reduction during flash heating. *Nature Geoscience*, 5, 8, pp. 574 - 578.
- Bland, M.T., **Singer, K.N.**, McKinnon, W.B., Schenk, P.M. (2012) **Enceladus'** extreme heat flux as revealed by its relaxed craters. *Geophysical Research Letters*. 39, 17204.
- Singer, K.N.** and McKinnon, W.B. (2011) Tectonics on **Iapetus**: Despinning, Respinning, or Something Completely Different? *Icarus*, 216, 1, pp. 198-211.
- Hynek, B.M. and **Singer, K.** (2007) Ground truth from the Opportunity Rover for **Mars** thermal inertia data. *Geophysical Research Letters*, 34, 11201.

Recent Conference Abstracts:

(Full list presented at the end of this document)

2018

- Singer, K.N.** et al., (2018) Cryovolcanism on **Pluto and Charon**. *EGU*, abstract# [5761](#).
- Singer, K. N.** et al., (2018) Impact craters on **Pluto and Charon** reveal a deficit of small Kuiper Belt objects. *The Transneptunian Solar System Meeting*, Coimbra, abstract can be found [here](#).

2017

- Singer, K. N.**, et al., (2017) Two geologic constraints on **Europa's** ice shell thickness and implications for habitability. *Europa Deep Dive 1: Ice-Shell Exchange Processes*, abstract# [2048](#).
- Singer, K. N.**, et al., (2017) Chaotic Mountain Blocks in **Pluto's** Sputnik Planitia. *AS/DPS Meeting Abstracts*, Vol. 49, #221.01. [Link to iposter](#).
- Singer, K. N.**, et al. (2017) **Pluto System** and Beyond – Results from **New Horizons**. Invited talk at the *Joint Japanese Geophysical Union/ American Geophysical Union meeting*.
- Singer, K. N.**, et al. (2017) Impact craters on **Pluto and Charon** reveal a deficit of small Kuiper belt objects. *Asteroids, Comets, Meteors 2017*.

2016

- Singer, K. N.**, et al. (2016) Impact Craters on **Pluto and Charon** Indicate a Deficit of Small Kuiper Belt Objects. *AAS/DPS Meeting Abstracts*, Vol. 48, #[213.12](#).
- Singer, K. N.**, et al. (2016) **Pluto System** Cratering History and Surface Ages. *GSA Meeting Abstracts*, Paper No. 48-5.
- Singer, K. N.**, et al. (2016) **Pluto's** Putative Cryovolcanic Constructs. *Planetary Mappers Meeting*. 1920, #[7017](#).
- Singer, K. N.**, et al. (2016) Craters on **Pluto and Charon** – Surface Ages and Impactor Populations. *LPSC Abstract*, #[2310](#).
- Singer, K. N.**, et al. (2016) **Pluto's** Putative Cryovolcanic Constructs. *LPSC Abstract*, #[2276](#).

2015

- Singer, K. N.**, et al. (2015) Craters on **Pluto and Charon**: The Influence of Low Gravities, Low Impact Speeds, and Unique Ices. *AGU Abstract*, #P41E-07.
- Singer, K. N.**, et al. (2015) Craters on **Pluto and Charon**: Characteristics and Impactor Population. *AAS/DPS Abstract*, Vol. 47., #102.02.
- Singer, K. N.**, Stern, S. A. (2015) An Endogenous Source for **Pluto's** Nitrogen (N₂). *LPSC abstract*, Vol. 46, pp. 1192.
- Singer, K. N.**, McKinnon, W. B., Jolliff, B. L., Plescia, J. B. (2015) Icy Satellite and **Lunar** Ejecta from Mapping of Secondary Craters: Implications for Sesquinary Forming Fragments. *LPI Contributions* 1841, 9034.
- Ostrach, L. R., **Singer, K. N.**, Petro, N. E., Robinson, M. S., 2015. Detecting Non-Obvious Secondary Craters on the **Moon**. *LPI Contributions* 1841, 9028.

Proposal Experience:

PI of selected SSW 2015 proposal
 New Horizons Extended Mission proposals
 Co-I on 2 Spacecraft Instrument proposals
 Co-I on 2 selected ROSES proposals
 LROC Extended Mission proposals

Invited Talks:

Fall 2019 Planned: University of Illinois
 Spring 2018 3 - Carnegie Institute; University of British Columbia; NRC-Herzberg
 Fall 2017 University of Arizona
 Spring 2017 Jp-GU/AGU Joint meeting
 Fall 2016 5 - GSA New Horizons Session, Georgia Tech, St. Louis University, Cornell
 Planetary Science brownbag, Cryospheric and Polar Processes division of
 CIRES/NSIDC/CU
 Spring 2016 4 - John's Hopkins, JPL, Caltech, Oklahoma University
 Spring 2015 Arecibo Radio Observatory
 Fall 2014 GSA: GK Gilbert Session in Honor of Bill McKinnon
 Spring 2014 University of Missouri, St. Louis, MO
 Fall 2013: AGU: Destination Europa Session
 Summer 2013 Lunar and Planetary Institute, Houston, TX
 Fall 2012 Missouri University of Science and Technology, Rolla, MO

Training Sessions:

2017-2018 Project Scientist Trainee under New Horizons PS Hal Weaver
 2017 SPICE Training Workshop
 2017 SwRI Project Management Class
 2014 GIS/Python Programming
 2013 Impacts and Life Field Course, Kuressaare, Estonia
 2013 Education Research Seminar
 2011, 2012 NAI Astrobiology Winter and Summer Schools (Hawaii, Iceland)
 2010 Meteor Crater Field Camp
 2010 JPL Planetary Science Summer School – Ganymede multiple-flyby mission

Professional Societies:

2014–Present Geological Society of America
 2009–Present American Astronomical Society – Division of Planetary Sciences
 2007–Present Association for Women in Science – St. Louis Chapter President (2009-2014)
 2007–Present American Geophysical Union

Planetary Science/University Service:

2016-2018	Roadmap for Ocean Worlds Committee – Pluto/Charon/KBO Co-Lead
2016-Present	NASA ROSES Grant Review Panels (including Chairing)
2015–2018	DPS Nominating Committee
2012–Present	NASA external reviewer
2009–Present	DPS Professional Development Committee – Mentoring Lead, Women in Astronomy Discussion Hour Lead
2008–Present	Women in Planetary Science Blog Steering Committee
2014	Wash U. Olin Fellowship Selection Committee
2010–2016	Astrobiology Primer 2.0 –Editor on 2 chapters <i>Chapter 5: What does life on Earth tell us about habitability?</i> <i>Chapter 6: What is understood about habitable environments outside of Earth?</i>
2010	Rapporteur for the Planetary Science Decadal Survey (Satellites Panel)
2009–2010	WU Graduate Student Senate
2006	CU Norlin Scholarship Selection Committee

Teaching and Outreach Experience:

2018	*Advising of Undergraduate Research Project
2018	PlutoPalooza Participant
2018-Present	New Horizons Science Team Liaison to Outreach Team
2014-2017	Google Hangout and Reddit AMA coordinator for New Horizons, in addition to numerous outreach activities and talks for New Horizons
2016	*Advising of Undergraduate Research Project
2014, 2016	Space in your face! - Public Outreach Talks in Denver
2011–2013	*WU-STAR Education Research Certificate
2011–2013	Graduate Student Advisory Board to Teaching Center
2009–2012	*Advising of Undergraduate Research Project
2010 and 2011	Speaker for the St. Louis Astronomical Society
2010–2011	*Co-Founder: Washington University Graduate Group on Teaching and Learning
2010	CAE (Center for Astronomy Education) Workshops on Teaching Astronomy
2007	Teaching Assistant – Washington University – Earth Materials Class and Labs
2006–2011	Lead organizer for Women in Science Day program for 75 high school girls
2003–2005	Learning Assistant (undergraduate TA) – University of Colorado – Physics 1130, Intro to Electricity and Magnetism; Astronomy 2000, Ancient Astronomy Grader for Astronomy 1030 & 1040, Accelerated Intro to Astronomy 1 & 2

Earlier Conference Abstracts:

2014

Singer, K. N., and McKinnon, W.B (2014) Lithospheric Stress and Failure of a Despun **Pluto**: Predictions for Flattening and Tectonics. *GSA abstract #259-7*.

Singer, K. N., Jolliff, B.L., McKinnon, W.B. (2014) **Lunar** Secondary Craters Measured Using LROC Imagery: Size-velocity Distributions of Ejected Fragments. *LPSC abstract #1162*.

Singer, K. N., McKinnon, W.B., Schenk, P.M. (2014) Two Geologic Constraints on **Europa**'s Ice Shell Thickness and Implications for Habitability. *Workshop on the Habitability of Icy Worlds abstract #4073*.

2013

Singer, K.N., Jolliff, B.L., McKinnon, W.B. (2013) Secondary Craters and the Size-Velocity Distribution of Ejected Fragments around **Lunar** Craters Measured Using LROC Images. *AGU abstract #P41F-1976*.

- Singer, K.N.**, McKinnon, W.B., Schenk, P.M. (2013) Ice Shell Thickness and Endogenic Processes on [Europa](#) from Mapping and Topographic Analyses of Pits, Uplifts and Small Chaos Features. *AGU abstract #P54A-02*.
- Singer, K.N.**, McKinnon, W.B., Schenk, P.M. (2013) Ice lithosphere thickness on [Europa](#) from impact basin ring-graben. *LPSC abstract #2197*.
- Singer, K.N.**, McKinnon, W.B., Schenk, P.M. (2013) Large landslides on icy satellites: New examples from [Rhea and Tethys](#). *LPSC abstract #2955*.
- Bland, M.T., **Singer, K.N.**, McKinnon, W.B. (2013) The surface topography of [Ceres](#): Pre-dawn predictions for extensive viscous relaxation. *LPSC abstract #1655*.

2012

- McKinnon, W.B., Schenk, P.M., **Singer, K.N.** and Moore, J.M. (2012) Return to Tyre: Heat flow estimates from mulitring impact graben on [Europa](#) and elsewhere. *GSA abstract #19-11*.
- Singer, K.N.**, Bland, M.T., McKinnon, W.B., and Schenk, P.M. (2012) Relaxed Craters Across [Enceladus](#) Signal Widespread High Heat Flows. *DPS abstract #114.11*.
- Singer, K.N.**, Bland, M.T., McKinnon, W.B., and Schenk, P.M. (2012) Relaxed Impact Craters on [Ganymede](#): Not All Sulci are Created Equal. *LPSC abstract #2775*.
- McKinnon, W.B., **Singer, K.N.**, Schenk, P.M. and Moore, J.M. (2012) Massive Ice Avalanches on [Iapetus](#), and the Mechanism of Friction Reduction in Long-runout Landslides. *LPSC abstract #2823*.
- Bland, M.T., **Singer, K.N.**, McKinnon, W.B., and Schenk, P.M. (2012) Crater Relaxation on [Enceladus](#): Takes of High Heat Fluxes in Unexpected Places. *LPSC abstract #2168*.
- Niebur, S. M., **Singer, K.**, Gardner-Vandy, K., Manning, J. G., Gibbs, M. G., Daou, D. (2012) Women in Planetary Science: Career Resources and e-Mentoring on Blogs, Twitter, Facebook, Google+, and Pinterest. In: J. B. Jensen, (Ed.), *Connecting People to Science: A National Conference on Science Education and Public Outreach*, Vol. 457, pp. 313.

2011

- Singer, K.N.**, Bland, M.T., McKinnon, W.B. , and Schenk, P.M. (2011) Topographic Analysis of Impact Craters on [Enceladus and Ganymede](#): Evidence for Viscous Relaxation. EPSC-DPS2011-1050.
- Bland, M.T., **Singer, K.N.**, McKinnon, W.B. (2011) [Enceladus](#)' ancient heat flux: Clues from numerical simulation of crater relaxation. EPSC-DPS2011-1161.
- Singer, K.N.**, Nowicki, L., McKinnon, W.B., and Schenk, P.M.. (2011) Secondary Craters and Ejecta on [Icy Satellites](#): Size-velocity Distributions. *LPSC abstract #1649*.
- Bland, M.T., **Singer, K.N.**, McKinnon, W.B., and Schenk, P.M. (2011) Constraints on [Ganymede's](#) Thermal Evolution from Models of Crater Relaxation. *LPSC abstract #1814*.
- Kring, D.A., ... **Singer, K.N.**, et al. (2011) Fold Hinge in Overtuned Coconino Sandstone and its Structural Displacement During the Formation of Barringer Meteorite Crater (a.k.a [Meteor Crater](#)). *LPSC abstract #1740*.
- Kring, D.A., ... **Singer, K.N.**, et al. (2011) Asymmetrical Distribution of Impact Ejected Lithologies at Barringer Meteorite Crater (a.k.a [Meteor Crater](#)). *LPSC abstract #1746*.
- Lynch, K.L., Smith, I.B., **Singer, K.N.**, et al. (2011) The Ganymede Interior Structure, and Magnetosphere Observer (GISMO) Mission Concept. *LPSC abstract #2364*.

2010

- Singer, K.N.** and McKinnon, W.B. (2010) [Iapetian](#) Tectonics: Despinning, Respinning, Contraction, Or Something Completely Different? *DPS abstract #42, #1.01*.
- McKinnon, W.B. and **Singer, K.N.** (2010) Small Impact Craters on [Triton](#): Evidence for a Turn-up in the Size-frequency Distribution of Small (sub-km) KBOs, and Arguments Against a Planetocentric Origin. *DPS abstract #42, #20.09*.

Singer, K.N., McKinnon, W.B., and Schenk, P.M. (2010) Pits, Spots, Uplifts, and Small Chaos Regions on [Europa](#): Evidence for Diapiric Upwelling from Morphology and Morphometry. *LPSC abstract #2195*.

2008-2009

Singer, K.N., McKinnon, W.B., Schenk, P.M., and Moore, J.M. (2009) Large Landslides on [Iapetus](#): Implications for Crater and Ridge Modification. *DPS meeting abstract #41, #38.01*.

Singer, K.N., McKinnon, W.B., and Schenk, P.M. (2009) Pits, Spots, Uplifts, and Small Chaos Regions on [Europa](#): A Search for Regional Variations. *LPSC abstract #2336*.

Singer, K.N. and McKinnon, W.B. (2008) A Search for Despinning Fractures on [Iapetus](#). *LPSC abstract #2415*.