

## CURRICULUM VITA

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# Geoffrey Clark Collins

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### EDUCATION

- Ph.D.* Brown University, Geological Sciences, 2000  
Thesis title: *Driving mechanisms for grooved terrain tectonics on Ganymede and chaotic terrain formation on Europa: Constraints from Galileo data*
- Sc.M.* Brown University, Geological Sciences, 1996  
Thesis title: *Evidence for rapid regional plains emplacement on Venus from the population of volcanically embayed impact craters*
- B.A.* Carleton College, Geology, 1994  
Thesis title: *Global-scale stresses on Triton*

### PROFESSIONAL EXPERIENCE

*Professor of Geology, Wheaton College, 2012-present*  
*Associate Professor of Geology, Wheaton College, 2006-2012*  
*Assistant Professor of Geology, Wheaton College, 2000-2006*  
*Research Assistant, Brown University, 1996-2000*  
Research and mission planning for Galileo spacecraft, James W. Head III, advisor  
*Teaching Assistant, Brown University, 1995 and 1997*  
*Intern, Lunar and Planetary Institute, 1993*  
Tectonics of Triton, Paul M. Schenk, advisor  
*Laboratory Teaching Assistant, Carleton College, 1992-1994*

### HONORS AND AWARDS

- Editor's Citation for Excellence in Refereeing, *Geophysical Research Letters* 2004.
- Brown Sigma Xi Research Prize, 2000.
- Joukowsky Family Foundation Outstanding Dissertation Award - Honorable Mention 2000.
- Geological Society of America Stephen E. Dworkin Planetary Geosciences Student Paper Award, 1999.  
Paper title: *Surface stresses resulting from internal differentiation: Application to Ganymede tectonics*
- American Geophysical Union Outstanding Student Paper Award, Fall 1998.  
Paper title: *Models for the formation of chaotic terrain on Europa*

### GRANTS AWARDED

PI: "Evolution of Fluvial Landscapes on Titan: Channel Erosion, Sediment Generation, and Methane Infiltration" NASA OPR, 2006.

PI: "Strain on the Saturnian Satellites" NASA CDAP, 2006.

PI: "Global Analysis of Grooved Terrain Tectonics on Ganymede" NASA OPR, 2004.

Co-I: "Icy Worlds: Astrobiology at the Rock-Water Interface and Beyond" NASA NAI, 2014.

Co-I: "A global geologic map of Enceladus" NASA CDAP, 2013.

Co-I: "Strike-slip faulting processes on Ganymede: Morphological inferences and failure mechanics" NASA OPR, 2012.

Co-I: "Investigations into CO<sub>2</sub> and other Materials on the Saturnian and Galilean Satellites" NASA CDAP, 2006.

Co-I: "Fusion and Analysis of Data from the Galileo Near Infrared Mapping Spectrometer (NIMS) and Solid State Imager (SSI) through GIS" NASA OPR, 2005.

Co-I: "Causes and Consequences of Faulting on Europa and Other Icy Satellites" NASA PG&G, 2003.

Co-I: "Digital Imaging: Infusing Active Learning Throughout a Science Curriculum" NSF DUE-A&I, 2002.

Co-I: "Furrow Systems on Ganymede: Use as Strain Markers" NASA PG&G, 2002.

Co-I: "Geological Mapping of Ganymede: A Post-Galileo View" NASA PG&G, 2001.

## PROFESSIONAL MEMBERSHIPS

American Geophysical Union; Geological Society of America; Division for Planetary Science of the American Astronomical Society; Planetary Society

## TEACHING SUMMARY

### *Teaching Experience*

- **Wheaton College: Professor.** I have taught the following classes at Wheaton, and the numbers in parentheses indicate the number of times I have taught the course. All classes are 3 contact hours per week, except Geology, which is 6 contact hours per week:
  - Geology (13): An introductory course with field trips and labs covering basic physical and historical geology, plus the interplay between humans and the Earth's environment.
  - Geophysics (5): An upper-level physics course covering heat transport, gravity, elasticity, brittle deformation, ductile flow, and fluid dynamics.
  - Remote Sensing (4): A mid-level course open to all majors covering the theory, collection, processing, and interpretation of remotely sensed data, plus GIS data processing.
  - The Solar System (9): An introductory astronomy course oriented toward comparative planetology and robotic space exploration.
  - Astrobiology (2): A seminar-style class to introduce students to the latest thinking about life in the universe, based on reading and discussing scientific journal articles.
  - Field Geology Seminar (1): Topics in tectonics, sedimentology, structural geology, and igneous petrology, leading to a week of independent field work in Death Valley and final research projects.
  - First-year seminar (3): I have run first-year seminars devoted to the exploration of Mars, and to the deep history of our universe. Overnight field trips have bonded the first-year students together.
  - Introductory Physics I (1): The first semester of a hands-on, workshop-style course for majors and non-majors, covering Newtonian mechanics and introducing thermodynamics.
  - Frontiers of Astronomy (2): A mid-level writing-intensive seminar covering hot topics in astronomy and planetary science. Students produce a scientific journal at the end.
  - Computational Physics (1): A mid-level course to introduce physics majors to solving complex problems using computer algorithms.
  - Introductory Physics Lab (3): The laboratory component of Introductory Physics, covering classical mechanics and basic E&M. I also added a new exploration geophysics lab.
  - I have also advised independent studies, including Geotechnical Engineering, Field Geology, Slot Canyon Erosion, Planetary Science, Environmental Physics, Environmental Remote Sensing, Thermography, and Observational Astronomy.
- **Brown University: Teaching assistant** for Global Environmental Remote Sensing and Mars, Moon, and Earth. **Teaching Consultant**, Sheridan Center for Teaching and Learning, Brown University, 1998-2000. **Teaching Certificate**, Sheridan Center for Teaching and Learning, Brown University, 1997.
- **Carleton College: Laboratory teaching assistant** for Geology and Global Change, Mineralogy, Paleontology, Tectonics, and Introduction to Geology.
- **Participated in national workshops** organized by Project Kaleidoscope and the AAC&U on science pedagogy, the planning of new science facilities, and interdisciplinary teaching.

## SERVICE

### *Service to Wheaton College*

- Member and Chair of Tenure Committee (2012-2014)
- Member and Chair of Provost's Advisory Committee (2009-2011)
- Chair of Physics and Astronomy Department (2008-2011)
- Member of Provost Search Committee (2008-2009)
- Represented Wheaton at three AAC&U curriculum conferences (2006-2009)

- Member of Budget Advisory Committee (2006-2007)
- Co-chair of Teaching and Learning Workshop series (2003-2004)
- Led the creation of the GIS Lab at Wheaton (2002-2004)
- With Bob Morris in Biology, won an NSF DUE grant and set up the ICUC lab (2001-2004)
- Member and secretary of the Advisory Committee (2001-2004)
- Member of the Infusion subcommittee of the Educational Policy Committee (2001-2004)
- Active role in starting the Brown-Wheaton Internship in the Liberal Arts program (2004)
- Member of First-Year Seminar Steering Committee (2002)
- Editorial board, *Midnight Oil* (2001-2002)
- Member of Organization of a Liberal Arts Education study group (2000-2001)

### ***Service to the planetary science community***

- Member of the Committee on Astrobiology and Planetary Science of the National Research Council (2012-2015)
- Science Organizing Committee for Workshop on the Habitability of Icy Worlds (2013-2014)
- Vice-Chair of the Committee on Planetary Protection Standards for Icy Bodies in the Outer Solar System for the National Research Council (2010-2012)
- Led community white paper on Ganymede exploration for Decadal Survey, with 37 coauthors (2009)
- Chair of review panels for NASA grant proposals (2008, 2009, 2015)
- Member of the Science Definition Team for the Jupiter System Observer (2007)
- Member of the Outer Planets Assessment Group (2005-present)
- Collaborator on Cassini Imaging Science Subsystem, working on Titan image processing (2005)
- Review panel member for NASA grant proposals (2005)
- Judge for Dornik Planetary Geosciences Student Paper Award and American Geophysical Union Outstanding Student Paper Award (2004-2014)
- External reviewer for NASA grant proposals (2000-2014)
- Reviewer for dozens of papers in *Science*, *Nature Geoscience*, *Journal of Geophysical Research*, *Icarus*, *Geophysical Research Letters*, *Planetary and Space Science*, and *Journal of Structural Geology* (1999-2014)
- Session chair at several conferences (1998-2008)
- Planned and targeted imaging sequences for the Galileo Solid State Imaging experiment at Ganymede and Europa (1996-2002)

### **STUDENT-FACULTY RESEARCH**

I have been the primary advisor on four undergraduate honors theses:

Noemie Goff-Pochat '10: "Thermal Weathering on Airless Planetary Bodies in our Solar System"

Megan O'Sadnick '09: "Surface Abrasion in the Blue Ice Areas of Antarctica"

Jon Kay '08: "Examining the Relationship between Rainfall, Discharge, and Infiltration on Saturn's Moon Titan"

Louie Michaud '08: "A Dilational Faulting Model for the Origin of Pit Chains on Enceladus"

I have also advised several undergraduate students on other independent scientific research projects:

Lily Munsill '15: Boulder statistics on Enceladus south polar terrain

Brent Landry '14: Cassini image processing and mapping of Enceladus' south pole

Scott Tarlow '12: Fault population analysis on Dione

Noemie Goff-Pochat '10: Mapping and strain analysis of faults on Enceladus and Dione

Hannah di Cicco '09: Searching for strained craters on Enceladus

Louie Michaud '08: Strain measurements from fault geometry on Ganymede

Jonathan Kay '08: Finalization of crater database for the global geological map of Ganymede

Emily Martin '06: Classification of grooved terrain on Ganymede and testing methods for time-sequence sorting

Jennifer Savage '06: Geological mapping of Ganymede

Rachel Fontaine '04: Reconstructing the geometry of ancient impact basins on Ganymede and Callisto

Dan Hartmann '04: New techniques for measuring strain across ridges on Europa

Matt Blake '04: Morphology and mapping of chaotic terrain on Europa

Jon McBee '04: Time sequence analysis of groove formation in Sippar Sulcus and leading hemisphere of Ganymede  
 Karrie-Sue Farrar '03: Mapping and classification of craters on Ganymede

## PUBLICATIONS

Asterisks (\*) denote Wheaton research students

### *Peer-Reviewed Publications*

- Barr, A. C., and **G. C. Collins**, Tectonic activity on Pluto after the Charon-forming impact, *Icarus* 246, 146-155, 2015.
- Collins, G. C.**, and T. V. Johnson, Ganymede and Callisto, in *Encyclopedia of the Solar System, 3<sup>rd</sup> edition* (T. Spohn, D. Breuer, and T. V. Johnson, eds.), 813-829, Elsevier, 2014.
- Sims, D. W., D. Y. Wyrick, D. A. Ferrill, A. P. Morris, **G. C. Collins**, R. T. Pappalardo, and S. L. Colton, Physical models of grooved terrain tectonics on Ganymede, *Geophysical Research Letters*, 10.1002/2014GL060359, 2014.
- Collins, G. C.**, G. W. Patterson, J. W. Head, R. T. Pappalardo, L. M. Prockter, B. K. Lucchitta, and J. P. Kay\*, Global geological map of Ganymede, *United States Geological Survey Science Investigations Map Series #3237*, 2013.
- Burr, D. M., M. Ádámkóvics, V. R. Baker, **G. C. Collins**, A. D. Howard, R. P. Irwin, M. P. Lamb, J. M. Moore, J. T. Perron, L. S. Sklar, S. A. Drummond, and B. A. Black, Fluvial features on Titan, *Geological Society of America Bulletin* 125, 299-321, doi:10.1130/B30612.1, 2013.
- Litwin, K. L., B. R. Zygielbaum, P. J. Polito, L. S. Sklar, and **G. C. Collins**, Influence of temperature, composition, and grain size on the tensile failure of water ice: Implications for erosion on Titan, *Journal of Geophysical Research* 117, E08013, doi:10.1029/2012JE004101, 2012.
- Sogin, M. L., **G. C. Collins**, A. Baker, J. A. Baross, A. Barr, W. V. Boynton, C. S. Cockell, M. J. Daly, J. R. Fragola, R. Lopes, K. H. Nealson, D. S. Stetson, and M. H. Thieme, *Assessment of Planetary Protection Requirements for Spacecraft Missions to Icy Solar System Bodies*, National Academies Press, 2012.
- Patterson, G. W., **G. C. Collins**, J. W. Head, R. T. Pappalardo, L. M. Prockter, B. K. Lucchitta, and J. P. Kay\*, Global geological mapping of Ganymede, *Icarus* 207, 845-867, 2010.
- Collins, G. C.**, W. B. McKinnon, J. M. Moore, F. Nimmo, R. T. Pappalardo, L. M. Prockter, and P. M. Schenk, Tectonics of the outer planet satellites, in *Planetary Tectonics* (T. Watters and R. Schultz, eds.), 264-350, Cambridge University Press, 2010.
- Collins, G. C.**, and F. Nimmo, Chaotic terrain on Europa, in *Europa* (R. T. Pappalardo, W. B. McKinnon, and K. Khurana, eds.), 259-281, University of Arizona Press, 2009.
- Wahr, J., Z. A. Selvans, A. C. Barr, **G. C. Collins**, M. E. Mullen, M. M. Selvans, and R. T. Pappalardo, Modeling stresses on satellites due to non-synchronous rotation and orbital eccentricity using gravitational potential theory, *Icarus* 200, 188-206, 2009.
- Tong, E. Y., **G. C. Collins**, K. M. Judkins\*, P. D. Manos\*, A. E. Greene-Colozzi\*, J. L. Chen\*, J. A. Lee\*, M. J. Ophir\*, F. M. Laliberte\*, and T. J. Levesque\*, Motion-based angiogenesis analysis: A new method to quantify blood vessel growth, *Zebrafish* 6, 239-243, 2009.
- Collins, G. C.**, and J. C. Goodman, Enceladus' south polar sea, *Icarus* 189, 72-82, 2007.
- Collins, G. C.**, and T. V. Johnson, Ganymede and Callisto, in *Encyclopedia of the Solar System, 2<sup>nd</sup> edition* (L. A. McFadden, P. R. Weissman, and T. V. Johnson, eds.), 449-466, Academic Press, 2007.
- Burr, D. M., J. P. Emery, R. D. Lorenz, **G. C. Collins**, and P. A. Carling, Sediment transport by liquid surficial flow: Application to Titan, *Icarus* 181, 235-242, 2006.
- Collins, G. C.**, Relative rates of fluvial bedrock incision on Titan and Earth, *Geophysical Research Letters*, 32, L22202, doi:10.1029/2005GL024551, 2005.
- Pappalardo, R. T., and **G. C. Collins**, Strained craters on Ganymede, *Journal of Structural Geology* 27, 827-838, 2005.
- Gilmore, M. S., **G. C. Collins**, L. S. Crumpler, J. A. Cutts, A. V. deCharon, J. W. Head, K. T. Nock, M. Parry, and R. A. Yingst, Investigation of the application of aerobot technology at Venus, *Acta Astronautica* 56, 477-494, 2005.
- Goodman, J. C., **G. C. Collins**, J. Marshall, and R. T. Pierrehumbert, Hydrothermal plume dynamics on Europa: Implications for chaos formation, *Journal of Geophysical Research* 109, E03008, 2004.
- Pappalardo, R. T., **G. C. Collins**, J. W. Head, P. Helfenstein, T. McCord, J. M. Moore, L. M. Prockter, P. M.

- Schenk, and J. Spencer, Geology of Ganymede, in *Jupiter: Planet, Satellites, and Magnetosphere* (F. Bagenal, T. Dowling, and W. McKinnon, eds.), Cambridge University Press, 2004.
- Head, J. W., R. T. Pappalardo, **G. C. Collins**, M. J. S. Belton, B. Giese, R. Wagner, H. H. Breneman, N. A. Spaun, B. Nixon, G. Neukum, and J. Moore, Evidence for Europa-like resurfacing styles on Ganymede, *Geophysical Research Letters* 29, 2151, 2002.
- Moore, J. M., E. Asphaug, M. J. S. Belton, B. Bierhaus, H. H. Breneman, S. M. Brooks, C. R. Chapman, F. C. Chuang, **G. C. Collins**, B. Giese, R. Greeley, J. W. Head, S. Kadel, K. Klaasen, J. E. Klemaszewski, K. P. Magee, J. Moreau, D. Morrison, G. Neukum, R. T. Pappalardo, C. B. Phillips, P. M. Schenk, D. A. Senske, R. J. Sullivan, E. P. Turtle, and K. K. Williams, Impact features on Europa: Results of the Galileo Europa Mission (GEM), *Icarus* 151, 93-111, 2001.
- Prockter, L. M., P. Figueredo, R. T. Pappalardo, J. W. Head III, and **G. C. Collins**, Geology and mapping of dark terrain on Ganymede and implications for grooved terrain formation, *Journal of Geophysical Research* 105, 22,519-22,540, 2000.
- Greeley, R., P. H. Figueredo, D. A. Williams, F. C. Chuang, J. E. Klemaszewski, S. D. Kadel, L. M. Prockter, R. T. Pappalardo, J. W. Head III, **G. C. Collins**, N. A. Spaun, R. J. Sullivan, J. M. Moore, D. A. Senske, B. R. Tufts, T. V. Johnson, M. J. S. Belton, and K. L. Tanaka, Geologic mapping of Europa, *Journal of Geophysical Research* 105, 22,559-22,578, 2000.
- Collins, G. C.**, J. W. Head, R. T. Pappalardo, and N. A. Spaun, Evaluation of models for the formation of chaotic terrain on Europa, *Journal of Geophysical Research* 105, 1709-1716, 2000.
- Collins, G. C.**, J. W. Head, A. T. Basilevsky, and M. A. Ivanov, Evidence for rapid regional plains emplacement on Venus from the population of volcanically embayed impact craters, *Journal of Geophysical Research* 104, 24,121-24,139, 1999.
- Pappalardo, R. T., M. J. S. Belton, H. H. Breneman, M. H. Carr, C. R. Chapman, **G. C. Collins**, T. Denk, S. Fagents, P. E. Geissler, B. Giese, R. Greeley, R. Greenberg, J. W. Head, P. Helfenstein, G. Hoppa, S. D. Kadel, K. P. Klaasen, J. E. Klemaszewski, K. Magee, A. S. McEwen, J. M. Moore, W. B. Moore, G. Neukum, C. B. Phillips, L. M. Prockter, G. Schubert, D. A. Senske, R. J. Sullivan, B. R. Tufts, E. P. Turtle, R. Wagner, and K. K. Williams, Does Europa have a subsurface ocean? Evaluation of the geological evidence, *Journal of Geophysical Research* 104, 24,015-24,055, 1999.
- Patel, J. G., R. T. Pappalardo, J. W. Head, **G. C. Collins**, H. Hiesinger, and J. Sun, Topographic wavelengths of Ganymede groove lanes from Fourier analysis of Galileo images, *Journal of Geophysical Research* 104, 24,057-24,074, 1999.
- Prockter, L. M., A. Antman, R. T. Pappalardo, J. W. Head, **G. C. Collins**, and the Galileo SSI Team, Europa: Stratigraphy and geological history of an anti-Jovian region from Galileo E14 solid-state imaging data, *Journal of Geophysical Research* 104, 16,531-16,560, 1999.
- Collins, G. C.**, J. W. Head, and R. T. Pappalardo, The role of extensional instability in creating Ganymede grooved terrain: Insights from Galileo high-resolution stereo imaging, *Geophysical Research Letters* 25, p. 233-236, 1998.
- Collins, G. C.**, J. W. Head, and R. T. Pappalardo, Formation of Ganymede grooved terrain by sequential extensional episodes: Implications of Galileo observations for regional stratigraphy, *Icarus* 135, 345-359, 1998.
- Gilmore, M. S., **G. C. Collins**, M. A. Ivanov, L. Marinangeli, and J. W. Head, Style and sequence of extensional structures in tessera terrain, Venus, *Journal of Geophysical Research* 103, 16,813-16,840, 1998.
- Pappalardo, R. T., J. W. Head, **G. C. Collins**, R. L. Kirk, G. Neukum, J. Oberst, B. Giese, R. Greeley, C. R. Chapman, P. Helfenstein, J. M. Moore, A. McEwen, B. R. Tufts, D. A. Senske, H. H. Breneman, and K. Klaasen, Grooved terrain on Ganymede: First results from Galileo high-resolution imaging, *Icarus* 135, 276-302, 1998.
- Spaun, N. A., J. W. Head, **G. C. Collins**, L. M. Prockter, and R. T. Pappalardo, Conamara Chaos region, Europa: Reconstruction of mobile ice polygons, *Geophysical Research Letters* 25, 4277-4280, 1998.
- Belton, M. J. S., J. W. Head III, A. P. Ingersoll, R. Greeley, A. S. McEwen, K. P. Klaasen, D. Senske, R. Pappalardo, **G. Collins**, A. R. Vasavada, R. Sullivan, D. Simonelli, P. Geissler, M. H. Carr, M. E. Davies, J. Veverka, P. J. Gierasch, D. Banfield, M. Bell, C. R. Chapman, C. Anger, R. Greenberg, G. Neukum, C. B. Pilcher, R. F. Beebe, J. A. Burns, F. Fanale, W. Ip, T. V. Johnson, D. Morrison, J. Moore, G. S. Orton, P. Thomas, and R. A. West, Galileo's first images of Jupiter and the Galilean satellites, *Science* 274, p. 377-385, 1996.
- Montanari, A., P. Sandroni, A. Clymer, **G. Collins**, R. Coccioni, L. Lanci, and W. Lowrie, Preliminary report on a core drilled across the Eocene-Oligocene boundary in the type locality of Massignano (Italy): The

Massicore, *Phanerozoic Time Scale* (Odin, G. S., ed.), Bull. Liais. Inform. IUGS Subcommittee on Geochronology, 12, p. 13-16, 1994.

### **Conference Abstracts**

- Bland, M. T., T. L. Becker, K. L. Edmundson, G. W. Patterson, **G. C. Collins**, R. T. Pappalardo, S. A. Kattenhorn, T. Roatsch, and P. M. Schenk, A new Enceladus base map and global control network in support of geologic mapping, *Lunar Planet. Sci. XLVI*, #####, 2015.
- Noll, K. S., L. A. McFadden, A. R. Rhoden, L. F. Lim, W. V. Boynton, L. M. Carter, **G. Collins**, J. A. Englander, S. A. Goossens, W. M. Grundy, J. Y. Li, S. Mottola, J. Oberst, R. Orosei, A. M. Parsons, F. Preusker, D. C. Reuter, A. A. Simon, C. A. Thomas, K. Walsh, and M. E. Zolensky, DARE: Dark Asteroid Rendezvous, *Lunar Planet. Sci. XLVI*, #####, 2015.
- Seifert, F., M. E. Cameron, B. R. Smith-Konter, R. T. Pappalardo, and **G. C. Collins**, Global morphological mapping of strike-slip structures on Ganymede, *Lunar Planet. Sci. XLVI*, #2985, 2015.
- Smith-Konter, B., M. Cameron, F. Seifert, R. Pappalardo, and **G. Collins**, Global morphological mapping of strike-slip structures on Ganymede, *Eos Trans. AGU*, Fall Meet. Suppl., P43B-3984, 2013.
- Landry, B. C.\*, L. C. Munsill\*, **G. C. Collins**, and K. L. Mitchell, Observations about boulders on the south polar terrain of Enceladus, *Lunar Planet. Sci. XLV*, #2317, 2014.
- Watters, T. R., M. S. Robinson, M. E. Banks, K. Daud, N. R. Williams, M. M. Selvans, and **G. C. Collins**, Global distribution of lobate scarps on the Moon: Implications for the current stress state, *Lunar Planet. Sci. XLV*, #2163, 2014.
- Collins, G. C.**, A. C. Barr, and R. M. Lopes, The geophysical “no-man’s land” of transport across ice shells, *Workshop on the Habitability of Icy Worlds*, #4071, 2014.
- Barr, A. C., and **G. C. Collins**, Despinning and tidally driven tectonics in the Pluto-Charon binary system, *Eos Trans. AGU*, Fall Meet. Suppl., P44A-08, 2013.
- Patterson, G. W., **G. C. Collins**, J. W. Head, R. T. Pappalardo, and L. M. Prockter, A global geologic map of Ganymede, *International colloquium and workshop, Moscow: Ganymede Lander: Scientific goals and experiments*, 2013.
- Cameron, M. E., B. R. Smith-Konter, R. T. Pappalardo, **G. Collins**, and F. Nimmo, Tidally-driven strike-slip failure mechanics on Ganymede, *Lunar Planet. Sci. XLIV*, #2711, 2013.
- Tanaka, K. L., W. K. Hartmann, **G. C. Collins**, and J. G. Ogg, The evolving planetary time scale, *GSA Ann. Mtg. Abstracts*, T163-3, 2012.
- Sogin, M. L., D. Smith, and **G. Collins**, Assessment of planetary protection requirements for spacecraft missions to icy solar system bodies, *COSPAR Scientific Assembly*, 2012.
- Collins, G. C.**, L. S. Sklar, K. L. Litwin, and P. J. Polito, Do Titan’s river channels carve into ice bedrock or loose regolith? *Titan Through Time Workshop*, 2012.
- Burr, D., M. Ádámkóvics, V. R. Baker, **G. C. Collins**, A. D. Howard, R. P. Irwin, M. P. Lamb, J. M. Moore, J. T. Perron, L. S. Sklar, S. A. Drummond, and B. A. Black, Fluvial features on Titan: New insights from morphology and hydraulic modeling, *Eos Trans. AGU*, Fall Meet. Suppl., P32C-02, 2011.
- Collins, G. C.**, Chaos on Europa: Transition from solid ice to slush [invited], *Eos Trans. AGU*, Fall Meet. Suppl., C11A-0658, 2011.
- Collins, G. C.**, Planetary missions as lab experiments in the introductory classroom [invited], *Eos Trans. AGU*, Fall Meet. Suppl., ED12B-02, 2011.
- Collins, G. C.**, P. J. Polito, K. L. Litwin, and L. S. Sklar, Resistance of water ice to fluvial abrasion and implications for erosion on Titan, *Lunar Planet. Sci. XLII*, #2781, 2011.
- Collins, G. C.**, Testing candidate driving forces for faulting on Dione: Implications for nonsynchronous rotation and a freezing ocean, *Eos Trans. AGU*, Fall Meet. Suppl., P24A-08, 2010.
- Litwin, K. L., P. Polito, B. Zyguelbaum, L. S. Sklar, and **G. C. Collins**, The influence of impurities in Titan ice bedrock on tensile strength and resistance to fluvial erosion: Experimental results, *Eos Trans. AGU*, Fall Meet. Suppl., P31C-1554, 2010.
- Tarlow, S.\*, and **G. C. Collins**, Fault scarp offsets and fault population analysis on Dione, *Eos Trans. AGU*, Fall Meet. Suppl., P21B-1602, 2010.
- Paganelli, F., R. Pappalardo, G. Schubert, B. Stiles, **G. C. Collins**, K. Mitchell, and E. Stofan, Preliminary analysis of structural elements of Titan and implications for stress, *Lunar Planet. Sci. XLI*, #2664, 2010.
- Wyryck, D. Y., D. L. Buczkowski, L. F. Bleamaster, and **G. C. Collins**, Pit chains across the solar system, *Lunar*

- Planet. Sci. XLI*, #1413, 2010.
- Beyeler, J. D., L. S. Sklar, K. Litwin, J. P. Johnson, **G. C. Collins**, and K. X. Whipple, The dependence of bedrock erodibility on rock material properties: Is tensile strength enough? *Eos Trans. AGU*, Fall Meet. Suppl., EP21C-0616, 2009.
- Collins, G. C.**, Ganymede: A window into the evolution of the Jupiter system [*invited*], *Eos Trans. AGU*, Fall Meet. Suppl., P53B-03, 2009.
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