

Timothy A. Goudge

Curriculum Vitae

The University of Texas at Austin
Jackson School of Geosciences
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Research Interests

My science is driven by interests in: using remote sensing data to investigate the record of surface processes on planetary bodies; quantitative analysis of infrared spectroscopic data to remotely characterize mineralogy; and understanding how distinct boundary conditions on planetary surfaces affect sedimentary processes.

Education

Brown University, Providence, Rhode Island, USA

2015

Doctor of Philosophy (PhD) in Geological Sciences

Dissertation Title: *Paleolakes on Mars: Insights into timing, morphology, and mineralogy.*

Advisors: Jim Head and Jack Mustard

2012

Master of Science (ScM) in Geological Sciences

Advisors: Jim Head and Jack Mustard

Queen's University, Kingston, Ontario, Canada

2009

Bachelor of Science (BSc) in Geological Engineering

Focus in Geotechnical Engineering; Graduated Honors, 1st Class

Professional Experience

2015 – Present

Jackson School Distinguished Postdoctoral Fellow

Jackson School of Geosciences, The University of Texas at Austin

2010 – 2015

Graduate Student Research Assistant

Department of Geological Sciences, Brown University

Teaching Experience

2016

Instructor

Mars Sedimentology (GEO291), co-taught with David Mohrig,
Department of Geological Sciences, The University of Texas at Austin

2014 – 2016

Guest Lecturer

Brown University: Limnology (GEOL 1150); Advanced Remote
Sensing (GEOL 2330)

The University of Texas at Austin: Planetary Geology and Geophysics
(GEO391)

2014

Graduate Teaching Assistant

Mars, Moon, and the Earth (GEOL 0050), Department of Geological
Sciences, Brown University

- 2014 **Sheridan Teaching Certificate I – Reflective Teaching**
The Harriet W. Sheridan Center for Teaching and Learning, Brown University
- 2007 – 2008 **Undergraduate Teaching Assistant**
Earth's Physical Environment (APSC 151), Department of Geological Sciences and Geological Engineering, Queen's University

Refereed Journal Publications

1. de Haas, T., S. J. Conway, F. E. G. Butcher, J. Levy, P. M. Grindrod, **T. A. Goudge**, and M. R. Balme (2017), Time will tell: Temporal evolution of martian gullies and paleoclimatic implications, *Geol. Soc. London Spec. Pub.* 467, *in press*, DOI: 10.1144/SP467.1.
2. Liu, Y., **T. A. Goudge**, J. G. Catalano, and A. Wang (2017), Spectral and stratigraphic mapping of hydrated minerals associated with interior layered deposits near the southern wall of Melas Chasma, Mars, *Icarus*, *in press*, DOI: 10.1016/j.icarus.2017.11.006.
3. **Goudge, T. A.**, D. Mohrig, B. T. Cardenas, C. M. Hughes, and C. I. Fassett (2017), Stratigraphy and paleohydrology of delta channel deposits, Jezero crater, Mars, *Icarus*, *in press*, DOI: 10.1016/j.icarus.2017.09.034.
4. Salvatore, M. R., **T. A. Goudge**, M. S. Bramble, C. S. Edwards, J. L. Bandfield, E. S. Amador, J. F. Mustard, and P. R. Christensen (2017), Bulk mineralogy of the NE Syrtis and Jezero crater regions of Mars derived through thermal infrared spectral analyses, *Icarus*, *in press*, DOI: 10.1016/j.icarus.2017.09.019.
5. Cardenas, B. T., D. Mohrig, and **T. A. Goudge** (2017), Fluvial stratigraphy of valley fills at Aeolis Dorsa, Mars: Evidence for base-level fluctuations controlled by a downstream water body, *Geol. Soc. Amer. Bull.*, *in press*, DOI: 10.1130/B31567.1.
6. **Goudge, T. A.**, J. M. Russell, J. F. Mustard, J. W. Head, and S. Bijaksana (2017), A 40,000 year record of clay mineralogy at Lake Towuti, Indonesia: Paleoclimate reconstruction from reflectance spectroscopy and perspectives on paleolakes on Mars, *Geol. Soc. Amer. Bull.*, 129, 806–819, DOI: 10.1130/B31569.1.
7. **Goudge, T. A.**, R. E. Milliken, J. W. Head, J. F. Mustard, and C. I. Fassett (2017), Sedimentological evidence for a deltaic origin of the western fan deposit in Jezero crater, Mars and implications for future exploration, *Earth Planet. Sci. Lett.*, 458, 357–365, DOI: 10.1016/j.epsl.2016.10.056.
8. Levy, J. S., **T. A. Goudge**, J. W. Head, and C. I. Fassett (2017), Candidate volcanic and impact-induced ice depressions on Mars, *Icarus*, 285, 185–194, DOI: 10.1016/j.icarus.2016.10.021.
9. **Goudge, T. A.**, C. I. Fassett, J. W. Head, J. F. Mustard, and K. L. Aureli (2016), Insights into surface runoff on early Mars from paleolake basin morphology and stratigraphy, *Geology*, 44, 419–422, DOI: 10.1130/G37734.1.
10. Weider, S. Z., L. R. Nittler, S. L. Murchie, P. N. Peplowski, T. J. McCoy, L. Kerber, C. Klimczak, C. M. Ernst, **T. A. Goudge**, R. D. Starr, N. R. Izenberg, R. L. Klima, and S. C. Solomon (2016), Evidence from MESSENGER for sulfur- and carbon-driven explosive volcanism on Mercury, *Geophys. Res. Lett.*, 43, 3653–3661, DOI: 10.1002/2016GL068325.

11. **Goudge, T. A.**, K. L. Aureli, J. W. Head, C. I. Fassett, and J. F. Mustard (2015), Classification and analysis of candidate impact crater-hosted closed-basin lakes on Mars, *Icarus*, *260*, 346–367, DOI: 10.1016/j.icarus.2015.07.026.
12. Weber, A. K., J. M. Russell, **T. A. Goudge**, M. R. Salvatore, J. F. Mustard, and S. Bijaksana (2015), Characterizing clay mineralogy in Lake Towuti, Indonesia, with reflectance spectroscopy, *J. Paleolimnol.*, *54*, 253–261, DOI: 10.1007/s10933-015-9844-4.
13. **Goudge, T. A.**, J. F. Mustard, J. W. Head, C. I. Fassett, and S. M. Wiseman (2015), Assessing the mineralogy of the watershed and fan deposits of the Jezero crater paleolake system, Mars, *J. Geophys. Res.*, *120*, 775–808, DOI: 10.1002/2014JE004782.
14. Dickson, J. L., J. W. Head, **T. A. Goudge**, and L. Barbieri (2015), Recent climate cycles on Mars: Stratigraphic relationships between multiple generations of gullies and the latitude dependent mantle, *Icarus*, *252*, 83–94, DOI: 10.1016/j.icarus.2014.12.035.
15. **Goudge, T. A.**, J. F. Mustard, J. W. Head, M. R. Salvatore, and S. M. Wiseman (2015), Integrating CRISM and TES hyperspectral data to characterize a halloysite-bearing deposit in Kashira crater, Mars, *Icarus*, *250*, 165–187, DOI: 10.1016/j.icarus.2014.11.034.
16. **Goudge, T. A.**, J. W. Head, L. Kerber, D. T. Blewett, B. W. Denevi, D. L. Domingue, J. J. Gillis-Davis, K. Gwinner, J. Helbert, G. M. Holsclaw, N. R. Izenberg, R. L. Klima, W. E. McClintock, S. L. Murchie, G. A. Neumann, D. E. Smith, R. G. Strom, Z. Xiao, M. T. Zuber, and S. C. Solomon (2014), Global inventory and characterization of pyroclastic deposits on Mercury: New insights into pyroclastic activity from MESSENGER orbital data, *J. Geophys. Res.*, *119*, 635–658, DOI: 10.1002/2013JE004480.
17. Izenberg, N. R., R. L. Klima, S. L. Murchie, D. T. Blewett, G. M. Holsclaw, W. E. McClintock, E. Malaret, C. Mauceri, F. Vilas, A. L. Sprague, J. Helbert, D. L. Domingue, J. W. Head, **T. A. Goudge**, S. C. Solomon, C. A. Hibbitts, and M. D. Dyar (2014), The low-iron, reduced surface of Mercury as seen in spectral reflectance by MESSENGER, *Icarus*, *228*, 364–374, DOI: 10.1016/j.icarus.2013.10.023.
18. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and C. I. Fassett (2012), Constraints on the history of open-basin lakes on Mars from the composition and timing of volcanic resurfacing, *J. Geophys. Res.*, *117*, E00J21, DOI: 10.1029/2012JE004115.
19. Watters, T. R., S. C. Solomon, C. Klimczak, A. M. Freed, J. W. Head, C. M. Ernst, D. M. Blair, **T. A. Goudge**, and P. K. Byrne (2012), Extension and contraction within volcanically buried impact craters and basins on Mercury, *Geology*, *40*, 1123–1126, DOI: 10.1130/G33725.1.
20. **Goudge, T. A.**, J. W. Head, J. F. Mustard, and C. I. Fassett (2012), An analysis of open-basin lake deposits on Mars: Evidence for the nature of associated lacustrine deposits and post-lacustrine modification processes, *Icarus*, *219*, 211–229, DOI: 10.1016/j.icarus.2012.02.027.
21. Head, J. W., C. R. Chapman, R. G. Strom, C. I. Fassett, B. W. Denevi, D. T. Blewett, C. M. Ernst, T. R. Watters, S. C. Solomon, S. L. Murchie, L. M. Procktor, N. L. Chabot, J. J. Gillis-Davis, J. L. Whitten, **T. A. Goudge**, D. M. H. Baker, D. M. Hurwitz, L. R. Ostrach, Z. Xiao, W. J. Merline, L. Kerber, J. L. Dickson, J. Oberst, P. K. Byrne, C. Klimczak, and L. R. Nittler (2011), Flood volcanism in the northern high latitudes of Mercury revealed by MESSENGER, *Science*, *333*, 1853–1856, DOI: 10.1126/science.1211997.

First-Authored Conference Abstracts

1. ***Goudge, T. A.**, and C. I. Fassett (2017), The importance of lake overflow floods for early martian landscape evolution: Insights from Licus Vallis, *Fourth International Conference on Early Mars*, Abstract 3025.
2. **Goudge, T. A.**, B. L. Ehlmann, C. I. Fassett, J. W. Head, J. F. Mustard, N. Mangold, S. Gupta, R. E. Milliken, and A. J. Brown (2017), Jezero crater, Mars as a compelling site for future in situ exploration, *48th Lunar and Planetary Science Conference*, Abstract 1197.
3. ***Goudge, T. A.**, D. Mohrig, B. T. Cardenas, C. M. Hughes, and C. I. Fassett (2017), Stratigraphy and evolution of delta channel deposits, Jezero crater, Mars, *48th Lunar and Planetary Science Conference*, Abstract 1195.
4. **Goudge, T. A.**, and C. I. Fassett (2016), Knickpoints and hanging valleys of Licus Vallis, Mars, *2016 AGU Fall Meeting*, Abstract EP41B-0909.
5. ***Goudge, T. A.**, D. Mohrig, B. T. Cardenas, C. M. Hughes, J. S. Levy, and C. I. Fassett (2016), Stratigraphy and paleohydrology of delta channel deposits, Jezero crater, Mars, *2016 GSA Annual Meeting*, Abstract 22-5.
6. **Goudge, T. A.**, D. Mohrig, B. T. Cardenas, C. M. Hughes, J. S. Levy, and C. I. Fassett (2016), Sedimentology of the Jezero crater western fan deposit: 2. Secular changes in the style of channelization, *47th Lunar and Planetary Science Conference*, Abstract 1656.
7. ***Goudge, T. A.**, R. E. Milliken, J. W. Head, J. F. Mustard, and C. I. Fassett (2016), Sedimentology of the Jezero crater western fan deposit: 1. Evidence for a deltaic origin and implications for future exploration, *47th Lunar and Planetary Science Conference*, Abstract 1122.
8. **Goudge, T. A.**, C. I. Fassett, and C. Schwartz (2015), Constraining paleolake activity on Mars from outlet valley morphometry, *2015 AGU Fall Meeting*, Abstract P53D-2157.
9. **Goudge, T. A.**, J. F. Mustard, J. M. Russell, and J. W. Head (2015), Paleolake deposits on Mars: Perspectives on source-to-sink mineralogy from Lake Towuti, Indonesia, *46th Lunar and Planetary Science Conference*, Abstract 1191.
10. ***Goudge, T. A.**, K. L. Aureli, J. W. Head, J. F. Mustard, and C. I. Fassett (2015), Candidate closed-basin lakes on Mars: Insights into timing and intensity of fluvial activity, *46th Lunar and Planetary Science Conference*, Abstract 1190.
11. ***Goudge, T. A.**, J. F. Mustard, J. W. Head, and J. M. Russell (2014), Source to sink mineralogy in Lake Towuti, Indonesia from reflectance spectroscopy: Insights into paleolake deposits on Mars, *2014 GSA Annual Meeting*, Abstract 170-11.
12. ***Goudge, T. A.**, J. W. Head, J. F. Mustard, C. I. Fassett, and K. L. Aureli (2014), Insights from paleolake hydrologic setting: A comparison of hydrologically open and candidate hydrologically closed basins on Mars, *Eighth International Conference on Mars*, Abstract 1367.
13. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and J. M. Russell (2014), Source to sink mineralogy in Lake Towuti, Indonesia: Perspectives on open-basin lakes on Mars, *45th Lunar and Planetary Science Conference*, Abstract 1190.
14. **Goudge, T. A.**, J. W. Head, J. F. Mustard, and C. I. Fassett (2014), A transported origin for alteration minerals within the Jezero Crater, Mars paleolake basin: Evidence from catchment and delta mineralogy, *45th Lunar and Planetary Science Conference*, Abstract 1164.

15. ***Goudge, T. A.**, J. F. Mustard, J. W. Head, C. I. Fassett, and J. M. Russell (2013), Assessing catchment and delta mineralogy within the Jezero Crater paleolake system: A combined mapping and terrestrial analog approach, *2013 GSA Annual Meeting*, Abstract 11-8.
16. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and M. R. Salvatore (2013), Integrating CRISM and TES hyperspectral data to characterize a massive kaolin-group mineral deposit in Kashira Crater, Mars, *44th Lunar and Planetary Science Conference*, Abstract 1377.
17. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and C. I. Fassett (2013), Jezero Crater paleolake, Mars: Assessing the nature and provenance of alteration minerals and carbonates, *44th Lunar and Planetary Science Conference*, Abstract 1376.
18. ***Goudge, T. A.**, J. F. Mustard, J. W. Head, and M. R. Salvatore (2012), Integrating CRISM and TES data to constrain the modal mineralogy of hydrated mineral deposits on Mars – A pan-spectral approach, *2012 GSA Annual Meeting*, Abstract 60-10.
19. **Goudge, T. A.**, J. F. Mustard, and J. W. Head (2012), Geologic history of a paleolake in Kashira Crater, Mars and a comparison to terrestrial lacustrine mineralogy, *Third International Conference on Early Mars*, Abstract 7040.
20. ***Goudge, T. A.**, J. F. Mustard, J. W. Head, and C. I. Fassett (2012), Constraints on the history of open-basin lakes on Mars from the timing of volcanic resurfacing, *43rd Lunar and Planetary Science Conference*, Abstract 1328.
21. **Goudge, T. A.**, J. W. Head, L. Kerber, D. T. Blewett, B. W. Denevi, S. L. Murchie, N. R. Izenberg, W. E. McClintock, G. M. Holsclaw, D. L. Domingue, J. J. Gillis-Davis, Z. Xiao, R. G. Strom, J. Helbert, and S. C. Solomon (2012), Global inventory and characterization of pyroclastic deposits on Mercury: New insights into pyroclastic activity from MESSENGER orbital data, *43rd Lunar and Planetary Science Conference*, Abstract 1325.
22. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and C. I. Fassett (2011), Constraints on the history of open-basin lakes on Mars from the timing of volcanic resurfacing, *2011 AGU Fall Meeting*, Abstract P31E-1737.
23. ***Goudge, T. A.**, J. W. Head, J. F. Mustard, and C. I. Fassett (2011), Open-basin lakes on Mars: A global analysis of associated lacustrine and post-fluvial deposits, *The Second Moscow Solar System Symposium*, Abstract 2MS³-PS-03.
24. **Goudge, T. A.**, J. F. Mustard, J. W. Head, and C. I. Fassett (2011), Open-basin lakes on Mars: A study of mineralogy along a paleolake chain, *42nd Lunar and Planetary Science Conference*, Abstract 2244.
25. **Goudge, T. A.**, J. W. Head, J. F. Mustard, and C. I. Fassett (2011), A comprehensive look at martian open-basin lake morphology, *42nd Lunar and Planetary Science Conference*, Abstract 2131.

***Indicates oral presentation.**

Co-Authored Conference Abstracts

1. Cardenas, B. T., **T. A. Goudge**, C. M. Hughes, J. S. Levy, and D. Mohrig (2017), Justifying martian fluvial sinuous ridge measurements using Earth analog stratigraphy, *Fourth International Conference on Early Mars*, Abstract 3060.
2. Salvatore, M., **T. Goudge**, M. Bramble, C. Edwards, J. Bandfield, E. Amador, J. Mustard, and P. Christensen (2017), Bulk mineralogy of the Northeast Syrtis and Jezero crater

- regions of Mars derived through thermal infrared spectral analyses, *Fourth International Conference on Early Mars*, Abstract 3058.
3. Petersen, E. I., J. W. Holt, J. S. Levy, and **T. A. Goudge** (2017), New constraints on surface debris layer composition for martian mid-latitude glaciers from SHARAD and HiRISE, *48th Lunar and Planetary Science Conference*, Abstract 2767.
 4. Brown, A. J., C. E. Viviano-Beck, **T. A. Goudge**, and K D. Putirka (2017), Carbonate mineralogy of the Jezero crater watershed, *48th Lunar and Planetary Science Conference*, Abstract 2346.
 5. Bramble, M. S., **T. A. Goudge**, R. E. Milliken, and J. F. Mustard (2017), Testing the deltaic origin of fan deposits at Bradbury crater, Mars, *48th Lunar and Planetary Science Conference*, Abstract 2210.
 6. Cardenas, B. T., **T. A. Goudge**, C. M. Hughes, D. Mohrig, and J. S. Levy (2017), Stratigraphic architecture of compound channel-filling deposits in the Cedar Mountain and Morrison Formations, Utah: Stratigraphic analogs to martian sinuous ridges, *48th Lunar and Planetary Science Conference*, Abstract 1946.
 7. Cardenas, B. T., D. Mohrig, and **T. A. Goudge** (2017), Fluvial stratigraphy at Aeolis Dorsa, Mars records base level changes and backwater sedimentation controlled by a fluctuating downstream body of standing water, *48th Lunar and Planetary Science Conference*, Abstract 1938.
 8. Salvatore, M. R., **T. A. Goudge**, M. S. Bramble, C. S. Edwards, J. L. Bandfield, E. S. Amador, J. F. Mustard, and P. R. Christensen (2017), Bulk mineralogy of the northwest Isidis region of Mars derived through thermal infrared spectral analyses, *48th Lunar and Planetary Science Conference*, Abstract 1154.
 9. Fassett, C. I., and **T. A. Goudge** (2017), Hydrological modeling of the Jezero crater outlet-forming flood, *48th Lunar and Planetary Science Conference*, Abstract 1145.
 10. Gearon, J. H., J. S. Levy, and **T. A. Goudge** (2017), Making sense of chaos: Geomorphic investigations of martian chaos terrain, *48th Lunar and Planetary Science Conference*, Abstract 1121.
 11. Shover, K. R., **T. A. Goudge**, J. S. Levy, J. W. Holt, and C. I. Fassett (2017), Waning intensity of hydrological activity on Mars captured by fan/valley system mass balance, *48th Lunar and Planetary Science Conference*, Abstract 1106.
 12. Aylward, D., J. M. Swartz, **T. A. Goudge**, and D. Mohrig (2016), Alongshore distribution of washover deposits: Hurricane Ike and the Texas coast, 2008, *2016 AGU Fall Meeting*, Abstract EP11A-0964.
 13. Ellis, T., H. J. Hassenruck-Gudipati, D. Mohrig, and **T. A. Goudge** (2016), Investigating the relationship of Late Pleistocene terrace formation and channel dynamics within the Texas Gulf Coast plain, *2016 AGU Fall Meeting*, Abstract EP13B-1037.
 14. Lim, Y., J. S. Levy, **T. A. Goudge**, and W. Kim (2016), Controls of ice cover on Arctic delta morphodynamics and depositional processes, *2016 AGU Fall Meeting*, Abstract EP12B-06.
 15. Petersen, E. I., J. S. Levy, J. W. Holt, E. A. McKinnon, and **T. A. Goudge** (2016), The effect of surface roughness on shallow radar sounding of debris-covered glaciers in Deuteronilus Mensae, Mars, *47th Lunar and Planetary Science Conference*, Abstract 2618.

16. Lim, Y., J. S. Levy, W. Kim, and **T. A. Goudge** (2016), Experimental investigation of the effect of ice cover on delta morphology: How “warm and wet” were martian paleolake environments, *47th Lunar and Planetary Science Conference*, Abstract 2443.
17. Cardenas, B. T., A. B. Bryk, **T. A. Goudge**, C. M. Hughes, and D. Mohrig (2016), Determining paleoflow direction of martian channel belts using preserved channel-bend asymmetry: Case study at Aeolis Dorsa, Mars, *47th Lunar and Planetary Science Conference*, Abstract 2367.
18. Hughes, C. M., B. T. Cardenas, **T. A. Goudge**, and D. Mohrig (2016), Deltaic deposits indicative of a paleo-coastline at Aeolis Dorsa, Mars, *47th Lunar and Planetary Science Conference*, Abstract 2139.
19. Shover, K. R., **T. A. Goudge**, J. S. Levy, J. W. Holt, and C. I. Fassett (2016), Unraveling ancient martian hydrological conditions through mass balance studies of sedimentary fans, *47th Lunar and Planetary Science Conference*, Abstract 2057.
20. Weider, S. Z., L. R. Nittler, S. L. Murchie, P. N. Peplowski, T. J. McCoy, L. Kerber, C. M. Ernst, **T. A. Goudge**, R. D. Starr, N. R. Izenberg, R. L. Klima, J. W. Head, and S. C. Solomon (2016), Evidence from MESSENGER for sulfur- and carbon-driven explosive volcanism on Mercury, *47th Lunar and Planetary Science Conference*, Abstract 1217.
21. Mustard, J. F., S. M. Wiseman, **T. A. Goudge** (2015), Mechanisms for olivine carbonation at the Nili Fossae/Isidis basin boundary, Mars: Evidence for intense surface aqueous activity or low temperature surface alteration, *2015 GSA Annual Meeting*, Abstract 21-11.
22. Mustard, J. F., **T. A. Goudge**, M. S. Bramble, B. L. Ehlmann, J. W. Head, J. L. Dickson, C. I. Fassett, and K. M. Cannon (2015), Jezero crater watershed, Isidis basin, sulfate deposits and Syrtis Major: A compelling exploration zone for human exploration, *First Landing Site/Exploration Zone Workshop for Human Missions to the Surface of Mars*, Abstract 1034.
23. Fassett, C. I., **T. A. Goudge**, J. W. Head, and J. F. Mustard (2015), Open-basin lakes and the climate and surface environment of early Mars, *46th Lunar and Planetary Science Conference*, Abstract 1880.
24. Dickson, J. L., J. W. Head, and **T. A. Goudge** (2014), Burial, inversion, modification and removal of gullies on Mars: Clues to gully formation and evolution from detailed stratigraphic relationships, *Eighth International Conference on Mars*, Abstract 1442.
25. Mustard, J. F., S. M. Wiseman, and **T. A. Goudge** (2014), Carbonate in Nili Fossae at the Noachian-Hesperian boundary: Importance of post-Syrtis hydrologic systems?, *Eighth International Conference on Mars*, Abstract 1344.
26. Kerber, L., S. Besse, J. W. Head, D. T. Blewett, and **T. A. Goudge** (2014), The global distribution of pyroclastic deposits on Mercury: The view from orbit, *45th Lunar and Planetary Science Conference*, Abstract 2862.
27. Aureli, K. L., **T. A. Goudge**, J. W. Head, and C. I. Fassett (2014), Classification of candidate impact crater-hosted closed-basin lakes on Mars, *45th Lunar and Planetary Science Conference*, Abstract 2369.
28. Dickson, J. L., J. W. Head, L. Barbieri, and **T. A. Goudge** (2014), Evolution of the latitude dependent mantle on Mars: Thickness estimates and evidence for cyclical emplacement as revealed by Late Amazonian gullies, *45th Lunar and Planetary Science Conference*, Abstract 1680.
29. Grigsby, B., D. Turney, S. Murchie, D. Buczkowski, H. Nair, K. Seelos, C. Viviano, and **T. Goudge** (2014), Pursuing STEM: How Mars Exploration Student Data Teams

- (MESDT) students are preparing for their future in science, technology, engineering and math (STEM) related careers through authentic Mars research, *45th Lunar and Planetary Science Conference*, Abstract 1557.
30. Nittler, L. R., S. Z. Weider, R. D. Starr, N. Chabot, B. W. Denevi, C. M. Ernst, **T. A. Goudge**, J. W. Head, J. Helbert, R. L. Klima, T. J. McCoy, and S. C. Solomon (2014), Sulfur-depleted composition of Mercury's largest pyroclastic deposit: Implications for explosive volcanism and surface reflectance of the innermost planet, *45th Lunar and Planetary Science Conference*, Abstract 1391.
 31. Wiseman, S. M., J. F. Mustard, **T. A. Goudge**, and B. L. Ehlmann (2013), Topographic analysis of carbonate-bearing deposits in Nili Fossae on Mars, *2013 GSA Annual Meeting*, Abstract 11-10.
 32. Gillis-Davis, J., **T. A. Goudge**, J. W. Head, Z. Xiao, and P. K. Byrne (2013), The spatial and topographic distribution of pit craters on Mercury, *44th Lunar and Planetary Science Conference*, Abstract 2422.
 33. Aureli, K. L., J. W. Head, **T. A. Goudge**, and C. I. Fassett (2013), An analysis of candidate closed-basin lakes in impact craters on Mars, *44th Lunar and Planetary Science Conference*, Abstract 1244.
 34. Head, J. W., D. Marchant, C. Fassett, J. F. Mustard, **T. Goudge**, and K. Aureli (2013), Lessons from the McMurdo Dry Valley lakes for closed and open-basin lakes on Noachian Mars: "warm and wet" or "cold and icy"?, *ASLO 2013 Aquatic Sciences Meeting*, Abstract 11001.
 35. Gillis-Davis, J. J., M. M. Markley, **T. A. Goudge**, J. W. Head, Z. Xiao, and K. Gwinner (2012), Large pit craters of Mercury: Global distribution and occurrence, *43rd Lunar and Planetary Science Conference*, Abstract 2288.
 36. Head, J. W., S. C. Solomon, C. I. Fassett, S. L. Murchie, L. M. Prockter, M. S. Robinson, D. T. Blewett, B. W. Denevi, T. R. Watters, J. L. Whitten, **T. A. Goudge**, D. M. H. Baker, D. M. Hurwitz, P. K. Byrne, and C. Klimczak (2012), Effusive volcanism on Mercury from MESSENGER mission data: Nature and significance for lithospheric stress state and mantle convection, *43rd Lunar and Planetary Science Conference*, Abstract 1451.
 37. Head, J. W., C. R. Chapman, R. G. Strom, C. I. Fassett, B. W. Denevi, D. T. Blewett, C. M. Ernst, T. R. Watters, S. C. Solomon, S. L. Murchie, L. M. Prockter, N. L. Chabot, J. J. Gillis-Davis, J. Whitten, **T. A. Goudge**, D. M. Baker, D. M. Hurwitz, L. R. Ostrach, Z. Xiao, W. J. Merline, L. A. Kerber, J. L. Dickson, J. Oberst, P. K. Byrne, C. Klimczak, and L. R. Nittler (2011), Widespread and voluminous flood volcanism in the northern high latitudes of Mercury revealed by MESSENGER: Relation to global volcanic processes, *2011 AGU Fall Meeting*, Abstract P43E-10.
 38. Hurwitz, D. M., J. W. Head, M. T. Zuber, D. E. Smith, G. A. Neumann, R. G. Strom, C. I. Fassett, B. W. Denevi, D. T. Blewett, C. M. Ernst, T. R. Watters, S. C. Solomon, P. K. Byrne, C. Klimczak, S. L. Murchie, L. M. Prockter, N. L. Chabot, J. J. Gillis-Davis, **T. A. Goudge**, D. M. Baker, L. R. Ostrach, Z. Xiao, W. J. Merline, J. L. Dickson, J. Oberst, and L. R. Nittler (2011), Lava erosion on Mercury: Model results using new observations from MESSENGER, *2011 AGU Fall Meeting*, Abstract P41A-1591.
 39. Klimczak, C., T. R. Watters, P. K. Byrne, C. M. Ernst, S. C. Solomon, **T. A. Goudge**, J. W. Head, and Z. Xiao (2011), Strain analysis of extension in volcanically flooded impact craters on Mercury, *2011 GSA Annual Meeting*, Abstract 142-10.

40. Watters, T. R., S. C. Solomon, J. W. Head, C. M. Ernst, B. W. Denevi, M. S. Robinson, C. Klimczak, and **T. A. Goudge** (2011), Extension in the northern plains of Mercury, *2011 GSA Annual Meeting*, Abstract 142-9.
41. Fassett, C. I., B. W. Denevi, J. L. Whitten, **T. A. Goudge**, D. M. H. Baker, D. M. Hurwitz, L. R. Ostrach, Z. Xiao, P. Byrne, and C. Klimczak (2011), Widespread and voluminous flood volcanism in the northern lowlands of Mercury revealed by MESSENGER, *2011 GSA Annual Meeting*, Abstract 142-6.

Invited Talks

- 2017 NASA Marshall Space Flight Center; NASA Ames Research Center; USGS Menlo Park; Southwest Research Institute; NASA JPL; Rice University; SETI Institute; UT Institute for Geophysics; 58th Brown-Vernadsky Microsymposium
- 2016 University of Manitoba; UT – Austin; GSA Annual Meeting

Academic Honors and Awards

While at The University of Texas at Austin:

- 2015 – Present Jackson School Distinguished Postdoctoral Fellowship

While at Brown University:

- 2012 – 2015 Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship
- 2012, 2013 GSA Northeastern Section Student Travel Grant
- 2010 – 2011 First Year Graduate Fellowship

While at Queen's University:

- 2008 – 2009 J. P. Bickell Foundation Mining Scholarship
- 2008 – 2009 Gartner Lee Scholarship in Geological Engineering
- 2007 – 2008 J. J. Denny Memorial Scholarship in Geological Engineering
- 2006 – 2008 Morley E. Wilson Scholarship in Geological Sciences
- 2006 – 2007 Annie Bentley Lillie Book Prize for First Year Calculus
- 2005 – 2008 Dean's Scholar
- 2005 – 2006 Dean's Award
- 2005 – 2006 Dean's Entrance Scholarship in Applied Science

Field Experience

- 2017 Rio Grande River, TX; Ghost Ranch, NM; Texas Gulf Coast; Trinity River, TX
- 2016 Coos Bay, OR; Green River, UT; Trinity River, TX; Wax Lake Delta, LA
- 2015 North Loup River, NE
- 2015 Meridan, CT; Bavaria, Germany

Public Outreach and Service

- 2015 – Present Peer Reviewer for *Journal of Geophysical Research – Planets*; *Icarus*; *Planetary Data System (PDS)*
- 2015 – Present Review Panelist and External Reviewer for NASA ROSES

2014 – Present	Lead advocate for Jezero crater paleolake as a landing site for the NASA Mars 2020 rover [<i>site chosen as one of three finalists</i>]
2017	Session Co-Chair at 48 th Lunar and Planetary Science Conference
2011 – 2016	Volunteer for Mars Exploration Student Data Teams (MESDT)
2011 – 2015	Vartan-Gregorian Elementary School Volunteer Science Teacher
2014	Session Co-Chair at 2014 GSA Annual Meeting
2014	Guest Speaker at University of Maryland Observatory
2014	Guest Speaker for Skyscrapers, Inc.
2012 – 2014	Vartan-Gregorian Elementary School Volunteer Science Teacher Program Organizer
2011	Judge for Athena Science Challenge
2011 – 2012	Brown Graduate Student GeoClub Co-president

Technical Skills

Computer Skills: Proficient in ESRI's ArcGIS Software (including ArcMap, ArcScene, etc.), ENVI/IDL, USGS Integrated Software for Imagers and Spectrometers (ISIS), NASA Ames Stereo Pipeline, UNIX and shell scripting, MATLAB, Davinci (software developed by ASU for analyzing spacecraft data), R, Adobe Creative Suite (including Photoshop, Illustrator, etc.), and Microsoft Office (including Word, Excel, PowerPoint, etc.). Familiar with C++, Python, Maple, and Mathematica.

Laboratory Techniques: Preparation of samples (including grain size separates) for VNIR spectral analysis. Freeze drying of sediment samples, including modern lacustrine cores. VNIR reflectance spectra measurements with portable ASD field spectrometer. VNIR and MIR reflectance spectra measurements with Thermo Nicolet FTIR spectrometer. Use of GEOTEK multisensor core logger (MSCL), including use with ASD field spectrometer. Inductively coupled plasma atomic emission spectroscopy (ICP–AES) measurements for major element chemical analysis, including flux fusion sample preparation. Powder X-ray diffraction (XRD) analyses using a Bruker D2 PHASER instrument, and DIFFRAC.SUITE software (primarily EVA and TOPAS).

Professional Associations

2015 – Present	Sigma Xi (Full Member)
2012 – Present	Geological Society of America (GSA)
2011 – Present	American Geophysical Union (AGU)
2011 – Present	Geological Association of Canada (GAC)