

Gwendolyn D. Bart

Gwendolyn D. Barnes (legal name)
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Education

2007	Ph.D., Planetary Science University of Arizona, Tucson, AZ, USA.
1998	B.S., Chemistry University of California, Santa Barbara, CA, USA.

Research and Teaching Appointments

2008 Aug – present	Assistant Research Professor of Physics University of Idaho, Moscow, Idaho, USA Planetary Science (part-time; paid employment of about 33 full-time-equivalent months)
June 2007 – Oct 2009	Postdoctoral Research Scientist SETI Institute, Carl Sagan Center, Mountain View, California, USA Characterizing landing sites for the Lunar Crater Observation and Sensing Satellite (LCROSS)
Aug 2003 – May 2007	Graduate Research Associate Dr. H. Jay Melosh, advisor University of Arizona in Tucson, Arizona, USA Lunar Surface Geology from Analysis of Impact Craters and Their Ejecta
Jan 2001 – July 2003	Graduate Research Assistant Dr. Robert Greenberg, advisor University of Arizona in Tucson, Arizona, USA Tidal Stress in Europa's Ice Shell: Global Surface Cracking Patterns
Jan 2000 – Dec 2000	Graduate Research Assistant Dr. Timothy Swindle, advisor University of Arizona in Tucson, Arizona, USA Measurements of Krypton and Xenon in the Nakhlite Meteorites
Aug 1999 – May 2007	Graduate Teaching Assistant University of Arizona in Tucson, Arizona, USA 11 semesters
Jan 1998 – Dec 1998	Undergraduate Research Assistant; Dr. Peter Ford, advisor University of California, Santa Barbara, in Santa Barbara, California, USA Kinetics of Ruthenium Salen Nitrosyl and Ruthenium Salophen Nitrosyl Complexes

Scholarship Accomplishments

Current Research Activities:

Surface Halos Produced by Current Impact Cratering on Mars

This project investigates the enigmatic halos produced around brand-new impact craters on Mars. We are testing the hypothesis that the halos were formed by interaction of the atmospheric impact shock wave with the dusty martian surface.

Collaborators:

Ingrid Daubar, Jet Propulsion Laboratory, California, USA
Stephanie Quintana, Sandia National Labs, New Mexico, USA
Boris A. Ivanov, Institute for Dynamics of Geospheres, RAS, 119334, Moscow, Russia
Colin M. Dundas, U.S. Geological Survey, Flagstaff, AZ, USA
Alfred S. McEwen, University of Arizona, Tucson, AZ, USA

Constraining Lunar Regolith Depth to Better Understand the Regolith Formation Process

This project involves comparing regolith depth observations to results of a new regolith formation model. By tuning the model results to the observations, we will determine the importance of the generation of the crater's breccia lens to regolith formation.

Collaborators:

C Fassett, NASA Marshall Space Flight Center, Alabama
M Hirabayashi, Auburn University, Alabama
D Needham, NASA Marshall Space Flight Center, Alabama
B Thomson, University of Tennessee, Knoxville, Tennessee
D Minton, Purdue University, Indiana

Understanding the Relationship Between Boulders and Optical Maturity

This project investigates the common assumption that the optical maturity ("freshness") of an airless planetary surface is correlated to the surface boulder population. This assumption has implications for the formation of the optically mature surface. We will use OMAT parameters for the interiors/or crater ejecta of small craters and compare them to those craters with established absolute ages to help calibrate relative ages.

Collaborators:

J Grier, Planetary Science Institute, located in Maryland
R Watkins, Planetary Science Institute, located at Washington University, St Louis, MO
J Molaro, Planetary Science Institute, located at Jet Propulsion Laboratory, California

Publications:

Although my legal name is G.D. Barnes, I publish professionally as **G.D. Bart**. Names of students supervised by me are in *italics*.

Bart, G.D., I.J. Daubar, B.A. Ivanov, C.M. Dundas, A.S. McEwen, (2018). Dark Halos Produced by Current Impact Cratering on Mars. *Icarus* (submitted).

Daubar, I. J., Dundas, C. M., Byrne, S., Geissler, P., **Bart, G. D.**, McEwen, A. S., Russell, P. S., Chojnacki, M., Golombek, M. P., (2016). Changes in blast zone albedo patterns around new martian impact craters. *Icarus*. 267, 86-105.

Bart, G.D. (2014) The Quantitative Relationship Between Small Impact Crater Morphology and Regolith Depth. *Icarus*, 235, 130-135, doi:10.1016/j.icarus.2014.03.020 .

- Bart, G.D.,** *R.D. Nickerson, M.T. Lawder, H.J. Melosh.* (2011) Global Survey of Lunar Regolith Depths. *Icarus*, 215, 485-490, doi: 10.1016/j.icarus.2011.07.017 .
- Bart, G.D.,** H.J. Melosh. (2010) Distributions of Boulders Ejected from Lunar Craters. *Icarus*, 209, 337-357, doi: 10.1016/j.icarus.2010.05.023 .
- Bart, G.D.,** H.J. Melosh. (2010) Impact Into Lunar Regolith Inhibits High Velocity Ejection of Large Blocks. *J. Geophysical Research*. 115, E08004, doi: 10.1029/2009JE0034411 .
- Bart, G.D.,** H.J. Melosh. (2007) Using Lunar Boulders to Distinguish Primary From Distant Secondary Impact Craters. *Geophysical Research Letters*, 34, L07203, doi: 10.1029/2007GL029306 .
- Colaprete, A., P. Schultz, J. Heldmann, M. Shirley, K. Ennico, B. Hermalyn, D. Wooden, W. Marshall, A. Ricco, R. C. Elphic, D. Goldstein, D. Summy, **G.D. Bart**, E. Asphaug, D. Korycansky, D. Landis, L. Sollitt. (2010) The Detection of Water Within the LCROSS Ejecta Plume. *Science*, 330, 463-468, doi: 10.1126/science.1186986 .
- Bart, G.D.** (2007) Comparison of Small Lunar Landslides and Martian Gullies. *Icarus* 187, 417-421, doi: 10.1016/j.icarus.2006.11.004 .
- Bart, G.D.,** E.P. Turtle, W.L. Jaeger, L.P. Keszthelyi, R. Greenberg. (2004) Ridges and Tidal Stress on Io. *Icarus*, 169, 111-126, doi: 10.1016/j.icarus.2004.01.003 .
- Greenberg, R., G.V. Hoppa, **G.D. Bart**, T.A. Hurford. (2003) Tidal Stress Patterns on Europa's Crust. *Celestial Mechanics*, 87, 171-188, doi: 10.1023/A:1026169424511 .
- Works, C. F., C.J. Jocher, **G.D. Bart**, X. Bu, P.C. Ford. (2002) Photochemical Nitric Oxide Precursors: Synthesis, Photochemistry, and Ligand Substitution Kinetics of Ruthenium Salen Nitrosyl and Ruthenium Salophen Nitrosyl Complexes. *Inorganic Chemistry* 41, 3728-3739, doi: 10.1021/ic020248k .

Invited Talks:

- “NASA’s Lunar Science Institute: How Can Idaho Participate?” University of Idaho, Department of Physics, colloquium. Oct 31, 2011, in Moscow, ID.
- “Global Survey of Lunar Regolith Depths.” University of Idaho, Department of Physics, colloquium. November 1, 2010, in Moscow, ID.
- “Global Survey of Lunar Regolith Depths.” Washington State University, Department of Physics, colloquium. October 19, 2010, in Pullman, WA.
- “Water on the Moon.” University of Idaho, Department of Physics, colloquium. April 19, 2010, in Moscow, ID.
- “Impact Cratering on the Moon and Mars.” University of Idaho, Department of Physics, colloquium. February 9, 2009, in Moscow, ID.
- “An Overview of the Lunar Crater Observation and Sensing Satellite (LCROSS) Mission - An ESMD Mission to Investigate Lunar Polar Hydrogen.” Joint Annual Meeting of LEAG- ICEUM-SRR, held October 28-31, 2008 in Cape Canaveral, Florida.
- “Impact Cratering on the Moon and Mars.” University of Idaho, Department of Geological Sciences, colloquium. September 25, 2008, in Moscow, ID.

Contributed Presentations:

- Schwenzer, S. P.; Ott, U.; Hicks, L. J.; Bridges, J. C.; Filiberto, J.; **Bart, G. D.**; Swindle, T. D.; Miller, M. A.; Treiman, A. H.; Crowther, S. A.; Gilmour, J. D.; Herrmann, S.; Mohapatra, R.; Seidel, R. G. W.; Kelley, S. P.; Bullock, M. A.; Chavez, C.; Smith, H.; Moore, J. M. (March 2018) Fractionated Martian Atmosphere — The Case of the Nakhilites, Revisited with Experiments. 49th Lunar and Planetary Science Conference, The Woodlands, Texas, abstract #1561.
- Schwenzer, S. P.; **Bart, G.**; Bridges, J. C.; Crowther, S. A.; Filiberto, J.; Gilmour, J. D.; Herrmann, S.; Hicks, L. J.; Kelley, S. P.; Miller, M. A.; Ott, U.; Steer, E. D.; Swindle, T. D.; Treiman, A. H. (October 2017) Fractionated Noble Gases in Martian Meteorite ALH 84001 — An Indicator for Water-Rock Interaction, or a Sample of Ancient Atmosphere? Fourth International Conference on

- Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life. Flagstaff, AZ, abstract #3018.
- Cohen, B. A.; Lawrence, S. J.; Petro, N. E.; **Bart, G. D.**; Clegg-Watkins, R. N.; Denevi, B. W.; Ghent, R. R.; Klima, R. L.; Morgan, G. A.; Spudis, P. D.; Stopar, J. D. (March 2016) Identifying and Characterizing Impact Melt Outcrops in the Nectaris Basin. 47th Lunar and Planetary Science Conference, The Woodlands, TX, abstract #1389.
- Bart, G.D.**; Daubar, I.J.; *Spinolo, P.L.* (March 2014) Dependence of Martian Airblast Diameter on Crater Diameter. 45th Lunar and Planetary Science Conference, The Woodlands, TX, abstract #2852.
- Daubar, I. J.; Geissler, P. E.; McEwen, A. S.; Dundas, C. M.; Byrne, S.; Russell, P. R.; **Bart, G. D.** (March 2014) Changes in New Impact Blast Zones over Three Martian Years. 45th Lunar and Planetary Science Conference, The Woodlands, TX, abstract #2762.
- Bart, G.D.**; *Nickerson, R.D.*; *Johnson, A.C.* (October 2011) Tycho Secondary Craters Identified Via Ejected Boulders. Geological Society of America Annual Meeting, Minneapolis, MN.
- Bart, G. D.**; *Nickerson, R. D.*; *Lawder, M. T.* (July 2011) Lunar Regolith Depth Correlates with Lunar Geologic Units. 4th Lunar Science Forum, NASA Ames Research Center, CA.
- Bart, G. D.**; *Nickerson, R. D.*; *Lawder, M. T.* (March 2011) Geologic Unit Differences are Reflected by Lunar Regolith Depths. 42nd Lunar and Planetary Science Conference, The Woodlands, TX, abstract #2597.
- Nickerson, R. D.*; **Bart, G. D.**; *Lawder, M. T.*; Melosh, H. J. (March 2011) Global Lunar Regolith Depths Revealed. 42nd Lunar and Planetary Science Conference, The Woodlands, TX, abstract #2607.
- Lawder, M.T.*, **G.D. Bart**, *R.D. Nickerson.* (December 2010) Measuring Regolith Depth across the Lunar Surface. American Geophysical Union Fall Meeting, San Francisco, CA, abstract #P53A-1503.
- Bart, G.D.**; *R.D. Nickerson, M.T. Lawder.* (October 2010) Lunar Regolith Depths from LROC Images. American Astronomical Society Division for Planetary Sciences meeting, Pasadena, CA, abstract #21.11.
- Bart, G.D.** (July 2010) Global Survey of Lunar Regolith Depth. 3rd Lunar Science Forum, NASA Ames Research Center, CA.
- Colaprete, A., K. Ennico, D. Wooden, M. Shirley, J. Heldmann, W. Marshall, L. Sollitt, E. Asphaug, D. Korycansky, P. Schultz, B. Hermalyn, K. Galal, **G.D. Bart**, D. Goldstein, D. Summy. (March 2010) Water and More: An Overview of LCROSS Impact Results. Lunar and Planetary Science Conference, Houston, TX, abstract #2335.
- Colaprete, A., G. Briggs, K. Ennico, D. Wooden, J. Heldmann, L. Sollitt, E. Asphaug, D. Korycansky, P. Schultz, A. Christensen, K. Galal, **G.D. Bart**, LCROSS Team. (November 2009) An Overview of the Lunar Crater Observation and Sensing Satellite (LCROSS) Mission Results from Swing-by and Impact. Lunar Exploration Analysis Group meeting, Houston, TX, abstract #2064.
- Bart, G.D.**, H. J. Melosh. (July 2009) High Velocity Ejection of Large Blocks Inhibited by Impact Into Lunar Regolith. 2nd Lunar Science Forum, NASA Ames Research Center, CA.
- Bart, G.D.**, A. Colaprete. (June 2009) The Importance of LRO Observations to the LCROSS Mission. Lunar Reconnaissance Orbiter Science Targeting Meeting, Tempe, AZ.
- Bart, G.D.**, Colaprete, A. (May 2009) NASA's LCROSS Mission and the Search for Water Ice on the Moon. Annual Meeting of the Northwest Section of the American Physical Society, Vancouver, BC, Canada, abstract #BAPS.2009.NWS.B1.13.
- Bart, G.D.**, A. Colaprete. (March 2009) Shadow Depths and Other Characteristics of Potential LCROSS Impact Sites. Lunar and Planetary Science Conference, Houston, TX, abstract #2151.
- Colaprete, A., G. Briggs, K. Ennico, D. Wooden, J. Heldmann, L. Sollitt, E. Asphaug, D. Korycansky, P. Schultz, A. Christensen, K. Galal, **G.D. Bart**, LCROSS Team. (March 2009) An Overview of the Lunar Crater Observation and Sensing Satellite (LCROSS) Mission – An ESMD Mission to Investigate Lunar Polar Hydrogen. Lunar and Planetary Science Conference, Houston, TX, abstract #1861.

- Bart, G.D.**, A. Colaprete. (November 2008) LCROSS: Implications for a Lunar Cataclysm. Workshop on the Early Solar System Impact Bombardment, Houston, TX.
- Bart, G.D.**, A. Colaprete. (October 2008) Characterizing the LCROSS Impact Site. Lunar Exploration Analysis Group meeting, Cape Canaveral, FL.
- Bart, G.D.**, A. Colaprete. (September 2008) Selection and Characterization of the LCROSS Impact Site. American Astronomical Society Division for Planetary Sciences meeting, Ithaca, NY, abstract #32.15.
- Bart, G.D.**, A. Colaprete. (July 2008) LCROSS Impact Site Characterization. 1st Lunar Science Forum, NASA Ames Research Center, CA, abstract #2037.
- Bart, G.D.**, A. Colaprete. (March 2008) LCROSS Impact Site Characterization. 39th Lunar and Planetary Science Conference, Houston, TX, abstract #2225.
- Bart, G.D.**, H.J. Melosh (March 2008) Identifying Martian Secondary Craters by Their Ejected Boulders. 39th Lunar and Planetary Science Conference, Houston, TX, abstract #1461.
- Bart, G.D.**, H. J. Melosh. (December 2007) Maximum Velocity of a Boulder Ejected From an Impact Crater Formed on a Regolith Covered Surface. American Geophysical Union Fall Meeting, San Francisco, CA, abstract #U22A-07.
- Bart, G.D.**, H. J. Melosh. (March 2007) Boulders Untangle Primary from Secondary Craters. Lunar and Planetary Science Conference, Houston, TX, abstract #1501.
- Bart, G.D.**, H.J. Melosh. (September 2006) Boulders Ejected From Small Impact Craters. American Astronomical Society Division for Planetary Sciences meeting, Pasadena, CA, abstract #49.02.
- Bart, G.D.** (March 2006) Comparison of Martian Gullies and Lunar Crater-Wall Landslides. Lunar and Planetary Science Conference, Houston, TX, abstract #1345.
- Bart, G.D.**, H. J. Melosh. (August 2005) Lunar Far Side Regolith Depth. American Astronomical Society Division for Planetary Sciences meeting, Cambridge, England, abstract #57.07.
- Bart, G. D.**, H. J. Melosh. (March 2005) Ejected Boulders: Implications for Secondary Craters and the Age Dating of Surfaces. Lunar and Planetary Science Conference, Houston, TX, abstract #2022.
- Bart, G.D.**, H.J. Melosh, R.G. Strom. (November 2004) Characterization of Boulders Ejected from Small Impact Craters. American Astronomical Society Division for Planetary Sciences meeting, Louisville, KY, abstract #39.04.
- Bart, G.D.**, H. J. Melosh. (March 2004) Low Velocity Ejection of Boulders from Small Lunar Craters: Ground Truth for Asteroid Surfaces. Lunar and Planetary Science Conference, Houston, TX, abstract #1906.
- Bart, G.D.**, E.P. Turtle, W.L. Jaeger, L.P. Keszthelyi, R. Greenberg. (September 2003). Possible Surface Effects of Tidal Stress on Io. American Astronomical Society Division for Planetary Sciences meeting, Monterey, CA, abstract #02.04.
- Bart, G.D.**, R. Greenberg, G.V. Hoppa. (March 2003). Cycloids and Wedges: Global Patterns from Tidal Stress on Europa. Lunar and Planetary Science Conference, Houston, TX, abstract #1396.
- Bart, G.D.**, R. Greenberg, G.V. Hoppa, T.A. Hurford. (September 2002) Global patterns of diurnal tensile cracking on Europa. American Astronomical Society Division for Planetary Sciences meeting, Birmingham, AL, abstract #41.02.
- Swindle, T. D.; Olson, E. K.; **Bart, G.** (September 2001) Searching for Evidence of Extinct ³⁶-Chlorine in Efremovka. 64th Meteoritical Society Meeting, Rome, Italy, abstract #5084.
- Bart, G. D.**, T.D. Swindle, E.K. Olson, A.H. Treiman. (March 2001) Xenon and Krypton in Nakhla Mineral Separates. Lunar and Planetary Science Conference, Houston, TX, abstract #1363.

Grants and Contracts Awarded:

NOTE: Although my legal name is G.D. Barnes, I submit proposals professionally as G.D. Bart.

Program:	Mars Data Analysis Program (MDAP), NASA
Title:	<u>Blasting Mars: Surface Halos Produced by Current Impact Cratering</u>
PI:	G. D. Bart
Co-I:	I.J. Daubar, S. Quintana
Collaborators:	None
Award Period:	July 2018 – July 2020
Award Amount:	\$284,998
Type:	External, Competed, PI
Status:	Current
Program:	Mars Data Analysis Program (MDAP), NASA
Title:	<u>Martian Surface Structure and Age from Impact Crater Analysis</u>
PI:	G. D. Bart
Co-I:	None
Collaborators:	Alfred McEwen, Ingrid Daubar
Award Period:	Aug 2011–July 2015
Award Amount:	\$160,118
Type:	External, Competed, PI
Status:	Expired
Program:	Lunar Advanced Science and Exploration Research (LASER), NASA
Title:	<u>Lunar Surface Structure and Age from Impact Crater Analysis</u>
PI:	G. D. Bart
Co-I:	None
Collaborators:	Jay Melosh
Award Period:	Oct 2008–Sept 2012
Award Amount:	\$300,909
Type:	External, Competed, PI
Status:	Expired

Teaching Accomplishments**Areas of Specialization:**

Planetary Science, Astronomy, Chemistry

Courses Taught:

2012 Fall	General Astronomy, PHYS 103, University of Idaho, Moscow, Idaho.
2005 Fall	Intro to Chemistry, CHM080, Pima Community College, Tucson, Arizona.
1999-2007	11 semesters as Teaching Assistant for the following classes at University of Arizona in Tucson, Arizona: Our Golden Age of Planetary Exploration, PTYS 206 Planet Earth: Evolution of the Habitable World, PTYS 170A1 The Universe and Humanity: Origin and Destiny, PTYS 170B2 Beyond the Earth in Space and Time, NATS 102

Students Advised:

Undergraduate Students (Research Advisor):

Luke Spinolo	2013	Physics REU student
Rebecca Wizner	2012	Physics undergraduate student
Rachael Hachadorian	2012	Physics REU student
Ryan Nickerson	2010-2012	Physics undergraduate student
Andrew Johnson	2011	Physics REU student
Matthew Lawder	2010	Physics REU student
Eric Petersen	2009	Physics REU student

Graduate Students (Research Advisor):

Raechel Bianchetti	2009	Geography (M.S.)
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Graduate Students (Committee Member):

Rajni Dhingra	2019 (expected)	Physics (Ph.D.)
Johnathon Ahlers	2013-2018	Physics (Ph.D.)
Shannon MacKenzie	2013-2017	Physics (Ph.D.)
Emily Martin	2012	Geology (Ph.D.)
Casey Cook	2012	Physics (M.S.)
Graham Vixie	2010-2012	Physics (Ph.D.)
Jonathan Kay	2010	Geology (M.S.)

Non-credit Classes, Workshops, Seminars, Invited Lectures, etc.:

2010 Fall	Guest lecture, "Star Clusters", for General Astronomy (PHYS 103)
2009 Spring	Three guest lectures for Engineering Physics (PHYS 211)
2008, 2010, 2016, 2018	Guest lecture, "The Physics of Impact Cratering", for Astrophysics (PHYS 484/584) (one lecture each year)
2008 Fall	Guest lecture, "Impact Cratering on the Moon and Mars" for Core Science (CORS 217)

Service**University of Idaho**

- 2015-2009 Organized interdepartmental planetary science research discussions.
- 2013-2009 Student mentor for University of Idaho, Department of Physics REU program.
- 2010 Judge for the UIIdaho College of Science Student Research Exposition.
- 2009 Mentor for a student in the Univ. of Idaho McNair Summer Research program.

University of Arizona

- 2004-2002 Served two years on Organizing Committee for the Lunar and Planetary Laboratory Conference, a two-day scientific conference with a budget of \$6000.00.

Service to Scientific Community

- 2018 Served on two (2) NASA grant review panels.
- 2017 Served on four (4) NASA grant review panels.
- 2015 Served as external reviewer for NASA spacecraft instrument proposals.
- 2015 Served on NASA spacecraft instrument proposal review panel.
- 2013 Served on NASA grant review panel.
- 2013 Served on NASA grant review panel.

- 2011 Served on Scientific Organizing Committee 4th Lunar Science Forum NASA Ames Research Center CA.
- 2011-2009 Served as judge for Lunar and Planetary Science Conference Dwornik Student Presentation Awards.
- 2010 Served as session chair for Geology session 3rd Lunar Science Forum July 2010 at Moffett Field CA.
- 2010 Selected the lunar impact location for the LCROSS spacecraft in conjunction with the LCROSS team.
- 2009 Served on NASA grant review panel.
- 2008 Served on NASA grant review panel.
- 2007 Served on NASA grant review panel.

Editorial Service

- Served as scientific reviewer for the following journals/editors:
- Icarus, Oded Aharonson, editor. (2018 May)
- Meteoritics and Planetary Science, Gordon Osinski, editor. (2018 May)
- Icarus, Oded Aharonson, editor. (2017 June)
- Geophysical Research Letters, Andrew Dombard, editor. (2016 June)
- Journal of Geophysical Research, Mark Wieczorek, editor. (2013 June)
- Earth and Planetary Science Letters, Lars Stixrude, editor. (2013 May)
- Journal of Geophysical Research Planets, Jeffrey Plescia, editor. (2012 August)
- The Mars Journal, David Paige, editor. (2012 August)
- Earth and Planetary Science Letters, Lars P. Stixrude, editor. (2011 December)
- Icarus, Oded Aharonson, editor. (2011 July).
- Journal of Geophysical Research Planets, Sarah Stewart, editor. (2011 January)
- Planetary and Space Science, R. Schultz, editor. (2010)
- Geophysical Research Letters, Fabio Florindo, editor. (2009)
- Planetary and Space Science, R. Schulz, editor. (2008)
- Icarus, Jim Bell, editor. (2008)

Outreach Service

- 2010 Presentation to the Palouse Astronomical Society about NASA's LCROSS mission.

Community Service (non-academic, unrelated to employment)

- Moscow Elementary School Science Fair: One of two organizers for the event. I found external funding, arranged for the venue, advertised the event to the students, organized sign-ups, volunteers, judging, and take down. (2016-2018)
- Girl Scout Troop #1807: Leader (2017-2018)

Professional Development

Scholarship

- Write Winning Grant Proposals, Seminar, October 19, 2016.
- Jet Propulsion Laboratory TeamX Planetary Mission Planning Training, May 23-27, 2005.