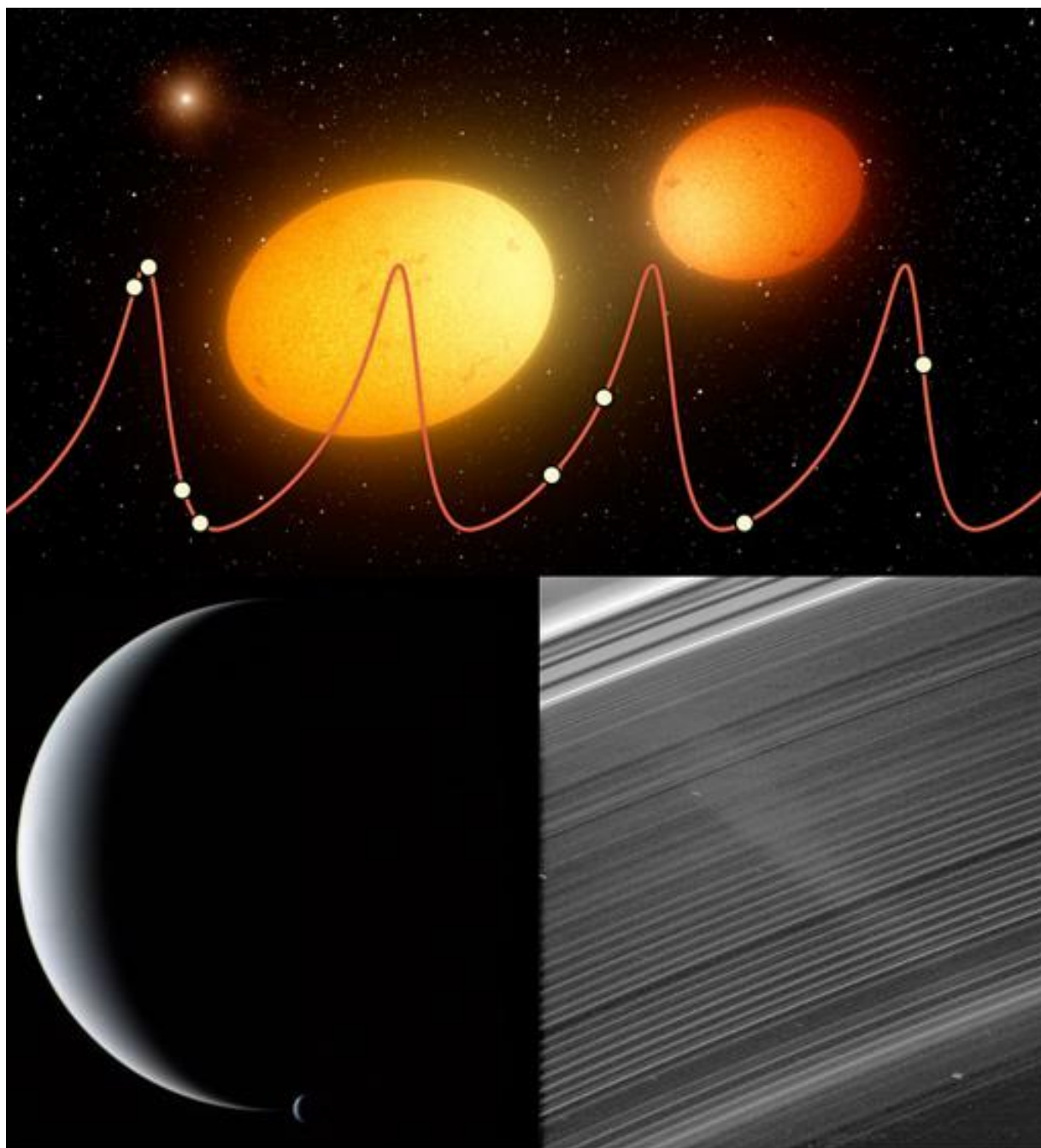


Carl Sagan Center
Activity Report October 2016
Dr. Nathalie A. Cabrol, Director



Our Cover:

Heartbeat Stars: Matters of the heart can be puzzling and mysterious -- so too with unusual astronomical objects called heartbeat stars. Heartbeat stars, discovered in large numbers by NASA's Kepler space telescope, are binary stars (systems of two stars orbiting each other) that got their name because if you were to map out their brightness over time, the result would look like an electrocardiogram, a graph of the electrical activity of the heart. Scientists are interested in them because they are binary systems in elongated elliptical orbits. This makes them natural laboratories for studying the gravitational effects of stars on each other.

Saturn's Rings: Spectacular to behold, and challenging to unravel. Based on data from NASA's Cassini mission, SETI Scientists have been involved in leading research efforts unlocking the nature, structure and even the age of Saturn's rings.

Neptune and Triton: SETI Researcher Matija Cuk explores the fate of the original moons of Neptune.

Peer-Reviewed Publications

1. Chojnacki, M., Urso, A., **Fenton, L.**, Michaels, T. (2016), "Aeolian dune sediment flux heterogeneity in Meridiani Planum, Mars," *Aeolian Research* Accepted, doi:10.1016/j.aeolia.2016.07.004.
2. Esposito, T.M. et al., 2016. Bringing "The Moth' to Light: A Planet-Sculpting Scenario for the HD 61005 Debris Disk." *The Astronomical Journal*, Volume 152, Issue 4, article id. 85, 16 pp. (2016). 152. Available at: <http://arxiv.org/abs/1605.06161> [Accessed September 27, 2016]
3. Federica Ferrari; Maria Camilla Cerlesi; Davide Malfacini; Laila Asth; Elaine C Gavioli; Velvet B Journigan; **Uma Gayathri Kamakolanu**; Michael E. Meyer; Dennis Yasuda; Willma E Polgar; Anna Rizzi; Remo Guerrini; Chiara Ruzza; Nurulain T. Zaveri; Girolamo Calo, (2016). "In vitro functional characterization of novel nociceptin/orphanin FQ receptor agonists in recombinant and native preparations." *European Journal of Pharmacology*. Accepted. DOI: 10.1016/j.ejphar.2016.10.025
4. Fisher, D., Lacelle, D., Pollard, W., **Davila, A.**, McKay, C. (2016). "Ground surface temperature and humidity, soil temperature cycles and advective flows set the ice table depth in University Valley, McMurdo Dry Valleys of Antarctica. *JGR*. Accepted.

5. Hedman, M. M., and **M. R. Showalter** 2016. A new pattern in Saturn's D ring created in late 2011. *Icarus* 279,155-165. DOI: 10.1016/j.icarus.2015.09.017
6. Henderson, C. B., Poleski, R., Penny, M., et al. (123 additional authors) 2016. "Campaign 9 of the K2 Mission: Observational Parameters, Scientific Drivers, and Community Involvement for a Simultaneous Space- and Ground-based Microlensing Survey." *PASP*, 128, 124401 (published 26 Oct 2016).
7. Millar-Blanchaer, M.A. et al., 2016. "Imaging an 80 AU Radius Dust Ring Around the F5V Star HD 157587." *The Astronomical Journal*, Volume 152, Issue 5, article id. 128, 12 pp. (2016)., 152. Available at: <http://arxiv.org/abs/1609.00382> [Accessed November 2, 2016].
8. Parro, V., Y. Blanco, F. Puente-Sánchez, L. A. Rivas, M. Moreno-Paz, A. Echeverria, G. Chong-Díaz, C. Demergasso, and **N. A. Cabrol**, 2016. "Biomarkers and metabolic patterns in the sediments and evolving glacial lakes as a proxy for planetary lake exploration." *Astrobiology*, 17, doi: 10.1089/ast.2015.1342.
9. **Race M.S.**, J. Johnson, J.A. Spry, B. Siegel and C. Conley (Editors) 2016. "Planetary Protection Knowledge Gaps for Human Extraterrestrial Missions Workshop Report." NASA Full report published on NASA NTRS site: <http://hdl.handle.net/2060/20160012793>
10. Shporer, Avi; Fuller, Jim; Isaacson, Howard; Hambleton, Kelly; Thompson, Susan E.; Prša, Andrej; Kurtz, Donald W.; Howard, Andrew W.; O'Leary, Ryan M. Radial. "Velocity Monitoring of Kepler Heartbeat Stars, *The Astrophysical Journal*, Volume 829, Issue 1, article id. 34, 18 pp. (2016) <http://adsabs.harvard.edu/abs/2016ApJ...829...34S>
11. J. C. Smith, R. L. Morris, J. M. Jenkins, S. T. Bryson, **D. A. Caldwell**, and F. R. Girouard. "Finding Optimal Apertures in Kepler Data." *PASP*, 128(12):124501, December 2016. (published 20 Oct 2016) <http://iopscience.iop.org/article/10.1088/1538-3873/128/970/124501>
12. Wang, J.J. et al., 2016. "The Orbit and Transit Prospects for beta Pictoris b constrained with One Milliarcsecond Astrometry." *The Astronomical Journal*, Volume 152, Issue 4, article id. 97, 16 pp. (2016). 152. Available at: <http://arxiv.org/abs/1607.05272> [Accessed November 2, 2016].
13. Wilhelm, M.B., **Davila, A.**, et al (2016). "Xeropreservation of functionalized lipid biomarkers in the hyperarid core of the Atacama Desert." *Organic Chemistry*. Accepted.

Abstracts of Conferences

1. **Beyer, Ross A.**; Singer, Kelsi N.; Nimmo, Francis; Moore, Jeffrey M.; McKinnon, William B.; Schenk, Paul M.; Spencer, John R.; Weaver, Harold A.; Olkin, Catherine B.; Young, Leslie; Ennico, Kimberly; Stern, S. Alan; and New Horizons Science Team. 2016. "Landslides on Charon and not on Pluto." American Astronomical Society, DPS meeting #48, id.#213.10. <http://adsabs.harvard.edu/abs/2016DPS...4821310B>
2. **Bishop J. L.**, Baker L., Rampe E. B. & M. A. Velbel (2016). "The Effects of Punctuated Warm and Wet Environments on Phyllosilicate Formation - or How Long was Early Mars Wet?" AGU Fall Meeting, San Francisco, CA, Abstract #142566.
3. Blake, D. F. et al. "The Mapping X-Ray Fluorescence Spectrometer (MAPX)," AGU Fall Meeting, San Francisco, CA, December 2016, Abstract #142372. <https://agu.confex.com/agu/fm16/meetingapp.cgi/Paper/142372>.
4. Blake D. F., **Sarrazin P.**, Bristow T., Downs R., Gailhanou M., **Marchis F.**, Ming D. Morris R., Solé V., A. Thompson K., Walter P., Wilson M., Yen A., Webb S. "The Mapping X-Ray Fluorescence Spectrometer," 3rd International Workshop on Instrumentation for Planetary Missions, Pasadena, CA, October 24-27 2016 <http://www.hou.usra.edu/meetings/ipm2016/pdf/sess461.pdf>
5. **Chiar J.**, Phillips C.B., Rudolph A., **Bonaccorsi R.**, **Tarter J.**, **Harp, G.**, **Caldwell D.A.**, and **DeVore, E.K.** (2016). "Life in the Universe – Astronomy and Planetary Science Research Experience for Undergraduates at the SETI Institute." AGU Fall Meeting, Session ED51B-0799.
6. **Cuk, M.**, and Hamilton, D., 2016. "Cuckoo in the nest: the fate of the original moons of Neptune." Presented at the 48th DPS/11th EPSC meeting, Pasadena, CA, October 16-21, #518.09.
7. Elphic, R., Teodoro L. F., **Davila A.**, Dartnell, L., McKay C. (2016). "The Enceladus Ionizing Radiation Environment: Implications for Biomolecules." AGU Fall Meeting, Abstract # 191975.
8. **Ertem, G.**, Ertem, M. C. McKay, C. P. Hazen R. M. (2017). "Protective role of Martian analogue minerals for biomolecules against radiation effects." Submitted to AAAS. Boston, MA.
9. **Estrada, P. R.**, Durisen R. H., and Cuzzi, J. N., 2016. "The evolution of Saturn's rings under the influence of the Edgeworth-Kuiper Belt micrometeoroid flux: tightening the constraints on ring age." Presented at the 48th DPS/11th EPSC meeting, Pasadena, CA, October 16-21, #114.05.

10. **French, R. S.; M. R. Showalter**, and M. K. Gordon 2016. "Precision Navigation of Cassini Images Using Rings, Icy Satellites, and Fuzzy Bodies." American Astronomical Society, DPS meeting #48, id. #121.14. Bibliographic Code: 2016DPS....4812114F.
11. Gordon, M., **M. R. Showalter**; L. Ballard, **M. S. Tiscareno**, and N. Heather 2016. "OPUS–Outer Planets Unified Search with Enhanced Surface Geometry Parameters–Not Just for Rings." American Astronomical Society, DPS meeting #48, id.#423.02. Bibliographic Code: 2016DPS....4842302G.
12. Greenberg, A. H. et al. "The Deflection Question," AGU Fall Meeting, San Francisco, CA, December 2016. <https://agu.confex.com/agu/fm16/meetingapp.cgi/Paper/183364>
13. Hanus et al., Concave Shape Model Of Asteroid (130). "Elektra Based On Disk-Resolved Images From VLT/Sphere," AGU Fall Meeting, San Francisco, CA, December 2016, Abstract # 188580.
14. **Hargitai H.** (2016) "Meta-catalog of Planetary Surface Features for Multicriteria Evaluation of Surface Evolution: the Integrated Planetary Feature Database." DPS 48/EPSC 11 Meeting #426.23.
15. **Hargitai H.** (2016) "Children's maps and Sonic Map — Art of Planetary Science Exhibit" DPS-EPSC Conference in Pasadena, CA (October 16-20th).
16. **Hinson, D.P.**, Linscott, I., Young, L., Stern, S.A., Bird, M., Ennico, K., Gladstone, R., Olkin, C.B., Patzold, M., Strobel, D.F., Summers, M., Tyler, G.L., Weaver, H.A., Woods, W., and New Horizons Science Team 2016. Radio Occultation Measurements of Pluto's Atmosphere with New Horizons. DPS/EPSC, vol. 48, abs.# 224.03.
17. Hofgartner, Jason Daniel; Buratti, Bonnie J.; Devins, Spencer; **Beyer, Ross A.**; Ennico, Kimberly; Olkin, Catherine B.; Stern, S. Alan; Weaver, Harold A.; Young, Leslie; and New Horizons Geology, Geophysics and Imaging Science Theme Team. 2016. "A Search for Temporal Changes on Pluto and Charon." American Astronomical Society, DPS meeting #48, id. #224.11. <http://adsabs.harvard.edu/abs/2016DPS....4822411H>
18. **Marchis, F.** et al., 2016. "Gemini Planet Imager Exoplanet Survey: Key Results Two Years Into The Survey." American Astronomical Society, DPS meeting #48, id.#112.03, 48.
19. **Franck Marchis, Philippe Sarrazin**, Clement Chalumeau, Sacha Gavino, Marc Gailhanou, Sam Webb, David Blake, 2016. "Study of the Map-X PSFs: a Mapping X-Ray Fluorescence Spectrometer for Characterizing Rocks on Mars and Asteroids." SSRN/LCLS Users' Meeting, Stanford U/SLAC, October 5-8, 2016 [https://conf-slac.stanford.edu/ssrl-lcls-2016/sites/conf-slac.stanford.edu/ssrl-lcls-2016/files/webform/SSRL_usersOct2016 .pdf](https://conf-slac.stanford.edu/ssrl-lcls-2016/sites/conf-slac.stanford.edu/ssrl-lcls-2016/files/webform/SSRL_usersOct2016.pdf)

20. **Marchis, F.** et al. "Imaging and characterizing exo-Earths at 10 microns - The TIKI project," AGU Fall Meeting, San Francisco, CA, December 2016.
<https://agu.confex.com/agu/fm16/meetingapp.cgi/Paper/169125>.
21. Moore, Jeffrey M.; Howard, Alan D.; Umurhan, Orkan M.; White, Oliver; Schenk, Paul M.; **Beyer, Ross A.**; McKinnon, William B.; Spencer, John R.; Singer, Kelsi N.; Grundy, William M.; Nimmo, Francis; Young, Leslie; Stern, S. Alan; Weaver, Harold A.; Olkin, Catherine B.; Ennico, Kimberly; Collins, Geoffrey; and New Horizons Science Team. 2016. "Bladed Terrain on Pluto: Possible Origins and Evolutions." American Astronomical Society, DPS meeting #48, id. #213.11.
<http://adsabs.harvard.edu/abs/2016DPS....4821311M>
22. **Ryan, E.L.**, Woodward, C. E., Sharkey, B. N. L. 2016. "Rotational properties of L4 Trojan asteroids from K2." American Astronomical Society, DPS meeting #48, id. #326.03.
<http://adsabs.harvard.edu/abs/2016DPS....4832603R>.
23. **Sarrazin, P.**, et al. "Full Field X-Ray Fluorescence Imaging Using Micro Pore Optics For Planetary Surface Exploration." International Conference on Space Optics, Biarritz, France, 18-21 October 2016. <http://ftp.servcbo.com/1610ICSO/Abstract/180-spc0180.pdf>.
24. **Showalter, M. R.**, I. de Pater, J. J. Lissauer, and R. S. French 2016. "Hubble Observations of the Ongoing Evolution of Neptune's Ring-Moon System," American Astronomical Society, DPS meeting #48, id. #203.09. Bibliographic Code: 2016DPS....4820309S.
25. Singer, Kelsi N.; McKinnon, William B.; Greenstreet, Sarah; Gladman, Brett; Parker, Alex Harrison; Robbins, Stuart J.; Schenk, Paul M.; Stern, S. Alan; Bray, Veronica; Spencer, John R.; Weaver, Harold A.; **Beyer, Ross A.**; Young, Leslie; Moore, Jeffrey M.; Olkin, Catherine B.; Ennico, Kimberly; Binzel, Richard; Grundy, William M.; and New Horizons Geology Geophysics and Imaging Science Theme Team, The New Horizons MVIC and LORRI Teams 2016. "Impact Craters on Pluto and Charon Indicate a Deficit of Small Kuiper Belt Objects." American Astronomical Society, DPS meeting #48, id. #213.12.
<http://adsabs.harvard.edu/abs/2016DPS....4821312S>
26. **Tiscareno, M. S.**, 2016. "Propeller peregrinations: Ongoing observations of disk-embedded migration in Saturn's rings." Presented at the 48th DPS/11th EPSC meeting, Pasadena, CA, October 16-21, #107.01.
27. **Tiscareno, M. S.**, 2016. "Observing rings and small moons with JWST." Exploring the Universe with JWST Meeting, Montreal, Canada, October 25.
28. Van Heerden, E. et al., 2016. "The Deflector Selector: A Machine Learning Framework for Prioritizing Deflection Technology Development." American Astronomical Society, DPS meeting #48, id. #329.11, 48.
<http://adsabs.harvard.edu/abs/2016DPS....4832911V>.

29. Verbiscer, A. J., M. W. Buie, R. Binzel, K. Ennico, W. M. Grundy, C. B. Olkin, **M. R. Showalter**, J. R. Spencer, S. A. Stern, H. A. Weaver, L. Young 2016. "The Pluto System At Small Phase Angles." American Astronomical Society, DPS meeting #48, id. #213.02. Bibliographic Code: 2016DPS....4821302V.
30. Vernazza, P. et al., 2016. "C-complex asteroids: Two main compositional families?" American Astronomical Society, DPS meeting #48, id. #510.06, 48. <http://adsabs.harvard.edu/abs/2016DPS....4851006V>.
31. Wooden, D.H., Lederer, S.M., Jehin, E., Rozitis, B., Jefferson, J. D., Nelson, T.W., Dotson, J.L., **Ryan, E. L.**, Howell, E. S., Fernandez, Y. R., Lovell, A.J., Woodward, C.E., Harker, D.E. 2016. "Characterization of the high-albedo NEA 3691 Bede." American Astronomical Society, DPS meeting #48, id. #325.14. <http://adsabs.harvard.edu/abs/2016DPS....4832514W>.

[Popular Publications/Web Stories/ Other Media / Interviews](#)

Diniega, S., Tan, J., **Tiscareno, M. S.**, and Wehner E. "Senior scientists must engage in the fight against harassment." *Eos* 97 (20), 11-13 (15 Oct 2016).

Anonymously submitted (but co-authored by **Tiscareno, M. S.**). "Harassment in our community: An open letter." *Physics Today* 69 (10), 12 (Oct 2016).

Other (Media Interviews):

Shostak, S. Interview on "Science Friday" (NPR radio) 10/7/2016

Shostak, S. Interviews radio and TV CBC, Edmonton, Canada 10/17 - 18/2016

Shostak, S. Interview by BBC5 on Schiaparelli lander (radio) 10/19/16

Shostak, S. Guest on "Coast to Coast AM", two hours (radio) 10/25/16

[Technical Reports](#)

Tarter, Jill "Report from Subcommittee B – New Approaches to SETI (August 19-20, 2016 workshop)," submitted to the Breakthrough Foundation, for the Breakthrough Listen Initiative, Oct 5.

Gillum, Harp "Optical SETI Workshop Report," submitted to the Breakthrough Foundation, for the Breakthrough Listen Initiative, Oct 5.

Invitation to Speak (Professional and Public)

Ballard, L. Invited talk on “How to play with deep space data”, DENT: Space conference, San Francisco, 9/22

Ballard, L. invited speaker at dotAstronomy 8, Oxford

Busch, M. Public outreach session and star party in Pasadena during DPS+EPSC.

Cabrol, N. A. Invited seminar at the Universidad Católica del Norte, Antofagasta, Chile: “Biosignature Detection on Mars.”

Cuk, M., Invited talk: “Dynamical evidence for a recent formation of Saturn’s moons.” Presented at the workshop “Young Moons and Rings”, Monrovia, CA, October 14, 2016.

Gillum, E. SETI Institute Colloquium. “A Novel Approach to Optical SETI.” 10/4/16

Gorti, U., 2016. Invited review talk on Protoplanetary Disks at the SOFIA:The Local Truth conference, Asilomar, CA, October 11-14.

Gulick G. Gave an oral presentation at the DPS/EPSC meeting on Oct. 25, 2016, “Understanding Gully Formation and Seasonal Flows on Recent and Current Mars”.

Harp, G. SETI Institute Colloquium. “The Radio Search for Extraterrestrial Intelligence at the SETI Institute.” 10/18/16

Race, M. Los Altos Library: Oct 19: “Astrobiology, Planetary Protection and Missions in the Solar System

Race, M. Menlo-Atherton High School - Oct 19 College and Career Day Speaker

Richards, J. Interview with KXLR Radio, in Redding, CA.

Shostak, S. Lecture, “New Developments in SETI,” Mt. Tam astronomy lectures 10/8/2016

Shostak, S. Silicon Valley Lecture Series, “Science of Star Wars,” 10/12/2016

Shostak, S. Physics colloquium, San Jose State University, 10/13/2016

Shostak, S. Presentation to physics department, McKuen University, Edmonton, Canada 10/17/2016

Shostak, S. Public presentation at space and science center, Edmonton, Canada 10/17/2016

Shostak, S. Presentation for Mt. Diablo Astronomical Society, Walnut Creek, CA 10/25/16

Shostak, S. Panels for “Alien Con”, Santa Clara, CA 10/29/2016

Shostak, S. Bay Area Science Festival, San Francisco 10/30/2016

Tarter J. North American Breakthrough Listen Workshop Green Bank WV “SETI Futures”
10/6/16

Tarter J. Los Altos High School STEM celebration week, “Life Beyond Earth?”, 10/25/16

Tarter J. Celebration of Marvel Cinematic Universe and Dr. Strange with NAS Science

Tarter J. Entertainment Exchange, “SETI: An Alternate Reality”, 10/27/16
CSIcon Las Vegas, “Life Beyond Earth?”, 10/29/16

Significant Events and Activities

Ross Beyer:

- Participated in DPS New Horizons press conference, coverage:
 - <http://aasnova.org/2016/10/19/48th-dps11th-epsc-meeting-day-2/>
 - <http://www.space.com/34443-landslides-on-pluto-moon-charon.html>
 - <http://www.natureworldnews.com/articles/30447/20161021/scientists-discover-landslides-pluto-s-moon-charon.htm>
 - <http://www.universetoday.com/131492/latest-results-new-horizons-clouds-pluto-landslides-charon/>
- Worked with Astronomy Magazine to help them create the First-ever Pluto globe, now available for purchase:
 - <http://cs.astronomy.com/asy/b/daves-universe/archive/2016/10/17/astronomy-magazine-announces-first-ever-pluto-globe.aspx>
 - Shop: <https://myscienceshop.com/ShopPluto>
 - Video: <http://www.astronomy.com/PlutoVideo>

Michael Busch: A large number of important things happened during or were presented during the week of the DPS+EPSC Meeting, most of which have already been covered in the media. Particularly notable was the successful arrival in Mars orbit of the Trace Gas Orbiter; which was unfortunately accompanied by the loss of the Schiaparelli lander.

Nathalie A. Cabrol led the first field expedition in the Chilean Andes of the SETI Institute NAI team. The team members used field instruments relevant to the Mars 2020 and ExoMars missions that will search for evidence of past life on Mars. They also collected 215 samples from sites that present analogies to priority candidate landing sites for these two missions. A writer and a photographer from the New York Times were with the team during the

expedition. An article will be published in February.

Doug Caldwell wrote K2 Campaign-9 Data Release Notes (10/1/2016) describing the data characteristics and data processing on the special K2 microlensing campaign.

See <https://keplergo.arc.nasa.gov/k2-data-release-notes.html>

Lori Fenton began working with high school student Helen Carson on project, using the NASA Ames Mars Global Climate Model to simulate wind patterns in Meridian Planum over the past ~200ka.

Lori Fenton participated in a COSPAR workshop at LPI in Houston, TX (Oct. 25-27).

Ginny Gulick and SI research assistant **Natalie Glines** both gave talks at the DPS/EPSC meeting. This was Ms. Glines first oral presentation at a professional meeting.

Henrik Hargitai gave an education poster and a space art exhibition at the DPS/EPSC meeting.

Franck Marchis presented the MapX instrument at the SSRL SLAC user meeting since we used one of the Synchrotron lines to calibrate it.

Margaret Race: Participant and member of organization team for international COSPAR Workshop on “Refining Planetary Protection Requirements for Human Missions,” Oct 25-27, LPI Houston TX.

Erin Ryan:

- Currently serving on the K2 Users Panel
- Co-investigator on proposal to observe comet 67P/Churyumov–Gerasimenko with the K2, and was part of the effort related to the brief NASA image feature found at <http://www.nasa.gov/image-feature/ames/kepler/nasas-kepler-gets-the-big-picture-of-comet-67p>

Tarter, Shostak, Harp participated in SETI Science Advisory Board Meeting Sept 27-28 at SETI Institute

Jill Tarter:

- attended Curiosity Retreat in Gateway Canyon CO, conducting a precept session with Allen
- attended Celebration for 25th anniversary of Ira Flatow’s Science Friday in NYC

Matthew Tiscareno:

- Currently serving on the AAS/DPS Professional Culture and Climate Subcommittee
- Currently serving on the NASA Planetary Data System (PDS) Roadmap Study Team

Highlights

1. **Lisa Ballard** named to “100 Awesome Women in Open Source”
2. **Lisa Ballard** appointed to NASA Datanauts 2016 class.
3. **Rosalba Bonaccorsi** conducted fieldwork in the Mojave/Death Valley to collect long-term climate data of temperature, rainfall, and moisture at three key desert sites. Temperature data monitored in Death Valley are in agreement with the worldwide trend (since 1895) that 2016 has been the hottest year ever on record. July 2016 summer nights were the hottest (i.e. highest low temperature) ever recorded for the last 121 years. This weather/microclimate monitoring effort has been ongoing since 2005.

The relevance of such climate data is multi-fold: 1. The extreme variation of temperature, moisture, and rain intensity has a profound impact on life in such extreme environments as well as on the weathering/formation of the geology settings e.g., clay supported fine grained sediments colonized by extremophiles; 2. Monitoring the air temperature increase in one of the hottest extreme place on Earth like Death Valley, is our “canary” alert system in a climate change scenario.



Figure - Chasing rainstorms in Death Valley: Rain gauge for monitoring temperature and rain duration, abundance, and intensity at the mountain site. (Photo credits R. Bonaccorsi).

4. **Michael Busch:** SETI scientists were primary authors or co-authors of 38 presentations at the DPS meeting. These have already been featured on the SETI website: <http://www.seti.org/seti-institute/news/seti-institute-scientists-head-48th-annual-dps-meeting>.

5. **Nathalie Cabrol** & team are currently investigating several field sites in Chile (e.g. Pajonales and San Pedro de Atacama) with multiple instruments related to those on Mars rovers.
6. **Cuk, M.**, Gave a talk to seminar attendees (mostly high school students) at Petnica Science Center in Serbia on the past dynamics of Saturn's moons and Earth's Moon. October 7, 2016
7. **Estrada, P. R.**, Interview by Christopher Crockett of Science News Magazine about my DPS talk on new constraints on the age of Saturn's rings. Article appeared 10/20/16: (<https://www.sciencenews.org/article/experts-dont-agree-age-saturn-rings?tgt=nr>).
8. **Margaret Race** was Lead Editor and co-author of a NASA workshop report posted on NASA's Planetary Protection website <https://planetaryprotection.nasa.gov/humanworkshop2015/>
9. **Shostak, S.** gave 4 media interviews that could be turned into highlights
10. **Tiscareno, M. S.**, currently serving on the AAS/DPS subcommittee on Professional Culture and Climate.
11. **Tiscareno, M. S.**, currently serving on the NASA Planetary Data System Roadmap Study Team.

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