# Dr. Edgard G. Rivera-Valentin — *Curriculum Vitae*

## Contact Information


Staff Planetary Scientist
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## Education

**Ph.D., Space and Planetary Sciences** 2012
Arkansas Center for Space and Planetary Sciences, University of Arkansas
- Dissertation: Modeling $H_2O$ stability and transport on Mars and Iapetus: Exploring their effects on geomorphic and atmospheric processes
- Focus: Planetary thermodynamics and atmosphere-surface interactions

**B.A., Physics, Mathematics** 2008
Department of Physics and Astronomy & Department of Mathematics, Alfred University
- *Magna cum Laude*, with Honors in Physics and Astronomy
- Minor in Planetary Science
- Thesis: An analysis of Ganymede and Callisto using impact cratering distribution

## Academic Appointments

**Staff Scientist II** Aug 2014 to present
Department of Planetary Studies, Arecibo Observatory
- Focus: Planetary radar astronomy of Mars and Icy Satellites

**Visiting Scientist** April 2014 to July 2014
Department of Planetary Studies, Arecibo Observatory

**Postdoctoral Research Associate** Aug 2012 to July 2014
Department of Earth, Environmental, and Planetary Sciences, Brown University
- Focus: Modeling impact-induced thermal history and compositions of planetary bodies

**Senior Graduate Assistant** Aug 2008 to May 2012
Arkansas Center for Space and Planetary Sciences, University of Arkansas
- Focus: Heat and mass transfer modeling focusing on stability and transport of water on Mars and Iapetus and its effect on the local environment

**Visiting Graduate Researcher** Aug 2011 to Oct 2011
Lunar and Planetary Institute, Universities Space Research Association
- Focus: Icy moon surface ice strength and global heating via measurements of depth-to-diameter ratios; code development for crater morphology calculations

**REU Intern** May 2007 to Aug 2007
Lunar and Planetary Institute, Universities Space Research Association
- Focus: Comparative planetology of Ganymede and Callisto via cratering statistics

**Research Assistant** May 2006 to Aug 2006
Stull Observatory, Department of Physics and Astronomy, Alfred University
- Focus: Solar observations at the Stull Observatory; studied the relative velocities of material within solar prominences; developed code to measure relative velocities

## Professional Experience

**Computer Support Assistant and Webmaster** May 2011 to July 2012
National Office for Research on Measurement and Evaluation Systems
- Created an online submission system for the Journal of Educational Research and Policy Studies (JERPS) and provided computer support

## TEACHING EXPERIENCE

**Brown University**

*Invited Guest Lecturer* — Fall 2012, 2013
- GEOL 1950 Astrophysical and Dynamical Processes in Planetary Science

**University of Arkansas**

*Invited Guest Lecturer* — Nov 2011
- SPAC 5313 Planetary Atmospheres

*Instructor* — May 2009 to Aug 2010
- Astronomy Lab
- Physics I: Drill Session

*Teaching Assistant* — Aug 2008 to May 2009
- University Physics I

**Alfred University**

*Instructor* — Summer 2008, 2013, 2014
- Summer Astronomy Institute for high school students

*Teaching Assistant* — Aug 2006 to May 2008
- Physics I and II

## STUDENT ADVISING

**Graduate Committee Participation**
- *Holly Farris*, University of Arkansas — 2013 to present
- *Adrienn Luspay-Kuti*, University of Arkansas — 2012 to 2014

**Undergraduate Intern Advising**
- *Erika Lopez Garcia*, Brown University — 2013 to 2014
- *Ilya Uts*, University of Arkansas — Summer 2011
- *Nitish Chopra*, University of Arkansas — Summer 2010
- *Victor Akunyili*, University of Arkansas — Summer 2009

## INVITED TALKS

**Planetary Radar Astronomy: The Arecibo Story** — April 2015
Google Hangout Seminar, University of Central Arkansas, Physics Department

**Physical Evolution of Planetary Bodies** — Jan 2015
Colloquium Series, Arecibo Observatory, National Astronomy and Ionosphere Center

**Water on Mars: Searching for habitability beyond Earth** — July 2014
Summer Astronomy Institute, Department of Physics and Astronomy, Alfred University

**Iapetus: The yin yang moon of Saturn** — Dec 2013
Seminar Series, Arecibo Observatory, National Astronomy and Ionosphere Center

**Water on Mars** — June 2013
Summer Astronomy Institute, Department of Physics and Astronomy, Alfred University

**Heat and Mass Transfer Processes in Planetary Science** — May 2013
Lunch Bunch Series, Department of Geological Sciences, Brown University

**Brines on Mars: In search of the liquid culprit** — Oct 2012
Physics Colloquium, Department of Physics and Astronomy, Bates College

**Iapetus: The yin yang moon** — Feb 2012
Lunch Bunch Series, Department of Geological Sciences, Brown University

## OUTREACH PRESENTATIONS

**From stars to planets: An introduction to space** — Feb 2015
Lecture Series, Arecibo Observatory Space Academy for High School Students

**Water in the Solar System: In search for life beyond Earth** — Sept 2014
World Space Week, Arecibo Observatory, National Astronomy and Ionosphere Center

**The Arecibo Observatory** — Sept 2014, April 2015
Hispanic Heritage Month Series, The Discovery Museum and Planetarium, Bridgeport, CT

## GRANTS

**Primary Investigator**, "Investigating the martian near-surface water exchange: Insights from comparisons at equatorial and polar latitudes", Mars Data Analysis Program, Co-Investigators: Vincent F. Chevrier, University of Arkansas & Javier Martin-Torres, Analytical Services & Materials, Inc; Collaborators: Danielle Nuding, JPL & Maria-Paz Zorzano, Centro de Astrobiologia. Awarded, 04/15 to 04/18 at $291,531.

**Collaborator**, "Laboratory studies of the formation of aqueous solutions by deliquescence on Mars", Mars Fundamental Research Program, P.I. Margaret Tolbert, University of Colorado. Awarded, 02/14 to 02/17 at $299,138.

**Collaborator**, "Experimental and modeling investigation of the diurnal water vapor dynamics in subsurface martian environments", Mars Fundamental Research Program, P.I. Vincent Chevrier, University of Arkansas. Awarded, 02/13 to 03/16 at $315,000.

**Collaborator**, "Brine Observation Transition To Liquid Experiments (BOTTLE)", Wallenberg Foundation, PI: Javier Martin-Torres, Lulea Tekniska Universitet. Submitted 2015.

## AWARDED OBSERVING TIME

**Co-Investigator** "Arecibo radar observations of 17 high-priority near-earth asteroids during CY2015", Arecibo Observatory, Awarded 01-12/2015.

**Co-Investigator** "Radar characterization of NEAs: Using moderate resolution imaging astrometry, and a systematic survey", Arecibo Observatory, Awarded 01-12/2015.

**Co-Investigator** "Arecibo radar ranging measurements of the Galilean satellites", Arecibo Observatory, Awarded 01-03/2015.

## HONORS AND AWARDS

**NASA/JPL/Caltech**
- Planetary Science Summer School Certificate of Completion, 2011

**University of Arkansas**
- Doctoral Academy Fellowship, 2008 to 2012

**Alfred University**
- Alfred University Scholar, 2008
- Dean's Award, 2008
- Diversity Leadership Award, 2008
- Metzger Award in Astronomy, 2007

**Honor Society Membership**
- Phi Beta Kappa, National Liberal Arts and Sciences Honor Society
- Phi Kappa Phi, Academic Excellence Honor Society
- Pi Mu Epsilon, National Mathematics Honor Society
- Omicron Delta Kappa, National Leadership Honor Society

## ACADEMIC SERVICE

**Arecibo Observatory**
- Arecibo Observatory Colloquium Series Organizer — January 2015 to present

**Brown University**
- Seminar Organizer — January 2013 to May 2014

**University of Arkansas**
- Trip Coordinator — January 2010 to May 2012
- Graduate Student Representative — January 2011 to December 2011
- Planetarium Coordinator — August 2009 to August 2011

PROFESSIONAL SERVICE

**Referee Service**

- *Panelist Reviewer*, NASA ROSES Programs, & NASA NESSF
- *Journal Reviewer*, Nature Geoscience, & EOS, Transactions American Geophysical Union
- *External Reviewer*, NASA ROSES Programs, & Natural Sciences and Engineering Research Council of Canada

**Conference Service**

- Dwornik Award Judge, Lunar and Planetary Science Conference
- Session Chair, Lunar and Planetary Science Conference

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*Students advised indicated by* *

SUBMITTED JOURNAL PUBLICATIONS

[1] Kereszturi A., **Rivera-Valentin, E. G.**, Possible water lubricated grain movement in the circumpolar region of Mars. *Astrobiology*.

[2] **Rivera-Valentin, E. G.**, Barr, A. C., Addressing the Stonewall hypothesis with 3-D modeling of impact melt production. *Icarus*.

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REFEREED JOURNAL PUBLICATIONS

[3] Martin-Torres, F. J., Zorzano, M.-P., Valentin-Serrano, P., Harri, A.-M., Genzer, M., Kemppinen, O., **Rivera-Valentin, E. G.**, *et al.*, 2015. Transient liquid water and water activity at Gale Crater, Mars. *Nature Geoscience*, doi:10.1038/ngeo2412.

[4] **Rivera-Valentin, E. G.**, Chevrier, V. F., 2015. Revisiting the Phoenix TECP data: Implications for regolith control of near-surface humidity on Mars. *Icarus*, 253, 156-158, doi:10.1016/j.icarus.2015.03.003.

[5] Lopez Garcia, E. J.*, **Rivera-Valentin, E. G.**, Schenk, P. M., Hammond, N. P., Barr, A. C., 2014. Topographic constraints on the origin of the equatorial ridge on Iapetus. *Icarus*, 237, 419-421, doi:10.1016/j.icarus.2014.04.025.

[6] Luspay-Kuti, A.*, Chevrier, V. F., Cordier, D., **Rivera-Valentin, E. G.**, Singh, S., Wagner, A., Wasiak, F. C., 2014. Experimental constraints on the composition and dynamics of Titan's polar lakes. *Earth & Planetary Science Letters*, 410, 75-83, doi:10.1016/j.epsl.2014.11.023.

[7] Nuding, D. L., **Rivera-Valentin, E. G.**, Davis, R. D., Gough, R. V., Chevrier, V. F., Tolbert, M. A., 2014. Deliquescence and efflorescence of Calcium Perchlorate: An investigation of stable aqueous solutions relevant to Mars. *Icarus*, 243, 420-428, doi:10.1016/j.icarus.2014.08.036.

[8] **Rivera-Valentin, E. G.**, Barr, A. C., Lopez Garcia, E. J.*, Kirchoff, M. R., Schenk, P. M., 2014. Constraints on planetesimal disk mass from the cratering and equatorial ridge on Iapetus. *Astrophysical Journal*, 792, 127, doi:10.1088/0004-637X/792/2/127.

[9] **Rivera-Valentin, E. G.**, Barr, A. C., 2014. Estimating the size of late veneer impactors from impact-induced mixing on Mercury. *Astrophysical Journal Letters*, 782, L8, doi:10.1088/2041-8205/782/1/L8.

[10] **Rivera-Valentin, E. G.**, Barr, A. C., 2014. Impact-induced compositional variations on Mercury. *Earth & Planetary Science Letters*, 391, 234 - 242, doi:10.1016/j.epsl.2014.02.003.

[11] Chevrier, V. F., **Rivera-Valentin, E. G.**, 2012. Formation of recurring slope lineae by liquid brines on present-day Mars. *Geophys. Res. Lett.*, 39, L21202, doi:10.1029/2012GL054119.

[12] Keresturi, A., **Rivera-Valentin, E. G.**, 2012. Locations of thin liquid water layers on present-day Mars. *Icarus*, 221, 289 - 295, doi:10.1016/j.icarus.2012.08.004.

[13] Luspay-Kuti, A.*, Chevrier, V. F., Wasiak, F. C., Roe, L. A., Welivitiya, W. D. D. P., Cornet, T., Singh, S., **Rivera-Valentin, E. G.**, 2012. Experimental simulations of methane evaporation on Titan. *Geophys. Res. Lett.*, 39, L23203, doi:10.1029/2012GL054003.

[14] **Rivera-Valentin, E. G.**, Blackburn, D. G., Ulrich, R. K., 2012. Exploring the effects of overburden on the sublimation and transport of $H_2O$ on Iapetus. *Icarus*, 220, 808-820, doi:10.1016/j.icarus.2012.06.024.

[15] **Rivera-Valentin, E. G.**, Blackburn, D. G., Ulrich, R. K., 2011. Revisiting the thermal inertia of Iapetus: Clues to the thickness of the dark material. *Icarus*, 216, 347-358, doi:10.1016/j.icarus.2011.09.006.

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*Oral presentations indicated by* #

CONFERENCE ABSTRACTS

[16] Farris, H. N., Conner, M. B., **Rivera-Valentin, E. G.**, Chevrier, V. F., 2015. Regolith control of atmospheric water vapor on Mars: Analysis of Phoenix TECP data. LPSC XLVI, Abstract #2353.

[17] **Rivera-Valentin, E. G.**, Craig, P. I., 2015. Impact-induced clay mineral formation and distribution on Mars. LPSC XLVI, Abstract #2554.

[18] Chevrier, V. F., **Rivera-Valentin, E. G.**, 2014. Regolith-atmosphere water vapor transfer on Mars: Comparison between Phoenix TECP and MSL REMS data. $8^{th}$ International Conference on Mars, Abstract #1436.

[19] Farris, H. N.*, **Rivera-Valentin, E. G.**, Chevrier, V. F., Kennington, D., Bryson, K. L., 2014. Experimental investigation of adsorption kinetics in montmorillonite: Implications for diurnal variations of martian atmospheric water. $8^{th}$ International Conference on Mars, Abstract #1023.

[20] Lopez Garcia, E. J.*, **Rivera-Valentin, E. G.**, Schenk, P. M., Hammond, N. P., Barr, A. C., 2014. Topographic constraints on the origin of the equatorial ridge on Iapetus. LPSC XLV, Abstract #1450.

[21] Luspay-Kuti, A.*, Chevrier, V. F., Singh, S., **Rivera-Valentin, E. G.**, Wagner, A., Wasiak, F. C., 2014. Composition and dynamics of Titan's lakes. LPSC XLV, Abstract #1882.

[22] Nuding, D. L., **Rivera-Valentin, E. G.**, 2014. Predictions on the Deliquescence of Calcium Perchlorate at the MSL Landing Site. $46^{th}$ AAS/DPS Abstract #413.06.

[23] #**Rivera-Valentin, E. G.**, Barr, A. C., 2014. Estimating the Sizes of Late Veneer Impactors from Impact-Induced Mixing on Mercury. $46^{th}$ AAS/DPS Abstract #205.01.

[24] **Rivera-Valentin, E. G.**, Nuding, D. L., 2014. Deliquescence of Mars relevant salts at the Phoenix and MSL landing sites. $8^{th}$ International Conference on Mars, Abstract #1332.

[25] #**Rivera-Valentin, E. G.**, Lopez Garcia, E. J.*, Barr, A. C., 2014. Geological constraints on the outer system planetesimal disk mass from ridge survival on Iapetus. LPSC XLV, Abstract #2615.

[26] Chevrier, V. F., **Rivera-Valentin, E. G.**, Altheide, T. S., 2013. Stability and activity of liquid brines on present-day Mars. Workshop on the Present-Day Habitability of Mars.

[27] Kereszturi, A., Appere, T., **Rivera-Valentin, E. G.**, 2013. Thin liquid water films on present-day Mars. Workshop on the Present-Day Habitability of Mars.

[28] Luspay-Kuti, A. *, Chevrier, V. F., **Rivera-Valentin, E. G.**, Singh, S., Roe, L. A., Wagner, A., 2013. Evaporation of liquid hydrocarbon mixtures on Titan. American Astronomical Society, DPS meeting.

[29] Luspay-Kuti, A.*, Chevrier, V. F., Wasiak, F. C., Roe, L. A., Welivitiya, W. D. D. P., Cornet, T., Singh, S., **Rivera-Valentin, E. G.**, 2013. Experimental constraints on methane evaporation at the low latitudes of Titan. LPSC XLIV, Abstract #2256.

[30] Nuding, D. L., **Rivera-Valentin, E. G.**, Gough, R. V., Chevrier, V. F., and Tolbert, M. A., 2013. Deliquescence of Calcium Perchlorate: An investigation of stable aqueous solutions relevant to Mars. American Astronomical Society, DPS meeting.

[31] #**Rivera-Valentin, E. G.**, Barr, A. C., 2013. Impact-induced compositional variations on Mercury. MESSENGER-BepiColombo Joint Science Meeting.

[32] #**Rivera-Valentin, E. G.**, Barr, A. C., 2013. Impact-induced compositional variations on Mercury: Implications for primordial interior structure. LPSC XLIV, Abstract #1015.

[33] Blackburn, D. G., Buratti, B. J., **Rivera-Valentin, E. G.**, 2012. Exploring the Impact of Thermal Segregation on Dione through a Bolometric Bond Albedo Map. LPSC XLIII, Abstract #1536.

[34] Chevrier, V. F., **Rivera-Valentin, E. G.**, 2012. Regolith Control of Atmospheric Water Vapor on Mars from Analysis of the Phoenix TECP Data. LPSC XLIII, Abstract #2370.

[35] **Rivera-Valentin, E. G.**, Blackburn, D. G., Ulrich, R. K., 2012. On the Mass Balance at Iapetus' Poles: Exploring the Limiting Effects of the Dark Overburden. LPSC XLIII, Abstract #1033.

[36] **Rivera-Valentin, E. G.**, Schenk, P., White, O.L., 2012. Small Diameter Crater Shapes and Geometry on Iapetus and Rhea. LPSC XLIII, Abstract #2042.

[37] Stickle, A. M., Banks, M. E., Benecchi, S. D., Bradley, B. K., Budney, C. J., Clark, G. B., Corbin, B. A., James, B. P., Kumar, K., O'Brien, R. C., **Rivera-Valentin, E. G.**, Saltman, A., Schmerr, N., Seubert, C. R., Siles, J. V., Stockton, A. M., Taylor, C., Zanetti, M., 2012. Vulcan: A Concept Study for a New Frontiers-Class Venus Lander. LPSC XLIII, Abstract #1939.

[38] Uts, I.*, **Rivera-Valentin, E. G.**, Chevrier, V. F., 2012. Exploring Possible Brine Compositions for Martian Paleolakes. LPSC XLIII, Abstract #1731.

[39] Blackburn, D. G., **Rivera-Valentin, E. G.**, Ulrich, R., Roe, L. A., 2011. The Upper Bound for $CO_2$ Transport on Iapetus: Narrowing In on the Nature of the $CO_2$ in the Dark Material. LPSC XLII, Abstract #1216.

[40] Chopra, N.*, **Rivera-Valentin, E. G.**, Luspay-Kuti, A., Chevrier, V. F., 2011. Modeling the Stability of Liquid Methane on Titan. LPSC XLII, Abstract #1643.

[41] Hanley, J., **Rivera-Valentin, E. G.**, Chevrier, V. F., 2011. Control of the Water Cycle by the Regolith at the Phoenix Landing Site. Fourth International Workshop on the Mars Atmosphere: Modeling and Observations.

[42] Luspay-Kuti, A.*, **Rivera-Valentin, E. G.**, Chopra, N.*, Chevrier, V. F., 2011. Modeling the Stability of Ontario Lacus on Titan. LPSC XLII, Abstract #1747.

[43] Petty, B. M., **Rivera-Valentin, E. G.**, Steinkraus, D. C., 2011. Effect of Temperature on the Mortality of Japanese Beetles. Southeastern Branch of the Entomological Society of America.

[44] #**Rivera-Valentin, E. G.**, Blackburn, D. G., Ulrich, R., 2011. Using Thermal Inertia to Estimate the Thickness of the Iapetian Dark Material. LPSC XLII, Abstract #1073.

[45] **Rivera-Valentin, E. G.**, Chevrier, V. F., Ulrich, R., Roe, L., 2011. Effects of Freezing Point Depression on Martian Paleolake Stability. LPSC XLII, Abstract #1074.

[46] Schmerr, N. C., Banks, M. E., Benecchi, S. D., Bradley, B. K., Budney, C. J., Clark, G. B., Corbin, B. A., James, B. P., Kumar, K., O'Brien, R. C., **Rivera-Valentin, E. G.**, Saltman, A., Schmerr, N., Seubert, C. R., Siles, J. V., Stockton, A. M., Taylor, C., Zanetti, M., 2011. Concept Study for a Venus Lander Mission to Analyze Atmospheric and Surface Composition. 2011 VEXAG International Venus Workshop.

[47] Blackburn, D. G., **Rivera-Valentin, E. G.**, Ulrich, R., 2010. Carbon Dioxide Sublimation on Iapetus: Exploring the Kinetic Possibilities. American Astronomical Society, DPS meeting #42, #1.04; Bulletin of the American Astronomical Society, Vol. 42, p.941.

[48] Chevrier, V. F., Hanley, J., **Rivera-Valentin, E. G.**, 2010. Regolith Control of Atmospheric Water Vapor on Mars from Analysis of Phoenix TECP Data. LPSC XLI, Abstract #2559.

[49] **Rivera-Valentin, E. G.**, Blackburn, D. G., Ulrich, R., 2010. Mapping the Thermal Inertia of Iapetus. American Astronomical Society, DPS meeting #42, #9.06; Bulletin of the American Astronomical Society, Vol. 42, p.955.

[50] **Rivera-Valentin, E. G.**, Ulrich, R., Chevrier, V. F., Altheide, T. S., Wray, J. J., 2010. Dynamic Modeling of Martian Paleolake Stability. LPSC XLI, Abstract #1446.

[51] Altheide, T. S., Chevrier, V. F., **Rivera-Valentin, E. G.**, 2009. Modeling the Stability of an Ancient Paleolake in Columbus Crater, Terra Sirenum, Mars. Workshop for Modeling Martian Hydrous Environments, Abstract #4030.

[52] Howe, K. L., **Rivera-Valentin, E. G.**, Chevrier, V. F., Dixon, J. C., 2009. Experimental Simulation of the Effect of Viscous Fluids on Martian Gully Forms. Workshop for Modeling Martian Hydrous Environments, Abstract #4024.

[53] #**Rivera-Valentin, E. G.**, Chevrier, V. F., Ulrich, R., 2009. Time Dependent Model for Heat Transfer and Water Vapor Diffusion/Adsorption at the Phoenix Landing Site. Workshop for Modeling Martian Hydrous Environments, Abstract #4020.

[54] **Rivera-Valentin, E. G.**, Gavin, P., Coleman, K. A., Dixon, J., 2009. Liquid Water and Water-Ice Slush Flume Simulations of Gully Synthesis Varying Exit Aperture Diameter. LPSC XL, Abstract #1355.

[55] **Rivera-Valentin, E. G.**, Kirchoff, M. R., Schenk, P., 2008. An Analysis of the Geologic Histories of Ganymede's Dark Terrain and Callisto through Cratering Distributions. LPSC XXXIX, Abstract #2370.