

Andrew Joseph Ryan

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Curriculum Vitae

Education:

- May 2018 **Ph.D. in Geological Sciences**, School of Earth and Space Exploration
Arizona State University, Tempe, AZ
- Dec. 2013 **M.S. in Geological Sciences**, School of Earth and Space Exploration
Arizona State University, Tempe, AZ
- May 2011 **B.S. in Environmental Geosciences**, Department of Geography,
Geology, and the Environment, Slippery Rock University, Slippery Rock,
PA

Professional Experience:

- 2019–present **Postdoctoral Research Associate**
OSIRIS-Rex Mission, University of Arizona Lunar and Plan. Lab.
Tucson, Arizona – Advisors: J. Emery, M. Delbo, and D. Lauretta
- 2018–2019 **Postdoctoral Researcher**
Observatoire de la Côte d’Azur; Université Côte d’Azur
Nice, France – Advisors: M. Delbo and M. Bernacki
- 2016–2017 **Instrument Operations Specialist**
OSIRIS-REx Thermal Emission Spectrometer (OTES)
Arizona State University and University of Arizona
- 2016–2018 **Founder and Chief Technologist**
SciSight, LLC – Commercial Spectroscopy Startup
Tempe, Arizona
- 2015–2017 **Pancam Payload Downlink Lead (PDL)**
Mars Exploration Rover (MER) Opportunity
Arizona State University, Tempe, AZ
- 2011–present **THEMIS Science Team Member**
Thermal Emission Imaging System aboard Mars 2001 Odyssey
Arizona State University, Tempe, AZ
- 2011 **Internship Program Staff Assistant**
NASA Lunar and Planetary Science Academy
Goddard Space Flight Center, Greenbelt, MD

Refereed Publications:

- Ryan, A.J.**, Pino-Munoz, D., Bernacki, M., and M. Delbo (2020), Full-Field Modeling of Heat Transfer in Asteroid Regolith: Radiative thermal conductivity of polydisperse particulates, *Journal of Geophysical Research: Planets* 125, e2019JE006100.

- Molaro, J.L., Walsh, K.J.,...**Ryan, A.J.**,... et al. (2020), In situ evidence of thermally induced rock breakdown widespread on Bennu's surface, *Nature Communications* 11, 2913.
- DellaGiustina, D.N., Emery, J.P.,...**Ryan, A.J.**,... et al. (2019), Properties of rubble-pile asteroid (101955) Bennu from OSIRIS-REx imaging and thermal analysis, *Nature Astronomy* 3, p. 341–351.
- Walsh, K.J., Jawin, E.R.,... **Ryan, A.J.**,... et al. (2019), Craters, boulders and regolith of (101955) Bennu indicative of an old and dynamic surface, *Nature Geoscience* 12, p. 242–246.
- Cambioni, S., Delbo, M., **Ryan, A.J.**, Furfaro, R., and E. Asphaug (2019), Constraining the Thermal Properties of Planetary Surfaces using Machine Learning: Application to Airless Bodies, *Icarus* 325, p. 16–30.
- Kletetschka, G., Hooke, R. L., **Ryan, A. J.**, Fercana, G., McKinney, E., and K. P. Schwebler (2013), Sliding stones of Racetrack Playa, Death Valley, USA: The roles of rock thermal conductivity and fluctuating water levels, *Geomorphology* 195, p. 110 – 117.
- Ryan, A. J.** and P. R. Christensen (2012), Coils and Polygonal Crust in the Athabasca Valles Region, Mars, as Evidence for a Volcanic History, *Science* 336, p. 449–452.

Publications in Review:

- Ryan, A.J.** and K.X. Whipple, Amphitheater-headed canyons of southeastern Utah: The case for bedrock channel erosion by overland flow, *Earth Surface Processes and Landforms* (in revision).
- Rozitis, B., **Ryan, A.J.**, Emery, J.P., et al., Asteroid (101955) Bennu's Weak Boulders and Thermally Anomalous Equator, *Science Advances* (Resubmitted July 2020).
- Simon, A.A. et al., Widespread distribution of carbon-bearing materials on near-Earth asteroid (101955) Bennu, *Science* (In review).
- DellaGiustina, D.N., et al., Diverse Color and Reflectance of Asteroid (101955) Bennu, *Science* (In review).
- Scheeres, D.J., et al., Heterogenous mass distribution of the rubble-pile asteroid (101955) Bennu, *Science Advances* (In review).
- Daly, M.G., et al., Hemispherical Differences in the Shape and Topography of Asteroid (101955) Bennu, *Science Advances* (In review).

Publications in Preparation:

- Ryan, A.J.**, Pino-Munoz, D., Bernacki, M., Delbo, M., and J. Biele, Full-Field Modeling of Heat Transfer in Asteroid Regolith 2: Radiative thermal conductivity of particulates as a function of porosity, *Journal of Geophysical Research* (Status: Submission expected Sept. 2020)

Select Presentations and Abstracts

- Ryan, A.J.**, et al. (2020), Thermophysical Analysis of Regolith on (101955) Bennu: The Coarse Regolith Conundrum. *Europlanet Science Congress ESPC2020*, invited talk.

- Ryan, A.J.**, Pino-Muñoz, D., Rozitis, B., Emery, J., and others (2019), Physical Interpretation of Bennu's Thermal Inertia. *Joint meeting of the DPS/EPSC*, EPSC-DPS2019-324-1.
- Ryan, A.J.**, Pino-Muñoz, D., Bernacki, M., Delbo, M., Emery, J., and D. Lauretta (2019), Asteroid regolith thermophysical properties: Porosity and skin-depth effects, *Asteroid Science in the Age of Hayabusa2 and OSIRIS-REx*, LPI Contrib. No. 2189, Abstract 2070.
- Ryan, A.J.**, Pino-Muñoz, D., Bernacki, M., Delbo, M., Emery, J., Christensen, P.R., and D. Lauretta (2019), Full-Field Modeling of Heat Transfer in Asteroid Regolith: Thermal Conductivity Results for Mono- and Polydisperse Particulates, *50th Lunar and Planetary Science Conference*, Abstract 2512.
- Ryan, A.J.** and P.R. Christensen (2017), Measurements of Regolith Simulant Thermal Conductivity Under Asteroid and Mars Surface Conditions, *American Geophysical Union 2017 Fall Meeting*, P33H-05.
- Ryan, A.J.** and P.R. Christensen (2016), New laboratory technique to determine thermal conductivity of complex regolith simulants under high vacuum, *American Geophysical Union 2016 Fall Meeting*, P21A-2078.
- Ryan, A.J.**, and K.X. Whipple (2014), An Investigation of Amphitheater-Headed Canyon Distribution, Morphology Variation, and Longitudinal Profile Controls in Escalante and Tarantula Mesa, Utah, *American Geophysical Union 2014 Fall Meeting*, EP31D.
- Ryan, A.J.**, Hamilton, C.W., and P.R. Christensen (2014), Coils in context: Dynamics of the Athabasca Valles Lava Flow, *8th International Conference on Mars*, 1404.
- Ryan, A.J.**, Piqueux, S., and P.R. Christensen (2014), Radiometric determination of thermal conductivity of complex particulate materials under Mars-like conditions, *45th Lunar and Planetary Science Conference*, 2220.
- Ryan, A.J.**, Salvatore, M. R., Smith, R. E., Edwards, C. S., and P. R. Christensen (2013), Solving for the Surface: An Automated Approach to THEMIS Atmospheric Correction, *American Geophysical Union 2013 Fall Meeting*, P51G.
- Ryan, A. J.**, Whipple, K. X., and J.P. Johnson (2012), Are amphitheater-headed canyons indicative of a particular formative process?, *American Geophysical Union 2012 Fall Meeting*, EP51A-0969.
- Ryan, A. J.** and P.R. Christensen (2012), Lava Coils and Drifting Polygonal Terrain in Cerberus Palus, Mars, *43rd Lunar and Planetary Science Conference*, abstract 2552.
- Ryan, A.J.** and 9 others (2011), Lifting of the Clast by Water and Ice: An Explanation for the Trails of the Racetrack and Bonnie Claire Playas, *Geological Society of America Abstracts with Programs* 43, p. 139.
- Ryan, A.J.** and M.J. Zieg (2010), Petrographic and Geochemical Analysis of a Nipigon Diabase Sill. *Institute on Lake Superior Geology Proceedings* 56, p. 58-59.

Laboratory and Instrument Development Experience

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| 2015–2018 | Lead design, assembly, testing, calibration, operation, and data analysis of OSIRIS-REx funded asteroid thermal conductivity cryogenic vacuum chamber with infrared camera, Arizona State University, Tempe, AZ. |
| 2016–2017 | Thermal vacuum (TVAC) instrument testing: Instrument operator for OSIRIS-REx Thermal Emission Spectrometer (OTES) for TVAC at ASU and full OSIRIS-REx spacecraft TVAC at LHM. Lead chamber operator for the student-led Phoenix CubeSat infrared camera instrument TVAC. |

- 2016–2017 Infrared dispersion spectrometer design, assembly, and testing with SciSight LLC startup, Tempe, AZ.
- 2013–2017 Operation, calibration, and maintenance of MFRP funded Mars thermal conductivity chamber, Arizona State University, Tempe, AZ.
- 2014– Experience with Raspberry Pi and Arduino for gathering data from infrared microbolometers, pyrometers, and various environmental sensors.

Software and Operating System Experience

Proficient in: Mac, Linux, and Windows Operating Systems

Well versed in scientific software: COMSOL Multiphysics, Davinci (davinci.asu.edu), LabView, JMARS/J-Asteroid (jmars.asu.edu), Cimlib, ArcGIS,

Able to program in: Python, Davinci, Bash-/C-shell, C/C++, MATLAB, and some experience with Java, HTML, IDL

Grants and Fellowships

- 2019–2021 **OSIRIS-REx Postdoctoral Research Associate**, Lunar and Planetary Laboratory, University of Arizona.
- 2018–2019 **OSIRIS-REx Postdoctoral Research Associate**, Laboratoire Lagrange, Observatoire de la Côte d’Azur and Université Côte d’Azur.
- 2015–2017 **Collaborator, NASA OSIRIS-REx Mission Science**, OSIRIS-REx Regolith Thermal Conductivity Laboratory, PI: P.R. Christensen. Role: *Graduate Student*.
- 2012–2016 **Collaborator, NASA Mars Fundamental Research Program**, Thermal Conductivity Laboratory Measurements of Complex Surfaces with Applications to Mars, PI: P.R. Christensen. Role: *Graduate Student*.

Pending Grants in Review

- 2021–2023 **PI, Solar System Workings**, Thermal Conductivity and Apparent Thermal Inertia of Coarse and Porous Planetary Regoliths
- 2021–2023 **CO-I, Solar System Workings**, The spectral and thermophysical effects of thin dust coatings in a simulated airless body environment. PI: Timothy D. Glotch.

Field Work

- August 2015 **Iceland – Laki 1783–84 and Haluhraun 2014–15 lava flows**
Flow texture mapping and interpretation
- May 2014 **Hawaii – Dec. 1974 Kilauea fissure eruption**
Flow texture mapping and interpretation
- May 2012 **Southern Utah – Escalante Ntnl. Mon. and Henry Mt.**
Amphitheater-headed canyon reconnaissance

Awards and Honors:

- 2016 **Edson Student Entrepreneurship Initiative Inductee**
Seed funding (\$10k), resources, and mentorship

- 2013 **Scholarship Recipient**
NASA Planetary Volcanology Field Workshop, Hawaii
- 2012 **Scholarship Recipient**
LPI/NLSI Sudbury, Ontario Impact Structure Field Camp
- 2012 **Dwornik Award – Best Graduate Poster (honorable mention)**
GSA Planetary Geology Division, Lunar and Planetary Sci. Conf.
- 2011 **University Graduate Fellowship**
ASU School of Earth and Space Exploration and Graduate College
- 2011 **Outstanding Senior Man, SRU Class of 2011**
Slippery Rock University Alumni Association
- 2008–2009 **Presidential Scholar**
Slippery Rock University Academic Honors Committee

Teaching Experience

- 2014–2015 **Introduction to Geology Lecture (GLG-101)**
Mesa Community College
Adjunct Faculty Member
- 2011–2012 **Introduction to Geology Lab (GLG-103)**
Arizona State University
Lab Instructor

Education and Public Outreach

- 2016–2017 **Science Consultant**, “Port of Mars” Massive Multiplayer Online (MMO) game, Arizona State University Interplanetary Initiative
- Spring 2016 **Science Mentor**, ASU Sundial Mentoring Program, demonstrate research to undergraduates interested in science.
- Fall 2013 **Invited Public Lecturer**, ASU College of Liberal Arts and Sciences (CLAS) Academy Forum
- 2012–2016 **Mars Science Educator**, Earth and Space Open House, share recent Mars science with local families.
- June 2012 **Assistant Field Guide**, NASA Lunar and Planetary Science Academy, assist in planning and leading planetary geology field trip in Arizona.
- 2011–2016 **Guest Instructor and Panel Member**, Mars Student Imaging Project, work with 5th-12th grade student scientists.
- June 2011 **Assistant Field Guide**, NASA Lunar and Planetary Science Academy, assist in planning and leading planetary geology field trip in the Channeled Scablands, eastern Washington.

Languages

English (American) – Native
French – Intermediate-high proficiency