CARVER J. BIERSON

Updated: Aug. 2023
Arizona State University ⋄ School of Earth and Space Exploration
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CURRENT RESEARCH

- Making predictions of asteroid 16 Psyche for the upcoming NASA Psyche mission
- Assessing the connection between the composition of Jupiter's large satellites and their formation
- Using radar observations to characterize Mars' polar deposits and unravel the recorded climate history

TEACHING PHILOSOPHY

- Create a environment where students are actively engaging with the content and exploring their own questions
- Focus on having students synthesize and interpret information over memorize
- Use assessments to catch misconceptions and knowledge gaps so they can be quickly addressed

AWARDS

- AGU Study of the Earths Deep Interior Section Award for Graduate Research *Dec 2020*
- University of California at Santa Cruz Dissertation Year Fellowship *Sep 2019*
- National Science Foundation Graduate Student Research Fellowship (NSF GRFP) *Sep 2016*

PROFESSIONAL SERVICE

Division of Planetary Science Meeting Virtual Organizing Committee *Oct 2020*
- Assisted in organizing and managing volunteers to monitor and respond to violations of the meeting code of conduct

NASA Research & Analysis (R&A) review panelist *2020-present*
- Served on three week long panels in addition to providing 10 independent external reviews

EDUCATION

University of California Santa Cruz *June 2020*
Ph.D. in Earth Science
Thesis: *The chemical structure of Venus's atmosphere and interior evolution of Kuiper belt objects*
Advisors: Francis Nimmo, Xi Zhang

Northern Arizona University *May 2014*
B.S. in Astronomy
Summa Cum Laude

Red Rocks Community College *May 2010*
Associates of Arts

RESEARCH EXPERIENCE

Arizona State University 2020- Present
Postdoctoral Scholar Tempe, AZ
Advisors: Lindy Elkins-Tanton and Joseph O'Rourke

Southwest Research Institute 2012 - 2014
Student Scientist Boulder, CO
Advisor: Roger J. Phillips

TEACHING EXPERIENCE

Chandler-Gilbert Community College
AST111: Introduction to Solar System Astronomy
Online: Summer 2023, Fall 2023
AST101: Survey of Astronomy
Online: Fall 2023

Arizona State University
IPI 296/496: Inquiry (Topic: Was Mars ever habitable?)
Full Instructor: Spring 2023

University of California Santa Cruz
Introduction to Scientific Computing
Full Instructor: 1 term
Teaching Assistant: 1 term

Northern Arizona University
Physics Tutor: 2 years
Teaching Assistant: 7 Classes over 4 Semesters

City Year Chicago
Assistant for 6th and 7^{th}grade science classrooms: 1 year

Jefferson County Outdoor Education Laboratory School
Developed curriculum, trained instructors, and taught astronomy to 6th grade students: 2 years

Denver Museum of Nature and Science
Floor volunteer performing demonstrations and teaching visitors: 1300+ hours

PUBLIC TALKS

Exploration at the edge of the solar system
UC Santa Cruz 3-minute thesis, Feb. 2020;

Can you terraform Mars with nukes?
South Bay astronomy on tap, Jan. 2020;

Finding oceans on icy worlds
Santa Cruz Astronomy on Tap, Jul. 2018;

The History of the Martian South Polar Cap
SETI Talks Oct. 2016;

PUBLICATIONS

Bierson, C. J., Fortney, J. J., Trinh, K. T., Kreslavsky, M. A., (2023). "Jupiter's Early Luminosity May Have Driven off Io's Initial Water Inventory". *The Planetary Science Journal* 4.7, p. 122. ISSN: 2632-3338.

Keane, J. T., Matsuyama, I., **Bierson, C. J.**, Trinh, A., (2023). "Tidal Heating and the Interior Structure of Io". *Io: A New View of Jupiter's Moon*. Ed. by R. M. C. Lopes, K. de Kleer, and J. Tuttle Keane. Astrophysics and Space Science Library. Cham: Springer International Publishing, pp. 95–146. ISBN: 9783031256707.

Trinh, K. T., **Bierson, C. J.**, O'Rourke, J. G., (2023). "Slow evolution of Europa's interior: metamorphic ocean origin, delayed metallic core formation, and limited seafloor volcanism". *Science Advances* 9.24, eadf3955. eprint: `https://www.science.org/doi/pdf/10.1126/sciadv.adf3955`.

Bierson, C. J., Elkins-Tanton, L. T., O'Rourke, J. G., (2022). "The Geologic Impact of 16 Psyche's Surface Temperatures". *Planetary Science Journal*.

Bierson, C. J., Nimmo, F., (2022). "A note on the possibility of subsurface oceans on the Uranian satellites". *Icarus*, p. 114776.

Dai, L., Zhang, X., Shao, W. D., **Bierson, C. J.**, Cui, J., (2022). "A Simple Condensation Model for the H2SO4-H2O Gas-Cloud System on Venus". *Journal of Geophysical Research: Planets* 127.3, e2021JE007060. ISSN: 2169-9100.

Elkins-Tanton, L. T., Asphaug, E., Bell, J. F., **Bierson, C. J.**, Bills, B. G., Bottke, W. F., Courville, S. W., Dibb, S. D., Jun, I., Lawrence, D. J., Marchi, S., McCoy, T. J., Merayo, J. M. G., Oran, R., O'Rourke, J. G., Park, R. S., Peplowski, P. N., Prettyman, T. H., Raymond, C. A., Weiss, B. P., Wieczorek, M. A., Zuber, M. T., (2022). "Distinguishing the Origin of Asteroid (16) Psyche". *Space Science Reviews* 218.3, p. 17. ISSN: 1572-9672.

Fan, S., Gao, P., Zhang, X., Adams, D. J., Kutsop, N. W., **Bierson, C. J.**, Liu, C., Yang, J., Young, L. A., Cheng, A. F., Yung, Y. L., (2022). "A bimodal distribution of haze in Pluto's atmosphere". *Nature Communications* 13.1, p. 240. ISSN: 2041-1723.

Keane, J. T., Porter, S. B., Beyer, R. A., Umurhan, O. M., McKinnon, W. B., Moore, J. M., Spencer, J. R., Stern, S. A., **Bierson, C. J.**, Binzel, R. P., Hamilton, D. P., Lisse, C. M., Mao, X., Protopapa, S., Schenk, P. M., Showalter, M. R., Stansberry, J. A., White, O. L., Verbiscer, A. J., Parker, J. W., Olkin, C. B., Weaver, H. A., Singer, K. N., (2022). "The Geophysical Environment of (486958) Arrokoth-A Small Kuiper Belt Object Explored by New Horizons". *Journal of Geophysical Research: Planets* 127.6, e2021JE007068. ISSN: 2169-9100.

Umurhan, O. M., Grundy, W. M., Bird, M. K., Beyer, R., Keane, J. T., Linscott, I. R., Birch, S., **Bierson, C.**, Young, L. A., Stern, S. A., Lisse, C. M., Howett, C. J. A., Protopapa, S., Spencer, J. R., Binzel, R. P., Mckinnon, W. B., Lauer, T. R., Weaver, H. A., Olkin, C. B., Singer, K. N., Verbiscer, A. J., Parker, A. H., (2022). "A Near Surface Temperature Model of Arrokoth". *Planetary Science Journal*. arXiv: 2202.10485.

Beyer, R. A., Robbins, S. J., Beddingfield, C., **Bierson, C. J.**, Ennico, K., Lauer, T. R., McKinnon, W. B., Moore, J. M., Runyon, K., Olkin, C. B., Schenk, P. M., Singer, K. N., Spencer, J. R., Stern, S. A., Weaver, H. A., Young, L. A., Team, T. N. H. S., (2021). "Charon's Far Side Geomorphology". *The Planetary Science Journal* 2.4, p. 141. ISSN: 2632-3338.

Bierson, C. J., Tulaczyk, S., Courville, S. W., Putzig, N. E., (2021). "Strong MARSIS Radar Reflections From the Base of Martian South Polar Cap May Be Due to Conductive Ice or Minerals". *Geophysical Research Letters* 48.13, e2021GL093880. ISSN: 1944-8007.

Bierson, C. J., Steinbrügge, G., (2021). "Tidal heating did not dry out Io and Europa". *Planetary Science Journal*.

Conrad, J. W., Nimmo, F., Beyer, R. A., **Bierson, C. J.**, Schenk, P. M., (2021). "Heat Flux Constraints From Variance Spectra of Pluto and Charon Using Limb Profile Topography". *Journal of Geophysical Research: Planets* 126.2, e2020JE006641. ISSN: 2169-9100.

Schenk, P. M., Beddingfield, C. B., Bertrand, T., **Bierson, C.**, Beyer, R., Bray, V. J., Cruikshank, D., Grundy, W. M., Hansen, C., Hofgartner, J., Martin, E., McKinnon, W. B., Moore, J. M., Robbins, S., Runyon, K. D., Singer, K. N., Spencer, J., Stern, S. A., Stryk, T., (2021). "Triton: Topography and Geology of a Probable Ocean World with Comparison to Pluto and Charon". *Remote Sensing* 13.17, p. 3476.

Bierson, C. J., Nimmo, F., (2020). "Explaining the Galilean Satellites' Density Gradient by Hydrodynamic Escape". *The Astrophysical Journal Letters*.

Bierson, C. J., Zhang, X., (2020). "Chemical cycling in the Venusian atmosphere: A full photochemical model from the surface to 110 km".

Bierson, C. J., Nimmo, F., Stern, S. A., (2020). "Evidence for a hot start and early ocean formation on Pluto". *Nature Geoscience*.

Encrenaz, T., Greathouse, T. K., Marcq, E, Sagawa, H., Widemann, T., Bézard, B., Fouchet, T., Lefèvre, F., Lebonnois, S., Atreya, S. K., Lee, Y. J., Giles, R., Watanabe, S., Shao, W., Zhang, X., **Bierson, C. J.,** (2020). "HDO and SO2 thermal mapping on Venus - V. Evidence for a long-term anti-correlation". *A&A* 639, A69.

Shao, W., Zhang, X., **Bierson, C. J.,** (2020). "Revisiting Sulfur-Water Chemical System in the Middle Atmosphere of Venus: Self-shielding, Non-linearity and No Bifurcation". *JGR: Planets*.

Spencer, J. R. (2020). "The geology and geophysics of Kuiper Belt object (486958) Arrokoth". *Science* 367.6481. ISSN: 0036-8075.

Stern, S., White, O., McGovern, P., Keane, J., Conrad, J., **Bierson, C.**, Lauer, T., Olkin, C., Young, L., Schenk, P., Moore, J., Weaver, H., Runyon, K., Ennico, K., (2020). "Pluto's Far Side". *Icarus*, p. 113805. ISSN: 0019-1035.

Bierson, C., Nimmo, F., (2019). "Using the density of Kuiper Belt Objects to constrain their composition and formation history". *Icarus* 326, pp. 10 –17. ISSN: 0019-1035.

Stern, S. A., Weaver, H. A., Spencer, J. R., Olkin, C. B., Gladstone, G. R., Grundy, W. M., Moore, J. M., Cruikshank, D. P., Elliott, H. A., McKinnon, W. B., Parker, J. W., Verbiscer, A. J., Young, L. A., Aguilar, D. A., Albers, J. M., Andert, T., Andrews, J. P., Bagenal, F., Banks, M. E., Bauer, B. A., Bauman, J. A., Bechtold, K. E., Beddingfield, C. B., Behrooz, N., Beisser, K. B., Benecchi, S. D., Bernardoni, E., Beyer, R. A., Bhaskaran, S., **Bierson, C. J.**, Binzel, R. P., Birath, E. M., Bird, M. K., et al. (2019). "Initial results from the New Horizons exploration of 2014 MU69, a small Kuiper Belt object". *Science* 364.6441. ISSN: 0036-8075.

Bierson, C. J., Nimmo, F., McKinnon, W. B., (2018). "Implications of the Observed Pluto-Charon Density Contrast". *Icarus*.

Ding, M., Soderblom, J. M., **Bierson, C. J.**, Nimmo, F., Milbury, C., Zuber, M. T., (2018). "Constraints on Lunar Crustal Porosity from the Gravitational Signature of Impact Craters". *Journal of Geophysical Research: Planets* 0.ja.

Manning, C. V., **Bierson, C.**, Putzig, N. E., McKay, C. P., (2018). "The Formation and Stability of Buried Polar CO2 Deposits on Mars". *Icarus*. ISSN: 0019-1035.

Baker, D. M., Head, J. W., Phillips, R. J., Neumann, G. A., **Bierson, C. J.**, Smith, D. E., Zuber, M. T., (2017). "GRAIL gravity observations of the transition from complex crater to peak-ring basin on the Moon: Implications for crustal structure and impact basin formation". *Icarus* 292, pp. 54 –73. ISSN: 0019-1035.

McKinnon, W. B., Stern, S., Weaver, H., Nimmo, F., **Bierson, C.**, Cook, J., Grundy, W., Cruikshank, D., Parker, A., Moore, J., Spencer, J., Young, L., Olkin, C., Smith, K. E., (2017). "Origin of the pluto-charon system: Constraints from the new horizons flyby". *Icarus*, pp. –. ISSN: 0019-1035.

Bierson, C. J., Nimmo, F., (2016). "A test for Io's magma ocean: Modeling tidal dissipation with a partially molten mantle". *Journal of Geophysical Research: Planets* 121.11. 2016JE005005, pp. 2211–2224. ISSN: 2169-9100.

Bierson, C. J., Phillips, R. J., Smith, I. B., Wood, S. E., Putzig, N. E., Nunes, D., Byrne, S., (2016a). "Stratigraphy and Evolution of the Buried CO2 Deposit in the Martian South Polar Cap". *Geophysical Research Letters*. 2016GL068457. ISSN: 1944-8007.

Bierson, C. J., Phillips, R. J., Nimmo, F., Besserer, J., Milbury, C., Keane, J. T., Soderblom, J. M., Zuber, M. T., (2016b). "Interactions between complex craters and the lunar crust: Analysis using GRAIL data". *Journal of Geophysical Research: Planets*. 2016JE005090. ISSN: 2169-9100.

Nimmo, F., Hamilton, D. P., McKinnon, W. B., Schenk, P. M., Binzel, R. P., **Bierson, C. J.**, Beyer, R. A., Moore, J. M., Stern, S. A., Weaver, H. A., Olkin, C. B., Young, L. A., Smith, K. E., New Horizons Geology, Geophysics & Imaging Theme Team, (2016a). "Reorientation of Sputnik Planitia implies a subsurface ocean on Pluto". *Nature* advance online publication, pp. –. ISSN: 1476-4687.

Nimmo, F., Umurhan, O., Lisse, C. M., **Bierson, C. J.**, Lauer, T. R., Buie, M. W., Throop, H. B., Kammer, J. A., Roberts, J. H., McKinnon, W. B., Zangari, A. M., Moore, J. M., Stern, S. A., Young,

L. A., Weaver, H. A., Olkin, C. B., Ennico, K., (2016b). "Mean radius and shape of Pluto and Charon from New Horizons images". *Icarus*, pp. –. ISSN: 0019-1035.

Milbury, C., Johnson, B. C., Melosh, H. J., Collins, G. S., Blair, D. M., Soderblom, J. M., Nimmo, F., **Bierson, C. J.**, Phillips, R. J., Zuber, M. T., (2015). "Pre-Impact Porosity Controls the Gravity Signature of Lunar Craters". *Geophysical Research Letters* 42.17. ISSN: 1944-8007.

Soderblom, J. M., Evans, A. J., Johnson, B. C., Melosh, H. J., Miljković, K., Phillips, R. J., Andrews-Hanna, J. C., **Bierson, C. J.**, Head, J. W., Milbury, C., Neumann, G. A., Nimmo, F., Smith, D. E., Solomon, S. C., Sori, M. M., Wieczorek, M. A., Zuber, M. T., (2015). "The fractured Moon: Production and saturation of porosity in the lunar highlands from impact cratering". *Geophysical Research Letters* 42.17. 2015GL065022. ISSN: 1944-8007.