# CARVER J. BIERSON

Updated: Oct. 2020
Arizona State University ⋄ School of Earth and Space Exploration
CBierson@asu.edu ⋄ CarverBierson.com

## CURRENT RESEARCH

- Using the density of icy worlds as constrints on their fromation and evolution
- Modeling chemical cycleing and interactions between chemistry and condensation in Venus's atmosphere
- Characterizing the surface properties of 2014 $MU_{69}$ by limb topography analysis
- Combining data and models to characterize $CO_2$ exchange between Mars' atmosphere and polar caps

## AWARDS

- AGU Study of the Earth's 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*

## 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 NSPIRES review panelist** *Sep 2020*

## 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

## RESEARCH EXPERIENCE

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

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

## TEACHING EXPERINECE

**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 $6^{th}$ and $7^{th}$grade science classrooms: 1 year

**Jefferson County Outdoor Education Laboratory School**
Developed curriculum, trained instructors, and taught astronomy to $6^{th}$ 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.**, 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". *The Astrophysical Journal Letters*.

**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* 639, A69.

Spencer, J. R. (2020). "The geology and geophysics of Kuiper Belt object (486958) Arrokoth". *Science* 367.6481, A69. 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* 639, 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, pp. 10 –17. ISSN: 0036-8075.

**Bierson, C. J.**, Nimmo, F., McKinnon, W. B., (2018). "Implications of the Observed Pluto-Charon Density Contrast". *Icarus* 364.6441, pp. 10 –17. ISSN: 0036-8075.

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, pp. 10 –17. ISSN: 0036-8075.

Manning, C. V., **Bierson, C.**, Putzig, N. E., McKay, C. P., (2018). "The Formation and Stability of Buried Polar CO2 Deposits on Mars". *Icarus* 0.ja, pp. 10 –17. 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.ja, 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* 292.ja, 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* 121.11. 2016GL068457, pp. 2211–2224. 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* 121.11. 2016JE005090, pp. 2211–2224. 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, (Nov. 2016a). "Reorientation of Sputnik Planitia implies a subsurface ocean on Pluto". *Nature* advance online publication.11. 2016JE005090, 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., (Nov. 2016b). "Mean radius and shape of Pluto and Charon from New Horizons images". *Icarus* advance online publication.11. 2016JE005090, 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., (Nov. 2015b). "Pre-Impact Porosity Controls the Gravity Signature of Lunar Craters". *Geophysical Research Letters* 42.17. 2016JE005090, pp. –. 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., (Nov. 2015b). "The fractured Moon: Production and saturation of porosity in the lunar highlands from impact cratering". *Geophysical Research Letters* 42.17. 2015GL065022, pp. –. ISSN: 1944-8007.