

Samantha K. Trumbo

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Education

- Ph.D. Planetary Science**, California Institute of Technology Spring 2021
Dissertation: “Views of an Ocean World: The Signatures of Internal and External Processes on the Surface of Europa”
Advisor: Prof. Michael Brown
- M.S. Oceanography**, Scripps Institution of Oceanography, UCSD Fall 2015
Thesis: “Marine Export Productivity and the Demise of the Central American Seaway”
Advisor: Prof. Richard Norris
- B.A. Astronomy and Biology (double major)**, Cornell University Spring 2013
Magna Cum Laude, Distinction in All Subjects

Publications

15. T.M. Becker, **S.K. Trumbo**, P. Molyneux, K.D. Retherford, A. Hendrix, L. Roth, U. Raut, J. Alday, and M.A. McGrath (2022), “Mid-ultraviolet Hubble observations of Europa and the global distribution of SO₂”, *The Planetary Science Journal*, 3, 129, doi:10.3847/PSJ/ac69eb.
14. **S.K. Trumbo**, T.M. Becker, M.E. Brown, W.T.P. Denman, P. Molyneux, A. Hendrix, K.D. Retherford, L. Roth, and J. Alday (2022), “A new UV spectral feature on Europa: Confirmation of NaCl in leading-hemisphere chaos terrain”, *The Planetary Science Journal*, 3, 27, doi:10.3847/PSJ/ac4580.
13. W.T.P. Denman, **S.K. Trumbo**, and M.E. Brown (2022), “The influence of temperature and photobleaching on irradiated sodium chloride at Europa-like conditions”, *The Planetary Science Journal*, 3, 26, doi:10.3847/PSJ/ac4581.
12. M.E. Brown, W.T.P. Denman, and **S.K. Trumbo** (2022), “The mid-UV spectrum of irradiated NaCl at Europa-like conditions”, *The Planetary Science Journal*, 3, 28, doi:10.3847/PSJ/ac457f.
11. **S.K. Trumbo**, M.E. Brown, and D. Adams (2021), “The geographic distribution of dense-phase O₂ on Ganymede”, *The Planetary Science Journal*, 2, 139, doi:10.3847/PSJ/ac0cee.
10. K. de Kleer, B.J. Butler, I. de Pater, M.A. Gurwell, A. Moullet, **S.K. Trumbo**, and J. Spencer (2021), “Thermal properties of Ganymede’s surface from millimeter and infrared emission”, *The Planetary Science Journal*, 2, 5, doi:10.3847/PSJ/abcbf4.
9. **S.K. Trumbo**, M.E. Brown, and K.P. Hand (2020), “Endogenic and exogenic contributions to visible-wavelength spectra of Europa’s trailing hemisphere”, *The Astronomical Journal*, 160, 282, doi:10.3847/1538-3881/abc34c.
8. A.P. Ingersoll, S.P. Ewald, and **S.K. Trumbo** (2020), “Time variability of the Enceladus plumes: Orbital periods, decadal periods, and aperiodic change”, *Icarus*, 344, 113345, doi: 10.1016/j.icarus.2019.06.006.
7. **S.K. Trumbo**, M.E. Brown, and K.P. Hand (2019), “H₂O₂ within chaos terrain on Europa’s leading hemisphere”, *The Astronomical Journal*, 158, 127, doi:10.3847/1538-3881/ab380c.
6. **S.K. Trumbo**, M.E. Brown, and K.P. Hand (2019), “Sodium chloride on the surface of Europa”, *Science Advances*, 5, 6, doi: 10.1126/sciadv.aaw7123.
5. **S.K. Trumbo**, M.E. Brown, and B.J. Butler (2018), “ALMA thermal observations of Europa”, *The Astronomical Journal*, 156, 161, doi:10.3847/1538-3881/aada87.
4. **S.K. Trumbo**, M.E. Brown, and B.J. Butler (2017), “ALMA thermal observations of a proposed plume source region on Europa”, *The Astronomical Journal*, 154, 148, doi:10.3847/1538-3881/aa8769.
3. **S.K. Trumbo**, M.E. Brown, P.D. Fischer, and K.P. Hand (2017), “A new spectral feature on the trailing hemisphere of Europa at 3.78 μm”, *The Astronomical Journal*, 153, 250, doi:10.3847/1538-3881/aa6d80.
2. L.R. Corrales, T.D. Yi, **S.K. Trumbo**, D. Shalloway, J.I. Lunine, and D.A. Usher (2017), “Acetonitrile cluster solvation in a cryogenic ethane-methane-propane liquid: Implications for Titan lake chemistry”, *The Journal of Chemical Physics*, 146, 104308, doi:10.1063/1.4978395.
1. P.D. Fischer, M.E. Brown, **S.K. Trumbo**, and K.P. Hand (2016), “Spatially resolved spectroscopy of Europa’s large-scale compositional units at 3-4 μm with Keck NIRSPEC”, *The Astronomical Journal*, 153, 13, doi:10.3847/1538-3881/153/1/13.

Research Positions

51 Pegasi b Postdoctoral Fellow , Department of Astronomy, Cornell University	2021 – Present
NASA Earth and Space Science Graduate Fellow , Division of Geological and Planetary Sciences, Caltech	2017 – 2020
Graduate Student Researcher , Division of Geological and Planetary Sciences, Caltech	2015 – 2017
Graduate Student Researcher , Scripps Institution of Oceanography, UCSD	2013 – 2015
Undergraduate Researcher , Department of Astronomy, Cornell University	2011 – 2013
Intern , NASA Student Airborne Research Program (SARP)	Summer 2012

Fellowships and Awards

Heising-Simons Foundation 51 Pegasi b Fellowship in Planetary Astronomy , Cornell University	2021 – Present
NASA Earth and Space Science Fellowship (NESSF) , Caltech	2017 – 2020
E.W. Scripps Fellowship in the Geosciences , Scripps Institution of Oceanography	2013 – 2014
Outstanding Student Paper Award , American Geophysical Union	2012

Professional Affiliations and Service

NASA Europa Clipper Science Team , Postdoctoral Affiliate (MISE)	2021 – Present
NASA Europa Clipper Science Team , Graduate Student Affiliate (Europa-UVS)	2019 – 2021
American Geophysical Union (AGU)	2012 – Present
AAS Division of Planetary Sciences (DPS)	2016 – Present
Referee , <i>Geophysical Research Letters</i> , <i>AAS Journals</i> , <i>Icarus</i>	

Teaching Experience

Teaching Assistant, Caltech	Ge108: Applications of Physics to the Earth Sciences Ge157c: Remote Sensing Ge131: Planetary Interiors	2017 – 2019
Teaching Assistant, Scripps Institution of Oceanography	SIO 1: The Planets SIO 104/255: Paleobiology and the History of Life	2014 – 2015
Undergraduate Teaching Assistant, Physics Learning Center, Cornell University		2011

Research and Career Mentorship

Research Advisor and Thesis Committee Member for Peiyu Wu, Graduate Student, Cornell	Fall 2021 – Present
Career Mentor to Vivian Bai, Student, Pasadena City College (now in engineering at UCSD)	Winter – Summer 2021
Research Mentor to Sherry Liang, Undergraduate Student, Caltech	Fall 2019
Research Mentor to Yiluo Li, Visiting Undergraduate Student, Caltech	Summer 2018

Observing Experience

P.I. programs

Gemini Observatory

S.K. Trumbo and M.E. Brown, 2021B, GMOS-S, GS-2021B-Q-231 (4.7 hours)

S.K. Trumbo, M.E. Brown, and K de Kleer, 2019A, GMOS-S, GS-2019A-FT-109 (1.9 hours)

The Atacama Large Millimeter Array (ALMA)

S.K. Trumbo, M.E. Brown, and B.J. Butler, Cycle 6 (2018-2019), 2018.1.01292.S (2.5 hours)

NASA Infrared Telescope Facility (IRTF)

S.K. Trumbo, M.E. Brown, and K. de Kleer, Fall 2019: 2019B108, SpeX (8.5 hours over 9 nights)

S.K. Trumbo, M.E. Brown, and K. de Kleer, Spring 2018: 2018A099, SpeX (20 hours over 6 nights)

Co-I programs

W.M. Keck Observatory

M.E. Brown and **S.K. Trumbo** (Science P.I.), 2021B, NIRSPEC (2 half-nights)

M.E. Brown and **S.K. Trumbo** (Science P.I.), 2020A, NIRSPEC (3 half-nights)

M.E. Brown and **S.K. Trumbo** (Science P.I.), 2018A, NIRSPEC (4 half-nights)

The Atacama Large Millimeter Array (ALMA)

M.E. Brown, **S.K. Trumbo**, and B.J. Butler, Cycle 5 (2017-2018), 2017.1.01071.S (4 hours)

Hubble Space Telescope (HST)

M.E. Brown, D. Adams, **S.K. Trumbo**, and K de Kleer, Cycle 27, STIS, 15925 (25 orbits)

M.E. Brown, P. Fischer, K.P. Hand, and **S.K. Trumbo**, Cycle 24, STIS, 14650 (4 orbits)

Invited Seminars

UC Santa Cruz, EPS/IGPP Seminar, May 13, 2022

Cornell University, Planetary Lunch Seminar, October 19, 2020

UC Berkeley and UCLA, Joint CIPS and EPSS Seminar, September 30, 2020

CU Boulder, Laboratory for Atmospheric and Space Physics Seminar, September 3, 2020

JPL, Europa Clipper Lecture Series, January 10, 2020

JPL, Icy Worlds Seminar, April 18, 2019

Centre for Star and Planet Formation (STARPLAN), University of Copenhagen, Seminar, September 24, 2018

Conference Talks and Workshop Presentations

(Invited) S.K. Trumbo (2022) “Surface chemistry of the icy Galilean satellites: Observations, laboratory perspectives, and future directions”, Japan Geoscience Union Meeting (Hybrid), Chiba, Japan, PPS01-04.

(Invited) S.K. Trumbo (2022) “The surface of Europa: A window to the ocean below?”, Ice-Ocean Interactions on Icy Moons in the Solar System, Princeton Center for Theoretical Science, Princeton University, Princeton, NJ.

(Invited) S.K. Trumbo, T.M. Becker, M.E. Brown, W.T.P. Denman, P. Molyneux, A. Hendrix, K.D. Retherford, L. Roth, and J. Alday (2021), “A new UV absorption on Europa’s surface: Confirmation of NaCl in leading-hemisphere chaos terrain”, AGU Fall Meeting, New Orleans, LA, P24C-05.

S.K. Trumbo, D. Adams, and M.E. Brown (2021), “The geographic distribution of dense-phase O₂ on Ganymede”, 53rd AAS DPS Meeting (Virtual), 103.02.

S.K. Trumbo, M.E. Brown, and K.P. Hand (2020), “Endogenic and exogenic contributions to visible-wavelength spectra of Europa’s trailing hemisphere”, 52nd AAS DPS Meeting (Virtual), 106.03.

S.K. Trumbo, M.E. Brown, and K.P. Hand (2020), “H₂O₂ within chaos terrain on Europa”, Keck Science Meeting (Virtual).

S.K. Trumbo, M.E. Brown, and K.P. Hand (2019), “H₂O₂ within chaos terrain on Europa’s leading hemisphere”, 51st AAS DPS Meeting/EPSC Meeting, Geneva, Switzerland, EPSC-DPS2019-825.

S.K. Trumbo, M.E. Brown, and K. P. Hand (2018), “A Search for signatures of irradiated chloride salts on the surface of Europa”, 50th AAS DPS Meeting, Knoxville, TN, 407.02.

S.K. Trumbo, M.E. Brown, K. de Kleer, and K. P. Hand (2018), “Observational constraints on the distribution and temperature dependence of H₂O₂ on the surface of Europa”, Europa Deep Dive 2: Composition, Houston, TX, 3020.

S.K. Trumbo, M.E. Brown, K. de Kleer, and K. P. Hand (2018), “Observational constraints on the distribution and temperature dependence of H₂O₂ on the surface of Europa”, European Planetary Science Congress, Berlin, Germany, EPSC2018-203.

S.K. Trumbo, M.E. Brown, and B.J. Butler (2017), “ALMA thermal observations of Europa”, 49th AAS DPS Meeting, Provo, UT, 203.05.

S.K. Trumbo, S.P. Ewald, and A.P. Ingersoll (2016), “The time variability of individual geysers in the plume of Enceladus”, AGU Fall Meeting, San Francisco, CA, P32A-04.

S.K. Trumbo, P.D. Fischer, K.P. Hand, and M.E. Brown (2016), “A new spectral feature on the trailing hemisphere of Europa at 3.78 μm”, 48th AAS DPS Meeting, Pasadena, CA, 517.01.

S.K. Trumbo, S.L. Palacios, R.C. Zimmerman, and R.M. Kudela (2012), “A mathematical model for estimation of kelp bed productivity: Age dependence and contributions of subsurface kelp”, AGU Fall Meeting, San Francisco, CA, B34D-06.

Selected Press

“Water on Europa—with a Pinch of Salt”, Shannon Hall, *Scientific American*, June 2019

“Table Salt Compound Spotted on Europa”, Robert Perkins, *Caltech/JPL Press Release*, June 1019

“The Hidden Ocean Beneath Europa’s Frozen Crust May Contain Basic Table Salt”, George Dvorsky, *Gizmodo*, June 2019

“ALMA Maps Europa’s Temperature”, Charles Blue, *NRAO Press Release*, October 2018

“How Hot is Europa? There’s a Map for That”, Kimberly M. S. Cartier, *EOS*, September 2018

“One of Europa’s Plumes May Not Exist, Making Hunt for Life Hard”, Shannon Stirone, *New Scientist*, August 2017

Volunteer Work and Science Communication

Cornell Friends of Astronomy Lecture, March 22, 2022

Cornell Astronomical Society Lecture, March 4 2022

Physics Tutor, Pasadena City College

2020 – 2021

Math Tutor, Caltech Rise Program for Pasadena Unified School District

2020 – 2021

Career Mentor, Natural Sciences Mentorship Program, Pasadena City College

2020 – 2021

W. M. Keck Observatory Donor Talk, December 3 2020

Science Magazine Podcast, “Better Hurricane Forecasts and Spotting Salts on Jupiter’s Moon Europa”, June 13 2019

Talk for NASA SARP Undergraduate Interns, Caltech, July 18 2017

Educational Article, “From Geology to Biology: A Serpentine Story of Early Life”, *Small Things Considered*, American Society of Microbiology Blog, March 31 2014

Public Education Volunteer, The Birch Aquarium at Scripps Institution of Oceanography

Summer 2008