

## Samantha K. Trumbo

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### Education

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- 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

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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 O<sub>2</sub> 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), “H<sub>2</sub>O<sub>2</sub> 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

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- 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

<b>Graduate Student Researcher</b> , Division of Geological and Planetary Sciences, Caltech	2015 – 2017
<b>Graduate Student Researcher</b> , Scripps Institution of Oceanography, UCSD	2013 – 2015
<b>Undergraduate Researcher</b> , Department of Astronomy, Cornell University	2011 – 2013
<b>Intern</b> , NASA Student Airborne Research Program (SARP)	Summer 2012

### Fellowships and Awards

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

### Professional Affiliations and Service

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

### Teaching Experience

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

### Research and Career Mentorship

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

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**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

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**(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 O<sub>2</sub> on Ganymede”, 53<sup>rd</sup> 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”, 52<sup>nd</sup> AAS DPS Meeting (Virtual), 106.03.

**S.K. Trumbo**, M.E. Brown, and K.P. Hand (2020), “H<sub>2</sub>O<sub>2</sub> within chaos terrain on Europa”, Keck Science Meeting (Virtual).

**S.K. Trumbo**, M.E. Brown, and K.P. Hand (2019), “H<sub>2</sub>O<sub>2</sub> within chaos terrain on Europa’s leading hemisphere”, 51<sup>st</sup> 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”, 50<sup>th</sup> 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 H<sub>2</sub>O<sub>2</sub> 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 H<sub>2</sub>O<sub>2</sub> 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”, 49<sup>th</sup> 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”, 48<sup>th</sup> 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

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“**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

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**Talk for the Cornell Astronomical Society**, 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

**Talk for W. M. Keck Observatory Donors**, 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