

**Jacob I. Walter**  
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**Education**

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- 2012** Ph.D. Earth Sciences  
University of California, Santa Cruz, CA  
Thesis title: *The influence of small stresses on the dynamics of glaciers and subduction zones*
- 2006** B.A. Geology (Magna cum laude)  
University of Colorado, Boulder, CO

**Appointments**

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- 2016 -** **Geophysicist/State Seismologist**, Oklahoma Geological Survey, University of Oklahoma
- 2014 - 2017** **Research Associate**, Institute for Geophysics, University of Texas at Austin
- 2012 - 2013** **Postdoctoral Fellow**, Georgia Institute of Technology, Atlanta, GA

**Teaching Experience**

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- Spring 2018** **Co-instructor**, 50%, OU Geophysics 4970 – Introduction to Seismology
- 2017 -** **Co-instructor**, 20%, OU Geophysics 5970 - Graduate seminar on Geophysics
- 2014** **Guest Instructor (1 lecture)**, UT, Intro. to the Cryosphere (Fall 2014)
- 2013** **Guest Instructor (3 lectures)**, GT, Seismology (Fall 2013)
- 2012** **Guest Instructor (1 lecture)**, UCSC, Glaciology
- 2011, 2009** **Teaching Assistant**, UCSC EART 110C: The Dynamic Earth (Geophysics course for Senior Undergraduate and Graduate Students)

**Professional Experience**

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- 2006 - 2007** **Geologist**, Trihydro Corporation, Laramie, WY

**Publications – peer-reviewed**

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30. Regmi, N. and **J. I. Walter** (2019), Detailed Mapping of Shallow Landslides in Eastern Oklahoma and Potential Triggering by Oklahoma Earthquakes, *Geomorphology*, in press
29. Skoumal, R. J., J. O. Kaven, and **J. I. Walter** (2019), Characterizing Seismogenic Fault Structures in Oklahoma Using a Relocated Template-Matched Catalog, *Seismol. Res. Lett.*, doi: <https://doi.org/10.1785/0220190045>.

28. Vore, M. E., T. C. Bartholomew, J. P. Winberry, **J. I. Walter**, and J. M. Amundson (2019), Seismic tremor reveals spatial organization and temporal changes of subglacial water system, *J. Geophys. Res. Earth Surface*, <https://doi.org/10.1029/2018JF004819>.
27. Walton, M. A. L., E. C. Roland, **J. I. Walter**, S. P. S. Gulick, and P. J. Dotray (2019), Seismic velocity structure across the 2013 Craig, Alaska rupture from aftershock tomography: Implications for seismogenic conditions, *Earth and Planet. Sci. Lett.*, 507: 94-104, <https://doi.org/10.1016/j.epsl.2018.11.021>.
26. **Walter, J. I.**, C. Frohlich, and T. Borgfeldt (2018), Natural and induced earthquakes in the Texas and Oklahoma Panhandles, *Seismol. Res. Lett.*, 89 (6): 2437-2446, <https://doi.org/10.1785/0220180105>.
25. Barcheck, G. C., S. Tulaczyk, S. Y. Schwartz, **J. I. Walter**, and J. P. Winberry (2018), Implications of basal micro-earthquakes and tremor for ice stream mechanics: stick-slip basal sliding and till erosion, *Earth and Planet. Sci. Lett.*, 486: 54-60, doi:10.1016/j.epsl.2017.12.046.
24. Scales, M. M., H. R. DeShon, M. B. Magnani, **J. I. Walter**, L. Quinones, T. L. Pratt, and M. J. Hornbach (2017), A Decade of Induced Slip on the Causative Fault of the 2015 MW 4.0 Venus Earthquake, Northeast Johnson County, Texas, *J. Geophys. Res.: Solid Earth*, 122, doi:10.1002/2017JB014460.
23. Goebel, T. H. W., **J. I. Walter**, K. Murray, and E. E. Brodsky (2017), Comment on “How will induced seismicity in Oklahoma respond to decreased saltwater injection rates?” by C. Langenbruch and M. D. Zoback, *Science Advances*, 3:8, doi:10.1126/sciadv.1700441.
22. Chen, X., C. Pennington, J. Haffener, J. C. Chang, X. He, Z. Zhan, S. Ni, and **J. I. Walter** (2017), The Pawnee earthquake as a result of the interplay among injection, faults and foreshocks, *Scientific Reports*, 7: 4945, doi:10.1038/s41598-017-04992-z.
21. **Walter, J. I.**, J. C. Chang, and P. J. Dotray (2017), Foreshock seismicity suggests gradual differential stress increase in the months prior to the 3 September 2016 Mw 5.8 Pawnee earthquake, *Seismol. Res. Lett.*, 88(4), doi:10.1785/0220170007.
20. Yao, D., **J. I. Walter**, X. Meng, T. E. Hobbs, Z. Peng, A. V. Newman, S. Y. Schwartz, and M. Protti (2017), Detailed Spatio-Temporal Evolution of Microseismicity and Repeating Earthquakes following the 2012 Mw7.6 Nicoya Earthquake, *J. Geophys. Res. Solid Earth*, 121, doi:10.1002/2016JB013632.
19. Holland, D.M., D. Voytenko, K. Christianson, T.H. Dixon, M.J. Mei, B.R. Parizek, I. Vaňková, R.T. Walker, **J.I. Walter**, K. Nicholls, and D. Holland (2016), An intensive observation of calving at Helheim Glacier, East Greenland, *Oceanography* 29(4):46–61, doi.org/10.5670/oceanog.2016.98.

18. Frohlich, C., H. R. DeShon, B. W. Stump, C. Hayward, M. J. Hornbach, and **J. I. Walter** (2016), Reply to "Comment on 'A historical review of induced earthquakes in Texas' by Steve Everley", *Seismol. Res. Lett.*, 87, 1381-1383, doi:10.1785/0220160148.
17. Frohlich, C. F., H. DeShon, B. Stump, C. Hayward, M. J. Hornbach, and **J. I. Walter** (2016), A historical review of induced earthquakes in Texas, *Seismol. Res. Lett.*, 87(4), doi:10.1785/0220160016.
16. Gimbert, F., V. C. Tsai, J. M. Amundson, T. C. Bartholomaus, and **J. I. Walter** (2016), Sub-seasonal changes in pressure, geometry, and sediment transport observed in subglacial channels, *Geophys. Res. Lett.*, 43, doi:10.1002/2016GL068337.
15. **Walter, J. I.**, P. J. Dotray, C. Frohlich, and J. F. W. Gale (2016), Earthquakes in northwest Louisiana and the Texas-Louisiana border possibly induced by energy resource activities within the Haynesville shale play, *Seismol. Res. Lett.*, 87(2A), doi:10.1785/0220150193.
14. **Walter, J. I.**, Z. Peng, X. Meng, A. V. Newman, S. Y. Schwartz, and J. Marino Protti (2015), Far-field triggering of foreshocks near the nucleation zone of the 5 September 2012 (Mw 7.6) Nicoya Peninsula, Costa Rica earthquake, *Earth and Planet. Sci. Lett.*, 431: 75-86, doi:10.1016/j.epsl.2015.09.017.
13. Bartholomaus, T. C., J. M. Amundson, **J. I. Walter**, S. O'Neel, M. E. West, and C. F. Larsen (2015), Subglacial discharge at tidewater glaciers revealed by seismic tremor, *Geophys. Res. Lett.*, 42, doi:10.1002/2015GL064590.
12. Malservisi, R., S. Y. Schwartz, N. Voss, M. Protti, V. Gonzalez, T. H. Dixon, Y. Jiang, A. V. Newman, J. Richardson, **J. I. Walter**, and D. Vayenko (2015), Multiscale postseismic behavior on a megathrust: The 2012 Nicoya earthquake, Costa Rica, *Geochem. Geophys. Geosyst.*, 16, doi:10.1002/2015GC005794.
11. Aiken, C., J. P. Zimmerman, Z. Peng, and **J. I. Walter** (2015). Triggered seismic events along the eastern Denali fault in northwest Canada following the 2012 Mw 7.8 Haida Gwaii, 2013 Mw 7.5 Craig, and two Mw>8.5 teleseismic earthquakes, *Bull. Seismol. Soc. Am.*, 105, no. 2B, doi: 10.1785/0120140156.
10. Frohlich, C., **J. I. Walter**, and J. F. W. Gale (2015), Analysis of transportable array (USArray) data shows earthquakes are scarce near injection wells in the Williston Basin, 2008-2011, *Seismol. Res. Lett.*, 86, 492-499.
9. **Walter, J. I.**, I. Svelitsky, S. Tulaczyk, J. Fineberg, E. E. Brodsky, and S. P. Carter (2015), Rupture speed dependence on initial stress profiles: Insights from glacier and laboratory stick-slip, *Earth and Planet. Sci. Lett.*, 411: 112-120, <http://dx.doi.org/10.1016/j.epsl.2014.11.025>.

8. Peng, Z., **J. I. Walter**, R. Aster, D. A. Wiens, S. Anandkrishnan, and A. Nyblade (2014), Antarctic icequakes triggered by the 2010 Maule earthquake in Chile, *Nature Geosci.*, 7, 677–681, doi:10.1038/ngeo2212.
7. Protti, M., V. Gonzalez, A. V. Newman, T. H. Dixon, S. Y. Schwartz, J. S. Marshall, L. Feng, **J. I. Walter**, R. Malservisi, and S. E. Owen (2014), Nicoya earthquake rupture anticipated by geodetic measurement of the locked plate interface, *Nature Geosci.*, 7, 117–121, doi:10.1038/ngeo2038.
6. **Walter, J. I.**, S. Y. Schwartz, M. Protti, and V. Gonzalez (2013), The synchronous occurrence of shallow tremor and very low frequency earthquakes offshore of the Nicoya Peninsula, Costa Rica, *Geophys. Res. Lett.*, 40, 1517–1522, doi:10.1002/grl.50213.
5. Horgan, H. J., S. Anandkrishnan, R. W. Jacobel, K. Christianson, R. B. Alley, D. S. Heeszel, S. Picotti, and **J. I. Walter** (2012), Subglacial Lake Whillans – Part 1: Imaging a Shallow Active Reservoir Beneath a West Antarctic Ice Stream, *Earth and Planet. Sci. Lett.*, 331: 201–209.
4. **Walter, J. I.**, J. E. Box, S. Tulaczyk, E. E. Brodsky, I. M. Howat, Y. Ahn, and A. Brown (2012), Oceanic mechanical forcing of a marine-terminating Greenland glacier, *Ann. Glaciol.*, 53(60), 181–192(12), doi:10.3189/2012AoG60A083.
3. **Walter, J. I.**, E. E. Brodsky, S. Tulaczyk, S. Y. Schwartz, and R. Pettersson (2011), Transient slip events from near-field seismic and geodetic data on a glacier fault, Whillans Ice Plain, West Antarctica, *J. Geophys. Res. Earth Surface*, 116, F01021, doi:10.1029/2010JF001754.
2. **Walter, J. I.**, S. Y. Schwartz, J. M. Protti, and V. Gonzalez (2011), Persistent tremor of the northern Costa Rica seismogenic zone, *Geophys. Res. Lett.*, 38, L01307, doi:10.1029/2010GL045586.
1. Outerbridge, K. C., T. H. Dixon, S. Y. Schwartz, **J. I. Walter**, M. Protti, V. Gonzalez, J. Biggs, M. Thorwart, and W. Rabbel (2010), A tremor and slip event on the Cocos-Caribbean subduction zone as measured by a GPS and seismic network on the Nicoya Peninsula, Costa Rica, *J. Geophys. Res.*, 115, B10408, doi:10.1029/2009JB006845.

## Funding and Grants

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### Current External Research Grants

“Collaborative Research: Triggering of Antarctic Icequakes, Slip Events, and other Tectonic Phenomena by Distant Earthquakes,” lead PI with Z. Peng (Georgia Tech), NSF-Antarctic Earth Sciences, \$189,702 awarded, 2 months salary/yr, 6/1/16-5/31/18.

“Roles of stress heterogeneity and stress interaction in induced seismicity: example from the Fairview/Woodward area in Oklahoma,” co-PI, lead PI is X. Chen (OU), USGS, \$52,705, 5/1/18-12/31/18.

“NSFPLR-NERC: TIME (Thwaites Interdisciplinary Margin Evolution) - The Role of Shear Margin Dynamics in the Future Evolution of Thwaites Drainage Basin,” co-PI with 8 other co-PIs at 4 other institutions, 1 OU co-PI (N. Nakata), NSF, \$512,170 to OU, 1 month salary/yr, 5/1/18-4/30/23.

“Refining Principal Stress Measurements in Reservoir Underburden in Regions of Induced Seismicity through Seismological Tools, Laboratory Experiments, and Theory,” lead PI at OU with 2 other co-PIs and federal lab collaborators, US Department of Energy, \$495,423 to OU, 1 month salary/yr, 10/1/18-9/31/22

**Pending External Research Proposals**

“Collaborative Research: Slip behavior of a shallow, seismogenic subduction interface,” lead PI with 2 other US inst., NSF-Geophysics.

**Past Internal Research Grants**

“Probing variations in deformation rate and seismicity along the forearc of the uniquely accessible Western Solomon Islands,” lead PI, JSG seed grant, 0.5 months salary, \$34,214.

**Past External Research Grants**

“Probing dynamic interactions between the Haida Gwaii and Craig earthquakes and implications for Southeast Alaska faults,” lead PI with Z. Peng (Georgia Tech), USGS-NEHRP, \$49,996 awarded to UT, 2 months salary, 3/1/15-2/29/16.

“Collaborative Research: MIDGE: Minimally Invasive Direct Glacial Exploration of Biogeochemistry, Hydrology and Glaciology of Blood Falls, McMurdo Dry Valleys,” NSF-AISS, subaward in amount of \$15,353 awarded, 0.78 months salary.

**Students**

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**Graduate advisor**

Zach Rosson	MS Student	OU	M.S. awarded 2019
Taylor Borgfeldt	MS Student	UT Austin	M.S. awarded 2017

**Graduate thesis committee member**

Yan Qin	PhD	OU	2018-
Colin Pennington	PhD	OU	2018-
Jiewen Zhang	PhD	OU	2018-
Stephen Marsh	MS	OU	Completed 2018
Mason Fried	PhD	UT Austin	2014-2018

**Undergraduate research advising**

Sarah Sundberg	2018 Summer research	OU
Angie Ortega	2018 Summer research	OU
Roberto Clairmont	2018 Summer research	OU
Shawn Lee	2015 IRIS summer intern	UC Berkeley, Geophysics
Julie Gerzina	Fall 2015 – Spring 2016	UT Austin, Physics
Peter Dotray	Fall 2014 – Fall 2016	UT Austin, JSG

## **Invited/Special Seminars**

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Identifying hydraulic-fracture triggered earthquakes amongst other earthquakes in Oklahoma, Keynote presentation, Microseismic Industry Consortium, Calgary, Alberta, November 2018

Hydraulic-fracture triggered earthquakes in Oklahoma, Oklahoma City Geophysical Society, Oklahoma City, OK, October 2018.

Keynote on Oklahoma earthquakes, SEG Technical Workshop on Earthquake damage to Infrastructure, August 2018

The past and future seismic hazard in Oklahoma and how we can change the outlook, Oklahoma State University Geology Seminar, Spring 2018.

Oklahoma, America's earthquake hotbed?, UC Riverside Geology Department Seminar, Fall 2017

Oklahoma Geological Survey: Monitoring and studying seismicity in Oklahoma, Oklahoma State University, National Earthquake Program Manager's Meeting, Spring 2017.

A myriad of mechanisms for inducing Texas earthquakes in the last century, Baylor University, September 2016.

Towards observing the full spectrum of fault slip behavior, from slow slip to megathrust earthquakes, University of Montana, March 2016.

Antarctica Now: Hot Science in a Changing World, SXSW Eco, Austin, TX, October 2014.

The spatio-temporal evolution of seismic activity preceding and following the 5 September 2012 Nicoya Peninsula earthquake, Pacific Geoscience Centre, February 2014.

Dynamics of ice sheets on seismic (and slightly longer) timescales, University of Illinois Chicago, October 2013.

The spatio-temporal evolution of seismic activity preceding and following the 5 September 2012 Nicoya Peninsula earthquake, Institute of Geophysics, Chinese Earthquake Administration, August 2013.

Dynamics of ice sheets on seismic (and slightly longer) timescales, Earthquake Research Institute, University of Tokyo, August 2013.

## **Selected Recent Conference Presentations**

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**Walter, J. I.**, J. C. Chang, and K. Murray (Talk), Earthquakes and human activities to induce them in Oklahoma, *SSA Meeting*, Miami, FL, 2018.

**Walter, J. I.**, and K. Murray (Talk), Evolving spatio-temporal associations between earthquakes and wastewater injection wells in Oklahoma, *GSA South-Central Meeting*, Little Rock, AR, 2018.

**Walter, J. I.**, Z. Peng, S. Hansen, Z. Rosson (Poster), Repeating ice-earthquakes beneath David Glacier from the 2012-2015 TAMNNET array, *AGU Fall Meeting*, New Orleans, December 2017.

**Walter, J. I.**, J. C. Chang, P. J. Dotray (Poster), The spatio-temporal evolution of seismic activity leading up to the 3 September 2016 Mw 5.8 Pawnee earthquake, *AGU Fall Meeting*, San Francisco, CA, December 2016.

**Walter, J. I.**, C. Frohlich, T. Borgfeldt, P. J. Dotray, S. Bilek (Oral), West Texas-New Mexico seismicity: induced and natural sequences along old tectonic features, *GSA Meeting*, Denver, CO, October 2016.

**Walter, J. I.**, Z. Peng, H. Kao, X. Meng, T. Hobbs, P. Dotray, T. Mulder (Oral), Dynamic interactions between the late October 2012 Haida Gwaii and early January 2013 Craig earthquakes and other faults in Southeast Alaska, *AGU Fall Meeting*, San Francisco, CA, December 2015.

**Walter, J. I.**, Z. Peng, S. Tulaczyk, and L. Beem, Ice stream slip triggered by distant earthquakes, *AGU Fall Meeting*, San Francisco, CA, December 2014.

**Walter, J. I.**, I. Svetlizky, J. Fineberg, E. E. Brodsky, S. Tulaczyk, and S. P. Carter (Oral), Interfacial stresses at the grounding line of the Whillans Ice Plain control the initial stick-slip rupture speed, *Western Antarctic Ice Sheet Workshop*, San Diego, CA, September 2014.

**Walter, J. I.**, H. Kao, Z. Peng, C. Aiken, X. Meng, J. Zimmerman (Oral), Investigating dynamic interactions between the October 2012 Haida Gwaii and January 2013 Craig earthquakes, *Seismological Society of America Meeting*, Anchorage, AK, May 2014.

**Walter, J. I.**, J. Amundson, Z. Peng, S. Prejean, and P. Morgan (Invited Oral), The seismic signature of glacier outburst floods, *AGU Fall Meeting*, San Francisco, CA, December 2013.

**Walter, J. I.**, Z. Peng, X. Meng, C. Kyriakopoulos, A. V. Newman, R. Malservisi, L. Feng, S. Y. Schwartz, T. H. Dixon, M. Protti, and Z. Kannan, Spatio-temporal patterns of post-earthquake seismicity and afterslip following the 5 September 2012 (Mw 7.6) Nicoya Peninsula earthquake, *AGU Fall Meeting*, San Francisco, CA, December 2013.

**Walter, J. I.**, Z. Peng, S. Y. Schwartz, X. Meng, A. Newman, and M. Protti (Invited Oral), Tremor, slow slip, and the spatio-temporal evolution of seismic activity at the fringes of a

megathrust earthquake at the Nicoya Peninsula, Costa Rica, *Seismological Society of America Meeting*, Salt Lake City, UT, April 2013.

### **Earthquake risk/Antarctica/Scientist as a career outreach talks**

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Norman Science Cafe, Norman Central Library, OK, March 2019

Wilson Elementary, Norman, OK, March 2019

Will Rogers Elementary, Putnam City, OK, February 2019

Timber Creek Elementary, Moore, OK, January 2019

Geology and Geophysics Colloquium, “Life after Grad School,” Norman, OK January 2019

Frontier Elementary, Edmond, OK, November 2018

Public talk, Norman Frontier West Public Library, October 2018.

Public talk, Enid First Baptist Church, August 2018.

Skype with a Scientist, Jenks Elementary School, Jenks, OK, May 2018.

Cross Timbers Elementary, Earthquakes in Oklahoma!, Tecumseh, OK, March 2018

What is an earthquake? What is a scientist? Various earthquake activities, Jones Academy STEM Summer Science Camp visit to OU and Norman, June 2018

Raspberry Shake program training to teachers, Enid, OK, June 2018

Public talk, Okmulgee Lions Club, June 2018.

Earthquake risk in Oklahoma, Ready Business Quakesmart Workshop, Midwest City, OK, October 2017

Earthquake risk in Oklahoma, Oklahoma County Local Emergency Planning Committee Tabletop Exercise, OK, October 2017

Earthquake risk in Oklahoma, East Oklahoma County Rotary Club, Choctaw, OK, October 2017

McKinley Elementary, Great Central US Shakeout – What to do in an Earthquake?, Norman, OK, October 2017

What is an earthquake? What is a scientist? Various earthquake activities, Jones Academy STEM Summer Science Camp, Hartshorne, OK, July 2017



## Service

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- Reviewer** Science, Nature Geoscience, Earth and Planetary Sciences Letters, Geophysical Research Letters, Seismological Research Letters, Journal of Geophysical Research-Earth Surface/Solid Earth, Geology, Journal of Glaciology, Bulletin of the Seismological Society of America, Polar Science, National Geographic (ad-hoc), NSF Arctic Natural Sciences (ad-hoc), NSF Geophysics (ad-hoc), NSF GeoPRISMS (ad-hoc), USGS Earthquake Hazards Program (panel), SEG Technical Abstracts
- Committee** PASSCAL Scientific Standing Committee Member (2015-2017), Polar Networks Science Committee (joint IRIS/UNAVCO), Institutional Representative to IRIS consortium of Universities conducting seismological research (2015-2017), UTIG Annual Review Committee (2016), UTIG Seminar Committee (2016)
- Outreach** STEM summer science camp instructor to Choctaw Nation students; Various outreach talks to local schools (10-14 per year in Oklahoma; Adult-oriented evening public lectures (10-11 per year); Contributed to Ice Stories, an Exploratorium (science museum in San Francisco) project and website featuring contributions from Antarctic researchers
- Organizer** Eastern Section of the Seismological Society of America 2017 Meeting

## Awards as a Graduate Student

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- 2011 - 2012** Chancellor's Dissertation Year Fellowship (\$21,000 plus student fees)  
**2011** Earthscope Annual Meeting Student Presentation Award  
**2010** Waters Award (Best Department Thesis Proposal ~\$4,000)  
**2009 - 2012** NASA Earth and Space Science Fellowship (\$90,000)  
**2010** US Antarctic Service Medal

## Fieldwork experience

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Geophysics Team Leader: Oklahoma Geological Survey

Field party participant and leader of smaller sub-groups during work: Costa Rica, 5 trips during PhD; Greenland, 2008; Whillans Ice Plain, 2008 and 2010; Taylor Glacier, Dry Valleys, December 2014; Solomon Islands, April 2015

Field team leader (or co-leader), responsible for all aspects of safety and logistics: Helheim Glacier, August 2014; Solomon Islands, September 2015; Taku Glacier, March 2016

Certifications/skills: First-Aid CPR with AED (January 2016 recertification), glacier roped-travel, crevasse rescue training

## References

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