

MATTHEW W. HERMAN  
Assistant Professor  
Department of Geological Sciences  
California State University, Bakersfield  
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## Professional Appointments

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**California State University, Bakersfield**, Bakersfield, CA  
Assistant Professor Aug 2020–Present

**Utrecht University**, Utrecht, The Netherlands  
Postdoctoral Researcher, Tectonophysics Research Group (Supervisor: Rob Govers) 2017–2020

**The Pennsylvania State University**, University Park, PA  
NASA Ph.D. Fellow, Department of Geosciences 2015–2017  
Teaching Assistant, Department of Geosciences 2010–2015

## Education

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**The Pennsylvania State University**  
**Ph.D. Geosciences** (Advisor: Kevin Furlong) 2017  
Dissertation: *Deformation Processes Throughout the Earthquake Cycle*

**M.S. Geosciences** (Advisor: Kevin Furlong) 2012  
Thesis: *Regional Moment Tensors from the 2010-2012 Canterbury Earthquake Sequence, South Island, New Zealand*

**Amherst College**  
**B.A. Geology and Physics** (double major), Magna cum laude (GPA: 3.87/4.00) (Advisor: John Cheney) 2009  
Thesis: *P-T Paths of Biotite-Sillimanite-Garnet Gneisses from the Highland Mountains, Southwest Montana*

## Peer-Reviewed Publications

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- Herman, M.W.**, Govers, R. (2020). Locating fully locked asperities along the South America subduction megathrust: A new physical inter-seismic inversion approach in a Bayesian framework. *Geochemistry, Geophysics, Geosystems*.
- Herman, M.W.**, Govers, R. (2020). Extensional deformation in subduction zones triggered by co-seismic stress changes from megathrust earthquakes. *Earth and Planetary Science Letters* 544, 116379.
- Herman, M.W.**, Furlong, K.P., Govers, R. (2018). The accumulation of slip deficit in subduction zones in the absence of mechanical coupling: Implications for the behavior of megathrust earthquakes. *Journal of Geophysical Research: Solid Earth* 123, 8260-8278.
- Meyers, B., **Herman, M.W.**, Furlong, K.P., Pananont, P. (2018). Evaluating the state of stress and seismic hazard in Thailand and vicinity through finite element modeling. *Journal of Asian Earth Sciences* 166, 260-269.
- Kintner, J.A., Ammon, C.J., Cleveland, K.M., **Herman, M.** (2018). Rupture processes of the 2013-14 Minab earthquake sequence, Iran. *Geophysical Journal International* 213, 1898-1911.
- Govers, R., Furlong, K.P., van de Wiel, L., **Herman, M.W.**, Broerse, T. (2018). The geodetic signature of the earthquake cycle at subduction zones: Model constraints on the deep processes. *Reviews of Geophysics* 56, 6-49.
- Furlong, K.P., **Herman, M.** (2017). Reconciling the deformational dichotomy of the 2016 Mw 7.8 Kaikoura, New Zealand, earthquake. *Geophysical Research Letters* 44, 6788-6791. (Research Commentary)
- Nealy, J.N., **Herman, M.W.**, Moore, G.L., Hayes, G.P., Benz, H.M., Bergman, E.A., Barrientos, S.E. (2017). The 2017 Valparaiso earthquake sequence and the megathrust patchwork of central Chile. *Geophysical Research Letters* 44, 8865-8872.
- Pananont, P., **Herman, M.W.**, Pornsopin, P., Furlong, K., Habangkaem, S., Waldhauser, F., Wongwai, W., Limpisawad, S., Warnitchai, P., Kosuwan, S., Wechbunthung, B. (2017). Seismotectonics of the 2014 Chiang Rai, Thailand, earthquake sequence. *Journal of Geophysical Research: Solid Earth* 122, 6367-6388.

- Herman, M.W.**, Nealy, J.L., Yeck, W.L., Barnhart, W.D., Hayes, G.P., Furlong, K.P., Benz, H.M. (2017). Integrated geophysical characteristics of the 2015 Illapel, Chile, earthquake. *Journal of Geophysical Research: Solid Earth* 122, 4691-4711.
- Herman, M.W.**, Furlong, K.P. (2016). Revisiting the Canterbury earthquake sequence after the 14 February 2016 Mw 5.7 event. *Geophysical Research Letters* 43, 7503-7510.
- Herman, M.W.**, Furlong, K.P., Hayes, G.P., Benz, H.M. (2016). Foreshock triggering of the 1 April 2014 Mw 8.2 Iquique, Chile, earthquake. *Earth and Planetary Science Letters* 447, 119-129.
- Hayes, G.P., **Herman, M.W.**, Barnhart, W.D., Furlong, K.P., Riquelme, S., Benz, H.M., Bergman, E., Barrientos, S., Earle, P.S., Samsonov, S. (2014). Continuing megathrust earthquake potential in Chile after the 2014 Iquique earthquake. *Nature* 512, 295-298.
- Herman, M.W.**, Herrmann, R.B., Furlong, K.P., Benz, H.M. (2014). Using regional moment tensors to constrain the kinematics and stress evolution of the 2010-2013 Canterbury earthquake sequence, South Island, New Zealand. *Tectonophysics* 633, 1-15.
- Hayes, G.P., Furlong, K.P., Benz, H.M., **Herman, M.W.** (2014). Triggered aseismic slip adjacent to the 6 February 2013 Mw 8.0 Santa Cruz Islands megathrust earthquake. *Earth and Planetary Science Letters* 388, 265-272.

### In Review

- McKenzie, K.A., Furlong, K.P., **Herman, M.W.** (in review at *Geochemistry, Geophysics, Geosystems*). Bi-directional loading of the subduction interface: Evidence from kinematics of slow slip events.
- D'Acquisto, M., **Herman, M.W.**, Govers, R. (in review at *Journal of Geophysical Research: Solid Earth*). On the cause of enhanced landward motion of the overriding plate after a major subduction earthquake.

### Grants and Awards

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| USGS Earthquake Hazards Program (PI)<br><i>Inter-seismic locking and implications for megathrust earthquakes in the Aleutian subduction zone</i>   | Submitted |
| NWO User Support Programme Space Research (GO) (Co-PI)<br><i>Fingerprinting vertical land motion from the earthquake cycle above subduction zones</i><br>Award Number: ALWGO.2019.001                          | Accepted  |
| NASA Graduate Earth and Space Science Fellowship<br><i>From megathrust to the surface: Quantifying upper plate deformation at subduction zones throughout the earthquake cycle</i><br>Award Number: NNX14AL21H | 2014–2017 |
| AGU Outstanding Student Paper Award, Tectonophysics Section, Fall Meeting  | 2012      |

### The Pennsylvania State University

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| Graduate Student Colloquium 1st place Ph.D. (Post-Comps) Talk – 2018 Deines Lecture  | Spring 2017    |
| Graduate Student Colloquium 1st place Ph.D. (Pre-Comps) Talk                         | Spring 2015    |
| Graduate Student Colloquium 1st place Master's Talk                                  | Spring 2012    |
| Paul D. Krynine Scholarship  | Fall 2011–2016 |
| Charles Knopf, Sr. Memorial Scholarship for Outstanding First-Year Graduate Students | Fall 2010      |
| Chevron AGU Travel Award   | Fall 2010      |

### Teaching Experience

#### California State University, Bakersfield

- GEOL1009: How The Earth Works  
 GEOL1209: Dangerous Earth

#### The Pennsylvania State University

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| Co-developer and TA – “Plate Tectonics”                           | Fall 2016            |
| Co-developer and TA – “Earthquake Information Project”            | 2014–2015            |
| Field Camp – “Contact Metamorphism and Cooling of the Alta Stock” | 2015                 |
| Teaching Assistant – “Physical Processes in Geology”              | Fall 2011, Fall 2013 |

Teaching Assistant – “Natural Disasters: Hollywood vs. Reality”	Spring 2013, Spring 2014
Teaching Assistant – “Geology of Climate Change”	Spring 2011
Teaching Assistant – “Geology of the National Parks”	Fall 2010

### Short Courses

“Modeling Earthquake Deformation” – Kasetsart University, Bangkok, Thailand	2015
“Flexure and Heat Flow” – Chevron, Houston, Texas	2013

### Online Tutorials

“Beginner’s Guide to Unix”  
 “Beginner’s Guide to Awk”  
 “Introduction to Generic Mapping Tools (versions 4 and 5)”  
 Available at: [www.matthewwherman.com/tutorials.html](http://www.matthewwherman.com/tutorials.html).

### Amherst College

Teaching Assistant – “Dynamics”	Fall 2008
Teaching Assistant – “Mineralogy”	Fall 2007
Teaching Assistant – “Introductory Physics II: Electromagnetism and Optics”	Spring 2007
Teaching Assistant – “Principles of Geology”	Fall 2006

### Student Advising

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#### Utrecht University

Marjolein Blasweiler (B.Sc.) – with Rob Govers <i>Sensitivity of the Triggering Relationship of the 2019 Ridgecrest Earthquake Sequence, California, USA</i>	2020
Teus van Dam (B.Sc.) – with Rob Govers <i>Seismic Sources of the Zakynthos Earthquake of October 25, 2018 (USGS 6.8), and its Relationship to the Subsequent Displacements, Stresses and Seismicity</i>	2020
Fenna Houtsma (B.Sc.) – with Rob Govers <i>Earthquake triggering in the Puerto Rico earthquake swarm (2019 - 2020)</i>	2020
Nicolai Nijholt (Ph.D.) – Doctoral Examination Committee Member <i>STEP faults and lithosphere dynamics in the Mediterranean</i>	2019
Jasper Van Weers (M.Sc.) – with Hanneke Paulssen <i>Relocating earthquakes in the Groningen region using a double-difference approach</i>	2019
Dagmar Bouwman (M.Sc.) – with Hanneke Paulssen <i>Relocating seismicity from the 2017 Botswana earthquake sequence</i>	2018
Lucas Eskens (B.Sc.) – with Rob Govers <i>The relation between mainshocks and subsequent aftershocks and how it fits in the seismic sequence and tectonic setting: a case study of the M7.5 earthquake, Papua New Guinea, February 25th, 2018</i>	2018
Jort Jansen (B.Sc.) – with Rob Govers <i>The Mw 7.9 Gulf of Alaska earthquake: Stress distribution and earthquake interaction</i>	2018

#### The Pennsylvania State University

Mitchell Hastings (B.S.) – advised by Kevin Furlong <i>Modeling the Stress Evolution of the Aleutian Arc Subduction Zone</i>	2017
Robert Drewicz (B.S.) – advised by Kevin Furlong <i>Exploration of Geothermal Resources in the Newcastle Geothermal System of the Escalante Desert, Utah</i>	2013
Eric Guth (B.S.) – advised by Kevin Furlong <i>An Assessment of Potential Earthquake Magnitudes For the North Island, NZ Subduction Zone</i>	2013

## Service to Community

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### European Geosciences Union

EGU General Assembly Session Convener

“Advances in understanding earthquake sequences and (a) seismic slip across scales” 2020

### American Geophysical Union

Mentoring365 program for Fall Meeting abstracts

2019

Fall Meeting Outstanding Student Presentation Award Judge

2017–2019

### The Pennsylvania State University

Geodynamics Seminar Coordinator

2012–2016

### Referee

*Earth and Planetary Science Letters, Geophysical Research Letters, Journal of Geophysical Research: Solid Earth, New Zealand Journal of Geology and Geophysics, Science Advances, Tectonophysics*

### Proposal Reviewer

Fondo Nacional de Desarrollo Científico y Tecnológico (Chile), Swiss National Science Foundation

## Outreach

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### Real World Globes

“Magnetic Anomalies of the Ocean” ([www.realworldglobes.com](http://www.realworldglobes.com))

2019

### American School of the Hague (Wassenaar, The Netherlands)

Guest Scientist

April 2018, April 2019

### Utrecht University

“Earthquake Cycle at Subduction Zones” ([www.youtube.com/watch?v=TIQKPoxMdGg](http://www.youtube.com/watch?v=TIQKPoxMdGg))

June 2018

### European Geosciences Union

“The Art of the 15-minute Talk” ([blogs.egu.eu/divisions/gd/2018/06/07/the-art-of-the-15-minute-talk](http://blogs.egu.eu/divisions/gd/2018/06/07/the-art-of-the-15-minute-talk))

2018

### Stone Valley Community Charter School (Huntingdon, PA)

Science Fair Judge

March 2014

### The Pennsylvania State University

“Shake, Rattle, and Rocks”

January 2013

## Scientific and Professional Development

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COMET InSAR Training Workshop (University of Leeds)

November 2019

## Software Development

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I work with existing geodynamics and geophysics software packages in my research and also develop my own tools. I am skilled in Linux, Fortran, awk, Generic Mapping Tools (GMT), Seismic Analysis Code (SAC), and Matlab, as well as some HTML/CSS, Python, and OpenMPI.

*Hdef* ([github.com/mherman09/Hdef](https://github.com/mherman09/Hdef))

Developed tools for computing fault-generated deformation in an elastic half-space. Capabilities include modeling GPS displacements, synthetic InSAR interferograms, static stress transfer, and tsunami sources. Introductory tutorials for use of *Hdef* are available at: [www.matthewwherman.com/software.html](http://www.matthewwherman.com/software.html).

### *GTECTON*

Contributed to massively parallel finite element platform developed by Rob Govers at Utrecht University.

## Professional Associations

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Southern California Earthquake Center Member

2020–Present

Geological Society of America Member

2019–Present

European Geosciences Union Member

2018–Present

American Geophysical Union Member

2010–Present

## Research (External to Degree Programs)

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### USGS National Earthquake Information Center

Graduate Student Intern

Summer 2010–2015

### Kelly Services – Covidien (Webster Groves, MO)

Research & Development Group

2009

### Geophysical Institute, University of Alaska-Fairbanks

NASA Planetary Geology & Geophysics Undergraduate Research Program

2008

## Public Talks

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Utrecht University Seismology Seminar

31 October 2019

*Constraining Patterns of Interseismic Locking and Slip Deficit in Subduction Zones and Their Relationship to Great Earthquake Ruptures*

Utrecht University Seismology Seminar

31 January 2019

*Crustal Faulting Above A Ruptured Subduction Megathrust In The 2016 Kaikoura, New Zealand, Earthquake*

Penn State Geodynamics Seminar

4 April 2018

*Post-seismic Relaxation Masks Subduction Zone Locking in South America or: How I Learned to Stop Worrying and Love 3D Modeling*

Penn State Deines Lecture (for best presentation at PSU Geosciences Graduate Student Colloquium) 3 April 2018

*Loading, Triggering, and Relaxing: Observations and Models of Subduction Earthquake Processes*

TU Delft

13 March 2018

*Understanding Megathrust Earthquakes Through Observations and Models*

## Open-File Reports

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As part of its mission to communicate earthquake science, the USGS National Earthquake Information Center designed a series of maps describing the seismotectonic settings of regions around the globe with significant earthquake activity. I contributed to several of these maps, which can be found at: [earthquake.usgs.gov/earthquakes/byregion](http://earthquake.usgs.gov/earthquakes/byregion).

**Herman, M.W.**, Hayes, G.P., Smoczyk, G.M., Turner, R., Turner, B., Jenkins, J., Davies, S., Parker, A., Sinclair, A., Benz, H.M., Furlong, K.P., and Villasenor, A. (2015). Seismicity of the Earth 1900-2013 Mediterranean Sea and vicinity. U.S. Geological Survey Open-File Report 20101083-Q, scale 1:10,000,000.

Benz, H.M., **Herman, M.**, Tarr, A.C., Hayes, G.P., Furlong, K.P., Villasenor, A., Dart, R.L., and Rhea, S. (2011). Seismicity of the Earth 1900-2010 Australia Plate and Vicinity. U.S. Geological Survey Open-File Report 2010-1083-G, scale 1:15,000,000.

Benz, H.M., **Herman, M.**, Tarr, A.C., Hayes, G.P., Furlong, K.P., Villasenor, A., Dart, R.L., and Rhea, S. (2011). Seismicity of the Earth 1900-2010 New Guinea and Vicinity. U.S. Geological Survey Open-File Report 2010-1083-H, scale 1:8,000,000.

Benz, H.M., **Herman, M.**, Tarr, A.C., Furlong, K.P., Hayes, G.P., Villasenor, A., Dart, R.L., and Rhea, S. (2011). Seismicity of the Earth 1900-2010 Eastern Margin of the Australia Plate. U.S. Geological Survey Open-File Report 2010-1083-I, scale 1:8,000,000.

## Conference Proceedings

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In the interest of space, I only list abstracts for which I was a (co-)presenting author. A complete list of co-authored abstracts can be found at my website ([www.matthewwherman.com/publications.html](http://www.matthewwherman.com/publications.html)).

2020

**Herman, M.W.**, Govers, R., Nijholt, N., van der Wiel, L.Y. (2019). Probabilistic constraints on lithospheric forces, fault tractions, and rheology in the eastern Mediterranean region. Abstract presented at 2020 EGU General Assembly, Vienna, Austria, 3–8 May.

2019

**Herman, M.W.**, Govers, R. (2019). Resolving locked asperities and slip deficit in unlocked regions: A new inversion method applied in the South America subduction zone. Abstract T051H-0359 presented at 2019 AGU Fall Meeting, San Francisco, CA, 9–13 Dec.

Govers, R., **Herman, M.W.** (2019). Causes of extensional deformation in subduction zones following megathrust earthquakes. Abstract T13H-0333 presented at 2019 AGU Fall Meeting, San Francisco, CA, 9–13 Dec.

**Herman, M.W.**, Govers, R. (2019). The evolution of extensional deformation throughout subduction zone earthquake cycles. Geological Society of America Abstracts with Programs, vol. 51, no. 5.

**Herman, M.W.**, Govers, R. (2019). The relationship between earthquake cycle processes and normal faulting earthquakes in subduction zones: A case study of the 2011 Tohoku earthquake. Abstract EGU2019-12766 presented at 2019 EGU General Assembly, Vienna, Austria, 7–12 Apr.

2018

Simons, W.J., Riva, R., Pietrzak, J., **Herman, M.W.**, Hooper, A.J., Vigny, C., Susilo, S., Sarsito, D.A., Sofian, S., Broerse, T., Kleptsova, O., Lhermitte, S., Nijholt, N., Shen, L., Efendi, J., Naeije, M., Bhat, H.S., Morishita, Y., Govers, R.M.A. (2018). Tsunami potential of the 2018 Sulawesi earthquake from GNSS constrained source mechanism. Abstract NH23F-3553 presented at 2018 AGU Fall Meeting, Washington, DC, 10–14 Dec.

**Herman, M.W.**, Govers, R. (2018). Modeling the spatial and temporal evolution of normal faulting earthquakes in the upper plate of the Japan subduction zone after the 2011 Tohoku earthquake. Abstract G23C-0614 presented at 2018 AGU Fall Meeting, Washington, DC, 10–14 Dec.

Furlong, K.P., **Herman, M.W.**, Rogers, D.B. (2018). Quantifying plate tectonics in the classroom – Magnetic anomalies, Euler poles, and plate motions on a sphere. Abstract ED23C-0928 presented at 2018 AGU Fall Meeting, Washington, DC, 10–14 Dec.

**Herman, M.W.**, Govers, R. (2018). Overprinting the signal of inter-seismic coupling on subduction megathrusts throughout the earthquake cycle. Abstract EGU2018-8003 presented at 2018 EGU General Assembly, Vienna, Austria, 8–13 Apr.

2017

**Herman, M.W.**, Furlong, K.P., Govers, R. (2017). Implications of loading/unloading a subduction zone with a heterogeneously coupled interface. Abstract T23F-0675 presented at 2017 AGU Fall Meeting, New Orleans, LA, 11–15 Dec.

Furlong, K.P., **Herman, M.W.** (2017). Linkages between the megathrust and upper-plate deformation: Lessons from the deformational dichotomy of the 2016 Kaikoura New Zealand earthquake. Abstract T23F-0678 presented at 2017 AGU Fall Meeting, New Orleans, LA, 11–15 Dec.

2016

**Herman, M.W.**, Govers, R., Furlong, K.P. (2016). Constraining interseismic deformation processes in subduction zones through simple mechanical models. Abstract T13A-2669 presented at 2016 Fall Meeting, AGU, San Francisco, CA, 12–16 Dec.

2015

**Herman, M.W.**, Furlong, K.P., Hayes, G.P., Benz, H.M. (2015). Foreshock (and slow slip?) triggering of the 1 April 2014 Mw 8.2 Iquique, Chile, earthquake. Abstract T41D-01 presented at 2015 Fall Meeting, AGU, San Francisco, CA, 14–18 Dec.

**Herman, M.W.**, Yeck, W., Nealy, J., Hayes, G.P., Barnhart, W., Benz, H.M., Furlong, K.P. (2015). Integrated geophysical characteristics of the 2015 Illapel, Chile, earthquake. Abstract S54C-04 presented at 2015 Fall Meeting, AGU, San Francisco, CA, 14–18 Dec.

2014

**Herman, M.**, Furlong, K., Hayes, G., Benz, H. (2014). Assessing the utility of strong motion data to determine static ground displacements during great megathrust earthquakes: Tohoku and Iquique. Abstract S31D-4449 presented at 2014 Fall Meeting, AGU, San Francisco, CA, 15–19 Dec.

2013

**Herman, M.W.**, Furlong, K.P., Hayes, G. (2013). Constraining the static deformation process of the great 2011 Tohoku earthquake using high rate GPS. Abstract S43A-2496 presented at 2013 Fall Meeting, AGU, San Francisco, CA, 9–13 Dec.

2012

**Herman, M.W.**, Furlong, K.P., Herrmann, R.B., Benz, H. (2012). Using regional moment tensors to constrain kinematics and stress evolution during the 2010-2012 Canterbury, New Zealand, earthquake sequence. Abstract T33A-2644 presented at 2012 Fall Meeting, AGU, San Francisco, CA, 3–7 Dec.

2011

**Herman, M.W.**, Furlong, K.P., Herrmann, R.B., Benz, H. (2011). Using regional moment tensors to constrain earthquake processes following the 2010 Darfield and 2011 Canterbury New Zealand earthquake sequences. Abstract S21C-07 presented at 2011 Fall Meeting, AGU, San Francisco, CA, 5–9 Dec.

2010

**Herman, M.W.**, Furlong, K.P., Benz, H., Hayes, G.P. (2010). A comparison of transpressional boundaries: what New Zealand can tell us about tectonics in New Guinea. Abstract T13B-2195 presented at 2010 Fall Meeting, AGU, San Francisco, CA, 13–17 Dec.

2009

**Herman, M.W.**, Cheney, J.T., Harms, T.A., (2009). Metamorphism and P-T paths of K-feldspar-garnet-sillimanite-biotite bearing rocks from the Highland Mountains, southwestern Montana. Geological Society of America Abstracts with Programs, Vol. 41, No. 3, p. 16.

2008

**Herman, M.W.**, Chappelow, J.E., Herrick, R.R. (2008). New crater depth data for Mercury derived from MESSENGER Flyby 1 Imagery. Eos Trans. AGU, 89(53), Fall Meet. Suppl., Abstract U21A-0013.