

Keith D. Koper  
Curriculum Vitae  
June 13, 2017

**Present position**

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**Education**

Ph.D. (Geophysics), Washington University, 1998  
B.A. (Math, Geology, ISP), Northwestern University, 1993

**Professional experience**

Guest Scientist, Los Alamos National Laboratory, 2016-present  
Professor, Dept. of Geology & Geophysics, University of Utah, 2015-present  
Director, University of Utah Seismograph Stations, 2010-present  
Assoc. Professor, Dept. of Geology & Geophysics, University of Utah, 2010-2015  
Assoc. Professor, Dept. of EAS, Saint Louis University, 2006-2010  
Assistant Professor, Dept. of EAS, Saint Louis University, 2001-2006  
Post-doc, Dept. of Geosciences, University of Arizona, 1998-2001

**Academic recognition**

Certificate of excellence in reviewing, *Earth Planet. Sci. Lett.*, 2012  
Doornbos Prize, IUGG-SEDI, 2006  
Citation from Saint Louis University for excellence in research, 2003  
Tolman Geoscience Fellowship, Washington University, 1993-1995

**Research interests**

array seismology; Earth's ambient seismic noise field; forensic seismology and exotic sources; rupture imaging of giant earthquakes; seismicity and tectonics of the intermountain West; structure and dynamics of Earth's deep interior—especially the core

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## 1. Teaching/Mentoring

### 1.1 Courses taught

*Seismology and Nuclear Explosions, EAS-130, SLU* - An intro level science course for non-science majors that was designated as a SLU2K course, meaning that enrollment was capped at 19 students, only freshmen could register, and discovery-based learning techniques were emphasized. Taught seven times: fall 2002, fall 2003, fall 2006, fall 2007, fall 2008, fall 2009, and spring 2009.

*Introduction to Earthquakes, EAS-193, SLU* - An intro level science course designed to fulfill the science requirement of a college-wide core curriculum; enrollment of ~40-50 students. Taught four times: fall 2001, fall 2002, fall 2003, and fall 2005.

*Earth Dynamics, EAS-437, SLU* - An upper level undergraduate class designated as a required course for geoscience majors; enrollment of ~4-8 students. Taught three times: spring 2005, spring 2006, and spring 2010.

*Time Series Analysis, EAS-512, SLU* - A graduate course on signal processing with enrollment of ~5-10 students. Taught four times: spring 2003, spring 2005, spring 2007, spring 2009.

*Exploration Seismology, EAS-551, SLU* - A graduate course on refraction and reflection seismology with enrollment of ~5 students. Taught once in fall 2009.

*Geoscience Journal Club, EAS-591, SLU* - A seminar course in which grad students present recent scientific papers. Enrollment is typically 10-20 students. Taught three times: spring 2003, fall 2005, fall 2006.

*Array Seismology, EAS-593, SLU* - A special topics graduate course on array seismology with enrollment of ~5 students. Taught once in fall 2007.

*Geophysical Inverse Theory, EAS-610, SLU* - A graduate course on inverse theory with enrollment of ~5-10 students. Taught four times: spring 2004, spring 2006, spring 2008, and spring 2010.

*Graduate Seminar - Mantle Transition Zone, EAS-619, SLU* - A special topics graduate course on the mantle transition zone with enrollment of ~5 students. Taught once in spring 2002.

*Signal/Image Processing, GEO5320/6320, Utah* - A course on digital signal processing that was cross-listed for advanced undergraduates and graduate students with enrollment of 10-15 students. Taught four times: spring 2011, spring 2013, fall 2014, spring 2017.

*Graduate Seminar - Earth's Inner Core, GEO6920-03, Utah* - A special topics graduate course on the inner core with enrollment of 5-10 students. Taught once in fall 2011.

*Earthquake Seismology and Risk Assessment, GEO-5330/6330, Utah* - A course

on earthquake seismology that was cross-listed for advanced undergraduates and graduate students with enrollment of 10-15 students. Taught three times: spring 2012, spring 2014, fall 2015.

### **1.2 Undergraduate researchers supervised**

Arvind Parapuzha, 2016, Utah (w/ Burlacu)  
Julian Stanley, 2016, Utah (w/ Burlacu)  
Afiq Mokhtar, 2015-2016, Utah (w/ Burlacu)  
Greg Bobetich, 2015-2016, Utah (w/ Burlacu)  
Kyler Goddard, 2014-2015, Utah (w/ Burlacu)  
Eli Workman, 2013-2014, Utah (w/ Burlacu)  
Derrick Chambers, 2013, Utah (w/ Pankow, McCarter)  
Yeou Hui Wong, 2012-2013 Utah (w/ Burlacu)  
Gavin Thomas, 2012, Utah (w/ Burlacu)  
Kevin Seats, 2007-2010, SLU  
Boston Fodor, 2005-2007, SLU  
Marina Dombrovskaya, 2003-2005, SLU  
Veronica Parker, 2002-2005, SLU  
Teresa Herrmann, 2002, SLU  
Jill Franks, 2001-2003, SLU  
Moiria Pyle, 2001-2002, SLU  
Alisa Miller, 2000-2001, Arizona

### **1.3 Graduate students supervised**

Guanning Pang, Ph.D., 2015-present, Utah  
Chase Batchelor, M.S., 2016, Utah (co-advised with Pankow)  
Derrick Chambers, M.S., 2015, Utah (co-advised with McCarter, Pankow)  
Oner Sufri, M.S., 2009, SLU; Ph.D. 2015, Utah  
Tex Kubacki, M.S., 2014, Utah (co-advised with Pankow, McCarter)  
Christine Gammans, M.S., 2013, Utah (co-advised with Pankow, Pechmann)  
Kevin Kwong, M.S., 2013, Utah  
Kim Dyal, M.S.S.S.T, 2012, Utah  
Veronica Parker, M.S., 2010, SLU  
Yan Xu, Ph.D., 2009, SLU  
Zuihong (Kathy) Zou, Ph.D., 2007, SLU  
Felipe Leyton, Ph.D., 2006, SLU

### **1.4 Post-doctoral researchers supervised**

Jamie Farrell, 2014-2015, Utah

Moira Pyle, 2009-2012, SLU/Utah  
Ali Fatehi, 2006-2008, SLU  
Raef Abd-Elmoneam Elsayed, 2002-2003, SLU

## 1.5 Visiting Students Mentored

Wenying Li, undergraduate student from USTC, summer of 2016  
Qiaoxia Liu, Ph.D. student from USTC, all of 2015

## 2. Research

### 2.1 Invited Academic Talks

*"Mining Induced Earthquakes in Utah"*, Southern Methodist University, March 24, 2017.  
*" $M_L$ - $M_C$ : A Possible Depth Discriminant for Small Seismic Events Recorded at Local Distances"*, Los Alamos National Laboratory, Sept. 15, 2016.  
*"Fine-Scale Heterogeneity in Earth's Inner Core"*, Earth Life Science Institute, Tokyo Tech, Tokyo, Japan, Feb. 10, 2016.  
*"Earthquake Early Warning in the Intermountain West"*, Basin and Range Province Seismic Hazards Summit III, Salt Lake City, UT, Jan. 13, 2015.  
*"Source Physics - An Academic Perspective"*, 2014 Review of Monitoring Research, Albuquerque, NM, June 19, 2014.  
*"Seismic Network Monitoring at Yellowstone"*, Yellowstone Volcano Observatory consortium meeting, Mammoth Springs, MT, May 7, 2014.  
*"Using Seismology to Observe Ocean Storms and Storminess"*, NAS Workshop on Observations of Sea-Level Rise and Storminess in California, Irvine, CA, June 20, 2013.  
*"Rupture Imaging of Recent Giant Earthquakes"*, Northwestern University, Jan. 11, 2013.  
*"Observations of Earth's Background Seismic Radiation"*, New Mexico Tech, Sept. 22, 2011.  
*"Initial Rupture Models for the Mw 9.0 Tohoku Earthquake of 11 March 2011"*, Utah Geological Association, May 9, 2011, Salt Lake City.  
*"The M6.3 New Zealand Earthquake of Feb. 21, 2011 & M9.0 Japan Earthquake of March 11, 2011"*, Utah Seismic Safety Commission, April 28, 2011, Salt Lake City.  
*"Using Arrays to Characterize and Locate Sources of Short-Period Seismic Noise"*, European Geophysical Union General Assembly, April 2011, Vienna.  
University of Utah, October, 2009  
Southern Methodist University, February, 2009  
USGS - National Earthquake Information Center, December, 2008  
University of Chicago, May, 2008

Georgia Tech. University (two talks), March, 2008  
Washington University, October, 2007  
USGS - National Earthquake Information Center, August, 2007  
University of Minnesota, May, 2007  
Saint Louis University, November, 2006  
10th SEDI Meeting, Prague, Czech Republic, July, 2006  
University of Illinois, November, 2005  
Carnegie Institution of Washington, October, 2005  
University of Kentucky, April, 2005  
Princeton University, March, 2005  
University of Missouri, Columbia, May, 2003  
Northwestern University, Spring 2002  
Lawrence Livermore National Laboratory, Summer 2002  
Washington University, Fall, 2001  
Saint Louis University, Spring, 2001  
University of Florida, Spring, 2001  
Rice University, Spring, 2001  
Purdue University, Winter, 2000  
University of Hawaii, Winter, 2000  
University of Wyoming, Winter, 2000  
Lawrence Livermore National Laboratory, Fall 1999

## **2.2 External funding**

Mapping Fine-Scale Structure in Earth's Inner Core with a Global Arrays of Seismic Arrays, National Science Foundation, NSF10044586, July 1, 2017 – June 30, 2020, \$270,000 (Keith D. Koper, PI)

Evaluation of  $M_L$ - $M_C$  as a Possible Depth Discriminant at Local Distances, Air Force Research Laboratory, FA9453-17-C-0022, June 1, 2017 – May 30, 2020, \$324,931 (Keith D. Koper, PI)

MIS Analysis and DINSAR Measurements – Tools for Improving Mine Ground Control Safety, National Institute for Occupational Safety and Health, 200-2016-90240, Sept. 1, 2016 – Oct. 31, 2021, \$1,225,764, (Michael K. McCarter, PI; Keith D. Koper co-PI).

Operation and Maintenance of the Yellowstone Regional Seismic Network and Earthquake Information System, United States Geological Survey, USGS-G16AC00029, Feb. 1, 2016 - Jan. 31, 2019, \$914,205, (Keith D. Koper, PI; Jamie Farrell, co-PI)

Regional and Urban Seismic Monitoring: Wasatch Front, Utah, and Neighboring Intermountain West, United States Geological Survey, USGS-G15AC00028, Feb. 1, 2015 - Jan. 31, 2020, \$3,962,400, (Keith D. Koper, PI; Kristine Pankow, co-PI)

Operation and Maintenance of the Yellowstone Regional Seismic Network and Earthquake Information System, United States Geological Survey, USGS-G13AC00018, Feb. 1, 2013 - Jan. 31, 2016, \$804,037, (Keith D. Koper, PI)

Regional and Urban Seismic Monitoring: Wasatch Front, Utah, and Neighboring Intermountain West, United States Geological Survey, USGS-G10AC0085, 2010-2015, \$3,153,149, (Keith D. Koper, PI; Kristine Pankow, co-PI)

Upgrades to Earthquake Monitoring Systems in the Utah Region, United States Geological Survey, USGS-G09AC00467, \$458,025, (Kristine Pankow, PI; Keith D. Koper, co-PI)

Location and Characterization of Ambient Seismic Noise Using USArray, National Science Foundation, EAR-0951558, 2010-2013, \$243,656, (Keith D. Koper, PI)

Seismic Imaging of the Inner Core Boundary region, National Science Foundation, EAR-0537438, 2006-2010, \$193,871, (Keith D. Koper, PI)

Modeling P Wave Multipathing at Regional Distances ( $13^{\circ} - 30^{\circ}$ ) in Southeast Asia, Air Force Research Laboratory, FA8718-06-C-0003, 2005-2007, \$149,301 (Keith D. Koper, PI)

Mapping the Fine Structure of Earth's Inner Core with Seismic Array Data, National Science Foundation, EAR-0229103, 2003-2006, \$147,937 (Keith D. Koper, PI)

Upgrade of Computer Facilities for the Seismology Research Group at Saint Louis University, National Science Foundation, EAR-0214259, 2002-2005, \$67,425, Keith D. Koper (PI), Lupei Zhu (co-PI), Robert B. Herrmann (co-PI), Brian J. Mitchell (co-PI), Timothy M. Kusky (co-PI)

Analysis of Steep Angle Seismic Reflections from Earth's Inner and Outer Core, National Science Foundation, EAR0087330, 2000-2003, \$80,196 (Keith D. Koper, PI)

### 2.3 Peer reviewed publications

68. Gal, M., A. M. Reading, S. P. Ellingsen, K. D. Koper, and R. Burlacu (2017), Full wavefield decomposition of high frequency secondary microseisms reveals distinct arrival azimuths for Rayleigh and Love waves, *J. Geophys. Res. Solid Earth*, 122, doi:10.1002/2017JB014141.
67. Zhang, H., K. D. Koper, K. Pankow, and Z. Ge (2017), Imaging the 2016  $M_w$  7.8 Kaikoura, New Zealand earthquake with teleseismic P waves: A cascading rupture across multiple faults, *Geophys. Res. Lett.*, 44, doi:10.1002/2017GL073801.
66. Moore, J. R., K. L. Pankow, S. R. Ford, K. D. Koper, J. M. Hale, J. Aaron, and C. F. Larsen (2017), Dynamics of the Bingham Canyon rock avalanches (Utah, USA) resolved from topographic, seismic, and infrasound data, *J. Geophys. Res. Earth Surf.*, 122, doi:10.1002/2016JF004036.

65. Workman, E., F.-C. Lin, and K. D. Koper (2017), Determination of Rayleigh wave ellipticity across the Earthscope Transportable Array using single-station and array-based processing of ambient seismic noise, *Geophys. J. Inter.*, 208, 234-245, doi:10.1093/gji/ggw381.

—2016 Peer-Reviewed Publications—

64. Koper, K.D., J. C. Pechmann, R. Burlacu, K. L. Pankow, J. M. Hale, P. Roberson, and M. K. McCarter (2016), Magnitude based discrimination of manmade seismic events from naturally occurring earthquakes in Utah, USA, *Geophys. Res. Lett.*, 43, 10,638-10,645, doi:10.1002/2016GL070742.
63. Moore, J. R., M. S. Thorne, K. D. Koper, J. R. Wood, K. Goddard, R. Burlacu, S. Doyle, E. Stanfield, and B. White (2016), Anthropogenic sources stimulate resonance of a natural rock bridge, *Geophys. Res. Lett.*, 43, 9669-9676, doi:10.1002/2016GL070088.
62. Lay, T., L. Ye, C. J. Ammon, A. Dunham, and K. D. Koper (2016), The 2 March 2016 Wharton Basin  $M_w$  7.8 earthquake: High stress drop north-south strike-slip rupture in the diffuse oceanic deformation zone between the Indian and Australian Plates, *Geophys. Res. Lett.*, 43, 7937-7945, doi:10.1002/2016GL069931.
61. Liu, Q., K. D. Koper, R. Burlacu, S. Ni, F. Wang, C. Zou, Y. Wei, M. Gal, and A. Reading (2016), Source locations of teleseismic P, SV, and SH waves observed in microseisms recorded by a large aperture seismic array in China, *Earth Planet. Sci. Lett.*, 449, 39-47, doi:10.1016/j.epsl.2016.05.035.
60. Lay, T., L. Ye, K. D. Koper, and H. Kanamori (2016), Assessment of teleseismically-determined source parameters for the April 25, 2015  $M_w$  7.9 Gorkha, Nepal earthquake and the May 12, 2015  $M_w$  7.2 aftershock, *Tectonophysics*, doi:10.1016/j.tecto.2016.05.023.
59. Gal, M., A. M. Reading, S. P. Ellingsen, K. D. Koper, R. Burlacu, and S. J. Gibbons (2016), Deconvolution enhanced direction of arrival estimation using 1- and 3-component seismic arrays applied to ocean induced microseisms, *Geophys. J. Inter.*, 206, 345-359, doi: 10.1093/gji/ggw150.
58. Ye, L., T. Lay, H. Kanamori, and K. D. Koper (2016), Rapidly estimated seismic source parameters for the 16 September 2015 Illapel, Chile  $M_w$  8.3 earthquake, *Pure Appl. Geophys.*, 173, 321-332, doi:10.1007/s00024-015-1202-y.

—2015 Peer-Reviewed Publications—

57. Huang, H.-H., F. C. Lin, V. C. Tsai, and K. D. Koper (2015), High-resolution probing of inner core structure with seismic interferometry, *Geophys. Res. Lett.*, 42, 10622-10630, doi:10.1002/2015GL066390.
56. He, X., S. Ni, L. Ye, T. Lay, Q. Liu, and K. D. Koper (2015), Rapid seismological quantification of source parameters of the 25 April 2015 Nepal



- earthquake, *Seism. Res. Lett.*, 86, 1568-1577, doi:10.1075/0220150131.
55. Chambers, D. J. A., K. D. Koper, K. L. Pankow, and M. K. McCarter (2015), Detecting and characterizing coal mine related seismicity in the Western U.S. using subspace methods, *Geophys. J. Inter.*, 203, 1388-1399.
54. Gal, M., A. M. Reading, S. P. Ellingsen, L. Gualtieri, K. D. Koper, R. Burlacu, H. Tkalčić, and M. A. Hemer (2015), The frequency dependence and locations of short period microseisms generated in the Southern Ocean and west Pacific, *J. Geophys. Res. Solid Earth*, 120, 5764-5781, doi:10.1002/2015JB012210.
53. Pyle, M. L., K. D. Koper, G. G. Euler, and R. Burlacu (2015), Location of high-frequency P-wave microseismic noise in the Pacific Ocean using multiple small aperture arrays, *Geophys. Res. Lett.*, 42, 2700-2708, doi:10.1002/2015GL063530.
52. Koper, K. D., and R. Burlacu (2015), The fine structure of double-frequency microseisms recorded by seismometers in North America, *J. Geophys. Res. Solid Earth*, 120, 1677-1691, doi:10.1002/2014JB011820.

—2014 Peer-Reviewed Publications—

51. Sufri, O., K. D. Koper, R. Burlacu, and B. de Foy (2014), Microseisms from Superstorm Sandy, *Earth Planet. Sci. Lett.*, 402, 324-336.
50. Ye, L., T. Lay, K. D. Koper, R. Smalley Jr., L. Rivera, M. G. Bevis, A. F. Zakrajsek, and F. N. Teferle (2014), Complementary slip distributions of the August 4, 2003  $M_w$  7.6 and November 17, 2013  $M_w$  7.8 South Scotia Ridge earthquakes, *Earth Planet. Sci. Lett.*, 401, 215-226.
49. Gal, M., A. M. Reading, S. P. Ellingsen, K. D. Koper, S. J. Gibbons, and S. P. Näsholm (2014), Improved implementation of the fk and Capon methods for array analysis of seismic noise, *Geophys. J. Inter.*, 198, 1045-1054.
48. Kubacki, T., K. D. Koper, K. L. Pankow, and M. K. McCarter (2014), Changes in mining induced seismicity before and after the 2007 Crandall Canyon mine collapse, *J. Geophys. Res. Solid Earth*, 119, 4876-4889, doi:10.1002/2014JB011037.
47. Reading, A. M., K. D. Koper, M. Gal, L. S. Graham, H. Tkalčić, and M. A. Hemer (2014), Dominant seismic noise sources in the Southern Ocean and West Pacific, 2000–2012, recorded at the Warramunga Seismic Array, Australia, *Geophys. Res. Lett.*, 41, 3455-3463, doi:10.1002/2014GL060073.
46. Pankow, K. L., J. R. Moore, J. M. Hale, K. D. Koper, T. M. Kubacki, K. M. Whidden, and M. K. McCarter (2014), Massive landslide at Utah copper mine generates wealth of geophysical data, *GSA Today*, 24, 4-9, doi:10.1130/GSATG191A.1.

—2013 Peer-Reviewed Publications—

45. Yue, H., T. Lay, J. T. Freymueller, K. Ding, L. Rivera, N. A. Ruppert, and K.

- D. Koper (2013), Supershear rupture of the 5 January 2013 Craig, Alaska ( $M_w$  7.5) earthquake, *J. Geophys. Res.*, *118*, 5903-5919, doi:10.1002/2013JB010594.
44. Ye, L., T. Lay, H. Kanamori, and K. D. Koper (2013), Energy release of the 2013  $M_w$  8.3 Sea of Okhotsk earthquake and deep slab stress heterogeneity, *Science*, *341*, 1380-1384.
43. Thomas, G., K. D. Koper, R. Burlacu, and D. Drobeck (2013), A model of ambient seismic noise recorded by the Utah regional network of strong-motion seismometers, *Seism. Res. Lett.*, *84*, 759-771, doi:10.1785/0220130026.
42. Koper, K. D., and C. J. Ammon (2013), Planning a global array of broadband seismic arrays, *EOS Trans., AGU*, *94*, p. 300.
41. Lay, T., L. Ye, H. Kanamori, Y. Yamazaki, K. F. Cheung, K. Kwong, and K. D. Koper (2013), The October 28, 2012  $M_w$  7.8 Haida Gwaii underthrusting earthquake and tsunami: Slip partitioning along the Queen Charlotte Fault transpressional plate boundary, *Earth Planet. Sci. Lett.*, *375*, 57-70.

—2012 Peer-Reviewed Publications—

40. Yue, H., T. Lay, and K. D. Koper (2012), En echelon and orthogonal fault ruptures of the 11 April 2012 great intraplate earthquakes, *Nature*, *490*, 245-249.
39. Lay, T., H. Kanamori, C. J. Ammon, K. D. Koper, A. R. Hutko, L. Ye, H. Yue, and T. M. Rushing (2012), Depth-varying rupture properties of subduction zone megathrust faults, *J. Geophys. Res.*, *117*, B04311, doi:10.1029/2011JB009133.
38. Sufri, O., K. D. Koper, and T. Lay (2012), Along-dip seismic radiation segmentation during the 2007  $M_w$  8.0 Pisco, Peru earthquake, *Geophys. Res. Lett.*, *39*, L08311, doi:10.1029/2012GL051316.
37. Koper, K. D., A. R. Hutko, T. Lay, and O. Sufri (2012), Imaging short-period seismic radiation from the 27 February 2010 Chile ( $M_w$  8.8) earthquake by back-projection of P, PP, and PKIKP waves, *J. Geophys. Res.*, *117*, B02308, doi:10.1029/2011JB008576.

—2011 Peer-Reviewed Publications—

36. Koper, K. D., A. R. Hutko, T. Lay, C. J. Ammon, and H. Kanamori (2011), Frequency-dependent rupture process of the 2011  $M_w$  9.0 Tohoku earthquake: Comparison of short-period P wave backprojection images and broadband seismic rupture models, *Earth Planets Space*, *63*, 599-602.
35. Koper, K. D., A. R. Hutko, and T. Lay (2011), Along-dip variation of teleseismic short-period radiation from the 11 March 2011 Tohoku earthquake ( $M_w$  9.0), *Geophys. Res. Lett.*, *38*, L21309, doi:10.1029/2011GL049689.

—2010 Peer-Reviewed Publications—

34. Koper K. D., and V. L. Hawley (2010), Frequency dependent polarization analysis of ambient seismic noise recorded at a broadband seismometer in the Central United States, *Earthquake Science*, 23, 439-447.
33. Xu, Y., R. B. Herrmann, and K. D. Koper (2010), Source parameters of regional small-to-moderate earthquakes in the Yunnan-Sichuan region of China, *Bull. Seism. Soc. Am.*, 100, 2518-2531.
32. Lay T., C. J. Ammon, H. Kanamori H., L. Rivera, K. D. Koper, and A. R. Hutko (2010), The 2009 Samoa-Tonga great earthquake triggered doublet, *Nature*, 466, 964-968.
31. Lay, T., C. J. Ammon, H. Kanamori, K. D. Koper, O. Sufri, and A. R. Hutko (2010), Teleseismic inversion for rupture process of the 27 February 2010 Chile ( $M_w$  8.8) earthquake, *Geophys. Res. Lett.*, 37, L13301, doi:10.1029/2010GL043379.
30. Koper, K. D., K. Seats, and H. M. Benz (2010), On the composition of Earth's short period seismic noise field, *Bull. Seism. Soc. Am.*, 100, 606-617.
29. D'Amico, S., K. D. Koper, R. B. Herrmann, A. Akinci, and L. Malagnini (2010), Imaging the rupture of the  $M_w$  6.3 April 6, 2009 L'Aquila, Italy earthquake using back-projection of teleseismic P-waves, *Geophys. Res. Lett.*, 37, L03301, doi:10.1029/2009GL042156.

—2009 Peer-Reviewed Publications—

28. Koper, K. D., B. de Foy, and H. M. Benz (2009), Composition and variation of noise recorded at the Yellowknife seismic array, 1991-2007, *J. Geophys. Res.*, 114, B10310, doi:10.1029/2009JB006307.
27. Xu, Y., and K. D. Koper (2009), Detection of a ULVZ at the base of the mantle beneath the Northwest Pacific, *Geophys. Res. Lett.*, 36, L17301, doi:10.1029/2009GL039387.
26. Koper, K. D., and A. Fatehi (2009), Array analysis of regional distance P-coda in south Asia, *Bull. Seism. Soc. Am.*, 99, 2509-2522.
25. Xu, Y., K. D. Koper, O. Sufri, L. Zhu, and A. R. Hutko (2009), Rupture imaging of the  $M_w$  7.9 12 May 2008 Wenchuan earthquake from back projection of teleseismic P waves, *Geochem. Geophys. Geosyst.*, 10, Q04006, doi:10.1029/2008GC002335.

—2008 Peer-Reviewed Publications—

24. Koper, K. D., R. B. Herrmann, and H. M. Benz (2008), Overview of open seismic data from the North Korea event of 9 October 2006, *Seism. Res. Lett.*, 79, 178-185.
23. Zou, Z., K. D. Koper, and V. F. Cormier (2008), The structure of the base of the outer core inferred from seismic waves diffracted around the inner core, *J.*

- Geophys. Res.*, 113, B05314, doi:10.1029/2007JB005316.
22. Peng, Z., K. D. Koper, J. E. Vidale, F. Leyton, and P. Shearer (2008), Inner-core fine-scale structure from scattered waves recorded by LASA, *J. Geophys. Res.*, 113, B0931, doi:10.1029/2007JB005412.
  21. Koper, K. D., and B. de Foy (2008), Seasonal anisotropy in short-period seismic noise recorded in South Asia, *Bull. Seism. Soc. Am.*, 98, 3033-3045.

—2007 Peer-Reviewed Publications—

20. Zou, Z., F. Leyton, and K. D. Koper (2007), Partial melt in the lowermost mantle near the base of a plume, *Geophys. J. Int.*, 168, 809-817.
19. Leyton, F., and K. D. Koper (2007), Using PKiKP coda to determine inner core structure: 1. Synthesis of coda envelopes using single-scattering theories, *J. Geophys. Res.*, 112, B05316, doi:10.1029/2006JB004369.
18. Leyton, F., and K. D. Koper (2007), Using PKiKP coda to determine inner core structure: 2. Determination of  $Q_c$ , *J. Geophys. Res.*, 112, B05317, doi:10.1029/2006JB004370.
17. Flanagan, M., S. C. Myers, and K. D. Koper (2007), Regional traveltime uncertainty and seismic location improvement using a three-dimensional a priori velocity model, *Bull. Seism. Soc. Am.*, 97, 804-825.

—2005 Peer-Reviewed Publications—

16. Koper, K. D., and M. Dombrovskaya (2005), Seismic properties of the inner core boundary from PKiKP/P amplitude ratios, *Earth Planet. Sci. Lett.*, 237, 680-694.
15. Leyton, F., K. D. Koper, L. Zhu, and M. Dombrovskaya (2005), On the lack of seismic discontinuities in the inner core, *Geophys. J. Inter.*, 162, 779-786.

—2004 Peer-Reviewed Publications—

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  135. Stein, J. R., K. L. Pankow, D. Chambers, Discriminating seismic sources (mining-induced seismicity, fluid injection induced seismicity, and tectonic earthquakes) in Central Utah, USA, Annual Meeting of the Seismological Society of America, Reno, NV, April 20-22, 2016.

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134. Huang, H.-S., F.-C. Lin, V. Tsai, and K. Koper, Probing high-resolution inner core structure using earthquake coda interferometry with USArray, Fall Meeting of the American Geophysical Union, San Francisco, CA, December 14-18, 2015.
133. Koper, K. D., J. M. Hale, R. Burlacu, K. Goddard, A. Trow, L. Linville, J. Stein, D. Drobeck, and M. Leidig, Dense seismic recordings of two surface-detonated chemical explosions, Fall Meeting of the American Geophysical Union, San Francisco, CA, December 14-18, 2015.
132. Liu, Q., K. Koper, R. Burlacu, S. Ni, and F. Wang, Location of body wave microseism sources using three-component data from a large aperture seismic array in China, Fall Meeting of the American Geophysical Union, San Francisco, CA, December 14-18, 2015.
131. Reading, A., M. Gal, K. Koper, and H. Tkalcic, Improved detection and location of ocean microseism signals using array techniques, Fall Meeting of the American Geophysical Union, San Francisco, CA, December 14-18, 2015.
130. Chambers, D. J. A., M. K. McCarter, K. D. Koper, K. L. Pankow, Application of regional subspace detection to identify mining induced seismicity, 34th International Conference on Ground Control in Mining, Morgantown, WV, July 28-30, 2015.
129. Stein, J. R., K. L. Pankow, K. D. Koper, M. K. McCarter, Discriminating mining induced seismicity from natural tectonic earthquakes in the Wasatch Plateau region of Central Utah, 34th International Conference on Ground Control in Mining, Morgantown, WV, July 28-30, 2015.
128. Pankow, K. L., J. R. Stein, D. Chambers, and K. D. Koper, Discriminating seismic sources (mining-induced seismicity, fluid injection induced seismicity, and tectonic earthquakes) in Central Utah, USA, 26th International Union of Geology and Geophysics General Assembly, Prague, Czech Republic, June 22 - July 2, 2015.
127. Koper, K. D., and R. Burlacu, Location of P-wave microseism sources via back-projection of large aperture seismic array data, 26th International Union

of Geology and Geophysics General Assembly, Prague, Czech Republic, June 22 - July 2, 2015.

126. Batchelor, C., K. D. Koper, and K. L. Pankow, Characterization of seismic swarms in Utah, Seismological Society of America Annual Meeting, Pasadena, CA, April 21-23, 2015.

—2014 Meeting Abstracts —

125. Gal, M., A. Reading, S. Ellingsen, K. Koper, H. Tkalcic, and M. Hemer, Frequency dependence of short period seismic noise from two decades of observations at Warramunga Seismic Array (WRA), Australia, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
124. Goddard, K., K. D. Koper, and R. Burlacu, Microseisms from the Great Salt Lake, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
123. Koper, K. D, and R. Burlacu, Splitting of the double-frequency microseismic peak at land-based seismometers in North America, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
122. Reading, A., M. Gal, M. Hemer, K. Koper, and H. Tkalcic, Seismic noise observations from multiple arrays in the southern hemisphere: Challenges and opportunities, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
121. Reading, A., M. Gal, P. Morse, K. Koper, M. Hemer, N. Rawlinson, M. Salmon, M. de Kool, and B. Kennett, Tracking paths of ocean source ambient seismic noise into, and through, the 3D Earth, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
120. Stein, J., K. Pankow, K. Koper, and M. McCarter, Discriminating mining induced seismicity from natural tectonic earthquakes in the Wasatch Plateau region of Central Utah, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
119. Stickney, M., K. Pankow, K. Koper, and K. Whidden, The 2014 Challis, Idaho earthquake swarm, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
118. Whidden K., K. Hansen, M. Timothy, M. Boltz, K. Pankow, and K. Koper, Natural reservoirs and triggered seismicity: a study of two northern Utah Lakes, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2014.
117. Pankow, K. L., T. Kubacki, K. D. Koper, K. Whidden, J. R. Moore, and M. K. McCarter, Induced earthquakes from the 2013 Bingham Canyon landslides, annual GSA meeting, Vancouver, Canada, October, 2014.
116. Pechmann, J. C., K. D. Koper, R. B. Herrmann, K. M. Whidden, H. M. Benz, K. L. Pankow, F. Lin, and D. S. Chapman, An M4.8 earthquake in the upper

- mantle beneath the Wind River Range, Wyoming, Seismological Society of America Annual Meeting, Anchorage, AK, April 2014.
115. Sufri, O., K. D. Koper, and R. Burlacu, A microseism catalog based on broadband data from the US Transportable Array, Seismological Society of America Annual Meeting, Anchorage, AK, April 2014.
114. Ye, L., T. Lay, K. D. Koper, R. Smalley, M. G. Bevis, A. F. Zakrajsek, and F. N. Teferle, Rupture process of the November 17, 2013  $M_w$  7.8 Scotia Sea earthquake, Seismological Society of America Annual Meeting, Anchorage, AK, April 2014.

—2013 Meeting Abstracts—

113. Kwong, K. B., K. D. Koper, H. Yue, and T. Lay, Reconciling short-period and broadband source models of the  $M_w$  8.7 Indian Ocean Earthquake of 11 April 2012, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
112. Pankow, K. L., S. R. Ford, T. Kubacki, K. M. Whidden, J. R. Moore, and M. K. McCarter, Bingham Canyon Landslide: Force history analysis and identification of induced earthquakes, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
111. Sun, J., H. Yue, R. Burgman, T. Lay, and K. Koper, Rupture process of the 24 Sept 2013,  $M_w = 7.7$  Pakistan earthquake from joint inversion of dense near-field geodesy and teleseismic datasets, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
110. Whittaker, S., M. S. Thorne, K. D. Koper, and N. C. Schmerr, Broadband array observations of the D" discontinuity, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
109. Ye, L., T. Lay, H. Kanamori, and K. D. Koper, Energy Release of the 2013  $M_w$  8.3 Sea of Okhotsk earthquake and deep slab stress heterogeneity, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
108. Yue, H., T. Lay, J. T. Freymueller, K. Ding, L. A. Rivera, N. A. Ruppert, and K. D. Koper, Supershear Rupture of 2013 Jan 5,  $M_w$  7.5, Craig, Alaska earthquake, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
115. Bahavar, M., A. R. Hutko, C. M. Trabant, K. D. Koper, R. E. Anthony, and R. C. Aster, The New IRIS DMC noise toolkit, Fall Meeting of the American Geophysical Union, San Francisco, CA, December, 2013.
107. Sufri, O., and K. D. Koper, Microseisms from superstorm Sandy recorded in North America by the transportable array, IUGG Joint Assembly, Gothenburg, Sweden, July, 2013.
106. Burlacu, R., K. D. Koper, and S. J. Arrowsmith, Sampling the noise field



- recorded at the USArray TA infrasound stations, CTBT Science and Technology Conference, Vienna, June, 2013.
105. Boltz, M. S., T. M. Kubacki, D. J. A. Chambers, K. M. Whidden, K. L. Pankow, K. D. Koper, and M. K. McCarter, Analysis of mining-induced seismicity at Central Utah coal mines, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.111. Kwong, K. B., and K. D. Koper, Tracking the short period energy release of the 28 October 2012  $M_w$  7.7 Haida Gwaii earthquake, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  104. Gammans, C. N. L., K. L. Pankow, J. C. Pechmann, K. M. Whidden, and K. D. Koper, Analysis of aftershocks from the 3 January 2011  $M_w$  4.5 Tushar Mountains (Utah) earthquake, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  103. Lay, T., L. Ye, H. Kanamori, Y. Yamazaki, K. F. Cheung, K. D. Koper, and K. D. Kwong, The October 28, 2012  $M_w$  7.8 Haida Gwaii underthrusting earthquake and tsunami: Slip partitioning along the Queen Charlotte Fault transpressional plate boundary, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  102. Sufri, O., and K. D. Koper, Microseisms from Superstorm Sandy, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  101. Thomas, G. L., K. D. Koper, R. Burlacu, and D. Drobeck, A Model of Ambient seismic noise recorded by the Utah regional network of strong-motion seismometers, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  100. Wong, Y., K. D. Koper, and V. Burlacu, Survey of broadband seismic noise recorded at permanent stations of the Utah Regional Seismic Network, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.
  99. Yue, H., T. Lay, K. Koper, and E. Hill, En echelon and conjugate fault ruptures of the 11 April 2012 great Indo-Australia intraplate earthquakes, Seismological Society of America Annual Meeting, Salt Lake City, UT, April, 2013.

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98. Koper, K. D., T. M. Kubacki, M. K. McCarter, and K. L. Pankow, Waveform correlation based detection of aftershocks of the 6 August 2007 4.1  $M_w$  Crandall Canyon Mine Collapse in Central Utah, AGU Fall Meeting, San Francisco, CA, Dec. 3-7, 2012.
97. Kwong, K. B., K. D. Koper, H. Yue, and T. Lay, High resolution teleseismic P-wave back-projection imaging using variable travel time corrections:

- Characterizing sub-Events of the great April 11th 2012 Indian Ocean Intraplate earthquakes, AGU Fall Meeting, San Francisco, CA, Dec. 3-7, 2012.
96. Reading, A. M., L. Graham, K. D. Koper, M. A. Hemer, and H. Tkalcic, Seismic noise sources and storm severity in the Southern Ocean, Insights from the Warramunga Array (WRA), Northern Territory, Australia, AGU Fall Meeting, San Francisco, CA., Dec. 3-7, 2012.
  95. Yue, H., T. Lay, and K. D. Koper, En echelon and orthogonal fault ruptures of the 11 April 2012 great intraplate earthquakes, AGU Fall Meeting, San Francisco, CA, Dec. 3-7, 2012.
  94. Koper, K. D., K. L. Pankow, R. Burlacu, K. W. Whidden, J. C. Pechmann, J. M. Hale, and P. M. Roberson, Capabilities of University of Utah Seismograph Stations for monitoring seismicity in Utah, USGS sponsored *Volcanism in the Southwest* meeting, Flagstaff, AZ, Oct. 18-19, 2012.
  93. Koper, K. D., K. L. Pankow, R. Burlacu, K. W. Whidden, J. C. Pechmann, J. M. Hale, and P. M. Roberson, An overview of Utah seismicity and seismotectonics, annual AEG meeting, Salt Lake City, UT, September, 2012.
  92. Sufri, O., and K. D. Koper, Microseisms from 2009 Hurricane Ida recorded across the Transportable Array, IRIS Workshop, Boise, ID, June 13-15, 2012.

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91. Farrell, J., R. B. Smith, F. Massin, S. Husen, R. Burlacu, K. D. Koper, and D. Drobeck, High precision earthquake source and wave properties of the Yellowstone volcanic-tectonic system using automated seismic waveform analysis, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2011.
90. Lay, T., C. J. Ammon, H. Yue, K. D. Koper, A. R. Hutko, and E. E. Brodsky, Depth-varying rupture properties of subduction zone megathrust faults, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2011.
89. Pyle, M. L., and K. D. Koper, Body wave energy investigations in ambient seismic noise, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2011.
88. Sufri, O., and K. D. Koper, Exploration and visualization of continuous seismic data recorded by the Earthscope Transportable Array in 2009, American Geophysical Union Fall Meeting, San Francisco, CA, Dec. 2011.
87. Burlacu, R., K. L. Pankow, W. J. Arabasz, J. C. Pechmann, K. D. Koper, D. Drobeck, J. Rusho, C. Hatch, P. Roberson, J. M. Hale, and W. Blycker, Utah's Regional/urban ANSS seismic network - integrated multifaceted monitoring, European Geophysical Union General Assembly, Vienna, April 2011.
86. Koper, K. D., Using arrays to characterize and locate sources of short-period seismic noise, European Geophysical Union General Assembly, Vienna, April

2011.

85. Koper, K.D., A. R. Hutko, T. Lay, C. J. Ammon, and H. Kanamori, Frequency-dependent rupture process of the 11 March 2011  $M_w$  9.0 Tohoku-oki earthquake: Comparison of short-period P wave backprojection images and broadband seismic rupture models, European Geophysical Union General Assembly, Vienna, April 2011.
84. Koper, K. D., A. R. Hutko, T. Lay, C. J. Ammon, and H. Kanamori, Comparison of short-period P wave backprojection images and broadband seismic rupture models for the 11 March 2011  $M_w$  9.0 Tohoku-Oki earthquake, Seismological Society of America Annual Meeting, Memphis, TN, April 2011.

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83. Koper, K., and V. Hawley, Frequency dependent polarization analysis of ambient seismic noise recorded at broadband seismometers, Fall AGU Meeting, San Francisco, CA, 2010.
82. Pyle, M. L., and K. Koper, Investigating body wave energy in ambient seismic noise, Fall AGU Meeting, San Francisco, CA, 2010.
81. Sufri, O., K. Koper, A. Hutko, T. Lay, C. J. Ammon, and H. Kanamori, Imaging the rupture of the 27 February 2010 Chile ( $M_w$  8.8) earthquake via backprojection of P, PP, and PKP waves, Fall AGU Meeting, San Francisco, CA, December, 2010.
80. Koper, K. D, K. Seats, and H. M. Benz, On the composition of earth's short-period seismic noise field, SSA Annual Meeting, Portland, Oregon, April, 2010.
79. Hawley, V., and K. D. Koper, Seismic noise polarization at stations in the central United States, SSA Annual Meeting, Portland, Oregon, April, 2010.
78. Hutko, A., T. Lay, and K. D. Koper, Imaging the rupture of the September 2009  $M_8.1$  Samoan outer rise earthquake and a triggered aftershock on the plate interface, SSA Annual Meeting, Portland, Oregon, April, 2010.
77. McNamara, D., and K. D. Koper, Seismic observations of seasonal sea- ice cycles in Alaska, SSA Annual Meeting, Portland, Oregon, April, 2010.
76. Pyle, M. L., and K. D. Koper, Investigating source locations for body wave energy in ambient seismic noise, SSA Annual Meeting, Portland, Oregon, April, 2010.
75. Sufri, O., Y. Xu, and K. D. Koper, Rupture imaging of recent large earthquakes in South America via backprojection of teleseismic P waves, SSA Annual Meeting, Portland, Oregon, April, 2010.

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74. d'Amico, S., K. D. Koper, R. B. Herrmann, A. Akinci, and L. Malagnini, Rupture propagation and damage distribution for the  $M_w$  6.3 April 6, 2009

- L'Aquila earthquake, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
73. Hutko, A. R., T. Lay, and K. D. Koper, Imaging the ruptures of the 2009 Samoan and Sumatran earthquakes using broadband network backprojections: Results and limitations, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
  72. Koper K. D., B. de Foy, and H. Benz, Composition and variation of noise recorded at the Yellowknife seismic array, 1991-2007, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
  71. Pyle M. L., and K. Koper, Investigating source locations for body wave energy in ambient seismic noise, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
  70. Seats, K., K. Koper, and H. Benz, Rapid determination of focal depth using a global network of small-aperture seismic arrays, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
  69. Xu, Y., and K. Koper, On the scattering strength of the lower mantle beneath the Pacific ocean, Fall meeting of the American Geophysical Union, San Francisco, CA, December, 2009.
  68. Koper, K. D., K. Seats, and H. M. Benz, On the composition of Earth's short period seismic noise field, International Scientific Studies, CTBTO, Vienna, Austria, 2009.
  67. Koper, K. D., and Y. Xu, Using IMS seismic arrays to constrain the structure of Earth's deep interior, International Scientific Studies, CTBTO, Vienna, Austria, 2009.
  66. Koper K. D., and H. M. Benz, An analysis of noise recorded at the Yellowknife Seismic Array, Annual meeting of the Seismological Society of America, Monterey, CA, 2009.
  65. Sufri, O., Y. Xu, and K. D. Koper, Imaging the rupture of the M8.0 Pisco Earthquake of 2007 by backprojecting teleseismic P waves, Annual meeting of the Seismological Society of America, Monterey, CA, 2009.
  64. Xu, Y., and K. D. Koper, Chemical heterogeneity in the lower mantle from array observations of short period P and Pdiff coda, Annual meeting of the Seismological Society of America, Monterey, CA, 2009.

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63. d'Amico, S., K. D. Koper, and R. B. Herrmann, Array analysis of short period seismic noise recorded in Central Australia, Annual Meeting of the Seismological Society of America, Santa Fe, NM, April, 2008.
62. Koper, K. D., and B. de Foy, Seasonal anisotropy of short-period seismic noise in South Asia, Annual Meeting of the Seismological Society of America, Santa Fe, NM, April, 2008.

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61. Koper, K. D., P. M. Shearer, Z. Peng, and J. Vidale, Simulations of inner core coda waves with a multiple-scattering phonon based algorithm, Fall AGU Meeting, San Francisco, CA, 2007.
60. Xu, Y., and K. D. Koper, Array observations of short period Pdiff coda waves, Fall AGU Meeting, San Francisco, CA, 2007.
59. Zou, Z., K. D. Koper, and P. M. Shearer, An analysis of small-scale heterogeneity in the mantle with PKP precursors recorded at IMS arrays, Fall AGU Meeting, San Francisco, CA, 2007.
58. Fatehi, A., and K. D. Koper, Modeling P Wave multipathing at regional distances in southeast Asia, Spring SSA Meeting, Kona, Hawaii, 2007.
57. Koper, K. D., R. B. Herrmann, and H. M. Benz, Seismic overview of the North Korean test of 9 October 2006, Spring SSA Meeting, Kona, Hawaii, 2007.

—2006 Meeting Abstracts—

56. Flanagan, M. P., S. C. Myers, and K. D. Koper, Regional travel-time uncertainty and seismic location improvement using a three-dimensional a priori velocity model, Fall AGU Meeting, San Francisco, CA, 2006.
55. Koper, K. D., and F. Leyton, Synthesis of PKiKP coda envelopes using single-scattering theories, Fall AGU Meeting, San Francisco, CA, 2006.
54. Leyton, F., and K. D. Koper, Determination of decay rates for precritical PKiKP codas, Fall AGU Meeting, San Francisco, CA, 2006.
53. Peng, Z., J. E. Vidale, K. D. Koper, and F. Leyton, Fine-scale heterogeneity and differential rotation of the inner core from scattered waves recorded by the LASA, Fall AGU Meeting, San Francisco, CA, 2006.
52. Zou, Z., K. D. Koper, and V. Cormier, Constraints on the velocity gradient at the base of the outer core and inner core Q from PKP<sub>BC</sub> diffracted waves, Fall AGU Meeting, San Francisco, CA, 2006.
51. Flanagan, M. P., S. C. Myers, and K. D. Koper, Regional travel-time uncertainty and seismic location improvement using a 3-dimensional a priori velocity model, IRIS Workshop, Tucson, AZ, 2006.
50. Koper, K. D., and F. Leyton, Decorrelation of coda waves from earthquake doublets recorded at YKA: Inner core super-rotation?, IRIS Workshop, Tucson, AZ, 2006.
49. Peng Z., J. Vidale, F. Leyton, and K. Koper, Investigating fine-scale heterogeneity of the inner-core structure using inner-core scattered waves recorded by LASA, SSA Meeting, San Francisco, CA, 2006.

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48. Koper, K. D., and V. Parker, Slowness anomalies of PKP phases recorded at

- the seismic array in Eielson, Alaska (ILAR), Fall AGU Meeting, San Francisco, CA, 2005.
47. Koper, K. D., and V. Parker, Slowness anomalies of PKP phases recorded in Alaska: Implications for inner core anisotropy, Annual IRIS/UNAVCO Workshop, Stevenson, WA, 2005.
  46. Koper, K. D., The Generic Array Processing (GAP) software package, Annual SSA Meeting, Lake Tahoe, NV, 2005.

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45. Herrmann R. B., C. J. Ammon, and K. D. Koper, GSAC - Generic Seismic Application Computing, Fall AGU Meeting, San Francisco, CA, 2004.
44. Koper, K. D., and M. Dombrovskaya, Seismic evidence for a complicated inner core boundary, Fall AGU Meeting, San Francisco, CA, 2004.
43. Leyton, F., and K. D. Koper, Quantifying inner core scattering from PKiKP coda waves, Fall AGU Meeting, San Francisco, CA, 2004.
42. Zou Z., and K. D. Koper, Structure of the inner core-outer core boundary inferred from PKP<sub>BC</sub> diffracted waves, Fall AGU Meeting, San Francisco, CA, 2004.
41. Zou, Z., and K. D. Koper, Structure of the inner core-outer core boundary inferred from PKP<sub>bc</sub> diffracted waves, Annual IRIS Workshop, Tucson, AZ, 2004.
40. Koper, K. D., Seismic constraints on the change in density across the inner core-outer core boundary, biannual SEDI symposium, Garminsch-Partenkirchen, Germany, 2004.
39. Leyton, F., and K. D. Koper, On the lack of seismic discontinuities in the inner core, biannual SEDI symposium, Garminsch-Partenkirchen, Germany, 2004.

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38. Leyton, F., K. D. Koper, L. Zhu, and M. Dombrovskaya, On the existence of seismic discontinuities in the inner core, Fall AGU Meeting, San Francisco, CA, 2003.
37. Koper, K. D., J. M. Franks, and M. Dombrovskaya, New evidence for inner core scattering from observations of PKiKP coda, Fall AGU Meeting, San Francisco, CA, 2003.
36. Franks, J. M., and K. D. Koper, New evidence for seismic scatterers within Earth's inner core, Annual IRIS Workshop, Yosemite, CA, 2003.
35. Leyton, F., K. D. Koper, and L. Zhu, Exploring the possibility of an inner core transition zone, Annual IRIS Workshop, Yosemite, CA, 2003.

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34. Koper, K. D., T. C. Wallace, and R. C. Aster, A case study in forensic

- seismology: The 1998 natural gas pipeline explosion near Carlsbad, New Mexico, Fall AGU Meeting, San Francisco, CA, 2002.
33. Pyle, M. L., and K. D. Koper, A global study of PKiKP/PcP amplitude ratios, Fall AGU Meeting, San Francisco, CA, 2002.
  32. Robertson-Maurice, S., D. A. Wiens, K. D. Koper, and E. Vera, Crustal and upper mantle structure of southernmost South America inferred from regional waveform inversion, Fall AGU Meeting, San Francisco, CA, 2002.
  31. Wallace, T. C., and K. D. Koper, Forensic analysis of seismic events in the water; submarines, explosions and impacts, Fall AGU Meeting, San Francisco, CA, 2002.
  30. Koper, K. D., M. L. Pyle, and J. M. Franks, Constraints on core structure from small aperture seismic arrays, biannual SEDI Symposium, Lake Tahoe, CA, 2002.
  29. Wallace, T. C., and K. D. Koper, Forensic seismology: constraints on terrorist bombings, Spring AGU Meeting, Washington, DC, 2002.
  28. Koper, K. D., M. L. Pyle, and J. M. Franks, Mining the IMS database for studies of deep Earth structure, Annual SSA Meeting, Victoria, BC, 2002.

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27. Beck, S., G. Zandt, T. Wallace, M. Anderson, R. Fromm, T. Shearer, L. Wagner, K. Koper, P. Alvarado, E. Triep, F. Klinger, M. Araujo, M. Bufaliza, J. Campos, E. Kausel, and J. R. Paredes, CHARGE, the CHile ARgentina Geophysical Experiment: Imaging the south central Andean lithosphere using passive broadband seismology, Fall AGU Meeting, San Francisco, CA, 2001.
26. Erickson, J., K. D. Koper, and G. Zandt, Anisotropic crustal structure inversion using a niching genetic algorithm, Fall AGU Meeting, San Francisco, CA, 2001.
25. Fisher, J. L., D. A. Wiens, and K. D. Koper, Niching genetic algorithm receiver functions analysis: Application to Patagonia and Antarctica, Annual IRIS Workshop, Jackson Hole, WY, 2001.
24. Koper, K. D., Constraints on core structure from PcP-PKiKP differential travel times, Annual IRIS Workshop, Jackson Hole, WY, 2001.
23. Koper, K. D., T. C. Wallace, L. Wagner, R. Aster, A. Sanford, and K.W. Lin, Seismic recordings of the Carlsbad, NM pipeline explosion of 19 August 2000, Annual SSA Meeting, San Francisco, CA, 2001.
22. Paquette, A. M., T. C. Wallace, and K. D. Koper, Underwater explosions and the sinking of the Kursk: An experiment in regional calibration, Annual SSA Meeting, San Francisco, CA, 2001.
21. Wallace, T. C., G. van der Vink, and K. D. Koper, Open seismic data: Does it help or hurt a CTBT, Annual SSA Meeting, San Francisco, CA, 2001.

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20. Koper, K. D., Constraints on core structure from differential (P,S)cP and PKiKP travel times, Fall AGU Meeting, San Francisco, CA, 2000.
19. Miller, A. C., K. D. Koper, and T. C. Wallace, Inner core heterogeneity from differential PKP travel times, Fall AGU Meeting, San Francisco, CA, 2000.
18. Wallace, T. C., K. D. Koper, M. Tinker, S. R. Taylor, and H. Hartse, Seismic analysis of the 12 August 2000 Kursk submarine disaster in the Barents Sea, Fall AGU Meeting, San Francisco, CA, 2000.

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17. Koper, K. D., T. C. Wallace, and R. E. Reinke, Source properties of chemical explosions inferred from regional seismograms, Fall AGU Meeting, San Francisco, CA, 1999.
16. Robertson, S., D. Wiens, K. D. Koper, E. Veras, and P. Shore, Crustal and upper mantle structure of the Austral Andes from regional waveform inversions using a genetic algorithm, Fall AGU Meeting, San Francisco, CA, 1999.
15. Koper, K. D., and T. C. Wallace, Regional wave propagation in Siberia, Seismic Research Review Meeting, Las Vegas, NV, 1999.
14. Koper, K. D., T. C. Wallace, and D. Hollnack, Seismic analysis of the 7 August 1998 truck-bomb blast at the American Embassy in Nairobi, Kenya, Annual IRIS Workshop, Yosemite, CA, 1999.

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13. Koper, K. D., D. A. Wiens, L. Dorman, S. Webb, and J. Hildebrand, Estimates and implications of  $\ln V_s/\ln V_p$  values for the mantle underlying the Lau backarc spreading center, Fall AGU Meeting, San Francisco, CA, 1998.

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12. Wiens, D. A., Y. Xu, E. Roth, K. D. Koper, L. M. Dorman, J. Hildebrand, S. Webb, and D. Zhao, The upper mantle seismic structure of the Lau backarc spreading center, Fall AGU Meeting, San Francisco, 1997.
11. Al-Eqabi, G. I., K. D. Koper, M. E. Wyssession, P. J. Shore, K. M. Fischer, and T. J. Clarke, Lithospheric cross-section across the Northeastern United States, Annual SSA Meeting, Honolulu, HI, 1997.
10. Koper, K. D., and M. E. Wyssession, Optimization on a multimodal landscape with a niching genetic algorithm; a seismological example, Annual SSA Meeting, Honolulu, HI, 1997.

*—1996 Meeting Abstracts—*

9. Al-Eqabi, G. I., K. D. Koper, and M. E. Wyssession, Using a genetic algorithm to investigate the laterally-varying shallow shear-wave velocity structure beneath Maine from surface waves, Fall AGU Meeting, San Francisco, CA,



- 1996.
8. Al-Eqabi, G. I., K. D. Koper, M. E. Wysession, K. M. Fischer, and T. J. Clarke, Inverting regional seismic waveforms for the crust and upper mantle structure beneath the Northeastern United States using a genetic algorithm, Fall AGU Meeting, San Francisco, CA, 1996.
  7. Koper, K. D., D. A. Wiens, D. Zhao, L. Dorman, S. Webb, and J. Hildebrand, Can seismology resolve a metastable olivine wedge in the Tonga subduction zone?, Fall AGU Meeting, San Francisco, CA, 1996.
  6. Xu, Y., D. A. Wiens, K. D. Koper, P. J. Shore, Crust and upper mantle structure of Southwest Pacific from regional waveform inversion and receiver function analysis, Fall AGU Meeting, San Francisco, CA, 1996.
  5. Al-Eqabi, G. I., K. D. Koper, M. E. Wysession, Source spectrum of Nevada Test Site explosions obtained from seismic  $L_g$  waves using genetic algorithm, Annual SSA Meeting, St. Louis, MO, 1996.
  4. Koper, K. D., and M. E. Wysession, Investigating the structure of the core with PKP travel times, Annual SSA Meeting, St. Louis, MO, 1996.

—1995 Meeting Abstracts—

3. Fisher, K. M., M. E. Wysession, T. J. Clarke, M. J. Fouch, G. I. Al-Eqabi, P. J. Shore, R.W. Valenzuela, K. D. Koper, The Missouri to Massachusetts broadband seismometer deployment; collaborative studies of mantle structure, SSA Eastern Section Meeting, Palisades, NY, 1995.
2. Koper, K. D., and M. E. Wysession, Using a genetic algorithm to invert PKP travel time data for core-mantle boundary and inner core boundary structure, IUGG General Assembly, Boulder, CO, 1995.
1. Wysession, M. E., K. D. Koper, R. Valenzuela, and B. Hicks, Using IRIS PASSCAL broadband data to model CMB structure, IUGG General Assembly, Boulder, CO, 1995.

## 2.6 Google Scholar profile

My Google Scholar profile can be accessed at:

<http://scholar.google.com/citations?user=YqHslWQAAAAJ&hl=en>

It provides a freely available measure of scientific impact by automatically tracking citations and keeping a running calculation of the h-index and i10-index.

### **3. Service**

#### **3.1. Professional service**

Member of IRIS board of directors, 2016-present

Member of U.S. Air Force Seismic Review Panel, 2011-present

Vice-Chair of Utah Seismic Safety Commission, 2010-present

Member of EOS editorial board, 2010-present

Member of DOE external review panels on Signal Analysis for LANL, LLNL, and SNL, 2016

Member of NSF Geophysics SCEC5 external review panel, 2016

Member of LLNL external review committee for energy and climate, 2015

Member of NSF IRIS/GSN external review panel, 2015

Co-convener of fall AGU session on microseisms, San Francisco, CA, 2014

Co-convener IRIS special interest group on global arrays, Sunriver, OR, 2014

Co-organizer of IASPEI session on array seismology, Gothenburg, Sweden, 2013

Co-organizer of IRIS workshop on array seismology, Raleigh, NC, 2013

Co-chair of organizing committee for 2013 Annual meeting of Seismological Society of America, 2012-2013

Chair of the Incorporated Research Institutions for Seismology (IRIS) Data Management System Standing Committee (DMSSC), 2008-2011; member of DMSSC 2004-2007, 2012

Chair of Incorporated Research Institutions for Seismology (IRIS) Data Products Working Group (DPWG), 2009-2012

Associate Editor for Bulletin of the Seismological Society of America, 2003-2010

Member of Seismological Society of America (SSA) and American Geophysical Union (AGU)

Peer review of proposals submitted to: the National Science Foundation programs of Geophysics, CSEDI, Earthscope, Instrumentation and Facilities; Incorporated Research Institutions for Seismology; the National Nuclear Security Administration; the United States Geological Survey NEHRP; program; the Australian Research Council. About 5-10 reviews per year.

Peer review of manuscripts submitted to: Bulletin of the Seismological Society of America; Earth and Planetary Science Letters; Earth, Planets, Space; EOS Trans. AGU; Geophysical Journal International; Geophysical Research Letters; International Journal of Coal Geology; Journal of Earth Science; Journal of Geophysical Research; Journal of Seismology; Nature; Nature Communications; Physics of the Earth and Planetary Interiors; Progress in Earth and Planetary Science; Pure and Applied Geophysics; Science; Seismological Research Letters; Soils and Foundations. About 10-15 reviews per year.

### **3.2 University, college, and departmental service**

Member of departmental merit review committee (Utah), 2016  
Member of college RPT committee (Utah), 2016  
Member of departmental lecture series committee (Utah), 2015-2016  
Member of departmental strategic planning committee (Utah), 2014-2015  
Member of geophysics special funds committee (Utah), 2014-2016  
Member of departmental space committee (Utah), 2013-2014  
Member of departmental graduate affairs committee (Utah), 2011-2014  
Chair of departmental ad-hoc RPT committee (Utah), 2013, 2015  
Chair of search committee for tectonophysicist (Utah), 2011  
Member of search committee for exploration seismologist (Utah), 2010-2011  
Member of ad-hoc faculty RPT committee (Utah), 2010, 2015  
Director of geoscience graduate programs (SLU), 2007-2009  
Member of university research committee (SLU), 2002-2006  
Departmental rep. for geoscience E&O (SLU), 2001-2005  
Member of search committee for departmental chair (SLU), 2003-2004  
Member of search committee for geology faculty member (SLU), 2004  
Member of Ph.D. thesis committee (Beshara Sholy, 2002, SLU; Mohammed Fnais, 2004, SLU; Hongyi Li, 2005, SLU; Ali Fatehi, 2006, SLU; Sara Pozgay, 2007, WashU; Risheng Chu, 2008, SLU; Hongfeng Yang, 2010, SLU; Sebastiano d'Amico, 2010, SLU; Hongzhu Cai, 2015, Utah; Yao Yao, 2016, Utah)  
Member of M.S. thesis committee (Rachel Huson, 2002, SLU; Julia Kurpan, 2007, SLU; Kevin Jensen, 2013, Utah; Mark Hale, 2013, Utah; Yao Yao, 2013, Utah; Lisa Linville, 2014, Utah; Stefanie Whittaker, 2014, Utah; Alison Starr, 2015, Utah; Jared Stein, 2015, Utah)  
Member of M.S.S.S.T committee (Mindy Timothy, 2014; Kristel Hansen, 2014)  
Peer review of internal University Utah seed grant proposals (2 in 2014)

### **3.3. Community service and outreach**

Phone interview with Geoff Smith of Utah Public Radio on induced seismicity (12/19/2016)  
Phone interview with Eva Botkin-Kowacki of *Christian Science Monitor* on seismic events in North Korea (12/16/2016)  
Interview with reported from Science News about discovery of telseismic S waves in microseisms (8/24/2016)  
TV interview with KSL News about earthquake recent earthquakes (5/25/2016)  
Radio interview with KSL News (Salt Lake City) about earthquake preparedness (4/17/2015)

Phone interview with reporter from Deseret News about earthquake safety in Utah (4/8/2015)

Presentation at monthly preparedness workshop of Salt Lake City Office of Emergency Management (11/8/2014)

Phone interview with reporter from Sanpete Messenger about M4.2 Mt. Pleasant, UT earthquake (7/1/2014)

Presentation to the Herriman, Utah community response group on seismic hazard and preparedness (5/14/2014)

Radio interview with Roger McDonough of KCPW Public Radio in SLC about earthquakes and earthquake preparedness (4/21/2014)

Local TV interview with KSL regarding the M3.2 Tooele earthquake (4/20/2014)

In-studio TV interview with local Fox13 channel regarding the M3.2 Tooele earthquake (4/20/2014)

Interview with student reporter from UU Chronicle on earthquake preparedness (4/17/2014)

Interview with Laura Zuckerman for story about the Challis, Idaho sequence of earthquakes (4/14/2014)

Interview with 6th grade Lego League team at The McGillis School, SLC, Utah (11/15/2013)

Interview with local TV (KSL) about microseisms from hurricane Sandy (4/18/2013)

Phone interview with Nayantara Narayanan from ClimateWire about microseisms from Hurricane Sandy (4/17/2013)

Phone interview about Hurricane Sandy seismic observations with Becky Oskin, science writer for OurAmazingPlanet (4/15/2013)

Phone interview with SLtrib reported Brian Maffly about annual SSA meeting in SLC (4/15/2013)

Phone interview with KSL reporter and seismic observations of Hurricane Sandy (4/12/2013)

Local TV (KSL) interview regarding verdict in Italian seismology trial (10/24/12)

Interview on local radio (KSL) about Indian Ocean earthquakes (9/28/12)

Radio interview on BBC about Indian Ocean earthquakes (9/27/12)

Telephone interview about Indian Ocean earthquakes with AAAS reporter (9/24/12)

Invited talk to Utah Society of Professional Engineers (5/12/12)

Interview with local radio (KUER) during Shakeout exercises (4/12/12)

Interview with local TV (KSL) about seismic hazard in Utah (4/11/12)

Tour of UUSS to visiting boy scouts (4/10/12)

Talk to the Univ. Utah student health service about earthquake preparedness (10/29/11)

Radio interview for local station (KSL) about manslaughter trial of Italian

seismologists (10/22/11)

TV interview with local station (KSL) about manslaughter trial of Italian seismologists (10/21/11)

Radio interview with Neil Cavuto of FoxNews on the M5.8 Virginia earthquake (8/23/11)

Three radio interviews with KSL (morning, afternoon, evening), a television interview with local station ABC4, and a phone interview with Salt Lake Tribune reporter regarding the great M 8.9 Japan earthquake (3/11/11)

Interview with Daily Utah Chronicle about the Lehi earthquake sequence (2/14/11)

Phone interview with KUTV regarding the Lehi earthquake sequence (2/13/11)

Host of Science Movie Night at the downtown SLC library, sponsored by the Utah Museum of Natural History (2/9/11)

Phone interview with reported from the Daily Utah Chronicle of the USSC report (1/24/11)

TV interview with local Fox affiliate concerning a report issued by USSC on school safety with respect to seismic hazard (1/21/11)

Presentation about the Tushar mountains earthquake sequence to the Utah Seismic Safety Commission quarterly (1/20/11)

Presentation to the Sugarhouse Neighborhood Council about earthquake hazards and preparation (12/1/10)

Interview with Daily Utah Chronicle concerning the 2009 Samoa-Tonga earthquakes (8/20/10)

Interview with NY Times reporter concerning the 2009 Samoa-Tonga earthquakes (8/19/10)

Interview with Radio Australia concerning the 2009 Samoa-Tonga earthquakes (8/18/10)

Lecture to visiting group of high school students from Science Center, July 17, 2009

Lectures to about 40 visitors on a USGS field trip, May 28, 2009

TV Interview with local CBS channel 4 about New Madrid fault zone, April 20, 2009

Lecture to visiting members of Junior Academy of Science, July 31, 2008

Radio interview with 550 AM in St. Louis about aftershock of Illinois earthquake, April 21, 2008

Earthquake lecture to visitors and students affiliated with the Saint Louis Science Center March 26, 2008

Earthquake lecture to visiting group of cub scouts, Nov. 1, 2007

Phone interview with Julie Barrat of KWMU about a mine collapse in Utah that was recorded seismically, Aug. 8, 2007

Phone interview with Jennifer Yauck of Geotimes about forensic seismology and

North Korea nuclear test, Jan. 8, 2007  
 Presenter at Normandy Middle School Science Night, Nov. 16, 2006  
 Phone interview with Tiffany Bommarito of KSDK news regarding the recent Ryuku Islands earthquake, Nov. 15, 2006  
 Phone interview with Larr O'Hanlan of Discovery Channel regarding the North Korea nuclear test, Oct. 12, 2006  
 Phone interview with Ben Schaub of Discovery Canada regarding the North Korea nuclear test, Oct. 10, 2006  
 Interview with St. Louis AP reported Cheryl Whitnower about seismic hazard in the St. Louis region, Sept. 14, 2005  
 Interview with River City Times of Peoria, Il., Sept. 13, 2005  
 Radio interview about recent California seismicity with Jen Kerner from Metro Networks, June 17, 2005  
 Lecture about the great Sumatra earthquake to students visiting SLU from Roosevelt High School, April 1, 2005  
 Three lectures about the great Sumatra earthquake to 6-8th graders at St. Francis of Assisi School, March 10, 2005  
 Earthquake lecture to visiting 4th graders from Mary Queen of Peace, Jan. 6, 2005  
 Interviews with three local TV stations (2,4,5) about the great earthquake and tsunami in the Indian Ocean, Dec. 27, 2004  
 Earth science exhibitor for Science Olympiad at Incarnate Word Middle School, April 20, 2004  
 Plate tectonics lecture to visiting 4-6th graders, March 10, 2004  
 Plate tectonics lecture to 6-8th graders at Sperring Middle School, Feb. 26, 2004  
 Plate tectonics lecture to 5-8th graders at Marion Middle School, Jan. 6, 2004.  
 Interview by Saint Louis Post Dispatch for feature story on forensic seismology, Nov. 10, 2003  
 Lecture to 4th graders during outreach event, Nov. 4, 2003  
 Local TV (KMOV) interview about a regional earthquake, June 6, 2003  
 Local radio (550 AM) interview about forensic seismology, May 30, 2003  
 Lecture to 7th graders at Lasalle Springs Middle School, May 7, 2003  
 Interview with local TV (Channel 4) concerning Alabama earthquake, April 29, 2003  
 Seismology booth exhibitor for science night at Christ Prince of Peace School, Feb. 13, 2003  
 Lecture to grades 3-6 at a program for gifted students at Normandy High School, Oct. 17, 2002  
 Lecture at K-6 teachers workshop, June 13, 2002  
 Lecture to visiting middle schoolers, March 27, 2002  
 Seismology booth exhibitor at the Incarnate Word elementary school Science Olympiad, Feb. 28, 2002

Lecture at University Missouri St. Louis (UMSL), broadcast live to rural K-12 educators, Feb. 5, 2002

Lecture and tour to visiting 7th graders, Jan. 14, 2002

#### **4. Administration**

I have been director of the University of Utah Seismograph Stations (UUSS) since July 2010. UUSS is a distinct organizational unit within the Department of Geology and Geophysics that focuses on research, education, and public service related to earthquakes and seismic monitoring. We have 12 full-time employees, an average of 12 part-time employees, and an annual budget of approximately \$2,000,000. I am responsible for overall leadership, management, and stewardship of UUSS. Electronic versions of UUSS annual reports for 2012-2015 are available from the UUSS web page:

[http://www.quake.utah.edu/wp-content/uploads/uuss\\_ar2012.pdf](http://www.quake.utah.edu/wp-content/uploads/uuss_ar2012.pdf)

[http://www.quake.utah.edu/wp-content/uploads/uuss\\_ar2013.pdf](http://www.quake.utah.edu/wp-content/uploads/uuss_ar2013.pdf)

[http://www.quake.utah.edu/wp-content/uploads/uuss\\_ar2014.pdf](http://www.quake.utah.edu/wp-content/uploads/uuss_ar2014.pdf)

[http://www.quake.utah.edu/wp-content/uploads/uuss\\_ar2015.pdf](http://www.quake.utah.edu/wp-content/uploads/uuss_ar2015.pdf)