

CONTACT INFORMATION

New Mexico Institute of Mining and Technology
Department of Earth and Environmental Science
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POSITION

Assistant Professor of Geophysics, 2014–present

INTERESTS

Active tectonic and volcanic deformation processes, high-rate and real-time GNSS applications, non-traditional GNSS signals, signal processing & time series analysis, inverse methods, software engineering

EDUCATION

- 09/2007 – 07/2012 Ph.D. Geophysics, University of Alaska Fairbanks (UAF), USA
Dissertation: “Volcano Deformation and Subdaily GPS Products”
- 10/1999 – 08/2007 M.Sc. Computer Science, Humboldt-Universität zu Berlin, Germany
Thesis: “CRUSDE: A plug-in based simulation framework for composable CRUSTal Deformation simulations using Green’s functions”

PRACTICAL EXPERIENCE

- 08/2012 – 08/2014 *Postdoctoral Employee, Berkeley Seismological Laboratory, UC Berkeley, USA*
Implementation of GPS integrated earthquake early warning (Python, Shell)
Volcano deformation studies in Alaska, Iceland
- 09/2007 – 07/2012 *Research Assistant, Geophysical Institute and Alaska Volcano Observatory, University of Alaska Fairbanks, USA*
Volcano deformation studies in Alaska, Kamchatka and Iceland; volcano monitoring; development of computer programs for data analysis (Matlab, Shell, Perl)
- 03/2006 – 09/2006 *Visiting Student, Nordic Volcanological Center, Iceland*
Forecast elastic crustal response to the Hálslón water reservoir, investigation of seasonal cycles in continuous GPS time series in Iceland (Matlab, C).
- 06/2003 – 07/2007 *Developer/Programmer, Zuse Institute Berlin, Germany*
Redesign of a platform independent museum database system (C/C++, Qt)
- 09/2001 – 12/2002 *Programmer, DaimlerChrysler Research/Technology, Germany*
Multi-Agent-System to analyze supply net relations in the automotive industry (Java)
- 05/2001 – 05/2002 *Developer/Programmer, Skilldeal AG, Germany*
Web application design and development to manage company and employee profiles and administer outsourcing tasks (PHP, MySQL).
- until 2007 *Freelance Programmer, Germany*
Development of several commercial and private websites or webbased projects.

ACADEMIC HONORS AND AWARDS

Student Publication Award 2013, Geophysical Institute, UAF (for [Redoubt paper](#))
Outstanding Student Performance Award 2011, Geophysical Institute, UAF
Geophysical Society of Alaska, Scholarship Award 2010
Alaska Geological Society, Scholarship Award 2010
Best Diploma Thesis in Applied Computer Science: CS Dept. Humboldt Univ. Berlin, 2008
AGU Outstanding Student Paper Award: Geodesy Section, Fall Meeting, 2006.
Erasmus Exchange Programme grant: Háskóli Íslands, Reykjavík, Iceland, 2005.

TEACHING EXPERIENCE (NMT)

Volcanology (ERTH 456 & GEOL 556) (Fall 2016)

Volcanic systems from storage to plume and deposits combined with monitoring and analysis techniques.

The Earth's Crust (ERTH 203) (Spring 2016)

Basic structural geology and dynamic processes for earth science majors and petroleum engineers.

Geodetic Methods (ERTH 471 & GEOP 572) (Fall 2015)

Theory and application of modern geodetic tools to measure Earth's surface deformation with emphasis on GPS and InSAR. Data processing from raw data to kinematic products. Evaluation of signals and modeling of their sources.

Geophysical Inverse Methods (GEOP 529) (Spring 2015, 2017)

Theory and practice of various techniques of inverting geophysical data to obtain model parameters. Emphasis is on the understanding and use of linear inverse techniques.

Earth Science Practicum (ERTH 205) (Spring 2015)

Instruction and practice in computational methods used to solve Earth science problems. Simple ways to describe physical processes mathematically, then approximate them numerically. Introduction to spreadsheets, Matlab, graphics programs. Review of math and statistics.

Geophysics Journal Club (GEOP 572) (every semester)

Discussion of recent papers of significant relevance to the field or current geologic events.

TEACHING EXPERIENCE (UAF)

Beyond the Mouse – Programming Skills for Geoscientists (GEOS 692) (Fall 2009, 2010, 2011)

I created a new 2 credit course (2009: 1 credit) together with faculty supervisor Jeff Freymueller aimed at geoscience students with little or no programming experience. General introduction to programming and fundamental concepts, Matlab, Shell Scripting, Unix Tools, Generic Mapping Tools, HTML/CSS.

International Volcanological Fieldschool – Lectures on Volcano Deformation (Summer 2009)

Lectures on volcano deformation focusing on data acquisition and source modeling. Aimed at undergraduate and graduate students of volcanology and related fields.

FIELDWORK

2016	Antarctica, Erebus	campaign GPS
2014	Antarctica, Erebus	campaign GPS
2014	Iceland	continuous GPS installations
2014-now	New Mexico	campaign GPS (SMB, Valles planned), cont. GPS maintenance
2011	Katmai, Alaska	GPS campaign, International Volcanological Field School
2009-2012	Alaska	Differential GPS campaigns in coastal towns

2009	Kamchatka, Russia	Field school at Mutnovsky and Gorely volcanoes
2008-2010	Kamchatka, Russia	GPS work for volcano deformation (Bezymianny, Karymsky 2008)
2008	Iceland	field assistant, examination of the Skerin ridge, Eyafjallajökull
2007-2012	Alaska	GPS campaigns
2006	Iceland	field assistant, GPS campaigns: Highlands and Skeiðarárjökull

COMPUTER SKILLS

Languages: C/C++, Java, PHP, SQL, Matlab, Unix Shell Scripting, Python, Perl, UML, XML, L^AT_EX, Javascript, HTML/CSS, Prolog
Operating Systems: Unix/Linux, Windows.
Miscellaneous: version control, Qt-Framework, various libraries (fftw3, gsl, . . .), Generic Mapping Tools

LANGUAGES

German (first language), English (fluent), Russian (basics), Icelandic (few basics)

POPULAR RECOGNITION

March 11, 2011 Tohoku-oki Earthquake Response

- > 80,000 YouTube views of animations of Japan's continuous GPS data showing the evolution of permanent and dynamic displacements generated by the earthquake
- > 37,000 unique visitors of my response website: http://www.grapenthin.org/notes/2011_03_11-tohoku-oki/
- > 5,000 views of invited presentation on slideshare.net:
<http://www.slideshare.net/rgrapenthin/visualization-of-the-seismic-waves-and-permanent-displacements>
- Animations featured in National Geographic video: "Rare Video: Japan Tsunami"
<http://video.nationalgeographic.com/video/player/news/environment-news/japan-tsunami-2011-vin.html>
- Figure showing dynamic features of the event reproduced in Global – The International Briefing, Issue 6, second quarter 2011
- Paper (see Publication 4) covered by OurAmazingPlanet and syndicated outlets: <http://www.ouramazingplanet.com/1960-3d-japan-quake-animation.html>

Kamchatka PIRE Project

- Project was featured in one episode of the 4 part documentary "The Pacific Ring of Fire" for French/German TV station ARTE

Other Research News Coverage

- Paper 11 *The 2014 Mw 6.0 Napa earthquake, California: Observations from real-time GPS-enhanced earthquake early warning* was Science Editor's Choice (Science, Vol. 346, Issue 6214, page 1197) and covered by KQED Science.
- Paper 9 *Volcanic plume height correlated with magma pressure change at Grímsvötn volcano, Iceland* gained significant traction and was covered by Nature News, phys.org, Ars Technica, Live Science and others

PUBLICATIONS

Under Review / Submitted

1. **Grapenthin, R.**, M. West, and J. T. Freymueller, The Utility of GNSS for Earthquake Early Warning in Regions with Sparse Seismic Networks, *under review at BSSA*.

We argue for the inclusion of GNSS-based S-wave detections into EEW trigger pools in regions with sparse seismic networks and distributed assets that require protection. We use the example of the 2016 M_w 7.1 Iniskin earthquake and derive a relationship between earthquake depth and distance to help determine whether GNSS S-wave observations could expedite warnings to specific locations.

2. **Grapenthin, R.** and S. Hreinsdóttir, Tephra, Water, Hail: The Volcanic Plumes of the 2011 Grímsvötn eruption, Iceland, as seen by GNSS, *submitted to GRL*.

We analyze high-rate GPS data from the 2011 Grímvötn eruption for plume signatures in signal-to-noise ratio and phase residuals. We find evidence for changes of water from vapor to ice in the high altitude sectors of the plume, which ended up falling out as tephra-rich hail.

3. **Grapenthin, R.**, M. West, C. Tape, J. T. Freymueller, Instantaneous GNSS velocities capture earthquakes and basin effects.

We use single frequency high-rate GNSS phase observations to determine receiver velocities and thus create a potential real-time velocity-meter with unlimited dynamic range. We demonstrate that this method can reliably resolve ground motions of a few mm/s and apply this to the 2016 M_w 7.1 Iniskin earthquake where we resolve S-waves and fundamental frequencies in Cook Inlet.

In Preparation (to be submitted end of 2016 / early 2017)

1. Folsom, M, S. Kelley, **R. Grapenthin**, and M. Person, Surface Rebound and Groundwater Temperature Fluctuations at a Municipal Wellfield during an Episode of Aquifer Recovery. *in prep. for Water Resources Research*
Geodesy class project combined with LANL SAGE data shows aquifer recharge in northern New Mexico after well management changed. Main recharge source is Rio Grande; thus highlights aquifer dynamics.
2. **Grapenthin, R.**, The 2015 M_w 7.8 Gorkha and M_w 7.3 Kodari earthquakes, Nepal, as seen by instantaneous GNSS velocities. *in prep. for GRL*
Demonstration that integration of instantaneous GNSS velocities produces reasonable co-seismic offset estimates (real-time application; ± 5 cm). Basin oscillations & amplification in Kathmandu & Khumjung. Requires publication of *in review #3* before submission.
3. **Grapenthin, R.**, A. Komjathy, R. Bürgmann, Precursor or No? Review of Earthquake Precursors seen with GNSS in the Ionosphere, *in prep. for SRL*
Comprehensive review of literature claiming and contesting pre-earthquake ionospheric anomalies recorded by GNSS to pull a solid line of arguments against such pre-cursors into the solid earth literature.
4. **Grapenthin, R.**, Dike Injections with a Twist: Analog Modeling of Magma Chamber Formation and Dike Propagation, *in prep. for Journal of Geoscience Education*.
Expansion of http://www.grapenthin.org/notes/2016_09_08_gelatin_dike/ post detailing a captivating experiment on dike intrusions, dynamics, and deformation for class demonstrations or lab exercises.

Peer-reviewed

11. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, 2014. The 2014 M_w 6.0 Napa earthquake, California: Observations from real-time GPS-enhanced earthquake early warning, *Geophys. Res. Lett.*, published online, [doi:10.1002/2014GL061923](https://doi.org/10.1002/2014GL061923), Science Editor's Choice: Science, Vol. 346, Issue 6214, page 1197.
10. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, 2014. Operational real-time GPS-enhanced earthquake early warning. *J. Geophys. Res.* , 119(10), 7944-7965, [doi:10.1002/2014JB011400](https://doi.org/10.1002/2014JB011400)
9. Hreinsdóttir, S., F. Sigmundsson, M. Roberts, H. Björnsson, **R. Grapenthin**, P. Arason, Th. Árnadóttir, J. Hólmjárn, H. Geirsson, R.A. Bennett, M.T. Gudmundsson, B. Oddsson, B.G. Ófeigsson, T. Villemin, T. Jónsson, E. Sturkell, Á. Höskuldsson, G. Larsen, T. Thordarson, B.A. Óladóttir, 2014. Volcanic plume height correlated with magma pressure change at Grímsvötn volcano, Iceland, *Nature Geoscience*, [doi:10.1038/ngeo2044](https://doi.org/10.1038/ngeo2044) (News & Views on this: [doi:10.1038/ngeo2064](https://doi.org/10.1038/ngeo2064), Nature News coverage: [doi:10.1038/nature.2014.14498](https://doi.org/10.1038/nature.2014.14498))
8. **Grapenthin, R.**, 2014. CRUSDE: A plug-in based simulation framework for composable CRUSTAL DEformation simulations, *Computers & Geosciences*, 62, 168-177, [doi:10.1016/j.cageo.2013.07.005](https://doi.org/10.1016/j.cageo.2013.07.005)
7. **Grapenthin, R.**, J. T. Freymueller, S. S. Serovetnikov, 2013. Surface Deformation of Bezymianny Volcano, Kamchatka, Recorded by GPS: The Eruptions from 2005-2010 and Long-term, Long-wavelength Subsidence, *JVGR*, 263, 58-74, [doi:10.1016/j.jvolgeores.2012.11.012](https://doi.org/10.1016/j.jvolgeores.2012.11.012)

6. **Grapenthin, R.**, J. T. Freymueller, A. M. Kaufman, 2013. Geodetic Observations during the 2009 eruption of Redoubt Volcano, Alaska, *JVGR*, 259, 115-132, doi:10.1016/j.jvolgeores.2012.04.021
5. **Grapenthin, R.**, 2011. Computer Programming for Geosciences: Teach Your Students How to Make Tools, *EOS*, Vol. 92, Issue 50, pp. 469–470, doi:10.1029/2011E0500010
4. **Grapenthin, R.** and J. T. Freymueller, 2011. The dynamics of a seismic wave field: Animation and analysis of kinematic GPS data recorded during the 2011 Tohoku-oki earthquake, Japan, *Geophys. Res. Lett.*, 38, L18308, doi:10.1029/2011GL048405 – **GRL Editors' Highlight**
3. Ófeigsson, B.G., A. Hooper, F. Sigmundsson, E. Sturkell, and **R. Grapenthin**, 2011. Deep magma storage at Hekla volcano, Iceland, revealed by InSAR time series analysis, *J. Geophys. Res.*, 116, B05401, doi:10.1029/2010JB007576
2. **Grapenthin, R.**, B. G. Ófeigsson, F. Sigmundsson, E. Sturkell, and A. Hooper, 2010. Pressure sources versus surface loads: Analyzing volcano deformation signal composition with an application to Hekla volcano, Iceland, *Geophys. Res. Lett.*, 37, L20310, doi:10.1029/2010GL044590
1. **Grapenthin, R.**, F. Sigmundsson, H. Geirsson, Th. Árnadóttir, V. Pínel, 2006. Icelandic rhythms: Annual modulation of land elevation and plate spreading by snow load, *Geophys. Res. Lett.*, 33, L24305, doi:10.1029/2006GL028081

Significant Reports & White Papers

3. **Grapenthin, R.**, T. Fischer, Rick Aster, Jessica Larsen, Craig Cary, and Nelia Dunbar, 2016. A Vision for a Facility Supporting Antarctic Volcano Studies, submitted to NSF & Mount Erebus Research Community.
2. 3 contributions to *The Benefits of Enhanced Earthquake Monitoring and Potential Earthquake Early Warning in Alaska – A Stakeholder Survey*, 2016. Developed by the Alaska Seismic Hazards Safety Commission for the Office of Alaska Governor Bill Walker; http://seismic.alaska.gov/presentations_reports.php
1. **Grapenthin, R.**, and F. Sigmundsson, 2006. Green's Functions and Crustal Deformation - Manual and Examples - Institute of Earth Sciences, University of Iceland, Nordic Volcanological Center, Report 0602, 30 pp.

INVITED PRESENTATIONS

- 03/2016 Department of Earth and Planetary Science, University of New Mexico, Department Seminar
- 03/2016 ShakeAlert Research Meeting, Caltech, California, USA.
- 11/2015 Earthquake Early Warning in Subduction Zones, UC Berkeley, California, USA.
- 06/2015 EarthScope National Meeting, Stowe, Vermont, USA.
- 04/2015 School of Earth Sci. and Env. Sustainability, Northern Arizona University, Department Seminar
- 03/2014 Department of Terrestrial Magnetism, Carnegie Institution Washington, Department Seminar
- 03/2014 Department of Terrestrial Magnetism, Carnegie Institution Washington, Department Seminar
- 02/2014 South Dakota School of Mines and Technology, Department Seminar
- 01/2014 New Mexico Tech, Department Seminar
- 10/2013 Cornell University, Department Seminar and Active Tectonics lecture
- 04/2013 University of Oregon, Geology Seminar
- 03/2013 University of Alaska, Seismology Brown Bag Seminar
- 01/2013 Central Washington University, Geology Seminar
- 12/2012 Northern California GPS User Group Meeting
- 07/2012 USGS, Earthquake Science Center Seminar, Menlo Park, CA ([video](#))
- 05/2012 University of Iceland, Nordvulk Seminar, Reykjavik, Iceland
- 05/2012 Humboldt-University, METRIK Seminar, Berlin, Germany
- 03/2012 UC Berkeley, Seismological Laboratory Seminar, Berkeley, CA
- 05/2011 Real-time GPS for Seismology and other Applications Workshop, Austin, TX.

CONFERENCE PRESENTATIONS

* – presented for first author ° – invited

2016–. . .

69. C. Ruhl, **R. Grapenthin**, D. Melgar, M. Aranha, R.M. Allen, *West-Coast Wide Expansion and Testing of the Geodetic Alarm System (G-larmS)*, AGU Fall Meeting, 12-16. Dec 2016, San Francisco, CA, USA.
68. J. Freymueller, J. Elliott, **R. Grapenthin**, *GPS/GNSS for Earthquake, Tsunami and Volcano Hazards: Examples of Assessments, Response, and Real-time Monitoring in Alaska*, AGU Fall Meeting, 12-16. Dec 2016, San Francisco, CA, USA.
67. Murray, J.R., B. Crowell, **R. Grapenthin**, K. Hodgkinson, T. Melbourne, D. Melgar, S. Minson, D. Schmidt, *Toward incorporation of real-time GNSS data in the West Coast Earthquake Early Warning system*, 11th Joint Meeting U.S.-Japan Natural Resources Panel on Earthquake Research, 16-18. November 2016, Napa, CA, USA.
66. A.J. Luhmann, S.L. Bilek, R.S. Diniakos, E.A. Morton, A. Rinehart, E.C. Alexander, Jr., S.C. Alexander, M. Larsen, J.A. Green, **R. Grapenthin**, G.A. Spinelli, *Delineating karst conduit location using geophysical signals generated during recharge events*, GSA Annual Meeting, 25-28. September 2016, Denver, CO, USA.
65. C. Ruhl, D. Melgar, **R. Grapenthin** M. Aranha, R.M. Allen, *Fakequakes: Earthquake Rupture Scenarios for California and Cascadia*, SCEC Annual Meeting, 11-14 September 2016, Palm Springs, USA.
- 64.° Melgar, D., R. M. Allen, S. Barrientos, **R. Grapenthin**, M. Aranha, *Local Tsunami Warnings and the role of high-rate GNSS in Earthquake Early Warning*, Japan Geoscience Union Annual Meeting 2016, 22-26th May 2016.
63. **Grapenthin, R.**, M. Aranha, D. Melgar, R.M. Allen, *Rapid Finite Faults with Real-Time GPS: The Geodetic Alarm System*, SSA Annual Meeting, 20-22. April 2016, Reno, NV, USA.
62. **Grapenthin, R.**, J.T. Freymueller, *The 2016 M_w 7.1 Iniskin, Alaska, Earthquake as seen by High-rate GPS and Early Warning Potential*, SSA Annual Meeting, 20-22. April 2016, Reno, NV, USA.
61. **Grapenthin, R.**, S. Hreinsdóttir, *GPS phase-residual and SNR analysis of the 2010 Eyjafjallajökull and 2011 Grímsvötn ash plumes*, UNAVCO Science Workshop, 29-31. March 2016, Broomfield, CO, USA.
- 60.° **Grapenthin, R.**, M. Aranha, D. Melgar, R. M. Allen, *G-larmS: Overview and Updates*, ShakeAlert Research Meeting, 14-15th March 2016.

2011–2015

59. **Grapenthin, R.**, S. Hreinsdóttir, M. T. Gudmundsson, *The 2010 Eyjafjallajökull and 2011 Grímsvötn ash plumes as seen by GPS*, AGU Fall Meeting, 14-18. December 2015, San Francisco, USA, #G32A-03 (talk).
- 58.* Aranha, M., **R. Grapenthin**, D. Melgar, R.M. Allen, *Investigations on Real-time GPS for Earthquake Early Warning*, AGU Fall Meeting, 14-18. December 2015, San Francisco, USA, #S33B-2763 (poster).
57. Ófeigsson, B. and 19 others, *Deformation derived from GPS geodesy associated with Bárðarbunga 2014 rifting event in Iceland*, AGU Fall Meeting, 14-18. December 2015, San Francisco, USA, #T51G-2998 (poster).
56. Frídríksdóttir, H. and 20 others, *Real-time GPS Monitoring of the 2014-2015 Bárðarbunga Rifting Event in Iceland*, AGU Fall Meeting, 14-18. December 2015, San Francisco, USA, #G41A-1005 (poster).
- 55.° **R. Grapenthin**, I. A. Johanson, and R. M. Allen *Operational Real-time GPS in Earthquake Early Warning*, EarthScope National Meeting, 14-17 June 2015, Stowe, Vermont, USA (talk).
54. Hellweg, M., R.M. Allen, I. Henson, I. Johanson, D. Neuhauser, **R. Grapenthin**, *ElarmS & GlarmS, UC Berkeley's Earthquake Early Warning Algorithms in CISN ShakeAlert*, SSA Annual Meeting, 21-23. April 2015, Pasadena, USA.

53. Hellweg, M., R.M. Allen, I. Henson, I. Johanson, D. Neuhauser, **R. Grapenthin**, *Earthquake Early Performance in the M 6.0 South Napa earthquake: UCB's algorithms ElarmS and GlarmS*, SSA Annual Meeting, 21-23. April 2015, Pasadena, USA.
52. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, *G-larmS: An Infrastructure for Geodetic Earthquake Early Warning, applied to Northern California*, AGU Fall Meeting, San Francisco, Abstract: S32C-06 (talk).
51. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, *The 2014 Mw 6.0 Napa Earthquake, California: Observations from Real-time GPS-enhanced Earthquake Early Warning*, AGU Fall Meeting, San Francisco, Abstract: S33F-4938 (poster).
50. Sigmundsson, F., S. Hreinsdottir, A. Hooper, **Ronni Grapenthin**, E. Heimisson, B. Ofeigsson, E. Sturkell, M. Roberts, M. T. Gudmundsson, A. Hoskuldsson, H. Bjornsson, P. Arason, M. Parks, S. Dumont, and V. Drouin, *Magma flow, eruption column and magma pressure change during 2010 Eyjafjallajökull and 2011 Grimsvötn eruptions, Iceland: Constraints from volcano geodesy on physical models of eruptive processes*, AGU Fall Meeting, San Francisco, Abstract: V34B-02 (talk).
49. Hudnut, K. W., S. Minson, M. Boese, C. Felizardo, I. Johanson, **R. Grapenthin**, B. Crowell, D. Schmidt, J. Murray, M. Lisowski, J. Langbein, D. Smith, D. Determan, V. Thomas, T. Melbourne, *The West Coast Earthquake Early Warning Global Navigation Satellite System Working Group*, AGU Fall Meeting, San Francisco, Abstract: S32C-03 (talk).
48. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, *Operational Real-time GPS-enhanced Earthquake Early Warning*, 3rd International Conference on Earthquake Early Warning, Berkeley, California (talk).
47. **Grapenthin, R.**, I.A. Johanson, R.M. Allen, *Real-time GPS enhanced Earthquake Early Warning: The Northern California Setup*, The Future of PBO in the GAGE Facility (2013-2018) and After EarthScope Community Workshop, Breckenridge, Colorado (poster).
46. Allen, R., **R. Grapenthin**, L. Meng, et al., *Designing a network-based earthquake early warning system for California* AGU Fall Meeting, 2013, talk.
45. **Grapenthin, R.**, I. Johanson, R. Allen, *G-larmS: Integrating Real-Time GPS into Earthquake Early Warning* AGU Fall Meeting, 2013, poster.
- 44.° Werner, C., M.P. Poland, J.A. Power, A.J. Sutton, T. Elias, **Grapenthin, R.**, W.A. Thelen, *Detecting deep crustal magma movement: Exploring linkages between increased gas emission, deep seismicity, and deformation* AGU Fall Meeting, 2013, talk.
43. **Grapenthin, R.**, J.T. Freymueller, A.M. Kaufman, *The 2009 Redoubt Eruption Observed with GPS: Aseismic Inflation, Mid-crustal Remobilization and Net-Deflation*, GeoPrisms Aleutian Mini-Workshop, 2013, poster.
42. **Grapenthin, R.**, I. Johanson, R. Allen, *Integrating Real-Time GPS into Earthquake Early Warning for Northern California*, EarthScope National Meeting, Raleigh, NC, 2013, poster.
41. Hellweg, M., R.M. Allen, S. Colombelli, **R. Grapenthin**, I. Henson, I. Johanson, H.S. Kuyuk, D. Neuhauser, *Operating and Improving Earthquake Early Warning for Northern California and the US West Coast*, Seismological Society of America Annual Meeting, Salt Lake City, UT, 2013, talk.
40. Johanson, I., D. Dreger, **R. Grapenthin**, P. Lombard, *Rapid Fault Determination from Real-Time GPS for ShakeMap*, Seismological Society of America Annual Meeting, Salt Lake City, UT, 2013, poster.
39. **Grapenthin, R.**, I. Johanson, R. Allen, *Integrating Real-Time GPS into Earthquake Early Warning for Northern California*, Seismological Society of America Annual Meeting, Salt Lake City, UT, 2013, talk.
- 38.° **Grapenthin, R.** *Volcano Deformation and Subdaily GPS Products*, University of Oregon, 2013, talk.
- 37.° **Grapenthin, R.**, I. Johanson, R. Allen, *Integrating Real-Time GPS into California's Earthquake Early Warning System*, University of Alaska, Geophysical Institute, 2013, talk.
- 36.° **Grapenthin, R.** *GPS – A Multi-Tool: Plumbing, Plumes, and Early Warning* Central Washington University, 2013, talk.
35. **Grapenthin, R.**, J.T. Freymueller, *Volcanic plumes monitored with GPS: The eruptions of Okmok 2008, and Redoubt 2009, Alaska*, presented at 2012 Fall Meeting (NH14A-04), AGU, San Francisco, Calif., 03-07 Dec, talk.

- 34.° **Grapenthin, R.** Towards Real-time GPS in Earthquake Early Warning and Applications for Volcano Monitoring Northern California GPS User Group Meeting, 2012, talk.
- 33.° **Grapenthin, R.** Volcano Deformation and Subdaily GPS Products, Earthquake Science Center Seminar, USGS, 2012, talk.
- 32.° **Grapenthin, R.**, J.T. Freymueller, A.M. Kaufman, S.S. Serovetnikov, Sources and Plumes: GPS Observations at Redoubt Volcano, Alaska and Bezymianny Volcano, Kamchatka, Nordvulk Seminar, University of Iceland, 2012, talk.
- 31.° **Grapenthin, R.**, Earth-ComputerScience-Interface, METRIK Seminar, Humboldt-University, Berlin, Germany, 2012, talk.
30. **Grapenthin, R.**, J.T. Freymueller, S.S. Serovetnikov, Geodetic observations at Bezymianny Volcano, Kamchatka: The eruptions from 2005-2010 and long-term, long-wavelength subsidence as seen by the PIRE GPS network, EGU2012-384, 2012, EGU General Assembly 2012, talk.
- 29.* Hreinsdóttir, S., F. Sigmundsson, M. Roberts, Th. Árnadóttir, B. Ófeigsson, **R. Grapenthin**, E. Sturkell, T. Villemin, R. Bennett, and H. Geirsson, The 2010 Eyjafjallajökull and 2011 Grímsvötn eruptions: Insights from GPS geodesy, EGU2012-13577, EGU General Assembly 2012, talk.
- 28.° **Grapenthin, R.**, Volcano Geodesy on Gliding Timescales: Sources, Plumes, and Precursors, BSL Seminar, UC Berkeley, 2012, talk.
27. **Grapenthin, R.**, J.T. Freymueller, GPS and Volcanic Ash Plumes: The eruptions of Okmok 2008 and Redoubt 2009, Alaska, presented at 2012 UNAVCO Science Workshop, Boulder, Colorado., 27 Feb.- 01 Mar, poster.
26. **Grapenthin, R.**, J.T. Freymueller, A.M. Kaufman, Plumbing and Plumes: Geodetic Observations during the 2009 eruption of Redoubt Volcano, Alaska, presented at 2011 Fall Meeting (V32A-06), AGU, San Francisco, Calif., 04-09 Dec, talk.
- 25.* Hreinsdottir, S., **R. Grapenthin**, F. Sigmundsson, M.J. Roberts, J. Holmjarn, H. Geirsson, Th. Árnadóttir, R.A. Bennett, T. Villemin, B.G. Ófeigsson, E.C. Sturkell, The 2011 Grímsvötn Eruption From High Rate Geodesy, presented at 2011 Fall Meeting (V34B-02), AGU, San Francisco, Calif., 04-09 Dec, talk.
24. Sigmundsson, F., S. Hreinsdottir, H. Bjornsson, Th. Arason, **R. Grapenthin**, M.J. Roberts, J. Holmjarn, H. Geirsson, Th. Árnadóttir, R.A. Bennett, B. Oddsson, M.T. Gudmundsson, B.G. Ófeigsson, T. Villemin, E.C. Sturkell, Grímsvötn 2011 Explosive Eruption, Iceland: Relation between Magma Chamber Pressure Drop inferred from High Rate Geodesy and Plume Strength from Radar Observations From High Rate Geodesy, presented at 2011 Fall Meeting (V41E-08), AGU, San Francisco, Calif., 04-09 Dec, talk.
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