

# Ronni Grapenthin

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## CONTACT INFORMATION

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## POSITION

Postdoctoral Employee, GPS and Earthquake Early Warning, 2012–present

## INTERESTS

High-rate and real time GPS applications, crustal deformation processes, software engineering

## EDUCATION

- 09/2007 – 08/2012 Ph.D. Geophysics, University of Alaska Fairbanks (UAF), USA  
*Dissertation:* “Volcano Deformation and Subdaily GPS Products”  
*Advisor:* Prof. Dr. Jeffrey Freymueller
- 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”  
*Advisors:* Prof. Dr. Joachim Fischer, Humboldt-Universität zu Berlin, Germany  
Prof. Dr. Freysteinn Sigmundsson, University of Iceland

## ACADEMIC HONORS AND AWARDS

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 (UAF)

### Instructor

*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. It is aimed at geoscience students with little or no programming experience. Contents: General introduction to programming and fundamental concepts, Matlab, Shell Scripting, Unix Tools, Generic Mapping Tools, HTML/CSS. Responsibilities: curriculum and lecture development, teaching lectures (7–9 of 14); development, oversight, grading of labs and homework, class project mentoring.

*International Volcanological Fieldschool – Lectures on Volcano Deformation* (Summer 2009)  
Two talks as invited lecturer on volcano deformation focusing on data acquisition and (forward) modeling. Aimed at undergraduate and graduate students of volcanology and related fields.

*Beyond the Mouse – A Short Course on Programming* (Spring 2009)  
Series of 6 seminars preceded GEOS 692 described above. Responsibilities: course organization, curriculum development, 2 seminars, course materials. All 5 presenters donated their spare time.

## Teaching Assistant

Responsibilities: short lab introductions, student mentoring, grading of labs and short essays  
Spring 2009, Fall 2010: Glaciers, Volcanoes, Earthquakes (GEOS 120, included 2 substitute lectures)  
Fall 2009: Introduction to Geology (GEOS 101)

## PRACTICAL EXPERIENCE

- 09/2007 – 07/2012 *Research Assistant, Geophysical Institute/Alaska Volcano Observatory, University of Alaska Fairbanks, USA*  
Volcano deformation studies in Alaska, Kamchatka and Iceland; development of computer programs for data analysis and volcano monitoring
- 03/2006 – 09/2006 *Visiting Student, Nordic Volcanological Center, Iceland*  
Forecast elastic crustal response to the Hálsón water reservoir, investigate seasonal cycles in continuous GPS time series in Iceland.
- 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.

## FIELDWORK

- |           |                   |   |
|-----------|-------------------|---|
| 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<sup>A</sup>T<sub>E</sub>X, Javascript, HTML/CSS, Prolog
- Operating Systems: Unix/Linux, Windows.
- Miscellaneous: 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

- > 60,000 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.gps.alaska.edu/ronni/sendai2011.html>
- > 2,500 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

#### PUBLICATIONS

##### Peer-reviewed

6. **Grapenthin, R.**, J. T. Freymueller, A. M. Kaufman, 2012. Geodetic Observations during the 2009 eruption of Redoubt Volcano, Alaska, *JVGR*, <http://dx.doi.org/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, <http://dx.doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1029/2010GL044590)
1. **Grapenthin, R.**, F. Sigmundsson, H. Geirsson, Th. Árnadóttir, V. Pinel, 2006. Icelandic rhythms: Annual modulation of land elevation and plate spreading by snow load, *Geophys. Res. Lett.*, 33, L24305, [doi:10.1029/2006GL028081](https://doi.org/10.1029/2006GL028081)

##### Submitted

7. **Grapenthin, R.**, J. T. Freymueller, S. S. Serovetnikov, Surface Deformation of Bezymianny Volcano, Kamchatka, Recorded by GPS: The Eruptions from 2005-2010 and Long-term, Long-wavelength Subsidence, *submitted to JVGR*.

##### In Preparation

8. Hreinsdóttir, S., F. Sigmundsson, M. Roberts, H. Björnsson, **R. Grapenthin**, Th. Arason, Th. Árnadóttir, J. Hólmjárn, H. Geirsson, R. Bennett, B. Oddsson, M. T. Gudmundsson, B. G. Ófeigsson, T. Villemin, E. Sturkell, High Rate Geodesy Magma Chamber Meter and Evolution of the Grímsvötn 2011 Eruption.
9. **Grapenthin, R.**, and J. T. Freymueller, Volcanic plumes monitored with GPS: The eruptions of Okmok 2008, and Redoubt 2009, Alaska.
10. **Grapenthin, R.**, CrusDe: A plug-in based simulation framework for composable CRUSTal Deformation simulations.

#### INVITED PRESENTATIONS

- 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

PRESENTATIONS

\* – presented for first author    ° – invited

2011–2015

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. \* Hreinsdóttir, 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. Hreinsdóttir, 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.
23. Lopez, T.M., J. Dehn, A. Belousov, D. Fee, H. Buurman, **R. Grapenthin**, S. Ushakov, Use of High Temporal Resolution Thermal Imagery of Karymsky’s Volcanic Plume to Constrain Volcanic Activity and Elucidate Vent Processes, presented at 2011 Fall Meeting (V33A-2618), AGU, San Francisco, Calif., 04-09 Dec, poster.
22. Buurman, H., M.E. West, **R. Grapenthin**, Tracking a closing volcanic system using repeating earthquakes, presented at 2011 Fall Meeting (V53C-2634), AGU, San Francisco, Calif., 04-09 Dec, poster.
21. **Grapenthin, R.**, J.T. Freymueller, S.S. Serovetnikov, Surface deformation of Bezymianny Volcano, Kamchatka, recorded by GPS: The Eruptions from 2005–2010 and long-term, long-wavelength subsidence, 2011 JKASP Meeting, Petropavlovsk-Kamchatskii, Russia, August 25–30, talk.
20. Fernandes, R.M.S., J.T. Freymueller, M.S. Bos, **R. Grapenthin**, Evaluating the uncertainties of the estimated vertical velocities of Bezymianny GPS Network, 2011 JKASP Meeting, Petropavlovsk-Kamchatskii, Russia, August 25–30, talk.

- 19.° **Grapenthin, R.** and J.T. Freymueller, Tracking Earthquakes in 4D: The 2011 Tohoku-oki Event, Japan, Real-time GPS for Seismology and other Applications Workshop, 2011 EarthScope National Meeting, Austin, Texas, May 17-20, talk.
18. **Grapenthin, R.** and J.T. Freymueller, Capturing a seismic wave field: Animation of kinematic GPS data recorded during the 2011 Tohoku-oki Earthquake, Japan, presented at 2011 EarthScope National Meeting, Austin, Texas, May 17-20, poster

2006–2010

17. **Grapenthin, R.**, J.T. Freymueller, S.S. Serovetnikov, The December 2009 and May 2010 eruptions of Bezymianny volcano, Kamchatka: Interpretation of the GPS Record, Abstract V33D-04, presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec, talk
16. Arendt, A., J.T. Freymueller, S.B. Luthke, **R. Grapenthin**, Modeling Elastic Uplift Associated with GRACE Hydrology Solutions for Southeast Alaska, Abstract G51C-0693, presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec, poster
15. **Grapenthin, R.**, J.T. Freymueller, P.F. Cervelli, Analysis of the geodetic record of the 2009 eruption of Redoubt Volcano, Alaska, Geophysical Research Abstracts, Vol. 12, EGU2010-12560, 2010, EGU General Assembly 2010, poster
13. **Grapenthin, R.**, F. Sigmundsson, B.G. Ófeigsson, E. Sturkell, Surface loading affects internal pressure source characteristics derived from volcano deformation signals, Geophysical Research Abstracts, Vol. 12, EGU2010-12520, 2010, EGU General Assembly 2010, poster
12. Freymueller, J.T., **R. Grapenthin**, A.A. Arendt, S. Miura, T. Sato, Y. Ohta, Seasonal Height Variations in Alaska Caused by Cryospheric and Hydrospheric Change, IAG 2009, Buenos Aires, 2009, talk
11. **Grapenthin, R.**, J.T. Freymueller, V. Bakhtiarov, S. Serovetnikov, A Point in a Vulcanian Eruption: Decomposing the Continuous GPS Record of the 2008 Karymsky Eruption using Wavelets, JKASP 2009, Fairbanks, 2009, poster
10. Shipman, J.S., T.M. Kayzar, **R. Grapenthin**, O.V. Kuvikas, T.M. Lopez, O.K. Neill, W.A. Thelen, Partners in International Research and Education: Student Contributions to the Collaborative Investigation of Bezymianny, Shiveluch, and Karymsky Volcanoes, Kamchatka, Russia and Mount St. Helens, WA, USA, Eos Trans. AGU, 89(52), Fall Meet. Suppl., Abstract V43A-2147, 2008, poster
9. **Grapenthin, R.**, CrusDe: A plug-in based simulation framework for composable CRUSTal DEformation simulations, Eos Trans. AGU, 89(52), Fall Meet. Suppl., Abstract IN11A-1017, 2008, poster
8. **Grapenthin, R.**, F. Sigmundsson, E. Sturkell, B. Ófeigsson, Pressure sources vs. surface loads: Analyzing deformation signal composition at volcanoes – a case study at Hekla volcano, Iceland, IAVCEI 2008 General Assembly, 17-22 August 2008, Reykjavik, Iceland, talk
7. **Grapenthin, R.**, F. Sigmundsson, R. Pedersen, V. Pinel, Surface Loading Effects Complicate the Derivation of Internal Pressure Source Characteristics from Volcano Deformation Signals, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract V53C-1421, 2007, poster
6. Ófeigsson, B., P. Einarsson, F. Sigmundsson, E. Sturkell, H. Ólafsson, **R. Grapenthin**, H. Geirsson, Crustal response to the formation of the Háslón reservoir in Iceland, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T13A-0495, 2007, poster
5. **Grapenthin, R.**, F. Sigmundsson, H. Geirsson, Th. Árnadóttir, V. Pinel, Icelandic rhythmic: Annual modulation of land elevation and plate spreading by snow load, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract G33B-0055, 2006, poster – **AGU Geodesy Section Outstanding Student Paper Award**
4. Ófeigsson, B., P. Einarsson, F. Sigmundsson, E. Sturkell, H. Ólafsson, **R. Grapenthin**, H. Geirsson, Expected Crustal Movements due to the Planned Háslón Reservoir in Iceland, Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract T13A-0495, 2006, poster
3. **Grapenthin, R.**, F. Sigmundsson, H. Geirsson, T. Árnadóttir, V. Pinel, Iceland's annual snow load revised: a plain model, *Nordic Volcanological Center, Fall Seminar Series*, 2006, talk
2. **Grapenthin, R.** and F. Sigmundsson, Crustal subsidence due to the Háslón reservoir: predicting the Earth's response, *Geoscience Society of Iceland, Spring Meeting 2006*, Abstract Volume, p. 36, 2006, poster

1. Sigmundsson, F., P. Einarsson, E. Sturkell, B. Ófeigsson, **R. Grapenthin**, H. Geirsson, S. Jakobsdóttir, P. Halldórsson, Geologic hazards in the Kárahnjúkar area and their monitoring: Will the Háslón reservoir trigger deformation, fault slip and fracture opening? *Geoscience Society of Iceland, Spring Meeting 2006*, Abstract Volume, p. 17, 2006, talk

#### OTHER PUBLICATIONS

##### Theses

3. **Grapenthin, R.**, Volcano Deformation and Subdaily GPS Products, *Dissertation, University of Alaska Fairbanks*, 167pp., 2012
2. **Grapenthin, R.**, CRUSDE: A plug-in based simulation framework for composable CRUSTal DEformation simulations using Green's functions, *Thesis, Humboldt-University Berlin*, 127pp., 2007
1. **Grapenthin, R.**, Propagation of traffic dependent immission by means of videobased traffic-monitoring (in German), *Undergraduate Thesis, Humboldt-University Berlin*, 47pp., 2005

##### Reports

1. **Grapenthin, R.** and F. Sigmundsson, Green's Functions and Crustal Deformation – Manual and Examples, Institute of Earth Sciences, University of Iceland, Nordic Volcanological Center, Report 0602, 30 pp., 2006