

# Nordic Earthquake Researcher Network - NordQuake

“This documents show the content of the project website (<http://nordquake.net/>) for the “Nordic Earthquake Researcher Network – NordQuake” project that was running from OCT 2011 to OCT 2014. In the appendix the minutes, announcements and programs see under Nordquake Activities are found.” Peter Voss, Copenhagen, 2022-04-12.

Funded by NordForsk



## About NordQuake

This researcher network will contribute to strengthening the quality of the earthquake research and research training in the Nordic and Baltic countries.

Earthquake monitoring is today performed in all of the Nordic and Baltic countries. The technical development in earthquake monitoring has over recent years evolved to a system of real time data transmission through the Internet. These data are a key component in both earthquake research and in research training at many Nordic and Baltic research institutions.

Cooperation, networking and joint use of research infrastructure is necessary to consolidate and develop the competence and experience that exist within the Nordic and Baltic countries. Earthquakes risk is relevant in the Nordic and Baltic countries to infrastructure such as nuclear power plants, hydrocarbon industry and nuclear waste storage. Understanding of earthquake risk abroad is also of great importance to the public and industry in the Nordic region.

Earthquake risk is a key topic for NordQuake. Recent earthquakes such as Kaliningrad in SEP 2004 and Sweden in DEC 2008, clearly illustrate that earthquakes are not bound by national borders and that the public will benefit tremendously by a joint use of the Nordic infrastructure in this field. The Kaliningrad earthquakes were a remarkable manifestation of seismicity in an area whose seismological record is devoid of any seismicity throughout centuries. The largest earthquake was felt in all the countries surrounding the Baltic.

This researcher network will provide a link to the NEAR - Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation project founded by the European Commission, and constitute a forum for earthquake research topic in relation the Comprehensive Nuclear-Test-Ban Treaty, a UN treaty ratified by all the countries in the Nordic region.

Earthquake engineering is an increasing business field in the Nordic and Baltic countries, and NordQuake will provide information on industry with job opportunities to students in the network. The goal is to widen the scientists' perspective in the earthquake research field, to introduce them to new scientific problems and to give them the tools and the network to solve these. The Nordic Earthquake Researcher Network - NordQuake is funded by NordForsk.

### NordQuake Aims

Earthquake monitoring is today performed in all of the Nordic and Baltic countries. The technical development in earthquake monitoring has over recent years evolved to a system of real time data transmission through the Internet. These data are a key component in both earthquake research and in research training at many Nordic and Baltic universities and research institutions. Through the Nordic Earthquake Researcher Network NordQuake, the quality of the earthquake research and research training in the Nordic and Baltic countries, will be strengthen and increased.

Cooperation, networking and joint use of research infrastructure is necessary to consolidate and develop the competence and experience that exist within the Nordic and Baltic countries.

Earthquakes risk is relevant in the Nordic and Baltic countries to infrastructure such as nuclear power plants, hydrocarbon industry and nuclear waste storage. Understanding of earthquake risk overseas is also of great importance to the public and industry in the Nordic region, which has been expressed by the recent devastating earthquakes in e.g. Sumatra 2004, Haiti 2010 and Japan 2011. Earthquake risk is a key topic for NordQuake.

Furthermore, recent earthquakes such as Kaliningrad in SEP 2004 and Sweden in DEC 2008, clearly illustrate that earthquakes are not bounded by national borders and that the public does and will benefit tremendously, by a joint use of the Nordic infrastructure in this field. The Kaliningrad earthquakes were a remarkable manifestation of seismicity in an area whose seismological record is devoid of any seismicity throughout centuries. The largest earthquake was felt in all the countries surrounding the Baltic. This Researcher Network will provide a link to the NEAR - Network of European Research Infrastructures for Earthquake Risk Assessment and Mitigation project founded by the European Commission, and constitute a forum for earthquake research topic in relation the Comprehensive Nuclear-Test-Ban Treaty, a UN treaty ratified by all the countries in the Nordic region. Earthquake engineering is an increasing business field in the Nordic and Baltic countries, NordQuake will provide information on industry with job opportunities to students in the network.

For all involved scientists this Researcher Network's goal is to widen their perspective in the earthquake research field, to introduce them to new scientific problems and to give them the tools and the network to solve these.

## NordQuake objectives to be achieved

During the operating period of the network, the objectives listed below will be achieved. The status will be found on the website under Achievements.

- Create a network website with general information and to share information on meetings, training courses and achievements. This activity will take part in the first part of the network period.
- Hold four researcher network meetings and two research training courses.
- Generate a data set of major earthquakes: A data set of digital recording of the most important earthquakes in the Nordic region will be compiled. This data set will include both permanent and temporary seismic stations and will constitute a reference for the research training. This activity will take place in the first part of the network period.
- Select the most important historical earthquakes in the region. And use the network website to facilitate the storing, displaying and dissemination of data related to these earthquakes. This activity will take part in the middle part of the network period.
- Inspection of historical pre-instrumental key earthquakes in the region and preparation of the related materials according to the standards required today. This activity will take place during the whole project.
- Exchange of metadata: Although data from earthquake observations are shared in real time between the Nordic and Baltic countries, there is a lack of sharing metadata. Metadata will be exchanged and tested. This activity will take place in the middle and last part of the network period.

## NordQuake Activities

NordQuake will organize and hold meetings and training courses for earthquake researchers and students at universities and other research institutions in the Nordic and Baltic countries and training courses for PhD students and young researchers. Details on these activities are given below.

Researcher Network kick off meeting

Time and place: 7-8 OCT 2011 in Reykjavik, Iceland.

Minutes

Researcher Training course

Time and place: 11 - 15 JUNE 2012, University of Bergen, Norway

Announcement - Program

Researcher Network meeting 2012

Time and place: 24 - 26 OCT 2012, Tallin Estonia

Announcement (<https://www.seismo.helsinki.fi/nordic2012/index.html> )

Researcher Network meeting 2013

Time and place: Autum, Bergen, Norway.

Researcher Training course 2013

Time and place: 27 - 31 MAY 2013, GEUS, Denmark.

Announcement - Program

Researcher Network meeting 2014

Time and place: 8-10 OCT 2014, Visby, Sweden

Announcement - Program

### [NordQuake Achievements](#)

This webpage gives the status of the objectives to be achieved by the network.

The status of four researcher network meetings and two research training courses is seen under Activities.

The following earthquakes have been selected to constitute the data set of major earthquakes. The list is preliminary and may be expanded:

2000 Iceland

2004 Kaliningrad

2008 Iceland

2008 Svalbard

2008 Lund

2009 Skagarak

2011 Jan Mayen

As a basis of the selection of the most important historic earthquakes in our region and an inspection of historic pre-instrumental key earthquakes, the Scandinavian Earthquake Archive has been selected LINK ([ftp://ftp.geo.uib.no/pub/seismo/REPORTS/Scandinavian\\_earthquake\\_archive/](ftp://ftp.geo.uib.no/pub/seismo/REPORTS/Scandinavian_earthquake_archive/) )

Exchange of metadata between network operators.

A virtual earthquake network with the focus on the Baltic Sea is in preperation, contact Ilma Janutyte.

A virtual earthquake network with the focus on the Baltic area is established, contact Dr. Valerijs Nikulins.

A virtual earthquake network with the focus on the Arctic area is in preperation with russian collagues, contact NORSAR.

A description of event codes used in the nordic format by the network operators, contact Dr. Marja Uski.

Historical earthquakes in northern Europe, contact Dr. Marja Uski.

Establishment of Working groups:

Macroseismology. Chairman: Päivi Mäntyniemi

Virtual network, Chairman Peter Voss

Identification of explosions and local earthquakes, Chairman: Tormod Kværna

Other Nordic initiatives:

NORDSEIS - Advanced studies of seismology in Nordic countries, LINK (<https://www.seismo.helsinki.fi/english/education/nordseis.html> )

### NordQuake Participants

The researcher network is open to all with in interest in the field of earthquake risk. Participants can select the activities they wish to join and take part in reaching the objectived to be achieved during the operation of the network.

Participants are requested to subscribe to the NordQuake mailing list at this link: Mailing list (<https://mailman.uib.no/listinfo/nordquake> )

## Joining NordQuake

The Nordic Earthquake Researcher Network - NordQuake is a network for researchers and students in the Nordic-Baltic countries in the field of earthquake risk. The network is open for all that have an interest in this field.

In order to join please contact the national representative under Contact.

We encourage researchers from our neighbor countries to join the coming Researcher Network meetings, information is found under Activities.

## Contact NordQuake

If you need to get in contact with the researcher network, there are 3 different ways: On matters that are related to a specific country please contact the national representative listed below. On matters that concern all participants please use the NordQuake mailing list by sending an e-mail to [nordquake@uib.no](mailto:nordquake@uib.no). On matters that relate to the administration of NordQuake please contact Peter Voss at [pv@geus.dk](mailto:pv@geus.dk).



## Appendix

# NordQuake kick off meeting

# OCT 2011

**Held at, Orkugarður, Grensásvegur 9, Reykjavik, Iceland**

**Friday, OCT 7<sup>th</sup> and Saturday Oct 8<sup>th</sup> 2011**

**In prolongation of the 42nd Nordic Seismology Seminar**

## LIST OF PARTICIPANTS

### **Department of Earth Science, University of Bergen, Norway**

Kuvvet Atakan	atakan@geo.uib.no
Mathilde B. Sørensen	Mathilde.Sorensen@geo.uib.no
Lars Ottemøller	lot081@geo.uib.no
Jens Havskov	njojh@uib.no

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### **Lithuanian Geological Survey**

Andrius Pacesa	andrius.pacesa@lgt.lt
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### **Institute of Seismology, Department of Geosciences and Geography, University of Helsinki, Finland**

Päivi Mäntyniemi	paivi.mantyniemi@helsinki.fi
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### **University of Oulu, Finland**

Elena Kozlovskaya	elena.kozlovskaya@oulu.fi
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### **Icelandic Meteorological Office, Iceland**

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Steinunn S. Jakobsdóttir	ssj@vedur.is

### **Reykjavík University, Iceland and University of Uppsala, Sweden**

Ólafur Guðmundsson	ogud@hr.is
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### **Geological Survey of Denmark and Greenland – GEUS, Denmark**

Peter Voss	pv@geus.dk
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### **Department of Earth Sciences, University of Uppsala, Sweden**

Reynir Böðvarsson	Reynir.Bodvarsson@geo.uu.se
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# **The Minutes of NordQuake kick off meeting**

The NordQuake kick off meeting was opened with a presentation by Peter Voss, where the background, the structure and the goals of the NordQuake Researcher Network was described (see abstract attached). This presentation was given to the participants of the Nordic Seismology Seminar who were also invited to take part in the kick off meeting. All the national represents in NordQuake were invited prior to the meeting.

The meeting was held as a round table discussion, where the broader aspects of the Researcher Network were discussed on Friday, and details on the coming research training course and researcher network meeting was planned on Saturday.

It was decided that a NordQuake that the national represents will make up the steering committee.

## **Friday 7<sup>th</sup>**

### **Topics to be covered during the research training course and researcher network meeting**

To reach the objectives to be archived during the operation period of the network and beyond, a number of research topics were suggested and discussed. To obtain the best result it was decided to structure the research training course and researcher network meeting in thematic form, focusing on specific research areas.

As main topics for the research training course the following topics were suggested:

- Earthquake hazard
- Source data
- Meta data
- Analyzing data from networks in our region
- Fault plane solutions
- Macroseismic analyses
- Teleseismic earthquakes
- Discrimination between earthquake and explosions
- Site response
- Virtual networks
- Structure and 3D models

For the first research training course it was decided to use recordings of major earthquakes in our region as a basis for the course.

For the first researcher network meeting new topics should be invited, since the best result will be achieved with active participants. An example of a topic is the virtual seismic network covering the Baltic Sea suggested by Valerijs Nikulins and Reynir Böðvarsson.

University of Bergen offered to host a mailing list for the participants. (This has since been established, [nordquake@uib.no](mailto:nordquake@uib.no). Subscribe at <http://mailman.uib.no/listinfo/nordquake>)

It was planned that homepage <http://nordquake.net> also should list:



- Courses related to earthquake risk at Nordic universities.
- Promote external research training courses like e.g. the SeiscomP training courses
- Link to QUEST a European system for streaming courses.
- The webpage should host a wiki-type page

## Use of EPOS

It was suggested to request a session at the ESC General Assemble, dedicated to Nordic+Arctic Earthquake research. 33rd General Assembly of the European Seismological Commission (GA ESC) that will be held 19-24 August, 2012 in Moscow, Russia  
 Deadline for submission of sessions to ESC is DEC 1<sup>st</sup>, 2011

NordQuake offers support to students and researchers that by short term visits at Nordic or Baltic universities or research institutions can improve their skills and strengthen the quality in their research. The status of this initiative is that NordQuake will support a research visit of a phd student from Lithuanian (Ms. Ilma Janutytė) at University of Oulu, Finland and a phd student from Iceland (Ms. Ásdís Benediktsdóttir) at University of Uppsala, Sweden, in the coming months.

## Saturday 8<sup>th</sup>:

### The research training course

For the training course it was decided to select recordings of major earthquakes in our region. These data should then be used during the training course. These earthquakes should be recorded in the entire region by modern instruments. And the data and metadata from these earthquakes should be provided by the national networks.

The selected earthquakes:

2000 Iceland  
 2004 Kaliningrad  
 2008 Iceland  
 2008 Svalbard  
 2008 Lund  
 2009 Skagarak  
 2011 Jan Mayen

The University of Bergen offered to host the first research training course. They suggested to hold the course in June 2012, and it was planned to have a final timeline for the five day course before the end of 2011. Peter Voss will then send out an invitation for the training course with a registration deadline.

Peter Voss will do the initial review of the applicants to the research training course. If there is larger number of applicants than 20, Peter Voss will send his recommendations on whom to select to the NordQuake steering committee, who will then do the final selection. An overall goal is to have participants from all eight countries.

Two lecturers from University of Bergen will participate and there one or two other lectures will be invited.

Each day during the research training course will start with a presentation related to the current topic by the lecturers or participants.

The participants will then by analyzing the selected earthquakes get hands on experience with modern analyzing methods.

For participants with a basic knowledge in earthquake analyzing, training material including software, exercises and a training dataset is provided.

In addition the participants are invited to bring data and software from their own research project, to work on and to present to the other participants.

After first research training course the result of the participants research of the selected earthquakes will be posted on the <http://nordquake.net> webpage.

### **The first researcher network meeting**

University on Helsinki offered to organize the first researcher network meeting. The time of the meeting will be determined in the beginning of 2012.

It was decided to split the three day meeting in two parts under thematic sessions, where part one is a morning session with presentations by the participants and the afternoon session is dedicated to different tasks. A small number of task forces will be formed with a leader, and the participants join a task force with colleagues to share knowledge and experience and to work on research topics.

The task leader will at the end of the day present the outcome for the task force work.

Discrimination between measurements of earthquake and explosions and a Baltic Sea Virtual Network are examples of two tasks. The participants will be invited to suggest additional tasks prior to the meeting.

It was decided that at the end of the researcher network meeting in 2012, an open meeting will help by the steering committee, with a similar round table discussion. The meeting will involve a review of the first research training course and the researcher network meeting, the status of individual research visits, the status of the [www.nordquake.net](http://www.nordquake.net) webpage and the goals and structure of the future research training course and the researcher network meeting.'

The meeting was closed at noon Saturday.

Abstract of opening presentation:

The Nordic Earthquake Researcher Network – NordQuake

P.H. Voss

Geological Survey of Denmark and Greenland – GEUS

Earthquake monitoring is today performed in all of the Nordic and Baltic countries. The technical development in earthquake monitoring has over recent years evolved to a system of real time data transmission through the Internet. These data are a key component in both earthquake research and in research training at many Nordic and Baltic universities and research institutions. Through the Nordic Earthquake Researcher Network – NordQuake, the quality of the earthquake research and research training in the Nordic and Baltic countries, will be strengthened and increased.

Cooperation, networking and joint use of research infrastructure is necessary to consolidate and develop the competence and experience that exist within the Nordic and Baltic countries.

Earthquake risk is relevant in the Nordic and Baltic countries to infrastructure such as nuclear power plants, hydrocarbon industry and nuclear waste storage. Understanding of earthquake risk overseas is also of great importance to the public and industry in the Nordic region, which has been expressed by the recent devastating earthquakes in e.g. Sumatra 2004, Haiti 2010 and Japan 2011. Earthquake risk is a key topic for NordQuake.

Furthermore, recent earthquakes such as Kaliningrad in SEP 2004 and Sweden in DEC 2008, clearly illustrate that earthquakes are not bounded by national borders and that the public does and will benefit tremendously, by a joint use of the Nordic infrastructure in this field. The Kaliningrad earthquakes were a remarkable manifestation of seismicity in an area whose seismological record is devoid of any seismicity throughout centuries. The largest earthquake was felt in all the countries surrounding the Baltic.

This network of Nordic researchers will provide a link between the researchers in Nordic and Baltic countries and the EPOS project on plate observing systems founded by the European Commission, and constitute a forum for earthquake research topic in relation the Comprehensive Nuclear-Test-Ban Treaty, a UN treaty ratified by all the countries in the Nordic-Baltic region.

Earthquake engineering is an increasing business field in the Nordic and Baltic countries, NordQuake will provide information on industry with job opportunities to students in the network.

For all involved scientists this network of Nordic researchers goal is to widen their perspective in the earthquake research field, to introduce them to new scientific problems and to give them the tools and the network to solve these.

# NordQuake Training Course 2012 on Analysis of local earthquake data

**Time and place:** The course will take place between 11 - 15 June 2012, at the University of Bergen, Bergen, Norway.

**Program:** The course will focus on the analysis and interpretation of local earthquake data. The main topics will include signal processing in observational seismology, earthquake location, magnitude calculation, fault plane solution, moment tensor inversion and spectral analysis. Each day will start with presentations related to the current topic by the lecturers or participants. However, other work or topics can also be presented. The participants will mostly work with earthquake data to get hands on experience. The main software used will be SEISAN.

**Who can attend:** The course is open to PhD and MSc students and young researchers with a background in earthquake seismology from Nordic countries. There are 15 places available.

**Funding:** NordQuake will pay the participants travel and accommodation costs from Nordic countries. Some support is also available for participants from outside.

**How to attend:** If you wish to participate please send an e-mail to **Peter Voss** (email address: [pv@geus.dk](mailto:pv@geus.dk)) before **11 May**. Please also send your CV and explain why you wish to attend. If there are more applicants than places, the course organizers will decide based on the applications. If you are interested in participating, but this date does not suit you, please let us know.

**Presentations:** Participants are invited to bring data and software from their own research project, to work on and to present to the other participants.

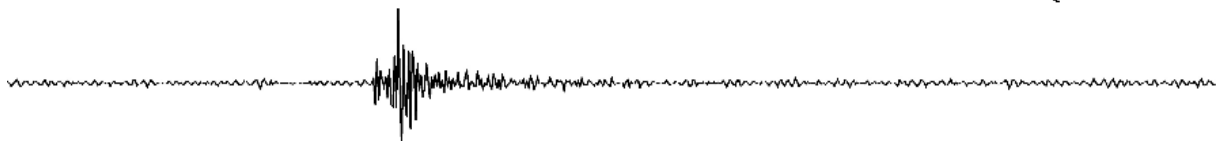
**Instructors:** Assoc. Prof. Lars Ottemöller, Prof. Jens Havskov (both University of Bergen), Dr. Peter Voss (GEUS)

**Nordquake - The Nordic Earthquake Researcher Network - <http://nordquake.net/>**  
- is a researcher network with the aim to contribute to strengthening the quality of the earthquake research and research training in the Nordic and Baltic countries. **NordQuake is funded by NordForsk.**



**Nordic Earthquake Researcher Network**

NordQuake





# NordQuake Training Course 2012 on Analysis of local earthquake data University of Bergen, Norway 11-15 June 2012

The course will focus on the analysis and interpretation of local earthquake data. The main topics will include signal processing in observational seismology, earthquake location, magnitude calculation, fault plane solution, moment tensor inversion and spectral analysis. Each day will start with presentations related to the current topic by the lecturers or participants. However, other work or topics can also be presented. The participants will mostly work with earthquake data to get hands on experience. The main software used will be SEISAN.

There will be three types of sessions: 1) lectures, 2) talks by participants and 3) working sessions. A large proportion of the time will be spent in the working sessions with a content which to a large extent will be decided by the participants. During the working sessions we will probably form groups that work on specific topics using the participant's data.

## **Venue and Contact phone numbers in Bergen**

Department of Earth Science, University of Bergen

Realfagbygget

Allegt 41, 5007 Bergen

Department of Earth Science office: +47 55 58 36 00, Fax +47 55 58 36 60

Lars Ottemöller office: +47 55 58 26 16, mobile +47 46 78 25 34

NordQuake website: <http://nordquake.net/>

NordQuake is a researcher network funded by:



**norden**

NordForsk

## Talks program

The time for each talk is about 15 minutes including questions.

Monday afternoon 11/6:

Andreas Köhler	In search of Icequakes on Svalbard
Ilma Janutyte	Introduction to the PASSEQ project and seismicity of Lithuania
Johan Skott	Kiruna mining seismicity

Tuesday morning 12/6:

Babak Hejrani	Upper mantle P-wave tomography: comparison between Southern and Northern Caledonides
Paivi Mantyniemi	Macroseismic studies of historical earthquakes in the Fennoscandian Shield

Tuesday afternoon 12/6:

Randi Karin Tveit	Seismic hazard in Bergen due to a M6 earthquake along the Øygarden Fault Zone
Christian Schiffer	Geophysical investigation of the East Greenland Caledonides

Wednesday morning 13/6:

Emilia Ndemuweda	Present and future research
Ingi Þ. Bjarnason	Included seismicity

Wednesday afternoon 13/6:

Andrea Tesoniero	<u>3D elastic focusing effects in the Los Angeles Basin upon the Northridge earthquake</u>
Martin Hensch	Moment and Stress Tensor Inversion of Volcanic Earthquakes in Iceland: Constraints on Magmatic Processes

## Program

Time	Monday 11	Tuesday 12	Wednesday 13	Thursday 14	Friday 15
<b>09:00-10:30</b>	<b>10:00-</b> Lars: Registrtration Tour of the institute Introduction to SEISAN	Lars: 2 Talks by participants  Lecture: Phase reading, location and magnitudes	Jens: 2 Talks by participants  Fault plane solution and moment tensor inversion	Jens/Lars: Talks by participants  Lecture: Data handling, data quality	Working session
<b>Coffee Break</b>					
<b>11:00-12:30</b>	Peter: Discuss program and decide on working session content and NordQuake Practical arrangements. Installation of software .	Working session	Working session	Working session	Working session
<b>Lunch Break</b>					Lars: Closing
<b>13:30-14:00</b>	Lars: Introduction to basic SEISAN training:	Peter: 2 Talks by participants	Lars: 2 Talks by participants  Seisan_Explorer  Working session	Jens: Lecture: to be decided e.g  Earthquake spectra and source parameters	
<b>14:00-15:00</b>	Working session	Peter: Instrument response	Working session	Working session	
<b>Coffee Break</b>					
<b>15:30-17:00</b>	Jens: 3 Talks by participants  Working session	Working session	16:00- City Tour – weather dependent	Working session	

## List of Participants

1. Andreas Köhler, University of Oslo, Norway
2. Martin Hensch, Icelandic Meteorological Office, Iceland
3. Emilia Ndemuweda, Luleå University, Sweden
4. Ilma Janutyte, University of Vilnius and Lithuanian Geological Survey, Lithuania
5. Andrea Tesoniero, University of Copenhagen, Denmark
6. Päivi Mäntyniemi, University of Helsinki, Finland
7. Christian Schiffer, University of Aarhus, Denmark
8. Babak Hejrani, University of Aarhus, Denmark
9. Johan Skott, Luleå University, Sweden
10. Ingi Bjarnason, University of Iceland, Iceland
11. Randi Karin Tveit, University of Bergen, Norway

### Email list:

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Babak Hejrani [babak.hejrani@geo.au.dk];  
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Peter Voss [pv@geus.dk]



# NordQuake Training Course 2013 on Analysis of earthquakes

## With a focus on hazard, processing and moment tensor inversion

**Time and place:** The course will take place between 27 - 31 May 2013, at the Geological Survey of Denmark and Greenland - GEUS, Copenhagen, Denmark

**Program:** The course will focus on the analysis and interpretation of local earthquake data. The main topics will include seismic hazard analysis, signal processing in observational seismology and moment tensor computation using full waveform inversion. Each day will start with presentations related to the current topic by the lecturers or participants. However, other work or topics can also be presented. The participants will mostly work with earthquake data to get hands on experience. The software used in the exercises is based on SEISAN.

**Who can attend:** The course is open to PhD and MSc students and researchers with a background in earthquake seismology from Nordic countries. There are 25 places available. The participants must bring their own computer.

**Funding:** NordQuake will pay the participants travel and accommodation costs from Nordic countries. Some support is also available for participants from outside.

**How to attend:** If you wish to participate please send an e-mail to **Peter Voss** (email address: [pv@geus.dk](mailto:pv@geus.dk)) before **22 April**. Please also send your CV and explain why you wish to attend. If there are more applicants than places, the course organizers will decide based on the applications.

**Presentations:** Participants are invited to bring data and software from their own research project, to work on and to present to the other participants.

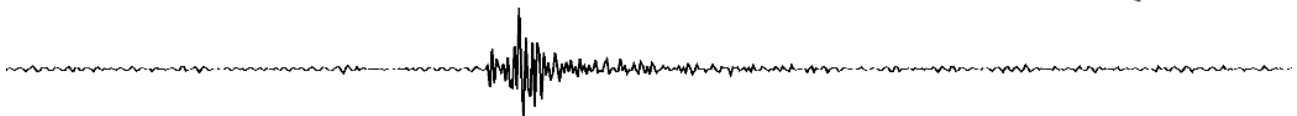
**Instructors:** Assoc. Prof. Mathilde B. Sørensen, Prof. Jens Havskov (both University of Bergen), Dr. Peter Voss (GEUS)

**Nordquake - The Nordic Earthquake Researcher Network** - <http://nordquake.net/> - is a researcher network with the aim to contribute to strengthening the quality of the earthquake research and research training in the Nordic and Baltic countries. **NordQuake is funded by NordForsk.**



**Nordic Earthquake Researcher Network**

NordQuake



# NordQuake Training Course 2013 on Analysis of earthquakes *With a focus on hazard, processing and moment tensor inversion*

27-31 May 2013

**Hosted by  
Geological Survey of Denmark and Greenland**

The course will focus on the analysis and interpretation of local earthquake data. The main topics will include seismic hazard analysis, signal processing in observational seismology and moment tensor computation using full waveform inversion. Each day will start with presentations related to the current topic by the lecturers or participants. However, other work or topics can also be presented. The participants will mostly work with earthquake data to get hands on experience. The software used in the exercises is based on SEISAN.

There will be three types of sessions: 1) lectures, 2) talks by participants and 3) working sessions. A large proportion of the time will be spent in the working sessions with a content which to a large extent will be decided by the participants. During the working sessions we will probably form groups that work on specific topics using the participant's data.

## **Venue and Contact phone numbers in Copenhagen:**

**Geological Survey of Denmark and Greenland - GEUS**  
Øster Voldgade 10  
1350 Copenhagen K

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Peter Voss office: +45 3814 2527, mobile +45 2288 6384

NordQuake website: <http://nordquake.net/>

NordQuake is a researcher network funded by:



**norden**

NordForsk

## Talks program

The time for each talk is max 15 minutes including questions.

Monday 27/5:

Kathrin Spieker	Lithospheric Structure in the Atlas Mountains, Morocco
Line Pinna	Local Earthquakes in the Ammasalik Region in Southeast Greenland
Kati Oinonen	Seismic event reports published by the Institute of Seismology, University of Helsinki
Babak Hejrani	Fault plane identification: examples from DC and non-DC sources
Kasper Ljungdahl	Teaching Oil exploration and Reflection Seismology for Undergraduates
Paivi Mantyniemi	On the role of pre-instrumental earthquake data in seismic hazard assessment

Tuesday 28/5:

Paula Koskinen	The potential of fault activation in the present stress field in Finland
Ilma Janutyte	Trouble stations
Niina Hellqvist	Modelling the upper crustal structure along FIRE 2&2A profiles using seismic attribute analysis
Andrea Tesoniero	Surface waveform inversion: a normal mode approach
Christian Schiffer	The Gravitational Stress Field – What can we use it for?
Bin Li	Work parts in my PhD project - at present and in the future
Helene Anja Kraft	TBA
Sigurlaug Hjaltadóttir	Seismicity in Eyjafjallajökull and magma movements

Wednesday 29/5:

Maris Plado	My year in Iceland
Paula Koskinen	The potential of fault activation in the present stress field in Finland
Søren Gregersen	Earthquake claims

## Preliminary program

Time	Monday 27	Tuesday 28	Wednesday 29	Thursday 30	Friday 31
<b>09:00-10:30</b>	<b>10:00-</b> Peter: Registration Tour of GEUS Introduction to SEISAN	Mathilde: 2 Talks by participants  Earthquake catalogs and statistics  2 Talks by participants	Mathilde: Zonation, ground motion parameters, attenuation  2 Talks by participants	Mathilde: Theory of PSHA, example	Mathilde: Summary, final remarks (uncertainties, site effects, risk assessment, ...)
<b>Coffee Break</b>					
<b>11:00-12:30</b>	Peter: 2 talks by participants Discuss program Practical arrangements Installation of software	Working session  Poisson distribution GR relation	Working session  Zonation Completeness	Working session  SHA (simplified) Crisis	Working session
<b>Lunch Break</b>					Peter: Closing
<b>13:30-15:00</b>	Mathilde: Introduction to seismic hazard assessment	Jens: 2 Talks by participants  Introduction to focal mechanisms and moment tensor inversion	Jens: 2 Talks by participants  Moment tensor inversion Working session	Jens: Moment tensor inversion  Working session	
<b>Coffee Break</b>					
<b>15:30-17:00</b>	Jens: 4 Talks by participants  Working session	2 talks by participants  Working session	17:00- City Tour – weather dependent	Working session	
<b>Evening</b>			19:00 Dinner (hosted by the NORDQUAKE)		

## List of Participants

1. Andrea Tesoniero, University of Copenhagen, Denmark
2. Ásdís Benediktsdóttir, University of Iceland, Iceland
3. Babak Hejrani, University of Aarhus, Denmark
4. Bin Li, University of Bergen, Norway
5. Christian Schiffer, University of Aarhus, Denmark
6. Helene Anja Kraft, University of Copenhagen, Denmark
7. Ilma Janutyte, University of Vilnius and Lithuanian Geological Survey, Lithuania
8. Jeppe Regel, Technical University of Denmark
9. Kasper Ljungdahl, Technical University of Denmark
10. Kathrin Spieker, University of Bergen, Norway
11. Kati Oinonen, University of Helsinki, Finland
12. Line Pinna, University of Copenhagen, Denmark
13. Maris Plado, University of Tartu, Estonia
14. Niina Hellqvist, University of Helsinki, Finland
15. Paivi Mantyniemi, University of Helsinki, Finland
16. Paula Koskinen, University of Helsinki, Finland
17. Sigurlaug Hjaltadóttir, University of Iceland/Icelandic Met. Office, Iceland
18. Mathilde B. Sørensen, University of Bergen, Norway
19. Jens Havskov, University of Bergen, Norway
20. Peter Voss, GEUS, Denmark
21. Søren Gregersen, GEUS, Denmark
22. Tine B. Larsen, GEUS, Denmark
23. Trine Dahl-Jensen, GEUS, Denmark

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# The 45th Nordic Seismology Seminar on 8<sup>th</sup>-10<sup>th</sup> of October 2014 in Visby on Gotland

The 45th Nordic Seismology Seminar will be held in Visby on Gotland on the 8<sup>th</sup>-10<sup>th</sup> of October 2014. The meeting will commence with lunch at 12.00 on Wednesday October 8<sup>th</sup> and end after lunch on Friday October 10<sup>th</sup>.

## CONFERENCE COST

The registration fee is in total 3.800 SEK for the conference. The fee includes two nights accommodation, all meals and a cultural program around Visby with a following conference dinner on Thursday night.

## REGISTRATION AND ABSTRACT

Please submit your registration to the conference to [ehartmanjuhlin@gmail.com](mailto:ehartmanjuhlin@gmail.com) at the latest August 31<sup>st</sup> with name, contact information, billing address and if you have any special requests about the food.

Abstract with title/authors and abstract text, together with oral or poster preference should be sent to [ehartmanjuhlin@gmail.com](mailto:ehartmanjuhlin@gmail.com) at the latest September 15<sup>th</sup>.

## THE SEMINAR VENUE

Wednesday October 8<sup>th</sup>

Wisby Strand, Strandvägen 4 <http://www.wisbystrand.se/eng>

Thursday and Friday October 9<sup>th</sup>-10<sup>th</sup>

Scandic Visby, Färjeleden 3

[http://www.scandichotels.com/Hotels/Sweden/Visby/Visby/#.U\\_Lkp1bN7pM](http://www.scandichotels.com/Hotels/Sweden/Visby/Visby/#.U_Lkp1bN7pM)

<http://kartor.eniro.se/m/NFP4q>

## PROGRAM

### Wednesday October 8

11.30-12.00 Registration at Wisby Strand, Strandvägen 4  
12.00-13.15 Lunch  
13.15-15.30 Seminar Wisby Strand  
15.30-16.00 Coffee  
16.00-17.30 Seminar Wisby Strand  
It's about 1 km between Wisby Strand and Scandic Visby1  
17.30- Check-in at Scandic Visby, Färjeleden 3  
19.30 Dinner at Scandic Visby

### Thursday October 9

09.00-10.30 Seminar Scandic Visby  
10:30-11:00 Coffee  
11.00-12.15 Seminar Scandic Visby

12:15-13:30 Lunch  
13:30-15:00 Seminar Scandic Visby  
15:00-19:00 Cultural program around Visby  
20.00 Dinner in Visby

### **Friday October 10**

09:00-10:30 Seminar Scandic Visby  
10:30-11:00 Coffee  
11:00-12:00 Seminar Scandic Visby  
12:00-13:00 Lunch

### **ACCOMMODATION ARRANGED BY THE ORGANIZERS**

Rooms are booked at the hotel Scandic Visby  
<http://www.scandichotels.com/Hotels/Sweden/Visby/>  
Färjeleden 3  
621 58 Visby  
Phone: +46 498 201250

40 rooms are reserved for the "45<sup>th</sup> Nordic Seismology Seminar" as a group.  
To reserve a room and get the group rate you send an email to  
[ehartmanjuhlin@gmail.com](mailto:ehartmanjuhlin@gmail.com) at the latest August 31<sup>st</sup>.

Please write

- your first name
- surname
- address
- e-mail
- phone number
- arrival date
- departure date

The reservation includes buffet breakfast, use of gym- and relax area and free wifi internet.

### **HOW TO GET THERE**

#### **Air**

<http://www.destinationgotland.se/en/By-air/>

#### **Ferry**

<http://www.destinationgotland.se/en/By-ferry/Our-lines/>

#### **Airport bus**

<http://www.flygbussarna.se/en/visby>

Visby map [http://www.visbycentrum.se/pdf/visbykarta\\_2014.pdf](http://www.visbycentrum.se/pdf/visbykarta_2014.pdf)



# The 45th Nordic Seismology Seminar

## 8th-10th of October 2014 in Visby on Gotland

### Wednesday October 8

- 11.30-12.00    **Registration** at Wisby Strand, Strandvägen 4
- 12.00-13.30    **Lunch**
- 13.30-16.00    **Seminar** Wisby Strand  
13.30    **Welcome**
- 13.40-14.00    Northern Finland Seismological Network: a tool to analyse long-period  
seismological signals  
*Elena Kozlovskaya*
- 14.00-14.20    Ostrobothnia Local Seismic Network (OBF) Detection and location  
capability of phase 1  
*Jari Kortström*
- 14.20-14.40    Towards a homogenized earthquake catalogue for the Fennoscandian  
shield  
*Marja Uski*
- 14.40-15.20    **Coffee**
- 15.20-15.40    On seismic hazard assessment for the Eastern Baltic region  
*Bela Assinovskaya*
- 15.40-16.00    The 2014 magnitude 4.1 Sveg earthquake  
*Björn Lund*
- 16.00-17.30    **Poster session** Wisby Strand
- A quantitative method to map the source distribution of microseisms using  
noise Covariograms; *Hamzeh Sadeghisorkhani*
- A strategy for earthquake catalog relocations using the maximum likelihood  
method; *Ka Lok Li*
- Current software development at SNSN; *Peter Schmidt*
- Seismic monitoring of glacier calving and surging on Spitsbergen,  
Svalbard; *Andreas Köhler*
- New Fennoscandian shield empirical ground motion characterization  
models; *Tommi Vuorinen*
- Analysis of waveforms of local earthquakes in the West Bohemia/ Vogtland  
area and Reykjanes Peninsula; *Alena Bouskova*
- Earthquakes in Greenland and single station detection;*  
*Peter H. Voss*
- 2.5D waveform and real noise simulation of receiver functions in 3D models  
*Christian Schiffer*

	It is about 1 km between Wisby Strand and Scandic Visby
18.00	Check-in at Scandic Visby, Färjeleden 3
18:30	<b>Dinner</b> at Scandic Visby

### Thursday October 9

- 09.00-15.00    **Seminar** Scandic Visby
- 09:00-09:20    Back-Projection Analysis of Moderate to Large Earthquakes Using Data from the Swedish National Seismic Network (SNSN)  
*Hossein Shomali*
- 09:20-09:40    A Proterozoic boundary in southern Norway revealed by joint-inversion of P-receiver functions and surface waves  
*Valérie Maupin*
- 09:40-10:00    Multiscale, finite-frequency P & S tomography of the upper mantle in the southwestern Fennoscandian Shield  
*Valérie Maupin*
- 10:00-10:20    Automated event detection algorithm based on signal-to-noise ratio migration  
*Frederic Wagner*
- 10:20-11:00    **Coffee**
- 11.00-11.20    Probabilistic Seismic Hazard (PSHA): Challenges and Alternatives  
*Conrad Lindholm*
- 11.20-11.40    Time-Delay Correction Surfaces for Improved Seismic Array Performance  
*Steven J Gibbons*
- 11:40-12:00    Stress Tensors and Diverse Focal Mechanism Solutions of Microseismic Events during Active Deformation in Krysuvik Geothermal Area, SW Iceland, in 2009  
*Sigrídur Kristjansdóttir*
- 12.00-13.20    **Lunch**
- 13:20-13:40    Stress Pattern of the Shanxi Rift System, North China, Inferred from the Inversion of New Focal Mechanisms  
*Bin Li*
- 13:40-14:00    Active faults and potential ground shaking in Cuba  
*Mathilde B. Sørensen*

- |             |  |
|-------------|--|
| 15.00-19.00 | <b>Cultural program</b> around Visby by bus (outdoor activities and walking) |
| 19.00       | <b>Dinner</b> in Visby (the bus will drop us directly at the restaurant)     |

## Friday October 10

- 09:00-09:20 Presentation of the LKAB project: Analysis of mining induced seismicity at Kiirunavaara Mine  
*Christina Dahnér*
- 09:20-09:40 Seismic analysis of mine collapse signals in NE Estonia  
*Heidi Soosalu*
- 09:40-10:00 NEONOR2 project - Neotectonics in Nordland  
*Ilma Janutyte*
- 10:00-10:20 NordQuake – Closing remarks and Future Corporation  
*Peter H. Voss*
- 10.20-11.00 **Coffee**
- 11:00-11:20 FIN-EPOS – a Finnish national initiative of EPOS  
*Annakajsa Korja*
- 11:20-11:40 EPOS and Seismology in the Nordic countries  
*Reynir Bödvarsson*
- 12:00-13.00 **Lunch**
- 13.00-15.00 EPOS discussion