

Annual reporting 2018: Nordic Centre of Excellence (NCoE) in the Nordic Societal Security Programme

Original aims:

NORDRESS AIMS TO

- **Enhance societal resilience in a wide spectrum covering individual, community, infrastructure, and institutional resilience**, through defined interdisciplinary research projects, emphasizing cooperation between different NORDIC institutions.
- **Create a lasting interdisciplinary platform for sharing ideas and knowledge among many of the best scientists and experts on natural hazards in the Nordic countries**, most of whom have not worked together before.
- **Improve the opportunities of the NORDRESS partners to obtain funding** from other agencies and thus have an **impact on scientific progress**.
- **Improve networking, education and training through The Nordic Societal Security Academy (NSSA)**, which administers a quarter of the NordForsk grant.
- More specifically, **each of the 13 WP tasks has its aims, stated in the original project description**.

Design and methods: NORDRESS is arranged into 2 administrative and 4 research WPs, each of which is further subdivided into Tasks. Each of these has its own approach, design and methods. NORDRESS employs sound scientific methods in every field and emphasizes a cross-disciplinary approach. Emphasis is placed on cooperation between institutions in more than one Nordic country, both for transfer of knowledge and to create networks that will last beyond the timeframe of NORDRESS itself. NORDRESS also emphasizes cooperation beyond the consortium, with relevant agents and institutions, ranging from public participation in local communities to health- and social service providers, civil protection and emergency managers, municipal authorities, meteorological offices, the coast guard, aviation authorities, the media, and others.

Practical changes to original plan: No major changes have occurred in the project per se, although some proposed staff members in the WPs changed jobs and were replaced by others.

As reported earlier, the development of exchange rates between the Icelandic and Norwegian currencies have seriously reduced the workhours and other expenses that the grant can cover.

Personnel of the NCoE: (Table 1) see below

Detailed research progress:

NORDRESS is a multifaceted project aiming at increasing societal security and resilience from the viewpoints of individuals (WP3), communities (WP4), infrastructure (WP5), and

institutions (WP6). With the issues mentioned above in mind, we will describe briefly the progress made in 2018 in these WPs as well as the work on Administration (WP1) and the Nordic Societal Security Academy (WP2). We apologize for the length of the text, but the scope and complexity of the project call for more than the stipulated 4 pages.

NORDRESS emphasizes cooperation of different disciplines within and beyond its borders. There is active collaboration between different groups in the consortium as is cooperation with stakeholders outside of NORDRESS, such as civil protection agencies, municipal authorities, health- and social service providers, emergency response group (the Red Cross, rescue teams) local police forces, societal safety policy makers, and media. This cooperation has taken place both within individual research projects, and through the activities of the NSSA, that funds study visits, workshops, and meetings (see below).

WP1 ADMINISTRATION manages the CoE, distributes funds, follows the progress of all WPs and provides information and advice as needed. WP1 has introduced NORDRESS in various fora, pursued cooperation opportunities outside of NORDRESS and prepared grant applications. WP1 hosted the second annual meeting in Malmö, Sweden on April 25-26 2018, and met with the Scientific Advisory Board in Copenhagen on June 25 2018. WP1 also hosted a workshop in Copenhagen on Sept 17-18 2018 where members of all WPs brainstormed about creative ways to disseminate NORDRESS' work and results, not least through the use of documentaries or short films. This work is still in progress. WP1 prepares all official reports and documents, including the annual report.

WP2 The NORDIC SOCIETAL SECURITY ACADEMY (NSSA) continued to be a great success as a source of mobility and cooperation. NSSA has all along acted as a great motivator for cooperation in the consortium, as the funded activities generally involve partners from more than one institution and country. The grants also provide opportunities for the WPs to organise workshops to discuss and plan their work, often with extraneous experts – in some cases several WPs join to host a workshop. Thus, the NSSA has fuelled cooperation between and beyond our partner institutions, and even recruited new consortium members. NSSA has been instrumental in building trust, strengthening the network and opening opportunities for transfer of knowledge and sharing of technical equipment. In 2018 NSSA 19 researchers received mobility grants.

WP3 Individual Resilience

Work has progressed very well in WP3. The team consists of experts in Iceland, Denmark, Norway and Sweden, who collaborate widely in their studies on the physical and psychological effects of being subjected to serious natural hazards, as well as the accessibility of support and treatment following such stress. These ongoing studies involve adults, children and disabled people.

WP3.1 Long-term health following natural disasters

WP3.2 Children in natural disasters – health and risk management

WP3.3 Psychosocial support and intervention following natural disasters

The subjects of NORDRESS funded papers published in 2018 gives an idea of the ongoing projects:

- Mental health effects following the Eyjafjallajökull eruption in 2010;
- Long term health effects of the same eruption on children;
- Implementation and utilization of psychosocial support after natural disasters in Iceland;

- Experiences of physically disabled individuals in Denmark of the accessibility of medical and psychosocial services following disasters and other traumatic events;
- Development and predictors of psychological outcomes after the 2008 earthquake in Iceland;
- Communicating with children and adolescents about the risk of natural disasters;
- Swedish survivors' perspective and symptoms of post-traumatic stress following their evacuation after the 2004 Southeast Asian tsunami;
- Use of hypnotic medication among Swedish survivors of the 2004 Southeast Asia Tsunami.

NORDRESS has fostered trust and cooperation across borders in WP3. The team in Iceland works for example closely with colleagues at the Karolinska Institute in Stockholm, where they have been granted extended access to registered data in their follow up study on Swedish adult and childhood survivors of the 2004 Tsunami in South East Asia. This means that the follow up will be extended to 8,5 years.

WP3's takes part in The SAGA Cohort study regarding the association of natural hazards with mental and physical health in women. The SAGA Cohort is an Icelandic nationwide study on the impact of trauma on women 's health. The target population consists of all women, 18 years or older, residing in Iceland in February 2018. In February 2019 30 000 women have participated. Another new project WP3 and the SAGA Cohort is the preparation of a web-based application including treatment for PTSD which is being developed in collaboration with a clinical psychologist and professor at the Karolinska Institute and Uppsala University in Sweden.

WP4 Community resilience

All the Nordic countries participate in WP4, which explores the role of communities in societal resilience to natural hazards.

Substantial progress has been made with respect to generating understanding of factors that affect people's decision-making during a crisis, particularly with respect to efficient and timely communication of natural hazard risk.

In addition to internal cooperation between the three Tasks of WP 4, the teams collaborate directly with WP 5 on Infrastructure and WP 6 on Institutions.

WP4 has created a wide circle of collaboration, including national and international colleagues and stakeholders such as civil protection agencies, including meteorological offices, emergency and rescue managers, health professionals, social service providers, insurance companies, authorities at local, regional and national levels, media, and last but not least residents in hazard prone areas.

4.1 Unpacking and measuring community resilience In 2018 WP 4.1 gave priority to finalizing publications. A MSc thesis was completed, and two papers submitted on the role of communities in flood risk management in Finnish Lapland. An additional paper was submitted on the role of local knowledge in natural hazard management in Norway.

4.2 Risk perception In 2018 the WP4.2 team included 2 doctoral students and one MSc student who completed her degree in the spring.

WP4.2 had 13 papers published in 2018 resulting from their work on:

Natural hazard communication;

Reducing risk-taking behaviour among tourists;

Residents' perception and the response of local communities to natural hazards;

Revisiting evacuation guidelines in the light of changing communities;

Learnings from post-disaster community-scale recoveries.

A major output in 2018 was a 771 page open access book: *Observing the Volcano World: Volcano Crisis Communication* co-edited by the NORDRESS member Deanne Bird (<https://link.springer.com/book/10.1007%2F978-3-319-44097-2>). It brings together an international and interdisciplinary assembly of experts, ranging from academics and disaster practitioners, observatory volcanologists/scientists, government and NGO officials and practitioners, the insurance sector, teachers and other educators and local populations affected by volcanic eruptions.

A major milestone is the interest of the Civil Protection Agency in Iceland to cooperate with NORDRESS in developing mitigation plans and evacuation strategies related to volcanic eruptions.

WP4.3 Participatory early warning and monitoring systems for natural hazards

WP4.3 has focused on developing a Nordic framework for a web-based participatory early warning and monitoring system. An open access paper and conference presentations in 2018 centred around flood risk management in this context. Trials carried out in several countries have shown that on-line GIS services are a viable and effective way of gathering nontechnical information from the public. Public reporting of unusual or potentially damaging natural events not only provide scientists and first-responders with valuable local information and context, but also help to increase public awareness of natural hazards. In addition to trials in Denmark (GEUS), the meteorological offices in Finland (FMI) and Iceland (IMO) are about to complete the trials, moving the application to operational use. The technical memo resulting from IMO's development work was partly written in 2018, and the plan is that the final version will be made available on the NORDRESS website by September 2019. It will contain guidelines for developing a web-based registration form for public documentation of natural hazards.

The findings of WP4.3 formed the basis of a successful bid to organise a session at the forthcoming climate change adaptation conference, to be held in Lisbon in May 2019.

WP 5 Infrastructure resilience

Initially WP5 planned to focus on the resilience of transportation infrastructure on land, sea and in the air, but with time it has broadened the focus to include the built environment and important tourist destinations. It works with transportation authorities, insurance companies, city planners, tourism operators, coast guards and aviation authorities. In cooperation with WP4, WP5 proposed two sessions for the ECCA conference in 2019, a) Ethical dimensions of sea level rise and b) Towards citizens aided early warning and monitoring for natural hazards.

In 2018 NORDRESS contributed to a DRR course organized by GEUS and Copenhagen University.

WP 5.1 and 5.2 Mitigation of risk posed by slope failures and avalanches on transport infrastructure have worked on predictions and mitigations of landslides and avalanches. Although the funding for research projects was limited, NORDRESS has resulted in a very valuable network between experts in the Nordic countries, especially the Norwegian Geophysical Institute, the IMO and the University of Iceland. The NSSA has funded several extended visits where staff members from both countries have taken part in field work to gain first-hand experience of the methods used to predict and mitigate hazards.

The network that has been established in the NSSA resulted in a NSSA funded emergency workshop to prepare actions to tackle a newly discovered fissure in the mountain above the Svínafell glacier in southern Iceland, a very popular tourist destination. The workshop

brought together experts from all over Europe who shared experience of similar problems and potential mitigation measures. This has direct effects on the subsequent actions taken by civil protection authorities.

WP5.3 Risk assessment and prevention for flooding and coastal erosion in extreme weather has focused on coastal flooding in Denmark, Iceland and Sweden. A coastal vulnerability index (CVI) for erosion of the southern shores of Sweden has been developed (https://gis.swedgeo.se/ksi_erosion/) based on two sub-indices, Coastal characteristics and Societal values.

NORDRESS results have also contributed to other climate adaptation projects carried out at the Swedish Geophysical Institute, including a literature review on managed realignment (or managed retreat) as an alternative or complement to hard infrastructure protection of the shoreline.

In Denmark, WP5.3 has focused on cooperation with key stakeholders to develop dynamic flood risk mapping on a national scale. This resulted in conference presentations on Transition of a national water resources model to a flood risk model for Denmark.

https://sdfe.dk/media/2919109/36-2018-geus_endelig-rapport.pdf WP5.3 has also contributed to the development of methods to disseminate to citizens and municipalities dynamic maps of flood risk from groundwater, cloud bursts, sea level rise and rivers.

In Iceland NORDRESS has access to a high-resolution DEM (digital elevation model) database, hosted at the IMO in Iceland. The DEM is currently being used to identify flood plains and tidal flats in the south of Iceland, a populated region that historically has experienced flooding from storm surges.

Thus, NORDRESS related activities have contributed to increase the resilience of land-based infrastructures, by improving predictions, vulnerability mapping and mitigation measures.

WP 5.4 Arctic offshore challenges

In 2018 WP 5.4 worked on analysing empirical data collected during the LIVEX16 expedition. This resulted in two oral presentations *Temporal interorganizational collaboration: surviving fragmented sensemaking* and *Coordination during temporal collaboration: surprises and sensemaking in distributed settings*. Another task of WP 5.4 was the development of a computer assisted cross-boundary table-top SAR exercise in the Arctic. In 2018 data was collected to develop requirements specifications in cooperation with practitioners. This exercise however resulted in the realisation that perhaps a computerized table-top exercise is not the best solution. Currently, WP5.4 is working on developing a new concept in collaboration with a Danish board game development company to use in preparing and training responders.

WP 5.5 The vulnerability of air traffic to volcanic eruptions has studied the response of European aviation authorities to the Eyjafjallajökull eruption in 2010. In May 2018 Uta Reichardt defended her PhD thesis *Ash and Aviation in Europe: A Stakeholder Analysis of Preparedness for Volcanic Ash from Iceland*. 2018 was devoted to dissemination of results, through both academic and public outlets. One article was published, one accepted for publication, and a third is currently under review. The research results were also distributed in print and web-based news outlets in Iceland, both in Icelandic and English, in a radio interview, and a presentation at a public conference on volcanic threat in Southern Iceland. The work of WP5.5. has directly involved a broad selection of national and international stakeholders and decision makers, such as IATA (International Air Transport Association, EUROCONTROL (European Organisation for the Safety of Air Navigation), ICETRA (Icelandic Transport Authority) , ISAVIA (Icelandic Air Traffic management), IMO, Icelandair, Icelandic

Ministry for the interior, Volcanic Ash Advisory Centre (VAAC London), and Rolls Royce jet engine manufacturer. The work resulted in practical recommendations to improve preparedness for extreme aviation events, and Uta Reichardt has been invited to take part in the VOLCEX, the transnational volcanic ash exercises are organised to ensure that aviation and ATM are ready for another major eruption.

WP 6 Institutional resilience

WP 6.1 Review and enhancement of the institutional framework for natural hazard management has in collaboration with the other NORDRESS WPs analysed the institutional arrangements in the governance of natural hazard risks in Denmark, Finland, Iceland, Norway and Sweden.

In 2018 the emphasis was on publications, two WP 6.1 members, Kristian Cedervall Lauta and Adriaan Perrels, finalized a special issue of the International Journal of Disaster Risk Reduction. The virtual issue, called *Nordic Models of Coping with Disaster* contains several NORDRESS-authored papers on:

- Shared spirit, different designs;
- Resilience to natural hazards: An analysis of territorial governance in the Nordic countries;
- Adaptation by the least vulnerable: Managing climate and disaster risks in Finland;
- Conceptualizing cold disasters: Disaster risk governance at the arctic edge;
- Participatory early warning and monitoring systems: A Nordic framework for web-based flood risk management;
- Recovering local sociality: learnings from post-disaster community-scale recoveries;
- Sending a message: How significant events have influenced the warnings landscape in Australia;

Through this special issue of the Journal of Disaster Risk Reduction WP6.1 has promoted cross-disciplinary communication and cooperation by bringing together authors from most of the NORDRESS WPs.

6.2 The Nordic Welfare system

WP6.2 has studied how the Nordic countries can learn from each other regarding the implementation of local social services after natural hazards, and how they could support each other with resources in times of need. WP6.2 received very little research funding but has emphasized network building across borders. Through the years, WP6.2 has hosted several NSSA workshops and summer schools, which benefit from contacts with the Nordic Welfare Watch and the Svalbard group that has been given extended mandate to include the co-ordination of social services to their tasks.

Governance: The Institute for Sustainability Studies, University of Iceland is the NORDRESS **Project Manager**. Daily management lies with a 4-person **Executive board**, while the **NORDRESS Council**, consisting of one representative from each Party, has the ultimate decision-making power in the Consortium.

All partners are devoted to specific tasks within the project which is structured into 13 **workpackage tasks** (WP Task). Each WP task has been assigned a **WP leader** who coordinates activities and is responsible for the work-plan of the WP task and its progress, as well as financial and scientific reports. WP leaders come from the partner institutions in all the Nordic countries, which ensures a joint Nordic representation in the management of the CoE. This governance structure has proven to be effective and problem free.

Highlights of the research: (Up to two paragraphs on key developments, during the period of the report)

- Key developments in NORDRESS research in 2018 include the progress in studying community resilience in the areas most affected by the volcanic eruption in Eyjafjallajökull in 2010. Almost 80 in-depth interviews were conducted, about half with affected families and half with providers of various social services (local governments, schools, health- and elderly service providers, the church and other faith-based organisations, voluntary organisations, rescue workers and the police). The researcher was able to establish a good rapport with the responders who seemed to appreciate the opportunity to reflect on and share their experience. These interviews are currently being analysed.
- Another key development is the participation of NORDRESS in the H2020 funded and nationwide SAGA Cohort study, that gathers information on the effects of trauma on health of all women in Iceland. This gives NORDRESS an opportunity to improve the understanding of the association of natural hazards with mental and physical health in women.

Key findings:

Examples of key findings in 2018 are

- 1) a series of recommendations to European aviation authorities on how to improve risk management of volcanic ash incidents on aviation, based on Uta Reichardt's doctoral research. These include recommendations regarding long-term contingency planning, improved exercises, communication, staff funding, regulatory alignment and research funding.
- 2) In cooperation with key stakeholders in Denmark WP5.3 took part in developing a dynamic flood risk map on a national scale, by transitioning a national water resources model to a flood risk model. This resulted in a list of recommendations on how to monitor flood risk, taking various parameters into account.
- 3) Utilization of psychological support in the aftermath of natural disaster appears to be contingent on the severity of the event. Well-coordinated national psychosocial plans for natural disaster are associated with increased satisfaction with received psychosocial support among disaster victims.
- 4) Children are a particularly vulnerable group in the aftermath of disasters. Children suffering from adverse physical and/or psychological symptoms need long-term follow-up to decrease the risk of persistent symptomology. Developmentally appropriate evidence-based affordable treatment needs to be funded and available in the long term following natural disasters.
- 5) Disasters can lead to disturbances in family functioning, causing psychopathological problems among both children and their caregivers. Increased attention should be placed on assisting families in disaster interventions.

Warrant:

As long as NORDRESS bases its research on sound and accepted scientific methods and publishes its findings in peer reviewed academic journals, a particular argumentation to support confidence in its findings should not be needed.

Researcher mobility: (Table 2) see below

Researcher training and education:(Table 3) see below

Output and dissemination: (Table 4) see below

Meetings and networking:

The NORDRESS Annual meeting was held in Malmö on April 25-26 2018 and attended by 20 members of all NORDRESS WPS.

A 2-day workshop was held in Copenhagen on September 17-18 2018 where 25 representatives from all NORDRESS WPs came together to discuss novel ways of disseminating NORDRESS results.

A NORDRESS NSSA grant was provided to invite both local and foreign scientist from different fields of science and civil defense to a 2-day workshop, **Landslides on glaciers**, in Reykjavík in November 2018. On the first day students, general public and stakeholders were invited, free of charge, to listen to 15 presentations addressing different scopes of mapping, monitoring, early warning systems, modeling, safety management, risk management and risk assessments. On the second day a selection of scientists was invited to take part in discussion groups dealing with different scopes and potential consequences of large slope failures. The workshop has today led to close collaboration between scientist from several countries in Europe and 6 people from Iceland will visit the participants from Norway in June 2019, on a mobility grant from NORDRESS, where they will visit and learn about mapping and active monitoring of high-risk sites in Norway. This meeting resulted in a grant application successfully submitted to the Icelandic energy research fund.

Infrastructure and data policy:

NORDRESS requires solid research infrastructure, equipment and other physical facilities, as well as access to databases and opportunities to collect further data. These needs are well met, as the partners are well equipped universities and research institutions ready to provide these facilities. NORDRESS emphasizes open access to methods and results and data as appropriate. The NORDRESS website provides continuous information on project activities and NORDRESS partners are urged to produce open reports and submit academic papers to open access journals. NORDRESS helps cover the cost of open access publications.

Progress and contributions towards Programme aims:

a) to address common Nordic Societal security issues by providing excellent, cross-disciplinary research in this field.

NORDRESS addresses Nordic Societal Security against natural hazards experienced by all the Nordic countries, albeit to varying degrees. Although natural threats vary from one region to another for geological, geographical and social reasons, similar measures may be adopted to increase societal security across borders.

NORDRESS is highly cross-disciplinary and all its activities aim to increase societal security in the Nordic countries and beyond.

I NORDRESS approaches societal security from four directions: of **individuals, communities, infrastructure and institutions**. All these are equally important to all the Nordic countries.

II NORDRESS studies a **variety of natural hazards**, ranging from local to transboundary:
avalanches and landslides
floods from rivers, the ocean and extreme weather
forest fires
threats in Arctic waters
volcanic eruptions

III NORDRESS strives to **improve a variety of security measures**:

- Mapping, monitoring, and predicting different hazards, including public participation in monitoring.
- Understanding public acceptance of and compliance with security measures, such as warnings and evacuations, and scrutinizing the assistance provided to the affected populations by social services of various kinds, rescue teams and safety agents.
- Evaluating mitigation measures, such as protective structures versus temporary closure of transport lines.
- Understanding risk and security measures in Arctic offshore and marine environments.
- Improving stakeholder collaboration in the European air industry.
- Understanding the legal and institutional framework of natural hazards in the Nordic countries.
- Understanding the role of the welfare system and social services in natural hazard relief.

IV NORDRESS involves a **wide variety of experts** ranging from academics through civil protection agents of all kinds to local inhabitants affected by hazardous natural events. The consortium is very interdisciplinary.

b) to facilitate and develop international Societal security research cooperation

Conferences, Courses and Workshops organized by NORDRESS through the NSSA are generally open to international participation and have attracted academics and other researchers, students, and various stakeholders from all over the world. NORDRESS members involve international partners in their work. WP3 works closely with international colleagues at the Karolinska Institute in Stockholm; WP4 has established long term collaboration with Australian experts on community resilience and natural disasters, WPs 4 and 5 have repeatedly arranged sessions at the international conference ECCA, and WP5 has also instigated widespread cooperation between European air traffic controllers and other air industry stakeholders.

c) to mobilize and qualify researchers for participation in EU Societal security research funded by the Horizon 2020 program

NORDRESS has certainly qualified researchers to take part in large international research programs. The partners scrutinize opportunities offered by H2020 and have taken part in exploratory meetings to prepare applications. The NORDRESS members in the SAGA Cohort study successfully applied for an H-2020 grant which lasts. Applications to other EU-programs have also been successful, e.g. to the Northern Periphery and Arctic Program (www.northernperiphery.eu) for a multinational project on safety at sea, App4Sea, which operates 2017-2020.

d) to involve users of research results (industry, policy makers, local communities etc.) in the work

NORDRESS emphasizes cooperation with end users in all its WPs. In the health sector our researchers cooperate with clinicians, both in the fields of mental and physical health. They also provide advice to local authorities, schools, media, and others on how to react to very stressful events, such as natural disasters, with the welfare of vulnerable groups, not least children and disabled people, in mind. Regarding community resilience NORDRESS collaborates with local authorities, civil protection authorities and agents, tour operators and guides, NGOs, media, and local populations. Infrastructure resilience is studied from the viewpoint of transportation including relevant authorities and engineers in the research, such as meteorological offices and road authorities; maritime security involves search and rescue experts, local authorities and managers of safety exercises. When it comes to aviation security NORDRESS collaborates with the European air traffic control system, air companies, engine designers and other stakeholders. Finally, studies on institutional security involve legal experts and social workers and others who have direct experience on how these systems work and need to be developed.

Thus, NORDRESS involves users of the research results to a high degree in its work.

e) to disseminate the results to a wide array of stakeholders in the Nordic region and internationally;

NORDRESS is a collaborate effort by Nordic researchers and experts who work on different aspects important for society's resilience to natural hazards. The consortium spans the chain from academics to end-users, and includes experts on geophysics, meteorology, geography, engineering, societal infrastructure, the welfare systems, disaster law and (catastrophe) insurance, public health, psychological trauma, civil protection and emergency management. Thus, NORDRESS is in itself a network of scientists, experts, end-users and other stakeholders in the field of natural hazards and societal security.

As the network of NORDRESS members is wide and varied, NORDRESS reaches a wide array of stakeholders through its own internal work and meetings.

NORDRESS publishes its findings in academic journals, books and reports, both in English and the Nordic languages, which makes the material more accessible to the public. It helps members cover the publication cost in open access journals. It reaches out to other stakeholders through meetings, conferences and other media. The NSSA enables members to bring together administrators, rescue workers, (local) politicians, inhabitants in risk areas, health professionals, media people and others. Thus NORDRESS has built in mechanisms that allow for a wide outreach to various stakeholders, on a local, national and international level.

Impact strategies and plans: In addition to conventional scientific means of disseminating results in high impact journals, books and conferences, NORDRESS emphasizes collaboration with stakeholders in all its WPs, as its impact will depend on the attention it gains among the public and decision makers. We try to involve, or at least consult, authorities from relevant sectors in each project. Similarly, we reach out to those affected by the natural hazards, the local populations, rescue and relief teams, media etc. Thus, we hope to ensure that our studies are perceived as relevant by those who work in the field, as well as those directly affected by the natural hazards.

The NSSA is a unique feature of NORDRESS. It provides wide opportunities for arranging workshops, courses or other events for a wide variety of stakeholders: scientists, administrators, civil protection agencies, rescue workers, and media people. It has proven invaluable for integrating the various elements of the CoE.

Potential media stories:

Disaster Risk Management in a popular tourist destination: In recent years, glaciers in Iceland have receded and thinned substantially due to climate warming. As glaciers retreat, adjacent mountain slopes lose some of their lateral support, resulting in unstable slopes and the possibility of hazardous landslides. Bedrock faults have formed in recent years above the Svínafellsjökull in SE-Iceland. Monitoring shows that an area more than 1 km long and several hundred meters wide, about 60-100 million m³, is moving, and the process might trigger an enormous rockslide onto the glacier. If the rockslide reaches the lagoon at the glacier terminus it may cause a tsunami as well. This is alarming as the area is a very popular tourist destination. Instabilities are developing above other glaciers in the Nordic countries and elsewhere and large areas need to be investigated to identify potential landslide source areas. To be able to understand the nature of these environmental changes and grasp the scope of the potential consequences of a large slope failure, a NORDRESS NNSA course/seminar grant was obtained to invite both local and foreign scientist from different fields of science and civil defense to a 2-day workshop, Landslides on glaciers, in Reykjavík in November 2018. On the first day students, general public and stakeholders were invited, free of charge, to listen to 15 seminars where different scopes were addressed of mapping, monitoring, early warning systems, modeling, safety management, risk management and risk assessments. On the second day a selective group of scientist were invited to take part in discussion groups dealing with different scopes and potential consequences of large slope failures. The workshop has today led to close collaboration between scientist from several countries in Europe and 6 people from Iceland will visit the participants from Norway in June 2019, on a mobility grant from NORDRESS, where they will visit and learn about mapping and active monitoring of high-risk sites in Norway.

Supplementary funding:

NORDRESS cooperates widely with other projects in and beyond the Nordic countries. These have their separate funding, from national and international sources. This is a win-win situation, as researchers consider it an asset to be a part of NORDRESS when they apply, and NORDRESS benefits indirectly from a successful application. We do not have an overview of all grants received by NORDRESS partners in related projects, but recent examples include an H2020 grant to the SAGA Cohort, and grants from the Icelandic Research Fund to Prof Arna Hauksdóttir WP3 leader to study the effects of natural hazards on health; to Edda B Þórðardóttir WP3 to study long term morbidities and comorbidities after exposure to trauma and bereavement; to Halldór Björnsson WP4 and WP5 to improve the monitoring of active seismic fissures and map seismic risk in inhabited areas.

Programme evaluation:

We have no special comments on the work and procedures of NordForsk, the Program Committee or the Scientific Advisory Board, which have provided us with very useful advice and encouragement.

Requests for Programme support: NORDRESS is a large CoE with 13 WPs and more than 60 partners, who are prepared to assist each other. Thus we have not needed to seek advice directly to the NordForsk Program Committee. The Scientific Advisory Board has also provided very useful advice.

Again, we thank NordForsk for offering support. So far the need has not arisen, but it is good to know that we may seek advice or assistance in the future.

Table 1: Personnel of the NCoE

List the names of the research team leaders involved in the NCoE. Please give the number of other researchers and students who have worked within the project. Also, please indicate the number persons in each category as listed (number of, number of man months in total and the number of man months paid by the NCoE).

Name of the research team leader	Host Institution
Guðrún Pétursdóttir, WP1- WP2	UI
Arna Hauksdóttir, WP3.1	UI
Atle Dyregrov WP 3.1	SFK
Ask Elklit WP3.3	SDU
Haakon Lein WP4.1	NTNU
Guðrún Gísladóttir WP4.2	UI
Hans Jørgen Henriksen WP4.3	GEUS
Per Danielsson WP 5.3	SGI
Farrokh Nadim WP5.1 & 5.2	NGI
Morten Thanning Vendelø WP5.4	CBS
Guðmundur Freyr Úlfarsson WP 5.5	UI
Adriaan Perrels WP 6.1	FMI
Guðný Björk Eydal WP 6.2	UI

	Number of Persons	Man-months in Total	Man-months paid by the NCoE
Professors and senior researchers	78	20,844	4,575
Post docs	5	32,9	8,9
PhD students	9	11,087	6,841
Other academic personnel	1	9	8
Coordination and administration of the NCoE	2	4	0
Auxiliary personnel (office, technical, other personnel)	3	14,670	14,670

Table 2: Researcher mobility

Please specify research stay abroad as well as visits by foreign researchers.

Name, job title, organisation	Site of work	Purpose of visit	Duration of visit	Comments, output of the visit
Peter van der Keur, Senior Scientist; Hans-Jørgen Henriksen, Senior Consultant; Jacob Kidmose, Senior Scientist, GEUS	Tech4Dev2018 conference, Lausanne, Switzerland	Give presentations on Web based access to hydrological risk data and model simulations in Denmark – how can participatory EWMS support new groundwater and nature based solutions’	3 days (27-29 June 2018)	Contribution in Tech4Dev report Peter van der Keur presented NORDRESS / WP4.3 work on Participatory Early Warning and Monitoring Systems. The audience included people working with Early Warning Systems from all parts of the world, especially South America.
Edda Björk Þórðardóttir PostDoc & Heiðrún Hlöðversdóttir research assistant (WP 3.1.)	Karolinska Institutet, Sweden	Study visit to attend the Stress Research Seminar and Networking Event at the Medical Epidemiology and Biostatistics Department.	3 days (10-13 December 2018)	Experience shared and connections established with other Nordic researchers in the field.
Ingibjörg Lilja, PhD student, University of Iceland (WP 4.2.)	Southern Iceland	Meetings in Southern Iceland with police, key municipal staff members, and volunteers to learn about risk assessment and long-term	54 days in 2018	Participated in meetings arranged by Civil Protection Authorities with natural hazard responders and local community staff members.

		recovery plans for municipalities in Southern Iceland		The tasks were threefold: to define potential risk in the surroundings, planning long-term responses, and presenting the outcome to local residents for comments.
Ingbjörg Lilja Ómarsdóttir, PhD student, University of Iceland (WP 4.2.)	Kaunas University of Technology, Kaunas Lithuania	European Sociological Association-RN22 „Sociology of Risk and Uncertainty“ mid-term conference „Complexities of Risks and Uncertainty“	4 days (2-5 October 2018)	Participated in a workshop for PhD students, presentation „Natural Hazards, Risk and Uncertainties: Recovering from the Eyjafjallajökull eruption“
Rasmus Dahlberg & Tara Zapp (WP 5.4) Royal Danish Defense College	Amsterdam, Netherland	To organize and attend the NEEDS 3 Conference	3 days (21-23 March 2018)	Organized a 5-paper panel “The Grey Zone”, addressing the overlap between civilian and military organizations in disaster and emergency management.
Arna Hauksdóttir professor, UI Edda B Thordardóttir post-doc, UI Heidrún Hlödversdóttir research assistant, UI	Washington, DC, USA	34th Annual meeting of the International Society for Traumatic Stress Studies (ISTSS)	5 days (Nov 7-11 2018)	Four poster presentations: 1) hypnotic medication use among Swedish survivors of the 2004 southeast Asia tsunami 2) Long-term health of

Hrefna Hardardóttir research assistant, UI				children following the Eyjafjallajökull volcanic eruption 3) Mental health effects following the eruption in Eyjafjallajökull volcano and 4) A cohort profile of the Icelandic SAGA (Stress-And-Gene-Analysis) Cohort.
Deanne Bird, Research Specialist, University of Iceland & Guðrún Gísladóttir Professor UI	University College London, United Kingdom	Book Launch - Volcano Crisis Communication	3 days (September 9-21 2018)	DB is one of the book's editors and both are chapter authors.
Sóley Kaldal, Icelandic, specialist, Coast guard, (WP 5.4)	Maastricht, Netherlands	To attend a course, mostly taught online, but the kick off requires a 2-week attendance in Maastricht in September 2018 and one week wrap-up attendance again in spring 2019.		
Karoliina Pilli-Sihvola, researcher, FMI & Atte Harjanne, PhD student, FMI (WP 6.1)	Norrköping, Sweden	Nordic Conference on Climate Change Adaptation 2018; Two oral presentations at the conference & networking	3 days (October 22.-25. 10.2018)	Both Karoliina and Atte gave presentations based on their work in NORDRESS
Sigríður Sif	Norsk Geofysisk	2-4 weeks study	2-4 weeks in	

Gylfadóttir, specialist, IMO (WP. 5.1)	Institutt, Oslo	visit to NGI in Oslo, working with Carl Bonneview Harbitz and other using NGI's software to set up a landslide model for the threatening situation at Svinafellsheidi in Iceland	late 2018 or early 2019	
--	-----------------	--	-------------------------	--

Number of:

Visiting days 150

Visiting researchers 19

Table 3: Researcher training and education

Please list courses organized. Specify the number of students participating (own students, and other students) and number of ECTS points gained in the courses. In addition, the number of PhD and Post Docs, both national and international is asked for.

Course (name of course, institution, person responsible)	Own Students	Other students	Number of ECTS points
Panel organized at the NEEDS 3 conference in Amsterdam in March 21-23 2018			
NORDRESS took part in organizing a DRR master course at Copenhagen University https://kurser.ku.dk/course/nmk16002u/2017-2018 :			

How many PhDs and Post Docs are recruited in Nordic countries (specify the country) and how many are recruited internationally?

Number of PhD students recruited in Nordic countries (specify the country)	2 PhD students from Iceland 2 PhD students from Finland (one of them working in Norway) 1 PhD student from Denmark 1 PhD student from Sweden
Number of PhD students recruited outside Nordic countries	1 from Germany
Number of Post Docs recruited in Nordic countries (specify the country)	1 in Iceland
Number of Post Docs recruited outside Nordic countries	1 from Germany

Specify the number of PhD degrees achieved at the NCoE in reporting period.

Number of PhD degree achieved	1 (WP 5.5.)
-------------------------------	-------------

Table 4: Output and dissemination

Report the output of the research, e.g. publications.

Two tables are provided. The first table is for publications, reports and outreach activities with the main activities/collaboration funded by the NCoE. The second table is for publications, reports and outreach activities where the NCoE research has contributed. Also, report the number of Open Access publications.

Please attach a complete publication list – To the extent possible, please indicate direct publication linked to the work of the NCoE.

Nordress was very active in publishing its research in 2018. In total 31 peer reviewed papers were published, and 22 conference presentations given, out of which 3 were invited lectures. These and various other activities are listed below:

University degrees completed in 2018:

PhD thesis:

1. Reichardt, U., 2018. Ash and aviation in Europe: A stakeholder analysis of preparedness for volcanic ash from Iceland. Faculty of Civil and Environmental Engineering, University of Iceland, (WP 5.5)

MSc thesis:

1. Kauppinen V (2018) "Local community means something like team spirit?" Community resilience of flood risk management in Kittilä. Master Thesis, Department of Environmental Sciences, University of Helsinki (WP 4.1)
2. Þórhildur Heimisdóttir (2018): Ægífegurð eldfjalla: Áhættuupplifun ferðamanna á Laugaveginum vegna eldgosavár/ Sublime volcanoes: Tourists' experiences of volcanic risk on the Laugavegur hiking trail. Department of Geography and tourism, University of Iceland (WP 4.2).

Editorial work (open access):

Fearnley, C., Bird, D.K., Haynes, K., McGuire, W.J., Jolly, G. (eds.) Observing the Volcano World: Volcano Crisis Communication. Springer.
<https://www.springer.com/gp/book/9783319440958>

Lauta, K. and Perrels A. (eds.) (2018). Nordic Disaster Risk Reduction: Shared spirit, different designs, International Journal of Disaster Reduction Research, special issue (guest editors K. Lauta and A. Perrels), DOI.10.1016/j.ijdr.2018.02.031.
<https://www.sciencedirect.com/journal/international-journal-of-disaster-risk-reduction/special-issue/10T49GCGBWM>

Table A Outreach and dissemination of activities/collaboration mainly funded by NORDRESS

Peer reviewed scientific publications / of which Open Access	12/12
Non peer-reviewed publications / of which Open Access	0
Reports	0
Publications for the public	1
Invited conference presentations	0
Conference presentations, oral / poster	13
Number of appearances in media	2
Outreach and dissemination to the public	0
Web disseminations	0
Conferences arranged	0
Summer courses	0

Outreach and Dissemination main activities/collaboration funded by NORDRESS

Peer reviewed scientific publications (Open access-OA).

Gissurardóttir ÓS, Hlodversdóttir H, Thordardóttir EB, Pétursdóttir G, Hauksdóttir A. (2018).

Mental health effects following the eruption in Eyjafjallajökull volcano in Iceland – A population-based study. Scand J Public Health. 2018. Published online January 9, 2018.

<https://doi.org/10.1177/1403494817751327>. OA

Thordardóttir EB, Gudmundsdóttir B, Pétursdóttir G, Valdimarsdóttir UA, Hauksdóttir A.

(2018). Psychosocial Support After Natural Disasters in Iceland- Implementation and Utilization. Int J of Disaster Risk Reduction. 27: 642-648. OA

Hlodversdóttir H, Thorsteinsdóttir H, Thordardóttir EB, Pétursdóttir G, Hauksdóttir A. (2018).

Long-term health of children following the Eyjafjallajökull volcanic eruption – A prospective cohort study. Eur J Psychotraumatol. Published online: 05 Mar 2018.

<https://doi.org/10.1080/20008198.2018.1442601> OA

Thordardóttir EB, Gudmundsdóttir H, Gudmundsdóttir B, Hrólfssdóttir AM, Aspelund T,

Hauksdóttir A. (2018). Development and predictors of psychological outcomes following the 2008 earthquake in Iceland: A longitudinal cohort study. Eur J Psychotraumatol.

Published online May 10, 2018. <https://doi.org/10.1177/1403494818771444> OA

Midtbust LGH, Dyregrov A, Djup HW. (2018). Communicating with children and adolescents

about the risk of natural disasters. Eur J Psychotraumatol. Published Feb 6 2018. doi:

10.1080/20008198.2018.1429771. OA

- Bird, D.K. Gísladóttir, G. 2018. Responding to volcanic eruptions in Iceland: from the small to the catastrophic. *Palgrave Communications* 4(1), 151.
<https://www.nature.com/articles/s41599-018-0205-6> OA
- Bird, D.K., Jóhannsdóttir, G, Reynisson, V, Karlsdóttir, S., Guðmundsson, M.T., Gísladóttir, G., 2018. Crisis communication during the 2010 Eyjafjallajökull eruption, In: Fearnley, C., Bird, D.K., Haynes, K., McGuire, W.J., Jolly, G. (Eds.) *Observing the Volcano World: Volcano Crisis Communication*. Springer.
https://link.springer.com/chapter/10.1007/11157_2017_6 OA
- Bird, D.K., Haynes, K., 2018. Communicating into the Future, In: Fearnley, C., Bird, D.K., Haynes, K., McGuire, W.J., Jolly, G. (Eds.) *Observing the Volcano World: Volcano Crisis Communication*. Springer. https://link.springer.com/chapter/10.1007/11157_2017_26 OA
- Fearnley, C., Bird, D.K., Haynes, K., McGuire, B., Jolly, G., 2018. Volcanic Crisis Communication: Where do we go from here? In: Fearnley, C., Bird, D.K., Haynes, K., McGuire, W.J., Jolly, G. (Eds.) *Observing the Volcano World: Volcano Crisis Communication*. Springer. https://link.springer.com/chapter/10.1007/11157_2017_27 OA
- Henriksen, H.J., Roberts, M.J., van der Keur, P., Harjanne, A., Egilson, D., Alfonso, L. (2018). Participatory early warning and monitoring systems: A Nordic framework for web-based flood risk management. *International Journal of Disaster Risk Reduction*, 31:1295–1306.
<https://doi.org/10.1016/j.ijdrr.2018.01.038> OA
- Karoliina Pilli-Sihvola, Atte Harjanne, Riina Haavisto (2018). Adaptation by the least vulnerable: Managing climate and disaster risks in Finland, *International Journal of Disaster Risk Reduction*, 31:1266-1275. <https://doi.org/10.1016/j.ijdrr.2017.12.004>. OA
- Lisa Van Well, Peter van der Keur, Atte Harjanne, Emmanuel Pagneux, Adriaan Perrels, Hans Jørgen Henriksen, Resilience to natural hazards: An analysis of territorial governance in the Nordic countries, *International Journal of Disaster Risk Reduction*, 31: 1283-1294
<https://doi.org/10.1016/j.ijdrr.2018.01.005>. OA

Publications for the public

- Reichart, U., Úlfarsson, G.F., Pétursdóttir, G., 2018. Kötflugos á þotuöld (Katla eruption in the jet-age). In: Conference committee: Sæmundsson, P., Rutkowska, B., Sigmundsdóttir, B., Jónsdóttir, K., Hauksson, H., Andrésdóttir, Þ.B., Gústafsson, L.E., Hjartardóttir, ÁR, Reynisson, V., Þorkelsson: Kötfluráðstefna. 100 ár frá upphafi gossins 12. október 2018, Vík í Mýrdal, 12. -13. október 2018., 87-90.

Conference presentations

- Hlodversdóttir, H., Thordardóttir, E., Gissurardóttir, O., Pétursdóttir, G., Hauksdóttir, A., (AH presenting). Mental Health Effects following the Eruption in Eyjafjallajökull Volcano in Iceland: A Population-based Study. The Nordic Congress of Psychiatry: Shaping the future. 13.-16. June 2018. Symposium 2D - The ambient, airborne and environment and mental health.
- Hlodversdóttir, H., Thorsteinsdóttir, H., Thordardóttir, E., Njardvik, U., Pétursdóttir, G., Hauksdóttir, A. Long-term Health of Children following the Eyjafjallajökull Volcanic Eruption: A Prospective Cohort Study. International Society for Traumatic Stress Studies (ISTSS) 34th Annual Meeting on the theme of "Promoting Societal Change: Integrating Traumatic Stress Research, Practice and Policy for Vulnerable Populations." 8.-10. November 2018, Washington USA
- Hlodversdóttir, H., Thordardóttir, E., Gissurardóttir, O., Pétursdóttir, G., Hauksdóttir, A. Mental Health Effects following the Eruption in Eyjafjallajökull Volcano in Iceland: A

- Population-based Study. International Society for Traumatic Stress Studies (ISTSS) 34th Annual Meeting on the theme of “Promoting Societal Change: Integrating Traumatic Stress Research, Practice and Policy for Vulnerable Populations.” 8.-10. November 2018, Washington USA
- Thordardottir, E., Song, H., Fang, F., Arnberg, F., Valdimarsdottir, U., Hauksdóttir, A. Hypnotic Medication Use among Swedish Survivors of the 2004 Southeast Asia Tsunami. International Society for Traumatic Stress Studies (ISTSS) 34th Annual Meeting on the theme of “Promoting Societal Change: Integrating Traumatic Stress Research, Practice and Policy for Vulnerable Populations.” 8.-10. November 2018, Washington USA
- Räsänen, A., Setten, G., Lein, H. Disentangling the roles of local communities in flood risk management. The Society for Risk Analysis-Europe. Risk & Uncertainty – From Critical Thinking to Practical Impact. Mittuniversitetet, Östersund 18-20 Juni 2018.
- Setten, G. Lein., H. We draw on what we know anyway!: The meaning and role of local knowledge in natural hazard management. The Society for Risk Analysis-Europe. Risk & Uncertainty – From Critical Thinking to Practical Impact. Mittuniversitetet, Östersund 18-20 Juni 2018.
- Bird, D., Gísladóttir, G. 2018. Bad tourists! Reducing risk-taking behaviour among Iceland’s increasing tourist population – Cities on Volcanoes 10 – Naples, Italy – September 2018.
- Bird, D., Gísladóttir, G. 2018. Will they go, or will they stay? Comparing past experiences and population change to predict future response to a volcanic crisis – Cities on Volcanoes 10 – Naples, Italy – September 2018
- Atte Harjanne: Adaptation through two lenses - Experiences from climate proofing Helsinki as a researcher and a politician, Nordic Conference on Climate Change Adaptation 2018; Norrköping, Sweden.
- van der Keur, P., Henriksen, H.-J., Kidmose, J.. Web based access to hydrological risk data and model simulations in Denmark – how can participatory EWMS support new groundwater and nature based solutions? Tech4 Dev. Participatory Early warning and Monitoring Systems, Lausanne, Switzerland, June 2018.
- Atte Harjanne: Adaptation through two lenses - Experiences from climate proofing Helsinki as a researcher and a politician. The 5th Nordic Conference on Climate Change Adaptation, NOCCA Norrköping Sweden, October 23-25
- Karoliina Pilli-Sihvola: Helsinki - The most functional city in the world despite weather and climate change: realism or utopia. The 5th Nordic Conference on Climate Change Adaptation, NOCCA Norrköping Sweden, October 23-25
- Matthew Roberts: Flood monitoring in Iceland: challenges and early warnings. Presentation at the Icelandic Meteorological Office, 24 July 2018.

Number of appearances in media

- Van Well., L., Vi bryr oss mer on naturen än husen när havet stiger. Sydsvenskan A-delen, October 28. 2019.
- Bird, D. Changing communities may affect the success of Iceland’s evacuation guidelines, multiple news releases published and tweeted by Springer Nature and Palgrave Communications. For example, <https://www.springer.com/gp/about-springer/media/research-news/all-english-research-news/changing-communities-may-affect-the-success-of-iceland-s-evacuation-guidelines/16345942>

Table B Outreach and dissemination of activities/collaboration where NORDRESS has contributed

Peer reviewed Publications / of which Open Access	19
Non peer-reviewed Publications / of which Open Access	1
Reports	1
Publications for the public	1
Invited conference presentations	3
Conference presentations	6
Number of appearances in media	4
Outreach and dissemination to the public	5
Web disseminations	-
Conferences arranged	-1
Summer courses	1

Table B Outreach and dissemination of activities/collaboration where NORDRESS has contributed

Peer reviewed Publications

- Todorovac, A., Simonsen, L. D. & Elklit, A. (2018). No one left behind. *Journal of Emergency Management*, 16, 1-13. Doi:10.5055/jem.2018.0000.
- Dyregrov A, Yule W, Olff M. (2018). Children and natural disasters. *Eur J Psychotraumatol*. Published Aug 15 2018. doi: 10.1080/20008198.2018.1500823.
- Gudmundsdottir R, Hultman CM, Valdimarsdottir U. (2018). Evacuation of Swedish survivors after the 2004 Southeast Asian tsunami: The survivors' perspective and symptoms of post-traumatic stress. *Scand J Public Health*. Published online Apr 1 2018. doi: 10.1177/1403494818771418
- Todorovac, A., Simonsen, L. D. & Elklit, A. (2018). Review of research. In Federal Office of Civil Protection and Disaster Assistance (Ed.) *Assisting Disabled in Case of Disaster* (pp 133-135). Bonn: Author.
- Elklit, A., Simonsen, L. D. & Todorovac, A. (2018). No one left behind - The accessibility of medical and psychosocial services following disasters and other traumatic events: Experiences of physical disabled individuals in Denmark. In Federal Office of Civil Protection and Disaster Assistance (Ed.) *Assisting Disabled in Case of Disaster* (pp 136-152). Bonn: Author.
- Elklit, A., (2018). Research Results. Danish study. In Federal Office of Civil Protection and Disaster Assistance (Ed.) *Assisting Disabled in Case of Disaster* (pp 69-74). Bonn: Author.
- Van Well, L., van der Keur, P., Harjanne, A., Pagneux, E., Perrels, A., Henriksen, H.J., (2018) Resilience to natural hazards: An analysis of territorial governance in the Nordic

- countries. *International Journal of Disaster Risk Reduction*.
<https://doi.org/10.1016/j.ijdr.2018.01.005>
- Ruuhela, R.; Hyvärinen, O.; Jylhä, K. Regional Assessment of Temperature-Related Mortality in Finland. *Int. J. Environ. Res. Public Heal.* 2018, 15, doi:10.3390/ijerph15030406.
- Amri, A., Haynes, K., Bird, D.K., Ronan, K., 2018. Bridging the divide between studies on disaster risk reduction education and child-centred disaster risk reduction: a critical review. *Children's Geographies* 16, 239-251.
- Anderson-Berry, L., Achilles, T., Panchuk, S., Mackie, B., Canterford, S., Leck, A., Bird, D.K., 2018. Sending a message: How significant events have influenced the warnings landscape in Australia. *International Journal of Disaster Risk Reduction* 30, 5-17. – OPEN ACCESS
- Carmichael, B., Wilson, G., Namarnyilk, I., Rostrum, V., Marimowa, J., Nadji, S., Cahil, J., Hunter, F., Brockwell, S., Webb, B., Bird, D. 2018. Local and Indigenous management of climate change risks to archaeological sites. *Mitigation and Adaptation Strategies for Global Change* 23(2), 231-255.
- Forte, P., Bonadonna, C., Gregg, C.E., Dominguez, L., Bran, D., Bird, D., Castro, J., 2018. Ash resuspension related to the 2011-2012 Cordón Caulle eruption, Chile, in a rural community of Patagonia, Argentina. *Journal of Volcanology and Geothermal Research* 350, 18-32.
- Okada, T., Howitt, R., Haynes, K., Bird, D., McAneney, J. 2018. Recovering local sociality: learnings from post-disaster community-scale recoveries. *International Journal of Disaster Risk Reduction* 31, 1030-1042.
- Lauta, K.C., Vendelö, M.T., Sörensen, B.R., Dahlberg, R. Conceptualizing Cold Disasters: Disaster Risk Governance at the Arctic Edge, *International Journal of Disaster Risk Reduction*, 31, 1276-1282
- Reichardt, U, Ulfarsson, G.F., Pétursdóttir, G. Volcanic Ash and Aviation: Recommendations to Improve Preparedness for Extreme Events. *Transportation Research Part A: Policy and Practice*, 113, 101-113
- Reichardt, U, Ulfarsson, G.F., Pétursdóttir, G. Developing Scenarios to Explore Impacts and Weaknesses in Aviation Response Exercises for Volcanic Ash Eruptions. *The 97th Annual Meeting of the Transportation Research Board*. Compendium og Papers. Transportation Research Board, National Research Council, Washington, D.C., U.S.A., 16 p.
- Pilli-Sihvola, K., Harjanne, A., Haavisto, R. Adaptation by the least vulnerable: Managing climate and disaster risks in Finland, *International Journal of Disaster Risk Reduction*, 31:1266-1275. <https://doi.org/10.1016/j.ijdr.2017.12.004>.
- Lisa Van Well, Peter van der Keur, Atte Harjanne, Emmanuel Pagneux, Adriaan Perrels, Hans Jørgen Henriksen. Resilience to natural hazards: An analysis of territorial governance in the Nordic countries, *International Journal of Disaster Risk Reduction*, Volume 31, 2018, Pages 1283-1294, ISSN 2212-4209, <https://doi.org/10.1016/j.ijdr.2018.01.005>. [WP61]
- Lauta, K. and Perrels A. (2018), Nordic Disaster Risk Reduction: Shared spirit, different designs, *International Journal of Disaster Reduction Research*, special issue (guest editors K. Lauta and A. Perrels), DOI.10.1016/j.ijdr.2018.02.031 [WP61]

Non peer-reviewed Publications

- Perrels, Adriaan, (2018), Gratis informatie over natuurrisico's (Free information about natural hazards), *Economisch Statistische Berichten*, Vol.103, no.4759, pp.116-118 (in Dutch).

Reports (open access)

- Hildén, M.; Haavisto, R.; Harjanne, A.; Juhola, S.; Luhtala, S.; Mäkinen, K.; Parjanne, A.; Peltonen-Saisio, P.; Pilli-Sihvola, K.; Pöyry, J.; Tuomenvirta, H. (2018-09-10),

Ilmastokestävä Suomi - Toimintamalli sää- ja ilmatoriskien arviointien järjestämiseksi,
<http://urn.fi/URN:ISBN:978-952-287-602-7>.

Publications for the public

Gísladóttir, G. and Bird, D., 2018. Hvað getum við lært af fyrri kynslóðum? Reynsla Álftveringa af Kötlugosinu 1918/What have we learned from our ancestors? The residents of Álftaver community of the volcanic eruption in 1918. In: Conference committee: Sæmundsson, Þ., Rutkowska, B., Sigmundsdóttir, B., Jónsdóttir, K., Hauksson, H., Andrésdóttir, Þ.B., Gústafsson, L.E., Hjartardóttir, ÁR, Reynisson, V., Þorkelsson: Kötluráðstefna. 100 ár frá upphafi gossins 12. október 2018, Vík í Mýrdal, 12. -13. October 2018., 26-32.

Invited conference presentations

Pétursdóttir G., Reichardt, U. How Can We Build Island Communities That Are Resilient to the Impacts of Climate Change and Environmental Hazards – Iceland. 7th *International Conference on Environmental Future*, Honolulu, Hawaii, April 16-20.

Danielsson, P. Regional Kustsamverkan, Skåne/Halland (*Eng. Regional coastal cooperation in Southern Sweden*). Almedalen, Sweden, July 2018.

Danielsson P. "Georisker i kustnära samhällen" (*Eng. Geo-risk in coastal communities*). Klimatanpassning Sverige. Stockholm, September 6, 2018.

Conference presentations

Reichardt, U., Ulfarsson, G.F., Pétursdóttir G., Developing Scenarios to Explore Impacts and Weaknesses in Aviation Response Exercises for Volcanic Ash Eruptions. *The 96th Annual Meeting of the Transportation Research Board*, Washington, D.C., U.S.A, January 7-11.

Valdimarsdóttir, U., Hauksdóttir, A., Thordardóttir, E., Hardardóttir, H., Torfadóttir, J., Tómasson, G. The Stress-And-Gene-Analysis (SAGA Cohort) – Design and Cohort Profile. International Society for Traumatic Stress Studies (ISTSS) 34th Annual Meeting on the theme of "Promoting Societal Change: Integrating Traumatic Stress Research, Practice and Policy for Vulnerable Populations." 8.-10. November 2018, Washington USA.

Dahlberg, R., Vendelö, M.T. Temporal Interorganizational Collaboration: Surviving Fragmented Sensemaking. The tenth International Symposium on Progress Organizational Studies (PROS), Halkidiki, Greece, June 20.-23, 2018. Pp 1-20.

Larsen B., Vendelö, M.T. What Happened to Technology of Foolishness, and is it relevant in a contemporary context? SCANCOR 30th Anniversary Conference: Thirty Years of Organizational Learning and Educational Institutions. November 3-4. Stanford University, California, pp 1-37.

Van Well, L., Björlin, A., Danielsson, P., Göransson, G., Ndayikengurukiye G., Isayeva, A. Mapping the "soft" and ethical consequences of sea level rise -with stakeholder and citizen input. Nordic solutions for robust societies (NOCCA) 5th Nordic Conference on Climate Change Adaptation: October 23-25 2018, Norrköping, Sweden.

Guðrún Gísladóttir and Deanne Bird, 2018. Hvað getum við lært af fyrri kynslóðum? Reynsla Álftveringa af Kötlugosinu 1918 (*Engl. What have we learned from our ancestors? The residents of Álftaver community of the volcanic eruption in 1918*). Kötluráðstefna. Conference held in October 112-13 in memory of the 100 years anniversary of the 1918 Katla eruption.

Number of appearances in media

Reichardt, U., Pétursdóttir G., Ulfarsson, G.F. Örafajökull Eruption Could Greatly Impact Air Traffic (In Icelandic: Gos í Örafajökli gæti haft mikil áhrif á flugumferð) fréttir, University

of Iceland website.

https://www.hi.is/frettir/gos_i_orafajokli_gaeti_haft_ahrif_a_flugumferd.

Reichardt, U., Ulfarsson, G.F., Pétursdóttir G. What Impact Will a Big Eruption Have on Global Air Traffic? (In Icelandic: Hvaða áhrif mun stórt eldgos hafa á flugumferð í heiminum?), Í Bítið, Bylgjan (radio station), interviewed by G. Helgason and Karlsson, H., January 26.

Reichardt, U., Volcanic Eruption Would Have Widespread Effect on the Continent (In Icelandic: Eldgos hefði víðtæk áhrif um alla álfuna). *Morgunblaðið* (newspaper), January 25, pp1, 24-25.

Björnsson, A.M. Öraefajokull eruption could paralyse all air traffic in Europe, Iceland Monitor (online news agent). https://icelandmonitor.is/news/nature_and_travel/2018/06/06/orafajokull_eruption_could_paralyse_all_air_traffic/

Outreach and dissemination to the public

Gísladóttir G. and Bird, D. Local resident's perception of Katla eruption in 1918. How does inherited memories impact current resident's perceptions of future Katla eruption and evacuation strategies due to potential future Katla eruption. Presentation held for the association of Skaftfellingafélagið (association of people associated to the area of Skaftafellssýslur). Reykjavík, November 8, 2018.

Gísladóttir, G. The experience of the local population in Álftaver farming community of the 1918 Katla eruption. Presentation for the residents in Skaftárhreppur municipality, Kirkjubæjarklaustur, Vestur Skaftafellssýsla December 1st, 2018.

Dahlberg, R. The Conspiracy of Unlikely Events. Lecture on the Third Joint Arctic SAR Workshop and TTX. Reykjavík, Iceland, April 10-11.

Vendlö, M.T., Organizational Sensemaking. Lecture on the Third Joint Arctic SAR Workshop and TTX. April 10-11, Reykjavík, Iceland.

Fearnley, C.J., D.K. Bird. *Book Launch* for: Observing the Volcano World: Volcano Crisis Communication (eds. Fearnley, C.J., Bird, D.K., Haynes, K., McGuire, W.J., Jolly, G.). Part of the Springer Series: Advances in Volcanology. Springer recorded the event on video to make it available online (see <https://www.ucl.ac.uk/sts/events/2018/sep/book-launch-observingvolcano-world>). The entire book is free open access

<https://www.springer.com/gp/book/978331944095>

Summer Courses, seminars arranged:

DRR master course Copenhagen University <https://kurser.ku.dk/course/nnmk16002u/2017-2018>: Involvement of NORDRESS in the planning and a presentation by van der Keur, P., and Jørgen Henriksen., H: *Climate change and the increased risk of flood – the Copenhagen case study. Territorial governance, early warning and monitoring. Drought and water security in DRR.*

Panel organized by Rasmus Dahlberg at the NEEDS 3 conference in Amsterdam in March 21-23 2018.