



# **THEMES AND SESSIONS**

**35<sup>th</sup> NGWM**

**REYKJAVÍK**

**ICELAND**

**5<sup>th</sup> to 7<sup>th</sup> of January 2022**

## **THEME 1: [EC] Environment and climate**

Organizer: Skafti Brynjólfsson ([skafti@ni.is](mailto:skafti@ni.is)), Halldór Björnsson ([halldor@vedur.is](mailto:halldor@vedur.is)), Hrafnhildur Hannesdóttir ([hh@vedur.is](mailto:hh@vedur.is))

### **[EC-1] Physical and biological impact of climate change**

1. Physical aspects of climate change and climate change impacts.

Conveners: Halldór Björnsson ([halldor@vedur.is](mailto:halldor@vedur.is))

This session aims to examine recently observed climate change and its impacts on physical systems from wide perspective pertaining to processes in the atmosphere, ocean, cryosphere and on land, including the influence of cryospheric mass loss on sea level and volcanic risks. This includes both observed changes, current and paleo, as well as modelled changes. We welcome submissions on climate and geological processes, the dynamics of interaction between the different parts of the climate system, observed changes and impacts as well as high impact events.

2. Ecological aspects of climate change and climate change impacts

Conveners: Inga Svala Jónsdóttir ([isj@hi.is](mailto:isj@hi.is))

The aim of this session is to highlight the impacts of climate change on ecosystems and ecosystem-climate feedback processes. We welcome various approaches to address questions on both direct and indirect effects of past, present and future climate change on biodiversity and ecosystem functioning, ranging from paleo-ecological, experimental to modelling approaches.

### **[EC-2] Glaciers and glacial processes**

Conveners: Hrafnhildur Hannesdóttir ([hh@vedur.is](mailto:hh@vedur.is)), Ívar Örn Benediktsson ([ivarben@hi.is](mailto:ivarben@hi.is)) and Skafti Brynjólfsson ([skafti@ni.is](mailto:skafti@ni.is))

A reduction in ice volume and area has been observed throughout the northern hemisphere, including the Arctic and Nordic regions in recent years. This leads to substantial effects on glacial river discharge, sea level, and sediment-landform assemblages, as well as the exposure of previously glaciated areas. These effects are expected to continue and magnify over the coming decades. Understanding the behavior of Arctic and sub-arctic glaciers at present is, therefore, vital for reconstructing past environmental changes and predicting future climate and glacier change scenarios. This session will address past, recent and future changes in mass balance, volume and areal extent of glaciers and their potential societal impacts, as well as current and past glaciological, glacial geological and geomorphological processes. Presentations on mapping and observational programs, modeling studies, processes and reconstructions are solicited.

### **[EC-3] Palaeoglaciology and palaeoclimate; the Nordics and beyond**

Convener: Anne Hughes ([anna.l.c.hughes@manchester.ac.uk](mailto:anna.l.c.hughes@manchester.ac.uk)) and Monica Winsborrow ([monica.winsborrow@uit.no](mailto:monica.winsborrow@uit.no))

A longer-term consideration of interactions between ice sheets and climate is essential to contextualise present-day changes, improve theoretical understanding and numerical modelling of climatic and glaciological processes, and predict future changes. Glacial and climatic archives of the high latitudes are distinctly rich and diverse having experienced multiple cycles

of ice advance and retreat. In recent decades, numerous technological and methodological developments (e.g. new dating techniques and proxies, readily-available ultra-high resolution imagery, elevation, and bathymetric datasets, and advances in numerical ice and climate modelling) have facilitated fresh insights into the glacial and climate history of these regions.

This session will address latest developments in understanding the palaeoglaciology and palaeoclimate of high-latitude regions, focusing on ice-climate interactions through glacial-interglacial cycles. We welcome submissions with a wide geographical and methodological scope; encompassing terrestrial and marine records of ice sheet and palaeoclimatic change, and implementing field, laboratory, remote sensing, and modelling approaches.

#### **[EC-4] Permafrost and periglacial processes (cooperation with [GA-1])**

Conveners: Bernd Etzelmüller ([bernd.etzelmuller@geo.uio.no](mailto:bernd.etzelmuller@geo.uio.no)), Ivar Berthling ([itb@forskningsradet.no](mailto:itb@forskningsradet.no)) and Karianne Staalesen Lilleøren ([k.s.lilleoren@geo.uio.no](mailto:k.s.lilleoren@geo.uio.no))

Permafrost and periglacial processes are common in all Nordic mountain areas, and a dominant characteristic of earth surface processes in adjacent High-Arctic areas. Permafrost is governed by complex interactions between the surface-atmosphere energy exchange, seasonally variable ground surface and sub-surface thermal characteristics, and geothermal heat flow. Climate change effects on permafrost distribution are of high societal relevance, as thawing permafrost might lead to increase release of greenhouse gasses, large-scale vegetation changes, and decreased slope stability in steep mountain areas.

Permafrost and seasonal frost drive periglacial processes have faced increased attention, e.g. in relation to slope stability, distribution of permafrost landforms (rock glaciers and palsas) as indicators for paleoclimate, and the role of ground thermal regime in landscape dynamics. The session calls for presentations addressing mapping, monitoring and modeling of permafrost and associated earth system dynamics in a changing climate, along with studies related to periglacial processes, landforms and landscapes, slope stability and permafrost related geohazards.

## **THEME 2: [UV] Understanding volcanoes**

Organizer: Sara Barsotti ([sara@vedur.is](mailto:sara@vedur.is)), Michelle Maree Parks ([michelle@vedur.is](mailto:michelle@vedur.is)) and Ásta Rut Hjartardóttir ([astahj@hi.is](mailto:astahj@hi.is))

### **[UV-1] Monitoring volcanoes and assessing their hazards**

Conveners: Sara Barsotti ([sara@vedur.is](mailto:sara@vedur.is)) and Magnús Tumi Guðmundsson ([mtg@hi.is](mailto:mtg@hi.is))

The monitoring of active volcanoes and the eruption history knowledge are two essential elements to reduce the potential impact of volcanic eruptions on the society and the environment. At the same time, assessing the potential hazard of a volcano is a complementary piece of information needed to understand to which extent a volcano is dangerous. Ideally, such assessments should guide planning in volcanic regions and form the basis for response plans to the main scenarios that have been identified. Advances have been made on several fronts the last decade in terms of monitoring tools, near-real time data processing, early-warning systems and integration of multi-disciplinary data as well as in addressing uncertainty in the hazard assessment and developing new algorithms to address cascading effects. This session welcomes any contributions investigating new challenges and recent achievements on these topics.

### **[UV-2] Volcanism in Iceland**

Conveners: Bergrún Arna Óladóttir ([bergrun@vedur.is](mailto:bergrun@vedur.is)) and Þorvaldur Þórðarson ([torvth@hi.is](mailto:torvth@hi.is))

Iceland is one of the most active and productive terrestrial volcanic regions, with eruption frequency of about 20 events per century and magma output rates around 5 km<sup>3</sup> per century. Although Iceland is dominated by mafic magmatism and volcanism, as is evident from 91:6:3 distribution of mafic, intermediate and silicic eruptions, its record also features most common terrestrial magma types and eruption styles. Postglacial volcanism is confined to the neovolcanic zones where 30 active volcanic systems are responsible for most of the Holocene activity. In this session we welcome contributions on all aspects of Icelandic volcanism during the Holocene and the Neogene.

### **[UV-3] Volcanism in the North Atlantic**

Conveners: Lars Ottemöller ([Lars.Ottemoller@uib.no](mailto:Lars.Ottemoller@uib.no)) and Esther Ruth Guðmundsdóttir ([estherrg@hi.is](mailto:estherrg@hi.is))

The history of volcanism in the North Atlantic originates in the beginning of the Paleogene and is reflected both in rift and mantle plume volcanism. In this session contributions on all aspects of North Atlantic volcanism are welcome e.g. formation of flood basalts from the continental breakup and the post breakup activity on mid-ocean ridges and Quaternary volcanic activity on Svalbard, Jan Mayen and Iceland. Regional scale studies based on geological and geophysical data that aim at investigating deeper processes also fall into the scope of this session. At much smaller scale, we like to hear from interdisciplinary monitoring campaigns of activity on the Mid-Atlantic Ridge.

#### **[UV-4] Multidisciplinary characterization of magma plumbing systems**

Conveners: Michelle Maree Parks ([michelle@vedur.is](mailto:michelle@vedur.is)) and Rikke Pedersen ([rikke@hi.is](mailto:rikke@hi.is))

Active magma plumbing systems may be investigated through interpretation of data from multiple sources, such as geochemistry of volcanic products or geophysical observations. Processes related to migration of melt from source to storage area or eruption site, magma migration, accumulation and ascent, crustal assimilation and temporal storage history all contribute to conceptualizing specific plumbing designs of volcanic systems. Insights into the governing processes on magma migration may be added from analogue modelling. However, not all aspects of magma evolution and migration can be investigated in active systems. Whereas many geophysical observation methods only provide a temporal glimpse into the life of a volcanic system, further insights into the entire life-span may be added from geochemical and structural mapping of extinct systems exposed by erosion.

Here we bring together multiple disciplines in order to enlighten a range of the complexities of volcanic plumbing systems. We invite contributions from studies of individual data sources as well as multidisciplinary approaches shedding light on active or extinct subvolcanic processes. We encourage authors to consider the multidisciplinary character of the session and present their findings in an appealing format towards a wide audience.

## **THEME 3: (GT) Geodynamics & tectonic evolution**

Organizer: Halldór Geirsson ([hgeirs@hi.is](mailto:hgeirs@hi.is)), Michelle Maree Parks ([michelle@vedur.is](mailto:michelle@vedur.is)), Ásta Rut Hjartardóttir ([astahj@hi.is](mailto:astahj@hi.is)) and Anett Blischke ([Anett.Blischke@isor.is](mailto:Anett.Blischke@isor.is))

### **[GT-1] Volcano deformation**

Conveners: Freysteinn Sigmundsson ([fs@hi.is](mailto:fs@hi.is)) and Olivier Galland ([olivier.galland@geo.uio.no](mailto:olivier.galland@geo.uio.no))

Deformation in active and ancient volcanoes is potentially an excellent proxy for revealing subsurface magmatic processes. Magma migrates and makes its own pathways by deforming the surrounding host rock and volcano roots through a variety of processes, including hydraulic elastic fracturing with predominantly tensile failure, viscous indenter mechanism with predominantly shear failure, and viscoelastic creep when magma pressure is sustained over long periods of time. The results of such processes can be observed at different scales, from outcrop-scale rock structures that reveal the propagation of magma, seismic activity reflecting stress changes associated with magma migration, to large-scale deformation of entire volcanic edifices. Numerical and analog modelling are highly valuable to better understand and quantify the correlation between magmatic processes and associated deformation. This session welcomes all contributions documenting deformation due to magmatic processes, contributing to better understanding of the processes involved.

### **[GT-2] Earthquakes & seismic processes**

Conveners: Kristín Jónsdóttir ([kristin.jonsdottir@vedur.is](mailto:kristin.jonsdottir@vedur.is)) and Vala Hjörleifsdóttir ([vala.hjorleifsdottir@or.is](mailto:vala.hjorleifsdottir@or.is))

A broad spectrum of seismology is currently being studied at universities, governmental organizations, as well as industrial companies in the Nordic and Baltic countries. This seminar aims at capturing the diversity of seismological studies in this part of the world. We welcome a wide spectrum of contributions to this session on seismological studies, earthquakes, and seismic processes. This includes studies of seismic networks and acquisition systems. Presentations highlighting Nordic cooperation and data sharing in the seismological context are especially welcome. Seismic monitoring is being conducted in all the Nordic countries and we welcome presentations highlighting interesting results of various environments, including volcano, glacial, industrial, and geothermal settings. Studies of seismic hazard, of interesting earthquakes, of earthquakes and cascading hazards and seismic structure are also welcome to our session.

### **[GT-3] Linking geodynamic evolution and paleobathymetry**

Conveners: Eivind Olavson Straume ([e.o.straume@geo.uio.no](mailto:e.o.straume@geo.uio.no)), John R. Hopper ([jrh@geus.dk](mailto:jrh@geus.dk)) and Anett Blischke ([Anett.Blischke@isor.is](mailto:Anett.Blischke@isor.is))

This session focuses on linking geodynamic processes to paleobathymetric changes through geological time, affecting ocean circulation, global and local sea level changes, and potential environmental impacts. Contributions can include modelling, observational, or theoretical studies that address bathymetric and topographic changes by processes of plate tectonics and underlying mantle convection. Interdisciplinary contributions that link geological and geophysical observations that constrain the paleogeographic evolution of continental and

oceanic terrains are especially welcome. In addition, since paleogeography is a key boundary condition in paleo-ocean circulation and climate models, we encourage studies that look at ocean and atmospheric circulation in response to paleogeographic changes.

#### **[GT-4] Oblique rift systems, micro-plate formation, and crustal build-up**

Conveners: John R. Hopper ([jrh@geus.dk](mailto:jrh@geus.dk)), Arne Døssing ([ards@space.dtu.dk](mailto:ards@space.dtu.dk)) Gwenn Peron-Pinvidic ([Gwenn.Peron-Pinvidic@NGU.NO](mailto:Gwenn.Peron-Pinvidic@NGU.NO)), and Anett Blischke ([Anett.Blischke@isor.is](mailto:Anett.Blischke@isor.is))

The session focuses on the processes responsible for the formation of propagating rift systems and micro-plates (both oceanic and continental), with special emphasis on basement fabric, tectono-magmatic architecture, and spatial and temporal evolution. We seek contributions based on structural and stratigraphic observations, geophysical and numerical modelling, geodynamic reconstructions, as well as studies that give insight into the dynamics of propagating rift systems, their asymmetry, and links to micro-plate formation in tectono-magmatically driven active or passive continental breakup. Interdisciplinary contributions are especially welcomed, as microplate formation can relate to various parameters such as plate boundary relocations, mantle plumes, wrench tectonics, multiphase rift events, or inherited lithospheric heterogeneities.

#### **[GT-5] Glacial Isostasy, Sea level change and mantle dynamics**

Conveners: Halldór Geirsson ([hgeirs@hi.is](mailto:hgeirs@hi.is)) and Björn Lund ([Bjorn.Lund@geo.uu.se](mailto:Bjorn.Lund@geo.uu.se))

The Nordic region encompasses a wide range of glacio isostatic response, with the ongoing Fennoscandinavian rebound; rapid GIA response in Iceland due to the underlying mantle plume; and accelerated ice loss at Greenland. The time varying load of glaciers drives sea level change, induces flow in the mantle, affects seismicity, changes pressures in the mantle and thereby melt production. Three dimensional variations in earth structure and load histories cause challenges in modeling and interpreting results. Great advancement has been made in the field of glaciostatic response, for example modeling and observations. We welcome all contributions on glacio isostasy, sea level change in the Nordics, other parts of Earth, or even from other planetary bodies. Contributions on other aspects of mantle dynamics are also welcome.

#### **[GT-6] Open session: Structural geology and processes of the Earth's crust**

Conveners: Ásta Rut Hjartardóttir ([astahj@hi.is](mailto:astahj@hi.is)) and Anett Blischke ([Anett.Blischke@isor.is](mailto:Anett.Blischke@isor.is))

In this session, we welcome a broad range of contributions in the field of structural geology and crustal deformation processes, both in large and small scales of surface and subsurface investigations. These contributions can be based on observational, modelling, or theoretical studies, which give valuable insight into the structure and evolution of both oceanic and continental crust, as well as the crust-mantle boundary. Interdisciplinary contributions are especially welcomed, such as contributions from specific fields in geological and geophysical studies, presenting new developments and approaches. This session therefore opens an opportunity to compare studies done along active plate boundaries to older oceanic, and continental crust domains.

## **THEME 4: [GA] Geoscience and the society: hazards and anthropogenic impact**

Organizer: Þorsteinn Sæmundsson ([steinis@hi.is](mailto:steinis@hi.is))

### **[GA-1] Geohazards in the Nordic and Arctic**

Conveners: Þorsteinn Sæmundsson ([steinis@hi.is](mailto:steinis@hi.is)), Reginald Hermanns ([Reginald.Hermanns@NGU.NO](mailto:Reginald.Hermanns@NGU.NO)), Daniel Ben-Yehoshua ([dby@hi.is](mailto:dby@hi.is)), Costanza Morino ([costanza.morino@gmail.com](mailto:costanza.morino@gmail.com))

The Nordic countries face varied spectra of geohazards, spanning from geophysical types such as volcano eruptions and earthquakes in Iceland over to quick clay landslides in Norway and Sweden, rockslides and related displacement waves in Norway and Iceland. In addition, are the Nordic countries exposed to extreme weather conditions, such as storms with high wind speeds, heavy rainfall and fast temperature changes that often result in landslides, flooding and coastal erosion. A special condition is that permafrost conditions vary from south to north strongly and special and are in the region more dominant than elsewhere in Europe. Thus there are special threats related to permafrost conditions or its disappearance due to climate change.

This session aims at presenting a wide range of geohazard studies in the arctic and subarctic regions, including case studies from various geographical, geological and topographical settings and more general evaluations of geohazards from a Nordic perspective and to discuss adaptation measures to those threats. The session is open for all types of geo and natural hazards present in the region.

### **[GA-2] Risk assessment and management of geohazards**

Conveners: Harpa Grímsdóttir ([harpa@vedur.is](mailto:harpa@vedur.is))

In recent years there has been an increased interest in the study of risk assessment and risk management in relation to geohazards. This interest is reflected both at international level, through UN organizations and the World Bank, and at regional and local levels. The world continues to see the development of extremely densely populated areas, depending on sophisticated infrastructure in order to secure necessary resources (e.g. food, water and energy). Such areas are, in many parts of the globe, exposed to threats from, i.a. earthquakes, tsunamis, rising sea level, floods and shortage of (ground) water. Smaller communities are exposed to more local threats, e.g. landslides in Norway. The key questions are: How should societies, on a large or a small scale, handle the risk posed by geohazards? What should the role of geoscientists in the risk management process be? Contributions addressing issues such as risk, hazard, vulnerability, coping capacity etc. are welcome.

### **[GA-3] Offshore, near-shore and coastal geohazards**

Conveners: Bjarni Richter ([br@isor.is](mailto:br@isor.is)) and Ögmundur Erlendsson ([ogmundur.erlendsson@isor.is](mailto:ogmundur.erlendsson@isor.is))

In this session we invite contributions from the offshore industry as well as from researchers and land-use planning groups in coastal settings. We also welcome contributions regarding offshore geohazards that have become a topic of great importance about risk mitigation and environmental protection. Offshore resources management, such as fisheries, mineral-, geothermal- or hydrocarbon prospecting, and the planning of offshore installations and

sustainable energy usage, e.g. offshore wind parks, have rapidly developed and move increasingly from nearshore to deeper waters across the world's coastal to deeper shelf areas. Main offshore geohazards include slope instability, seabed condition uncertainties, underground blowouts due to effects of shallow hydrocarbon, or magmatic sourced gas or gas hydrates releases.

## **THEME 5: [IP] Igneous and Metamorphic Geochemistry**

Organizer: Sæmundur Ari Halldórsson ([saemiah@hi.is](mailto:saemiah@hi.is)) and Bjarni Gautason ([bjarni.gautason@isor.is](mailto:bjarni.gautason@isor.is))

### **[IM-1] Mineralogy, general session**

Conveners: Tobias Weisenberger ([tobias.weisenberger@hi.is](mailto:tobias.weisenberger@hi.is)) and Kristján Jónasson ([kristjan@ni.is](mailto:kristjan@ni.is))

Minerals are the basic ingredients of geology. Mineralogy provides the insights into the nature, properties, and stability of minerals, but it is rapidly progressing towards multiple new applications of mineralogical data and technological advancements that utilize minerals and their synthetic equivalents. This session focuses on the composition, structure, and stability of minerals in the different environments of the world, whether they are generated at the Earth's surface, deep within the Earth, or in other exotic circumstances. Contributions on mineralogy in general are welcome.

### **[IM-2] Igneous and magmatic processes - past and present**

Conveners: Sæmundur Ari Halldórsson ([saemiah@hi.is](mailto:saemiah@hi.is)), Olgeir Sigmarsson ([olgeir@hi.is](mailto:olgeir@hi.is)) and Guðmundur H. Guðfinnsson ([gudmhg@hi.is](mailto:gudmhg@hi.is))

Understanding igneous processes is key to elucidating Earth's formation and evolution, including the formation of major crustal types and ore deposits. Micro- to macro-scale observations by means of varied array of both classic, but also state-of-the-art, geochemical and petrological methods are allowing for an increasingly improved understanding of the wide range of igneous and magmatic processes at play, both past and present. We welcome contributions from disciplines that include, but are not limited to, geochemistry and petrology, that seek to shed light on igneous and magmatic processes and their timescales.

### **[IM-3] Metamorphism and crustal fluids**

Conveners: Enikő Bali ([eniko@hi.is](mailto:eniko@hi.is)) and Bjarni Gautason ([bjarni.gautason@isor.is](mailto:bjarni.gautason@isor.is))

The interplay between mineral reactions, deformation and the presence of fluids govern metamorphic and metasomatic processes within the Earth's mantle and crust and triggers changes through time. In order to better understand these processes, we need to combine field observations, microstructural and fluid inclusion studies, geothermobarometry with geochemical and thermo-mechanical modelling. In this session we invite contributions from all aspects of metamorphic petrology and geochemistry from deep crustal to shallow levels across different crustal lithologies.

## **THEME 6: [ER] Earth resources**

Organizer: Daði Þorbjörnsson ([dadi.thorbjornsson@isor.is](mailto:dadi.thorbjornsson@isor.is)), Eydís Salome Eiríksdóttir ([ese@hafogvatn.is](mailto:ese@hafogvatn.is)) and Sandra Ósk Snæbjörnsdóttir ([sandra@carbfix.is](mailto:sandra@carbfix.is))

### **[ER 1] Geothermal research and utilization**

Conveners: Daði Þorbjörnsson ([dadi.thorbjornsson@isor.is](mailto:dadi.thorbjornsson@isor.is)) and Ingvi Gunnarsson ([ingvi.gunnarsson@on.is](mailto:ingvi.gunnarsson@on.is))

The thermal state of the Earth controls a wide range of geological processes. As such, terrestrial heat flow studies are of prime importance for understanding the past, present and future of our planet and for planning the use of its natural resources. In addition, the growing demand for new and clean energy sources has renewed the interest in geothermal energy. Recent technological advances have dramatically expanded the range and size of viable thermal resources thereby opening a potential for widespread geothermal utilization. The goal of this session is to give an overview on the recent progress made in the field, the potential environmental impact of geothermal utilization, as well the future of geothermal energy as a potential solution to the energy crisis facing the globe.

### **[ER 2] Geological storage of CO<sub>2</sub>**

Conveners: Sandra Ósk Snæbjörnsdóttir ([sandra@carbfix.is](mailto:sandra@carbfix.is)) and Deirdre Clark ([deirdre.clark@isor.is](mailto:deirdre.clark@isor.is))

Substantial and sustained reduction of anthropogenic CO<sub>2</sub> emissions to the atmosphere are needed to achieve the goals of the Paris agreement and constrain the current rapid warming to 1,5-2°C. Carbon capture and storage (CCS) solutions play an important role in the transition towards carbon neutrality. CCS includes a range of processes for CO<sub>2</sub> capture, separation, transport, storage, and monitoring, and is considered the key technology for reducing emissions from fossil fuel power plants while these are still part of the energy systems, limiting emissions from many industrial processes such as steel, aluminium and cement production, and to deliver "negative emissions" by removing and permanently storing CO<sub>2</sub> captured directly from air by the second half of the century. This session addresses all aspects of geological storage of CO<sub>2</sub> through deep storage of liquid or supercritical CO<sub>2</sub> and CO<sub>2</sub> storage via carbon mineralisation of mafic and ultra-mafic rocks. Contributions on topics such as site characterisations, analysis of natural analogues, monitoring techniques, reservoir modelling and validation methods are encouraged.

### **[ER 3] Hydrology, hydrogeology, and weathering**

Conveners: Eydís Salome Eiríksdóttir ([ese@hafogvatn.is](mailto:ese@hafogvatn.is)) and Þráinn Friðriksson ([thrainn.fridriksson@or.is](mailto:thrainn.fridriksson@or.is))

Water is one of the Earths' resources which is of major importance to all processes, organic and inorganic. Water is continuously cycled between its various reservoirs through various processes of evaporation, condensation, precipitation, deposition, runoff, infiltration, and groundwater flow. Understanding the processes involved in the water cycle and the properties of freshwater systems is essential for sustainable utilization, to avoid pollution and protect freshwater ecosystems. This session welcomes abstracts regarding surface- and groundwater

resources, floods and droughts, hydrological and hydrogeological mapping, monitoring and exploration, physical and chemical surface and subsurface weathering, climate effects on the hydrological cycle and weathering, water utilization, environmental concerns and water pollution, biogeology, groundwater models and other matter of this subject.

#### **[ER 4] Deep sea minerals**

Conveners: Børge Johannes Wigum ([BorgeJohannes.Wigum@heidelbergcement.com](mailto:BorgeJohannes.Wigum@heidelbergcement.com)) and Steinar Ellefsmo ([steinar.ellefmo@ntnu.no](mailto:steinar.ellefmo@ntnu.no))

Minerals are required for a sustainable development and minerals support the Green Shift. Solar panels, wind-turbines and the construction or modification of power grids to realize electrification and decarbonization efforts, will increase the demand of metal such as copper by between 275 and 350% in 2050. The need for developing mineral resource on the deep ocean floor to meet this increased demand is debated. This session on deep sea minerals will cover the value chain from understanding the deep geological processes that forms the potential deposits, to processing technologies via environmental concerns, exploration strategy development and exploration technologies, resource potential assessment and technologies for ore extraction. Focus will be on the Arctic Mid-Atlantic ridge with potential contributions from leading international research institutions.

#### **[ER 5] Metal and mineral resources**

Conveners: Bryndís G. Róbertsdóttir ([bgr@os.is](mailto:bgr@os.is)) and Hjalti Franzson ([hjaltif@simnet.is](mailto:hjaltif@simnet.is))

The systematic exploration and exploitation of minerals and metals has been evolving from the dawn of civilization. This evolution is driven by the need for a particular product within each society. The occurrence is, however, heavily dependent on the respective geological environment. Not only do the Nordic countries exhibit very varied geological features ranging from Pre-Cambrian to Neo-volcanic oceanic crust but are also at a very different stage in the development of exploration and mining of economic metal deposit. Common to many of the processes that lead to metalliferous anomalies is related to magmatism and associated geothermal activity. This session welcomes presentations concerning geological evolution of metalliferous anomalies, their exploration and mining.

#### **(ER-6) Basin analysis and sedimentology**

Convener: Ingrid Anell ([ingriane@geo.uio.no](mailto:ingriane@geo.uio.no))

Sedimentary basins host a vast amount of geological resources including fossil fuels, drinking water, geothermal water, minerals, ores and building materials. Advances in understanding the formation and development of basins and the distribution and quality of sedimentary successions within the basins, contributes to more sustainable and resource intensive extraction or use of resources. Our understanding of basins and their infill history, the formation of different depositional environments and the subsequent sedimentary rock characteristics, the post-depositional history, compaction, alteration and fluid circulation is approached through a variety of geological and geophysical methods. Technological advances have in recent years revolutionized the level of detail and insight which can be gathered. This session calls for contributions on recent and on-going advances within a wide range of topics related to basin formation and advances in sedimentology. Contributions might feature but are not limited to topics such as sedimentary basins in various tectonic settings, sediment routing, rates and source

to sink, depositional environments and process regime, stratigraphy, reservoir and seal characterization, and post-depositional processes and diagenesis.

## **THEME 7: [IS] Interdisciplinary sessions**

Organizer: Bjarni Gautason ([bjarni.gautason@isor.is](mailto:bjarni.gautason@isor.is))

### **[IS-1] Planetary Geoscience**

Conveners: Susan Conway ([susan.conway@univ-nantes.fr](mailto:susan.conway@univ-nantes.fr)) and Andreas Johnsson ([andreasj@gvc.gu.se](mailto:andreasj@gvc.gu.se))

We welcome contributions that are focused on the study of geoscience topics applicable or centered on celestial bodies other than our own. Topics can include studies of the interiors, surfaces, and/or atmospheres of the terrestrial planets, asteroids, comets, moons or exoplanets. We specifically encourage contributions using Iceland as an analogue with a natural bias towards Mars as the scientific focus.

### **[IS-2] Computers and geosciences: Developments in modelling, machine learning, and visualization.**

Conveners: Tobias Bauer ([tobias.bauer@ltu.se](mailto:tobias.bauer@ltu.se)) & Tero Niiranen ([tero.niiranen@gtk.fi](mailto:tero.niiranen@gtk.fi))

This session addresses research in modelling, machine learning and visualization in Geosciences. We invite contributions from 3D & 4D geomodelling, common earth modelling, machine learning applied to geo data, big data analysis, Virtual Reality, model visualization and related technologies. Topics cover both basic research as well as applications in all branches of geosciences.

### **[IS-3] Geoheritage, geoparks and geotourism**

Conveners: Berglind Sigmundsdóttir ([berglind@katlageopark.is](mailto:berglind@katlageopark.is)) and Lovísa Guðrún Ásbjörnsdóttir ([Lovisa.G.Asbjornsdottir@ni.is](mailto:Lovisa.G.Asbjornsdottir@ni.is))

The recognition and knowledge of geoheritage and geodiversity has been steadily growing over the past decades. Increasing demand of exploitation of Earth's resources has at the same time led to an urgent need for protecting international valuable and important geological phenomena. National and international inventory and assessment of geoheritage is essential for geoconservation. UNESCO Global Geoparks recognise geoheritage and geoconservation as being a fundamental resource in a territorial development and through capacity building and education they promote sustainable use of geological resources.

The aim of this session is to elaborate on how we can better inform our society and decision makers about the importance of geoheritage and the need for protecting it. We invite to this session contribution about geoheritage, geodiversity and geoconservation, geoparks and geotourism.

### **[IS-4] General contributions to geoscience**

Conveners: Bjarni Gautason ([bjarni.gautason@isor.is](mailto:bjarni.gautason@isor.is))

In this session we welcome contributions that do not fit in any of the advertised Themes and Sessions.

## **THEME 8: [AG] Applied geology**

Organizer: Børge Johannes Wigum ([BorgeJohannes.Wigum@heidelbergcement.com](mailto:BorgeJohannes.Wigum@heidelbergcement.com)) & Hafdís Eygló Jónsdóttir ([hej@vegagerdin.is](mailto:hej@vegagerdin.is))

### **[AG-1] Aggregates Production and Utilisation**

Conveners: Hafdís Eygló Jónsdóttir ([hej@vegagerdin.is](mailto:hej@vegagerdin.is)) and Alexandra Björk Guðmundsdóttir ([alexandra@bmvalla.is](mailto:alexandra@bmvalla.is))

This session welcomes any topic regarding aggregates, right from production to utilisation. Aggregates are used in number of ways in all kinds of constructions. They are very important in our daily life and are the most used material in the world. Aggregates are non-renewable sources, and some have limited availability. The end use of aggregates varies and therefore specifications for example for shape, abrasion, durability and frost resistance differs greatly. Aggregate production in the field, aggregate testing at research laboratories and utilisation of aggregates in different constructions is the essential constituent of this session.

### **[AG-2] Geological Resources - Geomaterials**

Conveners: Børge Johannes Wigum ([BorgeJohannes.Wigum@heidelbergcement.com](mailto:BorgeJohannes.Wigum@heidelbergcement.com)) and Þorbjörg Hólmgeirsdóttir ([thh@mannvit.is](mailto:thh@mannvit.is))

This theme includes the utilization of non-energy and non-metallic rocks and minerals as raw materials for industrial purposes, for the sustainable and beneficial use in the society. This includes, but not limited to, exploration and utilization of industrial minerals, resource assessment and utilization of natural sand and gravel vs. crushed rock, exploration and testing of natural pozzolans as Supplementary Cementitious Materials (SCM's), and production and utilisation of natural stones.

### **[AG-3] Engineering Geology**

Conveners: Jón Haukur Steingrímsson ([jon.haukur.steingrimsson@efla.is](mailto:jon.haukur.steingrimsson@efla.is)) and Atli Karl Ingimarsson ([atli@mannvit.is](mailto:atli@mannvit.is))

This session covers the interdisciplinary fields of the earth sciences and engineering, particularly geological and geotechnical engineering. It is focused on geological or engineering studies that are of interest to engineering geologists. Topics of interest include, but not limited to, cases related to rock mechanics/tunnels and landslides (combined with theme 4).

## **THEME 9: [RS] Remote Sensing in geosciences**

Organizer: Joaquín M.C. Belart ([joaquin@lmi.is](mailto:joaquin@lmi.is)) and Gro B.M. Pedersen ([gro@hi.is](mailto:gro@hi.is))

### **[RS-1] Remote sensing of the cryosphere**

Conveners: Joaquín M.C. Belart ([joaquin@lmi.is](mailto:joaquin@lmi.is)), Eyjólfur Magnússon ([eyjolfm@hi.is](mailto:eyjolfm@hi.is)), Andri Gunnarsson ([andri.gunnarsson@landsvirkjun.is](mailto:andri.gunnarsson@landsvirkjun.is))

Several aspects of the cryosphere are considered as essential climate variables, and their study has been drastically expanded with the large amount of remote sensing observations in the past decades. This session welcomes studies using remote sensing datasets with applications in the cryosphere, i.e. glaciers, ice sheets, snow and permafrost.

This includes, but is not limited to, studies focused on monitoring and measurement of glacier changes, ice sheet changes, glacier and ice sheet velocities, glacier and ice sheet mass balance and contribution to sea-level rise, measurement and monitoring of albedo changes, permafrost and snow, as well as characterization and study of properties of the cryosphere with remote sensing.

### **[RS-2] Monitoring of geohazards and environment**

Conveners: Ragnar Prastarson ([rhth@vedur.is](mailto:rhth@vedur.is)), Vincent Drouin ([vd@isor.is](mailto:vd@isor.is)), Sydney Gunnarson ([sydney@svarmi.is](mailto:sydney@svarmi.is))

This session is focused on Remote Sensing sensors and techniques for monitoring of a variety of Earth Systems, geohazards and environment. It also encourages novel techniques and algorithms for automated processing and setup of warning systems based on Remote Sensing. Examples of such applications are: Remote sensing applications on slope instabilities, use of remote sensing during volcanic unrest, study of co-seismic and post seismic deformations, floods and jökulhlaups and snow avalanches. Special focus is given to the use of Copernicus data (e.g. Sentinel) for near-real time monitoring.

### **[RS-3] Earth observations for marine and coastal environments**

Conveners: Lilja Run Bjarnadóttir ([Lilja.Bjarnadottir@NGU.NO](mailto:Lilja.Bjarnadottir@NGU.NO)), Ögmundur Erlendsson ([ogmundur.erlendsson@isor.is](mailto:ogmundur.erlendsson@isor.is)), Bryndís Brandsdóttir ([bryndis@raunvis.hi.is](mailto:bryndis@raunvis.hi.is)), Davíð Þór Óðinsson ([david.thor.odinsson@hafogvatn.is](mailto:david.thor.odinsson@hafogvatn.is)), Árni Þór Vésteinsson ([Arni@LHG.IS](mailto:Arni@LHG.IS))

Successful sustainable management and development of marine areas hinges on robust observations of the seabed, sea surface and coastal areas. This is of particular relevance in the context of climate change and rapid sea level rise. Information on seabed and coastal geology is also a key part to aid our understanding of the role of geology in marine ecosystem services, as a foundation for habitat mapping. Remote sensing provides a wealth of observations, yielding new insights to marine and coastal dynamics and seabed morphology.

In this session, we welcome a broad range of contributions focused on remote sensing data and techniques for the mapping and monitoring of the seabed landscape and substrate, sea surface, sea ice, as well as coastal mapping and monitoring. We also welcome automated and semi-automated mapping approaches, as well as studies related to the implementation of sustainable industry applications, e.g. from fisheries or coastal installations.

#### **[RS-4] Use of Remote Sensing for geological mapping**

Conveners: Gro B.M. Pedersen ([gro@hi.is](mailto:gro@hi.is)), Birgir Óskarsson ([birgir.v.oskarsson@ni.is](mailto:birgir.v.oskarsson@ni.is)), Gunnlaugur Einarsson ([gunnlaugur.m.einarsson@isor.is](mailto:gunnlaugur.m.einarsson@isor.is))

Remote sensing is becoming an essential tool for geological mapping. The wealth of remote sensing platforms, data and techniques provide numerous opportunities for information extraction for field work planning, data collection, processing, and analysis.

In this remote sensing session, we aim to bridge the gap between advanced information processing capabilities and the end-user earth scientist. We aim to discuss requirements and suitability of remote sensing data, including optical sensors (panchromatic, multispectral, hyperspectral and thermal), SAR, lidar or their combination, requirements to suitable image quality (radiometric, spatial and temporal resolution), platforms (UAV, airplanes, spaceborne or terrestrial sensors), need of pre-processing and determination of suitable image analysis. This also includes effective multi-temporal data analysis methods which provides challenges for optimal analysis of Earth observations data due to irregular temporal sampling, seasonal effects and imperfect registration.

We welcome contributions on terrestrial, airborne and spaceborne lidar and photogrammetry, multispectral and hyperspectral classification, data fusion and automated classification and change detection techniques.

#### **[RS-5] Geoscience data repositories and benchmarks**

Conveners: Benjamin Hennig ([ben@hi.is](mailto:ben@hi.is)), Ásta Kristín Óladóttir ([asta.k.oladottir@lmi.is](mailto:asta.k.oladottir@lmi.is)), Helmut Neukirchen ([helmut@hi.is](mailto:helmut@hi.is))

Geoscience data repositories and benchmark datasets are central to the organisation and access of open data to the research community and to the public. Such repositories enable new fields of conducting interdisciplinary science, integrating wide-ranging data sources, and they strive to ensure that research outputs (e.g., data, software, technology, or physical samples) are curated in an open and fair manner, having essential documentation, human-readable and machine-readable metadata in standard formats that are publicly accessible.

Researchers are encouraged and often even required by journals and grant giving organisations to make their data available, which later benefits them by giving proper credit and rewards for their works, in a similar manner to the way that scientific publications benefit researchers.

Thus, researchers and research institutions worldwide have started devoting significant efforts into creating and organising such rapidly growing repositories. In this session we would like to invite contributions that introduce new data repositories and science outputs that were generated through such repositories. The aim of this session is to provide an overview of ongoing initiatives of geoscience data repositories in the Nordic research community as well as having an open discussion about challenges and opportunities with different data curation strategies.