

# Bidding Document

# 33<sup>rd</sup> IGC 2008 NORDIC COUNTRIES



Vote **Nordic**

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Invitation to the 33<sup>rd</sup> IGC in 2008 presented at the 31<sup>st</sup> IGC  
in Rio de Janeiro 2000

Support by Governmental, National, Regional and Local  
Authorities and support by National Earth Sciences Institutions

Editors: Richard Sinding-Larsen  
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Design: Erik Hårberg, NGU. Cover by Temp

Print: Skipnes, Trondheim

Publication date: 2004, July 27

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Norden welcomes you  
to the lands of  
“Fire and Ice”



## 33<sup>rd</sup> IGC

### EXECUTIVE SUMMARY

The Nordic Geoscience Community proposes that the 33<sup>rd</sup> International Geological Congress should be held in Oslo, from 5 - 14<sup>th</sup> August, 2008. Close Nordic collaboration in the realms of science and culture provide the platform for this invitation.

We propose that IGC 2008 focuses not only on the five Nordic countries (Norden) - Denmark (with the Faeroe Islands and Greenland), Finland, Iceland, Norway and Sweden, but on the entire Arctic realm. Norden, alone, extends over more than a quarter of the Globe, north of 60°N and its geology spans the whole timescale. It ranges from the old continental cores of the Fennoscandian and Greenland (Laurentian) shields to the oceanic domains of the North Atlantic and Arctic Basins -

from the oldest (Isua, Greenland) to the youngest (Surtsey, Iceland) rocks on Earth. Lithospheric processes can be studied through time, from on-going and Tertiary sea-floor spreading, back through Mesozoic rifting to Palaeozoic and Precambrian orogeny. Environments, ranging from the European lowlands to the high Arctic deserts, provide ideal natural laboratories for studying processes in the atmosphere, hydrosphere and lithosphere, and interactions between these and the biosphere. The Arctic realm is ideally suited for palaeoenvironmental studies and today's sensitive environment is particularly favourable for researching on-going variability and change.

Geological resources have been of profound importance for the Nordic societies for many centuries, as they are today. Exploitation of metal ores and industrial minerals, fossil fuel (mainly oil and gas) and geothermal and hydroelectric energy, are vital components of the Nordic economy. In Norden, there is a particular concern that exploitation shall not degrade the environment.

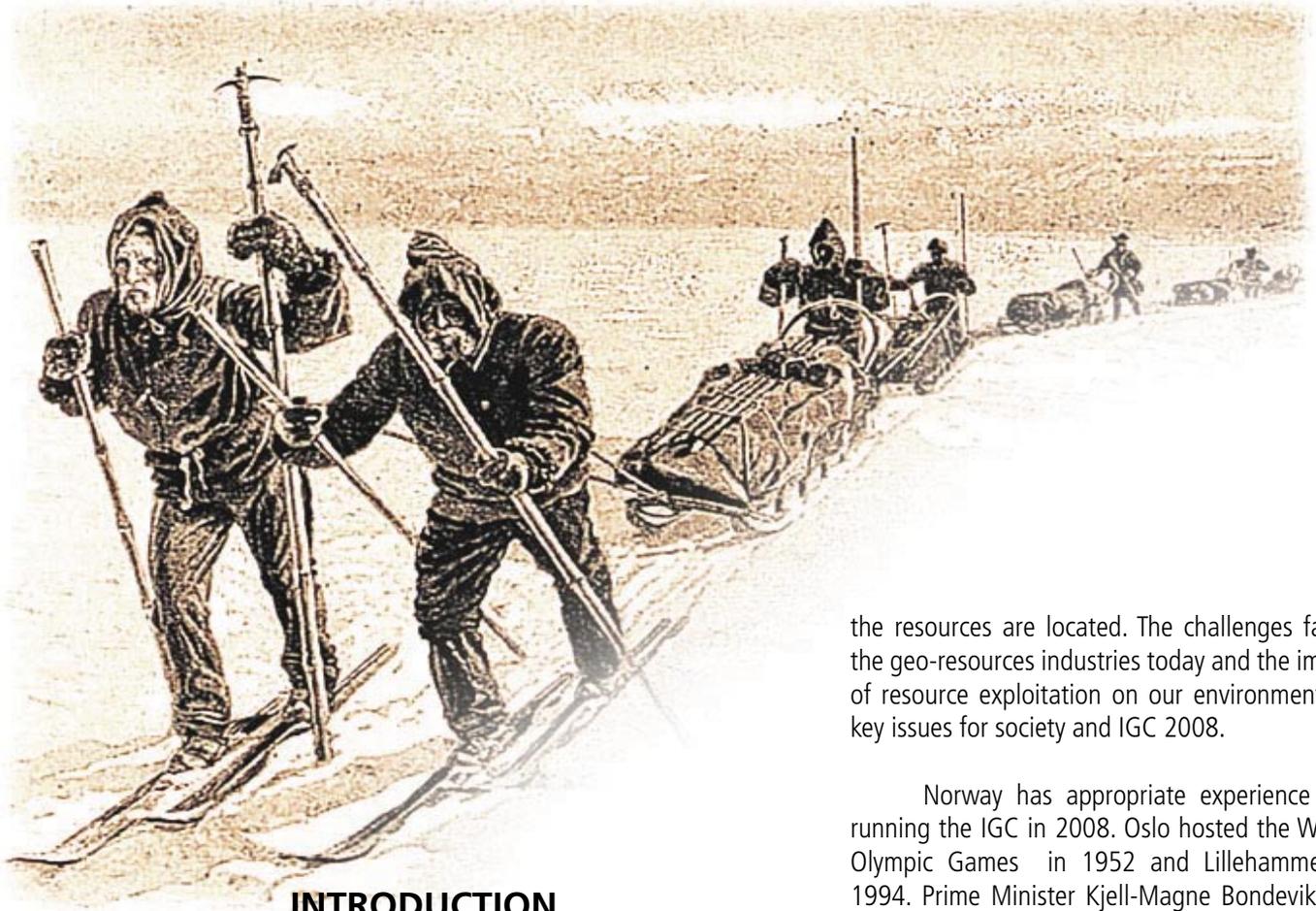
The IGC 2008 programme highlights the global theme **earth system science: foundation for sustainable development** and provides a Nordic perspective. Classical Earth Science is augmented today by a wide range of multidisciplinary fields of research; geosphere-biosphere interactions are particularly important. IGC 2008 will reflect these developments. The meeting will be organised in Topical, Special and General Symposia. The first of these will concern interdisciplinary global themes, the second will specially focus on major themes concerning the Nordic and Arctic realm, and the third will provide fora for the many different disciplines composing Earth Science.

With regard to the Special Symposia, we are organizing a consortium to cover all aspects of Arctic geoscience. For the Topical Symposia, we encourage colleagues worldwide to contribute to the programme which will also be a forum for presenting results from the International Year of the Planet Earth.

The Nordic countries allow a wide range of excursions. These will be organized before, during and after the Congress and be well integrated with the congress themes. The excursions include the high Arctic environments of Svalbard and Greenland, classical orogens and basins, world-class mineralizations, volcanism, divergent plate boundaries, impact structures, and other less familiar targets, including new Geoparks. Oslo itself is a superb location for one-day trips to the Precambrian, Caledonides, Upper Palaeozoic graben with related igneous rocks, glacial features and post-glacial landscapes. In addition, our close neighbours, Russia, the Baltic States and the United Kingdom, will provide outstanding excursion targets.

IGC 2008 is the global meeting place for the International Union of Geological Sciences (IUGS) and will be a venue for many other international geoscience organizations, providing facilities for holding both symposia and business meetings. 2008 will be the perfect time to present results from "International Year" initiatives - such as the International Polar Year and the International Year of the Planet Earth. It will also be a favourable location for small workshops and short courses. A Geohost programme will promote the attendance of young scientists. A social programme will provide participants and accompanying persons with a wide range of cultural activities. As a venue, Oslo offers spacious, modern and easily accessible conference facilities and accommodation ranging from First Class Hotels to Youth Hostels.





Nansen and his group  
cross the high Arctic  
(1888)

## INTRODUCTION

International Geological Congresses were held in Norden twice during the last century, in Stockholm in 1910 and Copenhagen in 1960. These meetings were of great benefit for both the geoscience community at large and the Nordic countries. The time is ripe for another Geo-Congress in this part of the world; its location, in Oslo, appropriately reflects the enterprise of Norwegian Earth Science today and the importance of geo-resources for society. Strong support from industry, academia and the Nordic geoscience community in general, is guaranteed; and there is an extra incentive - the Geological Survey of Norway celebrates its 150<sup>th</sup> anniversary in 2008.

The congress in Copenhagen, nearly half a century ago, was the first time a group of countries joined forces to run an IGC. This meeting promoted the creation of the IUGS. Its emphasis on the importance of a global perspective stimulated the crystallization, later in the 1960's, of the plate tectonics paradigm. Earth Science changed fundamentally in the 1960's. Since then, recognition of the importance of the planetary context and the development of remote sensing and other technologies have revolutionized our understanding of how the Earth works and where

the resources are located. The challenges facing the geo-resources industries today and the impact of resource exploitation on our environment are key issues for society and IGC 2008.

Norway has appropriate experience for running the IGC in 2008. Oslo hosted the Winter Olympic Games in 1952 and Lillehammer, in 1994. Prime Minister Kjell-Magne Bondevik and Mayor of Oslo Per Ditlev Simonsen join the IGC 2008 Bidding Committee in extending a warm welcome to the World Geoscience Community.

## Nordic Exploration and Science Legacy

This proposal to hold the World Geo-Congress 2008 in Oslo obtains its inspiration from the pioneering achievements of Nordic explorers and scientists. It goes back to the Viking era and the discoveries of Greenland by Erik the Red and America by his son Leifur Eriksson. Increasingly, over the years, exploration, especially of the Polar Regions, has gone hand in hand with science. Proximity to the high Arctic has tempted Nordic explorers northwards, with innumerable expeditions to Greenland and Svalbard and many of the other high Arctic coasts and islands. The names of Vitus Johanssen Bering, Adolf Erik Nordskiöld, Fridtjof Nansen, Roald Amundsen, Vilhjalmur Stefansson and many others are indelibly inscribed in the history of scientific exploration. Nansen's Fram expedition, drifting across the Arctic basin from 1893 to 1896 was not only an epic journey in a class of its own, but also laid the foundation for our understanding of the deep Arctic Ocean, with its blanket of constantly moving ice - the plague and frustration of most high Arctic science today.

## Earth Science and the Nordic Scene

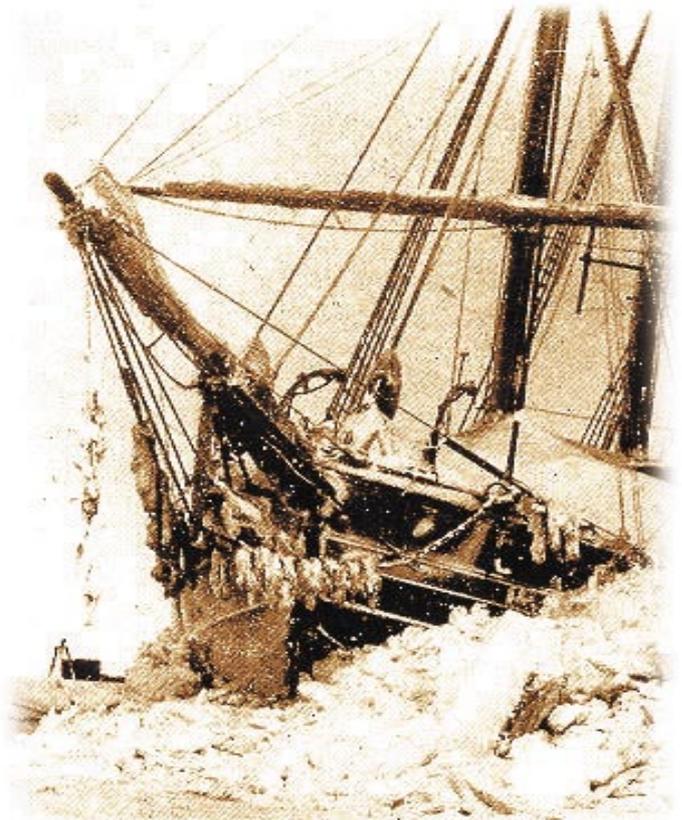
The nineteenth century witnessed a scientific revolution that was led by highly interdisciplinary individuals like Charles Darwin, with experience of global geology and amazing insight in biology. Much of the twentieth century was a time when the natural sciences disintegrated into a multiplicity of disciplines. Today, there is a growing awareness that although many of our technologies require great expertise in a single discipline, the major problems need a multidisciplinary approach both for their definition and solution. Industry was quick to recognize this need and, as the focus of the petroleum industry moved off-shore, the integration of geology and geophysics with a wide-range of other marine research, proved to be essential for understanding the dynamics of continental rifting, the development of the shelves and ocean margins and the location of oil and gas.

At the time of the Copenhagen IGC, the potential of the continental shelves for hydrocarbons was, at most, no more than a mirage on the horizon. In the late 1950's and early 1960's, marine geophysics was in its infancy, but growing fast. Sea-floor spreading had been conceived, but was not clearly understood until the marine magnetic anomalies over the mid-ocean ridges were defined and interpreted. Thereafter, sea-floor spreading and subduction provided plausible mechanisms for continental drift and opened the door for kinematic analysis of the constantly moving plates. For nearly forty years, plate tectonics has provided the guiding paradigm for understanding most aspects of Earth's crust and mantle. Nevertheless, the changes in our science over the last forty years have also been spectacular. Many have been technology-driven, with the sophistication of the new remote-sensing technologies, the development of high precision mass-spectrometry (not least for isotope dating), 3D seismics for mapping the crust, and teleseismic tomography for imaging the whole planet. Seeking a better understanding of the Earth's origin and evolution in a planetary context, and with the spotlight turned on our neighbours Mars and Venus, provides a source of fascination for everyone on Earth.

In Norden today there are two vigorous developments. The first is based on a recognition that small "sub-critical" neighbouring countries can benefit greatly from big science and technology by close cooperation. The Nordic Council of Ministers strongly promotes research and innovation with many new initiatives, not least by financing the

establishment of Nordic research schools and internationally attractive centres of excellence. In parallel with this, there are national programmes to promote multidisciplinary research centres. Classical Earth Science, established on a foundation of maths, physics and chemistry, is expanding to embrace a wide range of other disciplines; industry is a strong partner. These trends will guide the Geo-Congress 2008 programme.

The Nordic countries with a combined population of about 25 million people have a higher number of Earth scientists per capita than the European Union and the United States of America. The Earth Sciences, in general, have a prominent position in the overall scientific profile of the Nordic countries and the research is internationally recognised as being of high quality. This reflects economic dependence on natural resources and a long history of exploration and exploitation. In this respect, classical Earth Science still has a stronghold in Norden; as will be amply demonstrated in the Congress Symposia and excursions.



The polar ship 'Fram'

## THE GEOLOGY OF THE NORDIC REALM

The Nordic countries reach from Greenland and the Svalbard archipelago in the high Arctic to the Central European Plains of southern Denmark. The region includes parts of the Eurasian and the North American continents and the intervening Norwegian-Greenland Sea of the North Atlantic Ocean. In plate tectonic terms, the region is shared between two lithospheric plates separated by the Mid-Atlantic Spreading Ridge. One of the Nordic countries, Iceland, straddles the actual plate boundary and is the best known surface exposure of a modern ocean ridge system; it therefore represents a unique study area for most phenomena associated with ocean spreading, active volcanism and mantle chemistry.

In crustal terms, the Nordic region spans from the oldest to the youngest rocks on Earth, i.e. from the Archaean cores of the Fennoscandian and Greenland (Canadian) shields to the newly formed oceanic crust of Iceland. South-western Greenland provides one of the most extensive occurrences of lower Archaean rocks, the 3.8 Ga Isua supercrustal sequence, whilst the Fennoscandian Shield contains some of the world's oldest ophiolites - both Palaeoproterozoic and late Archaean. Evidence of the role of plate tectonics in early Earth evolution is widespread in the volcanic arc associations, greenstone belts and deep marine successions of the Precambrian orogens.

The Caledonide Orogen of western Scandinavia, eastern Greenland and Barentsia has contributed much to the understanding of orogenic processes in the early Phanerozoic. Being one of the best exposed major orogens on Earth, this mid-Palaeozoic mountain belt has been a paradise for stratigraphers, structural geologists and petrologists over the last hundred years, since the early demonstration of vast nappe translations by Törnebohm in 1888. The mountains between Norway and Sweden today are world-famous also for their superb ophiolites (remnants of the Iapetus Ocean) and island-arc magmatism, high and ultra-high pressure metamorphism and numerous studies of exhumation of the lower crust - the interplay of compression and extension during orogeny.

The Caledonide Orogen of the Nordic realm was split apart by post-orogenic extension and rifting in the late Palaeozoic and Mesozoic. This region experienced ca. 300 million years of rifting, resulting in some of the world's largest extensional detachments; it paved the way for ocean-opening in the Tertiary and the development of one of Earth's larger hydrocarbon provinces. The North Sea is covered with an exceptionally good industry and academic data base. About 40 years of active exploration in the North Sea has led to an advanced level of understanding of the geological evolution and complexity of the basin. The Vøring margin, off mid Norway, is among the best studied volcanic margins globally due to a regional coverage of geophysical and geological data. Furthermore, the successful scientific drilling through a sequence of seaward dipping reflectors has greatly contributed to the understanding of this margin. Thus, the geology of the Nordic countries, from the Archaean to the present, demonstrates well the plate-tectonic cycles of continental break-up, sea-floor spreading, accretion of juvenile crust and continental collision, that relentlessly form and change our global environment. Iceland's location on the mid-Atlantic spreading centre has been a key area for understanding plate movement. And from this relatively well-studied Nordic domain, the IGC 2008 will reach into the vast unknown of the Arctic Basin, with its complex distribution of continental and oceanic crust and the strongly differing interpretations of the basin evolution.

The Nordic countries contain many classical localities for understanding geological processes. Pleistocene glacial deposits were described and interpreted nearly two hundred years ago, establishing a tradition for the study of glacial processes and their products. Hundred years ago, work on glacial varves provided a time-frame for understanding the development of Holocene land forms and the interrelationship of glacial loading, crustal down-warping, deglaciation and land uplift - the complex interplay of mantle dynamics and climate change that drives landscape evolution. And with regard to ancient glacial episodes, the Neoproterozoic deposits are particularly well studied. On the continental shelves of the Vendian to Early Palaeozoic Iapetus Ocean, Eocambrian tillites were deposited. These superbly exposed glacial strata were some of the first in the world to be described, and the Nordic realm is now a prime research target for the Neoproterozoic "Snowball Earth" hypothesis.

Nordic civilization has been founded on geo-resources and growth has been fuelled by them. Coal mining promoted the move away from wood. The mining of iron ore, copper and silver funded much of the Scandinavian expansion at the end of the Middle Ages. Many other metals have been discovered and have proved important in the last century for Finnish, Norwegian and Swedish economies. The most modern technologies characterize the scene today (for example, in Kiruna where much of the mining is remote-controlled). Industrial minerals experience a rapidly expanding market. Geothermal energy, long established as of paramount importance on Iceland, is now spreading everywhere in Norden. Hydroelectricity is a prime source of cheap electricity; nuclear power

is widely used in Sweden and Finland, where it is expanding. And over the last forty years, oil and gas have come to dominate the Nordic realm, first and foremost are the Norwegian and Danish sectors of the North Sea, and in the Norwegian Sea area. Now, as the off-shore targets become more difficult, the less accessible Arctic areas off the coasts of western and eastern Greenland and in the Barents Sea are attracting more attention. Elsewhere along the wide high Arctic continental shelves, the logistics are difficult, but the resource potential vast.

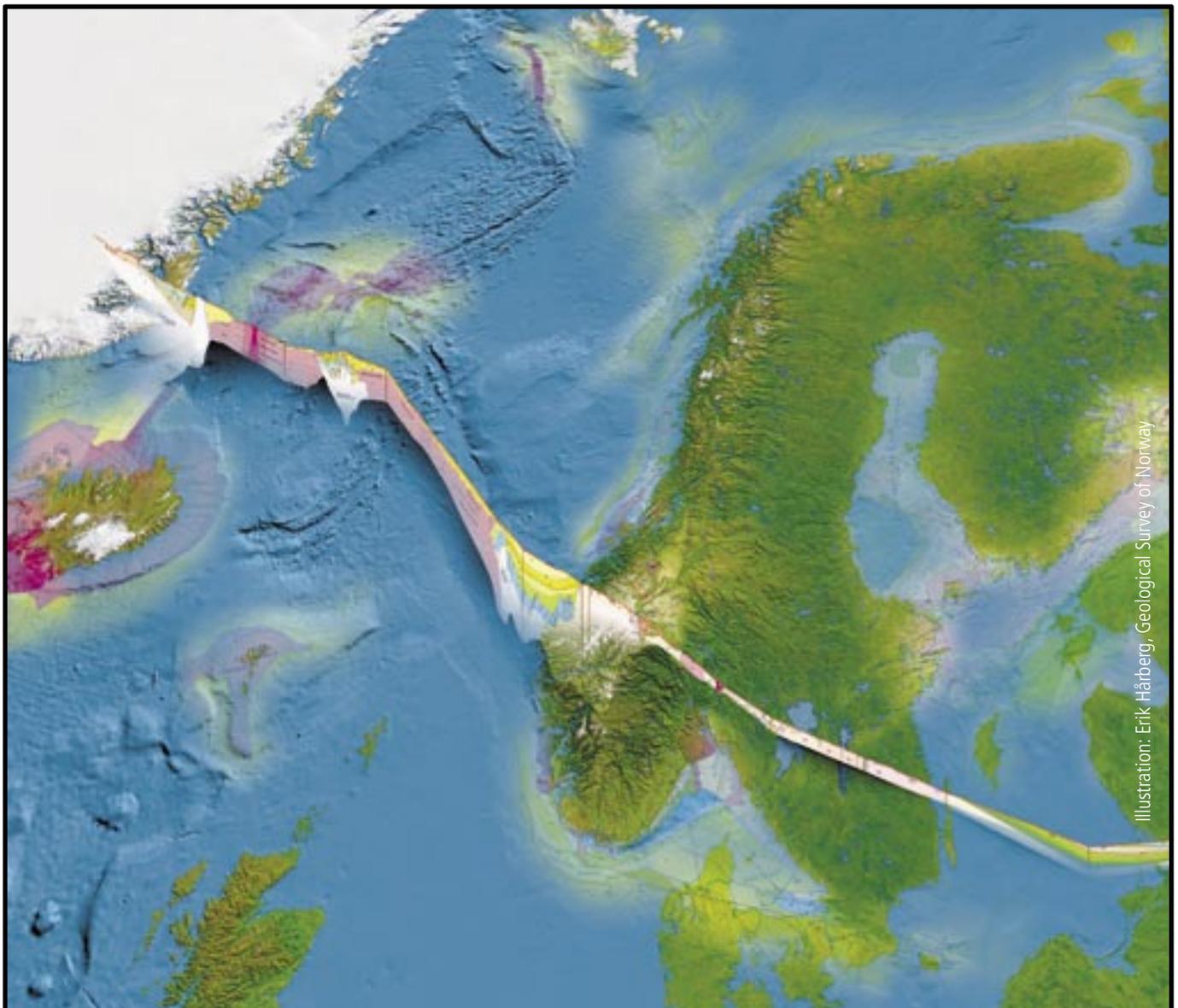


Illustration: Erik Håberg, Geological Survey of Norway

Cross-section from Greenland to the Baltic. Profile from Geological map, land and sea areas of Northern Europe Scale 1:4 million. Sigmond, Ellen M.O 2002, Geological Survey of Norway.

## THE ARCTIC: TECTONIC EVOLUTION, RESOURCES AND ENVIRONMENT

Polar ice covers the Arctic "Mare Incognita", the least known ocean on Earth, with its underlying lithosphere only rudimentarily defined and a tectonic evolution that is a subject of wide-ranging speculation. Two major deep troughs, the Amerasian and Eurasian basins dominate the high Arctic, separated by a narrow, long submarine ridge, named after the famous Russian scientist Mikhail Lomonosov. Bordering the deep basins are wide continental shelves, fifty percent of them in the Russian sector and the rest divided between U.S.A., Canada, Denmark and Norway.

The tectonic evolution of the Eurasian Basin appears to be relatively straight forward, with slow Cenozoic sea-floor spreading along the Gakkel Ridge opening a 3-4000 m deep oceanic trough, which was connected via the Fram Strait to the North Atlantic. By contrast, the Amerasian Basin contains a huge central domain of anomalous crust and mantle and only in the Canada Basin is sea-floor spreading confidently inferred and dated to late Mesozoic. Various submarine ridges and rises and continental promontories project from the continental shelves into the Amerasian Basin; the origins of most of these are much disputed. These circumstances imply that the Arctic is certainly the most problematic marine region on Earth; application of the United Nation's Convention on the Law of the Sea to this ocean and its margins is

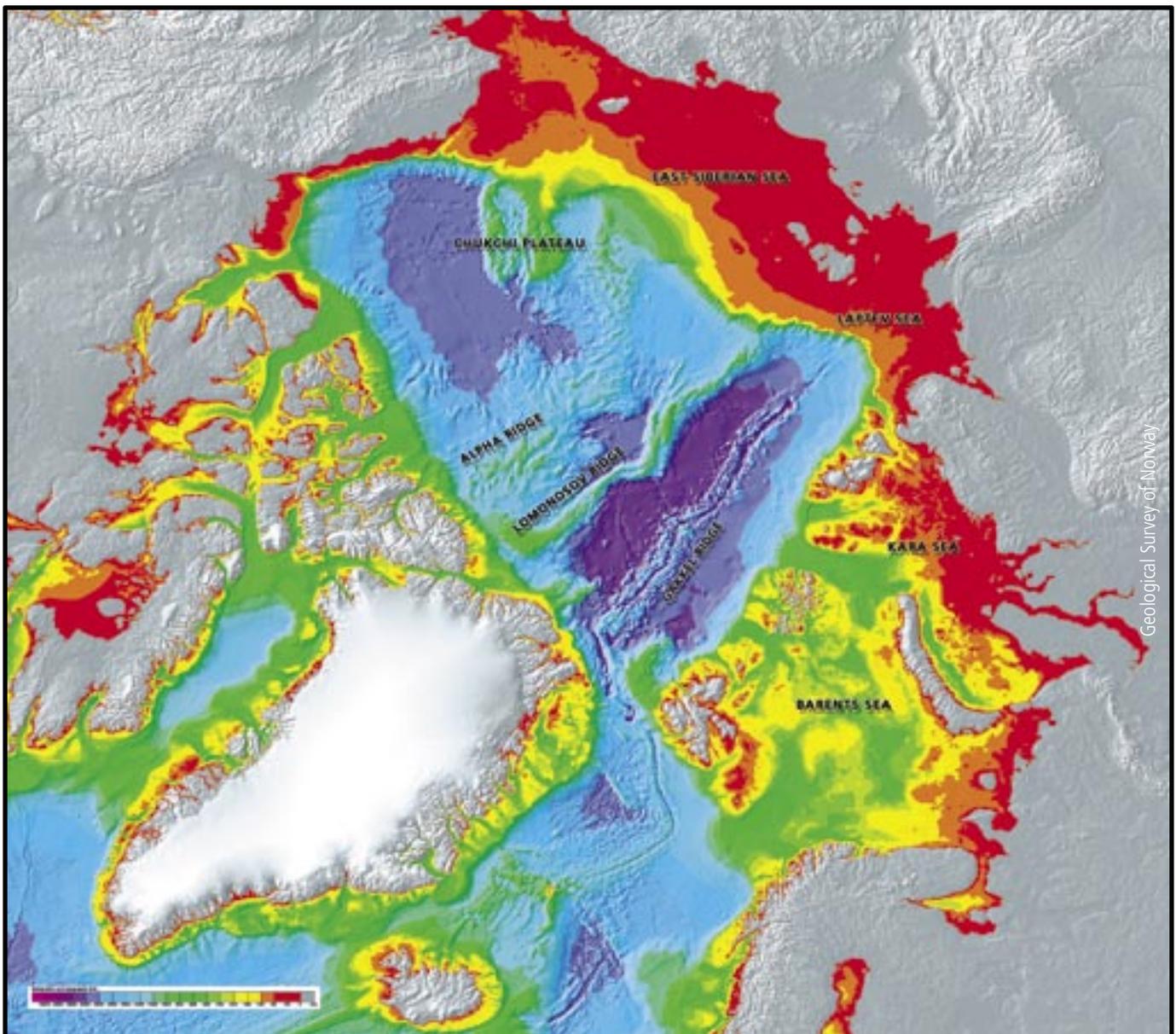
correspondingly difficult. Earth Science exploration has a long way to go in the Arctic.

The opening of the Fram Strait in the late Oligocene to Miocene, allowing deep cold waters into the Atlantic, had a profound influence on the global climate and the move from hot-house in the late Mesozoic to ice-house in the Miocene and onwards. Ocean circulation controls the climate of the Northern hemisphere and the Gulf Stream, making Norden a far more attractive environment than would otherwise be the case. Understanding today's climate variability and change can only be achieved against the backdrop of the historic and the pre-historic records that palaeoclimatologists are providing.

Mapping the bathymetry of the Arctic basin is providing new insight into the Pleistocene glacial history. Evidence of glacial erosion and scouring is found on both the Arctic continental shelves and the shallow mid-oceanic ridges, indicating the extent and thickness of previous glacial maxima. Studying (from ice-cores and other proxies) the timing and velocity of Cenozoic change in temperature in the Arctic, with the growth and retreat ice-sheets, and comparison with the Antarctic record, is providing an essential platform for understanding what is happening to our climate today. And as our high Arctic science expands, we have new opportunities to assess the impact of industrial activity on the Arctic environment; the source and extent of anthropogenic pollution and the needs for mitigation.



Photo: University of Copenhagen



Provisional map the International Bathymetric Chart of the Arctic Ocean (IBCAD) project

Resources are also important. Upper Palaeozoic and younger sedimentary rocks dominate the geology of the continental shelves and the potential for hydrocarbons is vast. The eastern Barents Sea is already known to contain major gas fields; the southern Kara Sea, likewise. Further east in the Russian Arctic, exploration is in its infancy. The Sverdrup Basin, in northern Canada, has a very high potential and the north slope of Alaska is already a well-defined major petroleum province. The Arctic will have an increasingly important role to play in the coming years of resource management on global scale, vital for world economy.

High Arctic research is gathering momentum in all the main disciplines concerned with the geosphere, biosphere and atmosphere. Major investigations of the Lomonosov Ridge will take place in 2004 (IODP's ARMADA expedition drilling project near the North Pole); transects across the Arctic basin are planned for 2005. Preparations for the International Polar Year 2007-8 are underway, with ambitious projects for international cooperation. IGC 2008 in Oslo will provide an ideal forum for presentation of the results of all these activities. An Arctic Consortium is being established to plan the key Arctic components of IGC 2008 – symposia, workshops, short courses and excursions.

## THE CONGRESS

### Invitation

A formal invitation to hold the 33<sup>rd</sup> IGC in Norden in 2008 was submitted by the Norwegian National Committee for IUGS to the Secretary General of the 31<sup>st</sup> IGC in Rio (August 2000). Subsequently, an interim bidding document was submitted to IUGS in July 2002 (see details in the enclosure section). At a meeting of the IGC Steering Committee in Florence (October 2002), a decision was taken (IGC 2004, second circular, p. 20) to strongly recommend that the 33<sup>rd</sup> IGC should take place in Oslo.

### Organisation

After consulting with Nordic partners, the Norwegian National Committee for IUGS, in November 2001, established a Nordic Bidding Committee for the 33<sup>rd</sup> IGC in Oslo 2008.

- Prof. Ivar B. Ramberg was appointed Chairman of this Committee, with the following executive members:

- Prof. Arne Bjørlykke, Director General of the Geological Survey of Norway

- Dr. Harald Brekke, President of the Norwegian Geological Society

- Prof. Richard Sinding-Larsen, Chairman of the IUGS National Committee and the following representatives of the Nordic countries:

- Dr. Karin Eriksson (Sweden)
- Dr. Henning Haack (Denmark)
- Prof. Sveinn P. Jakobsson (Iceland)
- Prof. Reijo Salminen (Finland)
- Prof. Tore O. Vorren (Norway).

Prof. R. Sinding-Larsen took over the chairmanship of the Bidding Committee in October 2003.

A committee has been set up for finance and contacts with authorities. Support of the bidding process has been obtained from industry and funding agencies. Special committees are responsible for the science and excursion programmes. A recently established Nordic IGC foundation will appoint the organization committee in consultation with the Nordic national committees for IUGS.

### Timing

The month of August has been selected as the best period of the year to organise the 33<sup>rd</sup> IGC. Firstly, because early August is a university vacation period, making it possible to obtain better rates from hotels and permitting the use of student residences for cheap accommodation. Secondly, the climate in Oslo is at its best in August and surprisingly mild for its latitude (60° N). Summer temperatures of 20-25° C are perfect for geological excursions; also for exploring the parks and hiking paths or even relaxing on the fjord beaches. Thirdly, August is also the warmest month in the higher Arctic, with minimal amounts of snow and ice, well suited for geological excursions.



The Boya Glacier  
Sogn og Fjordane

## CONGRESS STRUCTURE AND SCIENTIFIC PROGRAM

The scientific program of IGC 2008 will start and end with plenary sessions and include daily plenary lectures, throughout the Congress. The main programme will be made up of three kinds of symposia; Topical, Special and General. Field trips will be arranged as comprehensive pre- and post-congress excursions, as well as short trips during the congress to nearby localities in the Oslo area and further afield. Workshops and short courses will be arranged before, during and after the congress.

### Symposia

The three categories of symposia proposed for IGC 2008, are being designed to cover the full range of modern Earth Science. The Topical Symposia will be dedicated to major interdisciplinary global themes and the Special Symposia to major themes of particular importance for Norden and the Arctic realm; the General Symposia will be dominated by the many individual disciplines that compose Earth Science. Within this framework, it will also be possible to accommodate the variety of topics that

are the prime concern of the IUGS Commissions and the many others scientific bodies that traditionally meet at IGCs. Our ambition is to use the World Geo-Congress 2008 to span the whole field of Earth Science and bridge the gap between IUGS and IUGG.

If the Nordic Bid is successful at the Florence IGC 2004, an IGC 2008 Science Programme website will be quickly established to promote international partnership in the design of the 2008 programme. A provisional home-page already exists.

During the next few years, international Earth Science will be stimulated by two major research programmes – the International Year of Planet Earth (IYPE, 2005–7) and the International Polar Year (2007-8). The IGC 2008 science programme will reflect these two important initiatives.

Geoscientists, world-wide, are invited to propose symposia for IGC 2008. In September 2004, we will take contact with all the main international Earth Science organizations and encourage participation in the design of the programme.

### PRE CONGRESS

Excursions, Workshops and Short Courses  
July 26<sup>th</sup> - August 4<sup>th</sup>

### Opening Ceremony

5<sup>th</sup> August, 2008

#### General Symposia Oral Presentations

7<sup>th</sup> August  
8<sup>th</sup> August  
13<sup>th</sup> August  
14<sup>th</sup> August

#### General Symposia Poster Sessions

6<sup>th</sup> August  
7<sup>th</sup> August  
8<sup>th</sup> August  
11<sup>th</sup> August  
12<sup>th</sup> August  
13<sup>th</sup> August  
14<sup>th</sup> August

#### Plenary Lectures

Excursions,  
Business meetings  
9<sup>th</sup> August  
10<sup>th</sup> August

#### Plenary Lectures

#### Topical Symposia

6<sup>th</sup> August  
7<sup>th</sup> August  
8<sup>th</sup> August  
11<sup>th</sup> August  
12<sup>th</sup> August  
13<sup>th</sup> August  
14<sup>th</sup> August

#### Special Symposia

6<sup>th</sup> August  
7<sup>th</sup> August  
8<sup>th</sup> August  
11<sup>th</sup> August  
12<sup>th</sup> August  
13<sup>th</sup> August  
14<sup>th</sup> August

### Closing Ceremony

14<sup>th</sup> August, 2008

### POST CONGRESS

Excursions, Workshops and Short Courses  
August 15<sup>th</sup> - August 21<sup>th</sup>

## General Symposia

The General Symposia covering all the individual disciplines of the Earth Sciences, will provide a comprehensive "backcloth" for the Special

and Topical Symposia. The scope of the General Symposia will be known to all who are familiar with the IGC traditions and this presentation does no more than list subjects:

### Comparative Planetology

Earth Interior

### Engineering Geology

Environmental Geology

### Experimental Petrology Mineralogy

Exploration Geophysics

### Geochemistry

Geochronology and Isotope Geology

### Geodynamics

Geoenergy, incl. Geothermal

### Geohazards

Geology of Fossil Fuels

### Geology of Mineral Deposits

Geomagnetism

### Geomorphology

Geoscience Education and Geoethics

### Geotectonics

History of Geosciences

### Hydrogeology

### Igneous and Metamorphic Petrology

Isotope Geochemistry

### Marine Geology and Palaeoceanography

Mathematical Geology

### Metamorphic Petrology

Mineralogy

### Neotectonics/Paleoseismology

Palaeontology & Historical Geology

### Plate Motions and Regional Geophysics

Precambrian Geology

### Quaternary Geology

Regional Geology

### Remote Sensing

Resource Economics

### Sedimentology

Seismogeology

### Stratigraphy

Structural Geology and Geomechanics

### Volcanology



## Special Symposia (Norden and Arctic Realm)

The symposia, identified below, are grouped into a range of themes concerning the Nordic and general Arctic realms. These themes and symposia will be elaborated in more detail by an Arctic Consortium.

### ARCTIC COASTAL DYNAMICS POLAR BIOTA - ADAPTATION TO OR EVOLUTION IN EXTREME HABITATS

Early Man in high northern latitudes  
 Evolution and history of the Inuit  
 Life in a "warm" Arctic  
 Marine food webs and biogeochemical fluxes  
 Marine phytoplankton  
 Terrestrial faunas  
 Terrestrial vegetation

### CONTINENTAL RIFTING AND OCEAN OPENING

Atlantic and Arctic margins – Volcanic and nonvolcanic  
 Iceland plume  
 Ocean ridge processes

### HYDROCARBONS IN HIGH NORTHERN LATITUDES

Assessment of oil and gas resources in the Arctic  
 Coal resources of the Arctic  
 Environmental challenges  
 Evolution of sedimentary basins of the Nordic and Arctic realms  
 Exploration and development challenges  
 Gas-hydrates  
 Paleoenvironments of hydrocarbon formation  
 Petroleum case studies  
 Petroleum systems

### GLACIAL REBOUND, MANTLE RHEOLOGY AND LANDSCAPE EVOLUTION

Dating of events  
 Glaciation and vertical crustal movements  
 Neo-tectonics and fault kinematics  
 Seismic tomography, remote sensing  
 Tectonic geomorphology

### HISTORY OF CIRCUM-ARCTIC LAND SURFACES

Drainage patterns and rivers  
 Ice lakes  
 Large lake systems  
 Paratethys and its remnants  
 Tectonic evolution

### HISTORY OF NORTHERN HEMISPHERE GLACIATIONS

Comparison with the Southern Hemisphere  
 Glacial-Interglacial variability  
 Northern hemisphere ice sheets: When, where and why  
 Onset of Cenozoic glaciation and long term trends  
 Paleoclimate from ice-cores  
 Past climate modelling  
 Pre-Cenozoic glacial events

### MOUNTAIN-BUILDING PROCESSES THROUGH TIME

Neoproterozoic accretion  
 Palaeoproterozoic and Archaean plate tectonics  
 Paleozoic orogenies  
 Tertiary fold belts

### PERMAFROST

Modelling  
 Permafrost biogeochemistry  
 Stratigraphy of ice cores  
 Terrestrial and submarine systems

### THE ARCTIC OCEAN AND ITS CONTINENTAL MARGINS

Alpha-Mendeleev and Lomonosov ridges  
 Arctic shelves & marginal plateaux  
 Enigmatic Makarov and Canada basins  
 Gakkel Ridge hydrothermal systems  
 Gakkel Ridge tectonics-petrology  
 Paleooceanography  
 Physiography and deep crustal controls  
 Plate tectonic evolution

### Topical Symposia (Global)

The Topical Symposia, concerning major interdisciplinary global themes will focus on physical processes that are irreversibly changing our planet. Integration of field studies, remote sensing, laboratory experiments, computer modelling and theory are promoting a better understanding of how the Earth works.

The International Year of Planet Earth 2005-7 will provide a welcome focus on a variety of themes that are of particular societal importance, for example, Groundwater, Energy and other Resources, Natural Hazards, Health and Environmental Geochemistry, Climate-past, present and future, the Oceans, Deep Earth processes and surface response, and Megacities and subsurface space. Those involved in these themes world-wide, will be encouraged to help design appropriate symposia for IGC 2008.

Comments follow below on some aspects of the Earth Sciences that are expected to feature prominently in the IGC 2008 programme.

#### How Earth Sustains Life – Integrating Ecology, Biology and Geoscience

New multidisciplinary fields are becoming increasingly important, particularly at the interface between the geosciences and biosciences. Basic environmental science will increasingly depend on collaboration between biologists and geoscientists. The 33<sup>rd</sup> IGC will provide an opportunity to enhance and sustain research across the interface of ecological biology and geology.

The disciplinary basis of environmental science is in the process of reformulation. It is increasingly clear that answers to many of the most vexing questions about how humans are influenced by our natural environment depend on processes and phenomena that span the biological and geological sciences. Biotic diversity and complexity depend intimately on processes in the physicochemical environment. Conversely, fundamental physicochemical phenomena such as weathering, climate, and the development of soil fertility rely closely on a combination of geological and biological processes. This means that complex problems such as climate change,

acid rain, eutrophication, and biodiversity loss are inherently interdisciplinary; they are shaped by multiple feedbacks between biological and geochemical processes. Our understanding of basic environmental science has therefore arrived at a new intellectual frontier: a natural convergence of the historically distinct disciplines of biology and physical science.

This disciplinary convergence will, over the next decades, transform our understanding of basic processes that control the stability and sustainability of natural environmental systems. The Arctic environment is specially suited to study these interfaces and the Nordic countries represent an ideal venue for promoting such studies. The ensuing findings will have implications for our ability to predict and manage how humans impact the health of ecosystems across local, regional, and global scales. Such knowledge is a critical component of a safe, sustainable, and prosperous future and the 33<sup>rd</sup> IGC will be a timely venue to discuss these issues.

Links between biology and geoscience are not new; historical examples include seminal ideas by Svante Arrhenius on carbon dioxide and global climate and Vladimir Vernadsky on global biogeochemical cycles. What is new, however, is that both biology and geoscience have now developed to a point where convergence is broadly available, and where the potential for interdisciplinary synergism is unprecedented and critical for resolving key environmental problems. Recent progress of concepts, methods (e.g., genomics, molecular biology, and isotopes), observational tools (e.g., satellites), databases (e.g., geology, soils, vegetation, and land-use change), and computational abilities have virtually revolutionised scientific readiness and opportunities at this interface.

The term biogeosciences refers broadly to research that links biological, geophysical, and geochemical approaches to understand the earth system. These approaches include biogeochemistry (fluxes of matter and energy), biophysics (interactions of climatic, earth-system, and physiological processes), as well as geomedicine and hydrology (interactions of geology, living species, landforms, and water). Biogeoscience is a new discipline, based on technologies and concepts that enable the study of earth-system

processes and mechanisms across a continuum of spatial and temporal scales from microbes to global environments, and from physiological responses to the geologic record. Just as the development of molecular techniques has powered an explosion of basic biological knowledge, the development of new satellite sensors, computer models, and global informatics resources are fuelling a parallel explosion for understanding how earth-system processes scale from local to global and how they interact with living species. Building on basic knowledge about underlying mechanisms, the biogeosciences thus examine basic aspects of the function of the earth system.

Despite these opportunities, however, there exist barriers to developing and sustaining integrated research and training across the biology-geoscience interface. At the 33<sup>rd</sup> IGC, we will convene a special colloquium to discuss opportunities for, and obstacles to, developing sustained, broadly inclusive, and effective research collaborations among ecological biologists and geoscientists. This colloquium will address the emerging field of biogeosciences, identify barriers to further growth, and examine opportunities for developing initiatives to address intellectually broad questions that are central to understanding the interplay between living species and the earth system.

Two core areas for special symposia for IGC 2008 have been identified that presently are of particular importance to progress on both basic and applied issues:

### Geosciences and Health - Geomedicine

Environmental geochemistry, the combination of the natural background and anthropogenic change, has great importance for life on Earth. This field of multidisciplinary research focuses on how to improve our understanding of the tremendous structural and functional diversity that characterises land- and ocean-based ecosystems. How do functional differences across ecosystems emerge from the multitude of interactions between biological, geochemical, and physical processes? Knowledge of the mechanisms that control geographic variations is central to the development of dynamic and unified models. Thus, dramatic geographic variations in the medical conditions of humans are fundamentally

important, and the underlying mechanisms depend on poorly understood feed-backs between life metabolism relative to soils, climate, and geological substrates.

### Earth Processes in Space and Time

Integration of critical earth system processes across broad spatial and temporal scales. It is urgent that we understand how key processes are coupled across spatial and temporal scales within the earth system. While local-scale and short-term processes dominate the proximate turnover of carbon and other nutrients in local environments, many essential ecosystem-level properties develop over much larger spatial extents and over periods of decades, millennia, or longer. For example, while emission of the greenhouse gas methane is controlled at scales of microbes within anaerobic environments, the effects of methane on climate becomes apparent at global scales, and the dynamic coupling of methane and climate emerges only within millennial-scale atmospheric records such as those from the Greenland ice cores.

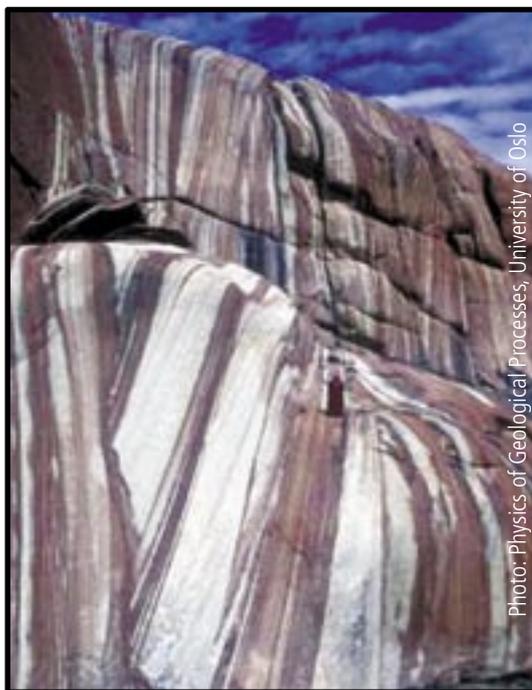


Photo: Physics of Geological Processes, University of Oslo

Patterns to processes: Cross-bedding in 380 million year old desert sand from East Greenland which reflects the dynamics of windblown granular media and the fluid flow that has caused the colour variation, as well as the processes underlying the movements of the continents.

### Some other Themes for Topical Symposia:

1. Origin of Planet Earth.
2. Neighbouring planets – origin, evolution and life.
3. Mantle heterogeneity, convection and self-organizing plates.
4. Geosphere- biosphere-hydrosphere-atmosphere interactions.
5. Crustal evolution through time.
6. Archaean earth and life: anaerobic to aerobic transformation.
7. Subsurface fluid flow and sediment-rock interaction: observations and modelling.
8. Continental margins; sedimentation, magmatism and tectonics.
9. Mountain collapse and basin evolution.
10. Neotectonics, surface processes and topography.
11. Soil science and geology – where do they meet?
12. Major glaciations and rapid climate change: driving mechanisms.
13. Phanerozoic diversification and extinction: impacts, climate and volcanicity.
14. Analogues and numerical modelling of geological processes.
15. Human influence on the earth system and earth management.
16. Geological resources for the 21<sup>st</sup> century and the environmental challenge.
17. Managing nuclear waste: from geology to politics.

### Onshore and Offshore Virtual Reality

One of the missions of the 33<sup>rd</sup> IGC is to demonstrate a 3D Virtual Reality geology model of the Svalbard archipelago. The geology of Svalbard is recognised as an excellent training ground for geoscientists.

Increasingly, oil and gas companies are turning to integration through GIS systems. The 33<sup>rd</sup> IGC will take this concept a step further by integrating GIS data in a 3D Virtual Reality (VR) environment.

### Educational Opportunities

By its nature, the organisation of the 33<sup>rd</sup> IGC requires an interdisciplinary perspective that is perhaps unmatched, and that will be embraced by leading academic institutions across the Nordic countries. This represents both a challenge and an opportunity from an educational standpoint. The challenge is to use the 33<sup>rd</sup> IGC to provide a strong foundation in science for undergraduate and graduate students, in combination with a broad perspective across a range of sciences. The opportunity is to bring new students into science at both undergraduate and graduate levels as is already seen in the growth of environmental science programs around the world. These issues of education are central to training the next generation of leaders in the earth sciences and to educating students in critical environmental issues. The Nordic research councils and other funding agencies have the opportunity to influence and lead the development of novel interdisciplinary earth science and environmental science curricula at academic institutions

# EXCURSIONS

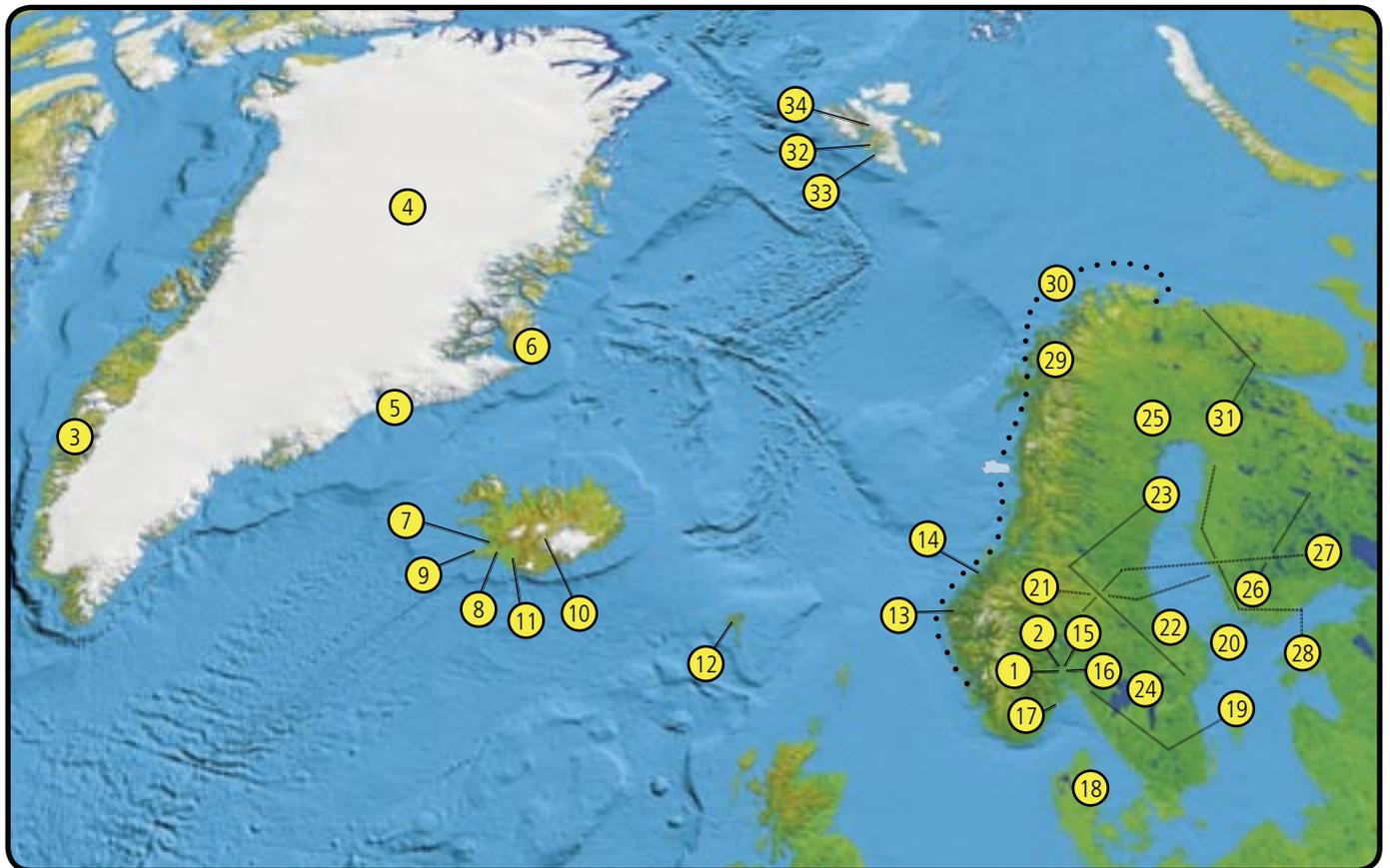
A selection of excursions highlights are presented below, followed by a list of additional excursion themes identified so far. The selected excursions highlighted are organised geographically as shown in the index map below. For the benefit of the interested reader, these excursions are also sorted by theme in the diagram figure following the map.

The work on the excursions is in progress and will continue until the date for the final announcement of the Congress Programme. The final programme will include a set of pre- and post-congress excursions of 4 – 7 days duration, as well as a set of mid-congress excursions of 1 – 2 days duration. There will also be daily excursions, throughout the Congress, in the vicinity of Oslo.



Excursions Sorted by General Themes

Precambrian and Metallogensis	Caledonides and Lower Palaeozoic	Upper Palaeozoic Mesozoic Basins	Atlantic Geology	Glacial and post-glacial	Geo-traverses	Special topics	Local Oslo Region
●	●	●	●	●	●	●	●
E 3	E 13	E 6	E 5	E 8	E 30	E 4	E 1
E 24	E 16	E 15	E 7	E 11	E 31	E 14	E 2
E 25	E 19	E 18	E 9	E 20	E 34	E 21	E 17
E 26		E 33	E 10	E 23		E 22	
E 27			E 12	E 28			
				E 29			
				E 32			



### Examples of Mid-Conference Excursions

- Excursion 1 page 22 General geology of the city of Oslo  
 Excursion 2 page 23 General geology of the city of Oslo and its surroundings by boat

### Examples of Pre- and Post-Conference Excursions

- Excursion 3 page 24 Isua, West Greenland the oldest rocks on Planet Earth  
 Excursion 4 page 25 Ice core drilling site, Greenland Ice Sheet  
 Excursion 5 page 26 The Skaergaard Layered Intrusion, East Greenland  
 Excursion 6 page 27 Jameson Land, East Greenland, a petroleum geology analogue for the Norwegian continental shelf  
 Excursion 7 page 28 Tectonics and active rift-volcanism in South and Southwest Iceland  
 Excursion 8 page 29 Subglacial volcanic activity in Southwest and West Iceland: terrestrial processes as an excursion to Mars  
 Excursion 9 page 30 A diverging plate boundary. One-day excursion to the Reykjanes Peninsula in Southwest Iceland  
 Excursion 10 page 31 The Tertiary formation of Iceland-plateau basalts and central volcanoes, with Krafla as a modern analogue.  
 Excursion 11 page 32 Weichselian interstadials and Late Weichselian deglaciation, and relative sea-level changes in South-west Iceland  
 Excursion 12 page 33 Faeroe Islands. Late Palaeocene/Eocene continent splitting volcanism and sedimentation.  
 Excursion 13 page 34 The Caledonian infra-structure and evolution in Southern Norway  
 Excursion 14 page 35 Avalanches and slides  
 Excursion 15 page 36 The Carboniferous-Permian Oslo Rift  
 Excursion 16 page 37 From epicontinental sea to foreland basin – the Lower Palaeozoic of the Oslo region.  
 Excursion 17 page 38 Classical geological localities within the Oslo rift and surroundings  
 Excursion 18 page 39 The Cretaceous and Tertiary geology of Southern Sweden and Denmark  
 Excursion 19 page 40 Lower Palaeozoic faunal and lithofacies developments in Southern Scandinavia.  
 Excursion 20 page 41 Baltic Sea marine geology - a sea-going mini symposium  
 Excursion 21 page 42 Impact structures in Scandinavia  
 Excursion 22 page 43 Impact structures in Scandinavia  
 Excursion 23 page 44 Glacial and postglacial landforms, stratigraphy and history of Central Sweden.  
 Excursion 24 page 45 The Bergslagen metallogenetic zone, Sweden  
 Excursion 25 page 46 Metallogenesis in Finland and Sweden  
 Excursion 26 page 47 Archean-Proterozoic overview in Fennoscandia  
 Excursion 27 page 48 Carbonatites and alkaline rocks of the Fennoscandian Shield  
 Excursion 28 page 49 Postglacial overview of Finland  
 Excursion 29 page 50 Glacial and post-glacial landforms, stratigraphy and history of the fjord areas of Tromsø, Arctic Norway  
 Excursion 30 page 51 Geology along the Norwegian coast, voyage from Bergen to Kirkenes by boat (Hurtigruten)  
 Excursion 31 page 52 A traverse of the Kola Peninsula  
 Excursion 32 page 53 Terrestrial and marine Quaternary stratigraphy of Spitsbergen - high Arctic  
 Excursion 33 page 54 The post-Caledonian depositional succession of Svalbard  
 Excursion 34 page 55 Geotraverse of Spitsbergen from the Precambrian to the Quaternary

## Examples of Mid-Conference Excursions

### Excursion 1: General geology of the city of Oslo and its surroundings by bus

The excursion will visit some of the classical outcrops around the city of Oslo in the Caledonian foreland

foldbelt. The trip will focus on the Early Palaeozoic transition from the Cambrian Baltic shallow epicontinental sea environment into the Caledonian foreland basin environment. It will also include outcrops that show tectonic and magmatic features of the Late Palaeozoic Oslo Graben.

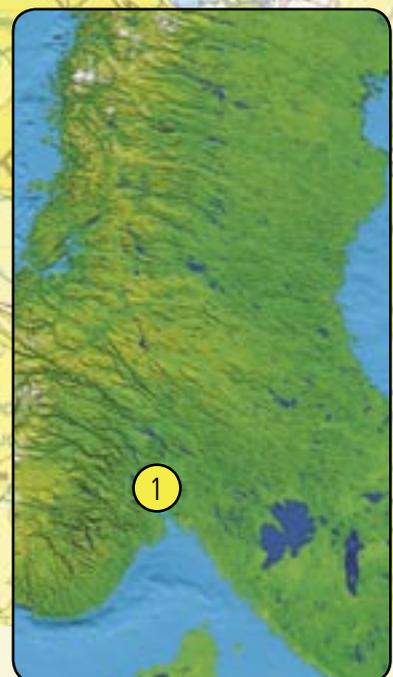


Photo: Bjørn T. Larsen, Geological Survey of Norway

The Alum Shale Formation - the "hot shale" of the Middle Cambrian

The excursion will include:

- Høvikvolden: Røyken: The Sub-Cambrian peneplain and the transgression of the Baltic plate
- Nærnes: The Alum Shale Formation, the Cambrian "hot shale", and the normal faulting of the Oslo Graben
- Bjerkåsholmen: Lower Ordovician limestones and mudstones
- Kalvøya: The uppermost Ordovician nodular limestones and sandstones, and the Permian dyke intrusions
- Øverland Bærum: The Silurian reefal limestones of the Malmøya Fm
- Løkenhavna, Kolsås: The Upper Carboniferous Asker Group sediments and the first basaltic lava flow of the Oslo Graben
- Alternative climb to the top of Kolsås



**Excursion 2: General geology of the City of Oslo and its surroundings by boat**

The excursion will visit some of the best shoreline outcrops in the inner part of the Oslo Fjord to

show details of the Early Palaeozoic Baltic shallow epicontinental sea environment and the transition into the Caledonian foreland basin environment. It will also include outcrops that show tectonic and magmatic features of the Late Palaeozoic Oslo Graben.

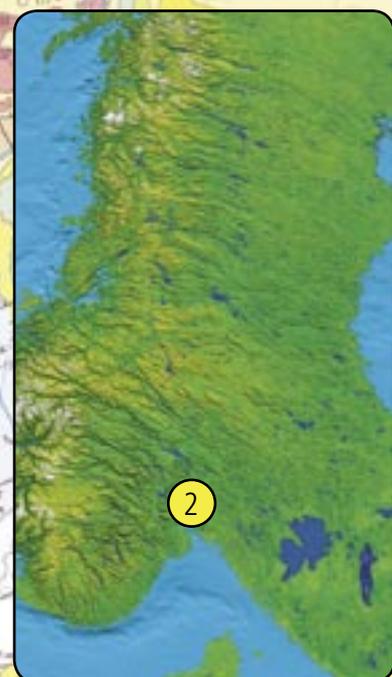


Photo: Bjørn T. Larsen, Geological Survey of Norway

Inverted Ordovician - Silurian boundary at Hovedøya

The excursion will include:

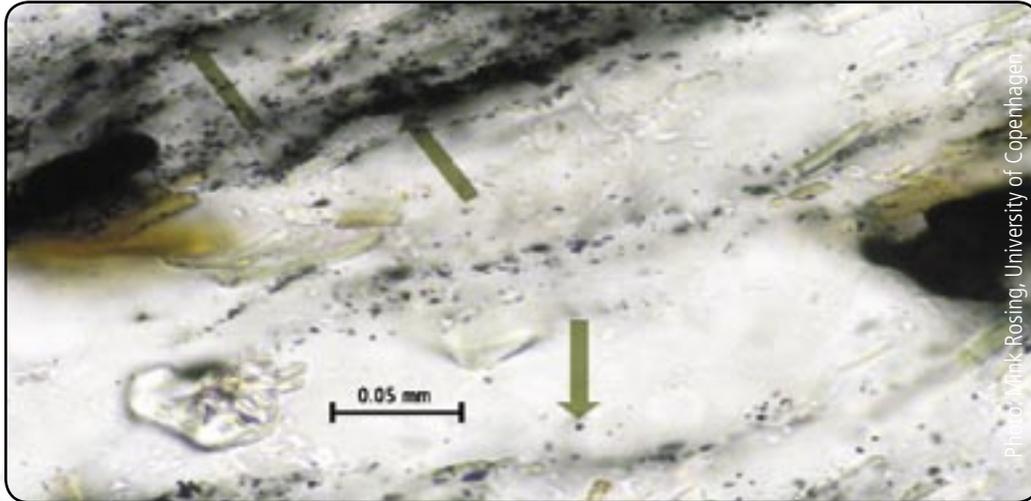
- Oslo Harbour: Embarkation from the quay in front of the Akershus Castle
- Hovedøya: Middle and Upper Ordovician mudstones, limestones and sandstones, Boundary to the Silurian, Caledonian tectonism
- Langøyene: The Ordovician/Silurian boundary and the beginning of the foreland basin environment
- Malmøya: Lower Silurian limestones and mudstones
- Nesodden: The Nesodden normal fault and the Upper Palaeozoic Oslo Rift
- Skogerholmen: The facies change along the Ordovician/Silurian boundary
- Vestfjorden: Caledonian folding and thrusting, and Permian dyke intrusions related to the Oslo Rift
- Oslo Harbor disembarkation, the quay at Akershus Castle



## Examples of Pre- and Post-Conference Excursions

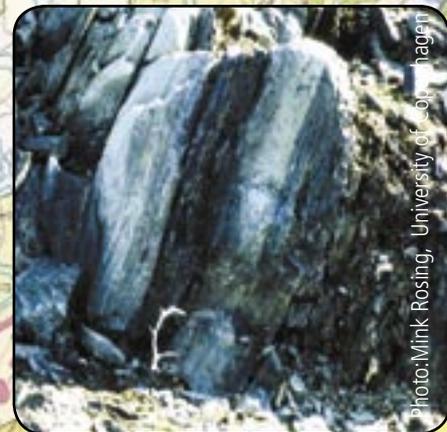
### Excursion 3: Isua, West Greenland – the oldest rocks on Planet Earth

Isua is located on the edge of the Greenland Ice Sheet on the west coast of Greenland. The excursion will focus on the lithostratigraphy and the interpretation of the World's oldest known rocks.



Thin section prepared from 3.8 Ga old ocean sediments from Isua. Black dots are graphite composed of isotopically light carbon – proposed remains from algae in a very early ocean

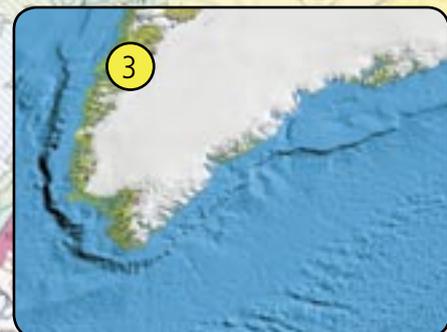
Kalaallit Nunaat/  
Grønland



3.8 Ga old ocean sediments

The excursion will include:

- The banded iron formation
- The Amitsoq Gneisses
- The oldest known pillow lavas
- The 3800 Ma marine carbonaceous metasediments and the recent theories on their origin



**Excursion 4 : Ice core drilling site,  
Greenland Ice Sheet**

A one day visit to the 2008 drilling site where ice cores are recovered for glaciological, climatic and environmental studies. This excursions is done in combination with another excursions to Greenland.



University of Copenhagen

Ice core drilling site

Fresh ice core. DY3, Southern Greenland 1981



University of Copenhagen

### Excursion 5: The Skaergaard Layered Intrusion, East Greenland

The Skaergaard intrusion, a world-class geological locality, is a beautifully layered Tertiary gabbroic body, splendidly exposed on the east coast of Greenland just north of the Arctic Circle. It is roughly oval-shaped in plan, measuring 10 km north to south and 7.5 km east to west. The terrain

is alpine, rising to 1300 m, although it is dissected by a narrow sound, and much can be seen close to tidewater. The climate is maritime arctic, which means that extreme temperatures are not to be expected and rainy days may occur at the time of the excursion, although brilliantly sunny days are also common. The intrusion scarcely needs description as it forms part of most undergraduate courses in igneous petrology and has one of the largest literatures of any single geological locality.

Kalaallit Nunaat/  
Grønland

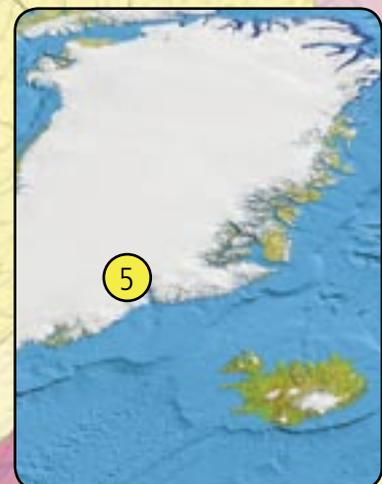


Photo: Kent Brooks, University of Copenhagen

Rhythmic layers interspersed with average gabbro, Skaergaard Base Area

The excursion will include:

- Extreme compositional differentiation and spectacular magmatic structures
- One of the world's largest igneous provinces (recently estimated to comprise  $10 \times 10^7 \text{ km}^3$  of magma)
- A spectacular coastal dike swarm



**Excursion 6: Jameson Land, East Greenland, as the petroleum geology analogue for the Norwegian continental shelf**

The excursion will focus on the stratigraphy and lithofacies of the Upper Triassic and Jurassic sedimentary sequence in Jameson Land.



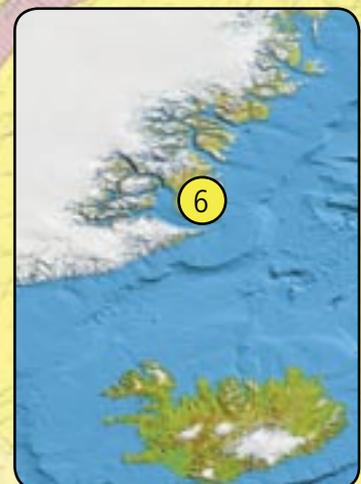
Photo: Geological Survey of Denmark and Greenland (GEUS)

East Greenland outcrops

The excursion will include:

- Profiles by foot in hillside outcrops through the Triassic and Jurassic stratigraphy
- Helicopter visit to the fault block unconformity between the Upper Palaeozoic basal sedimentary deposits and the Precambrian basement of Liverpool Land
- Helicopter visit to sites of Palaeocene dolerite sills in Jameson Land reservoir and source rock analogues

On-site comparison of sequence stratigraphy and lithofacies with the Triassic and Jurassic of the Norwegian continental shelf area – similarities and differences



**Excursion 7: Tectonics and active rift-volcanism in South and Southwest Iceland**

Iceland is in the process of an active rift-jump, and the different volcano-tectonic regimes will be investigated. The excursion will focus on tectonic fissures, active rift volcanism, subglacial volcanism, and active central volcanoes with their geothermal activity and distinctive petrology. Some of these geological and volcanological events are dated with tephrochronology.

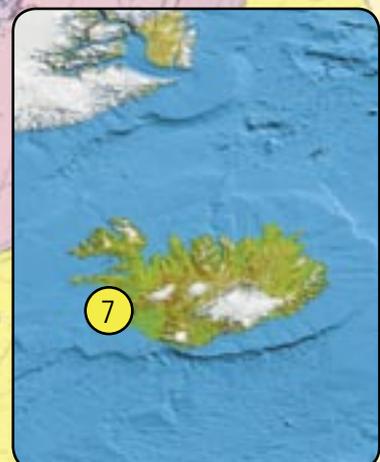


Photo: Oddur Sigurdsson, Iceland GeoSurvey

Lakagigar - a nearly 30 km long row of craters from the eruption in 1783-84

The excursion will include:

- Tectonics and volcanism of the active rift zones of Reykjanes, Thingvellir and the Eldgjá-Laki area
- Geothermal activity and its utilization at Reykjanes, Geysir and Landmannalaugar
- Pleistocene subglacial hyaloclastite ridges and table mountains in the area south of Langjökull
- The eruptive products of the central volcanoes Hekla, Eyjafjallajökull and Torfajökull
- The sandur outwash plains of Myrdalssandur and Skeidararsandur



**Excursion 8: Subglacial volcanic activity in Southwest and West Iceland, terrestrial processes as an excursion to Mars**

The excursion will focus on the subglacial hyaloclastite ridges and table mountains of Iceland, which appear to have very few counterparts except perhaps on the planet Mars. The lithofacies of these mountains and the palagonitization of the hyaloclastite will be investigated.

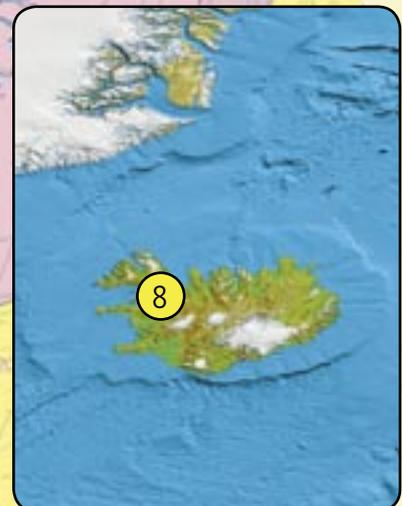


Photo: Ingibjörg Kaldal, Iceland GeoSurvey

Skjaldbreidur lava shield

The excursion will include:

- The main lithofacies of the young ridges and table mountains as well as the palagonitization of the hyaloclastites in the Jarlhettur and Hlödufell formations
- The eroded hyaloclastite ridges and table mountains of Kálfstindar and the Laugarvatn region
- The polygenetic hyaloclastite and pillow lava ridges of Sveifluháls and Undirhlidar
- The Holocene fissure lavas in the Reykjanes Peninsula, as parallels to subglacial hyaloclastite ridges
- Holocene lava shields in the Skjaldbreidur and Kjölur areas, as counterparts to the subglacial table mountains



**Excursion 9: A diverging plate boundary. One-day excursion to the Reykjanes Peninsula in Southwest Iceland**

A journey to the subaerial extension of the submarine Reykjanes Ridge. Tectonic, volcanic, geochemical and geothermal processes at a spreading centre. The transform fault in South Iceland will be inspected.

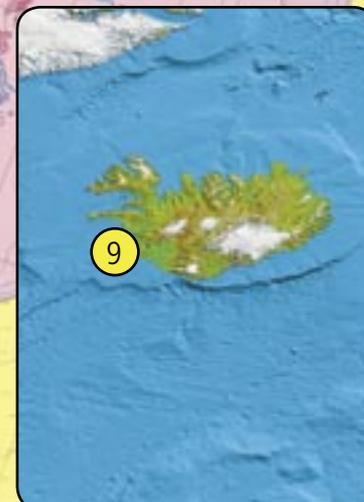


Photo: Helgi Torfason, Iceland Institute of natural History

The geothermal area in Krisuvik

The excursion will include:

- The diverging plate boundary on the Reykjanes Peninsula and Thingvellir with its active extensional rift volcanism
- High-temperature geothermal activity at various sites on the Reykjanes Peninsula
- The active South-Iceland transform fault south of Hestfjall
- The Pleistocene subglacial volcanic landforms at Sveifluháls and Hengill, as compared to the Holocene volcanic products in the Reykjanes Peninsula



**Excursion 10: The Tertiary formation of Iceland - plateau basalts and central volcanoes, with Krafla as a modern analogue**

Excursion covering Northeast, East and Southeast Iceland, with focus on the Tertiary lava pile and the kinematic processes giving rise to it, and the sea floor in general. The interspersed sedimentary layers, the dike swarms, central volcanoes, petrology and low-T alteration are demonstrated. The active Krafla centre in Northeast Iceland is taken as a modern analogue for the processes at work.

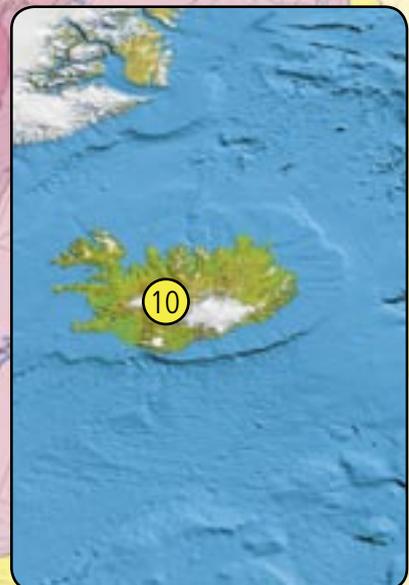


Photo: Helgi Torfason, Iceland Institute of Natural History

Krafla fires in 1984, North Iceland

The excursion will include:

- Tectonics, volcanism and geothermal activity of the active rift zone in the Krafla and Myvatn areas
- The Plio-Pleistocene marine fossiliferous sequence in Tjörnes
- The Pleistocene subglacial hyaloclastite ridges in Mödrudalsfjallgardur
- The Tertiary volcanic lava pile with its dike swarms in Reydarfjörður and Berufjörður
- The denuded Tertiary central volcanoes of Thingmúli, Breiddalur and Álftafjörður
- The Tertiary plutonic intrusions of Eystrahorn and Vestrahorn
- The flank-zone volcanic activity in Öraefi



### Excursion 11: Weichselian interstadials and Late Weichselian deglaciation, and relative sea-level changes in South-west Iceland

Iceland offers an exceptional opportunity to study the extremely rapid Late-Weichselian deglaciation and the resulting relative sea-level changes caused by the low viscosity of the upper mantle below Iceland. Voluminous eruptions in Early-Holocene are also related to the rapid

isostatic rebound. The excursion will take us from the westernmost Reykjanes Peninsula through the Reykjavík area, around Hvalfjörður to the Borgarfjörður District focussing on Weichselian interstadial stratigraphy, deglaciation and relative sea-level changes. While crossing the interior of Western Iceland the focus will be on the interaction between glaciers and volcanism. In Southern Iceland the main emphasis will be on a Younger Dryas - Preboreal re-advances of the inland ice-sheet and formation of concurrent shorelines.



Photo: Oddur Sigurdsson Iceland GeoSurvey

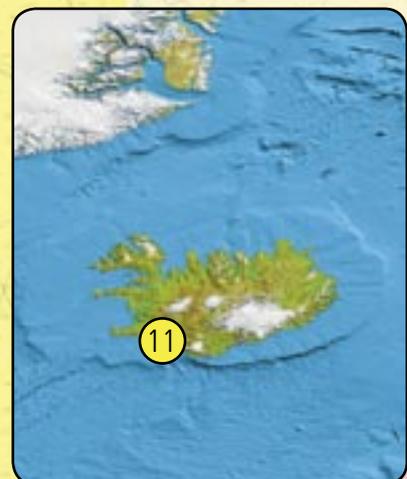
Glacier marginal environments of Sólheimajökull

The excursion will include:

- The interstadial sediments of Reykjanes and Reykjavík
- Younger Dryas – Preboreal marine sediments and landforms
- Early Bölling Raised shorelines and sediments below Akrafjall and Skardsheidi
- Subglacial volcanic formations and early postglacial shield volcanoes along Kaldidalur and Uxhryggir
- Younger Dryas – Preboreal moraines and proglacial sediments in Southern Iceland

Two possible additional alternatives

1. Through the central highlands to the Eyjafjörður area to study the retreat of an outlet glacier, formation of ice-dammed lakes and the formation of the Skogar/Vedde tephra
2. To Sólheimajökull and Myrdalsjökull to study modern development of glacier marginal environments with formation of tills, moraines and outwash plains



**Excursion 12: Faeroe Islands – Late Palaeocene/Eocene continent splitting volcanism and sedimentation**

The excursion will focus on the stratigraphy, volcanology, and petrology of the volcanic sequences of the Faeroe Islands, and their relationship with the volcanic passive margin of the northernmost Atlantic.

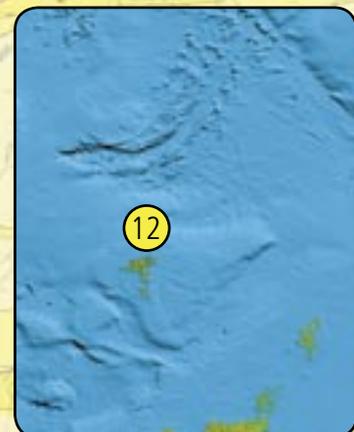


Photo: Geological Survey of Denmark and Greenland (GEUS)

Columnar jointing in Eocene lava flow

The excursion will include:

- The lower lava series
- The upper lava series
- Inter-bedded clastic sediments and coal horizons
- Visit to local coal mine
- Uplift history, island morphology and landslides
- Comparison with ODP drilling results and seismic mapping of the Vøring Plateau volcanic margin off the Norwegian coast



**Excursion 13: The Caledonian infrastructure and evolution in Western Norway**

The excursion will focus on the history and processes of the evolution of the Caledonian Orogen, including the constructional contraction phase as well as the subsequent late- to post-orogenic extensional phases.

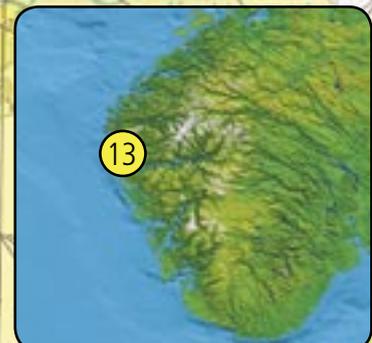


Photo: Harald Brekke, Norwegian Petroleum Directorate

Late orogenic folding of Ediacaran and Silurian pre- and syn-orogenic sediments

The excursion will include:

- Evidence for extreme crustal thickening provided by the ultra-high pressure eclogites
- The world's largest demonstrated extensional detachments
- The Devonian supra-detachment sedimentary basins in Western Norway
- Pre- and syn-orogenic lithostatigraphy



**Excursion 14: Avalanches and slides  
– a geohazard**

The excursion will deal with the hazard of unstable rock masses and marine clay deposits of Norway. The asymmetric Tertiary uplift and glacial erosion of

mainland Norway have formed the beautiful fjords of the country along with their steep mountain slopes susceptible to enormous rock avalanches. The post-glacial uplift of large areas of previous seabed, has left behind large areas of unstable marine clays susceptible to major slides in populated areas.



Photo: Lars H. Blikra, Geological Survey of Norway

Rock avalanche fan at the base of unstable mountain cliffs

The excursion will include:

- Historic rock avalanche sites in the fjords of Western Norway
- Monitored sites of possible future major rock avalanches
- Historic clay slide sites in the Trøndelag area of Mid-Norway
- Presentation of the present national avalanche and slide research program



**Excursion 15 : The Carboniferous-Permian Oslo Rift**

The excursion will focus on the Oslo Rift as an example of continental rifting within the Pangea Continent and

adjacent to the orogenic events of the Hercynian. The Oslo Rift, including the Oslo Graben, will be studied in terms of its rift architecture and extensional aspects, volcanism and plutonism, sedimentology, and its overall development in time and space.



Photo: Bjørn T. Larsen, Geological Survey of Norway

Palaeosurface of Permian basalt flow in the Oslo Rift

The excursion will include:

- Tectonics and Lower Palaeozoic sediments of the inner Oslofjord (By boat)
- The unconformity between the Lower and the Upper Palaeozoic, and the overlying Upper Carboniferous/Lower Permian sediments and volcanics, including the rhomb porphyry lava plateaus
- Permian alluvial fan, aeolian and fluvial red beds
- Batholith and sill intrusion complexes, including the famous larvikite syenite batholiths



### Excursion 16: From epicontinental sea to foreland basin – the Early Palaeozoic of the Oslo region

The excursion is aimed at demonstrating the transition, in time and space, from the Cambrian shallow epicontinental sea transgressing the Baltic peneplain to the Late Ordovician/Late Silurian foreland basin of the Caledonian Orogen. This is reflected in the Lower

Cambrian to Middle Ordovician transgressive to shallow water deposits of black shales, mudstones and limestones passing through Upper Ordovician to Lower Silurian deposits of a shallowing carbonate sea with increasing clastic input, ending up with the earliest foreland basin sandstone infill in the Late Silurian. The nature of folds, imbricated thrusts and back thrusts testify to the frontal, parautochthonous position with regard to the Caledonian Orogen.



Photo: Bjørn T. Larsen, Geological Survey of Norway

Outcrop of Lower Ordovician Ortoceras limestones

The excursion will include:

- The Ediacaran continental shelf deposits
- The boundary between the Precambrian and the Cambrian
- The vertical and lateral variations in lithostratigraphy and paleofauna of the Cambrian, Ordovician and Silurian through the Oslo region
- Foreland basin compressional tectonics and "piggyback basin formations"



**Excursion 17: Classical Geological Localities within the Oslo Rift and surroundings**

Local authorities in south-eastern Norway will submit an application dossier to the "European Geopark Network" (EGN) and UNESCO by the end of 2004 or early 2005. The plan is to prepare 40-50 localities of international

geological importance for educational, scientific and tourist purposes before 2007. These classic geological localities have been fundamental in the understanding of the geology of Norway, and are important in the European geological heritage. During the IGC-2008 the participants will be offered several 1-2 day excursions to localities within the geopark area.

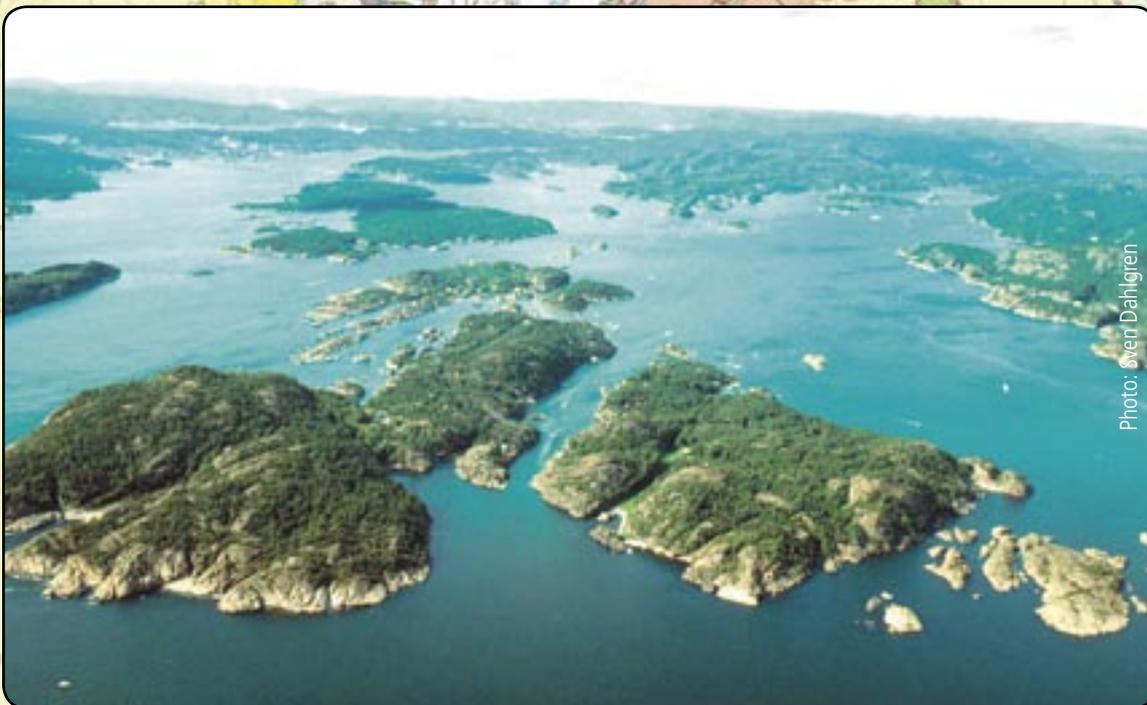


Photo: Sven Dahlgren

The skerries of the Langesund fjord

The excursion will include:

- The Fen carbonatite complex. World-type locality for carbonatites, fenitization etc.
- The Langesundsfjorden nepheline syenite pegmatites with their rare minerals, including a world-type locality for the element thorium and the mineral thorite
- The larvikites, which are extensively quarried for the world market
- The Brunlanes volcanic series. A recently "discovered" sequence of nephelinite and melilitite lava flows



**Excursion 18: The Cretaceous and Tertiary geology of Southern Sweden and Denmark**

A bus trip from Oslo through Southern Sweden to the University of Copenhagen and the Cathedral in Roskilde. From Hirtshals in Northern Jutland we take the ferry to Kristiansand in Norway and return to Oslo.

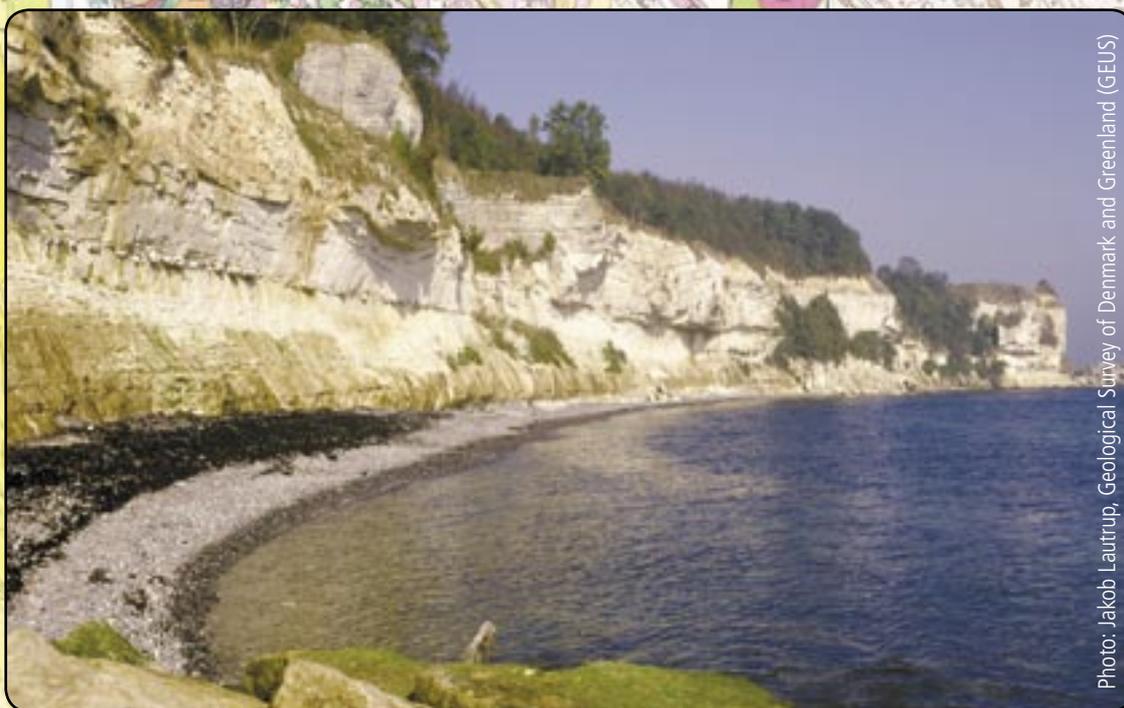
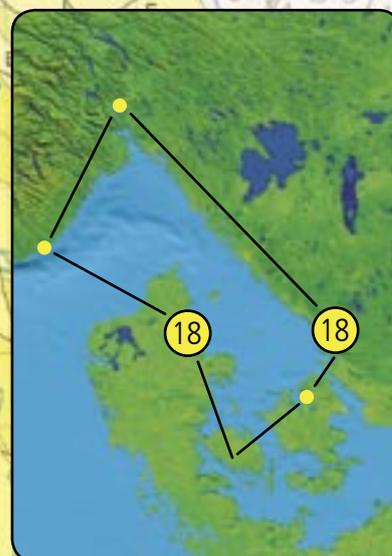


Photo: Jakob Laurrup, Geological Survey of Denmark and Greenland (GEUS)

Stevns Klint. The Cretaceous/Tertiary boundary is the clear horizontal surface at one third way up the cliff

The excursion will include:

- Visit to the world famous KT-boundary location at Stevns Klint and the scenic Cretaceous Møns Klint
- Further West on the island of Langeland we will look at the classical section of Ristinge Cliff where a spectacular glaciotectonic setting with over 30 thrust slices including the Eemian deposits are exposed
- In Jutland stops will include the fossil rich cliffs on the island Fur with their characteristic volcanic ash layers, Skagen Spit, and the active sand dune Raabjerg Mile



**Excursion 19: Lower Palaeozoic faunal and lithofacies developments in Southern Scandinavia.**

"The excursion will focus on the lithofacies and faunal record of the Middle Cambrian to Lower Silurian in classical localities from Gotland through Öland and Southern Sweden to Oslo.



Lower Silurian limestone formations, Gotland

The excursion will include:

- The world class exposures of Silurian biohermal mounds of the Island of Gotland
- The Ordovician fauna and carbonate platform sequence of the Island of Öland
- The Cambrian of southern mainland Sweden, including the transgressive basal Lower Cambrian sandstone and overlying radioactive black shales ("the Alun Shale")
- The Middle Cambrian to Silurian succession preserved in the Permian Oslo Rift
- Demonstration of the interaction between Upper Ordovician to Silurian prograding siliciclastic wedges from the evolving Caledonian mountain chain and the carbonate platforms and ramps in the Oslo Region

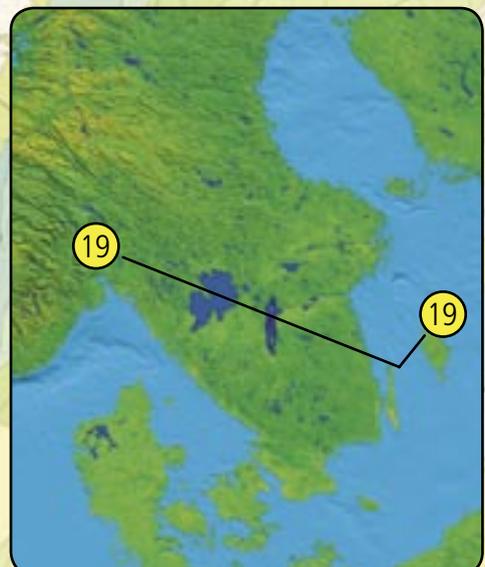


Photo: Anders Damberg, Geobild

### Excursion 20: Baltic Sea marine geology: a sea-going mini symposium

The excursion will focus on the post-glacial history of the Baltic Sea basin, environmental aspects of a semi-enclosed sea, marine geology and acoustic surveys, as well as the evolution of the Baltic Sea area through geological times.

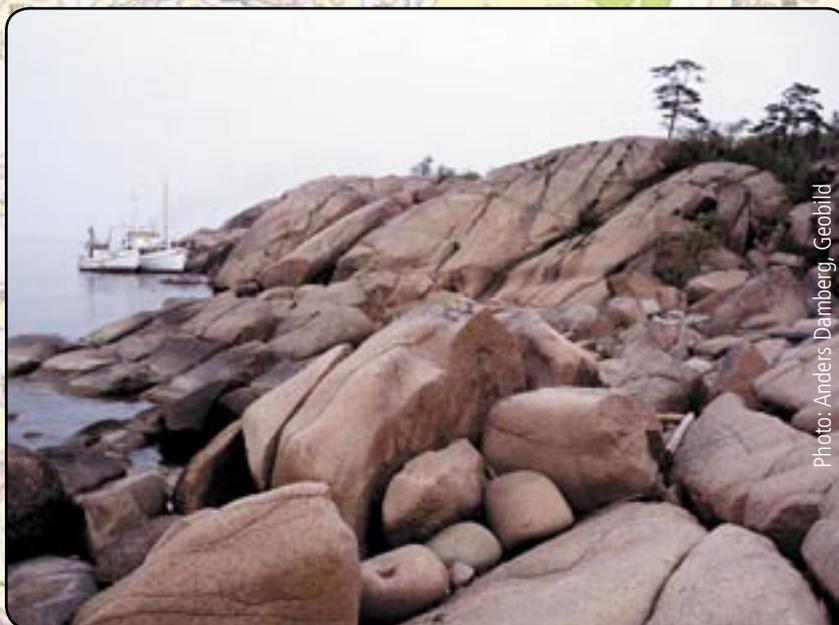


Photo: Anders Damberg, Geobild

Baltic Sea outcrop

The excursion will include:

- Åland Rapakivi-granite, Mariehamn
- Cambrian sandstone dikes, in almost present position during the accumulation of the sandstone, of which only the remnants exist (Prästö)
- Jotnian sandstones of the Åland Sea area
- Rocks and skerries, roches moutonnées of an island in the Archipelago Sea (Kökar)
- Outermost part of the Salpausselkä III ice-marginal formation (Jurmo)
- Gullkrona, skerries exposed from the sea by isostatic uplift of the bedrock



### Excursion 21: Impact structures in Scandinavia

The excursion will focus on terrestrial and marine impact structures with various target rocks, impact tectonism, impact melt rocks, shock metamorphism and geophysics

of impact. There are more than 20 meteorite impact structures in the Precambrian Shield of Scandinavia. Some of the impact events are ancient but some are relatively young. The field trip will focus on seven of them.

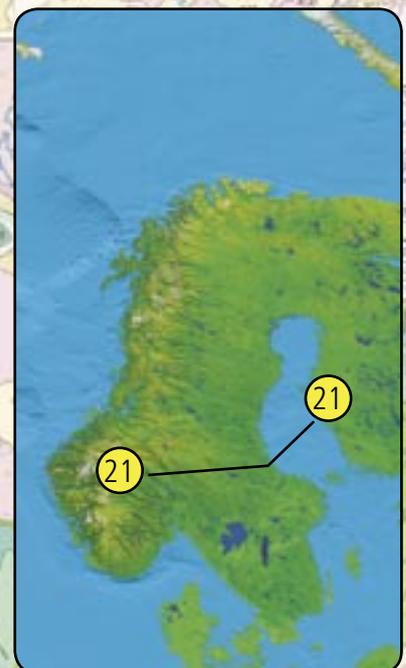


Limestones and shales in vertical position caused by Silurian meteorite impact at Siljan

Photo: Karin Eriksson, Naturgörium

The excursion will include:

- The Gardnos: Crater in central Norway
- Siljan: Crater collapse, pseudotachylite formation, shatter cones
- Lockne: Influence of a marine environment on crater formation, resurge deposits
- Dellen: Impact melt rocks, geophysical signatures of melt rocks
- Lappajärvi: Impact melt exposures, drill core exhibition, impact diamonds, overview of a young complex impact structure
- Karikkoselkä: Geophysics of a simple impact structure, shatter cones, drill core exhibition
- Söderfjärden: Drill core exhibition, breccia dykes, geophysical characteristics and probably a new drilling site with drill cores



**Excursion 22: Geology and radioactive waste disposal**

The excursion will focus on disposal of radioactive waste, and technical aspects and geology of the candidate areas for the disposal of highly-radioactive nuclear waste.

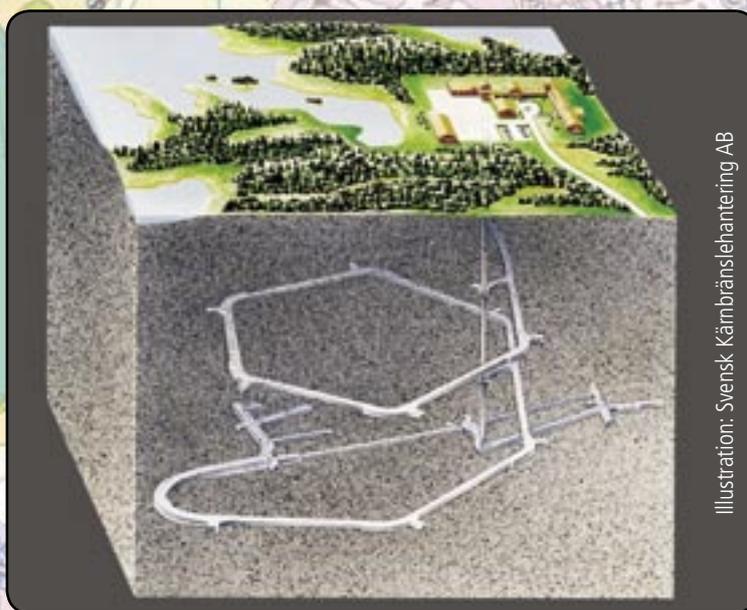
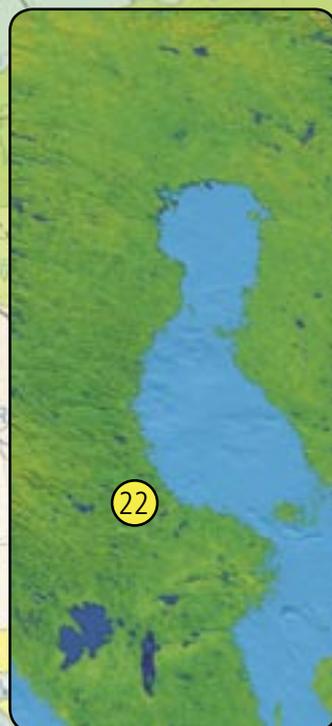


Illustration: Svensk Kärnbränslehantering AB

Underground repository for nuclear waste

The excursion will include:

- Visit to the underground repository for the disposal of low- and medium-radioactive waste at Forsmark (SFR)
- Geology of the candidate area for the disposal of highly-radioactive nuclear waste close to Forsmark
- Drillhole samples and data to a depth of c. 1 km in the Forsmark candidate area
- Deformation of Quaternary sediments in the Stockholm area – evidence for late- to post-glacial faulting and seismic activity?
- Visit to the temporary repository for highly-radioactive nuclear waste at Simpevarp (CLAB)
- Visit to the underground research laboratory at Äspö
- Geology of the candidate area for the disposal of highly-radioactive nuclear waste close to Simpevarp
- Drillhole samples and data to a depth of 1 km in the Simpevarp candidate area



**Excursion 23: Glacial and postglacial landforms, stratigraphy and history of Central Sweden**

The excursion will focus on glacial and post-glacial development, deposits and processes in Central Sweden. The excursion will use bus, helicopter and foot hikes along the route Stockholm-Uppsala-Rättvik-Östersund-Sollefteå-Örnsköldsvik.

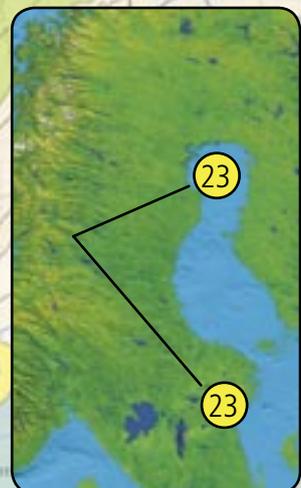


Photo: Anders Damberg, Geobild

Glaciofluvial deposits with swallows nests in upper parts

The excursion will include:

- De Geer moraines
- Varved glacial clay
- Eskers and gully system in Säter
- Canyon of Styggforsen
- Koppången solig enousmire complex
- Interglacial and interstadial deposits
- Glaciofluvial and fluvial erosion
- Varve chronology
- Recent delta deposits
- Highest glacial uplift on earth and ongoing shore processes



**Excursion 24: The Bergslagen metallogenetic zone, Sweden**

The excursion will focus on the following themes: 1.9 Ga volcanism, synvolcanic Zn-Pb-Cu deposits, banded

iron formations and skarn iron ores, intrusive suites, granite-associated tungsten deposits in a regional structural and metamorphic setting. The excursion will include visits to several types of volcanic-associated mineral deposits.



Photo: Karin Eriksson, Naturforum

The mining excavation known as the Great Pit at Falun

The excursion will include

- Active mine at Garpenberg (marble- and skarn-hosted Zn-Pb-Cu-Ag sulphide deposit with Mg-alteration)
- Active mine Zinkgruvan (Zn-Pb-Ag sulphide deposit with K-alteration)
- Closed mine at Falun with over 800 years of mining history (pyritic Zn-Pb-Cu-Au sulphide deposit with Mg alteration). Part of the World Heritage of the Mining Area of the Great Copper Mountain in Falun
- Characteristic Fe- and Mn-oxide deposits (e.g. Långban which is world famous as the type locality for hundreds of mineral species)



**Excursion 25 : Metallogensis in Finland and Sweden**

The excursion will focus on metallogeny of and mining in Palaeoproterozoic intrusions and greenstone belts of the northern part of the Fennoscandian Shield.

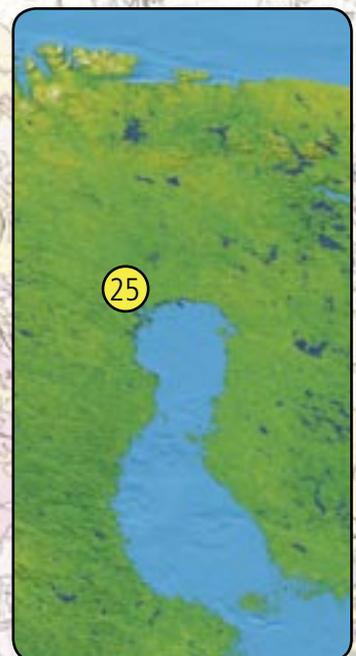


Photo: Geological Survey of Finland

The Kemi Mine

The excursion will include:

- 2440 Ma layered intrusion-hosted Cr deposits: the Kemi mine
- 2440 Ma layered intrusion-hosted PGE deposits: the Portimo deposits and mine(s) (the potential Suhanko mine)
- Orogenic gold deposits in the Palaeoproterozoic Central Lapland greenstone belt: Suurikuusikko deposit and deposits along the Sirkka Line shear zone
- Iron oxide-copper-gold style of mineralisation: Kolari deposits in westernmost Finnish Lapland, Aitik in Gällivare and other Au-Cu deposits around Gällivare and Kiruna in Sweden (all Palaeoproterozoic)
- The Kirunavaara and Luossavaara mines. The Kiruna iron deposits belong to the iron oxide-copper-gold category



**Excursion 26: Archean-Proterozoic overview in Fennoscandia**

The excursion will focus on crustal scale 3D modelling, Archean and Proterozoic ophiolites, collisional structures and stabilisation of thick crust.



Photo: Jari Väätäinen, Geological Survey of Finland

Palaeoproterozoic pillow lavas in Siilinjarvi

The excursion will include:

- Archean ophiolites and the Belomorian Mobile Belt
- Archean granite-greenstone association and Palaeoproterozoic overprinting
- The Jormua ophiolite – 2.08-1.96 Ga mantle fragment
- Basement-cover relationships – structural style of foreland deformation
- The Archean-Proterozoic boundary – 1.92 Ga island arc and 1.89 Ga HT-LP granulites
- The Tampere 1.90 Ga island arc and Central Finland Granitoid Complex



**Excursion 27: Carbonatites and Alkaline rocks of the Fennoscandian Shield**

The excursion will focus on alkaline intrusions of Norway, Sweden and Finland.

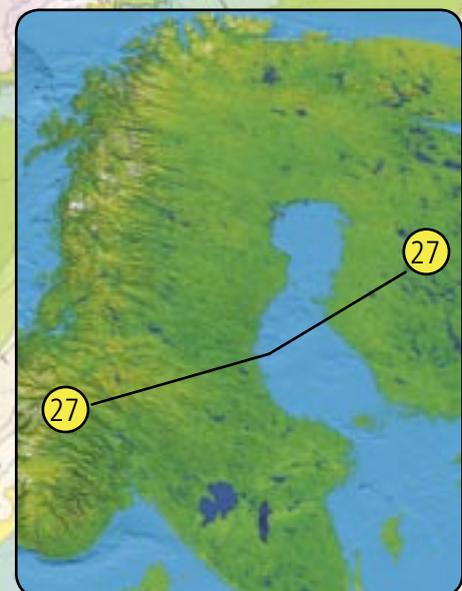


Photo: Kemira Oyj

Phosphorous mine, Siilinjärvi

The excursion will include:

- The Fen Complex: With a surface area of 4 km<sup>2</sup>, the 600 Ma Fen complex contains an array of rock types, including carbonatites, ijolites, and ultramafic lamprophyres (it is the type locality of damkjernite). The latter is one of the few rock types in Fennoscandia known to contain mantle xenoliths
- The Alnö Complex: Of similar age to the Fen Complex, this area of alkaline rocks and calcite carbonatite contains central intrusions up to 5 km in diameter. Over 1200 dikes have been recorded ranging from melilitites to alnöites to carbonatites. The more kimberlitic versions of the alnöites also form diatremes north of Alnö, which are presently being prospected for diamonds
- The Siilinjärvi Carbonatite: The 2.6 Ga Siilinjärvi carbonatite complex in Eastern Finland is one of the oldest carbonatites in the world. It consists of a steeply dipping lenticular body roughly 16 km long with a maximum width of 1.5 km and a surface area of 14.7 km<sup>2</sup>. An open pit mine for phosphorus ore commissioned in 1979, presently has an annual production of some 750,000 t apatite and 100,000 t carbonate concentrates from 9.0 Mt ore with 550 Mt of reserves and probable reserves



**Excursion 28: Postglacial overview of Finland**

The excursion will focus on mires, marginal formations, clays, groundwater, and land uplift.



Photo: Jari Väättäinen, Geological Survey of Finland

An esker surrounded by lakes in Central Finland

The excursion will include:

- Mires of post glacial age: different types, development, fuel peat production, balneological peat, reclaim of peat production area, target for tourism and education
- The Salpausselkä marginal formations: genesis, structure, ground water reservoirs, raw material for aggregate
- Post glacial land uplift; problems to marine traffic, saline agricultural fields
- Clay deposits of the saline and fresh water phases of the Baltic sea
- Wind blown material: dune field along the Bothnian Bay shoreline, loess on the Salpausselkä marginal formation
- Palaeosols and places of Neolithic and younger historical settlements



**Excursion 29: Glacial and post-glacial landforms, stratigraphy and history of the fjord areas of Troms, Arctic Norway**

The excursion will focus on glaciogene morphology, Quaternary stratigraphy, de-glaciation history, and post-glacial climate.



Photo: Rolv Dahl, Geological Survey of Norway

The Lyngen Alps, Troms county

The excursion will include:

- Glacially shaped landscape morphology
- Modern glacial deposits
- Raised beaches and sea-level changes



### Excursion 30: Geology along the route of the Norwegian Coastal Voyage (Hurtigruten)

The 'Hurtigruten' is operated by a fleet of 12 ships that travel along the Norwegian coastline every day, from Bergen on the southern west coast to the Russian

border near Kirkenes in northern Norway. There are over 30 ports of call. The journey has been described as one of the most beautiful sea voyages in the world, with many picturesque fjords, mountain peaks, glaciers, archipelagos and fishing villages to be seen along the route. The 'National Geographic Magazine' has recently described these stunning landscapes as "the best tourist destination in the world".



Photo: Terje H. Borge, Geological Survey of Norway

Tysfjord with the mountain Stetind, Nordland county

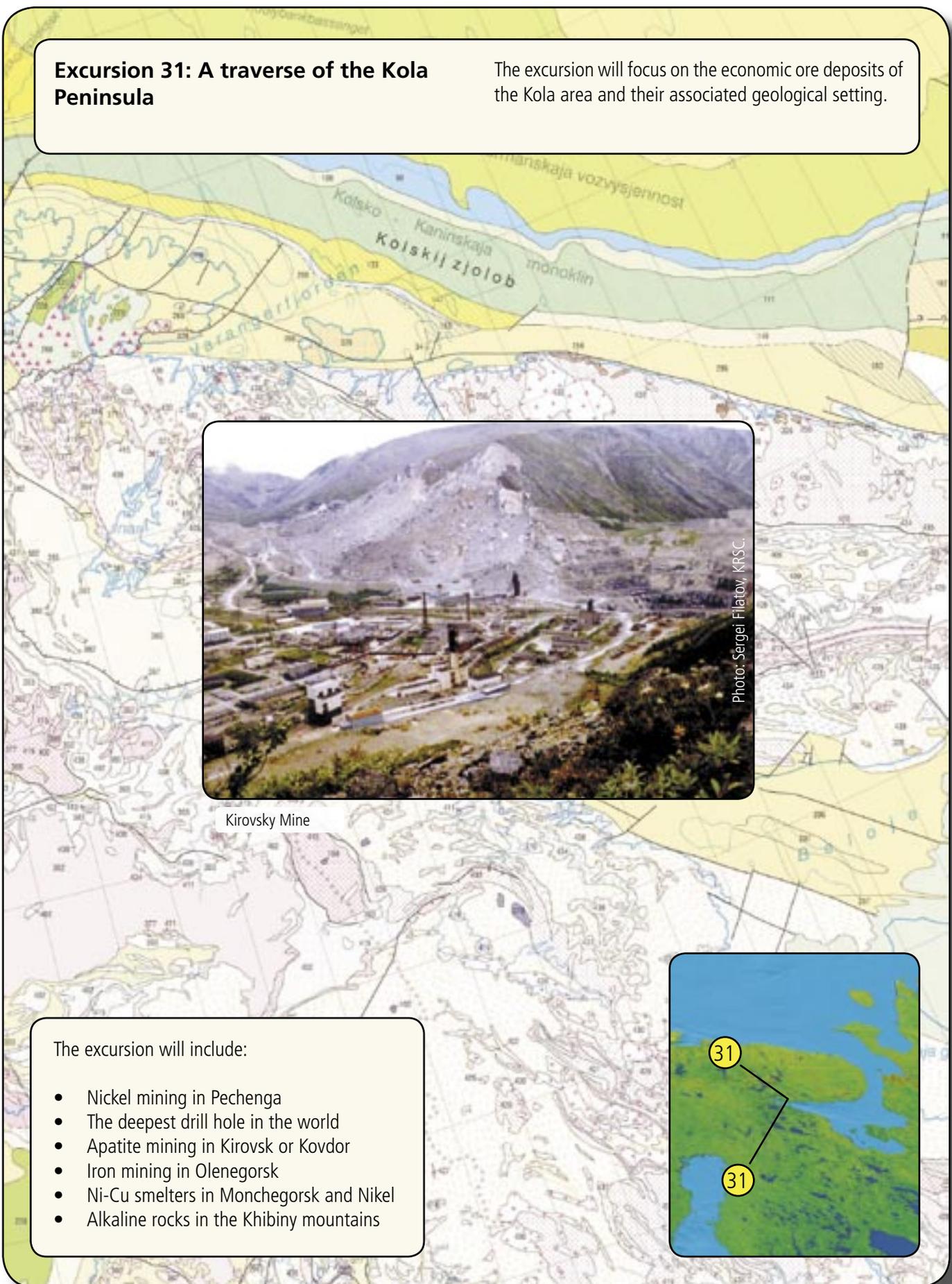
The excursion will include:

- Well-exposed Precambrian and Palaeozoic (Caledonian) rocks
- Landscape created by a major regional uplift during Tertiary times.
- Landscape created by glacial erosion during the Weichselian Ice Age
- Rugged coastlines, the 'strandflat' and precipitous sea cliffs and mountain peaks



**Excursion 31: A traverse of the Kola Peninsula**

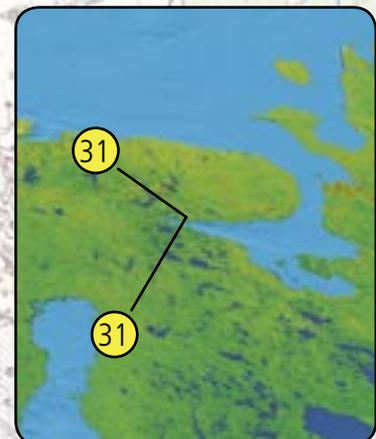
The excursion will focus on the economic ore deposits of the Kola area and their associated geological setting.



Kirovsky Mine

The excursion will include:

- Nickel mining in Pechenga
- The deepest drill hole in the world
- Apatite mining in Kirovsk or Kovdor
- Iron mining in Olenegorsk
- Ni-Cu smelters in Monchegorsk and Nikel
- Alkaline rocks in the Khibiny mountains



### Excursion 32: Terrestrial and marine Quaternary stratigraphy of Spitsbergen, high Arctic

Western Svalbard exhibits an extensive record of Quaternary climatic change. The excursion will focus on

the Quaternary history of Spitsbergen in the Svalbard Archipelago in the Arctic. The excursion will be made by boat into the fjords of Spitsbergen with geological surveying and onshore outcrop visits. The excursion will focus on stratigraphies from the last interglacial/glacial cycle, geomorphology and raised marine shorelines, and present day processes in the high arctic environment.

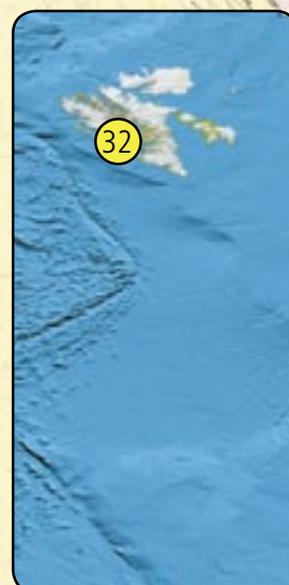


Photo: Winfried Dallmann, Norwegian Polar Institute

Quaternary section including the last interglacial period. Permian carbonate shelf deposits in the background

The excursion will include:

- Well exposed stratigraphies of Eemian to Weichselian marine and glacial deposits at Kapp - Ekholm (Billefjorden), S coast of Bellsund, Prins Karls Forland, and in Linnédalen
- Climatic reconstruction from sediment records and correlation to the marine record and palaeoceanographic changes of the North Atlantic
- Upper Pliocene/Lower Pleistocene sedimentation and landscape development in the Kongsfjorden area
- Holocene raised beach systems and sea level change. Various localities in Billefjorden, Bellsund and Kongsfjorden
- Permafrost and karst features (Mathisondalen, Billefjorden and Linnédalen)
- Glacial and periglacial processes. Longyeardalen, Adventtdalen and Brøggerhalvøya
- In addition to the geology: Arctic wildlife, cultural sites such as old trapper stations and abandoned mining settlements



**Excursion 33: The post-Caledonian depositional succession of Svalbard**

The excursion will focus on presenting the Carboniferous to Tertiary geology of Svalbard by boat and on foot in Spitsbergen.

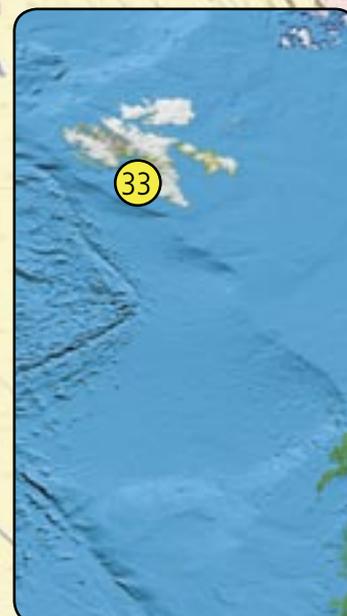


Photo: Winfried Dalmann, Norwegian Polar Institute

The Hyrne mountain in Hornsund showing a Carboniferous to Triassic section folded in the Tertiary

The excursion will include:

- Middle Carboniferous clastic-evaporite halfgraben sequence with interfingering fault-scarp deposits
- Upper Carboniferous marine carbonate shelf sequence with bioherms and evaporite rhythms
- Mesozoic clastic succession with Triassic delta sandstones, Triassic and Jurassic black shale successions, and Cretaceous coastal barrier environments
- Jurassic major sequence boundary with phosphatic lag deposits, oolites, etc.
- Early Cretaceous dolerite sills and dykes
- Tertiary foreland basin succession
- Coal production, visit to a coal mine



**Excursion 34: Geotraverse of Spitsbergen from the Precambrian to the Quaternary**

The excursion will present a traverse through the stratigraphic record of Spitsbergen. It will be made by ship from which outcrops will be visited by rubber boats and possibly helicopter.

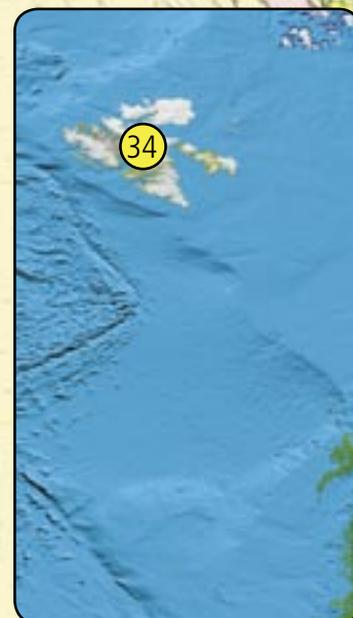


Photo: Winfried Dallmann, Norwegian Polar Institute

Décollement folds in Tertiary strata. View to the South, perpendicular to thrust movement; age of deformation: Early Tertiary

The excursion will include:

- Neoproterozoic basal sequences and Vendian tilloids (Bellsund)
- Caledonian thrust nappes with juxtaposed Proterozoic through Silurian strata (St. Jonsfjorden)
- Old Red molasse deposits (Dicksonfjorden)
- Middle Carboniferous clastic-evaporitic halfgraben sequence (Billefjorden)
- Upper Carboniferous marine, carbonate shelf sequence (Billefjorden, Gipshuken, Akseløya, Trygghamna)
- Mesozoic clastic succession, with delta sandstone, black shale, coastal barrier environments (Festningen, Janusfjellet)
- Tertiary Fold-Thrust Belt (Mediumfjellet, Trygghamna, Bellsund)
- Tertiary foreland basin succession (Kapp Hesselman, Longyearbyen)
- Coal production, visit of a coal mine (Longyearbyen)
- Permafrost features: patterned ground, pingos, thermokarst (in combination with other localities)
- Possible helicopter trip to northern Dickson Land, with splendid exposures across the Carboniferous Nordfjorden High / Billefjorden Trough



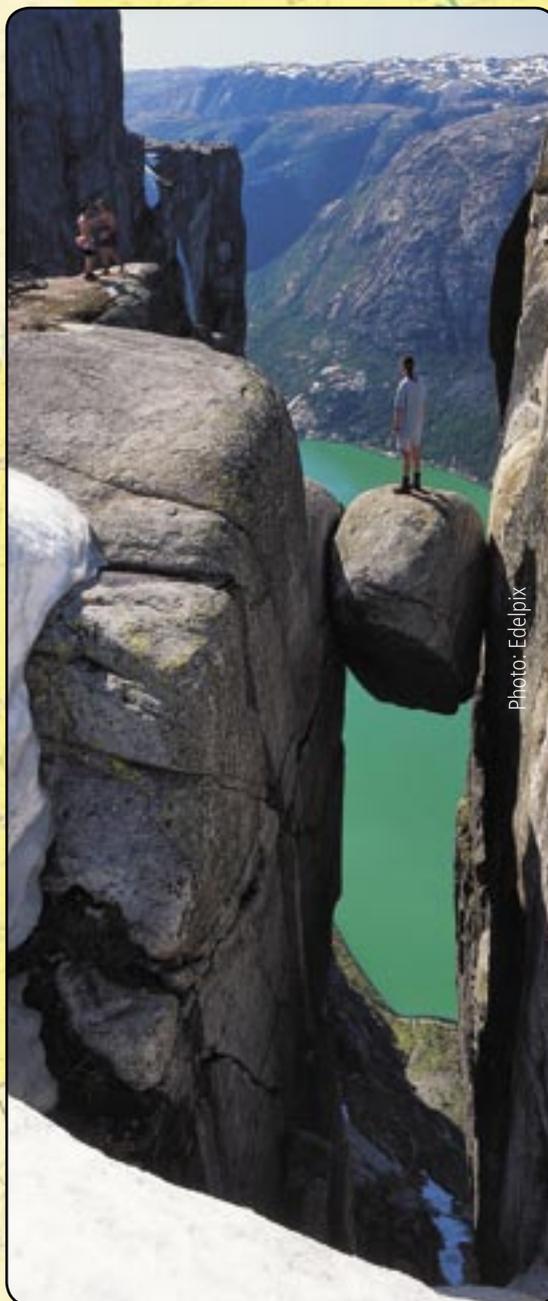
### Preliminary list of additional pre- and post-Conference excursions under consideration

1. Excursion by ship to the Russian islands of Franz Josefs Land
2. The Precambrian geology of the West Troms Gneiss Complex and the Lofoten area
3. The Precambrian crustal evolution in the southwest Baltic Shield – The Middle Proterozoic to Sveconorwegian evolution
4. The greenstone belts of Finnmark
5. The Seiland Igneous Complex
6. Layered intrusions in Norway
7. The Leka Ophiolite Complex
8. A traverse through the North-Norwegian Caledonides
9. Caledonian granite batholiths in Mid-Norway
10. Highlights of the regional geology of central-western Norway
11. The geology of northernmost Europe – A geotraverse from Kirkenes to Alta
12. A geotraverse at the Polar Circle
13. A geotraverse of the Caledonides in central Scandinavia
14. Post Caledonian tectonics of the Norwegian mainland
15. The hard rock geology of Svalbard
16. Late Palaeozoic to Tertiary sedimentary basins in Spitsbergen: Billefjord, Isfjord and Adventdalen.
17. The Tertiary fold belt: The West coast and outer fiords between Kongsfjord and South Cape on Spitsbergen
18. The Devonian basin in northern Spitsbergen – sedimentology, tectonic setting and Quaternary volcanism
19. The Quaternary of Arctic Eurasia
20. The Quaternary of Svalbard
21. Arctic Quaternary geology: Central fiord regions and the West coast on Spitsbergen
22. The glaciology and glacial morphology of Svalbard
23. Falling stage deltas and postglacial fjord-valley-fill stratigraphy, northern Norway
24. Raised beaches and postglacial sea-level change in Troms, northern Norway
25. The fiords of western Norway: Quaternary geology and geo-morphology
26. A traverse of the Quaternary geology of South Norway
27. Karst landforms and aquifer development in the Scandinavian Caledonides
28. Karst and sub-permafrost aquifers in Spitsbergen
29. Quarries and industry minerals
30. The Holsnøy eclogites

## Preliminary list of additional mid-Conference excursions under consideration

1. The carbonatites and their associated suite of rocks of the classical Fen locality
2. Visit to the silver mines at Kongsberg
3. Holocene glacial deposits of the Stavanger area, including the classical Esmark moraine
4. Offshore geology workshop in the national petroleum industry core store of the Norwegian Petroleum Directorate
5. Scenic tour of the steep sided Lysefjorden near Stavanger, including a visit to the Pulpit Rock
6. Tour of the steep railroad of Flåm in Sognefjord
7. Guided tour of the building and pavement stones of the city of Bergen, including the city's World Heritage historic quarters

City of Bergen



Kjæragbolten, a peculiarity of glacial erosion in the mountain cliff 1000 meters above Lysefjorden

## LOCATION AND ACCOMMODATION FACILITIES

### Oslo - proposed host city of the 33<sup>rd</sup> IGC in 2008

Oslo - the Capital of Norway - is situated in the heart of Scandinavia, surrounded by magnificent scenery from the fjord to the forested hills. Home of cultural giants like Edvard Munch, Gustav Vigeland, Thor Heyerdahl and Henrik Ibsen, each of them with a museum. Oslo offers a unique combination of natural beauty, culture and history, which makes it a perfect setting for exciting social activities. Besides being the city where the Nobel Peace Prize is awarded each year, Oslo is the home of Norway's largest University as well as several renowned research centres, such as SINTEF, NORSAR and IFE, among others.

In this document, we would like to provide information, which shows that Oslo is a perfectly suitable city to host the 33<sup>rd</sup> International Geological Congress in 2008.

### Within easy reach

Oslo Airport has daily non-stop connections with major European cities as well as with New York. A high-speed train links the airport to the city centre in 20 minutes. The Norway Congress Centre is located halfway between the Airport and the city centre. There is also a shuttle bus service from the airport to major downtown hotels.

In addition to flight connections, modern, comfortable trains and passenger ferries link Oslo with the other Scandinavian capitals and the rest of the European continent.

### Congress facilities

The congress will take place at *Norway Congress Centre*, located at Lillestrøm, midway between the airport and the city centre. With a total surface of 32.000 m<sup>2</sup> (345 000 sq.ft), the centre has 5 large meeting halls and ample exhibition space of 10.600 m<sup>2</sup>. The plenary hall can seat 6000 persons. Combined with 21 meeting rooms with the capacity for 100 –150 delegates, including those in the onsite Hotel Arena, and auditoriums next to the convention centre.



Photo: Edelpix

## Accommodation

In Oslo and the surrounding area, there are 73 hotels with a total of about 11,000 rooms ranging from luxury hotels to youth hostels, which can accommodate about 15,500 persons. 6500 hotel rooms have already been reserved, most in the city centre, no more than 15 minutes from the congress centre (by bus/train). In addition, 1000 beds are guaranteed in youth hostels and university residences. Prices range from USD 275 - 40 | EUR 240-30, for luxury hotels to youth hostels.

## Tourist information

Oslo Visitors and Convention Bureau provides tourist information at the following address:

### Tourist Information

Fridtjof Nansens plass 5  
NO-0160 Oslo, Norway  
Tel: +47 2414 7700  
Fax: +47 2242 9222

e-mail: [touristinfo@visitoslo.com](mailto:touristinfo@visitoslo.com)

internet: [www.visitoslo.com](http://www.visitoslo.com)

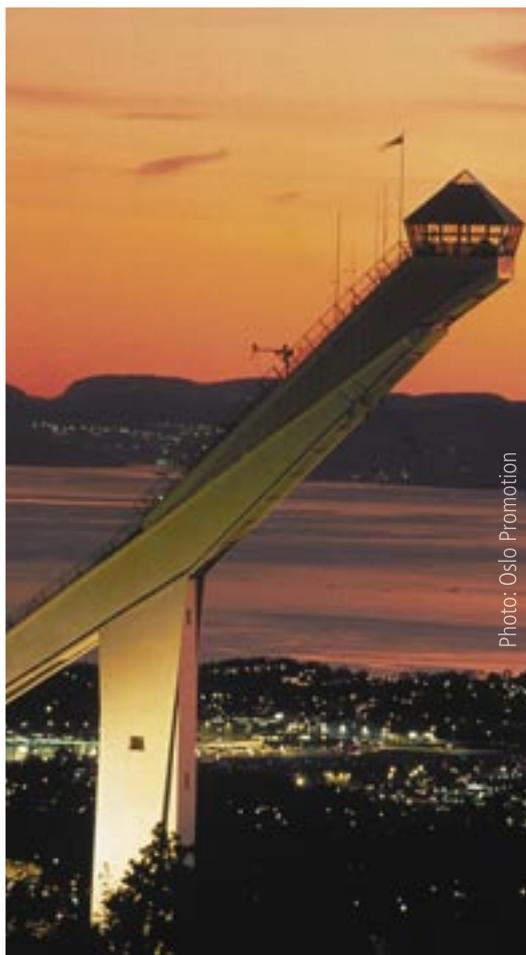


Photo: Oslo Promotion



Photo: Edelpix

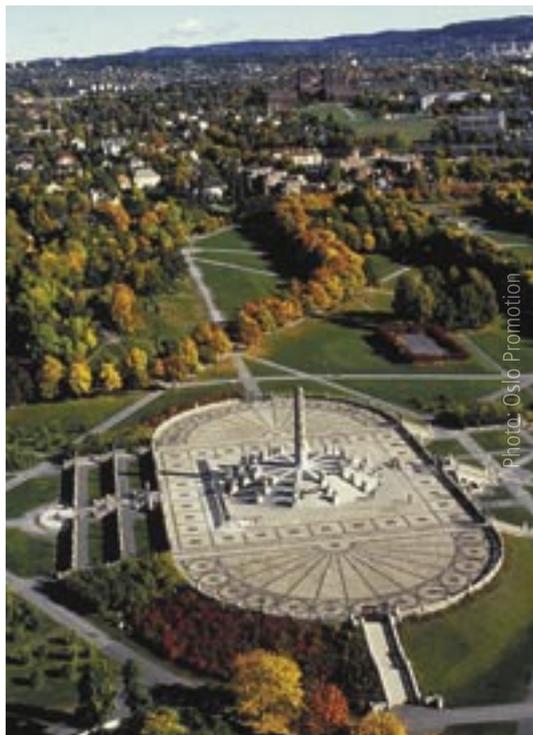
## Social program

Despite its northern location, Norway is definitely more solar than polar, thanks to the warming effects of the Gulf Stream. At the time of the Congress, the temperature in Oslo is normally pleasant (18-25°C). There is daylight as late as 10 p.m. and the sun rises as early as 5 a.m. Further North, above the Arctic Circle, the sun never fully sets during the summer.

Being a town of only half a million inhabitants, the centre of Oslo is small and compact, and most hotels, shopping areas, and entertainment offers are within walking distance. People in Oslo are friendly and enjoy welcoming visitors. Norwegians are skilled in languages, and practically all speak English, so communication is easy.

For extra curricular activities, the city of Oslo has a number of museums and parks and attractions:

**Vigeland Sculpture Park** - the famous sculpture park with the works of Gustav Vigeland (1869-1943) is one of the artistic highlights of Norway, featuring 212 sculptures in bronze or granite, modelled in full size.

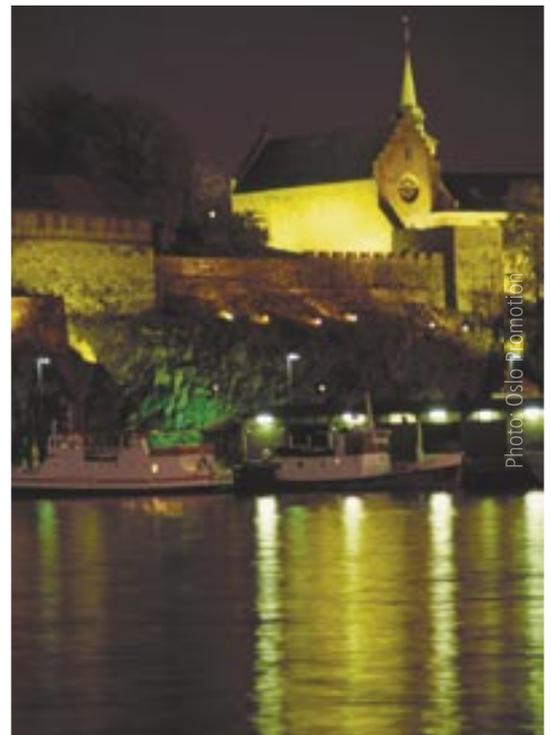


Vigeland Sculpture Park

**Edvard Munch (1863-1944)** is the most significant Norwegian contributor to the history of art, and the only Norwegian artist who has influenced European art trends, especially as a pioneer of Expressionism in Germany and the Nordic countries. In his art, he returned again and again to the themes of Illness, Death and Grief. Many of his famous paintings, such as *The Scream*, *Vampire*, *Madonna*, *Death in the Sickroom*, *The Dance of Life*, and *Girls on the Bridge*, are exhibited at the Munch Museum and The National Gallery.

**Henrik Ibsen (1828-1906)** is considered the father of modern drama and one of the world's most famous playwrights. Amongst his well known plays are: *A Doll's House*, *Hedda Gabler*, *Peer Gynt*, *Brand*, *The Wild Duck* and *An Enemy of the People*. As relevant today as they were 100 years ago, his plays are still staged all over the world. Oslo has a museum dedicated entirely to the playwright.

**Akershus Fortress and Castle** are national treasures, dating from the 13th century and located in the heart of Oslo. The Fortress grounds are an ideal recreation area, just as they were in the 19th century, and from the Fortress you can enjoy the beautiful view of the Oslo fjord and the bustling harbour area.



Akershus Fortress and Castle

view, hovers 435 meters above the everyday life in the Norwegian capital. Designed by Architect Holm Munthe and built in the unmistakable Dragon style, the building was completed in 1892. Situated in Holmenkollen, the ski jump arena, this popular restaurant is reachable by tram.

**The Holmenkollen Ski Jump** plays an important part in Norwegian and international skiing history, and is for many the main symbol of international ski sport, having been the focal point of Norwegian skiing for the last 100 years. From here, you can enjoy a panorama view of the city and its surroundings, and also enjoy summer concerts or take part in other activities. Inside the ski jump is an impressive ski museum.

**The Bygdøy peninsula** is a recreational area reachable by a short bus ride or by boat, and is the site of the following unique attractions:

**The Viking Ship Museum** houses findings from the great ship burials at Oseberg, Gokstad and Tune, and from a chieftain grave at Borre, Vestfold county. The three ships, which are the best preserved Viking ships in existence, were found in large burial mounds in the Oslo fjord region.

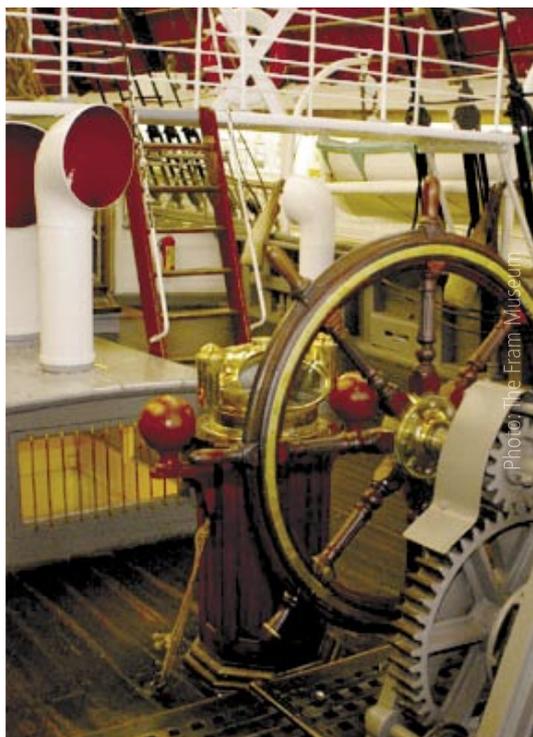
Beautifully crafted furnishings of wood and textiles from the Viking period are exhibited, and you can admire some of the finest examples of Nordic art and craftsmanship more than a thousand years old.

**The Kon-Tiki Museum** is the place to visit if you wish to experience the exiting world of the famous explorer Thor Heyerdahl (1914-2002). The Museum houses vessels and artefacts from several of his expeditions. You can see the original Kon-Tiki raft from 1947, the papyrus boat Ra II (1970), and an exciting collection of archaeological finds from the Easter Islands, East Polynesia, the Galapagos and Peru.

**The Polar Ship Fram.** The entire original Arctic exploration ship Fram, built 1892, is exhibited with its original interior and inventory. The ship was used for three expeditions by Fridtjof Nansen, Otto Sverdrup and Roald Amundsen. A comprehensive history of arctic exploration is presented around the ship.



The Viking Ship Museum



The Polar Ship Fram

## ENCLOSURES

INVITATION FOR HOSTING THE 33<sup>rd</sup> IGC IN 2008  
PRESENTED AT THE 31<sup>st</sup> IGC IN RIO DE JANEIRO 2000

Norwegian National Committee for IUGS



**Norwegian National Committee for the  
International Union of Geological Sciences**

**Chairman**  
Prof. R. Sinding-Larsen  
Norwegian University of  
Science and Technology  
7491 Trondheim  
Norway

Trondheim 28<sup>th</sup> of July, 2000

The Organizing Committee of the  
31<sup>st</sup> International Geological Congress  
Av. Pasteur, 404, Casa Brazil 2000 – Urca  
Rio de Janeiro – RJ  
Brazil – Cep 22290-240

Dear Sirs/Mesdames,

33<sup>RD</sup> IGC IN 2008 LOCATED TO SCANDINAVIA, OSLO, NORWAY.

The Norwegian National Committee for IUGS is hereby pleased to invite the 33<sup>rd</sup> International Geological Congress to be held in Scandinavia in Oslo, Norway in early August, 2008.

The last International Geological Congress in Scandinavia were held in Copenhagen, Denmark in 1962 and we would therefore be delighted to welcome all geologists to revisit Scandinavia almost half a century later. The intention of the 33<sup>rd</sup> IGC is to arrange the congress jointly with our neighboring countries and have excursions all over Scandinavia as well as Iceland and the Svalbard island. An organizing committee will be conveyed with representatives from geoinstitutions in all the Scandinavian countries.

Please find enclosed some information about Oslo and the logistics of the new conference center where the congress will be held.

Yours sincerely,

Richard Sinding-Larsen  
Chairman, Norwegian  
National Committee for IUGS

Enclosure

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**Committee Members:**  
Dr Gen. Aase Elvøyåke Geological Survey of Norway    Prof. Anders Elvøstet University of Oslo    Prof. Per Jørgensen Agric. University of Norway    Prof. Jan Mangerud University of Bergen    Prof. Tore Vorren University of Tromsø

SUPPORT BY GOVERNMENTAL NATIONAL, REGIONAL AND LOCAL AUTHORITIES

Prime Minister of Norway, Kjell-Magne Bondevik  
Mayor of Oslo, Per Ditlev Simonsen  
Finnish Ass. of Mining and Metallurgical Engineering  
Danish National Committee for IUGS  
Finnish National Committee for IUGS

Icelandic National Committee for IUGS  
Norwegian National Committee for IUGS  
Swedish National Committee for IUGS  
Geological Society of Finland  
Geological Survey of Finland



THE PRIME MINISTER

Oslo, 3 October 2002

Dear Sirs

I am proud to promote Norway as the venue of the 33rd International Geological Congress in 2008.

Geological sciences are of great importance for the sustainable management of natural resources and for the development of societies as a whole. It is imperative that governments, scientists and other stakeholders continue to work together to meet the world's challenges in the areas of environment and development.

Earth scientists have been vital to Norway's economic development based on mineral resources, hydroelectric power, oil and gas. I am sure that the International Geological Congress will benefit from Norway's extensive energy sector, where geosciences are at the forefront.

It would be an honour to welcome a distinguished group of geological scientist to Norway in 2008.

Yours sincerely,

The International Union of Geological Sciences  
Steering Committee



City of Oslo  
Mayor Per Ditlev-Simonsen

Prof. Ivar B. Raeborg  
Chairman of the Bidding Committee  
International Geological Congress

Date: 26.09

I have been informed that The Norwegian National Committee for the International Union of Geological Sciences (IUGS) on behalf of the Nordic Bidding Committee is bidding for International Geological Congress in 2008.

The City of Oslo is an ideal place for congresses. It offers excellent hotel accommodations in various categories, as well as professional congress facilities.

Oslo, the capital of Norway, has 500,000 inhabitants. It has a great variety of cultural attractions like theatres, opera, concert-hall and many museums. The Edvard Munch Museum is especially popular and renowned, and the Vigeland Sculpture Park is unique.

In addition to its cultural attractions, Oslo is endowed with the most beautiful surroundings. The Oslo Fjord and the hillsides frame the city and contribute to its atmosphere in a very special way.

We would appreciate to host the 33rd International Geological Congress in 2008, and we assure you that the Capital of Norway would do its utmost to ensure its success.

  
Per Ditlev-Simonsen  
Mayor of Oslo

Business information

Postadresse: 0457 Oslo  
Telefon: 22 40 14 40  
E-post: post@oslo.kommune.no



**Norwegian National Committee for the  
International Union of Geological Sciences**

Chairman  
Prof. B. Ståring-Larsen  
Norwegian University of  
Science and Technology  
N-7051 Trondheim  
Norway

21 February, 2002

To: The Nordic Preparatory Committee for the  
33 International Geological Congress in Oslo 2008

Professor Ivar B. Ramberg,  
Chairman of the Executive Team  
Ram-co  
Lysaker Torg 25  
1366 Lysaker

**SUBJECT: OFFICIAL SUPPORT FROM THE NORWEGIAN NATIONAL COMMITTEE  
FOR IUGS.**

On behalf of the Norwegian National Committee for IUGS, I am glad to give our full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33 IGC in Oslo during August 2008.

The members of the National Committee representing both the Geological Survey of Norway as well as the major academic institutions within the geosciences in Norway assure their full commitment to support this very important event for the Arctic area in general and for the Nordic countries in particular. This is a unique opportunity for the Nordic Geological Community to show to the largest international forum the advancement made in both basic and applied Earth Science research, and how many of these results now can be tested. The theme "From the Arctic environment towards a global assessment of ocean continent interactions" will provide an excellent opportunity for closer co-operation between the Norwegian institutions and the leading international counterparts in line with the agenda set forth by eminent polar explorers like Fridtjof Nansen, more than a century ago.

Moreover we think that the 33<sup>rd</sup> IGC in Oslo will represent a splendid opportunity for the Nordic geoscientific community to show to all the International Guests the beauty and the diversity of the geological settings that can be studied throughout the Nordic countries.

The Norwegian National Committee for IUGS is very proud to give to the 33<sup>rd</sup> International Congress all its scientific and organizational assistance in order to ensure a successful Nordic event in 2008, as a modern revitalization of the glorious IGC in Copenhagen nearly half a century ago.

Yours sincerely

R. Ståring-Larsen  
Chairman of the IUGS National Committee for Norway.

Committee Members:  
Dr. Gun. Arne Sandvik    Prof. Audun Eide    Prof. Per Bergman    Prof. Jan Mørland    Prof. Tom Yoccoz  
Geological Survey of Norway    University of Oslo    Agri. University of Norway    University of Bergen    University of Tromsø

**NATIONALKOMITEEN FOR GEOLOGI  
IUGS - DANISH NATIONAL COMMITTEE FOR GEOLOGY**

To: The Nordic Preparatory Committee for the  
33 International Geological Congress in Oslo 2008

Professor Ivar B. Ramberg,  
Chairman of the Executive Team  
Ram-co  
Lysaker Torg 25  
1366 Lysaker

**SUBJECT: OFFICIAL SUPPORT FROM THE DANISH NATIONAL COMMITTEE FOR IUGS.**

On behalf of the Danish National Committee for IUGS, I am glad to give our full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33 IGC in Oslo during August 2008.

The members of the National Committee representing both the Geological Survey of Denmark as well as the major academic institutions within the geosciences in Denmark assure their full commitment to support this very important event for the Arctic area in general and for the Nordic countries in particular. This is a unique opportunity for the Nordic Geological Community to show to the largest international forum the advancement made in both basic and applied Earth Science research, and how many of these results now can be tested.

Moreover we think that the 33<sup>rd</sup> IGC in Oslo will represent a splendid opportunity for the Nordic geoscientific community to show to all the International Guests the beauty and the diversity of the geological settings that can be studied throughout the Nordic countries, including the Faroe Islands and Greenland.

The Danish National Committee for IUGS is very proud to give to the 33<sup>rd</sup> International Congress all its scientific and organizational assistance in order to ensure a successful Nordic event in 2008, as a modern revitalization of the glorious IGC in Copenhagen nearly half a century ago.

Yours sincerely

Bjarne Leth Nielsen  
Chairman of the IUGS National Committee for Denmark.

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Support Letter\_DK.doc



VUORIMIESYHDISTYS —  
BERGSMANNAFÖRENINGEN ry.

16 April, 2007

To: The Nordic Bidding Committee for the 33 International Geological Congress in Oslo 2008

Professor Ivar B. Ramberg  
Chairman of the Executive Team  
Ram-co  
Lysaker Torg 25  
1366 Lysaker

**SUBJECT: OFFICIAL SUPPORT FROM THE FINNISH ASSOCIATION OF MINING AND METALLURGICAL ENGINEERS, GEOLOGY SECTION**

On behalf of the Finnish Association of Mining and Metallurgical Engineers (Geology Section), we are glad to give our full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33<sup>rd</sup> IGC in Oslo during August 2008.

The 33<sup>rd</sup> IGC will present a great opportunity for the international guests to study the beauty and the diversity of the geological settings throughout the Nordic countries. We are pleased to give to the 33<sup>rd</sup> International Geological Congress all its scientific and organizational assistance in order to ensure a successful Nordic event in 2008.

Yours sincerely,

Raimo Lehtinen  
Chairman, Finnish Association of Mining and Metallurgical Engineers, Geology Section

Jukka Lehto  
Secretary, Finnish Association of Mining and Metallurgical Engineers, Geology Section

ICELANDIC INSTITUTE OF NATURAL

The Nordic Preparatory Committee  
for the 33 IGC in Oslo 2008.  
c/o Professor Ivar B. Ramberg,  
Chairman of the Executive Team  
Ram-co, Lysaker Torg 25,  
1366 Lysaker, NORGE.

Subject: Official support from the Icelandic National IUGS.

On behalf of the Icelandic National Committee for the 33rd IGC, we are pleased to give our full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33<sup>rd</sup> IGC in Oslo during August 2008.

The members of the National Committee represent the University of Iceland, the Icelandic Institute of Natural History, the Nordic Volcanological Institute, the National Energy Authority and the Icelandic Geoscience Society. We assure our full commitment to support this very important event for the Nordic countries. This is a unique opportunity for the Nordic geological communities to demonstrate to the international forum the advancement made in both basic and applied earth science research, as well as the diversity of the geological settings that can be studied in the Nordic countries.

The Icelandic National Committee for IUGS is very proud to give to the 33<sup>rd</sup> International Congress all its scientific and organizational assistance in order to ensure a successful Nordic event in 2008, as a modern revitalization of the successful IGC in Copenhagen in 1960.

Yours sincerely,

Svein Pjetur Jakobsson  
Chairman of the IUGS National Committee for Iceland.



**GEOLOGIAN TUTKIMUSKESKUS**

GEOLOGISKA FORSKNINGSCENTRALEN  
GEOLOGICAL SURVEY OF FINLAND

1/1

28.2.2002

The Nordic Preparatory Committee for the 33 International Geological Congress in Oslo 2008  
Professor Ivar B. Ramberg, Chairman of the Executive Team  
Ram-co, Lysaker Torg 25  
1366 Lysaker  
Norway

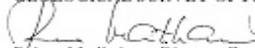
**SUBJECT: OFFICIAL SUPPORT FROM THE GEOLOGICAL SURVEY OF FINLAND**

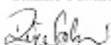
On behalf of the Geological Survey of Finland, we are glad to give our full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33<sup>rd</sup> IGC in Oslo during August 2008.

The 33<sup>rd</sup> IGC will represent a splendid opportunity for the Nordic Geoscientific community to show to all the International Guests the beauty and the diversity of the geological settings that can be studied throughout the Nordic countries.

The Geological Survey of Finland is very proud to give to the 33<sup>rd</sup> International Geological Congress all its scientific and organizational assistance in order to ensure a successful Nordic event in 2008.

GEOLOGICAL SURVEY OF FINLAND

  
Raimo Matikainen, Director General

  
Reijo Salminen, Professor



**GTK**

PL/PRP/O, Box 96  
FIN-02151 ESPOO, FINLAND  
Tel./Nat 020 550 11, Int. +358 20 550 11  
Fax/Nat 020 550 12, Int. +358 20 550 12  
<http://www.gtk.fi>

PL/PRP/O, Box 1237  
FIN-70211 KUOPPIO, FINLAND  
Tel./Nat 020 550 30, Int. +358 20 550 11  
Fax/Nat 020 550 13, Int. +358 20 550 13

PL/PRP/O, Box 77  
FIN-96101 ROVANIEMI, FINLAND  
Tel./Nat 020 550 40, Int. +358 20 550 11  
Fax/Nat 020 550 14, Int. +358 20 550 14



SUOMEN GEOLOGINEN SEURAT  
GEOLOGISKA SÄLLSKAPET I FINLAND  
GEOLOGICAL SOCIETY OF FINLAND

To: The Nordic Preparatory Committee for

Professor Ivar B. Ramberg,  
Chairman of the Executive team  
Ram-co  
Lysaker Torg 25  
1366 Lysaker

On behalf of the Geological Society of Finland we are glad to give all our scientific and organizational support to the invitation presented by the Norwegian delegation in Rio to hold the 33<sup>rd</sup> International Geological Congress in Oslo during August 2008.

Yours sincerely,

  
Mikko Niemi  
Chairman of the Geological Society of Finland

  
Pasi Eilu  
Secretary of the Geological Society of Finland



**KUNGL. VETENSKAPSAKADEMIEN**  
THE ROYAL SWEDISH ACADEMY OF SCIENCES  
Swedish National Committee for Geology

5 April, 2002

Dir 69-118/2002

Nordic Bidding Committee for the 33 International Geological Congress in Oslo 2008  
Professor Ivar B. Ramberg, Chairman of the Executive Team Ram-co  
Lysaker Torg 25  
N-1366 Lysaker  
Norge

**OFFICIAL SUPPORT FROM THE SWEDISH NATIONAL COMMITTEE OF GEOLOGY**

The Swedish National Committee of Geology (SNKGG) is an official expert committee of the Royal Swedish Academy of Sciences (Kungliga Vetenskapsakademien). This committee is the official Swedish representative of the International Union of Geological Sciences (IUGS), representing all Swedish Universities as well as the Geological Survey of Sweden and professional associations.

The International Geological Congress (IGC) is the largest and most important geoscientific congress, organized every four years throughout the world. This congress attracts normally more than 6000 delegates as well as numerous companies, exhibitors etc. There are plans on organizing this important event in Oslo, Norway, in cooperation with all the Nordic countries.

The Swedish National Committee of Geology gives its full scientific and organizational support to the invitation presented by the Norwegian delegation at the 31<sup>st</sup> IGC in Rio to hold the 33<sup>rd</sup> IGC in Oslo in August 2008. The committee assures its full commitment to morally support this very important event for the Nordic countries.

The 33<sup>rd</sup> IGC in Oslo in cooperation with all Nordic countries will represent an important opportunity for the Nordic geoscientific Community to show to all the several thousand International Guests the unique and world famous diversity of the geological settings that can be studied throughout the Nordic countries. It is also a unique opportunity for the Nordic Geological Community to show to the largest international forum in the field of geology the advancement

made in both basic and applied Earth Science research, and how many of these results now can be tested in support for the community. This will be done in all lectures, seminars, official international meetings as well as the many Internordic field trips to both novel and internationally famous Nordic localities, mining districts, companies etc.

Yours sincerely

Stefan Claesson  
Chairman of the IUOS National Committee for Sweden



The Nordic Preparatory Committee for the 33 IGC in Oslo  
c/o Professor Ivar B. Ramberg,  
Chairman of the Executive Committee,  
Ram-co, Lysaker Torg 25,  
1366 Lysaker

Yours:

Support from The University of Tromsø, Norway

On behalf of the University of Tromsø I am happy presented by the Norwegian delegation in Rio to Congress (IGC) in Oslo during August 2008.

The IGC is the largest and most important geoscientific throughout the world. This Congress, which is planned in several countries, will represent a great opportunity for the several thousand participants the unique geological settings that can be studied throughout the Nordic countries. The University of Tromsø look forward, in particular, to discuss the diverse geoscientific challenges in the Arctic region.

The University of Tromsø assures its full commitment to morally support the 33<sup>rd</sup> IGC-Congress in Oslo and the Nordic countries in 2008.

Yours sincerely

Jarle Aarbakke  
Rector

**RECTOR**  
Administration

University of Tromsø, NO-9017 Tromsø, Phone: + 47 77 64 40 00, Fax: + 47 77 64 47 00  
Jarle Aarbakke, Rector, E-mail: jarle@uio.no

## INTERIM MEETING OF THE IGC STEERING COMMITTEE

The IGC Steering Committee met in Casaitalia, Florence, Italy, October 3-5, 2002 (...)

The IGC Steering Committee decided to present the following suggestion for the consideration of the IGC Council:

(...)

At the 31st IGC three bids to hold the 33rd IGC were received: Norway (representing the Scandinavian countries), UK and Egypt. The UK later withdrew its bid. Only representatives from Norway were present at the Florence meeting, and their presentation was regarded very positively.

The decision of the IGC Steering Committee was to strongly recommend that the 33rd IGC should take place in Oslo, hosted by the Scandinavian Countries.



Bidding Document prepared by the Nordic Countries

Norway, Denmark (with the Faeroe Islands and Greenland)  
Finland, Iceland and Sweden  
3<sup>rd</sup> edition - July 2004