

Department of Earth Science Strategic plan 2016-2021

A full-page background image showing two mountaineers on a jagged, rocky mountain peak. The climbers are wearing helmets and backpacks, and are positioned on the right side of the frame. The background is a vast, snow-covered mountain range under a clear blue sky. The text "-Exploring the earth" is written in a white, handwritten-style font at the bottom left of the image.

-Exploring the earth

Preface

The Department of Earth Science (GEO) is a joint endeavour involving every member of staff in evidence-based research, innovation, education, professional integration and thematic problem-solving.

With a basis in fundamental geosciences, our goal is to develop and disseminate an understanding of geoscience processes in a local, national, and global perspective.

Although the distance from basic research to application is short within geosciences, the department has a special responsibility to nurture basic research. This must occur as part of the interaction between the individual scientist's free academic activities and research projects and the department's responsibility to produce quantifiable results within the constraints of the available resources.

Education and support services are also cardinal responsibilities for the department.

Background

The Department of Earth Science (GEO) is one of eight departments in the Faculty of Mathematics and Natural Sciences, University of Bergen.

A new strategy has been developed in accordance with the university's overarching strategy, the faculty's strategic plan, and other relevant national strategies. In parallel with the strategy work, society has seen significant changes that affect the need for geoscience expertise – amongst other things a more challenging labour market, clearer evidence for the impacts of climate change, and an increasing demand for energy transformation. In addition, we see a higher level of competition for research funding and human resources.

GEO's strategy is based on the above-mentioned factors. The strategy work was initiated at a seminar in winter 2015, in which all employees took part. Subsequently a working group was appointed, consisting of five younger, permanent members of academic staff. Their remit was to prepare the initial draft of the new strategy. They were at liberty to run the process largely as they themselves chose, and to discuss with colleagues or bring matters up more formally with the appropriate research groups.

The strategy group also met with two reference groups who were appointed by GEO's leader group. The scientific reference group was made up of six professors – all having long service, and with a range of experience and professional

profiles. The technical reference group consisted of six specialists of varied background and with responsibility for different areas of work. In addition, the Curriculum Board and the Research Training Committee provided input. Combined with the suggestions from the strategy seminar, this work provided a solid foundation for GEO's new strategy. From there on, the management team continued to work on the strategy, which was finalized by winter 2016.

The strategy was authorized by the department council on May 9th 2016.

Bergen, May 9th 2016

Gunn Mangerud
Head of Department



Introduction

GEO's main aim is to generate new knowledge of, and understanding for, the Earth's structure at all scales – including the Earth's evolution and the forces contributing to its dynamic behaviour. Research in the department focuses on the polar regions, and on the Arctic in particular.

Knowledge transfer and creation occurs through the department's education and supervision at bachelor's, master's and PhD level, and is disseminated through national and international publications and diverse outreach activities. GEO is one of Norway's most important suppliers of candidates, basic research and research results to industry, other academic institutions, and public administration for addressing society's challenges in areas such as energy, climate, and resource management.

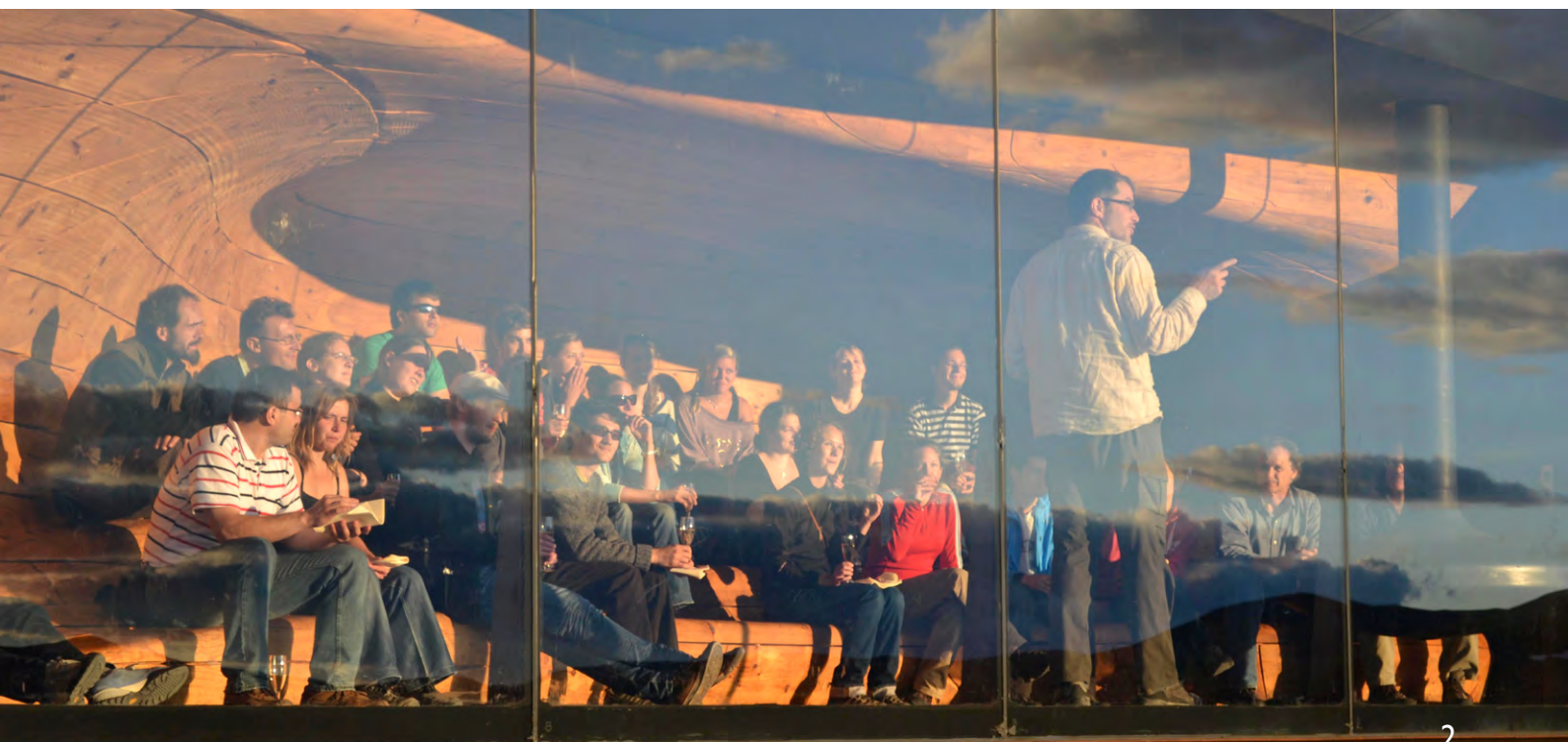
Several of the research groups in the department are of high international standing and we collaborate with renowned international partners. At the same time, we recognise that there is variable quality between disciplines and research activities at GEO. One of our main objectives is to build on our strengths while enhancing the quality of our activities across the department.

New insights – timeless knowledge

GEO's infrastructures' includes advanced laboratories that support a broad range of geochemical and geophysical analyses, modelling, and data processing, in addition to equipment for small- and large-scale geological and geophysical research, on land as well as at sea. GEO also has access to various seagoing vessels that are used to collect data for research and educational purposes.

The department's strategy complements the faculty's higher-level strategy, where "ocean", "climate", and "energy" are key words. Areas of crucial importance to society, such as understanding the mechanisms behind climate change and the social challenges faced in their aftermath, and the question of how to address the increasing demand for energy and mineral resources, will be important topics in GEO's education and research portfolio. GEO's ambition is to make a significant contribution to the advancement of knowledge within these areas.

GEO's strategy will be followed up through annual action plans that specify priority areas for the year concerned.



Vision

GEO will conduct basic research, concentrating on resources, energy, climate, geohazards and the environment, in a research environment that fosters quality and innovation. GEO will be an outstanding place of learning – with its students at the centre.

Knowledge about the Earth is vital for making decisions about energy, climate, demographics, geohazards, land planning, and resources. Through research, innovation and teaching, GEO seeks to provide society with geoscience expertise that will help to solve the challenges facing Norway and the world – today and in the future.

GEO will be a dynamic research community which, drawing on its current professional profile, recognizes possibilities and fields of application within new areas and research trends. Our research will be of high standing and our graduates will be sought-after, providing competence that is essential for the development of a sustainable society. GEO's ambitions are therefore to strengthen our basic disciplines and, at the same time, take part in the development of new directions for research – ideally with an interdisciplinary scope.

GEO will contribute to the establishment of interdisciplinary academic environments at an international level within the following four fields, all of which are supported by an extensive research infrastructure.

1. Resources

Rising population and continuous technological evolution creates a greater need for knowledge about geological resources. Success in acquiring such knowledge is crucial to a sound long-term management strategy for our natural resources. An increase in the production of renewable energy from solar cells and wind turbines, for instance, requires increased access to a range of metals and mineral raw materials.

GEO offers expertise regarding not only rock types and minerals in the deep sea and on land but also waterpower and other forms of energy. Through our fundamental understanding of the earth's structure and development, we can provide vital information to underpin decisions about planning and extraction, on land as well as in the marine environment.

2. Energy

The world will need more sustainable and effective energy solutions. Our prosperity depends on new knowledge that can contribute to energy restructuring. Cuts in greenhouse gas emissions will largely come about as a result of a move to renewable energy and improvements in energy efficiency. The accumulated competence from petroleum-related research will prove to be crucial to this transformation.

GEO will provide essential expertise in this phase of energy restructuring, not least through research connected to different forms of energy – e.g. geothermal, hydroelectric power, and within fields such as CO₂ storage. GEO will also provide expertise of great importance to the petroleum industry.

3. Climate

An understanding of the Earth system, the way in which different components interact, and how the geo- and biosphere's have co-evolved over time, is crucial to our understanding of the climate on earth. GEO is a leader in research on past climates; this knowledge is essential for predicting future climate changes and their consequences.

Climate change will require extensive adaptations, and our research concerning the earth's structure and geological processes is of major importance in our approach to these challenges. An understanding of the geological processes during different time periods and under different climate regimes is crucial if we are to understand the climate and environment of the future. Studies of geological archives from both land and sea are a key area in GEO's climate research.

4. Geohazards and the environment

The global increase in population presents challenges to the Earth's environment. GEO produces research-based knowledge that is essential for decision-making through our research in geohazards (e.g. earthquakes, landslides, subsea slides, floods, and flood waves), and also in (deep) marine environments where there are natural leakages of CO₂, methane, and heavy metals.

An understanding of the earth is of great importance in matters concerning demographics, water resources, mining, waste disposal, and land planning. GEO's interdisciplinary focus means the department is well equipped to be a leading institution, nationally and internationally, for research on these important challenges to society.

In the following sections, GEO's vision is presented in terms of the goals and measures needed for its realization. The four key areas of research, education, dissemination and public outreach, and work environment share common aims that can be summed up as follows:

GEO aims to:

- Produce excellent basic and innovative geoscience research that will help in finding solutions to society's challenges and needs – today and in the future.
- Educate students to become engaged, critical thinking citizens, relevant for employment and well equipped to help solving the 21st century's greatest challenges concerning resources, environment, energy, and climate.
- Carry out active, research-based outreach activities characterized by credibility, enthusiasm, and commitment.
- Provide a work environment characterized by positivity, job satisfaction, dedication, and a community spirit – an environment that promotes high quality research, education, communication and innovation, and of which students and staff are proud.



Research

Vision

GEO will produce excellent basic and innovative geoscience research that will help in finding solutions to society's challenges and needs – today and in the future.

GEO covers a broad spectrum within the Earth sciences, and is also home to specialized research communities at a high international level. Among other things, the department has been central to the establishment of three Centres of Excellence – geobiology, climate research, and improved oil recovery.

GEO aims to pursue and strengthen fields of expertise that coincide with the faculty's strategic priority areas – marine subjects, climate related research, and energy-related research. Much of the research will have a polar dimension. GEO will continue to concentrate heavily on research within the classic earth science subjects, including energy, paleoclimate, development of geophysical methods, seismology, and marine subjects – including deep marine systems and resources.

Research on geobiology and geohazards are also priority areas at GEO. In addition, we will exploit our already strong position when it comes to exploring the deep sea and in creating a system for monitoring tectonic plate movement.

The links between basic and applied research when combined with empirical data, theory, and modelling are a clear strength in GEO, and we will continue to utilise our natural location and infrastructural advantages – e.g. marine research vessels and GEO's field and laboratory facilities.

In addition to basic funding, the department receives extensive external funding from the Research Council of Norway, the EU, and industry partners. We therefore have the financial resources to carry out research at an international level.

Goal: To strengthen research within areas where GEO has a strong international profile.

To achieve this, we will:

- Strengthen ambitions concerning research and clarify goals within the research groups
- Retain our skilled researchers and promote their development
- Facilitate for all permanent academic staff to apply for external research funding
- Aspire to host Centres of Excellence, ERC Grants and other centres and major projects within strategic areas of research
- Increase the number of EU projects that receive funding from Horizon 2020
- Focus on publishing research results in international journals
- Arrange for scientific staff to have more continuous research time
- Provide international experience and exchange opportunities to staff and students
- Attract more visiting international researchers
- Work actively to establish strong research teams by recruiting top international candidates
- Work towards an improved gender balance
- Maintain and further develop competent support functions with the ability to deliver a high level of service
- Secure highly skilled technical staff with the ability to support field, expedition, and laboratory facilities.
- Make absolute demands for a high ethical standard

Goal: To focus on new priority areas building from our inherent strengths

To achieve this, we will:

- Utilize the potential in external funding schemes (e.g. ERC) to create changes in the scientific strategic direction and strengthen current priority areas
- Recruit staff with specialist skills to complement and renew our professional profile
- Increase interdisciplinary cooperation through participation in application processes, projects, and scientific meeting places.
- Promote increased cooperation externally and internally in GEO, the faculty, and the university by taking part in and creating professional forums

Goal: To support young researchers

To achieve this, we will:

- Actively seek out and attract talented international candidates for BFS and ERC Starting Grants
- Attract more highly qualified and motivated postdoctoral researchers
- Strengthen our career planning through discussion and guidance
- Facilitate international exchange opportunities for our researchers

Goal: To contribute to value creation based on research results

To achieve this, we will:

- Maintain GEO's successful collaboration with industry
- Increase general awareness about innovation
- Integrate innovation into PhD and postdoctoral positions through meetings and seminars, and highlight possibilities through examples
- Strengthen our relationship with Bergen Technology Transfer
- Consider collaboration with promising new partners who possess complementary expertise

Education

Vision

GEO will educate students to become engaged, critical thinking citizens, relevant for employment and well equipped to help solve the 21st century's greatest challenges concerning resources, environment, energy, and climate.

GEO is one of the largest educational institutions for geology and geophysics in Norway. Graduates who receive their education at bachelor's, master's, and PhD level at GEO are well qualified to work in research, education, industry, and public administration.

Our ambition is to provide a sought-after education of high academic standard which includes field-, expedition-, and laboratory-based instruction. Our education will emphasize critical thinking and promote an ethical, experimental, and practical learning environment, where the students are engaged in their own learning process.

Our objective is to enhance student learning and to produce graduates who are independent and attractive employees to every part of society. GEO aims to hold a leading position nationally in the development of student-centred education.

The education is research-based and intended to be an integrated part of the department's overall activity. An international dimension is ensured through active use of publications, participation in seminars and conferences, and through student exchange.

Goal: To strengthen the geoscience education we offer by creating a culture of quality

To achieve this, we will:

- Develop further an integrated geoscience education that expands the focus on processes and systems (The Earth System)
- Establishing clear learning objectives that will encourage students to become more involved in their own learning process



- Foster a formative culture for ethics, objectivity, and sound scientific practice
- Offer diverse and inspiring learning methods that incorporate research-based field and laboratory instruction
- Offer research-based instruction focusing on quantitative methods and modern digital resources
- Work determinedly towards becoming a Centre for Excellence in Education (SFU)
- Arrange professional activities among the students – e.g. integrating master students in the research groups
- Utilize adjunct positions (Prof. II) more actively in order to extend teaching competence
- Make innovation an integrated part of our curriculum
- Ensure that our students have opportunities to experience a fulfilling and social student life
- Develop further the academic administration's competence
- Outline a merit system for teaching
- Establish a culture where education is a collective responsibility
- Revitalize the programme board's role as a strategic body for our education
- Consider a "teaching semester" arrangement
- Emphasize teaching experience and quality when employing new staff
- Encourage all scientific staff to improve their pedagogic and didactic knowledge

Goal: To strengthen research training (PhD)

To achieve this, we will:

- Provide a doctoral education (PhD) of high international standard
- Recruit the best PhD candidates
- Focus on scientific creativity, quality, and innovation
- Encourage and arrange for researchers to participate in relevant international research forums, e.g. summer schools, conferences, and symposia
- Focus on proficiency in academic writing
- Improve ethics training during PhD studies
- Maintain and develop further the annual PhD seminar

Goal: To foster a culture in which education is a cardinal priority

To achieve this, we will:

- Engage permanently employed staff through regular meetings on educational topics



Dissemination and public outreach

Vision

GEO will carry out active, researchbased outreach activities characterized by credibility, enthusiasm, and commitment.

GEO has a long tradition of communication and public outreach activities. When encountering the complex challenges the world is now facing, imparting research results and knowledge to society and decision-makers is more important than ever. Geoscientists have a particular responsibility to participate in the public debate and disseminate knowledge through various media such as TV, radio, newspapers, the internet and social media, as well as through literature, lectures, organization work, and museum activities.

In Norway there is a pressing need for geoscientific related knowledge within education, administration, industry, and the business sector – in relation to issues such as energy, resources, geohazards, climate, and environment. GEO will be an environment where dissemination is recognized and valued and where the individual scientist is given support and assistance to find their own outreach arenas.

Goal: To provide relevant and sound geoscientific knowledge to the public

To achieve this, we will:

- Utilise available communication channels to showcase new research results
- Support and motivate individual researchers in their communication activities
- Encourage more people to receive media training
- Encourage our researchers and PhD candidates to impart knowledge through established channels

Goal: Generate interest in Earth Sciences among children and youth through engaging outreach activities

To achieve this, we will:

- Collaborate with local schools, and VilVite, on common projects
- Promote our studies through various events
- Arrange the GEO Olympics training annually, in collaboration with NGF
- Use our geo-didactician to widen our collaboration with high schools
- Contribute to the annual national arrangement “Geology Day”
- Demonstrate career opportunities for current and future candidates

Goal: To improve the research communication training

To achieve this, we will:

- Encourage all members of staff, students, and PhD candidates to participate in courses on science communication
- Highlight existing training opportunities



Foto: Eva Bjørseth

Work environment

Vision

GEO will provide a work environment characterized by positivity, job satisfaction, dedication, and a community spirit – an environment that promotes high quality research, education, communication and innovation, and of which students and staff are proud.

GEO wants to ensure an appropriate organizational structure and strategic management to ensure that every co-worker experiences a positive, stimulating work environment and a unifying collegial community.

GEO shall be characterized by an environment where everybody in the department treats co-workers and students with respect, and contributes to an inclusive, highly professional environment. GEO will always work closely with Health Safety and Environment (HSE) in order to avoid undesired incidents and reduce work-related risks.

Goal: A positive and inclusive work environment

In order to achieve this:

- Everyone at GEO has a responsibility to create a positive work environment

- Leadership and follow-up are always to be improved
- Internal communication is to be strengthened through various professional meeting places
- Social activities are to be maintained and developed further
- The department will participate actively in work groups and other forms of institution and campus development in order to contribute to a well-run and future-oriented workplace

Goal: A professionally stimulating and collegial work environment

To achieve this, we will:

- Create opportunities for sharing of knowledge and research results
- Include students, PhD researchers, and post-doctoral fellows in the research groups
- Maintain and develop further an efficient administration and well run technical services that cover the department's needs
- Discuss whether the department needs a new form of organization– and if so, why
- Ensure gender balance in every type of job and position

Goal: A safe and secure work environment

To achieve this, we will:

- Maintain continual focus on a safe and healthy work environment and establish a culture for managing workplace anomalies
- Prioritize laboratory safety and ensure efficient routines for handling waste, radiation, and noise
- Establish efficient routines for safety on expeditions, in the field and on work-related travels
- Arrange regular HSE sessions and follow-ups
- Ensure that updated guidelines and risk assessments for all of GEO's laboratories are always at hand
- Develop emergency plans and carry out emergency drills

This is the third strategy for the Department of Earth Science since the merger in 2003. The new strategy is based on previous strategies and the professional development that has occurred at the department during this time.



Foto: Terje Solbakk

