iEarth

# iEarth Annual Report

CENTRE FOR EXCELLENCE IN EDUCATION

UNIS

# Statements from the students about being engaged in iEarth

*"An opportunity to make contacts from across the country. Both students, professors, geologists etc."*

*"I attended the GeoPraksis conference at Quality airport hotel Gardermoen, the 3rd of November 2021. It was an educational, inspiring and social experience."*

*"An opportunity to be more involved in my own study program at the university."*

55 students participating in the GeoLearning Forum 2021

*"I feel really lucky and thankful that I have the opportunity to attend seminars like this as a student. It gives me a lot of motivation to work hard and continue with my studies."*

*"It was important to have a platform were there could be a closer cooperation between professors and students (especially in 2021, because of corona and less face-to-face communication at the university)."*

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## Summary

One and a half years after the Centre for Integrated Earth Science Education (iEarth) became a Centre of Excellence in Education (SFU) we see progress on many of the ambitions we set out in the project proposal and the action plan from 2020. In the annual report for 2021 we are looking back on what happened as well as looking forward, revising some of our plans for further progress. iEarth is an innovation project and we therefore need to continuously revise our strategies for how to reach our long-term visions and goals. Here are summarized our main activities in 2021:

- We have established a "Task Force" working on curriculum redesign, focusing on developing a graph database and a mobile phone application that can be used in a pilot study for instructors and students.
- We have been running the iEarth Research Group for almost a year and hired four (one vacant) PhD candidates and one Post Doc. The group is led by adjunct professor Anders Ahlberg, and their activities include bi-weekly digital meetings, a journal club and discussion forums. Running a digital research group is pioneering, and we are very proud of their progress.
- We have five iEarth student organizations up and running with chapters at GEO-UiB, GFI-UiB, UiO, UiT and UNIS. Activities in the student chapter are course evaluations, GeOrakel, career day, PubLectures, student breakfasts and workshops.
- We have launched a new web platform with new design and functionality. This is our main channel for dissemination both internally and externally. Here we have established a site for Educational Resources that is a shared resource for teaching and learning.
- We have further developed our program for seed money with the goal of kick-starting teaching and learning development aligned with the visions and the action plan in iEarth. So far, we have funded 53 projects sponsored with between 20k and 50k.
- We are currently running a pilot at the Department of Geoscience at UiO, where they have established a Section for Geoscience as a new strategic unit. This is a pilot and based on their experiences we hope to launch the concept at all institutions.
- We have started a Leading Educational Change through SoTL-course together with bioCEED. In total, 19 course participants (11 from iEarth) have proposed seven novel projects investigating a variety of challenges in educational transformation. This includes studies on students as change agents, barriers to change among instructors, and focusing on in-network communication strategies.
- We arranged together with CHESS a summer School on communication skills in outreach and teaching for PhD students. Here, students were exposed to challenges and solutions on efficient communication strategies in academic dissemination.
- We arranged the fourth national GeoLearning Forum with over 100 participants. For two days we had keynote lectures, workshops and sharing sessions.
- We have established a national internship course at UiT, UiB and UiO. The course is based on a pilot that has been arranged two times at UiT. In early November we arranged a national kick-off meeting for stakeholders, instructors and students involved in this program.
- We have changed our organisational structure by adding a leader group constituted by the education chairs at each institution. This is a forum for decision-making in iEarth regarding budget, strategy constrain and for monitoring performance.
- We got funding for a new HK-dir project lead by GFI-UiB with the title “Co-creation to promote active learning and communities of practice”. Here, co-creation and community of practice will be strategies used for changing the relationship between teachers and students. This will provide students with the best environment for learning during their studies.

# Abbreviations/Acronyms

**Action Plan** = Also called Centre Plan. The Centre Plan has developed through a series of discussions in the core team in iEarth during the Spring of 2020, after we were granted SFU status by DIKU. Here, we describe the objectives and specific actions planned for each of the iEarth Focus Areas.

**bioCEED** = Center of Excellence in Biology Education. bioCEED is a consortium between the Department of Biology at UiB (BIO), Department of Arctic Biology at UNIS (AB), Department of Education at UiB (HERU), and the Institute of Marine Research (IMR).

**Education Chair** = The education chairs oversee project progress and manage development of FAs at their respective institutions, thus ensuring implementation of iEarth policy throughout the consortium.

**FA** = Focus Area (earlier Progress Domains)

**GeoLearning Forum** = annual conference gathering all iEarth teachers and students. A program committee are responsible for the program and design the event alternating between Bergen, Oslo and Tromsø

**GeOrakel** = GeOrakel is inspired by biOrakel (bioCeed, 2021[1]), and is a service where the students in some courses can get help with assignments or in preparation for exams from teaching assistants in selected courses.

**GEO-UiB** = Department of Earth Sciences (GEO) at the University of Bergen

**GFI-UiB** = The Geophysical Institute (GFI) at the University of Bergen

**HK-dir** = The Directorate for Higher Education and Skills

**iEarth** = Centre for Integrated Earth Science Education. iEarth is a consortium between the Department of Earth Science at UiB, The Geophysical Institute at UiB, Department of Geosciences at UiO, Department of Geosciences at UiT – The Arctic University of Norway, and Department of Arctic Geophysics and Department of Arctic Geology at UNIS.

**iEDLF** = iEarth Digital Learning Forum is a digital meeting place for the entire iEarth consortium and a sharing place for good ideas and best practise in teaching and learning.

**NeoDash** = Interactive and open-source dashboard for querying and visualisation of programme data. The dashboard application connects to a cloud based Neo4j graph database. NeoDash lets you directly visualize your Neo4j data as graphs, bar charts, tables, maps and more.

**PubLectures** = This year, the iEarth student organization started with PubLectures, a series of lectures in an "informal" and "relaxed" environment. Each lecture is to introduce different research groups in the department of Earth Sciences.

**SoTL** = Scholarship of Teaching and Learning

**SDG** = Sustainable Development Goals

**SFU** = Centre for excellence in education granted by HK-dir.

**UiO** = University of Oslo

**UiT** = UiT – The Arctic University of Norway

[1] bioCeed (05.01.2022) biOrakel. https://biorakel.w.uib.no/

# Introduction

iEarth started its journey 1st June 2020, and after one and a half year we are already seeing an emerging cultural change among both instructors and students where words such as curriculum re-design, flipped classroom and co-creation can be heard. We have established one national and four local iEarth student chapters that are active with various events throughout the year to create a better learning environment for earth science students. In 2021, such work was especially important because of the effect COVID-19 restrictions had on the study environment. In general, these events aimed to "break the ice" between students, improve and support student collaboration, give students insights about research groups in the Earth Sciences and get students acquainted with different relevant industries.

In iEarth, our long-term goal is to develop geoscience education, make a difference and be visible at local, national, and international levels by disseminating our processes and results in the relevant fields of educational research. Dissemination in an SFU is a continuous process. We are currently moving to phase two of our dissemination strategy, which is focused on dissemination for understanding. We believe that an important asset for dissemination is a vital and active student organisation, with the students acting as change agents at institutional level. The iEarth pathway is to empower students to actively improve the university experience for themselves and their peers. Our appointed Education Chairs are another asset for dissemination and have very important roles in face-to-face communication, such as meeting with students and staff to inspire SoTL projects. Building trust among staff and students is very important, and relational pedagogy is a foundation for co-creation in learning and teaching.

We also believe that our new web portal and our new graphical design will help us attract attention from others. We will continue to build a site for Educational Resources on the webpage as we believe that this can be an important asset for teachers who want to develop their teaching methods and those who need inspiration for learning activities outside of the classroom. Here, we also post the recorded iEDLF, building up an archive of very interesting talks about teaching development.

During 2021 we had close contact with our funding agent, HK-dir, and we value the many gatherings and meeting places with other SFU communities in Norway. Having discussions and learning sessions with other SFUs is appreciated and inspiring for us in iEarth. In October we had a site visit by HK-dir in Oslo where we presented ongoing activities and further progress. They provided us with valuable feedback that we have considered for our further progress. For example, we have now established a small leader group within iEarth including the Education Chairs at each institution. The goal is to secure a streamlined and transparent leadership in iEarth, keeping everyone informed on strategic decisions that need to be taken – crucial for a consortium with more than 2000 km between some of the partners.

Critical for the long-term sustainability of iEarth is having front-runners with competence and drive to act as educational leaders and take part in the transformation of the teaching culture. Therefore, we have taken action and are hosting a course in educational leadership together with bioCEED for key personnel in both SFUs.

# 1. Results

## 1.1 Vision of the centre, focus areas, and activities

In iEarth we have a vision to create a student-centred, innovative learning environment for future Earth system scientists and citizens to meet complex societal challenges and opportunities. We aim to realise our vision by using the following strategies: (1) transform national Earth science curricula through a competence-oriented curriculum redesign; (2) create an effective learning environment by engaging students as partners in the educational process; (3) build a collaborative, innovative, research-based culture for teaching and learning among students and staff; (4) enhance student learning in the field by systematically investigating the effectiveness of field-based learning activities; and (5) develop alumni networks and internship practices as natural interfaces between students and future employers. Each of these five topics has its own Focus Area (FA) that will help facilitate transformation in an efficient way.

We aim for all staff and students to be involved in iEarth by working as change agents within our institutions, creating cultures that promote change inside the departments and institutions. In the following, we present the main targets and activities for the last year under the different focus areas. We have highlighted some key activities across focus areas such as internal projects, the course in Leading Education Change - through SoTL, and the CHESS and iEarth summer school in outreach communication. These activities have had success in 2021 with positive feedback and evaluations.

## 1.2 Important accomplishments and activities

### Focus area 1 – Shaping the future

In this focus area, we treat earth science education as an evolving ecosystem of concepts and competencies that can adapt to new insights and needs. The goal of FA1 is to redesign the educational programme as an integrated network of learning activities that form coherent learning progressions (Fig. 1). Our approach is to develop a graph model of teaching and learning and build a graph database for programme visualisation, analysis, design, and mapping.

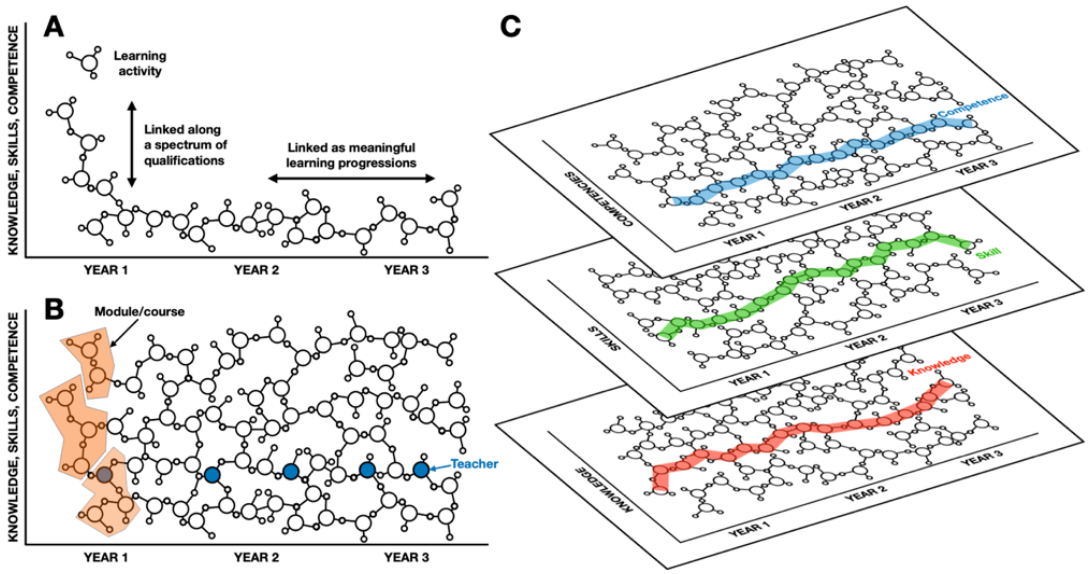



**Figure 1.** Schematic representation of the graph approach to programme design. (A) Learning activities are connected along a spectrum of learning descriptors or qualifications and linked temporally into learning progressions. (B) Modules or courses emerge from the structure. Individual teachers can use their expertise to do activities and assessments where they are most effective (e.g. blue dots). (C) The programme can be analysed from multiple perspectives. Here we use three qualification descriptors as examples of the interconnected layers of meaning that are embedded in the programme structure. Note that each layer is a unique representation and that the coloured learning trajectories can be independent of each other.

Main achievements in 2021 according to the original action plan:

### Establish a "Task Force" (FA1 Working Group)

The Working Group (WG) had its inaugural meeting in May 2021 and a total of five meetings in 2021 (Fig. 2) (Appendix 7). This pilot group includes two students and six academic staff members from the University of Bergen, Department of Earth Science (GEO-UiB), two PhD candidates in educational research, a member of the UiB central study administration, a member of the UiB Learning Lab, and an iEarth visiting professor from Lund University, Sweden. The GEO-UiB programme will be the pilot project for FA1, before expanding across the iEarth consortium. The WG discussions have already culminated in two tangible deliverables:

1. A white paper outlining the rationale, objectives, and guiding principles of the FA1 project. This concept paper (a.k.a. the "manifesto") is published on our website.
2. A draft of the graph ontology for teaching and learning that will underpin the programme graph database.

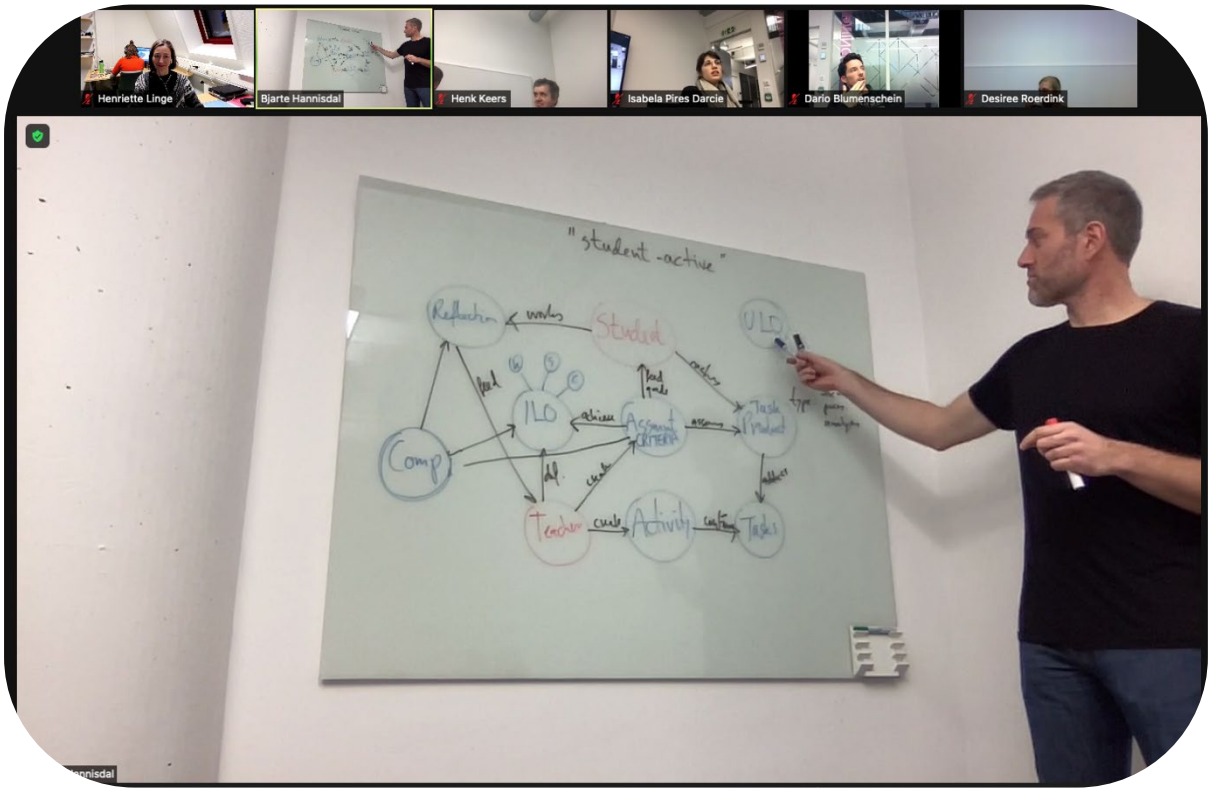



**Figure 2**. Screenshot from a hybrid meeting in the FA1 Working Group in November 2021. During this meeting, the group discussed the drafting of a graph ontology to capture the elements of teaching and learning.

### Develop a database architecture

Success in FA1 depends critically on capturing multiple perspectives and meanings among the highly interconnected elements of teaching and learning. We have therefore decided to use Neo4j, a leading graph database platform, open and cloud-based, that has become a popular tool for understanding complex systems in many domains. A major advantage of graph databases is that the ontology (i.e., representation of the knowledge domain) is flexible and can evolve as new insights and questions arise.

### Develop a web-based user interface

We have already started testing different 'dashboard' solutions for interactive user experiences that allow students, teachers, and all stakeholders to not only explore, visualise, and analyse the educational programme, but more importantly to collaborate on designing and developing teaching and learning (Fig. 3). A key design principle is the ability to represent multiple layers of meaning from different perspectives, so that the dashboard can act as a vehicle for institutional sensemaking.

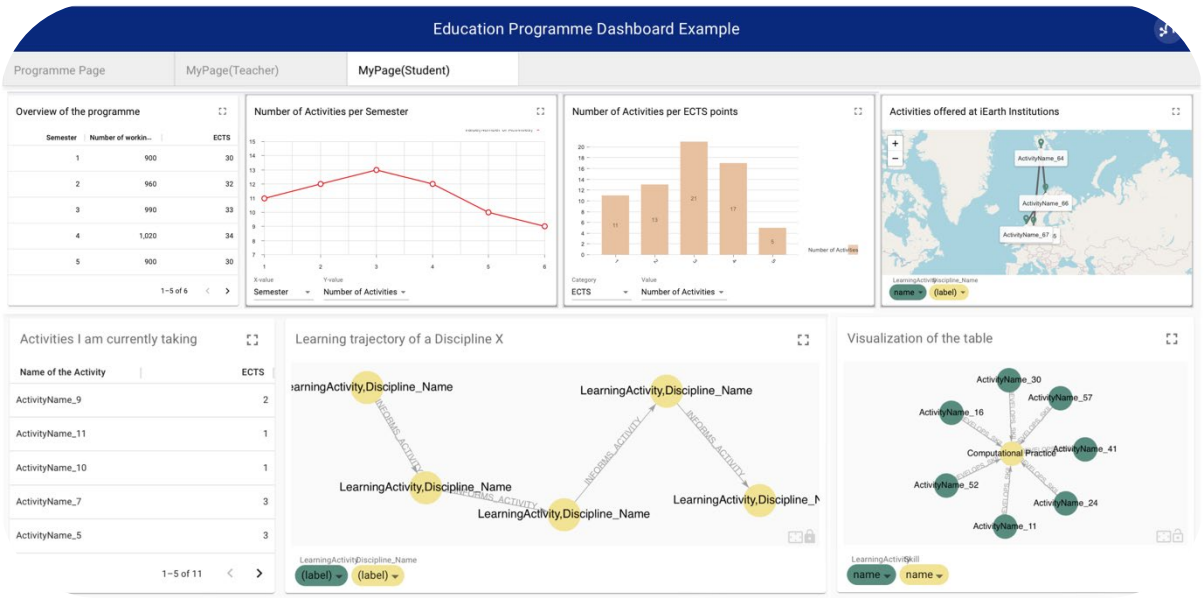



**Figure 3.** Example of a prototype interactive dashboard (NeoDash) for querying and visualisation of programme data. The dashboard application connects to a cloud based Neo4j graph database. Users can easily answer questions relevant to them, e.g., student: "Why am I learning this?", teacher: "Do students already know this?", administrator: "How is workload distributed?", employer: "What skills do graduates have?".

### Other achievements in 2021:

PhD candidate Dario Blumenschein was hired in 2021. His project (working title: *Implementing innovations in higher education – an in-depth study of a change process*) has been granted approval by the Norwegian Centre for Research Data to start collecting survey and interview data for mixed-method Social Network Analysis. His project aims to understand and explain the development of a change process from the perspectives of both the group in charge of the process and those affected by it.

We have a manuscript in preparation with the working title "*A Graph Database Approach to Curriculum Design and Mapping in Tertiary Science Education*", and we have submitted an abstract to the 2022 EuroSoTL conference in Manchester.

### Response to HK-dir site visit report:

In the report from their site visit in the fall of 2021, HK-Dir praises the FA1 project as "innovative", but also raises a concern: "A critical question is whether even the most detailed mapping of teaching practice (the taught curriculum) can stand alone in creating the curriculum of the future, or whether a theoretical and/or vision-based model is needed to fulfil this [focus area]". We feel the need to clarify that the FA1 project is primarily a design process with mapping as a complementary process. The mission is to design an entirely new programme structure that can adapt to future insights and needs in earth sciences as well as educational sciences. Mapping of existing student actions and motivating experiences is meant to support this design effort and to engage teachers and students in the process. Our approach is both visionary (e.g. rethinking the 'why', 'what', and 'how' of earth science education) and rooted in theory, including the scholarship of teaching and learning (e.g. student-centered, constructive alignment), design research (e.g. connectivity, flexibility, transparency, inclusivity) and theories of second-order change (e.g. social cognition, sensemaking, network theory, and diffusion of innovation).

## Focus area 2 – A learning environment for students

The key goal of FA2 in 2021 has been to engage and maintain students as partners in activities that are already established, and in new activities.

Main achievements in 2021 according to the original action plan:

### Engage students as partners in their education and peer instruction and peer feedback

The student organisations of iEarth continued to be active and recruit new members. Our national student leader, Guro Lilledal Andersen, has established a student organisation on Svalbard. Also, the first iEarth student organisation at GFI-UIB is established. We now have a student chapter in each iEarth institution (Fig. 4).

**Figure 4.** The five iEarth student organisations represented by the National student leader and chapter leaders. From left: Guro Lilledal Andersen (National Student leader, UiO), Elena Victoria Brattebø (GEO-UiB), Sander Løklingholm (GFI-UiB), Sverre Manu Johansen (UiO), Lovisa Hansson (UiT) and Ymke Lathouwers (UNIS).

Students are partners in all the meeting fora in iEarth. Students attend the weekly status meetings with the iEarth core group[2] (Appendix 9), serve on the iEarth board, and take seats in committees that plan our future activities. Our students also participate in several teaching conferences (Learning Forum UNIS, Network Meeting for SFU, Students as SFU partners, etc.). Additionally, students have their own fora for peer instruction and feedback (e.g., GeOrakel events), and meet regularly, across different years and classes. Because of the pandemic, there was no dedicated national iEarth workshop for students in 2021, but we plan for one in 2022.

Each of the student chapters was granted funding from our internal project funds called Seed Projects, to be used for activities (Appendix 3) promoting a better student environment at the four institutions. This year, the iEarth student organization in Bergen started with PubLectures, a series of lectures in an "informal" and "relaxed" environment. Each lecture is to introduce a different research group at the Department of Earth Science. The UNIS iEarth student organisation arranged several breakfast events as well as helping to arrange the first SCOPE – Student-lead Conference on the Polar Environment. At UiO the students are involved in piloting and developing course representatives in collaboration with the newly established Section for Geoscience education. At UiT an evening seminar series has started to create new meeting places for students. Three topical seminars were arranged one on volcanic eruptions, one on lakes sediments as archive for past climate and one on snow avalanche dynamics. According to the chapter leaders there is an aspect of connecting the students and staff on a friendly arena, which makes future cooperation easier.

The student organization in Bergen has done several course evaluations. *GEOV217: Geohazards* has been evaluated twice, and progressions and challenges in this specific course have been identified. The evaluation is based on guided discussions between iEarth students and groups of 5-7 students taking the course and the feedback is made available for the instructors. The guidelines of these discussions are a set of questions put together in cooperation with students and staff. Notes from these discussions are combined into a report to be shared with the course responsible as well as the student administration for further improvement of the course.

### Students write a bachelor's thesis as part of their BSc. degree

In 2021, the study program board at the Department of Geosciences at UiT decided that BSc students should have an option to write a 10 ECTs bachelor's thesis. The idea is that students can conduct a small research project under supervision, and hence gain an important early experience with research. Offering an optional BSc thesis is one of the aims of iEarth, and this is now possible at UiT and UiO.

[2] This group consists of Education Chairs, Focus Area leaders, student representatives, coordinators, Centre leader and network coordinator, and is the core group in iEarth with weekly meeting every Monday at 11.

### Optimise instructional technologies and physical learning spaces

The renovation of the Natural Sciences building ('Naturfagbygget') (Fig. 5) hosting the Department of Geosciences at UiT continued in 2021. The renovated building will contain active learning classrooms which we hope will improve the learning environment for the students. Staff and students are expected to be back in the building during the summer of 2022. To this end, each of the institutions have developed rooms that can be used for webinars. iEarth was also represented and provided input into the development of shared learning area space during the design and construction of the new Elvesletta student accommodation building in Longyearbyen, UNIS and in the big rebuilding project of southern part of Nygårdshøyden at UiB where Jostein Bakke has led the working group on teaching spaces. The rebuilding is expected to start in 2024 and continue for ten years (!).

**Figure 5.** Renovation of the Natural Sciences building at the Department of Geosciences at UiT. Photo: UiT – The Arctic University of Norway.

### National iEarth course in geohazards

The national iEarth geohazards course was offered for the 2nd time in 2021 at UiB, UiO and UiT. The course is developed by faculty, industry partners, and students in collaboration. It is based purely on student active learning. The course uses the local areas of each university as a field laboratory for studying geohazards, such as rockfalls, quick clay slides and avalanches.

## Focus area 3 – A learning environment for teachers

Key steps for this focus area are to develop teaching as a collegial enterprise.

Main achievements in 2021 according to the action plan:

### Develop teaching as a collegial enterprise and develop a site for Educational Resources (virtual competence centre)

In 2020, we started towards this goal by creating a new arena for sharing knowledge: the iEarth Digital Learning Forum (iEDLF). Throughout 2021, we held 19 unique seminars with speakers representing the whole consortium (Appendix 1), creating an inspiring sharing space with vibrant discussions. Normally, we shared these events on our Educational Resources site, making them available for everyone in the consortium. This year, however, we have been working on a new iEarth website and identity, and haven't had the same opportunity to share the seminars.

The virtual competence centre has been strengthened by this new website, with a more active site for educational resources. The following categories are e.g., video, tools, scientific contributions, connected to relevant hashtags such as #VirtualField, #TeachingMethods, #Tutorial etc. In this way, we want to make sure that the website is as active and up-to-date as possible so that even more teachers and students can find and use resources in various settings.

#### Leading Education Change—through SoTL

Together with fellow SFU bioCEED, and our partners in STEM education at Lund University, we are offering a new course. Leading Education Change—through SoTL will support the growth of skills and competences relevant for leading large-scale change in higher education. Faculty leaders are Roy Andersson and Sehoya Cotner from bioCEED, and Torgny Roxå and Anders Ahlberg from iEarth. To be as collaborative as possible, course meetings are distributed across the participating institutions, started in Bergen and concluding at UNIS in April 2022. At our kick-off meeting at UiB October 25th and 26th, we covered a lot of introductory topics: theories of change, the importance of gathering artefacts during the change process, stories of past successes, and approach our education initiatives like we approach our scientific research. There are 19 course participants who have proposed seven novel projects investigating a variety of challenges in educational transformation.

In addition to the national GeoLearning Forum, UNIS held its annual Learning Forum over two days in October 2021. This included iEarth participation in the organization of the Learning Forum, the presentation of a poster detailing iEarth and FA4 objectives and activities, and a sharing session seminar on applying for iEarth seed project funding.

### Make teaching a scientific enterprise through evidence-based teaching practice, initiate and support SoTL activity with students as partners

The iEarth development project funds (Seed Projects) are incentives and motivation to develop teaching and learning cooperation across departments and universities, engage students in improving their learning environment, and to promote Scholarship of Teaching and Learning. Projects can apply for funding up to 50 000 NOK. For a period of five years there will be two calls per year. So far, we had applications for Autumn 2020, Spring 2021 and Autumn 2021. In total, we have 53 iEarth Seed Projects, all working with projects in education development.

### Projects that received iEarth internal funding 2021: "Seed Projects"

**Spring 2021: 15 Seed Projects**

- **Aga Nowak, UNIS** – *SvalDEM*
- **Andreia Plaza Faverola, UiT** – *Developing an efficient learning environment from both the students' and the teachers' perspectives*
- **Anita Torabi, UiO** – *geological maps in the UiO bachelor*
- **Björn Nyberg, UiB** – *sEducate plugin for sedimentology course curriculums*
- **Daniel Kramer, UNIS** – *FROST*
- **Edina Pozer, UiO** – *Development of the Master Seminar Series*
- **Florina Schalamon, UNIS** – *Teaching Manual for field assistants in geoscience*
- **Henriette Linge, UiB** – *Establishing the UNIS Arctic Geology Alumni Network membership web database*
- **Ingrid Anell, UiO** – *Red Thread Course*
- **Judith Vestre, UiB** – *iEarth Student Organization Bergen Chapter*
- **Julien Pooya Weihs, UiB** – *Integrated Geophysics/Mathematics lectures, a pilot project*
- **Kjersti Daae, UiB** – *Communication skills in outreach and teaching*
- **Noora Partemis, UNIS** – *Student involvement in field-teaching preparations*
- **Serianna Kvarøy, UiB** – *Processing student interviews for a SoTL study on a geoscience course involving computational problem solving*
- **Tor Einar Møller, UiB** – *Writing a SoTL paper on students' perception of computational problem solving in a geoscience course*

**Fall 2021: 17 Seed Projects**

- **Anders Ahlberg, UiT -** *Troublesome knowledge, threshold concepts and signature pedagogies in Earth Science – a possibility to re-focus teaching and learning*
- **Cecilie Thaarup, UNIS –** *SCOPE*
- **Daniel Kramer, UNIS –** *iWalk on FROST*
- **Guro Lilledal Andersen, UiO –** *Escape Room icebreaker*
- **Henriette Linge, UiB -** *Time waits for no one: Establishment of a Nordic network for geochronology education*
- **iEarth student organisation, UNIS**
- **iEarth student organisation, UiB (GFI)**
- **iEarth student organisation, UiB (GEO)**
- **Ingrid Anell, UiO –** *Geogame*
- **Karen Mair, UiO –** *Creating soundtracks for geoscience*
- **Lukas Frank, UNIS –** *Meteorological instrumentation: From microchip to measurement*
- **Mathilde B. Sørensen, UiB –** *Geohazards students at Geofaredagen*
- **Rafael K. Horota, UNIS –** *There and Back Again: Svalbard and Beyond Edition*
- **Steffen L. Jørgensen, UiB –** *A computational activity to develop systems thinking skills*
- **Søren B. Tvingsholm, UiO –** *Evaluating and developing course representatives pilot*
- **Tor Einar Møller, UiB –** *Writing a SoTL paper on students' perception of computational problem solving in a geoscience course*
- **Ymke Lathouwers, UNIS –** *iEarth AW51: iEarth student lead workshop*

## Develop GeoLearning Forum into a national meeting place for Earth Science teaching

Students, Anders Mattias Lundmark, iEarth FA3 leader in 2021, and faculty worked closely together to arrange the main national meeting event of 2021: The iEarth GeoLearning Forum, Asker, October 21-22 with the following topic: "Teaching and learning (culture) for the future". Of a total of 113 participants, 55 were students. This was a great success with a record number of participants, and we exceeded our goal of 100 attendees (Fig. 6). It was the 4$^{th}$ national GeoLearning Forum, but the first-time students and staff participated as full partners. Students contributed to and took responsibility for planning and running the conference, gave presentations and participated in or led all workshops. Our experiences from GeoLearning Forum 2021 only strengthens our conviction that students and staff working together is the way forward to even better teaching and learning. All Focus Areas were presented in workshops.

**Figure 6.** GeoLearning Forum 2021 was a big success. Nearly half of the 113 participants were students. Photo: Kristian B. Bakken, UiO.

### Establish competence group on higher education research in Earth Science in Norway

The iEarth Research group (ERG) hit the ground running in 2021 (Appendix 5). ERG is open to anyone within and beyond iEarth. However, the doctoral candidates and the post-doctoral fellow constitute the core of the group. ERG also includes the four iEarth adjunct professors, several members of the supervision teams of the doctoral candidates and other iEarth staff. The seniors present webinars on key topics useful to the group. Documentation of ERG sessions are gathered and available in a Canvas web platform at University of Bergen. The activities involve twenty persons in total, and each activity typically attracts half of them.

During the first half of 2021, the recruitment processes of research students and a Postdoc within iEarth was in the foreground, along with the formation of supervision teams around each doctoral candidate/postdoc. As critical mass of participants was gradually reached during the summer, ERG activities for the following year (autumn 2021 - spring 2022) was planned and initiated. During the first semester there were eight ERG-activities: three PhD project presentations, four webinars held by seniors, and a literature mapping session.

#### CHESS/iEarth

In summer 2021, Kjersti Daae and Mirjam Glessmer led the CHESS/iEarth joint course on "communication skills in outreach and teaching" in Bergen. CHESS is training the climate scientists of tomorrow, iEarth is changing teaching culture in Norwegian geosciences. Naturally, PhD students from both centres have a lot to talk about, and that they are coming at it from different angles makes it even more interesting. This course started out virtually in spring, and for 13 weeks, they met online for two hours to discuss a diverse range of topics with interesting guest speakers:

- Ivar Nordmo: "different metaphors of learning".
- Virginia Schutte: "insights and practical tips on justice, equity, diversity and inclusion, and on science communication".
- Kikki Kleiven: "new ideas about teaching geosciences".
- Sam Illingworth "write 3 poems".
- Jostein Bakke "tip for good outreach".
- Cathy Bovill and Mattias Lundmark "students as partners"
- Anders Ahlberg "building good supervisor-supervisee relationships".
- Mirjam Glessmer "building networks in academia"

## Focus area 4 – Field-based learning

As stated in the action plan, FA4 aims to test and document methods to improve student field-based learning, and to improve knowledge transfer back and forth between the classroom and the field.

### Document present status and monitor the culture change in how teaching and learning in the field develops

Rafael K. Horota, iEarth PhD student, will work on "How digital can geosciences field-based learning be? Perceptions over digital technologies in Norway's geoscience higher education". Rafael has started to develop a questionnaire-based survey to gather information on field-based learning in all the iEarth institutions. The survey will be ready in 2022. Rafael has also collected data for his PhD project. The material has been integrated and used to develop Virtual Field trips. Some of this material (Fig.7), generated by Rafael, is available from this page: Virtual Field Trip: Isfjord Radio on Roundme. This will improve our understanding of today's field-based learning methods and technologies being applied and look for sense of similarities between the institutions.

UNIS Arctic Geology and Arctic Geophysics departments saw ten iEarth Seed Projects running during this period. Of these ten projects, seven directly addressed the objectives of FA4 with references to field learning, field teaching, and integration of digital field learning technologies. Two iEarth seed funding events were held in the 2021-22 period to profile new and existing iEarth projects at UNIS to a wider institution-wide audience as well as enabling discussion, idea exchange, and identification of synergies between projects.

### Develop, test, and evaluate new assessment methods for assessing field learning outcomes

In March 2021, bioCEED, jointly with iEarth at UNIS laid on a three-day field teaching assistant course for PhDs, masters, and postdocs engaged in field teaching. This will be delivered again in March 2022. Marius Jonassen, iEarth FA4 leader, and Mark Furze, UNIS iEarth Education Chairs, have participated in regular FieldPass meetings. FieldPass is an interdepartmental project funded by the Norwegian Agency for International Cooperation and Quality Enhancement in Higher Education. The overall goal of the project is to develop and research alternative forms of assessment that is suited for field- and lab related learning outcomes.

### Test and document methods to improve student field learning and to improve knowledge transfer back and forth between classroom and field

The iEarth Seed Project FROST – Fieldwork instRuctionals fOr Students and Teachers, led by Daniel Kramer, has created new teaching material for fieldwork participants (FPs) aiming to improve preparation for fieldwork from a scientific- and safety point of view. The material is divided into two main parts: Virtual Field Trips (VFTs) and instructional videos. The goal of the VFTs is to familiarise the FPs with the fieldwork area before going outside. The instructional videos explain in detail the instruments used during fieldwork (Fig. 7). The videos are made available for each of the meteorological classes at UNIS, but anyone can request them if needed.

**Figure 7.** Seed Project FROST: Virtual field guides and instructional videos for field learning.

## Focus area 5 – Alumni and outreach

To enhance the work life relevance of Earth Science education, it is vital to maintain contact with students after they graduate. Designing methods, and piloting and testing methods for educational networking with market and society are among the goals for this focus area (Fig. 8).


**Figure 8.** The first national kick-off of the GeoIntern project was arranged in Oslo in November 2021. Fifty-four participants, representing students, teachers and stakeholders met to discuss and debate the ways to collaborate between academia and businesses.

### Establish an internship course as a collaborative initiative between the iEarth partner universities in Oslo, Bergen and Tromsø, and to increase the national integration on this matter.

A key step in the development of FA5 and the implementation of internship courses was to apply for funding for a national 100% internship coordinator. In August 2021, Johanne Sofie Lund was employed as a national GeoIntern coordinator in the project. At UiB, Jan Magne Cederstrøm is engaged in a 50% administrative position on the GeoIntern project, where 30% is financed through this project. Benjamin Robson is course responsible for the internship at UiB and has been added as in-kind contribution from UiB. At UiO, Kristian B. Bakken is engaged in a 30% position through this project as administrative support. In addition, Karianne Staalesen Lilleøren is engaged in a 20% position as course responsible at UiO. Iver Martens is the project leader for the GeoIntern project, in a 25 % in-kind position from UiT.

Internship courses have been developed in order to meet the need for an increased perceived professional relevance of Earth Science among both students and employers. Courses with curricula aimed at covering the contact surfaces between academia and employers have been designed. In the spring of 2021 three courses at UiT, UiB and UiO were launched. Academic curriculums have been designed with various content at the different institutions. The main content covers skills regarding competence mapping, reflection, and transversal skills like communication, networking, and innovation. Students are exchanged to around 29 companies and organizations in the geoscience sector for their internship period (Fig. 9).


**Figure 9.** The 29 industry partners in the GeoIntern course for earth science students.

**Emphasize the collaboration and communication between academia and employers through projects like internships, alumni clubs, and arenas to convey knowledge and experience.**
Two alumni clubs have been established. One at UNIS and one at UiT – The Arctic University of Norway, in total, gathering more than 450 former students. GeoAlumni UiT is established and will serve as the alumni club of the geoscience community of UiT. The alumni network has high value as a contact network for student/alumni interaction. Due to the COVID-19 restrictions, only digital meetings have been arranged. Presentations from companies and students have been presented and discussed during these meetings. The UNIS Alumni Club has been established and includes candidates that have undergone education at different levels at UNIS. The UNIS Alumni Club counts around 150 members. Several Alumni gatherings have been arranged, both physically and digitally. The UNIS Alumni Club received iEarth project funding to establish a map-based solution to collect alumni information.

## 2. Dissemination of knowledge and practices

Our dissemination strategy was outlined in the action plan from 2020, and we are following a three-step development plan with dissemination for awareness, understanding and action as the main steps (Figure 10). In addition, we are especially targeting three separate areas: (1) local dissemination – dissemination of knowledge and practices within our institutions; (2) internal dissemination – sharing knowledge and practices among our consortium partner institutions; and (3) external dissemination – dissemination of knowledge and practices nationally and internationally (Appendix 5).

### 1. Local dissemination

During the first year of iEarth as an SFU we focused on dissemination for awareness with the aim of informing our colleagues and our institutions that we are change agents building a framework for cultural change, both within the student body and staff. We have seen how important our student organisations, working locally at UiO, UiB, UiT and UNIS, have been in this local dissemination and therefore we are continuing to sponsor their activities with funding from iEarth.

To engage staff members locally, we conducted internal teaching staff meetings at the consortium institutions. During COVID-19 lockdown we used digital platforms, but in 2022 the meetings will be physical. We hope that by hosting regular staff meetings, instructors will become aware of their own

teaching practices and move toward evidence-based teaching. Another important mission of these meetings is to share research-supported practices and develop collegial attitudes to teaching and learning activities.

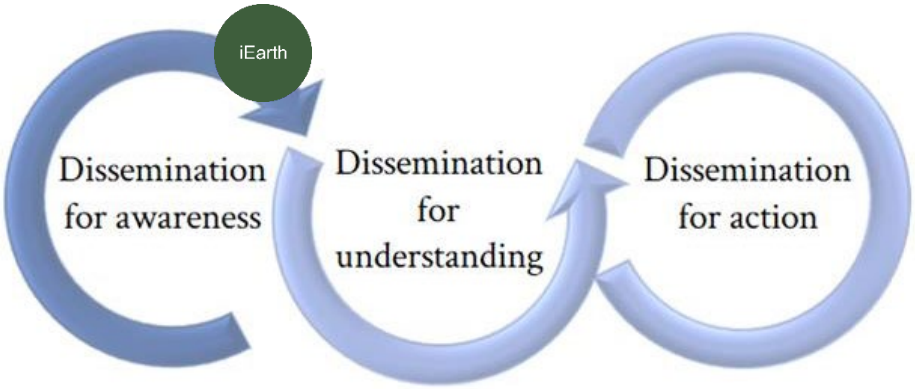



**Figure 10.** This is an illustration of our dissemination strategy. We are currently in the first phase (marked by the green iEarth logo), where we simply build awareness by telling the world that we exist. The next phase focuses on explaining what we want to do at iEarth, before entering the final phase, when we will disseminate for action.

### 2. Internal dissemination

Because the iEarth consortium is spread across the country, dissemination within the consortium – to share practices among partners, exchange ideas and spark inspiration – is very important. This year, all FA leaders, education chairs and student representatives, together with the iEarth leader and network coordinator, had weekly meetings (Appendix 10). Here, we shared progress and discussed challenges at the different institutions. This forum allows us to share practices between institutions and reflect on the outcome of mutual activities. In addition to the weekly meetings, we also hosted workshops for students and staff (Appendix 3 and 4). After the site visit from HK-dir we established, based on their advice, a leader group that oversee the local activities and coordinates on a national level.

### 3. External Dissemination

There were two main external dissemination strategies in 2021: the iEDLF and the GeoLearning Forum conference. The iEDLF included 19 seminars, with speakers from across Scandinavia. Invitations were distributed to the iEarth institutions, other SFUs and geoscience communities in Norway, the student body, and the iEarth Research Group. The seminars were all recorded and can be found on our site for Educational Resources on iEarth.no. The iEDLF continues into 2022 with a reduced number of events to five each semester as we prioritize physical meetings and face-to-face dissemination after the COVID-19 restrictions. The GeoLearning Forum conference was held at Leangkollen Conference centre in October 2021. The iEarth consortium was not very active at international conferences in 2021, but this is one of the targeted areas for 2022. External dissemination should also include participation in large international conferences and scientific publications. This aspect is something we hope to improve in 2022, particularly as the PhD students commence their projects and are ready to submit abstracts and discuss their projects with the international community.

## 3. Further progress

We had a strategy meeting in Oslo in February 2022 where we discussed further progress in iEarth. In 2020 we submitted an action plan for five years, and we are still following these action points. However, we are suggesting some changes and to slightly shift direction for some areas. We believe that an innovation project such as iEarth needs to be able revise the action plan accordingly. In the following section we outline the road ahead of us.

One important goal in 2022 for iEarth to be more active and visible in teaching and learning conferences in Norway and beyond. We would like to establish an educational research session on the Nordic and Norwegian geological meeting where we can share practice from iEarth with colleagues outside the

consortium. In addition, this will be an exciting arena for students to share their findings and to gain experience from the scientific community. We also intend to take part in conferences such as ISSOTL and EUROSoTL in the coming year. During 2022 we will take part in planning of an educational conference at University of Edinburgh together with colleagues in Scotland.

In FA1 we are still too early in the change process, but once the collective sensemaking has reached a point where the new programme design and connectivity is meaningful, students will be partners in developing a framework for reflection and peer assessment of their own progression. Specifically, we want students to be engaged in the development of meaningful learning progressions. During 2022 we aim to finalise a mobile application using *Flutter* that will be tested with students and teachers, for the purposes of both curriculum mapping and education planning. Alongside this goal is creating a database architecture using Neo4j. Our aim is to introduce our work to colleagues at UiB first and then expand to the rest of the consortium during 2022.

Further progress in FA2 will focus on expanding our activities with students as partners. We will arrange a student workshop with Catherine Bovill to discuss and revise the strategy for optimizing the activities in FA2. Face-to-face communication is important, especially after the COVID-19 restrictions, and we will develop further meeting points at institutional and national level for more exchange of practice and learning community development among the students. Another pilot currently running at UiO is to recruit student course representatives who support students and staff in continuously improving and developing courses. We aim for implementing course representatives for the entire iEarth community. We will pay special attention to the student organisation at UNIS as they are in a different situation with new students each semester. Here, we aim to build a permanent structure for the students and encourage iEarth-affiliated students at other institutions to take part in the organisation when studying at UNIS. The new HK-dir project entitled “Co-creation to promote active learning and communities of practice” (Appendix 6) at GFI-UIB will give a lot of valuable insight that can be communicated to the rest of the consortium.

In FA3 we want to develop and implement systems for shared courses across the consortium. The concept of developing and running a national iEarth course with common learning packages appears attractive and successful because we can gather geographically scattered expertise and fill gaps in curricula at individual institutions. iEarth aims to develop more such courses, and we currently have several suggestions in the pipeline: Quaternary geological methods, geochronology, SDG course on climate action, stable isotope, introduction class in climate dynamics, and speleology. Courses will be expected to use active learning strategies and cover the variety of methods and approaches that make up modern geosciences, including laboratory and desk (computer)-based methods as well as traditional field work. One suggestion for further progress is to offer some of these courses to international partners, and we are currently working on a proposal under the INTPART program for exchange with India. Other activities in FA3 are: to further develop an active educational resource webpage; arrange regular local meetings with internal projects/seed projects holders; arrange workshops/seminars for staff about cultural change (appendix 2) and how to make a teaching portfolio (with adjunct professor Torgny Roxå). We are currently looking into establishing an iEarth award for students and instructors. The purpose of this is to help our staff and students to build an educational CV as well as making iEarth visible in the community. A workshop focusing on 'sustainability in the curriculum' is planned at UiT in the fall of 2022. The workshop will use the UN SDGs as a framework. The workshop can potentially be open to other iEarth institutions and/or be offered in other cities

In FA4 we aim for a better use of the resources spent on field learning in earth science education by establishing local field laboratories (“super sites”) near the iEarth institutions. This is piloted at UNIS at two sites (Adventdalen and Erdmannflya) making a framework for such sites and a generic pilot that can be adapted by other institutions. FA4 will use the new iEarth webpages to spread virtual field teaching to all institutions by mapping out the resources that exists at the other institutions and collect

and catalogue reports, papers, guidance (explanations, how-to) and make it available for the entire consortium. The main object in FA4 is to further develop field education. In 2022, Rafael K. Horota will complete a comprehensive baseline study on the position of fieldwork in earth science education in Norway. We also want to develop a framework for certification of field skills that could be completed by making a Field Certificate for students during their bachelor or master studies. Finally, UNIS has developed a teaching assistant course that we will develop further and offer for all iEarth institutions.

Further progress in FA5 will be to establish a national workshop/meeting for all industry partners and stakeholders. The evaluation and the experience after the *internship* kick-off meeting points towards a need for such an arena. We would like to have an even closer collaboration with society and get more frequent feedback from industry partners. A board of mentors from businesses and industry will be included in the important work of the FA for the coming period. Enabling communication and peers for the relevance of the education and the actions being pursued.

A version of the internship courses now running at UiT, UiB and UiO will be implemented as a standalone course at UNIS over the next few years. There are some administrative challenges to establishing alumni networks in Bergen and Oslo, and we are looking into the possibility of making it low key with only a Facebook group for communication and the rest of the alumni activities connected to the institution's official alumni program. The bioCEED-led proposal "Developing-evidence based mentoring for better STEM work placements (DEVELOP)" was awarded funding by HK-dir in the fall of 2021 (Appendix 8). Iver Martens is iEarth project collaborator and WP-leader in DEVELOP. The project will focus on work placement hosts and mentoring capacity within businesses taking onboard internship students in the discipline subjects.

One topic that has already been mentioned is the continued need for focus related to the UN sustainable development goals. In Earth Science there are many possible targets such as quality education, clean water, climate action, life below water and life on land, which is why we will continue to pursue this topic in 2022.

### HK-dir "site visit"

During the fall of 2021 we had a site visit by HK-dir Professor Tina Bering Keiding from Aarhus University served as the expert panel member. In their report, the HK-Dir committee commented specifically on how we are organized, the work we are doing on curriculum analyses and development, how we are working together with the students, how we integrate our field-based learning into our classroom teaching and finally how we deal with stakeholder contact by sending students on short stays at our industry partners. These are all activities that strengthen the centre and help iEarth to achieve its aims and visions. They commented on the curriculum work and suggested that the centre needs a more analytical and theoretical approach to balance core academic experience and real-world problems. This is for sure something to pursue in the continuation of this work under FA1. See further comments from FA1 leader in the first chapter *Shaping the future*. Finally, the committee questioned the profile of the educational research group as they find it important to discuss and negotiate the borders between general educational research and the overall mission of the centre. We believe this question will be resolved as more SoTL activities are initiated among the consortium members in iEarth. For example, we aim to use student-led course evaluation initiatives at our institutions as leverage for local development projects. The site visit was a very positive experience for everyone involved and we are pleased that the committee found iEarth to be an academically sound and well managed centre.

# 4. Appendices

In the following chapter we have collected 11 appendices summarizing activities, members, and a financial overview.

**Appendix 1:** iEarth Digital Learning Forum (iEDLF)

**Appendix 2:** Overview of iEarth Workshops

**Appendix 3:** iEarth Student meetings, activities and seminars

**Appendix 4:** iEarth dissemination and outreach

**Appendix 5:** iEarth Research Group (ERG) activities

**Appendix 6:** iEarth publications

**Appendix 7:** Other relevant activities in iEarth

**Appendix 8:** Overview of iEarth external funding

**Appendix 9:** iEarth personnel

**Appendix 10:** Overview of iEarth core group meetings

**Appendix 11:** Accounting

## Appendix 1: iEarth Digital Learning Forum (iEDLF)

| iEDLF 2021 | | | | |
|---|---|---|---|---|
| # | Date | Presenter | Title/Theme | Attendees |
| 1 | 14.01.21 | Katarina Mårtensson | SoTL | 41 |
| 2 | 28.01.21 | Kerim H. Nisancioglu | SDG213 | 29 |
| 3 | 18.02.21 | Oda Bjørnsdatter, Ingvild Lorentzen, Iver Martens | Internship | 51 |
| 4 | 11.03.21 | Sehoya Cotner | Envisioning more equitable Higher Education | 21 |
| 5 | 25.03.21 | Øystein Brandsæter Asserson, Isabela Darci, Bjarte Hannisdal | Keeping up with student learning: our experience with student reflections | 51 |
| 6 | 08.04.21 | Bjarte Hannisdal, Lena Håkansson, Marius Jonassen, Mattias Lundmark, Iver Martens, Anders Schomacker | Updates from progress domain leaders | 63 |
| 7 | 22.04.21 | Bjarte Hannisdal | Earth Science Education: how do we connect the dots? | 40 |
| 8 | 26.05.21 | Dario Blumenschein, Rafael Horota, Jennie Lundquist, Julien Pooya Weihs | Meet our PhDs | 45 |
| 9 | 03.06.21 | Sigrid J. Bakke, Kjersti Daae, Lex Nederbragt | Implementing Jupyter Notebooks in teaching: opportunities and challenges | 42 |
| 10 | 17.06.21 | Guro Andersen, Mattias Lundmark | Co-creation | 28 |
| 11 | 23.09.21 | Jostein Bakke, Daniel Kramer, Tor Einar Møller, Björn Nyberg, Florina Schalamon | How to apply for iEarth Project funding + Presentation of four projects that have been granted fundings | 36 |
| 12 | 30.09.21 | Kerim H. Nisancioglu | SDG Course – One Ocean | 25 |
| 13 | 14.10.21 | Barbara Wasson | Learning Analytics – SLATE | 20 |
| 14 | 28.10.21 | Martin Indreiten | Arctic Safety Centre – How to operate safe in the high Arctic | 12 |
| 15 | 04.11.21 | Anders Ahlberg | iEarth research group – inquiry that informs educational change? | 14 |
| 16 | 11.11.21 | Harald Sodemann, Benjamin Robson | "DIY weather stations" and "ArcGIS FieldMaps app" | 22 |
| 17 | 18.11.21 | Henk Keers | Geoscience Education and Technology – before and during the pandemic | 16 |
| 18 | 25.11.21 | Bjarte Hannisdal, Marius Jonassen, Iver Martens, Mattias Lundmark | The iEarth Special: Speed dating with Focus Area leaders | 19 |
| 19 | 09.12.21 | Robert Morris Gray Jr. and Øystein Lund | Christmas Edition: pedagogical development for teaching staff, university education, innovation in education | 28 |

## Appendix 2: Overview of iEarth Workshops

| iEarth workshops 2021 | | | | |
|---|---|---|---|---|
| # | Date | Organized by | Topic | Attendees |
| 1 | 04.02.21 | Susan Johnsen | Design Thinking Workshop | 16 |
| 2 | 17.02.21 | Torgny Roxå | What are teaching cultures and what do they do? | 16 |
| 3 | 03.-04.11.21 | Iver Martens | GeoPraksis, arbeidslivsrelevans | 54 |
| 4 | 27.04.21 | Mattias Lundmark | ISSOTL submission workshop | |
| 5 | 14.-16.09.21 | Kjersti Daae and Mirjam Glessmer | CHESS/iEarth joint course on “communication skills in outreach and teaching” | 9 |
| 6 | 23.09.21 | Mattias Lundmark | License to learn | 30 |
| 7 | 28.10.21 | Mattias Lundmark | *Designe den perfekte kursen* | 14 |

## Appendix 3: iEarth Student meetings, activities and seminars

| Meetings and activities student organization 2021 | | | | |
|---|---|---|---|---|
| # | Date | Title | Type of Activity | Chapter |
| 1 | 19.01.21 | Underneath the volcano | PubLecture | UiB |
| 2 | 21.01.21 | | Semester planning | UiO |
| 3 | 29.01.21 | | Meeting between all student leaders at UiO, UiB and UiT | UiO, UiB, UiT |
| 4 | 08.02.21 | GeOrakel | GeOrakel | UiB |
| 5 | 18.02.21 | | Planning GIS-GeOrakel | UiO |
| 6 | 22.02.21 | GeOrakel | GeOrakel | UiB |
| 7 | 05.03.21 | GIS-GeOrakel | GeOrakel | UiO |
| 8 | 15.03.21 | GeOrakel | GeOrakel | UiB |
| 9 | 12.04.21 | GeOrakel | GeOrakel | UiB |
| 10 | 15.04.21 | | Discussing course in field reporting | UiO |
| 11 | 03.05.21 | GeOrakel | GeOrakel | UiB |
| 12 | 10.05.21 | Course in field report writing | Course | UiO |
| 13 | 11.05.21 | Digital career day | Digital career day | UiB |
| 14 | 14.06.21 | | Meeting between all student leaders at UiO, UiB and UiT | UiO, UiB, UiT |
| 15 | 22.06.21 | | Summary of the year | UiO |
| 16 | 31.08.21 | | Plan for new semester with new members | UiB |
| 17 | 01.09.21 | Bonfire evening | | UNIS |
| 18 | 11.09.21 | | Plan for new semester with new students | UiT |
| 19 | 17.09.21 | Fangene på fortet | Social activity | UiB |
| 20 | 22.09.21 | | Meeting with earlier leader. Discussing strategy for the new organisation. | UiT |
| 21 | 05.10.21 | GeOrakel | GeOrakel | UiB |
| 22 | 06.10.21 | | Planning the Fall semester | UiT |
| 23 | 06.10.21 | iEarth-møte | Allmøte | UiO |
| 24 | 11.10.21 | Information meeting for 1st year students | Info about iEarth | UiT |
| 25 | 12.10.21 | GeOrakel | GeOrakel 1st year students | UiT |
| 26 | 13.10.21 | GeOrakel | GeOrakel 2nd year students | UiT |
| 27 | 15.10.21 | Information meeting for 1st year students | Info iEarth | UiT |
| 28 | 18.10.21 | | Meeting with Iver and Johanne | UiT |
| 29 | 19.10.21 | GeOrakel | GeOrakel | UiB |
| 30 | 21.-22.10.21 | GeoLearning Forum | Conference | UiB, UiO, UiT |
| 31 | 24.10.21 | GeOrakel | GeOrakel 2nd year students | UiT |
| 32 | 26.10.21 | Snow avalanche evening with Martin Stefan | Fagkveld | UiT |
| 33 | 26.10.21 | GeOrakel | GeOrakel 1st year students | UiT |
| 34 | 27.10.21 | | Planning the career day | UiT |
| 35 | 28.10.21 | GeOrakel | GeOrakel 2nd year students | UiT |

| | | | | |
|---|---|---|---|---|
| 36 | 01.11.21 | Students and SFU partners | Presentation about student perspective and information meeting about SFU | UiB |
| 37 | 09.11.21 | UNISbreakfast with bioCEED | Student presentations | UNIS |
| 38 | 09.11.21 | GeOrakel | GeOrakel 1st year students | UiT |
| 39 | 17.11.21 | Subject evaluation GEOV217 | Subject evaluation | UiB |
| 40 | 20.11.21 | Christmas dinner | Christmas dinner | UiB |
| 41 | 22.11.21 | Shaping the future of earth science education | PubLecture | UiB |
| 42 | 22.11.21 | GeOrakel | GeOrakel 1st year students | UiT |
| 43 | 23.11.21 | GeOrakel | GeOrakel 2nd year students | UiT |
| 44 | 30.11.21 | GeOrakel | GeOrakel | UiB |
| 45 | 06.12.21 | Student representants | Support | UiO |

## Appendix 4: iEarth dissemination and outreach

| iEarth Outreach 2021 | | | | |
|---|---|---|---|---|
| # | Date | Presenter | Title and Focus Area | Conference |
| 1 | 07.01.21 | Iver Martens, Siri Karlsen | GeoPraksis, internship in geoscience education | The national Winter Meeting, digital |
| 2 | 15.04.21 | Jostein Bakke, Anders Schomacker | Framtidas geovitarar må vere digitale i heile sektoren. | Geoforskning.no |
| 3 | 31.04.21 | Jostein Bakke | Revolusjonerer norsk geoutdanning | Geoforskning.no |
| 4 | 26.05.21 | Iver Martens | Geo-Alumni Internship in geoscience | Geo-Alumni UiT, digital |
| 5 | 09.06.21 | Iver Martens | Geo-Intern project for UNIS-Alumni Club | UNIS-Alumni club, digital |
| 6 | 16.06.21 | Iver Martens | GeoPraksis- prosjekt-presentasjon | Medlemsmøte Norsk Petroleums-forening, Tromsø |
| 7 | 17.06.21 | Iver Martens, Oda Bjørnsdatter, Ingvild Lorentzen | Career learning for the future academia, the how and why – GeoIntern as a modern case study | EuroSoTL, digital, hosted by Manchester Metro-politan University |
| 8 | 02.09.21 | Iver Martens, Oda Bjørnsdatter | Karrierelæring i praksis – slik styrker vi arbeidslivsrelevans i en disiplinutdanning | Nettsamling Arb.livsrelevans, Kompetanse-nettverk for studenters suksess i høyere utdanning |
| 9 | 09.09.21 | Iver Martens | GeoIntern – Arbeidspraksis i geofagene | Fagdag, Institutt for Teknologi og Sikkerhet, Tromsø |
| 10 | 29.09.21 | Mattias Lundmark | Fjellsprengene – Yngres nettverk | Huk/UiO |
| 11 | 01.10.21 | Johanne Sofie Lund | GeoPraksis – Societal relevance for the future | Friday seminar IG |
| 12 | 05.10.21-07.10.21 | Marius Jonassen, Mark Furze, Rafael K. Horota, Guro Lilledal Andersen, Thea Krossøy | Part of the organisation committee. Poster about iEarth. Sharing sessions about *Virtual digital tools for fieldwork*, *iEarth at UNIS* and *iEarth project funding* | UNIS Learning Forum |
| 13 | 11.10.21 | Iver Martens | GeoIntern | Nordic Mineral Workshop UiT, digital |
| 14 | 15.10.21 | Johanne Sofie Lund | GeoPraksis – samferdsels-sektoren | Studenter i samferdsels-sektoren – Nettmøte med Konnekt |
| 15 | 18.10.21 | Iver Martens | GeoIntern for the National GeoHazard meeting | National Board Geofarerådet |
| 16 | 21.10.21-22.10.21 | **1.** Mattias Lundmark, Guro Lilledal Andersen | **1.** Finding out what works and not in your teaching (FA2, FA3). **2.** Designing | GeoLearning Forum |

| | | | | |
|---|---|---|---|---|
| | | **2.** Bjarte Hannisdal, Dario Blumenschein **3.** Ingvild Lorentzen, Oda Bjørnsdatter, Iver Martens, Johanne Sofie Lund **4.** Anders Ahlberg **5.** Marius Jonassen, Rafael K. Horota **6.** Kjersti Daae, Mirjam Glessmer | student learning trajectories (FA11. Finding out what works and not in your teaching (FA2, FA3) 2. Designing student learning trajectories (FA1) **3.** Landing that position – how to increase competence awareness in academia (FA5)). **4.** New Earth Science instructors – workshop on how to teach confidently with a sense of legitimacy (FA3). **5.** Exploring present and future digital learning tools parallel (FA4). **6.** Sharing session | |
| 17 | 26.10.21-29.10.21 | **1.** Kjersti B. Daae, Mirjam Glessmer **2.** Bjarte Hannisdal **3.** Mattias Lundmark | **1.** Bringing in the experts – an example of proactive co-planning of a second semester bachelor course – (FA2, FA3). **2.** Learning together (in a community of practice) across courses (FA11. Bringing in the experts – an example of proactive co-planning of a second semester bachelor course – (FA2, FA3). 2. Learning together (in a community of practice) across courses (FA1) **3.** I didn't learn anything, I just struggled with programming: Student perception of computational practices in a geoscience course (FA2, FA3) | ISSOTL 21 |
| 18 | 01.11.21 | Jostein Bakke, Elena V. Brattebø | Åpent informasjonsmøte om ny SFU-utlysing. Hvorfor søke SFU? | UiB læringslab |
| 19 | 02.11.21-03.11.21 | **1.** Rafael K. Horota **2.** Marius Jonassen | **1.** Exploring iVR as a digital field learning tool in Svalbard. **2.** Engaging students in meteorological field campaigns in Svalbard | Svalbard Science Conference |
| 20 | 03.11.21 | Iver Martens, Kathrine Tveiterås | Geo Intern Project – status update | KickOff GeoIntern, Gardermoen |
| 21 | 10.11.21 | Jostein Bakke | Reaksjonar etter jubileumsmøte om | Khrono.no |

| | | | | |
|---|---|---|---|---|
| | | | utdanning: «Kva skjedde her, statsråd Borten Moe?» | |
| 22 | 10.11.21 | Johanne Sofie Lund | Informasjonsmøte GeoPraksis | GeoPraksis for 2.-4. årsstudenter på IG |
| 23 | 26.11.21 | Iver Martens | Alumni networks and societal relevance | UNIS-Alumni Club, digital |
| 24 | 29.11.21 | Iver Martens | Veien til senter for fremragende undervisning | Undervisnings-kvalitetskonferan-sen UiT, digital |
| 25 | 29.11.21 | Mattias Lundmark | Studenter som partnere i undervisningsutvikling – hvordan få det til i praksis? | Utdannings-konfereansen, UiO |

## Appendix 5: iEarth Research Group (ERG) activities

| ERG webinar and activities | | | |
|---|---|---|---|
| # | Date | Webinars | Journal Clubs (incl. research plans) |
| 1 | 24.08.21 | Anders Ahlberg: Ethos of ERG – critical friends and peer feedback | |
| 2 | 10.09.21 | | Jennie Lundqvist: discussing her research plan |
| 3 | 22.09.21 | Catherine Bovill: Qualitative method-ologies: participatory methodologies involving students as co-researchers; case study methodology | |
| 4 | 08.10.21 | | Dario Blumenschein: discussing his research plan |
| 5 | 27.10.21 | Physical start-up session at GeoLearning Forum, Bergen Oct 21-22: negotiate principles and objectives (how to map, patterns to look for, identify "uncharted terrains") | |
| 6 | 05.11.21 | | Julien-Pooya Weihs: discussing his research plan (delayed) |
| 7 | 19.11.21 | Bjarte Hannisdal: Experiences with trying out new forms of instruction and assessment, prelimi-nary insights/ideas from SoTL project on student reflections on "ill-structured" problems | |
| 8 | 02.12.21 | | Rafael Kenji Horota: discussing his research plan |
| 9 | 14.12.21 | Kim Senger: Svalbox Integration of digital outcrops with other data – digital geology teaching & industry approach in academic virtual field trips. | |

## Appendix 6: iEarth publications

| iEarth Publications 2021 | | | | |
|---|---|---|---|---|
| # | Month | Focus Area | Authors | Reference |
| 1 | 26.10.21-29.10.21 | FA2 | Guro Andersen Lilledal, Kristian Bjelbøle Bakken, Adriana Amundsen Dauvi, Torjus Haakens, Ida Helene Magnor Hansen, Karianne Staalesen Lilleøren, Mattias A. Lundmark | Andersen, Guro Lilledal; Bakken, Kristian Bjelbøle; Dauvi, Adriana Amundsen; Haakens, Torjus; Hansen, Ida Helene Magnor, Lilleøren, Karianne Staalesen & Lundmark, Anders Mattias (2021). Bringing in the experts – an example of pro-active co-planning of a second semester bachelor course |
| 2 | December | FA2 | Mirjam Glessmer and Kjersti Daae | Glessmer, M.S., and K. Daae. 2021. Co-creating learning in oceanography. Oceanography 34(4), https://doi.org/10.5670/oceanog.2021.405. |
| 3 | | FA2 | Guro Andersen Lilledal, Kristian Bjelbøle Bakken, Adriana Amundsen Dauvi, Torjus Haakens, Ida Helene Magnor Hansen, Karianne Staalesen Lilleøren Mattias Anders Lundmark, Pia Alette Borgen Pedersen | Andersen et al. 2021. Students as partners in course development – a pilot. iEarth Education Research Series 2. |

## Appendix 7: Other relevant activities in iEarth

| iEarth other activities 2021 | | | | |
|---|---|---|---|---|
| # | Date | Author/ presenter | Topic | Type of media |
| | 10.05.21 | Bjarte Hannisdal | Task Force meeting | Outcomes of Task Force meetings: Draft of first white paper (*Manifesto*), now published on the new web page. First draft of teaching and learning ontology (graph data model). |
| | 23.06.21 | Bjarte Hannisdal | Task Force meeting | |
| 1 | 17.08.21 | Kjersti Daae | Studentmottak. Informasjon om muligheter innenfor studie og iEarth | |
| 2 | 07.09.21 | Bjarte Hannisdal | Task Force meeting | |
| | 05.10.21 | Bjarte Hannisdal | Task Force meeting | |
| | 16.11.21 | Bjarte Hannisdal | Task Force meeting | |
| 3 | | Mirjam Glessmer | Various topics | Blogposts: https://mirjamglessmer.com/?s=iearth |
| 4 | | Iver Martens | Nasjonalt konsortie for praksis er etablert og praksisordninger er stystematisert. Planlagt oppstart V22 | |
| 5 | | Mattias Lundmark | Seed Project: Course representatives | |
| 5 | | Iver Martens | To alumninettverk er etablert. Longyearbyen og UiT | |
| 6 | | Jostein Bakke, Bjarte Hannisdal, Anders Schomacker, Mattias Lundmark, Maria Jensen, Kjersti Daae, Kirsty Dunnett, Kristian B. Bakken, Mirjam Glessmer, Thea Krossøy, Torgny Roxå, Anders Ahlberg and Kari B. Johnsen. | Leading Educational Change – through SoTL (5ECTs) course with bioCEED and iEarth. | Mitt.uib.no |

## Appendix 8: Overview of iEarth external funding

| Externally funded projects 2021 | | | | |
|---|---|---|---|---|
| # | Corresponding author | Project title | Funding resource | Amount granted |
| 1 | Iver Martens | GeoPraksis | DIKU/Akademia-avtalen | 11000 kNOK |
| 2 | Sehoya Cotner (BioCeed), Iver Martens (iEarth rep.) | Develop | DIKU/HK Dir | 5500 kNOK |
| 3 | Kjersti Daae | Co-creation to promote active learning and communities of practice | DIKU/HK Dir | 4 500 kNOK |

# Appendix 9: iEarth personnel

## Centre management

**Centre Leader: Professor Jostein Bakke, UiB**
Jostein Bakke has been the centre leader for iEarth since its start in 2016. He is quaternary geologist working on paleoclimatic problems world-wide. He is research group leader for the Quaternary geology and paleo-climate group at the Department of Earth science at UiB, and leader for the national research infrastructure EARTHLAB.

**Network Coordinator: Thea Krossøy, UiB**
Thea Krossøy has been the Network Coordinator for iEarth since 2021. She has a background in Earth Science, specifically speleology from UiB, as well as geoscientific outreach from her work at Trollfjell UNESCO Global Geopark.

## iEarth Team

**Bjarte Hannisdal, UiB**

Bjarte is both Education Chair for GEO-UiB and leader for Focus Area 1. He is an associate professor at the Department of Earth Science at UiB, affiliated with the Geochemistry and Geobiology research group. His research interests are quantitative paleobiology and geobiology, Earth system history and causality in dynamic systems.

**Kjersti Birkeland Daae, UiB**

Kjersti is Education Chair at GFI-UiB. where she is affiliated with the Physical Oceanography research group. She works on high latitude processes, with an emphasis on water exchange along continental slopes, water mass transformations and ice shelf-ocean interaction.

**Karianne Staalesen Lilleøren, UiO**

Karianne is the Education Chair at UiO, which fits well with her role as Head of Education at the Department of Geosciences. She is a Senior Lecturer at the section for Physical Geography and Hydrology and Head of the very new Geoscience Education Section.

**Anders Mattias Lundmark, UiO**

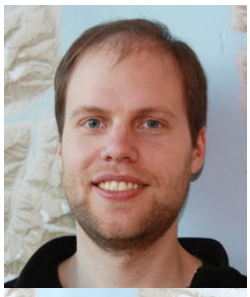
Anders is leader of Focus Area 3. He is an associate professor at the Department of Geosciences at UiO, where he is affiliated with the Section of Geology and Geophysics and member of the Geoscience Education Section. His research interests include tectonics and Earths development, regional geology and geodidactics.

**Iver Martens, UiT – The Arctic University of Norway**

Iver is the leader of Focus Area 5 and lectures at the Department of Geosciences at UiT – The Arctic University of Norway. Iver investigates the cooperation between industry and academia, how we can reduce the gap between them, and help each other to ensure benefits for both parts.

**Anders Schomacker, UiT – The Arctic University of Norway**

Anders is both Education Chair at UiT – The Arctic University of Norway and leader for Focus Area 2. He is a professor at the Department of Geosciences at UiT and is affiliated with the Coastal and Terrestrial Geosciences research group. His research focuses on Quaternary sciences, paleoclimatology, and glacial sediments, processes and geomorphology.



**Marius Jonassen, UNIS**

Marius is both the Education Chair at UNIS and one of the leaders of Focus Area 4. Marius is an associate professor with the Arctic Geophysics Department at UNIS, where he is affiliated with the Meteorology Group. His interests include polar meso- and synoptic scale meteorology, numerical weather forecasting and air-sea-ice interactions.

**Mark Furze, UNIS**

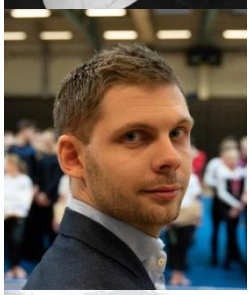
Mark is Education Chair at UNIS and Focus Area leader for *Field Learning*. Mark is an associate professor in quaternary geology, affiliated with the Department of Arctic Geology at UNIS.

**Kristian Bjelbøle Bakken, UiO**

Kristian is one of the iEarth coordinators, working as a Senior Executive Officer within the Section for Geodidactics at UiO.

**Johanne Sofie Lund, UiT – The Arctic University of Norway**

Johanne is one of the iEarth coordinators. She is the National Coordinator for the GeoPraksis initiative.



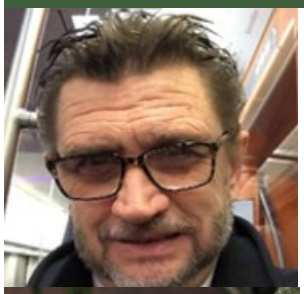
**Jan Magne Cederstrøm, UiB**

Jan Magne is one of the iEarth coordinators. Working as Head Engineer at the Department of Earth Science, Jan Magne is local coordinator for the GeoPraksis course at UiB.

**Karen Tellefsen, UiB**

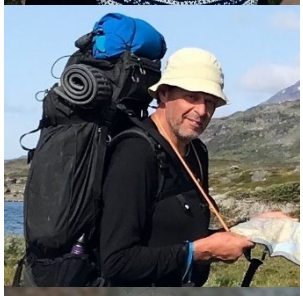
Karen is one of the iEarth coordinators. She is Senior Executive Officer at the Department of Earth Science, contributing to iEarth management and particularly the GeoPraksis course at UiB.

## iEarth Research Group 2021



**Anders Ahlberg (Leader), UiT and Lund University**
Anders is a senior lecturer at Lund University and adjunct associate professor at UiT – The Arctic University of Norway. His early career was devoted to geoscience teaching and research before it turned to educational development in the STEM disciplines. He is currently Research Education Study Director for the engineering disciplines at Lund University.

**Mirjam Glessmer, Lund University**
Senior Lecturer, Centre for Engineering Education.



**Torgny Roxå, Lund University**
Senior Lecturer, Centre for Engineering Education.

**Catherine Bovill, University of Edinburgh**
Senior Lecturer in Student Engagement, Institute for Academic Development.

**Jan Alexis Nielsen, University of Copenhagen**
Head of Department, Department of Science Education.

**Kirsty Dunnett, UiO**
Postdoctoral fellow.

**Dario Blumenschein, UiB**
PhD candidate, GEO-UiB.

**Julien Pooya Weihs, UiB**
PhD candidate, GFI-UiB.

**Jennie Lundquist, UiT**
PhD candidate.

**Rafael Horota, UNIS**
PhD candidate.

## iEarth Board

**Thea Krossøy**
Secretary

**Chairman of the Board**
Professor Tor Eldevik
**Head of Department, GFI-UiB**

**Marit Ubbe**
HK-Dir observer

**Professor Atle Rotevatn**
Head of Department, GEO-UiB

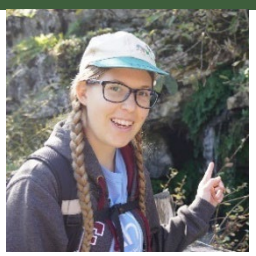
**Professor Matthias Forwick**
Head of Department, GEO-UiT

**Professor Bernd Etzelmüller**
Head of Department, GEO-UiO

**Professor Maria Jensen**
Head of Department, Arctic Geology, UNIS

**Guro Lilledal Andersen**
Student Representative, National Student Coordinator, UiO

## Student Organization

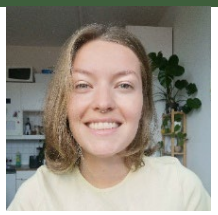


**Guro Lilledal Andersen**
National Student Coordinator, UiO

## UiO Student Chapter

**Sverre Johansen**
Student Coordinator

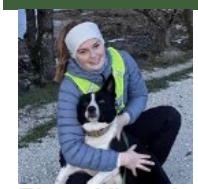
**Pia Alette Borgen Pedersen**
Financial student manager



**Sina Henning**
GeOrakel

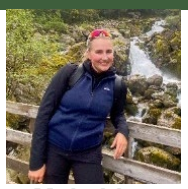
**Gjøri Nisja**
PR

## UiB Student Chapter

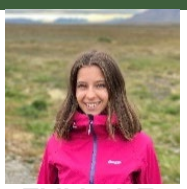


**Elena Victoria Brattebø**
GEO Student Coordinator

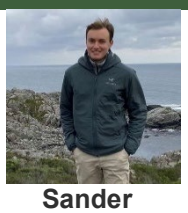
**Sverre Soldal**
Academic Liaison



**Maja Lian Jæger**
GeOrakel



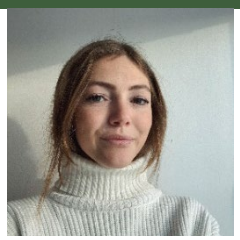
**Thilde J. T. Voje**
GeOrakel



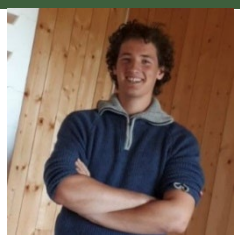
**Sander Løklingholm**
GFI Student Coordinator

Tora H. Myklebust, Lars M. Rainer, Vilhelm Nyby, Kristel Kaselaan, Søren B. Tvingsholm

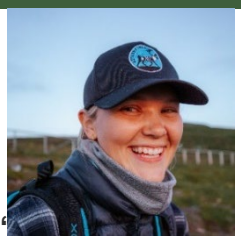
## UiT Student Chapter



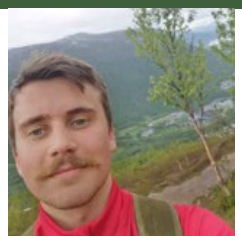
**Lovisa Hansson**
Student Coordinator



**Truls Aaby**



**Eline Nemeth Lunde**



**Vidar Nygård**

## UNIS Student Chapter

**Ymke Zoë Lathouwers**
Student Coordinator

**Florina Roana Schalamon**

**Tereza Mosociová**

**Håvard Kolstø Jensen**

**Eirik Borgersen**

**Solveig Solem**

# Appendix 10: Overview of iEarth core group meetings

| iEarth Core Group Meetings | | | |
|---|---|---|---|
| # | Date | Type of meeting | Attendees |
| 1 | 11.01.2021 | Status meeting | 17 |
| 2 | 18.01.2021 | Status meeting | 9 |
| 3 | 25.01.2021 | Status meeting | 14 |
| 4 | 01.02.2021 | Status meeting | 14 |
| 5 | 08.02.2021 | Status meeting | 11 |
| 6 | 15.02.2021 | Topic meeting, Bjarte Hannisdal – FA1 | 18 |
| 7 | 22.02.2021 | Status meeting | 14 |
| 8 | 08.03.2021 | Topic meeting, Anders Schomacker – FA2 | 19 |
| 9 | 15.03.2021 | Status meeting | 12 |
| 10 | 22.03.2021 | Status meeting | 14 |
| 11 | 12.04.2021 | Topic meeting, Mattias Lundmark – FA3 | 17 |
| 12 | 19.04.2021 | Status meeting | 13 |
| 13 | 26.04.2021 | Status meeting | 16 |
| 14 | 03.05.2021 | Topic meeting, Iver Martens – FA5 | 11 |
| 15 | 10.05.2021 | Status meeting | 12 |
| 16 | 31.05.2021 | Topic Meeting, Marius Jonassen – FA4 | 16 |
| 17 | 07.06.2021 | Status meeting | 12 |
| 18 | 14.06.2021 | Status meeting | 5 |
| 19 | 06.09.2021 | Topic meeting, Bjarte Hannisdal – FA1 | 18 |
| 20 | 13.09.2021 | Status meeting | 14 |
| 21 | 20.09.2021 | Status meeting | 11 |
| 22 | 27.09.2021 | Topic Meeting, Anders Schomacker – FA2 | 21 |
| 23 | 11.10.2021 | Status meeting | 14 |
| 24 | 18.10.2021 | Status meeting | 13 |
| 25 | 01.11.2021 | Topic Meeting, Mattias Lundmark – FA3 | 20 |
| 26 | 08.11.2021 | Topic Meeting, Marius Jonassen – FA4 | 16 |
| 27 | 15.11.2021 | Status meeting | 13 |
| 28 | 21.11.2021 | Topic meeting, Iver Martens – FA5 | 15 |
| 29 | 06.12.2021 | Status meeting | 16 |
| 30 | 13.12.2021 | Status meeting | 14 |

# Appendix 11: Accounting

| Aktiviteter | Regnskap 2020 | Budsjett 2021 | Regnskap 2021 | Budsjett 2022 | Budsjett 2023 | Budsjett 2024 | Budsjett 2025 | *Opprinnelig budsjett* | Regnskap/ Korrigert budsjett | Avvik |
|---|---|---|---|---|---|---|---|---|---|---|
| 06-Drift | 44 799 | 350 000 | 460 023 | 350 000 | 350 000 | 370 178 | 245 000 | ***1820000*** | 1 820 000 | |
| 07-Webinar | 334 608 | 0 | 468 271 | | | | | ***600000*** | 802 879 | -202 879 |
| 08-Virtuelt kompetansesen | 0 | 50 000 | 62 500 | 50 000 | 87 500 | 50 000 | | ***250000*** | 250 000 | |
| 09-Retreats | 104 688 | 400 000 | 499 116 | 300 000 | 296 196 | 300 000 | | ***1500000*** | 1 500 000 | |
| 10-Internships | 0 | 200 000 | 0 | 75 000 | 175 000 | 175 000 | 25 000 | ***450000*** | 450 000 | |
| 11-Konferanse | 0 | | 0 | | | | 300 000 | ***300000*** | 300 000 | |
| Internprosjekter | 324 234 | 637 300 | 784 292 | 1 405 924 | 1 347 050 | 1 178 000 | 583 198 | ***5825578*** | 5 622 698 | 202 880 |
| PhD | 0 | 4 142 000 | 3 110 295 | 5 260 000 | 5 439 705 | 5 052 000 | 542 000 | ***19404000*** | 19 404 000 | |
| Post doc | 0 | 1 241 000 | 91 427 | 1 278 000 | 1 317 000 | 1 856 000 | 649 573 | ***5192000*** | 5 192 000 | |
| Tekn | 0 | 823 000 | 297 000 | 848 000 | 526 000 | | | ***1671000*** | 1 671 000 | |
| adm. | 434 996 | 859 000 | 889 160 | 885 000 | 912 000 | 960 844 | 403 000 | ***4485000*** | 4 485 000 | |
| education chair | 1 715 868 | 4 465 000 | 3 766 959 | 4 604 000 | 4 737 000 | 5 398 173 | 3 093 000 | ***23315000*** | 23 315 000 | |
| Proff II | 520 755 | 1 188 000 | 1 614 291 | 1 224 000 | 1 076 000 | 975 000 | 146 176 | ***5556222*** | 5 556 222 | |
| PI | 379 661 | 885 000 | 1 013 814 | 912 000 | 939 000 | 967 000 | 407 525 | ***4619000*** | 4 619 000 | |
| **Total kostnder** | **3 859 609** | **15 240 300** | **13 057 149** | **15 952 650** | **16 011 050** | **16 126 000** | **5 217 300** | ***74 987 800*** | **74 987 800** | **1** |

In 2021, we spent significantly more funds than in 2020. However, this is because much of the funds from the 2020 budget have been transferred to the 2021 budget. Please see detailed information in the annual report from 2020.

In 2020, we decided to put the *PD-Driftsmidler* into the projects funding pool (see the activity "*Internprosjekter"*). In 2021, we funded 32 projects with a total of 714,706 NOK, however the 69,586 NOK left from 2021 will be transferred into the budget of 2022. The internal projects (seed projects) spent significantly less than budgeted for. This is a natural response to the limitations to travel, no physical meetings and other delays due to the pandemic. Many of the projects have been asking for an extension to spring 2022, which we have granted. Projects that have asked for extension have therefore not yet invoiced iEarth, and not visible in the budget yet. However, we foresee that the allocated funding will be used within 2022.

The post *Drift* is funding to cover travel for everyone in the consortium, such as the iEarth research group, as well as the day-to-day expenses of the centre. The leftover funds after merging the budget from 2020 and 2021 will be spread out over the four years in the centre period as we see that the iEarth research group and other consortium members will require travel between institutions, particularly in relation to the PhD candidates and their progress.

All five consortium institutions were able to spend 100,000 NOK on webinar facilities. Some of the invoices that should have been included in the *Drift* post have been added to the webinar post, which is why we have spent over the budget with -202,879 NOK.

In 2021 we spent all the funds for our new website, but since we transferred the funds from 2020, we will transfer the 37,500 NOK into the 2022 budget and use the additional funds to create specialized video material, develop blogs and hire a student to update the site.

The *Retreat* section of the budget is specifically aimed towards the GeoLearning Forum. In 2020 we almost did not spend any funds on travel and accommodation. The remainder was transferred into the 2021 GeoLearning Forum budget. We wanted to make this event as large as possible for the whole consortium, which we did. With over 100 participants, we used more than the foreseen budget in 2021. We therefore transferred 100,000 NOK from the *Internprosjekter* post in 2021, which means that we will have less funding to spend on internal projects in the future.

Through in-kind resources from iEarth institutions, we have created positions for five PhDs, five adjunct professors and one postdoc. In 2021 we hire four PhD's (one still vacant) and one Postdoc. As a response to the significant delays due to travel and contracts issues associated with the COVID-19 situation, we have used less in-kind resources on the PhD- and Postdoc-positions. The *Proff II* section

of the budget is not yet updated. There needs to be some correlations for 2022 in the in-kind resources as this has, so far, not been included in the project and is therefore missing updates in the budget.