iEarth

iEarth Annual Report 2022

UNIS

Statements from students about being engaged in iEarth

"Modernisation of geoscience education across all universities in Norway."

"Creates opportunities for the improvement of geoscience education.""

"GeoIntern has giving me a great opportunity to show what it takes to get a job and what a regular day in a company looks like"

"iEarth involves students and creates a good learning environment across different semesters"

"In GeoIntern, I got to use knowledge which I didn't think I would find use for in the company. This has made me want to get more engaged in other subjects during my education".

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Summary

Centre for Integrated Earth Science Education (iEarth) became a Centre of Excellence in Education (SFU) in 2020. We see progress on many of the ambitions we set out in the project proposal and the action plan. However, curriculum redesign and cultural changes in academia is a slow process that takes time to fulfil. We are on track and believe that our effort in the last year is visible internally and to external collaborators. In the annual report for 2022, we look back on what happened and look forward to revising some of our plans for further progress. iEarth is an innovation project, and we, therefore, need to continuously revise our strategies to reach our long-term visions and goals. Here are summarised our main activities in 2022:

- Student organisations are up and running, and we have hired a national leader in a 20% position to ensure that the organisations have continuity. Their contribution to iEarth is fundamental for our success as an SFU.
- Several new courses are transformed to module based with student-active learning methods. The goal is that some of these also should be national courses offered in the consortium after the outline of the geohazard course running for the third time this year. iEarth consortium has been involved in more than 15-course re-design projects since the start of the SFU.
- We are working on integrating the SDG goals into our curriculum and have had workshops on this topic at all institutions.
- Students are active partners in our teaching development, and the new normal is to have course representatives in courses. This is the first step in establishing a culture for co-creation within the iEarth consortium.
- We see an increased interest among the teachers to do SoTL projects on their own teaching. This will be followed up by shared workshops on teaching portfolios in 2023.
- We got funding from a new HK-dir project led by Iver Martens titled “GeoIntern International”. This is an expansion of the internship course to other countries.
- The joint bioCEED and iEarth course Leading Educational Change through SoTL course was concluded in 2022. 19 participants from 4 institutions (UiB, UiT, UNIS, UiO) completed the course (5 ECTS). The participants completed 7 group projects.
- We arranged the fifth national GeoLearning Forum with 120 participants. The topic for this year’s event was “Sharing is caring”, emphasising co-creation, workshops, and a keynote on self-reflective learning.
- We have changed our seed project program and increased the maximum grant amount, and we no longer have a fixed deadline for applying. This is done to make the program more adaptable and allows already funded projects to apply for follow-up money.
- Our new web page is up and running and is an important tool for disseminating our activities.
- The iEarth Research Group on educational research is now in a phase where we see publications from their work. This is very important dissemination for the international communities in educational research. We will strengthen the research group with two more experts, one in educational research and one in academic development.
- Finally, we see augmented dialogue over teaching among our colleagues. Open dialogue is the first step towards a culture of sharing and educational development. We can’t point at a certain point in our effort that led to this, but we see that teachers have more knowledge about education research and that they more commonly use a language backed by literature.

Future development of teaching and learning requires funding!

After two and a half years with iEarth as a Centre for Excellence in Education, we have started to see the effect of the systematic work done by colleagues in all involved departments. Students are active partners in our teaching development, teachers have started to do SoTL projects on their teaching, and there is an increased interest among staff to change the teaching methods and to start using student-active learning approaches. We see augmented dialogue over teaching and a new language backed by literature, including an attitude toward sharing. Overall, an SFU brings added value by promoting quality, expertise, collaboration, innovation, and community impact, ultimately benefiting students and society. The SFU funding mechanism makes way for internal priorities and realignment of education, as well as national collaboration, with a collective momentum and ambition for the student-teacher partnership that we could not have achieved without. The prestige of having SFU status adds momentum to the partner departments, the consortium, and the evolving educational programmes. Our SFU status drives us to focus on quality, where excellence in education is dedicated to providing high-quality educational programs and services, promoting best practices followed by an educational research program. The SFU program fosters collaboration and partnerships between teachers, researchers, industry, and the community, creating cross-disciplinary and cross-sectoral collaboration opportunities. iEarth, as an SFU, can serve as an innovation engine, driving the development of new and better ways of teaching and learning and promoting the integrating of technology and other cutting-edge tools into the educational process.

It can be challenging to coherently revise the curriculum across a study program and even more so when revising how we teach and interact with the students. An even larger challenge is to do so throughout a department and between departments nationally. The SFU program, or the equivalent, must scope and commit individual staff and institutions to the level of coherence and common ambition required to succeed.

Director iEarth	Chairman of the Board
Jostein Bakke	Tor Eldevik

Abbreviations/Acronyms

Action Plan = Also called Centre Plan. The Centre Plan has developed through a series of discussions in the core team in iEarth since 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 the development of FAs at their respective institutions, thus ensuring implementation of iEarth policy throughout the consortium.

GeoLearning Forum = annual conference gathering all iEarth teachers and students. A program committee is responsible for the program and designing 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 Science (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.

MNT = Årlig utdanningskonferanse i Stavanger.

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 organisation started with PubLectures, a series of lectures in an “informal” and “relaxed” environment. Each lecture is to introduce different research groups at 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

On February 12th, 2022, Norway lifted all COVID-19 restrictions, allowing iEarth, established during the pandemic, to commence operations under normal circumstances. The ensuing spring was a flurry of activity as we adjusted our operations to the new "normal". Our familiarity with digital tools provided a head start for the iEarth consortium, which spans nearly 3000 km from Longyearbyen to Oslo.

An ambitious part of the iEarth consortium is providing tools for curriculum redesign adaptable to future social needs. This work took a big step forward in 2022 by establishing a solid theoretical framework underpinning the research, design principles, and curriculum development processes. Further, we have launched a digital twin prototype to support collaborative curriculum processes, design, and research. It brings us great pride to announce that in 2022, two teachers from iEarth were recognised with prestigious awards. Karianne Staalesen Lilleøren from UiO was awarded the *best lecturer* at the Oslo Faculty of Mathematics and Natural Sciences. At the same time, Bjarte Hannisdal from UiB GEO received UiB's internal *Owl Award* for exceptional educational quality in the subject of GEOV114 – Geobiology.

Based on experiences from UiO, we have started a national Journal club for educational research. We meet regularly to discuss academic papers on a specific topic within educational research. Someone with an educational research background typically shares their insights, and the rest of the group engages in the discussion. The format is that we give a short introduction to a paper and that there are local gatherings for discussing the content.

During 2022 we have promoted iEarth members to attend conferences within Earth science and educational research, to disseminate iEarth activities, exchange ideas and build relationships. We will continue this activity in 2023 to help you expand your knowledge and gain insights into emerging trends.

The GeoLearning Forum, our annual gathering, has become a unique platform for students and staff to convene and engage in high-quality discourse, inspiration, and the exchange of ideas. As with the 2021 event in Oslo, over 100 participants from within and beyond the consortium attended, with half being students. In 2022, the Scandic Hotel Ørnen in Bergen was our chosen venue, and it proved to be an excellent host, ensuring a seamless experience for all attendees. One of the workshops we hosted was about co-creation, led by Professor Catherine Bovill. She emphasised the importance of active student participation, shared ownership of the learning process, and integrating real-world experiences and perspectives into the academic curriculum. The approach promotes the idea that learning is a continuous and dynamic process that occurs inside and outside the classroom and involves ongoing dialogue, reflection, and feedback. In iEarth, we keep working with co-creation to prepare students for the complex and rapidly changing world they will face upon graduation by providing them with the skills, knowledge, and experience needed to succeed in a dynamic and interconnected global society.

Also, in 2022 we enjoyed being part of the SFU family hosted by HK-dir. The many forums they provide for us are beneficial. In November, iEarth hosted part of the network gathering, and we could share our ideas and work with the rest of the SFU communities in Norway. We realise that having an SFU gives added value by promoting quality, expertise, collaboration, innovation, and community impact. This ultimately benefits both students and society. The competitive factor is important, as it confers status upon SFUs that distinctly generates momentum from other project funding sources. The program focuses on quality, wherein education strives for excellence by providing high-quality educational programs and services and promoting best practices through an academic research program. In iEarth, we strive to foster collaboration and partnerships between educators, researchers, industry, and the community, resulting in cross-disciplinary and cross-sectoral collaboration opportunities.

1. Results

1.1 Vision of the centre, focus areas and activities

In iEarth, we aim to establish an innovative and student-centred learning milieu for aspiring Earth system scientists and citizens to address intricate societal opportunities and challenges. To accomplish this objective, we have devised the following strategies: (1) revamp national Earth science curricula by adopting a competence-oriented curriculum redesign; (2) foster an effective learning environment by engaging students as partners in the educational process; (3) establish a collaborative, innovative, and 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 strategies has its own Focus Area (FA), enabling the transformation to occur streamlined and efficient.

Our objective is for all members of our academic community, including both students and staff, to become agents of change by fostering a culture that supports transformation within their respective departments and institutions. In the subsequent section, we outline the primary objectives and initiatives for 2022 across various focus areas. Regarding outreach and communication, we have highlighted crucial undertakings that span different focus areas, including internal projects, the SoTL's Leading Education Change course, and the activities of the iEarth Educational Research Group. These endeavours were met with success in 2022, as evidenced by the positive feedback and evaluations they received.

1.2 Important accomplishments and activities

Focus area 1 – Shaping the future

This focus area has made significant advances in 2022 along two main lines: (1) the establishment of a solid theoretical framework that underpins the research, design principles, and processes of curriculum development, and (2) the launch of a prototype of a digital twin to support collaborative curriculum processes, design, and research.

Complex adaptive systems (CAS) as a theoretical framework for curriculum

The iEarth vision of integrated Earth Systems Science and education for sustainability requires ***transformational*** change. However, curriculum transformation is inhibited by systemic barriers in higher education institutions, and to overcome these barriers, we need to build the capacity for teachers and students to have ***agency*** in a collaborative curriculum ecosystem. This curriculum ecosystem must be ***resilient*** to undergo transformational change and adapt to new insights and needs without compromising its integrity and core functions. Hence, we frame our approach using CAS theory, commonly used to analyse sustainability, resilience, and management of complex socio-ecological systems. For example, the dynamics of a time-evolving complex curriculum network can be analysed in terms of the ***adaptive cycle*** (Fig. 1B), a heuristic used to understand, design, and manage systems that are resilient but adaptive, combining both continuity and learning. A curriculum consists of nested structures (e.g., individuals, groups, departments), each with its adaptive cycle, that ***interact across scales*** (Fig. 1C). Large, slow cycles buffer smaller and faster cycles, which explains how a CAS can be resilient, i.e., able to accommodate innovation and reorganisation without destabilising. FA1 will use an innovative digital twin (described below) to operationalise these CAS concepts and quantify curriculum dynamics. When combined with in-depth insights from mixed methods research, FA1 will be uniquely positioned to gain new fundamental insights into how student and teacher agency can interact synergistically with collaborative curriculum transformation.

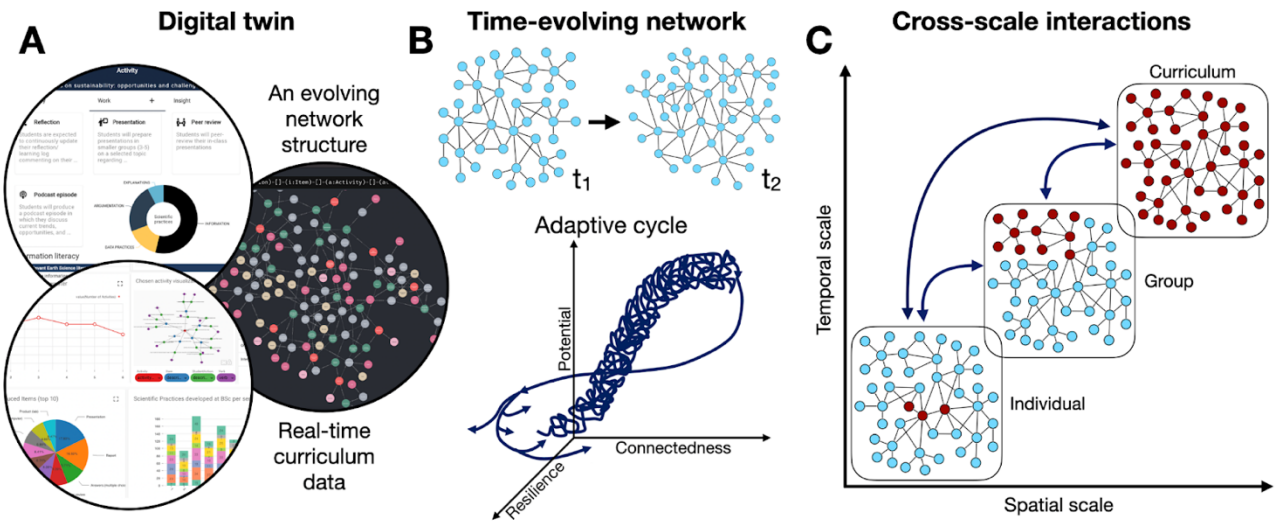


Figure 1. Leveraging the digital twin to analyse curriculum dynamics across scales. **A**. Three key elements of the digital twin are an interactive, flexible learning design app (upper circle), a graph database storing the evolving curriculum elements and their connections as a network (middle circle), and real-time visual mapping and analytics (lower circle). **B**. Curriculum dynamics can be described in terms of three abstract variables (connectedness, potential, and resilience) that can be computed from networks. As a curriculum network evolves, its trajectory in this 3D state space is expected to follow a loop-like pattern called the adaptive cycle, which is used to understand and manage resilience and sustainable development. **C**. A complex curriculum consists of nested structures, each with its own adaptive cycle, that interact across scales. These interactions and synergies can be quantified and combined with insights from mixed-methods research to gain a new fundamental understanding of teacher and student agency in collaborative curriculum processes.

A digital twin for collaborative curriculum development

FA1 has performed an in-depth analysis of the problem of higher education curriculum transformation through literature review and curriculum Task Force meetings, which has led to the identification of three generic design principles: ***visibility***, ***connectivity***, and ***flexibility***. These design principles have now been embodied in a highly innovative 'digital twin' (Fig. 1A): a digital representation of a complex curriculum network updated with real-time data, which provides a vast array of new affordances with ground-breaking implications for all actors involved: (1) Students are able to see what they are learning, for what purpose, and where it leads, choose what learning pathways to take, and build portfolios, which will empower students towards self-regulated learning. (2) Teachers are able to see where their teaching aspirations fit in the larger curriculum, what learning trajectories and progressions students can follow, see what their colleagues are doing, and build portfolios, giving teachers agency at the curriculum level. (3) Administrators can obtain reliable information for educational quality management, such as realistic workload distributions and congruence between intended and realised learning outcomes. (4) External stakeholders, such as potential employers, can get authentic insights into what skills and competencies students acquire and build more effective partnerships with higher education institutions. (5) All actors can engage in collaborative curriculum development involving ***virtual experimenting***, i.e., testing new content, student activities, or pedagogical practices in the digital twin before or while enacting innovations in the classroom. By building a collective capacity for more equitable change, sensemaking, and democratisation of curriculum innovation, we can work together towards the deep, sustainable curriculum transformation needed to fulfil the iEarth vision.

The digital twin was prototyped and pre-tested with teachers at UiB in March 2022, confirming that the digital twin can enhance curriculum visibility, counteract disciplinary fragmentation, capture the complexity of teaching and learning, and support different educational beliefs and practices. Future development will involve hiring professional software systems developers and deploying the digital twin in teacher teams engaged in collaborative curriculum design. Strict privacy control is required when capturing detailed data on the curriculum and the interactions of all those involved, including

personalised data that can be traced back to individuals. The software solution mitigates any such risks through strict adherence to GDPR regulations, with fine-grained access permissions that vary between user roles. The CAS theoretical framework and the digital twin innovation have been written in a manuscript that will be submitted to a suitable journal in the spring of 2023.

Focus area 2 – A learning environment for students

From the start, a fundamental part of iEarth has been to engage students as partners in their education inspired by the work of, e.g., Catherine Bovill (iEarth prof. II at UiB). We have come to think of this goal in terms of a ladder, stretching from student active learning (students engage with the learning process through, e.g., discussions and use of authentic data and problems) via co-creation (students and staff work together to create/adapt components of teaching and learning) to student-staff partnership where students and staff share the responsibility to set and reach educational goals. Moving up the ladder tends to add potential benefits, such as increased motivation, making teaching more relevant to students, and working on transferable skills such as collaboration/negotiation, metacognition and taking responsibility. Even so, different rungs on the ladder may be appropriate in various teaching and learning contexts. From the above, it's clear that the goals of FA2 can only be reached by staff or students in collaboration with the teachers. We are therefore working on reorganising the focus area, «The student's learning environment", to reflect this collaborative aspect better. An essential part of FA2 is the iEarth student chapters. They organise student activities at the institutions of iEarth that are important as meeting places focused on teaching and learning, scaffolding for projects such as GeOrakel, Pub lectures and career days (Fig. 2). These activities provide continuity to student-led projects, and facilitating communication between geoscience students in Bergen, Oslo, Tromsø and Longyearbyen. The work depends on individuals, which can pose challenges as new students join and elder students move on. To strengthen the student organisations and address this challenge, the student chapters decided to formalise a 20% paid position to head the student organisations advertised in 2023.

The arena where students and staff most frequently meet is the university courses. Several projects aimed at piloting and showcasing ways of engaging students in teaching and learning are underway, partly financed through iEarth seed funding. iEarth has a two-pronged approach to sharing and spreading examples and experiences. The first consists of sharing them in multiple venues such as the GeoLearning Forum, Digital Learning Forum, the Teaching and Learning Journal Club (UiO), and Teacher’s breakfast (Geophysical Institute, UiB), faculty meetings (Department of Earth science, UiB), Teachers meeting (UiT), Teachers retreat (UNIS), and through publications (e.g., Glessmer and Daae 2022), potentially reaching slightly different audiences. The second is to empower students to drive change. To trigger conversations about teaching and learning between teachers and students, iEarth students took the initiative to pilot course representatives at UiO in 2020. In 2022, the practice had spread to 5 of 10 mandatory bachelor courses at UiO, and this is implemented as a new tool in the entire consortium. This represents a new way for our students and staff to interact and allow students to give continuous feedback and suggestions during classes in a discussion format rather than as retrospective one-way communication in course evaluations. To facilitate the work, some staff and students involved in the project have written an introduction with suggestions for implementing course representatives aimed at both students and staff. In 2023, course representatives will be tried out in courses at UiT on the initiative of the local student chapter. The iEarth students also take responsibility for disseminating teaching and learning development. In addition to their contributions to various iEarth activities, such

as the GeoLearning forum, the students also presented several posters and papers at the 35th Nordic Geological Winter Meeting in Reykjavík.

Figure 2. To the left: iEarth representatives arranging a career day for their fellow students at all iEarth institutions. This is important for the students to be able to make decisions about their future career paths and what courses they should prioritise based on their interests. To the right: student engagement on Svalbard implementing digital tools in field education.

Focus area 3 – A learning environment for teachers

The critical steps for this focus area are to develop teaching as a collegial enterprise. Here are the main achievements in 2022 according to the action plan:

Cultural change: developing teaching into a collegial enterprise and developing a site for Educational Resources (virtual competence centre)

In 2020, we started working towards this goal by creating a new arena for sharing knowledge: the iEarth Digital Learning Forum (iEDLF). In 2022, we held seven unique seminars with speakers representing the consortium (Appendix 1), creating an inspiring sharing space with vibrant discussions. We also work locally at each iEarth member institution to stimulate this cultural change. In October 2022, iEarth and the Faculty of Science and Technology at UiT hosted the workshop "Integrating Sustainability into the Curriculum" by Prof. Susan Kaspari, visiting Fulbright Scholar in 2022-23 at UiT. This workshop was offered to inform faculty how to take concrete steps towards including the UN Sustainable Development Goals in the curriculum. Based on this, similar sustainability workshops are planned at UiB, UiO, and UNIS. These activities aim to develop teaching into a collegial enterprise with shared ownership among the faculty.

The joint bioCEED and iEarth course *Leading Educational Change through SoTL* were concluded in 2022. Nineteen participants from four institutions (UiB, UiT, UNIS, UiO) completed the course (5 ECTS). The participants completed seven group projects (Driving educational culture transformation during large-scale change among geoscience university faculty in Norway; A qualitative study of local educational leadership, change agents and grass root leadership at MN Faculty UiB; Internal communication strategy, iEarth; Making sense? Testing an early prototype of a curriculum app; When students inform local climate policy – An activity analysis of a course-based undergraduate research project at the University of Bergen; Core Themes in Critical Thinking: Perspectives from Students and Teachers; Implementing student-staff partnership informed by eight change theories). Some of these projects will be presented at the *MNT conference 2023* in March. The course concept was presented at EuroSoTL2022 in Manchester by the course leaders.

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

The iEarth seed project funds are incentives, and motivation to develop teaching and learning cooperation across departments and universities, engage students in improving their learning

environment, and promote SoTL. In 2022, we had two calls for applications. In the Spring semester, projects could apply for funding up to 50 000 NOK. Ten projects received funding. In the Fall semester, we encouraged larger projects, and applying for up to 150 000 NOK was possible. Fourteen projects received funding. In total, 24 iEarth Seed Projects have been supported, all working with projects in education development.

Figure 3. The director of the Avalanche section in NVE, Aart Verhage, shows mitigation measures in Jølster constructed after the summer flash flood in 2019 during the excursion part of the shared geohazards course. Here both students from UiB and UiO took part in the same field trip. This course was developed using seed project money from iEarth.

iEarth GeoLearning Forum – a national meeting place for Earth Science teaching and learning

The 5th iEarth GeoLearning Forum, held in Bergen on November 7-8, 2022, was the primary national meeting event of the year, and the event was attended by 120 participants. Students played an active role in the planning and execution of the conference. They delivered presentations, led workshops, and took responsibility for various tasks. The 2022 GeoLearning Forum focused on workshops and two keynote plenary talks. Prof. Catherine Bovill presented "From evidence to practice with co-creation and partnership," while Assoc. Prof. Robert Kordts spoke on "Leading yourself: Self-regulated learning and study success." The workshops and sharing sessions at the GeoLearning Forum encouraged active participation from all attendees, who contributed to shaping the future of Earth Science education. These sessions emphasised hands-on co-creation, competence portfolios, numerous roundtable discussions, and downtown Bergen mini excursions. Additionally, the poster session allowed the iEarth Seed Projects to present, share, and discuss their findings.

Figure 4. Opening of the 5th GeoLearning Forum in Bergen in November 2022. This has become a very important showground for sharing in the iEarth consortium. This year we had several workshops and keynote talks on co-creation and self-reflective learning.

The Education Research Group in Earth Science in Norway

The iEarth Education Research Group (ERG) hit the ground running in 2021. ERG is open to anyone within and beyond iEarth. However, the doctoral candidates and the post-doctoral fellow constitute the group's core. ERG also includes the iEarth adjunct professors, several doctoral candidates' supervision team members, and other iEarth staff. The ERG is involved in geo-educational research-related activities that bridge the geo-education research interests of individuals within the iEarth partner

institutions. To some degree, ERG supports the wider iEarth community with resources, activities, presentations, and ideas.

Figure 5. Members of the Educational Research group in iEarth at stage under the annual GeoLearning Forum in Bergen. Here they presented their research projects to the rest of the consortium. Running this research group as a virtual group with members located at the different host institutions is challenging, and therefore, we would like to spend more funds to give them the possibility to meet physically at least once a semester.

The 2022 ERG activities were organised by Anders Ahlberg, associate professor II at the Department of Geosciences, UiT The Arctic University of Norway, with support from the iEarth postdoctoral fellow Kirsty Dunnett at the Department of Geoscience, University of Oslo. From the start of 2021 up to the summer of 2022, ERG was open to anyone with a tentative iEarth-related research interest. After this initial "brain-storm mode", the focus was turned towards the work of the four doctoral candidates and the postdoctoral fellow that conducted the main core of research within iEarth. Participants present and discuss research plans, outcomes, and needs in the smaller ERG. However, each iEarth early-career researcher is locally supervised. ERG can therefore be seen as a compensatory network that connects early-career researchers who are otherwise at risk of being isolated in their iEarth partner institutions.

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 knowledge transfer between the classroom and the field. With FA4 based at UNIS, these aims are being addressed collaboratively with the bioCEED SFU, FieldPass, and digital learning environments in field-based geoscience teaching projects.

Document the present status of and monitor culture change in field teaching and learning

The two UNIS iEarth departments – Arctic Geology and Arctic Geophysics – saw ten iEarth Seed projects running during 2022, with seven directly addressing the objectives of Focus Area 4 with references to field learning, field teaching, and integration of digital field learning technologies. One iEarth Seed Funding event was held in 2022 to bring together new and existing iEarth projects at UNIS and to raise wider institution-wide awareness.

Rafael K. Horota, an iEarth PhD student, has continued to work on his main research topic, "How digital can geosciences field-based learning be? Perceptions over digital technologies in Norway's geoscience higher education".

Figure 6. Field activities on Svalbard at UNIS courses. UNIS and Mark Furze led the focus area 4, and they are leading the work with the development of digital tools, local field laboratories, teaching assistant courses and field and safety.

Rafael postponed the questionnaire-based survey to gather information on field-based learning in all the iEarth institutions for the beginning of 2023. His focus throughout 2022 has been collecting drone imagery data while assisting in course fieldwork for teaching and research expeditions. The material collected was integrated into the Svalbox database (http://svalbox.no/map) as planned in his iEarth seed project "There and Back Again: Svalbard edition", available for download through ZENODO and has been used to develop Virtual Field Guides.

An initiative to collect information on the state of field teaching practices at UNIS was developed during fall 2022 to be sent out to all course responsible in 2023. In lieu of a current leader for Focus Area 4, this initiative was developed by iEarth in the Arctic Geology department and by Lena Håkansson, an experienced field teacher and geology SoTL specialist hired temporarily to support UNIS iEarth. She did the evaluation named "Develop, test, and evaluate field teaching methods and outcomes", which will serve as a baseline survey to measure further progress in this focus area.

Building on the 2021 success of the joint iEarth-bioCEED field teaching assistant course for PhDs, masters, and postdocs, March 2022 saw the second delivery of this three-day course with participation from Mark Furze (UNIS iEarth Education Chair), Marius Jonassen (then iEarth FA4 Leader), and Ivar Nordmo (Assoc. Prof., Education Dept., UiB).

This 2022 delivery formed the basis of a successful iEarth Seed Fund application to develop the course into a five-day Field Teaching Academy as a joint project with UiB. Anticipated for initial roll-out in April 2023, the expanded course will deliver training in field pedagogics, leadership, group management, and planning to masters, PhDs, and postdoctoral fellows engaged in field teaching across UNIS and, later, UiB. The project includes participation from UNIS Geology, Biology, and Geophysics departments, UNIS Operations & Field Safety, The Arctic Safety Centre, and UiB Department of Earth science.

Further, collaborative work has been conducted with FieldPass (see below) at UNIS to explore the use of reflective diaries and formative assessment as effective teaching modalities, especially with reference to deepening student field learning. This included the experimental inclusion of reflective diaries in UNIS course AG-210 in 2021 and the implementation of reflective approaches to field note-taking in that course in 2022.

In UNIS course AG-209, reflections on student learning experience in a course committed to building good spatial understanding were carried out. This was a follow-up from surveys in 2018 and 2019, where student learning prior to field learning was monitored. In the systematic reflections from 2022,

information was collected on learning in the classroom, during field learning and during authentic research participation learning (term projects).

Test and document methods to improve field learning and improve field-classroom & classroom-field knowledge transfer

The initial 2022 development of Virtual Field Guides by PhD Rafael Horota was to be via the online Roundme platform. However, due to the major failures of Roundme during 2022, the platform went down and was unavailable such that Rafael was forced to develop his own web GIS platform. This solution, developed by Rafael as a critical field-to-classroom and classroom-to-field knowledge transfer tool, currently displays over 67 Arctic field locations available for Virtual Tours with 675 drones with 360° images. It is also being successfully integrated into the online Svalbox platform. This virtual platform is used for fieldwork preparations, field safety planning, and post-fieldwork activities at UNIS courses.

This entire material, along with other digital tools, has been changing the teaching culture in Arctic Geology and Arctic Geophysics departments at UNIS, extending the field component into the classroom. This is documented in Rafael's first PhD paper, "West Spitsbergen fold and thrust belt: A digital educational data package for teaching structural geology", in the Journal of Structural Geology.

The iEarth Seed Project iWALK on FROST, led by Daniel Kramer, and building on the previous FROST seed project, has created virtually walkable three-dimensional maps of key Arctic field teaching sites, integrating digital elevation models, photo-realistic textures, and 3D structures within multi-dimensional virtual reality gaming environment. These walkable VR maps provide virtual access to field sites, independent of season, light conditions, weather, and other factors typically limiting field accessibility in a more realistic and interactive fashion than conventional virtual field guides. Furthermore, walkable maps increase field safety by highlighting increased geohazards such as avalanche terrain.

To develop a framework for field skills certification

FA4 has followed closely and collaborated with the work of the UNIS FieldPass project, funded by the Olav Thon Foundation. This project seeks to develop and test field skills assessment and certification approaches at UNIS. FieldPass ends in 2023, and much of the results will be published, and some of the ongoing developmental work will be transferred to iEarth and bioCEED.

As part of the developmental work in 2022, courses in Arctic Geology and Arctic Geophysics (AG-210 The Quaternary & Glacial Geology of Svalbard; AGF-213 Polar Meteorology and Climate) were modified to include field skills assessment approaches as a prelude to field skills certification. AG-210, in particular, developed this approach in partnership with FieldPass with a framework for assessing field note acquisition and archiving. Further, this course also develops an assessed programme of independent student-planned and student-led short-field expeditions to develop project management and logistics skills in harsh environments.

The next stage, informed by FieldPass's results, will be to initiate a certification process for these field skills within AG-210 and to develop a procedure for evaluating its success. Based on these results, a framework for this approach will be codified and made available through iEarth whilst being shared with courses throughout the consortium. Integrating field skills assessment and certification across multiple courses will be a major challenge, especially given the traditional inertia, of course, outlines and assessment approaches.

To establish local field-teaching laboratories

In April 2022, UNIS hosted a joint bioCEED-iEarth workshop on local field-teaching laboratories as part of the larger Leading Educational Change course. This half-day workshop attended by iEarth and bioCEED members from across the consortia institutions initiated thinking on local field-teaching

laboratories and permitted the development of an initial theoretical, pedagogical framework for developing such systems.

Lena Håkansson (Lund University) was contracted to further develop these ideas as a white paper – exploring the educational basis for local field-teaching laboratories. This document establishes basic definitions and concepts and formulates the fundamental approaches for developing and implementing local field-teaching laboratories.

Focus area 5 – Alumni and outreach

Maintaining contact with students after graduation is vital to enhance the work-life relevance of Earth Science education. Designing methods and piloting and testing methods for educational networking with the market and society are among the goals of this focus area.

In 2022 the national GeoIntern project piloted the first national run of the GeoIntern course in Bergen, Oslo and Tromsø. In total, 25 students participated in this course. They undertook internships within various companies and organisations (Fig. 7). Students who undertook internships this year also reported on their experiences through blog posts available through Studentblogger | UiT.

Figure 77. Logos from all companies involved in the UiT, UiO, UiB and UNIS internship courses.

The GeoIntern course curriculum was developed and tested during its initial run in Tromsø in 2021 and has since been adapted to suit each individual campus. It includes a comprehensive mapping of competencies as a foundation for understanding one's own skills as a newly educated geoscientist and an overview of the geoscientist employment market. The course also offers training in essential transferable skills, such as communication, teamwork, reflection, networking, and social media management. Continuous feedback from both students and teachers has been utilised to refine and optimise the learning quality across all aspects of the course. The course concludes by introducing students to innovation and entrepreneurship. To ensure high-quality learning experiences across all course components, each part of the course has undergone rigorous quality control measures, including detailed mapping and feedback forms from both students and teachers. Throughout their internship, students have received follow-up support from the GeoIntern team through digital and physical meetings. In addition, companies hosting students have been interviewed during the internship period to facilitate desired changes. Emphasis has been placed on reflection upon the internship periods, as they provide learning opportunities in an authentic environment outside academia that cannot be

controlled. In June, the project presented a paper titled "Internships The Black Box of Higher Disciplinary Education" at the European SoTL conference in Manchester, collaborating with the SamPraksis project from the BFE Institute at UiT.

The feedback from students and employers throughout the first national run of the GeoIntern project was overwhelmingly positive. Students and employers love the idea and the possibility of GeoIntern. Exploring work-life relevance and performing hands-on work training in geo-related businesses and organisations has been a long-time desire in the geoscience society.

Institutions' managements have all been challenged in continuing the project's goals after external funding ends in 2023. And the project has, according to the long-term goals, tested new methods and developed long-term systems to increase work-life relevance in higher education in geoscience.

Throughout the year, two industry mentors Katrine Godtliebsen from Equinor and Berit Berbusmel from Skaland Graphite, have been awarded and affiliated with the GeoIntern project. They have provided vital how-to in communication with business partners and feedback on processes related to business partners. Communicating academic content and processes with business partners calls for a change in the language of communication, and the industry mentors have, in addition to other things, provided just this.

The project gathered 76 participants in October for the second GeoIntern annual project conference. The conference was held in Tromsø and UiT at the new facilities of the Department of Geosciences. The program allowed for an insight into students, educators and business perspectives, as well as important discussions around the importance and future of projects to increase work-life relevance in higher education in geoscience. The conference was very popular among students, and over 50 students from all partner institutions participated. For next year, the final year of the HK-Dir financed GeoIntern project, more business partners and academic staff should be involved in the conference to provide ownership and collegial growth in the field of work-life relevance in disciplinary sciences in academia.

In late 2022, the GeoIntern International at UiT was funded from the HK-Dir "Utforsk" portfolio. This extension aims to establish international internships for geoscience students across eight countries identified by the panorama strategy, namely China, Japan, South Korea, Brazil, South Africa, Canada, the USA, and India. From 2023 to 2026, we aim to facilitate student exchanges between these countries and Norway, allowing them to undertake international internships with affiliated business partners and universities in geoscience.

The UNIS Arctic Geology (AG) Alumni Club has developed a web-based GIS platform for collecting information on the current whereabouts, workplace, topic area of interest, and expertise of its alumni. The aim is to establish an alumni network that facilitates learning about future career paths for current students, fosters connections among past students and companies with UNIS alumni, and assists in the recruitment of employees or interns or communication of employment opportunities. The data is gathered through an online member form, generating a spreadsheet, which is transformed into coordinates using a Python script, thus allowing locations to be displayed on a map. The AG Alumni members are dispersed across Norway, the Nordic countries, Europe, and the rest of the world, comprising a unique network of students and professionals who have received field learning as an essential part of their education. This database also enables the study of how the field learning component has impacted the future careers and skill sets of the alumni. The AG Alumni Club has nearly 200 registered members and over 400 followers on social media. While the alumni club was only present on social media in 2022, a dedicated website is expected to be launched in March 2023. This website will showcase the alumni map and act as a point of contact for interested companies.

2. Dissemination of knowledge and practices

The dissemination strategy we are presently implementing was expanded in the 2020 action plan and revised in a strategy meeting in 2022. It is based on a three-step development plan, depicted in Figure 8, which centres around dissemination for the purposes of awareness, understanding, and action. Moreover, we have directed our focus towards three distinct areas, specifically: (1) local dissemination - the propagation of knowledge and practices within our institutions; (2) internal dissemination - the sharing of knowledge and practices among our consortium partner institutions; and (3) external dissemination - the widespread propagation of knowledge and practices nationally and internationally. We use various dissemination methods to reach a wider audience, such as face-to-face interactions, social media, webinars, and writing publications in educational research journals. We are also engaging key stakeholders and influencers to help amplify the dissemination efforts, and we have successfully established a national arena for stakeholders (Geopraksisdagen). We have now focused on continuous monitoring and evaluating the effectiveness of the dissemination strategy and making necessary adjustments based on feedback and data.

2.1 Local dissemination

During the two first years 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. After some discussions, we decided to start paying the leader of the national student chapter.

We conducted internal teaching staff meetings at the consortium institutions to engage staff locally. These meetings have different formats at different institutions. At UiB, we have two hours of teaching free time every Thursday, where we discuss different aspects of our curriculum, such as course re-designing, learning goals, and assessment forms. Other institutions have teachers' breakfasts and faculty meetings (see Appendix 7). These meetings aim to share research-supported practices and develop collegial attitudes to teaching and learning activities.

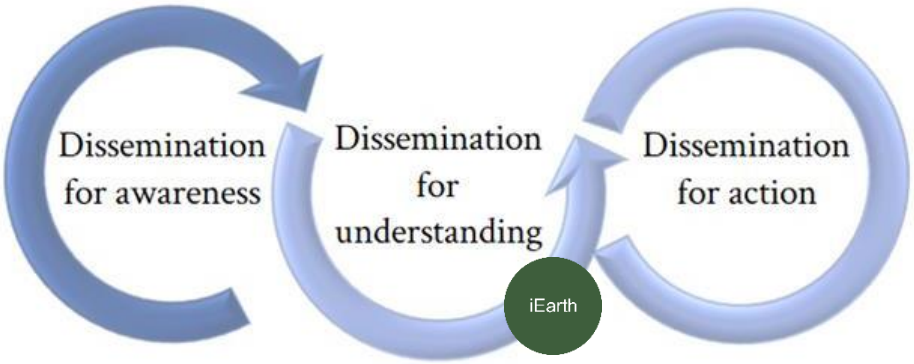


Figure 8. This is an illustration of our dissemination strategy. We are currently in the second phase (marked by the green iEarth logo), focusing on dissemination for understanding. This includes active participation in departments' internal educational development through the program boards.

2.2 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 hosted workshops for students and staff (Appendix 2 and 3).

2.3 External Dissemination

One initiative we use to disseminate best practise is the iEarth Digital learning forum. Here we invite all 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. In 2022 we had a reduced number of events as we prioritised physical meetings and face-to-face dissemination after the COVID-19 restrictions. The GeoLearning Forum conference was held at Scandic Ørnen Hotel in Bergen in early November 2022. The iEarth consortium targeted several conferences in 2022. We hope to improve this aspect in 2023, particularly as the PhD students commence their projects and are ready to submit abstracts and discuss their projects with the international community.

Projects that received iEarth internal funding 2022: "Seed Projects"

Spring 2022: 10 Seed Projects

- **Kirsty Dunnett and Anders Mattias Lundmark, UiO** – *Multiple perspectives in researching a troublesome topic and designing an intervention: a pilot*
- **Mark Furze, UNIS** – *Field Teaching Assistant Academy*
- **Elena V. Brattebø, UiB** – *iEarth student organization UiB GEO*
- **Mirjam Glessmer and Kirsty Dunnett, UiB and UiO** – *Amplifying student voices on teaching and learning*
- **Noora Partamies, UNIS** - *Student involvement in field-teaching preparations*
- **Mirjam Glessmer and Sehoya Cotner, UiB** – *Cultivating a sense of belonging in introductory Geosciences*
- **Sven Le Moine Bauer, UiB** - *Linking lab experiments and computational learning to foster systems thinking*
- **Grace Shepard, UiO** - *Source to Ink (s-Ink)*
- **Stein-Erik Lauritzen, UiB –** *Karst geology – the Norwegian version*
- **Guro L. Andersen and Mattias Lundmark, UiO** - *Students and staff course co-development*

Fall 2022: 14 Seed Projects

- **Ben Robson, UiB** - *Collaborating nationally on GIS and Remote Sensing teaching*
- **Emili Rønning, UiB** - *Supporting students's Sense of Belonging in iEarth*
- **Ander Mattias Lundmark, UiO** - *Exploring SAP in 4th generation SFUs*
- **Robert Kordts, UiB** - *Active learning in the Geoscience curriculum (ALIGC)*
- **Kirsty Dunnet and Kristian B. Bakken, UiO** - *iEarth Journal Club 2023*
- **Jean-Baptiste Koehl, UiO** - *Structural Geology by Students and Society: involving university students and non-scientists in structural field research in Norway (SGSS)*
- **Andreas Born, UiB** - *Workshop: Combine field-based and in-class activities in glaciology*
- **Nele Meckler, UiB** - *Future-proofing bachelor course GEOV110*
- **Kim Senger, UNIS** - *Svalbox4iEarth*
- **Sara M. Cohen, UNIS** - *GEO-Mod: A new way og teaching geoscientific methods to students and staff*
- **Henning Åkesson, UiO** - *Earth3D: 3D printing for learning Earth System Science*
- **Majken Borgersen, UiB** - *iEarth student organization GEO UiB*
- **Truls Aaby, UiT** - *iEarth student organization UiT*
- **Janika Sander, UNIS** - *iEarth student organization UNIS*

3. Further progress

We had a strategy meeting in Tromsø in February 2023 to discuss further progress in iEarth. In 2020 we submitted an action plan for five years that we slightly revised in 2022. However, we suggest some changes and a slightly shifted direction for some areas. An innovation project such as iEarth needs to be able to revise the action plan accordingly. In the following section, we outline the road ahead of us.

One important goal in 2023 for iEarth is to be more active and visible in teaching and learning conferences in Norway and beyond. We want to establish an educational research session at the Nordic and Norwegian geological winter meetings (network coordinator Thomas Thuesen was elected as a board member of the Geological Society of Norway). This forum is an excellent arena for sharing practice from iEarth with colleagues outside the consortium. We also intend to participate in conferences such as ISSOTL and EUROSoTL in the coming year. In June 2023, students and staff members from iEarth will participate the University of Edinburgh Learning and Teaching Conference with colleagues in Scotland at the University of Edinburgh.

In FA1, future development will involve hiring professional software systems developers and deploying the digital twin in teacher teams engaged in collaborative curriculum design. The software solution mitigates any such risks through strict adherence to GDPR regulations, with fine-grained access permissions that vary between user roles. The CAS theoretical framework and the digital twin innovation have been written in a manuscript that will be submitted to a suitable journal in the spring of 2023.

Further progress in FA2 will focus on expanding our activities with students as partners. We are working on a new way of organising the activities from the teachers to the students. We are therefore working on reorganising the focus area, «The student's learning environment", to reflect this collaborative aspect better. We don't have the answer to this effort, but we will conclude this during the Spring of 2023.

In FA3, we want to continue the positive work on shared courses across the consortium. Developing and running national iEarth courses 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 (already module based at UiB), geochronology, SDG course on climate action and introduction to Earth system science. Courses will be expected to use active learning strategies and cover the various methods and approaches that make up modern geosciences, including laboratory and desk (computer)-based methods and traditional fieldwork. Further, we would like to arrange regular local meetings with internal projects/seed project holders, workshops/seminars for staff about cultural change, and we are planning a shared iEarth workshop on how to make a teaching portfolio (with adjunct professor Anders Ahlberg).

In FA4, we aim for a better use of the resources spent on field learning in earth science education by establishing local field laboratories at 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. Further goals are establishing a national TA course. 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.

Further progress in FA5 will be establishing a national workshop/meeting for all industry partners and stakeholders that is sustained without any external funding. The evaluation and the experience after the *internship* kick-off meeting and the conference in Tromsø in the fall of 2022 point 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 industries 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 running at UiT, UiB and UiO will be implemented as a standalone course at UNIS over the next few years. At UNIS, there is a GIS-based alumni database, a concept we are looking into implementing in the rest of the consortium.

One topic already 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, so we will continue to pursue this topic in 2023. We will use SDG as the main topic for the GeoLearning forum in the fall of 2023.

4. Appendices

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

Appendix 1: iEarth Digital Learning Forum

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: Awards

Appendix 12: Accounting

Appendix 1: iEarth Digital Learning Forum (iEDLF)

iEDLF 2022				
#	Date	Presenter	Title/Theme	Attendees
1	03.02.22	Anne-Katrine Faber, Atle Rotevatn, Mattias Lundmark	Teaching in a digital world	38
2	29.03.22	Dr. Jason Davies	Connecting the Curriculum and changemaking: lessons learned at UCL.	17
3	31.03.22	Rolv M. Dahl and Terje Solbakk	NGU - The Norwegian geosite database: An educational resource for field course planning and documentation	9
4	28.04.22	Mathilde B. Sørensen	Cooperation in teaching across institutions: Developing a national course on geohazards	24
5	20.10.22	Rie Hjørnegaard Malm	Student learning and fieldwork culture in higher education Earth Science	15

Appendix 2: Overview of iEarth Workshops

iEarth workshops 2022				
#	Date	Organized by	Topic	Attendees
1	24.03.2022	Kirsty Dunnett	Troublesome knowledge part 1	10
2	30.03.2022	Anders Schomacker	Improving the teaching culture at IG	15
3	31.03.2022	Kirsty Dunnett	Troublesome knowledge part 2	10
4	19-22.04.2022	Mark Furze	iEarth-bioCEED Field Learning	20
5	25.04.2022	Kirsty Dunnett	Teaching and learning in geosciences	15
6	26.04.2022	Kirsty Dunnett	Educational change	5
7	27.04.2022	Søren Tvingsholm and Mattias Lundmark	Course representative workshop	12
8	02.05.2022	Kirsty Dunnett	Troublesome knowledge part 3	7
9	10.06.2022	Iver Martens, Anders Schomacker	MSc program in geology	15
10	22.06.2022	Ymke Lathouwers, Rafael Horota	51st International Arctic workshop Student Digital Photogrammetry	8
11	11.10.2022	Susan Kaspari	Integrating sustainability into the curriculum	13
12	17.10.2022	Bjarte Hannisdal	Competence portfolios for students	14
13	25-27.10.2022	Steve Coulson, Tina Dahl, Mark Furze	Annual UNIS Learning Forum (including workshops on sustainability and local field teaching labs)	60
14	18.11.2022	Anders Schomacker	Improving the teaching culture at IG	15
15	23.11.2022	Kirsty Dunnett	Getting to know students	9

Appendix 3: iEarth Student meetings, activities and seminars

Meetings and activities student organization 2022				
#	Date	Organized by	Activity	Chapter
1	20.01.22	Lovisa, Emilie, Vidar, Eline, Truls	Semester planning	UiT
2	24.01.22	Sverre	Semester planning	UiO
2	26.01.22	Guro Lilledal Andersen	National student meeting	UiB, UiO, UiT, UNIS
4	02.02.22	Sverre	Student meeting	UiO
5	03.02.22	Lovisa Hansson, Solveig Kavli	Structure and citations in academic writing workshop	UiT
6	10.02.22	Lovisa Hansson	Planning the career day	UiT
7	16.02.22	Elena V. Brattebø	GeOracle	UiB
8	16.02.22	Vidar, Truls, Lovisa, Eline	GeOracle	UiT
9	21.02.22	Lovisa Hansson	Teambuilding	UiT
10	23.02.22	Lovisa Hansson	GeOracle	UiT
11	02.03.22	Elena V. Brattebø	GeOracle	UiB
12	02.03.22	Lovisa Hansson	GeOracle	UIT
13	04.03.22	Lovisa	Planning the career day	UiT
13	07.03.22	Sverre	GeOracle	UiO
14	09.03.22	Lovisa Hansson, Solveig Kavli	Good searches for research questions writing workshop	UiT
15	16.03.22	Elena V. Brattebø	GeOracle	UiT
16	16.03.22	Lovisa, Eline, Truls, Vidar og Emilie	Planning the career day	UiT
17	18.03.22	Lovisa, Eline	Planning the career day	UiT
18	22.03.22	Elena V. Brattebø	GeOracle	UiT
19	30.03.22	Elena V. Brattebø	GeOracle	UiB
20	21.04.22	Sina Hennig	Fys-Mek med Sina	UiO
21	26.04.22	UiT students	iEarth Career Day	UiT
22	28.04.22	Sina Hennig	Fys-Mek med Sina	UiO
23	05.05.22	Sina Hennig	Fys-Mek med Sina	UiO
24	12.05.22	Sina Hennig	Fys-Mek med Sina	UiO
25	19.05.22	Sina Hennig	Fys-Mek med Sina	UiO
26	19.05.22	UiB students	iEarth Career Day	UiB
27	20.05.22	UiT students	Social activity	UiT
28	02.06.22	Sina Hennig	Fys-Mek med Sina	UiO
29	23.08.22		Planning the Fall semester	UiT
30	06.09.22		Quiz	UiB
31	10.10.22		Status meeting	UiT
32	19.10.22	GeOrakel	GeOrakel	UiB
33	20.10.22	GeOrakel	GeOrakel	UiT
34	07.11.22		Geo Learning Forum 2022	UiT, UiB, UiO
35	17.11.22	GeOrakel	GeOrakel	UiT
36	23.11.22	Exam GeOracle	GeOrakel	UiB
37	30.11.22		Afterwork Quiz	UiT
38	01.12.22	Exam GeOracle	GeOrakel	UiB
39	06.12.22	Exam GeOracle	GeOrakel	UiB
40	06.12.22		Social activity	UiT
41	07.12.22	Exam GeOracle	GeOrakel	UiB

Appendix 4: iEarth dissemination and outreach

iEarth Outreach 2022				
#	Date	Presenter	Title (Focus Area)	Presented at
1	04.01.22	Iver Martens, Johanne Lund	GeoIntern (FA5)	Høgskolen i Volda
2	25.01.22	Iver Martens	GeoIntern for industry (FA5)	Consto company presentation
3	07.02.22	Iver Martens	«Utdanningskvalitet i endring? Mellom realiteter og idealer» (FA5)	Resultat Utdanningskonferanse
4	04.03.22	Iver Martens	Praksis i nasjonalt faglig nettverk (FA5)	Nasjonalt faglig nettverk for praksis i disiplinfag
5	21.03.22	Kim Senger et al.,	Svalbox: digitizing and integrating Svalbards geoscientific record (FA4)	Conference paper. Second EAGE Digitalization Conference and Exhibition, Mar 2022, Volume 2022, p.1 - 5.
6	22.03.22	Bjarte Hannisdal	Test of curriculum digital twin prototype and focus group (FA1)	Media city, Bergen
7	27.04.22	Iver Martens, Johanne Lund	GeoIntern (FA5)	Prosjektpresentasjon for NTNU Geovitenskapsavdeling
8	28.04.22	Iver Martens	GeoIntern (FA5)	Equinor Stjørdal
9	11.05.22	Henk Keers, Elise Myhren Stordahl, Bjørn Nyberg, Karen Mair	Geoscience Education and Technology - Results from Two Worldwide Surveys (FA2)	Conference presentation NGWM22 Reykjavik
10	11.05.22	Rie Malm, Lena Håkansson	Fieldwork culture in Higher Education Geology (FA4)	Conference presentation NGWM22 Reykjavík
11	11.05.22	Elena V. Brattebø, Maja Lian Jæger, Vilhelm Nyby, Thilde Justine Voje	How can student involvement enhance geoscience higher education? (FA2)	Conference presentation NGWM22 Reykjavík
12	11.05.22	Lena Håkansson, Jennie Lundqvist	Troublesome knowledge and signature pedagogies in geosciences - a possibility to re-focus teaching and learning (FA1, FA2)	Conference presentation NGWM22 Reykjavík
13	11.05.22	Søren B. Tvingsholm, Mattias Lundmark	Student and staff collaboration for education development - course representatives for the 21st century (FA5)	Conference presentation NGWM22 Reykjavík
14	11.05.22	Iver Martens, Johanne Lund, Kristian Bakken, Thea Krossøy	GeoIntern- Work Life relevance in Geoscience education (FA5)	Poster presentation NGWM22 Reykjavík

15	11.05.22	Thea Krossøy, Jostein Bakke	Education for Earth's future. iEarth is the Centre for Integrated Earth Science Education (FA1, FA2, FA3, FA4, FA5)	Conference presentation NGWM22 Reykjavík
16	16.06.22	Iver Martens og Bjørn Petter Finstad	«Internships in academia – challenges and opportunities for practical orientation in (FA5)	EuroSoTL conference Manchester, UK
17	17.06.22	Dario Blumenschein, Bjarte Hannisdal, Kristian A. Haaga	Towards collaborative educational development: A new framework for curriculum co-creation. (FA1)	EuroSoTL Conference, Manchester, UK
18	18.08.22	Lundmark, Anders Mattias.	Geoscience education for the future -" A Norwegian perspective on disciplinary and multidisciplinary study programs in higher education" (FA2)	Invited talk; Geologiska Föreningen 150 years anniversary meeting
19	13.09.22	Lundmark, Anders Mattias.	Studenter bygger bedre emner! (FA2)	REAL frokost student presentasjon
20	29.10.22	Iver Martens og Bjørn Petter Finstad	Kvalitet i praksis, erfaringer fra to prosjekt i Arbeidsrelevansporteføljen	HK-Dir arb porteføljen Prosjektkonferanse Bergen
21	05.10.22	Iver Martens	Work life relevance in higher Science education, GeoIntern	Bridget Erasmus Plus summerschool Santorini Greece.
22	13.10.22	Iver Martens	GeoPraksis- statusoppdatering	GeoPraksis Årskonferanse 2022, Tromsø
23	13.10.22	Lundmark, Anders Mattias.	Student-staff partnership - et perspektivskifte i undervisningen	Universitetsbibliotekets Delingsseminar 2022
24	21.10.22	Iver Martens	GeoPraksis- et prosjekt for å øke arbeidsrelevans i høyere utdanning	Digital presentasjon for KONNEKT-akademia-prosjektmøte
25	31.10.22	Bjarte Hannisdal	iEarth Centre for Excellence in Education	Nansen Legacy Recruit Forum
26	16.11.22	Iver Martens	"GeoIntern, lessons learned from implementing internships in Geoscience education"	PermaIntern UArctic Nettverk, København.
27	16.11.22	Bjarte Hannisdal	New digital infrastructure for integrating learning design and curriculum mapping	Aarhus webinar organized by "Dansk Universitetspædagogisk Netværk"
28	07.12.22	Bjarte Hannisdal	iEarth Centre for Excellence in Education	Studiekvalitetsseminaret, UiB
29	12.12.22	Iver Martens	GeoPraksis, kvalitet i praksis.	Digital learning forum for arbeidspakkeledere iEarth SFU.
30	15.12.22	Iver Martens	"GeoIntern, lessons learned from implementing internships in Geoscience education"	Foredrag for Geological institute, Bicocca University Milano.

Appendix 5: iEarth Research Group (ERG) activities

ERG webinar and activities			
#	Date	Webinars	Journal Clubs
1	11.01.22	Urban Eriksson: On Social semiotics in science education – "Traversing the powers of 10"	
	15.02.22		"Does Active Learning really work?"
2	04.02.22	Torgny Roxå: Understanding Learning and Teaching Development Cultures	
3	02.03.22	Jan Alexis Nielsen: Assessment, societal issues as drivers/cases in teaching, competence-oriented teaching, and other educational research topics	
4	15.03.22		"Active learning may not feel like learning"
5	04.04.22	Jostein Bakke: What is bad and what is good outreach?	
6	27.04.22	Catherine Boville & Mattias Lundmark: Students as partners in: learning and teaching; curriculum design; assessment; broader ways of working.	
7	06.05.22		"Asking students to think, not follow"
8	01.06.22	Urban Eriksson: on students struggle in moving between patio-temporal scales	
9	07.06.22		'What does 'Active Learning' mean?'
10	21.06.22	Bjarte Hannisdal: Ongoing project on program design/mapping (graph database)	
11	11.08.22		" An Ecological Belonging Intervention "
12	28.09.22		"Engaging Students to Learn Through the Affective Domain"
13	02.11.22		"The messy teaching conversation"
14	08.11.22-09.11.22	GeoLearning Forum 2022, Physical meeting: ERG needs a discussion	
15	08.12.22		'Going solo: students' strategies for coping with an independent GIS project'

Appendix 6: iEarth publications

iEarth Publications 2022				
#	Month	Focus Area	Authors	Reference
1	February	FA2	Kim Svensson, Jennie Lundquist, Esmeralda Campos, Urban Eriksson	Active and passive transductions - definitions and implications for learning. Kim Svensson et al., 2022 Eur. J. Phys. 43 025705. https://doi.org/10.1088/1361-6404/ac3493
2	March	FA2	Kim Senger, Peter Betlem, Tom Birchall, Luiz Gonzaga Jr, Sten-Andreas Grundvåg, Rafael Kenji Horota, Andreas Laake, Lilith Kuckero, Atle Mørk, Sverre Planke, Nil Rodes, Aleksandra Smyrak-Sikora	Senger et. al (2022). Digitising Svalbard's geology: the Festningen digital outcrop model. First Break, Volume 40, Issue 3, Mar 2022, p. 47 – 55. https://doi.org/10.3997/1365-2397.fb2022021
3	June	FA2	Jennie Lundqvist, Kim Svensson, Karl Ljung, Urban Eriksson, Moa Eriksson	Lundqvist, J., Svensson, K., Ljung, K., Eriksson, U., & Eriksson, M. (2021). A Phenomenographic Analysis Of Students' Experience Of Geological Time. Journal of Astronomy & Earth Sciences Education (JAESE), 8(1), 1–26. https://doi.org/10.19030/jaese.v8i1.10388
4	August	FA2	Kirsty Dunnett	Dunnett, Kirsty (2022). Understanding the nature of students' experience of pre-university practical work in physics. European Journal of Physics. ISSN 0143-0807. 43(5). https://doi.org/10.1088/1361-6404/ac7e88

Appendix 7: Other relevant activities in iEarth

iEarth other activities 2022				
#	Date	Author/ presenter	Topic	Type of media
1	Autmumn 2021 – Spring 2022	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	Leading educational change - through SoTL (5 ECTS) course with bioCEED and iEarth	mitt.uib.no
2	31.01.22	Tina Dahl, Steve Coulson	Common assessment rubrics across subjects at GFI	Meeting
3	15.02.22	Kirsty Dunnett	iEarth Journal Club "Does Active Learning really work?"	Journal club
4	15.02.22	Mark Furze	UNIS iEarth Seed Fund Projects Event. Talks and workshop with current and new iEarth Seed Project Fund holders	Workshop
5	07.03.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
6	15.03.22	Kirsty Dunnett	iEarth Journal Club "Active learning may not feel like learning"	Journal club
7	08.04.22	Mark Furze, Maria Jensen	iEarth Departmental Planning Meeting	Meeting
8	02.05.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
9	05.05.22	Mark Furze, Maria Jensen	iEarth Departmental Planning Meeting	
10	13.05.22	Kirsty Dunnett	iEarth Journal Club "Asking students to think, not follow"	Journal club
11	30.05.22	Mattias Lundmark and Karianne Lilleøren	Inspiration for students as partners work	Meeting

12	31.05.22 - 01.06.22	Mattias Lundmark, Karianne Lilleøren, Kirsty Dunnett, Kristian B Bakken	iEarth internal UiO planning seminar	Seminar
13	02.06.22		GFI teacher's breakfast. K. Daae presenting use of co-creation and rubrics for assessments.	Teacher breakfast
14	07.06.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
15	07.06.22	Kirsty Dunnett	iEarth Journal Club 'What does 'Active Learning' mean?'	Journal club
16	01.08.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
17	08.08.22		iEarth + bioCEED workshop on belonging	Workshop
18	09.08.22	Sarah Hammerlund	Research on belonging from the US, and baseline results from surveys at UiB	Survey
19	11.08.22	Kirsty Dunnett	iEarth Journal Club " An Ecological Belonging Intervention "	Journal club
20	22.09.22	Anja Møgelvang	Ways of using cooperative learning in your classroom. We tried out a few activities and also discussed the benefits of using such learning activities	
21	22.09.22	Mark Furze, Maria Jensen	iEarth Departmental Planning Meeting	Meeting
22	28.09.22	Kirsty Dunnett	iEarth Journal Club "Engaging Students to Learn Through the Affective Domain"	Journal club
23	28.09.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
24	02.11.22	Kirsty Dunnett	iEarth Journal Club "The messy teaching conversation"	Journal club

25	07.11.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
27	11.11.22	Kjersti Daae	Common assessment rubrics across subjects at GFI	
29	05.12.22	Tina Dahl, Steve Coulson, Mark Furze	UNIS BioCEED-iEarth Synergy Meeting	Meeting
30	08.12.22	Kirsty Dunnett	iEarth Journal Club 'Going solo: students' strategies for coping with an independent GIS project'	Journal club

Appendix 8: Overview of iEarth external funding

Externally funded projects 2022				
#	Corresponding author	Project title	Funding resource	Amount granted
1	Iver Martens	GeoIntern international *UTF-2021/10176*	HK-Dir “Utforsk” portfolio	3 598 470 NOK

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 and leader for the national research infrastructure EARTHLAB. When iEarth became a SFU in 2020, he became the director for the iEarth consortium.

Network Coordinator: Thomas Hagen Thuesen, UiB
Thomas Hagen Thuesen started as the Network Coordinator for iEarth in October 2022. He has a background in sedimentology and Quaternary geology from the Department of Earth Science at UiB.

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 2. 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 3. He is a professor at the Department of Geosciences at UiT. His research focuses on Quaternary sciences, paleoclimatology, and glacial sediments, processes, and geomorphology.

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 GeoIntern initiative.

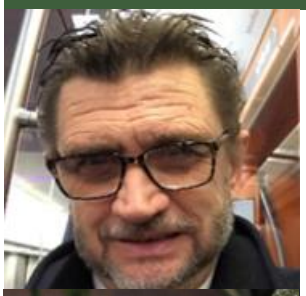
Jan Magne Cederstrøm, UiB

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

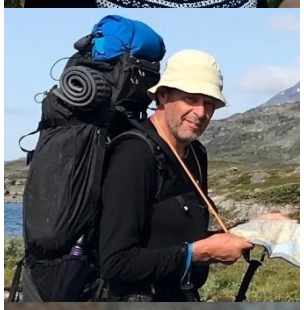
Karen is one of the iEarth coordinators. She is Senior Executive Officer at the Department of Earth Science, contributing to iEarth management and particularly the GeoIntern course at UiB.

iEarth Research Group 2022



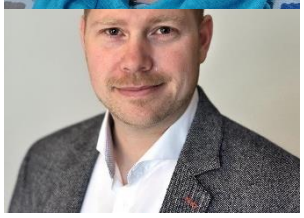
Anders Ahlberg (Leader), UiT and Lund University
Anders is a senior lecturer at Lund University and adjunct associate professor at UiT The Arctic University of Norway. His early career was devoted to geoscience teaching and research before it turned to educational development in the STEM disciplines. 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. Torgny retired in the fall 2022 and he will be replaced with a new adjunct professor during the Spring 2023.

Catherine Bovill, University of Edinburgh
Senior Lecturer in Student Engagement, Institute for Academic Development. Her contract is now extended unitl 2024.



Jan Alexis Nielsen, University of Copenhagen
Head of Department, Department of Science Education. His contract ended in the fall of 2022, and he is about to be replaced in early 2023.

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.

Jarle Børve Sleire, UiB
PhD candidate, GEO-UiB.

Gerald Leo Decelles III , UiO
PhD candidate, GFI-UiB.

iEarth Board

Thomas Hagen Thuesen
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

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

Guro Lilledal Andersen
Student Representative, National Student Coordinator, UiO

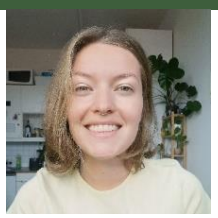
Student Organization

Guro Lilledal Andersen
National Student Coordinator, UiO

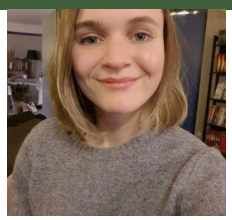
UiO Student Chapter

Sverre Johansen
Student Coordinator

Kjersti Stangeland
SoMe responsible

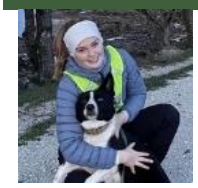


Sina Henning
GeOracle



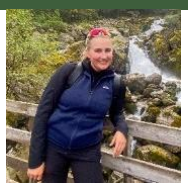
Gjøri Nisja
PR

UiB Student Chapter



Elena Victoria Brattebø
GEO Student Coordinator.

Sverre Soldal
Academic Liaison



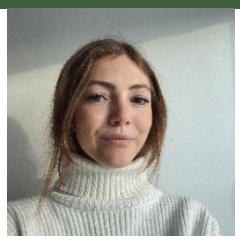
Maja Lian Jæger
GeOracle

Thilde J. T. Voje
GeOracle

Sander Løklingholm
GFI Student Coordinator

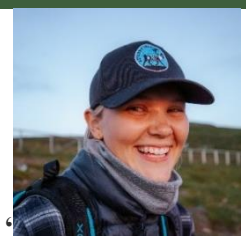
Tora H. Myklebust, Lars M. Rainer, Vilhelm Nyby, Kristel Kaselaan, Søren B. Tvingsholm

UiT Student Chapter



Lovisa Hansson
Student Coordinator

Truls Aaby
Economy responsible



Eline Nemeth Lunde
Student contact

Vidar Nygård
GeOracle

UNIS Student Chapter

Ymke Zoë Lathouwers
Student Coordinator

Florina Roana Schalamon

Tereza Mosociová

Appendix 10: Overview of iEarth core group meetings

iEarth Core Group Meetings			
#	Date	Type of meeting	Attendees
1	10.01.22	Status meeting - Startup meeting	12
2	17.01.22	Status meeting	13
3	24.01.22	Status meeting	10
4	31.01.22	Status meeting	13
5	07.02.22	Topic Meeting - FA5 - Sehoya Cotner	19
6	17.02.22	Topic Meeting - FA5 - Sehoya Cotner	
7	28.02.22	Status meeting	12
8	07.03.22	Topic Meeting - FA2 - Mattias Lundmark and Kjersti Daae	21
9	14.03.22	Status meeting	10
10	21.03.22	Status meeting	10
11	28.03.22	Status meeting	12
12	04.04.22	Topic Meeting - FA3 - Anders Schomacker	15
13	19.04.22	Strategy meeting iEarth and bioCEED	
14	25.04.22	Status meeting	10
15	02.05.22	Status meeting	10
16	16.05.22	Status meeting	10
17	23.05.22	Topic Meeting - FA4 - Mark Furze	20
18	13.06.22	Topic Meeting - FA1 - Bjarte Hannisdal	23
19	15.08.22	Status meeting	12
20	05.09.22	Topic Meeting - FA1 - Bjarte Hannisdal	15
21	03.10.22	Topic Meeting - FA2 - Mattias Lundmark	12
22	31.10.22	Topic Meeting - FA3 - Anders Schomacker	13
23	28.11.22	Topic Meeting - FA4 - Lena Håkansson	20
24	05.12.22	Statusmøte	10
25	12.12.22	Topic Meeting - FA5 - Iver Martens	17
26	15.12.22	Leader group meeting	14

Appendix 11: Awards

Awards in association with iEarth				
#	Date	Recipient	Award	Read more
1	07.11.22	Karianne Staalesen Lilleøren, UiO	"Best lecturer" award at the Faculty of Mathematics and Natural Sciences, UiO	https://www.iearth.no/feed/iearth-ansatte-far-anerkjennelse-for-undervisning
2	01.12.22	Bjarte Hannisdal, GEO-UiB	*Ugleprisen*, UiB's internal award for quality in education, for the work done in the course GEOV114 – Geobiology	https://www.iearth.no/feed/iearth-ansatte-far-anerkjennelse-for-undervisning

Appendix 12: Accounting

Aktiviteter	Regnskap 2020	Regnskap 2021	Budsjett 2022	Regnskap 2022	Differanse-2022	Budsjett 2023	Budsjett 2024	Budsjett 2025	*Opprinnelig budsjett*	Korrigert budsjett	Forbruk i % av budsjett
06-Drift	44 799	299 023	350 000	381 096	-31 096	350 000	370 178	374 904	***1 820 000***	1 820 000	0,40
07-Webinar	334 608	468 271		0	0				***600 000***	802 879	1,00
08-Virtuelt kompetansesenter	0	62 500	50 000	77 787	-27 787	87 500	22 213		***250 000***	250 000	0,56
09-Retreats	104 688	499 116	552 432	552 432	0	296 196	300 000		***1 500 000***	1 752 432	0,66
10-Internships	0	0	0	0	0	350 000	75 000	25 000	***450 000***	450 000	0,00
11-Konferanse	0	0		0	0			300 000	***300 000***	300 000	0,00
Internprosjekter	324 234	945 292	1 405 924	1 034 886	371 038	1 347 050	1 531 578	187 226	***6 012 804***	5 370 266	0,43
PhD	0	3 110 295	5 260 000	3 914 353	1 345 647	5 439 705	4 052 000	2 887 647	***19 404 000***	19 404 000	0,36
Post doc	0	91 427	1 278 000	1 522 816	-244 816	1 317 000	1 356 000	904 757	***5 192 000***	5 192 000	0,31
Tekn	0	297 000	848 000	0	848 000	848 000	526 000		***1 671 000***	1 671 000	0,18
adm.	434 996	889 160	885 000	770 856	114 144	912 000	960 844	517 144	***4 485 000***	4 485 000	0,47
education chair	1 715 868	3 766 959	4 604 000	4 303 766	300 234	5 737 000	6 212 580	1 578 827	***23 315 000***	23 315 000	0,42
Proff II	520 755	1 614 291	1 224 000	1 434 521	-210 521	1 076 000	764 479	146 176	***5 556 222***	5 556 222	0,64
PI	379 661	1 013 814	912 000	526 832	385 168	939 000	967 000	792 693	***4 619 000***	4 619 000	0,42
Total kostnder	**3 859 609**	**13 057 149**	**15 952 650**	**14 519 346**	**2 850 010**	**18 699 451**	**17 137 872**	**7 714 374**	***75 175 026***	**74 987 800**	
Diku	2 810 323	8 241 136		7 416 050		7 200 000	7 500 000	2 570 336		36 000 000	
Egen	1 049 286	4 816 013		7 103 296		11 499 451	9 637 872	5 144 038		38 987 800	

In 2022, we funded 24 projects for 1 356 268 NOK (10 – Intern projects). For the spring call, we funded ten projects for 471 068 NOK. For the fall semester, we decided to increase the number of funds each project could apply for from 50 000 NOK to 150 000 NOK. During fall 2022, we funded 14 projects for 885 200 NOK. Many of the projects have been asking for an extension, which we have granted. Projects that have asked for the extension have not yet invoiced iEarth, and are not visible in the budget yet. However, we foresee that the allocated funding will be used within 2023.

The post-06-Drift is funding to cover travel expenses for everyone in the consortium, such as the educational research group, as well as the day-to-day expenses of the centre.

The post-09-Retreats section of the budget is specifically aimed towards the GeoLearning Forum (our annual conference) held in Bergen this year. With over 120 participants at the GeoLearning Forum and increased costs across the board for hotels and travel, we used more than anticipated. We will transfer money from the internal project post to cover these costs. We wanted to make this event as large as possible for the whole consortium, and with over 100 participants, we will use more than the foreseen budget in 2023 as well.

Through in-kind resources from iEarth institutions, we have created positions for five PhDs, five adjunct professors and one postdoc. In 2022 one PhD student left the position for personal reasons. The *Prof II* section of the budget shows some underspent resources, and that's because one of the adjunct professors retired in 2022, and we were delayed in hiring a new one.