INSTITUTT FOR GEOVITENSKAP
Department of Earth Science

GEOVITEN
-ekstern

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Geoviten-ekstern er Institutt for geovitenskap ved Universitetet i Bergen sitt eksterne nyhetsblad og utgis en gang pr. måned. Geoviten-ekstern kan også leses fra vår eksterne nettside: www.uib.no/geo
Gunn Mangerud, instituttleder

Geoviten-ekstern is the Department of Earth Science at the University of Bergen's external newsletter. It is issued once per month and can also be read from our webpages http://www.uib.no/geo/en
Gunn Mangerud, Head of department

Introduction

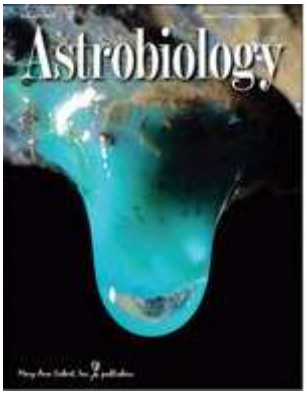
The last few weeks have indeed been brought news which will require many new geoscientists in the years to come: several new discoveries on the Norwegian Shelf, including the third largest discovery to date. Ratification of the boundary with Russia releasing large areas to explore where very little knowledge on the geology is known (Eastern Barents Sea). Increased focus on climate changes and their implications. New developments in our national mining sector. Lack of knowledge on geohazards and their implications. All these issues require expertise. Earth Science expertise. But developing these areas does not only require new geoscientists. It also requires new knowledge, new ideas, new and improved methods, innovation and creativity. More research and development is therefore needed to continue development and to add new knowledge.

In this perspective the National Budget 2012 put forward this week is a disappointment. From an Earth Science department's perspective it is certainly not visionary or ambitious. It is a budget with virtually no growth for this sector demonstrating lack of ambitions to really strengthen higher education, research and innovation. And it is worrying, in particular for infrastructure-, field- and laboratory based sciences. One positive signal did however appear: NOK 100 million are being earmarked for researcher-initiated research, while at the same time, universities are making similar priorities. Together, this will amount to NOK 200 million for the best project applications in which researchers wish to pursue their own ideas. This means that the so-called "FRINATEK" program which has had a success rate for applicants of less than 9 % can hopefully finance an increased number of applications with very high score from external evaluators from next year on. If Norway wants to be in the international research front this is the minimum of what is needed.

It is tempting to site former head of exploration and production at ConocoPhillips Knut Åm (talking to young Earth Science students in Bergen, Oslo and Trondheim this week): "In connection with developing new technologies (in his case related to the petroleum development in Norway), I would like to emphasise the following: In my opinion, an extremely important factor, but indeed also one of the most underestimated ones, have been the big research programs".

Gunn Mangerud

From our research



Researcher Nicola McLoughlin was a co-author of the introduction to the latest issue of Astrobiology.

Nicola McLoughlin is on the editorial board of *Astrobiology*. The Introduction states that: "Any attempt to investigate the origin and evolution of life on Earth or elsewhere must include consideration of the link between life and its changing planetary environment. [...] Given that volcanism is one of the primary mechanisms that generate geochemical disequilibria and fluid migration at a planet's surface or in its near subsurface, volcanism and life are inextricably linked."

It concludes: "Collectively, these papers [in this issue] show that studies in extremophile microbiology, microbial paleobiology, life detection, and the origin of life intersect with the remarkable and diverse conditions found in Earth's volcanic environments. Volcanic terrains are promising locations within which to search for answers as to life's origins and to investigate the reasons for its tenacity on Earth and, potentially, beyond."

From our education

Field course in Finse /årets feltkurs på Finse i emnet 'GEOV106 **Innføring i kvartærgeologi** fant sted 29.8-2.9. Feltkurset hadde 28 studenter og ble ledet av professor Atle Nesje og førsteamanuensis Henriette Linge, med Håvard Dretvik og Linda Bergheim Øygard som assistenter (se bilde). Dette var Atle Nesje sitt 30. feltkurs på Finse. Da han selv var med som feltkursassistent i 1982 satte han opp pinner i kjent avstand fra brefronten for å måle frontendringene til Midtdalsbreen, en nordlig utløper fra Hardangerjøkulen (se bilde). Dette gjør at man nå har en 30 år lang måleserie for Midtdalsbreen. I alt har brefronten trukket seg tilbake 119 m på disse 30 årene.

Research School

By PhD candidate Tor Mjell

Advanced Climate Dynamics Course (ACDC) 2011: Dynamics of Past Warm Climates

ACDC 2011 was set at the University of Washington Friday Harbor Laboratories on the beautiful San Juan Island, which is located north of Seattle, almost at the Canadian border. This course is the third advanced climate dynamics course organized jointly between the Bjerknes Centre for Climate Research (BCCR), University of Washington, and the Massachusetts Institute of Technology (MIT).[1] This year's main focus was on the dynamics of past warm climates. More specifically, to educate the students on the strengths and weaknesses of proxy reconstructions and model simulations for past warm climates, and learning what the limitations are in proxy-model comparison, in addition to giving an overview of the scientific communities general understanding of the dynamics of past warm climates. This was achieved through a mixture of fundamental and advanced lectures, lecture summary presentations by students, and student presentations of own work.
Important topics that were raised and discussed included: Meridional heat transport (e.g. importance of ocean heat transport in heating the high latitudes), the importance of paleogeography on global climate (closing of gateways etc.), model-data disagreement (e.g. cool equator paradox, low gradient paradox, the equator-pole heat transport problem), the global carbon cycle (CO_2 levels, ocean acidification), and sensitivity to CO_2 (observations, models, how sensitivity changes through time, etc.).
ACDC 2011 housed 21 students and 14 lecturers. The students came from 13 different research institutions and 11 different nations, all of which where working with proxy data or climate modeling, but on very different timescales, ranging from the Cretaceous to late Holocene. The lecturers were all amongst the best in their respective fields, which provided us with the state-of-the-art knowledge about past warm climates from models and proxy data. This compilation of students and lecturers created a friendly and informal atmosphere, which resulted in many fruitful and interesting discussions.

Participating in ACDC 2011 gave me a stronger awareness of the problems and opportunities that are incorporated into the different proxies and models that are commonly used in paleoclimatic research, as well as a more in-depth knowledge about past warm climates. Knowledge about past warm climates is very important, because they are used as an analogue for our future climate, while knowledge about the shortcomings of climate models is important because we rely on the models to predict the future climate.
In addition to being a very useful way of acquiring new knowledge, participating in a summer school like ACDC also represents an unique opportunity to learn and collaborate with researchers from across the globe, which is undoubtedly very beneficial for ones future scientific career, and is something I would encourage very PhD candidate to pursue.

ACDC 2011 was funded by: The Bjerknes Centre for Climate Research (UiB and UNI Research), The Norwegian Centre for International Cooperation in Higher Education (SIU), the Research Council of Norway, Massachusetts Institute of Technology (MIT), University of Washington, US Department of Energy (DoE), JISA and the Quaternary Research Center.

This edition's colleague

Patience Cowie joined the department in April 2011 as a Professor in Earth System Modelling. She is a member of the Geodynamics research group and her main research focus is on geomorphic modelling and cosmogenic exposure dating of tectonic and surface processes. Patience first became interested in earth science as an undergraduate student at the University of Durham in the UK. She moved to the USA in 1985 to do a PhD at Lamont Doherty Earth Observatory of Columbia University and graduated in 1992. Her PhD research was in structural geology and rock mechanics during which she developed a theoretical model to explain the propagation of faults in the brittle upper crust. While still at Lamont she applied the theory to fault development in Iceland and also at mid ocean ridges making use of side scan sonar data and high resolution bathymetry. This early work had significant impact not only in structural geology and active tectonics but also in mid-oceanic ridge and rift basin modeling as well as in the interpretation of fault development on other planets.

After her PhD she spent one year at the University of Nice in France developing numerical models to explain the fractal properties of fault patterns and spatial-temporal distributions of earthquakes. She returned to the UK in 1993, this time to Edinburgh University, first as a post-Doctoral researcher and then as a Royal Society of London University Research Fellow, a position she held until becoming a permanent member of staff at Edinburgh University in 2002. During her time at Edinburgh her work initially focused on the internal structure of fault zones and their fluid flow properties. However, since 2002 her research direction changed as she became involved in studying the geomorphic response to active tectonics in the Italian Apennines. In this work she collaborates closely with colleagues at the University of London (Birkbeck and Imperial Colleges), University of Colorado in the USA, and Durham University. The novelty of this work is that the landscapes she considers are not in topographic steady-state because they have been perturbed by growing networks of faults. By studying the surface processes that characterize the transient response of the landscape to changing tectonic uplift she has been able to place new constraints on fluvial erosion laws and the time taken to re-establish topographic steady state, an important factor in determining the volumes of material supplied by rivers to sedimentary basins.

Since 2006 she has been extending this work to include cosmogenic exposure dating of active faults in Italy and has been leading a major research project on this topic with colleagues at the University of Cologne in Germany, the University of Leeds as well as London and Durham Universities in the UK. The aim is to constrain fault slip rates and earthquake recurrence in the Italian Apennines over the Holocene and to use these data to improve earthquake hazard mapping. In2008 she became only the second female professor in earth science at Edinburgh University and the first ever to reach this level via internal promotion. In 2009 she was invited to become a science editor for GEOLOGY, which is a role she finds both stimulating and rewarding, although

time consuming. This is a four year appointment. She also contributes to teaching in geodynamics and is helping to develop new approaches to advancing the quantitative skills of the undergraduate students. In the near future she will also be creating a new course in quantitative geomorphology and surface process modeling.

Link to our three Centres of Excellence:

http://www.bjerknes.uib.no/

http://www.cipr.uib.no/

http://www.uib.no/geobio/en/

Geo-letter from abroad

Ulysses Ninnemann; Resolving the Ocean's Role in Abrupt Climate Variability

Leiv Eiriksson research sabbatical at Lamont Doherty Earth Observatory of Columbia University, USA

Best greetings from the woods of New York, USA. I'm now into the second month of my year-long sabbatical stay here at Lamont Doherty Earth Observatory. Lamont is Columbia Universities research institute devoted to the study of the Earth. Although Columbia University is in the heart of New York City, Lamont lies 17 miles (27km) north, on densely wooded bluffs overlooking the Hudson 'fjord'. It is so remote and pastoral here that it is easy to forget that the largest city in the U.S. (~19 million in metro area) is just minutes away. The quiet surroundings combined with the hyper pace of the city echo the character of the Observatory. Beyond the wild turkey and squirrels that populate the campus, there is little to distract the more than 300 research scientists in their intent endeavors to monitor the Earth, decipher records of its past, and better foresee its future. There are few places that offer this kind of research breadth concentrated in such close and focused surroundings—giving rise to unique possibilities for cross disciplinary research and approaches.

My main purpose of being at Lamont Doherty this year is to connect to some of these parallel disciplines and groups. In Norway, my students and I have been working to elucidate how ocean and climate varies on decadal and centennial timescales—giving us the first glimpses into the operation of the ocean and its coupling to climate on these timescales that are most immanently relevant for humankind. In parallel a number of groups here at Lamont have been working with other unique archives, methods, and approaches in order to constrain how climate and hydrology (e.g. draught) patterns have varied on these societal relevant timescales. By combining

these pictures, the hope is to build a coherent image of how regional and global patterns of rainfall and temperature (i.e. climate) are linked to large-scale changes in ocean circulation. In the end this picture of how the earth actually does behave and vary, including its jumps and thresholds, should provide us with a much better foundation for predicting how it will behave in the decades to come. Of course, as is usual with research, exciting new topics for potential collaboration have already emerged—it's shaping up to be a busy year.

Although the work at the institute has been rewarding, the opportunity for Earth System observations have not been solely cerebral. In the short 2 months since moving here we've experienced a relatively rare east coast (passive margin) earthquake and seen first hand the devastating power of hurricane Irene passing directly overhead. Irene was particularly impressive, toppling a 126 year old red oak tree onto our house, shaving off the chimney, part of the roof and gutters, and pinning live power lines in our front yard. Fortunately, no one was injured. Indeed, given the extensive flooding and damage in the region, we can consider ourselves fortunate and can also appreciate very clearly why insurance companies are increasingly concerned with global climate changes and the potential impacts of shifting weather and storm patterns. Another reason for us to work hard and figure out just how quickly and for what reasons climate has been able to shift in the past. With Irene behind us, and the arrival of autumn and Halloween preparations in full swing, I can safely say that although the phrase "everything is bigger in the U.S." may not hold universally, it definitely seems to apply for storms and Halloween decorations.

Ha en riktig god Høst! Ulysses Ninnemann

Other news

UiB remains in the top 200

From the University web page news (by S.O Drønen):

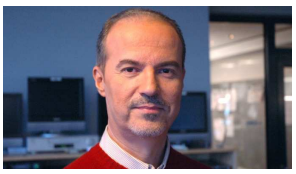
Last year the University of Bergen (UiB) reached 135th place in the Times Higher Education (THE) World University Rankings. This year UiB is in a more modest 191st place. " I register that this ranking shows a slight dip compared to last year. This breaks with the overall trend, which has shown us improving in all rankings in the last few years" , Rector Sigmund Grønmo says when confronted with the THE ranking for 2011-12. At the same time Grønmo points out that UiB was 121st in this year's QS-ranking, a promotion of 199 places since 2005. Rector Grønmo expresses delight that the UiB alongside the University of Oslo (UiO) keeps its ranking among the world's 200 leading universities. But whereas UiB drops a few places this year, UiO moves up slightly to 181st place. "I wish to congratulate the University of Oslo. However, for us the most important thing is that we are still among the 200 leading universities in the world. It's good for Norway to have two universities that are noted internationally", Grønmo says.

Natur 2011 – Hav i endring

Kunnskapen om havet og det biologiske mangfoldet i marine områder er de sentrale temaene når **Natur 2011** arrangeres på **Royal Garden Hotel i Trondheim 15. november**. Konferansen åpnes av Fiskeri- og kystminister Lisbeth Berg-Hansen.

Foredragsholdere på NATUR-konferansene er spesielt inviterte nøkkelpersoner og gode foredragsholdere som belyser årets tema fra ulike innfallsvinkler. Årets foredragsholdere vil gi oss et innblikk i dagens situasjon i marine områder, og ta for seg problemstillinger knyttet til blant annet hvordan klimaendringer og havforsuring påvirker artsmangfoldet og naturtypene, og belyse forholdet mellom næring og kunnskap.
Blant foredragsholderne finner vi vår kollega førsteamanuensis **Helga Flesche (Kikki) Kleiven.** Hun leder også forskningsgruppen i klimadynamikk ved Bjerknessenteret for Klimaforskning, samt flere EU og NFR prosjekt. Kleiven er også en aktiv formidler gjennom kurset "Klimaklok", som retter seg mot lærere og lærerstudenter. Fra Universiotetet i Bergen finner vi også **Truls Johannessen** som er professor i kjemisk oseanografi ved Geofysisk institutt, som også er med i Bjerknes-senteret for klimastudier.

GEO in media



På Høyden (Kuvvet Atakan, viserektor for utdanning/Institutt for geovitenskap)
Tittel: **Populært å studere i Bergen**
UiB tar inn 109 flere studenter i år enn i fjor. Aldri før har universitetet hatt så mange førsteprioritetssøkere.

På Høyden (Dr. Øyvind Paasche, leder ved Bergen Marine Forskningsklynge og Jørund Raukleiv Strømsøe, stipendiat ved Institutt for geovitenskap)
Tittel: **Rester etter urtiden.** På Høydens spalte"Vitenskapshistorier".

NRK (Atle Nesje, Institutt for geovitenskap/Bjerknessenteret)
Tittel: **Flaumen i Gaula var 100-års flaum**

Bergens Tidende (Kikki Kleiven, Bjerknessenteret, og Dekan Dag Rune Olsen)
Tittel: **Ny fart i bergenscenariene?**
Bergenscenarier 2020 er kommet nesten halvveis og har oppnådd mye.
Men nye utfordringer venter – ikke minst må det blåses ny ånd inn i prosjektet.

Nettavisen (Atle Nesje, Institutt for geovitenskap/Bjerknessenteret, Olav Kvalheim, Kjemisk institutt)
Tittel: **Her har du orkesterplass til klimaendringene**

Offshore.no (Gunn Mangerud, institutt for geovitenskap)
Tittel: **- Vil presse lønnen opp**
Geolog-mangelen koster oljeselskapene dyrt.

På Høyden (Hans Petter Sejrup, Institutt for geovitenskap)
Tittel: **Eksterne inn i PH-styret**
Universitetsstyret har bestemt at På Høydens styre skal ha et eksternt medlem med mediefaglig kompetanse. Derfor må en av de fem innstilte ut.

NRK (Stein-Erik Lauritzen, Institutt for geovitenskap)
Tittel: **Grotteforsker undersøker funnet**
Nordens eneste grotteforsker er begeistret. Han har kommet til leiren for å følge grottedykker-ekspedisjonen. http://ut.no/artikkel/1.7819757

Foto: Odd Arne Olderbakk/NRK

New in the department

Stéphane Rondenay is a seismologist who joined the Geodynamics Group as an Associate Professor on 1 September 2011. Stéphane received his undergraduate degree (geological engineering, 1994) and Masters degree (geophysics/mineral engineering, 1996) from Ecole Polytechnique de Montréal, and a PhD in Geophysics (2001) from the University of British Columbia in Vancouver, where he learned among other things that rain in coastal cities falls as snow in the mountains, and that this snow can be negotiated on telemark skis, two lessons that prepared him well for life in Bergen. Stéphane moved to Norway from the United States, where he spent the last decade in postdoctoral and faculty positions at Brown University and MIT. The primary goal of his research is seismic imaging, with a focus on the development of novel seismic imaging approaches, and the implementation and application of these (as well as existing) approaches to high-quality data sets aimed at solid earth and exploration targets.

Associate professor **Atle Rotevatn** has a mixed academic and industry background, having worked as an explorationist in the oil industry and more recently as as senior researcher at Uni CIPR.
Atle is a structural geologist by background and received his Cand. Scient. degree from the University of Oslo (2004) and his PhD from UiB (2007). His PhD was on "Tectonic deformation and fault interaction in porous siliciclastic rocks, with particular emphasis on relay ramps - Implications for fluid flow and reservoir performance".
Atle will join the Petroleum Geoscience Group where he will fill the role as the group's structural geologist. His research is centered around the evolution of faults and fault-related deformation, as well as their effect in hydrocarbon reservoirs.

Senior Executive Officer **Bjørn Arild Petersen** is our new Human Resource person. He started to work in the department at September 1st.

The new Head of administration **Terje Erstad** started on October 1st . Terje came from a position at the Medical Faculty, department of Biomedicine.

New PhD candidates

PhD dissertations (since last issue)

Dato	Kandidat	Oppgavetittel	Veileder	Bedømmelseskomité
29.09.11	Alexander Minakov	Structure and evolution of the northern Barents Sea - Lomonosov ridge margins from a mulitidisciplinary geophysical approach	Prof. Rolf Mjelde	Ass.prof Atle Austegard, GEO Prof. Keith Louden (Dalhousie University, Halifax) Dr. John Robert Hopper (GEUS, København)

Scientific production

Publications

Christopher, A., Jackson, L., & **Sømme, T. O.,** 2011: Borehole evidence for winglike clastic intrusion complexes on the western Norwegian margin. Journal of the Geological Society, London, Vol. 168, pp. 1075-1078. doi: 10.1144/0016-76492011-035

Hannisdal, B., 2011, Non-parametric inference of causual interactions from geological records. American Journal of Science, vol. 311, 315-334

Mangerud, J. Gyllencreutz, R.**, Lohne, Ø.S. and Svendsen, J. I**. (2011). Glacial history of Norway. In Ehlers, J., Gibbard, P. L. and Hughes, P. D. (eds.): Developments in Quaternary Science, Vol. 15, 279 – 298.

McLoughlin. N., Wacey, D., Kruber, C., Kilburn, M. R., **Thorseth I. H., Pedersen, R. B.** 2011: A combined TEM and NanoSIMS study of endolithic microfossils in altered seafloor baselt. Chemical Geology, (2011), doi: 10.1016/j.chemgeo. 2011.07.022

Slama, J., Walderhaug, O., Fonneland, H**., Kosler, J., Pedersen, R. B.,**
Provenance of Neoproterozoic to Upper Cretaceous sedimentary rocks, eastern Greenland: Implications for recognizing the sources of sediments in the Norwegian Sea. Sedimentary Geology, vol. 238, 3-4, 254-267

Zak, J., Kratinova, Z., Trubac, J., Janousek, V., **Slama, J.**, Mrlina. J.
Structure, emplacement, and tectonic setting of Late Devonian granitoid plutons in the Tepla–Barrandian unit, Bohemian Massif.Int J Earth Sci (Geol Rundsch), vol. 100, 1477-1495.

Reports

Hjelstuen, B. O., Kleiven, H. F., Monsen, S & Student Team, Cruise report from Byfjorden, Herdlefjorden ands Salhusfjorden, September 19 – 23, 2011

Conferences

De Schepper, S., Louwye, S. and Head, M. Pliocene to Early palynology of the Bering Sea: initial results from IODP Site U1341. *American Association Stratigraphic Palynologists (AASP*) Conference, September 2011, Southampton (Abstract Volume, p 11).

Dilek, Y., & **Furnes, H.,** 2011, Geochemical and tectonic fingerprinting of ophiolites, Goldschmidt 2011, Prague, Czech Republic, 2011

Dilek, Y., & **Furnes, H.,** 2011, Different types of Precambrian ophiolites. Goldschmidt 2011, Prague, Czech Republic, August 2011

Forsberg, R., Olesen, A. V., Nielsen, E., Kristensen, S., Ghidella Martha., Zakrajsek A., Greenbaum, J., Blankenship, D., **Gidskehaug, A.** ICEGRAV: New airborne geophysics in the Antarctic Peninsula and East Antarctica. 11th International Symposium on Antarctic Earth Sciences, Edinburgh, Scotland, July 2011

Furnes, H., Dilek, Y. & De Wit, M., 2011: Different types of Precambian ophiolites, Goldschmidt 2011, Prague, Czech Republic, August 2011

Gyllencreutz, R., Mangerud, J., Svendsen, J. I. and Lohne, Ø. S. 2011: The DATED chronology and Eurasian Ice Sheet reconstructions. XVIII. INQUA Congress. Bern, Switzerland. July 2011.

Kircher, N., **Gyllencreutz, R., Mangerud, J.** 2011: Novaya Zemlya – a nucleus for glaciation in the Barents-Kara Sea during MIS 3-2? APEX 5. international Conference and workshop. Longyearbyen, Svalbard. June 2011, p. 83

Kircher, N., **Gyllencreutz, R., Mangerud, J.** 2011: Novaya Zemlya – a nucleus for glaciation in the Barents-Kara Sea during MIS 3-2? XVIII. INQUA congress. Bern, Switzerland. July 2011.

Lane, C., Blockley, S., Smith, V., Tomlinson, E., Matthews, I., **Mangerud, J.** 2011: Is the Icelandic Vedde Ash one of a kind? XVIII. INQUA Congress. Bern, Switzerland. July 2011

Løvlie, R., Paasche, Øyvind, Geology, 2011: Synchronized post-glacial colonization of magnetotactic bacteria in four Norwegian lakes. Taiyuan University of Technology, September 16 th 2011. Geology, 2011,v. 39; no. 1; p. 75-78; doi:10.1130/G31525,1

Mangerud, G. , Vigran, J.O., Mørk, A., Hochuli, P.A.
A new Triassic palynostratigraphy for the Norwegian Arctic area, with focus on the Early Triassic palynological turnovers. *American Association Stratigraphic Palynologists (AASP*) Conference, September 2011, Southampton (Abstract Volume, p 24).

Mangerud, J., Svendsen, J.I, Heggen, H.P., Slimak, L., Plisson, H., Brugère, A., Paclov, P.Y., 2011: Breaking nevws on Ice Age Humans in Northern Russia. APEX Fifth International conference and workshop. Longyearbyen, Svalbard. June 2011, p. 96

Mangerud, J., Svendsen, J.I. & Lohne, Ø. S. 2011. Younger Dryas glaciation of Scandinavia – the type area for the Younger Dryas. XVIII. INQUA Congress. Bern, Switzerland. July 2011

Public outreach

Mangerud, J. 2011. Vulkanske askeskyer over Norge, Bergen-S Rotary, Fjøsanger, 12.09.2011

Pressemelding 28.9.11

NY DOKTORGRAD

Barentshav-arktis: Ny forskning avslører geologisk utvikling

Foto: Jan Kåre Wilhelmsen

Alexander Minakov disputerte torsdag 29. september for ph.d.-graden ved Universitetet i Bergen med avhandlingen: "Structure and Evolution of the Northern Barents Sea - Lomonosov Ridge
Margins from a Multidisciplinary Geophysical Approach" ved Institutt for geovitenskap, Universitet i Bergen.

Minakov har studert jordskorpens oppbygning og utvikling i det nordlige Barentshav og Arktis ved hjelp av havbunnseismiske- og tyngdedata. Arbeidet forklarer hvordan den kontinentale Lomonosov-ryggen ble splittet av den nordlige Barentshavsmarginen for ca. 60 millioner år siden. Videre gir studiet ny viktig kunnskap om fordelingen av magmatiske bergarter i jordskorpen rundt Kong Karls Land. Avhandlingen har viktige implikasjoner for klimaforskning og leting etter hydrokarboner.

Personalia:
Alexander Minakov ble født i 1982 i St. Petersburg, Russland. Han fikk sin mastergrad i geologi fra St. Petersburg State University i 2006. Fra 2004 til 2008 jobbet han som forsker ved Russian Research Institute for Geology and Mineral Resources of the World Ocean. Fra 2008 til 2011 har han jobbet med ph.d.-graden ved Institutt for geovitenskap ved Universitetet i Bergen.