INSTITUTT FOR GEOVITENSKAP
*Department of Earth Science*

GEOVITEN
-ekstern

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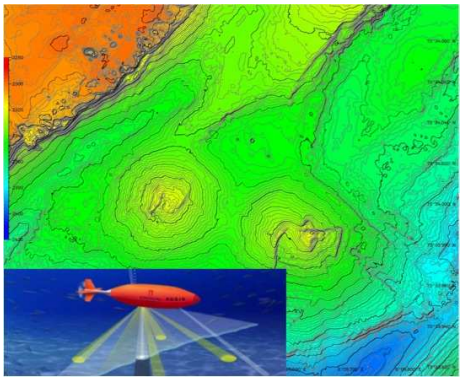
*Geoviten-ekstern er Institutt for geovitenskap ved Universitetet i Bergen sitt eksterne nyhetsblad og utgis en gang pr. måned. Geoviten-ekstern kan også leses fra vår eksterne nettside: www.uib.no/geo*
*Gunn Mangerud, instituttleder*

*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*

# Marine Research

The Department of Earth Science has a strong marine component within all research groups and employs a wide spectrum of geophysical and geological methods. Through fieldwork, cruises and research focus, the oceans are essential laboratories for research, both as field laboratories and in the study of the marine sedimentary deposits and the rock record beneath the ocean floor.

With Norway's extensive marine territories, including huge deep-water areas, and a strong national tradition for marine research, the department aims at continuing to play a leading role in a broad specter of marine research with particular focus in the northern areas. To do so, infrastructure related to marine research is essential. The department has a unique advantage in having access to research vessels and other essential infrastructure including ROV, a vibrator and snow-streamer for seismic surveys on land, hovercraft, equipment for crustal scale reflection and wide-angle seismic studies, marine magnetometer and equipment for long marine geological coring and seafloor sampling. To keep pace with the future, a new ROV is very high on our priority list and we "cross our fingers" for the Research Council's advanced scientific equipment process which is ongoing, and where the ROV application are invited to the second round to be concluded in September this year. A new ROV specifically designed for research purposes will be a national infrastructure contributing to strengthen Norway's role even further.



In this issue you can also read an article from the Annual Report just issued from our centre of Excellence in Geobiology; "Exploring the deep-sea with autonomous underwater vehicles (AUV)", yet another infrastructure essential to be leading in marine research.

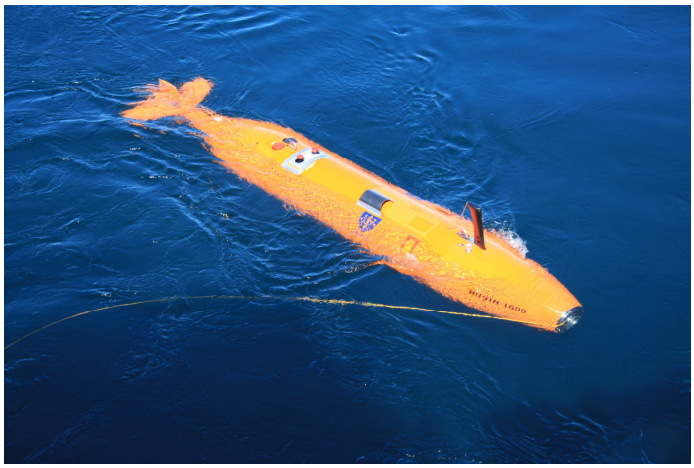
Happy reading!

Gunn Mangerud

# From our research

## Exploring the deep-sea with autonomous vehicles

By Professor Rolf Birger Pedersen,



Initially designed for use under warfare conditions – autonomous underwater vehicles (AUV) are now exploring the deep-sea for science!

Summer 2010, during a CGB-led international expedition, a five meter long torpedo-shaped AUV was launched from the *RV G.O. Sars* into the middle of the Norwegian/Greenland Sea. Once in the sea, the battery-driven propeller started rotating and the AUV disappeared below the surface. Following a pre-determined programme it started a silent and lonely voyage to 3000 metres deep where it explored the seafloor around the deep-sea volcanoes located there, looking for hot vents and new ecosystems. Twenty hours later the AUV returned to the surface – and researchers and crew heaved a sigh of relief that the 30-million-kr piece of equipment was once again safely on-board! Once on deck, the data collected in the deep could be unloaded. It revealed detailed maps and pictures of the seafloor as well as masses of information collected from the many different kinds of sensors. Among other things, the data showed where hot hydrothermal water was discharging from the seafloor. The AUV, "*Hugin*", was developed by the Norwegian Defence Research Establishment (FFI) and produced by Kongsberg Maritime - a world leader in AUV technology. Together with the Institute of Marine Research they established a consortium to manage the *Hugin* AUV's operation. In 2010 CGB undertook to modify the *RV G.O.Sars* so that she was capable of being a platform to launch the AUV. CGB has continued to invest in this AUV, and recently UiB became the fourth member of the "*Hugin*-consortium". The AUV is a multi-dimensional instrument platform that can be programmed to engage in diverse measurement routines autonomously. For example, it is equipped with a range of advanced navigational and acoustic systems. In addition, it has unique water column, seafloor, and sub-seafloor imaging capabilities. Its range of chemical, physical and optical sensors make it ideal for detecting chemical and particle anomalies in the water column. The use of AUVs has the additional benefit of optimising research and sampling time aboard research vessels as it can operate autonomously while researchers engage in other tasks. The operation of this AUV from the *G.O.Sars* platform opens new research possibilities for CGB (and other Norwegian research institutions). In particular it will enhance research activities relating to locating new seabed fluid-flow systems and their associated chemosynthetic ecosystems. Use of the AUV will also be important for the more applied aspects of CGB's research activity relating to the monitoring of subsurface CO2 storage sites. CGB's efforts to use modern robotics for deep-sea research is now paying off. The new capability of combined use of AUV and ROV from the *G.O.Sars* is bringing UiB to the forefront in deep-marine research.

From CBG – Annual Report 2010

**Published in Nature this month:**

Professor Ritske Huismans published in collaboration with colleague Christopher Beaumont at Dalhousie University, Nova Scotia a Nature letter this month; **Depth-dependent extension, two-stage breakup and cratonic underplating at rifted margins.**

Reference: Nature, 473, 2011. doi:10.1038/nature09988

**Published in Science this month:**

## Late Mousterian Persistence near the Arctic Circle


*Drafted by Eva Bjørseth, Department of Earth Science, UiB*

Professor John Inge Svendsen, professor emeritus Jan Mangerud and PhD candidate Herbjørn Presthus Heggen published in collaboration with French colleagues records from the Russian Arctic suggesting that the last Neandertals may have taken refuge in the dark Arctic north rather than the sunny south as archaeological evidence has indicated. At the 32,000-year-old site of Byzovaya in Russia's Polar Ural Mountains, which at 65 degrees latitude is as far north as Iceland, archaeologists found stone tools they argue are typical of those long associated with Neandertals in Europe. If Neandertals did make the tools, it would push Neandertals' range northward by 1000 kilometers, and the site would be one of the youngest claimed for Neandertals, especially since recent redating has moved many Neandertal sites earlier in time. It would also show that the cold-adapted Neandertals could survive the rigors of the Arctic. The paper is presently cited in more than 1000 web sites/news/papers around the world.

Reference; Ludovic Slimak, John Inge Svendsen, Jan Mangerud, Hugues Plisson, Herbjørn Presthus Heggen, Alexis Brugère, and Pavel Yurievich Pavlov. Science 13 May 2011: 841-845.

# From our education

**Mapping course in Elba /b**y Professor Joachim Jacobs

This years field mapping course Geov 252 took place from 01.-14.05.2011 on Elba Island, Italy. The course has a structural geology emphasis and focuses on the structural evolution of the Apennines fold and thrust belt.

In this course, students learn to produce and interpret geological maps. The area in eastern Elba is particularly interesting, because a very wide range of rock types are closely juxtaposed within this part of the Apennines. The different lithologies include an ophiolite sequence including serpentinites, different types of sedimentary rocks (from deep sea to continental margin), igneous intrusions and metasedimentary rocks in various stages of metamorphism. Additionally, ore mineralisations and superficial deposits including landslides can be mapped. Because the Apennines are a relatively young orogen, the exposed upper crustal tectonics complements ideally the much deeper crustal sections exposed in the Norwegian Caledonides. The course comprises two parts: (1) Mapping on Elba Island usually takes place during the first two weeks of May. (2) The fieldwork is preceded by a seminar series in which course participants are introduced to the geology of Elba and Apennine tectonics. The seminars also include the macro- and microscopic study of the different rock types to be found during mapping with the help of samples collected during previous years.

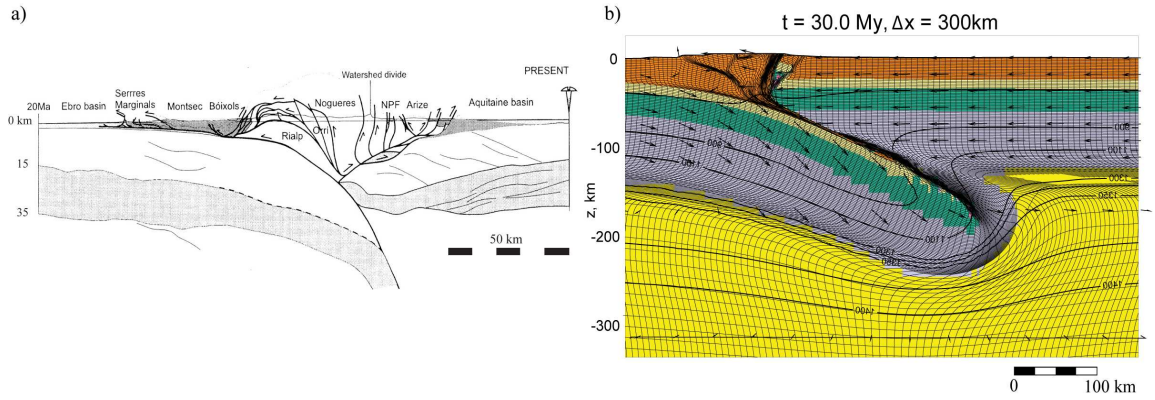
The picture shows Geov 252 participants gathering on the Mt. Capanne pluton (7 Ma), where impressive magma mixing processes can be studied. During this day, Prof. Sergio Rocchi, University of Pisa, kindly shared his expertise with the course participants.

## This edition's colleague

Suzon Jammes has been a post-doctoral researcher at the department of Earth Science since September 2009. She graduated from the School of Engineering Geophysics (EOST), University of Strasbourg, where she obtained her Masters degree in Geophysics. In 2005, she started a Ph.D. under the supervision of Prof. Gianreto Manatschal. The aim of the study was to characterise the processes leading to the observed extreme crustal thinning in transtensional setting in the Bay of Biscay and western Pyrenees. A multi-disciplinary and multi-scale approach was used for this work which included field work in western Pyrenees, interpretation of geophysical data (drill holes and seismic lines), gravimetric inversion and numerical modelling. This gave rise to collaborations with the industry (Total Pau), the University

of Paris 6 and the University of Austin, Texas where she spent several weeks working with Prof. Luc Lavier on numerical models.

In 2009, Suzon started a postdoctoral position in collaboration with Prof. R. Huismans at the department of Earth Science at the UiB. She is involved in the research project Pyrtec (TOPO-Europe program) and focuses on the influence of inheritance (local and regional) and the interaction between surface processes and tectonic deformation during the building of the Pyrenean-Cantabrian belt. To this end, she uses a complementary approach involving structural field work and numerical modelling.
Using structural and geophysical data, she is making a cross-section through the Mauléon basin in the northern Pyrenees in collaboration with Prof. Josep Anton Muñoz (University of Barcelona). The aim of this work is to identify the style of the deformation at the crustal scale and to quantify the exhumation and compression rates accommodated in this basin. This work further guides her numerical modelling approach which helps to single and identify factors controlling the tectonic style of inversion.




*Comparison between data from Pyrenean mountain belt and numerical models :*
*Cross section realized along the ECORS-Pyrenees profile (from Beaumont et al. 2000); b) 2D thermo-mechanical model at lithospheric scale realized with the code SOPALE*

Two-dimensional thermo-mechanical simulations at lithospheric scales are then carried out with the code SOPALE and allow to test for the following three main factors:
-the regional inheritance due to crustal and mantle structure,
-the inheritance due to local weaknesses,
-the influence of surface processes.

Link to our three Centres of Excellence:

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

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

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

# Andre nyheter/Other news

**International Scientific Conference : Northern Karsts Systems in our changing Environment**

Arkhangelsk 5-10 September 2011
International Conference dedicated to the 300th Anniversary of the birth of M.V.Lomonosov

Organizers:
Russian Geographical Society
UIS Commission on Karst Hydrogeology and Speleogenesis
Institute of Ecological Problems in the North, Ural Branch of the Rus. Acad. Sci.
State Nature Reserve «Pinezhsky», Russia
Institute of Geography of the Russian Academy of Sciences
Moscow State University, Russia
St.-Petersburg State University, Russia
Ukrainian Institute of Speleology and Karstology
McMaster University, Canada
**Department of Earth Sciences, Bergen University, Norway**
Natural Sciences Institute of the Perm State University, Russia
Permafrost Study Institute, Siberian Branch of the Russian Academy of Sciences
Autonomous non-profit organization «Institute of Ecology and Education for Sustainable Development»

The conference e-mail: cold-karst-11@mail.ru

# GEO in media

**Aftenposten** 19.5 2 s18 og 19 (professor emeritus Jan Mangerud)
Tittel: **Neandertalere.**
Verdens nordligste tilholdssted for neandertalere er med norsk deltagelse påvisk i Nord-Russland. At neandertalere tilpasset seg arktisk klima, vekker oppsikt.

**NRK1** 23.5 Førkveld (professor emeritus Jan Mangerud)
Tittel: **Aktiv supervulkan** http://www.nrk.no/nett-tv/klipp/739255/

*Helga (Kikki) Kleiven*

forskning.no (Innlegg av førsteamanuensis Helga (Kikki) Kleiven, Institutt for geovitenskap)
Tittel: **Klimaklok med naturlig klimavariasjon**
Kurset Klimaklok byr på kunnskap om fortidsklima og naturlig klimavariasjon, skriver Helga F. Kleiven i dette svaret på påstander om at naturlige klimafaktorer overses. (http://www.forskning.no/artikler/2011/mai/289080)

forskning.no (Intervju med professor emeritus Jan Mangerud og professor John-Inge Svendsen), Institutt for geovitenskap)

Tittel: **Neadertalere langt mot nord.**
(http://www.forskning.no/artikler/2011/mai/288339)

Bergens Tidende (professor John Inge Svendsen, Institutt for geovitenskap/UiB Bjerknessenteret, professor emeritus Jan Mangerud, Institutt for geovitenskap/UNI Bjerknessenteret)
Tittel: **Levde i 50 kuldegrader**
Neandertalerne hadde et røffere liv enn tidligere antatt, forteller bergensprofessor.

På Høyden (professor John Inge Svendsen, Institutt for geovitenskap/Bjerknessenteret, professor emeritus Jan Mangerud, Institutt for geovitenskap)
Tittel: **Neandertalerne levde under nordlyset**
UiB-geologer har funnet mammutbein og steinøkser ved Uralfjellene som tyder på at neandertalerne levde i det arktiske Russland, 1000 kilometer lenger nord enn tidligere antatt. Funnene er publisert i Science.

**Bergens Tidende.** 24 mai 2011. Dette kan du bare spise. Intervju med professor emeritus Jan Mangerud

**Dagbladet**. Askesky over Island igjen. Intervju med professor emeritus Jan Mangerud. Om aske fra vulkanutbruddet på Island

**Discovery News**. Neanderthals' Last Stand Possibly Found.

http://news.discovery.com/archaeology/neanderthal-last-stand-tools-ural-mountains-110512.html

**USA Today.** Did the Neanderthals linger in Russia?
http://content.usatoday.com/communities/sciencefair/post/2011/05/did-the-neanderthals-linger-in-russia-/1

# New candidates

New candidates since last issue of Geoviten ekstern .

**Masterpresentasjoner i mai 2011**

| Dato | Kandidat | Oppgavetittel | Veileder | Sensorkomité |
|---|---|---|---|---|
| 11.5 | Gjermund O. Sand | INNSJØSEDIMENTASJON OG KLIMAUTVIKLING I DE POLARE URALFJELLENE | Hovedveileder: Prof. John-Inge Svendsen<br>Medveileder: Øystein Lohne, Herbjørn Heggen | Forsker Jochen Kneis (NGU)<br>Prof. Atle Nesje (GEO) |
| 24.05 | Laba Ciren | Seismo-tectonics around Lhasa, Tibet | Hovedveileder: Lars Ottemøller<br>Medveileder: Kuveet Atakan | Forsker dr.philos Conrad Lindholm (NORSAR)<br>1.aman Mathilde B. Sørensen (GEO) |

**Ph.D – disputas/PhD dissertations**

| Dato | Kandidat | Oppgavetittel | Veileder | Bedømmelseskomité |
|---|---|---|---|---|
| 25.5 | Eivind N. Støren | Identifying flood deposits in lake sediments - Changing frequencies and potential links to long-term climate change | Hovedveileder: Atle Nesje<br>Medveileder: Svein Olaf Dahl (Geografisk Inst) | Professor, ph.d. Gunhild Rosqvist, Stockholms universitet,<br>Avdelingsleder Naturskade, dr.scient. Anders Solheim, NGI<br>Førsteamanuensis, ph.d. Henriette Linge, Institutt for geovitenskap, Universitetet i Bergen |
| | | | | |

# Scientific production

**Publications**

**Huismans, R.** & Beaumont C. Depth-dependent extension, two-stage breakup and cratonic underplating at rifted margins. Nature, 473, 2011. doi:10.1038/nature09988

Nussbaumer S.U., **Nesje A.** & Zumbühl H.J., 2011. Historical glacier fluctuations of Jostedalsbreen and Folgefonna (southern Norway) reassessed by new pictoral and written evidence. The Holocene, 21, 455-471. Doi: 10.1177/0959683610385728

Slimak, L, **Svendsen J.I., Mangerud J.,** Plisson H.,, **Heggen, H.P**., Brugère, A.and Pavlov, P.Y. Science 13 May 2011: 841-845.

**Sørensen M.B**., Voss P.H., **Havskov J.,** Gregersen S. & **Atakan K**., 2011. The seismotectonics of western Skagerrak. Journal of Seismology, pp 1-13, Doi:10.1007/s10950-011-9235-x

**Reports**

**Haflidason H**. Mörz T., Krieter S., Schunn W., Strobel S. & **Brendryen J**. 2011. Marine Geological Cruise Report from Ranafjorden-Sørfjorden. Report No. 100-02/11, Department of Earth Science, University of Bergen, Bergen, Norway, 12pp.

**Popular science**

**Svendsen J.I., Lohne Ø.S., & Mangerud J**. 2011. Istidsforskning i Uralfjellene - om "uvanlige" breer og mammutjegere. Polaråret 2007-2008. Det norske bidraget. Norges forskningsråd, 154 – 157.

Mesquita, M.D.S., Veldore V., Bhadwal S. & **Jansen E.,** Bhardwaj S. and Machineni N., 2011. An Indo-Norwegian Research Collaboration on Climate Change. Atmospheric Sciences Section of the AGU Newsletter, 5.

**Conferences**

Kleiven H.F. Hvordan skal vi forholde oss til globale klimautfordringer? The conference "Energi i et klimaperspektiv, utfordringer og muligheter". Kraftsenteret, Samnanger, Norway, 12.04.2011.

*EGU General Assembly 2011, Vienna, Austria, 03. – 08. April 2011*

Dilek Y. & **Furnes H**. Magmatic Imprint of Subduction Initiation in the Phanerozoic Ophiolite Record.

Hemming, S. & Li S. Glaciers, sea ice, fresh water, and climate variability in the North Atlantic during the last glacial cycle, 06.04.2011.

Veldore V., Mesquita M.D.S., Lunde T.M., Bhardwaj S. and **Jansen E.** Sensitivity Studies to Assess the Representation of Rainfall and Temperature over India using the WRF model in a Tropical Channel Setup.Vol. 13, Abstract EGU2011-8991.

**Other presentations**

**Aarseth I.,** 2011. Landformer og geologisk naturgrunnlag på Reimegrend. In: Reime R. Reimegrend: Frå bondesamfunn til hyttegrend. Voss prenteverk, 15-22.

**Aarseth I. & Mangerud J**. Hardangerfjorden: Korleis vart han danna og korleis og når vart han kvitt siste fjordbreen. Steinparken*, Rosendal, Norway, 30.04.2011.

**Nesje A.** Sea-level changes in the past, present and future. Presentation and excursion for students and a professor from the University of East Anglia, Norwich, UK. Bergen, Norway, 03.05.2011.

**Steer P.** In-situ quantification of the effective elasticity of a fault zone, and its relationship to fracture density. Geodynamics seminar, UiB. 03.05.2011.

**Yang M**. High resolution records of climate variability from Tibetan Plateau. Department seminar, UiB, 05.05.2011.

*Link til Steinparken I Rosendal: http://www.koi.no/steinpark.html

http://www.rosendalstiftinga.no/steinparken.html

## Flommer og klimaendringer

*Foto: Jill Johannessen*

Eivind N. Støren disputerte torsdag 26. mai for ph.d.-graden ved Universitetet i Bergen med avhandlingen:

”Identifying flood deposits in lake sediments - Changing frequencies and potential links to long-term climate change”

Avhandlingen er en studie av skiftende avsetningsregimer i innsjøsedimenter, sett i forhold til klimaendringer over de siste 10. 000 år. Hovedfokus har vært å gjenkjenne avsetninger fra historiske og forhistoriske flommer i innsjøsedimenter, og studere endringer i den rekonstruerte flomaktiviteten relatert til endinger i klimaet.

Flommer forårsaket av ekstremnedbør og/eller snøsmelting er blant de vanligste naturkatastrofene verden over. Slike hendelser, ofte også assosiert med skred, fører til død, lidelse og enorme økonomiske tap hvert eneste år. Over de siste årene har slike ekstremhendelser fått økt oppmerksomhet, ikke bare på grunn av sosiale og økonomiske konsekvenser, men også på grunn av at de klimatiske forutsetningene for dannelsen av slike hendelser er antatt å endres med global oppvarming.

Koblinger mellom klima og ekstremhendelser er svært komplekse og instrumentelle data, som dekker de siste 100-150 år, er som oftest for korte til å etablere pålitelige koblinger mellom klimaendringer og flomaktivitet. Basert på til dels nyutviklede metoder og detaljerte høyoppløselige analyser av innsjøsedimenter setter avhandlingen disse koblingene inn i et lengre klimatisk perspektiv. Støren finner at flomfrekvensen i et utvalg små vassdrag i Jotunheimen og Folldal har endret seg betydelig over de siste 10. 000 år, og at endringene i stor grad sammenfaller med storskala endringer i klimaet.

**Personalia:**

Eivind N. Støren født i 1981 og er oppvokst i Bergen. Han fullførte mastergraden i naturgeografi ved Universitetet i Bergen våren 2006 og har siden høsten 2006 vært ansatt som stipendiat ved Institutt for geovitenskap, med arbeidsplass på Bjerknesseneret for klimaforskning. Veiledere har vært Atle Nesje ved Institutt for geovitenskap, og Svein Olaf Dahl ved Institutt for geografi, Universtitetet i Bergen.