Review of Survey activities 2008

Edited by
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Cover photographs from left to right
2. Field work in West Greenland. Photo: Dennis Schlatter.
3. Investigations and sampling of an outcrop at Conde, Bahia, Brazil. Photo: Peter Jaspers.
4. Field experiments with remediation of contaminated soil in Vadsby, west of Copenhagen. Photo: Knud Erik S. Klint.

Frontispiece: facing page
Visit at the automatic weather station 'Lower Nuuk' on 30 July 2008 for data retrieval and maintenance. The station is located on the glacier Qamaasarsuup Sermia near the margin of the Greenland ice sheet, east of Godthåbsfjord (64°29’N, 49°31’W). It collects weather information and data about the local ablation and was established in 2007 as part of the Promice project (www.promice.org). Photo: Søren Nielsen.

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Following a number of years with major changes of the scientific environment in Denmark and also within the management of the Geological Survey of Denmark and Greenland (GEUS), 2008 was a year of stability and consolidation, a situation that will hopefully continue. Many new projects have been initiated and many previous projects have been completed at a time with strong focus on GEUS’ activities politically, commercially and from the media.

This sixth annual issue of Review of Survey activities describes selected projects that GEUS and its partners carry out in Denmark, Greenland and internationally. Together with the previous five published issues (also available at www.geus.dk), it provides a good overview of the Survey’s many different types of research and advisory activities. It contains a total of 19 four-page papers: ten on Denmark, eight on Greenland and one on international work.

Geology was on the lips of most of the Danish population an early morning in December 2008 when one of the strongest earthquakes recorded in Scandinavia woke up hundreds of thousands of people in southern Sweden and on Sjælland. One paper in this issue describes the background and details of the earthquake, including input from the public that contacted GEUS through its website.

Reduction of the emission of CO₂ is high on the political agenda in Denmark and internationally. One of the possibilities to reduce CO₂ emission from large point sources is to use carbon capture and storage (CCS). The Danish subsurface has a high potential to store CO₂, and structures such as the Vedsted structure in northern Jylland could be among the first dozen storage facilities utilised in Europe, and thereby become a key area for detailed research and monitoring for many years to come. The background for CCS and geological possibilities in Denmark are described in one paper.

Groundwater mapping and management have a very high priority in Denmark. One paper describes the many different geophysical methods that are used in hydrogeological mapping, as well as the administration of the geophysical data that are archived in a major database hosted at GEUS. Another paper describes the exchange between lake water and groundwater of lake Skærsø in Jylland.

In 2008 there was a high level of field activities in Greenland. The two largest campaigns in southern West Greenland and eastern Greenland are described in individual papers. The West Greenland field work was a follow-up on earlier projects focused on updating previous maps and thereby creating a better understanding of the potential distribution of mineral occurrences. The field work in eastern Greenland is the start of a major oil industry sponsored programme that has been launched to support and promote petroleum exploration within the coming five-year period. It includes shallow coring drilling.

One paper addresses a question often raised by scientists and explorers: what is the bedrock geology under the Inland Ice that covers 81% of the total area of Greenland? Available
geological and geophysical data are shortly reviewed and ideas for future studies presented. Another paper introduces a 3-D modelling of one of the best studied intrusions in the world, the Paleocene Skaergaard intrusion in East Greenland. Identification of significant platinum group and gold occurrences in this intrusion has lead to detailed investigations and exploration drilling over many years. The last decade of diamond exploration in West Greenland has provided a wealth of data on the dykes of kimberlite and ultramafic lamprophyres that may host diamonds. One paper summarises new data on petrology and age distribution of the dykes that have important implications for future diamond exploration. In a large country like Greenland, use of remote sensing data is important and cost-effective in mapping and exploration. One paper presents an analysis of hyperspectral data from the Sarfartoq carbonatite complex in West Greenland. The paper illustrates that such data can be applied to mapping of individual rock types.

The most recent processes and climate development in Greenland are described in two papers of which one stresses the importance of applied glaciology for the exploitation of the Malmbjerg molybdenum deposit in East Greenland, because the site of a possible future mine is located between two glaciers. Future access to the mining site and removal of ore and waste rock are highly dependent on the movement of the glaciers. The second paper addresses Holocene climate variation and marine history in South Greenland, based on a number of samples collected in Bredfjord and Narsaq Sund during the Galathea 3 expedition.

A final paper on landscape development in Brazil employs the same methods of landscape mapping and apatite fission track analysis that were used to study the uplift history of the margins of Greenland and Scandinavia.