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OAGS newsletter

Organisation of African Geological Surveys
Organisation des Services Géologiques Africains
Organisação de Serviços Geológicos Africanos

CONTENTS:

Sponsored by the Council for Geoscience
Applied Geoscience Solutions

First African Seismological Commission (AfSC) Assembly

The Obock and Rouéli geothermal sites, Djibouti Republic

The western extension of the Aden ridge penetrates the African continent through the Gulf of Tadjourah, an active oceanic ridge elongated in an east–west direction, but made of NW–SE rift segments and NE–SW transform faults, emerging in the Asal-Ghoubbet westernmost segments where two geothermal sites have been identified. While looking at the bathymetric or seismicity maps of the area, a striking feature appears: the active ridge is not located in the middle of the Gulf of Tadjourah, but on the northern part, very close to the coast, which itself appears as paralleling the ridge. This means that an important heat source is available from the shallow anomalous mantle and active volcanism on the spreading sea floor (1 500 m deep in the Tadjourah trough) very near to the coast.

Near to the town of Obock, the dominantly coralline coastline, uplifted and affected by E–W faults, is very close to the ridge itself, whereas in Rouéli — a recent basaltic plateau (gulf basalts, emitted 1 to 2 My ago, at the early stage of opening of the Gulf of Tadjourah) forming a promontory above the sea level and deeply affected by both WNW and NE fault systems — gets very close to the transverse faulting linking at depth the Obock and Tadjourah troughs.

While the surface geology is rather well known, the marine side was studied by at least two oceanographic

cruises, SUDMEROUAD in 1977 and TADOURADEN in 1995. From the latest studies, it was shown that the direction of spreading is oblique with respect to the rift as well as to the transform faults, and that both have therefore an opening component. It means that a shallow hot, anomalous and magma generating mantel is also present along transverse structures. The geophysical interpretation corroborates the field observations at Rouéli where both the WNW and NE faults look extensional.

As a matter of fact, several hot springs are encountered at both sites, and steam vents are also present at Rouéli. Available hydrogeochemical data indicate a temperature of 210 °C for the geothermal reservoir at Obock.

The high degree of recent faulting and the currently important seismicity envisaged a good permeability at depth, also linked with the expected geological nature of this continental talus made of detrital formations interbedded with coral reefs and faulted basalts. Of course, the geothermal reservoir should be looked for by deviated wells, towards the south in Obock and towards the south-east in Rouéli. The presence of an attractive geothermal resource in the area is of interest to answer the needs of the local population at two stages, presently (only very partly) answered by diesel engines in Obock and Tadjourah, and in the future in order to serve the railway line and port linking central-northern Ethiopia to the sea through central Afar. In addition to such promising prospectives for geothermal power production, these sites appear particularly appropriate — and unique in the world to this respect — for attempting to drill deep (with ICDP) in an oceanic ridge from the continent, an approach to future exploitation of the huge energy potential of mid-oceanic ridges in general.

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Council for Geoscience
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Council for Geoscience (South Africa)

Background

Like all geological surveys, the Council for Geoscience (CGS) in South Africa is mandated to collect geoscience information in order to facilitate the understanding of the solid earth processes. The CGS is responsible for the acquisition, management and delivery of geoscience data and information including natural resources (minerals, energy, water) and natural geohazards (earthquakes, natural emissions of hazardous gases, landslides and rockfalls, land subsidence and shrinking and swelling clays) as well as data for environmental management.

Current activities

NATIONAL MINERAL EXPLORATION PROJECTS

Although South Africa is considerably endowed in mineral resources, the long history of mining has resulted in a complete or partial depletion of reserves and resources due to the increasing depth of mining operations. To reverse the declining mining and investment trend in South Africa, the Government of South Africa provided funds to the CGS to acquire high quality geoscience data that may result in the discovery of new mineral deposits to stimulate mining/exploration investment in South Africa. Pre-competitive high quality geoscience data and products are important for reducing the exploration risk and for attracting mining/exploration companies to discover new prospects and deposits.

Funding started in the 2012/13 fiscal year and is divided into phases of three years each. The current Phase 2 runs from 2014/15 to 2017/18. The funding is believed to continue to Phase 3 (2019–2021).

The methods of investigation to acquire new data include:

- Selection of mineral belts based on several factors including the comprehensiveness of previous exploration, geological exposure (mineral belts and districts with poor exposure are given higher priority) and mineral occurrences/deposits.
- High resolution (200 m line spacing) airborne geophysical magnetic and radiometric surveys
- High resolution airborne electromagnetic (EM) surveys on selected target areas
- Regional soil sampling on a commonly 1 km x 1 km grid and a less commonly 500 m x 500 m grid on smaller mineral belts
- Application of new exploration technologies such as remote sensing
- Geological mapping in selected target areas (1:50 000 or 1:25 000 scale) on selected mineral belts/ districts
- Integration of the acquired data and production of mineral prospectivity maps and results
- Aggregate quality mapping to support the infrastructure development policy of the nation
- Re-interpretation of existing data from previous surveys
- Follow-up ground geophysics and geochemistry on selected mineral potential targets identified from regional surveys

The projects aim at producing the following products:

- Various geoscience maps and

reports (geochemical, geophysical, remote sensing, etc.)

- Integrated mineral prospectivity maps and reports
- The newly acquired data (as a national asset) can be re-processed and/or used by researchers for various purposes, such as mineral, water, environmental and other studies.

SEISMOLOGICAL ACTIVITIES

South Africa is considered a stable continental region and thus experiences low to moderate seismicity. However, the CGS has been operating and maintaining the South African National Seismograph Network for a number of years and has thus managed to create a fairly comprehensive database of the seismicity in and around the country.

From the database of the Seismograph Network, it is obvious that more than 80 per cent of South Africa's seismicity occurs within the mining regions, most especially the gold mining regions. Thus, the CGS is actively monitoring the mining regions and is participating in a number of studies to understand the mechanisms behind the seismicity and ultimately to assist in various mitigating activities. In addition, the CGS uses the database, and other available sources of data, to perform seismic hazard assessments for the country and for the construction of critical structures, such as dams, power plants, pipelines, etc.

Unfortunately, a legacy of the active mining of the country is the old abandoned mines which are currently filling up with water. The water ingress has re-introduced seismicity into areas, such as Johannesburg, which had previously experienced a drop in induced seismicity. The mechanics of fluid induced seismicity within the abandoned mines is a topic which the CGS is researching and the threat to Johannesburg thus needs to be quantified. The CGS has therefore embarked on a microzonation study of Johannesburg with the aim to create a model of the city indicating smaller zones that have relatively similar exposures to various earthquake related effects. The model will be used by the Johannesburg city planning and disaster management departments in order to assist with mitigating any disasters from fluid induced seismicity.

In all, the CGS aims to remain in the forefront of understanding seismicity related to human activity and is involved in various studies around the effects of hydraulic fracturing and blasting and other similar effects.

Internationally, the CGS actively participates within projects such as the Comprehensive Nuclear Test Ban Treaty, where the CGS operates and maintains three seismic stations and one infrasound station. The CGS is also a founding member of the AfricaArray initiative which aims to increase capacity within the geophysics field through training and seismological station installations throughout Africa. Moreover, the scientists of the CGS are involved in international seismic hazard initiatives such as the Global Earthquake Model and the seismotectonic map of Africa.

Experience within all of these projects has placed the CGS in a position which encourages collaboration with neighbouring countries on seismological monitoring and seismic hazard assessments, such as Mozambique, Namibia, Zimbabwe, Malawi, Rwanda, Swaziland, etc.

REGIONAL GEOSCIENCE MAPPING

Geoscience mapping forms the core function of the CGS, and is the basis upon which many of the offered products and services are derived, both nationally and regionally in Africa.

- Geological mapping is working towards the long-term goal of producing national geological map coverage at the 1:50 000 scale; systematic but prioritised into programmes supporting broad national objectives. Integration with the other mapping disciplines (including hydrogeological) is fundamental to the modern multi-disciplinary approach.
- Geophysical mapping involves high density line spacing of 200 m for aeromagnetic and radiometric data over strategic areas of the country.
- Geochemical mapping functions as part of a long-term objective is to provide geochemical coverage of the country from samples collected on a 1 km^2 grid, though a greater sample density has been adopted where necessary.
- Metallogenic mapping seeks to complete a 1:250 000-scale coverage of metallogenic maps with the long-term goal of establishing a programme for metallogenic characterisation with predictive models to locate new mineral deposits.
- Geotechnical mapping has in the past focussed on the environmental and development risks in the major urban areas but the scope will be expanded to produce national environmental sensitivity and natural hazard risk maps.
- Seismological mapping collates data from the National Seismograph Network which consists of three-component, broadband seismological stations. This allows for, amongst others, an on-going assessment of the seismic hazard of South Africa.
- Marine geoscience mapping utilises multi-beam swath bathymetry and side-scan sonar systems to map sections of the continental shelf to focus on potential heavy-mineral resources as well as aiding infrastructure development and informing marine/coastal zone environmental management.

To further the aim of adopting modern geological mapping techniques, an annual Field Mapping School is held to expose young graduates to the practical skills required. Revision compilation of the new 1:1 million-scale geological map of South Africa is being undertaken and will be published in time for the 35th International Geological Congress to be held in Cape Town in August 2016.

SERVICES OFFERED BY THE MARINE GEOSCIENCES

- Single and multibeam bathymetric surveys
- Side-scan sonar surveys
- Single channel seismic surveys
- Magnetic surveys
- Marine engineering site surveys including

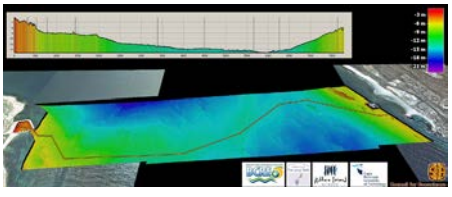
- Pipeline
- Telecommunication
- Outfalls surveys

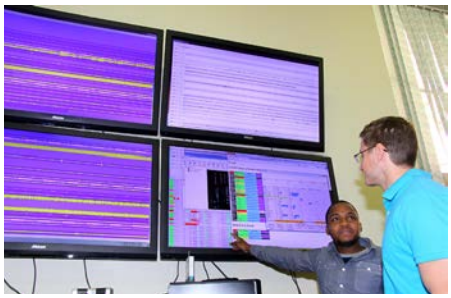
- Harbour development, maintenance and security surveys
- Well site surveys
- Assistance with extended EEZ claims
- GIS data management
- Marine habitat assessment and environmental monitoring programmes
- Coastal and marine environmental impact assessments (EIA)
- Wreck and debris clearance surveys
- Mineral exploration including surveying and sampling
- Scientific diving surveys
- Sediment coring/sampling and chemical analysis
- Coastal, nearshore and offshore sediment dynamics
- Palaeoclimate studies

ENGINEERING GEOLOGY

The newly adopted Geoscience Amendment Act (Act No. 16 of 2010) mandates the CGS to, among other things, be the custodian and curator of all geotechnical information in the country as well as a national mandatory authority in respect of geohazards related to infrastructure development. The Engineering Geology Competency of the CGS, which is based in Silverton, Pretoria, is tasked with providing this expertise. This expertise takes the form of the identification of the potential development of an area and identifying risk conditions, particularly sinkholes, geotechnical problems and landslides.

Engineering geological and geotechnical activities include site investigations, dolomite studies, structural plans for urban planning, referencing and maintenance of the Engineering Geological Databank (ENGEODE),





regional engineering geological mapping and applied research.

Main services rendered by the Engineering Geology Competency

- **Site investigations of buildings, dams and roads**

Manage and conduct engineering geological/geotechnical investigations for various infrastructure developments (dams, tunnels, pipelines, housing developments, cemeteries, waste disposal sites, etc.), from initial reconnaissance through feasibility and design to construction. Engineering geological investigations for dam safety purposes are a specialist focus area.

- **General engineering geological investigations and mapping**

Investigations are done for rural area establishment purposes, as well as feasibility studies for proposed rural areas sites. Where applicable, these investigations are done in accordance with the National Home Builders Registration Council (NHBRC) guidelines.

- **Regional landslide occurrence and hazard susceptibility mapping**

The occurrence of natural hazards is a serious constrain on economic development, particularly in developing countries. The CGS has a statutory programme for the identification and inventorisation of landslides and hazard susceptibility mapping mostly for areas with a steep topography, especially rural provinces as these are becoming increasingly vulnerable.

- **Advisory authority and report reviews role**

The CGS serves as an advisory authority at various local, provincial and national authorities with respect to geohazards and geology that may affect infrastructure development.

The CGS also performs a review function of geotechnical reports that form part of an application to local authorities and local government and central government departments which include:

- Dolomite stability reports, including phase 1 and phase 2 geotechnical reports for township development.

- Approval of these engineering geological reports is done in accordance with state-of-the-art techniques offering independent expert advice on the impact of land uses on dolomite, interpretation of gravity surveys undertaken for dolomite stability investigations and independent reviews of dolomite risk management plans.

- **Engineering Geological Database (ENGEODE)**

ENGEODE is part of the corporate database of the Council for Geoscience and includes information on engineering geological reports, maps and letters as well as detailed descriptions of soil profiles and dolomite boreholes contained in the reports. In excess of 50 000 records are currently stored on the database. This data is utilised by engineering geologists, urban developers and planners alike working in the field of urban development.

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Offical launch of the countrywide high resolution airborne geophysical data of Malawi

The Government of Malawi, through the Ministry of Natural Resources, Energy and Mining, has been conducting a countrywide high resolution airborne geophysical survey with the aim of acquiring new magnetic, radiometric and gravity data for the promotion of the minerals sector. This survey is a component of the Mining Governance and Growth Support Project (MGGSP) which is co-financed by the World Bank and European Union.

The data acquisition phase was conducted between September 2013 and August 2014. The project acquired high resolution magnetic and radiometric data covering the entire country of Malawi and gravity data from three survey blocks. Sander Geophysics Limited (SGL) of Canada was the main contractor and the British Geological Survey international (BGSi) provided quality control supervision. The contractors worked hand in hand with the Malawi Geological Survey Department.

The data has been delivered to the Geological Survey Department from where it can be accessed. In the meantime, the Ministry of Natural Resources, Energy and Mining officially launched the geophysical data as follows:

Venue: Bingu International Conference Centre (BICC)
Date: 20th August, 2015
Time: 09:00 am

The Official Launch of Airborne Geophysical Data was presided over by the Minister of Natural Resources, Energy and Mining, HON. BRIGHT MSAKA, S.C.

For further information contact the Director of the Geological Survey Department by email: jalf.salima@yahoo.com or the Public Relations Officer for Mining by email: levison.undi@gmail.com

Get to the core of GEOLOGY...

The International Geological Congress represents the 'Olympics' of Geology and is held every four years. Cape Town, South Africa will be hosting the 35th IGC in August 2016 on behalf of the African continent. The event will be a Pan African experience with the support of the major African geoscientific societies and related organisations. The expected 6000 - 10 000 delegates will include a large number of African delegates, and field trips are planned to all parts of the African continent.

The IGC was founded in 1876 and is the preeminent global geoscience congress. The 35th IGC will be the largest gathering of geoscientists and affiliated organisations ever held in Africa.

The organising committee of the 35th IGC would like to invite you to participate in this exciting event. You can do this in a number of ways:

The most important aspect of the Congress is its very extensive Technical Programme, featuring papers, posters, short courses and workshops. The principal themes for the scientific program are: **Geoscience in Society, Geoscience in the Economy and Fundamental Geoscience**. Your contribution to this program is crucial.

You can find the call for proposals for symposia, short courses or workshops at http://www.35igc.org or directly at the following link: http://goo.gl/aSLfj8. In addition, please feel free to contact the Technical Chair, Professor Laurence Robb (Laurence.robb@earth.ox.ac.uk) for further information.

We are inspired by what African geology has to offer the world. At the 35th IGC we will raise awareness of the unique, relevant and inspirational work that is happening in our region and on our continent. **You can contribute to the success of the 35th IGC** by sending news and information about your work to lynne@hippocommunications.com for distribution through all our social and traditional media channels.

You can join the conversation on Facebook
https://www.facebook.com/35thigc
and on Twitter @35IGC

IUGS GSSA Council for Geoscience Under the patronage of UNESCO

OneGeology

The ground-breaking project, *The Geological Surveys of the World*, was launched in 2007 and contributed to the 'International Year of Planet Earth', becoming one of the flagship projects of OneGeology.

Thanks to the enthusiasm and support of participating nations, the initiative has progressed rapidly towards its target — creating a dynamic geological map of the world, available to everyone via the web. We invite you to explore the website and view the maps in the OneGeology portal at http://www.onegeology.org/

The OAGS members are urged to become members of OneGeology to benefit from information sharing with other international geoscience and geological survey organisations.

Contact details

Email: onegeology@bgs.ac.uk

Website: www.onegeology.org

PROMIN 6ème Edition

Le Ministère des Mines et de l'Energie organise, les 17, 18 et 19 Septembre 2015 au centre international de Ouaga 2000, la 6è édition des Journées de promotion minière du Burkina (PROMIN Burkina 2015).

L'évènement est placé sous le thème : "Secteur minier : Enjeux et Perspectives pour un développement socio-économique durable".

Merci à vous tous qui allez participer aux six journées de promotion minière du Burkina.

Merci pour votre contribution à la réussite de PROMIN Burkina 2015.

Pour toutes informations utiles, veuillez consulter le site web

www.prominburkina.com

UPCOMING EVENTS

1. Rise of Animal Life (RALI 2015) dans le cadre du projet IGCP591

a. Lieu/Place : Marrakech, Maroc

b. Dates : du 5 au 10 Octobre 2015

c. Contact : Mme (Ms) Khadija EL HARIRI : rali2015@uca.ma, k.elhariri@uca.ma

2. Colloque International des Bassins Sédimentaires

a. Lieu/Place : Fès, Maroc

b. Dates : du 18 au 20 Décembre 2015

c. Contact : Abdellah BOUSHABA : abdellah.boushaba@usmba.ac.ma, abdellah.boushaba@gmail.com

3. Journées Géologiques du Maroc

a. Lieu/Place : Rabat, Maroc

b. Dates : du 10 au 12 Mai 2016

c. Contact : Ahmed BENLAKHDIM : a.benlakhdim@mem.gov.ma

4. La 6ème édition des Journées de Promotion Minière

a. Lieu/Place : Ministère des Mines et de l'Energie du Burkina Faso

b. Dates : 17 au 19 Septembre 2015

c. Contact : M. Jean Alphonse Some jalsome@yahoo.fr

5. LEGACY OF THE 35th IGC

Publications

Two publications will be released during the 35th IGC:

• A publication on the 50 most impressive geoheritage sites on the African Continent. This promises to be an impressive publication and the intention is to provide a copy to each congress delegate. The publication will focus on the top world-class geoheritage sites on the African continent, tthe huge tourist potential offered by these

magnificent geosites and the need for their future preservation.

• A set of two publications on the major mineral deposits of the African continent. This promises to be very useful publications and should stimulated renewed interest in the tremendous mineral potential of Africa.

Stamps

A special issue of 10 stamps and two first-day covers will be released by the South African Philatelic Bureau during the 35th IGC. These 10 stamps will highlight the 10 most impressive geological superlatives in South Africa and will commemorate the third geocongress to be held in the African Continent.

HOW TO QUALIFY FOR THE 35TH IGC GEOHOST PROGRAMME

GeoHost is a support scheme that aims to provide financial support to selected young earth scientists from around the globe, or eligible geoscientists who live and work in low-income countries to attend the 35th IGC in 2016. Financial support obtained by the 35th IGC through sponsorship or funding mechanisms will be utilised to assist young geoscientists (including YES participants) and geoscientists from low-income countries to participate in the 35th IGC as full delegates. GeoHost applicants have to present a paper or poster during the 35th IGC.

Why apply?

• Have you always wanted to attend a major scientific event?

• Do you see yourself as a future leader in the global geosciences?

• Do you want to share your geoscientific research results on the international stage?

• Do you want to develop your career, grow your network and enhance your professional standing?

Stream A - Early Career Earth Scientists

• Earth scientists located anywhere in the world who will be 33 years of age or younger on 31 December 2016.

Stream B - Deserving Earth Scientists from Low-Income Countries

• A passport from a World Bank-designated low-income country is required and a copy of the photo page must be provided on application.

Please see the following website for a list of official low income countries:

http://data.worldbank.org/income-level/LIC

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