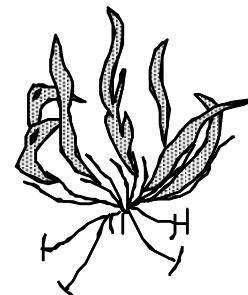


# Geological Society of Zimbabwe



## Newsletter

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June 2009

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*Orbicular Granite, Diana's Pool, Matopos      Photo: Sue Brooks, April 2009*

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The Committee, on behalf of the Geological Society of Zimbabwe, would like to offer a sincere vote of thanks to Marion de Beer of *Cadline* for preparing and printing our Phaup and Bond Award certificates for 2008 -- free of charge. This is, as previously, a wonderful gesture of Marion's time and skills and we can only encourage all you geologists and mining houses to steer your Autocad mapping work in her direction and to take advantage of at least 30 years of hard-won cartographic experience. *Cadline* also offers monochrome printing and scanning services in formats up to A0. Their telephone contact is 04-2917261/60 Tel/Fax is 04-301855 and the address is 94B Pendennis Road, Mount Pleasant in Harare. [marion.debeer@cadline.co.zw](mailto:marion.debeer@cadline.co.zw)

## Editorial

This edition of the Newsletter is the first under the Chairmanship of Forbes Mugumbate. We wish him well during his tenure and hope that as a Society we can help work towards the Centennial Celebrations of the Geological Survey in 2010. This institution has generated a proud record in its time and deserves to boast its achievements. It takes time to organize events and we look to pro-active leadership and initiative from the staff at the Geological Survey under its parent Ministry, that of Mines and Minerals Development, whose new Permanent Secretary is Mr Thankful Musukutwa. Mr Musukutwa is a mining engineer by profession who has been moved from his office in the mining sector of the Reserve Bank.

Much of this Newsletter covers report back from our February AGM, including the past Chairman's report for 2008, the Treasurer's Report and citations for the Phaup, Bond and Viewing awards. Our news contributors from the Geology Department and Geological Survey are, as always thanked for their efforts. We are still trying to wind up news from our geologists, wherever they may be on this planet, so please let us have snippets.

We have learnt of the deaths of two former members of the Society. 'Chick' Bohmke (Chairman 1983-84) worked prominently with Rio Tinto before his retirement into consultancy, in which field he served extensively in Tanzania. We hope to present an obituary in our next Newsletter. Then the news comes that Phillip Oesterlen, who mapped the Kanyemba area of the Zambezi Valley and contributed greatly to the Geological Survey as Chief Field Geologist in the 1990's, succumbed to the ravishes of cancer on 25<sup>th</sup> May in his native Germany.

This is an early announcement of this year's Summer Symposium to be held on Friday 27<sup>th</sup> November. It gives you all plenty of time to think about a subject and prepare your presentation for this event, which has become a highlight in our professional calendar.

Importantly Martin Spence from ACR is giving a talk on **Diamonds - De Beers' Successful Advertising/Marketing Strategies** at the Astra Business Park Lecture Theatre, corner Ridgeway North and Northend roads, Borrowdale ☐at 17.30 hours ☐on 19th June 2009. We look forward to seeing you there.

We have also made progress with regional co-operation, the latest contact being the Association of Zambian Mineral Exploration Companies - e-mail [azmec@iconnect.zm](mailto:azmec@iconnect.zm) or [info@azmec.co.zm](mailto:info@azmec.co.zm). They have drinks the first Friday of every month (somewhere in Lusaka) and invite anybody from the GSZ if they are around. The secretary is Julian Green and he is keen to promote our Summer Symposium amongst his members.

Keep your eye on announcements for a field trip to the Karoo uranium deposits to the north of Kariba in Zambia, which we are trying to facilitate.

We are also in contact with the Geological Society of Africa, and those of South Africa, Botswana and Namibia. It is time for us to re-enter the real World.

Don't forget to feed the Committee titles on Zimbabwe geology for consideration in the Phaup Award for 2009.

*Tim Broderick*



## Chairman's Chat

Forbes Mugumbate

I would like to start this chat by thanking the previous committee chaired by Collins Mwatahwa for successfully running the Society under very difficult socio-economic conditions. The collapse of the national economy during the tenure of the last Committee has been described as the most dramatic in history outside a war zone or a major natural calamity. Our Zimbabwe Dollar bank account was rendered worthless by hyperinflation. However, despite this and security concerns especially towards the June 2009 general election run-offs, the Society managed to conduct field trips and host talks, and the Committee capped their term by organising a successful AGM and dinner, which were well attended. It is at this AGM that the new Committee comprising myself, Forbes Mugumbate, as Chairman, Daniel Chatora, Tim Broderick, Collins Mwatahwa, Bornwell Mupaya, Houda Bouammar, Kudzai Musiwa, Kosmas Chenjerai, Gayle Hanssen, Andrew du Toit and Hillary Gumbo was inaugurated. This Committee undertakes to put maximum effort towards running the affairs of the Society.

Tribute is paid to our members who attended the AGM and dinner. The turnout was great despite economic challenges. Please continue to support your Society's activities including participating in field trips and attending talks. As per tradition, the AGM was used to celebrate achievements of winners of the Society's awards namely the Phaup Award given to the author(s) who made the most important contribution to the Geology of Zimbabwe through publishing results of research in internationally acclaimed journals; the Geoffrey Bond Award given to the best BSc Honours Degree project at the University of Zimbabwe; and the Mike Vinyu Award given to the best student at the School of Mines. We congratulate the winners.

Paul Chimbotza is thanked for spicing up events at the AGM with his humorous presentation on the trials and tribulations that a potential investor has to be subjected to by the bureaucracy at the Ministries of Mines and of Finance. We can only hope that the attitudes of officials in government improve as the economy improves.

Tim Broderick who continues to be the Editor of the Newsletter is commended for an exceptional job of ensuring production of the issues. The Newsletter remains the most important medium of communicating Society issues and events. The last issue had interesting information on what is happening to a few of our fellow geoscientists. Please contribute bits and pieces of information to make the Newsletter more exciting. We know Zimbabwean geoscientists are found all over the globe, so we need to know what you are doing out there.

The formation of the all-inclusive government has brought some stability to the country. There are definite signs of economic recovery. This new impetus should also reflect on the activities of the Society. Last year the Society managed three field trips and one talk. This year we should do more. For field trips, the intention is to use some of them to prepare for possible international trips next year for the centenary celebrations of the formation of the Geological Survey.

The Society, like many organizations holding FCAs, was affected by the Reserve Bank of Zimbabwe's policy of unilaterally seizing funds from account holders. Our Barclays Bank FCA, which was reported to be healthy at the AGM, fell victim to this policy when US\$19 036.98 was taken away. Efforts are being made to recover the money.

The situation at the Geology Department at the University of Zimbabwe remains critical. Please forward any ideas for reviving the Department. Our Society and the industry we serve will not survive for long without constant supplies of geologists from this Department.

I would like to end this chat by reminding readers that their membership subscriptions for 2009 are now due. So far about 40 members have paid up. Please remind colleagues to renew membership now. The annual charges are US\$10 ordinary membership; US\$20 foreign members; and US\$100 for Institutional membership.

## Articles and Reports

### Nyanga Archaeology— Reply to Love and Walsh

Ann Kritzinger

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Several of the points raised by Love and Walsh are similar to those argued by Burritt, John, Mupira, Soper and Sutton, and answered by me in *Cookeia* (Kritzinger 2008a). Dissent based on agricultural conjecture will persist until the build-up of direct evidence from geological and metallurgical analyses forces a reappraisal of Nyanga archaeology. Sight of results from samples taken on the ZGS/GSZ team visit last year will be useful in this regard, and advice concerning “the way forward in conducting an orientated geochemical soil survey” (Ed. note, Kritzinger 2008) appreciated when available.

Mineralogical analysis, not conjecture, will determine the reason for the anomalous coarse sand fraction and other geomorphological inconsistencies when a relevant programme is funded. Most of Love and Walsh’s assumptions are misguided and need correcting. For instance the magnetite comment I made (Kritzinger 2008:6) was nothing to do with its wide occurrence but a specific reference to the crushing and panning of sorted quartz – ‘black sands’ in the pan is a clue to prospectors worldwide that gold-bearing eluvial and/or alluvial deposits may be present (Kritzinger 2008b). The “cairns” referred to by Love and Walsh are composed of a high proportion of hand-sorted quartz. Summers points out that cairns are “very large indeed” near Ziwa “[pit] enclosures”, and “sometimes standing on the top of pillars of soil in gullies” (1958:24). This relationship, out of character with “the clearing of stones from fields”, occurs in other districts where ore-dressing is evident. Positive assay results are to hand and visible gold has been found.

I have not released a paper on my assay data beyond one paragraph and its footnote featuring results to August 2008 (Kritzinger 2008a:14). Soil samples from drains, tunnel and tank infill, and oven-type structures commonly found on or near tank platforms, all show direct evidence of gold, commonly 0.06-1.4g/t. A newsletter is not the place to publish a full report, but it is necessary to inform Love and Walsh that the customary “repeat analysis” was made on the two “above 0.1 g t<sup>-1</sup> gold” drain samples of 12 g/t and 1.78g/t in June 07 and Jan 09 with results of 0.72 and 0.09g/t respectively. Method of testing, fire assay-lead oxide fusion & AAS finish; accredited labs listed in Kritzinger 2008a:23.

John considers that even low assays of 0.06-0.09g/t are “too high to be background gold levels – they are definitely ore and residue type results ... Thus it does seem they were doing something along the lines of processing gold there” (email, 02/02/09). Such residue figures are significant for a system “purpose built for the recovery of gold” where the higher values would have been extracted. They therefore conform with my waste “comparison to the Central Rand gold dumps”.

I take the points about remote Golden Mile and Fourkoura. Exploration in the Muda River area of Mozambique is more comparable, where “efforts to locate the host to the [eluvial and alluvial] gold by bedrock crushing and panning have shown its presence in a variety of rock types ... [including] north trending dolerite dykes (CAMEC Dec. 2004). The statement that “Primary gold deposits are unknown in

Zimbabwean dolerites” is a generalisation that misunderstands the nature of the ore being mined in the top terraces of Gungutsva Mine. There is “evidence in the mining [panning and sluicing] of riverbeds” in five rivers 2-6km from the mine, and environmental concern is growing about the panning of rivers across the Eastern Highlands (fig. 1).

Alluvial gold has to originate from a primary source. In Nyanga, secondary enrichment commonly formed on hillslopes between the lode and the river, appears to be missing. Research to date demonstrates that surface deposits have been worked-out some time in the past in a skilful method of bench-mining. There appear to be “no local beliefs as to who built the terraces and when” (Matowanyika 1991, referenced in Soper 2002:4). When terraces are met with face to face intensive terrace farming in this high-rainfall region—especially irrigation in relation to the “Drylands” or “semi-arid” type referenced by Love and Walsh—loses credibility.

Unlike the natural terraces they introduce “southwest of Nyatsundzuru”, the terraces I am referring to are manmade, very narrow, with retaining walls that record well in Landsat imagery. Relevant 1:25 000 and 1: 50 000-scale topographical maps do not show this type of terrace in the Udu Valley. I am therefore unsure where Love and Walsh locate their “mapped” terraces but boulders characterised by the colour and hardness of dolerite outcrop at the Udu Valley chalets. They appear to be outliers of the large [porphyritic]dolerite sill straddling Nyangombe Falls 2 km due west near the Udu confluence (Tyndale-Biscoe 1957, map). Stocklmayer (1978) shows Udu headstreams between two dolerite dykes trending north-east toward Nyamakanga Hill from the upper Udu Valley at the southern extremity of his map.

My views on “cattle pens .. hut circles .. small gardens .. furrows .. dung to fertilise their fields” are published in *Cookeia* (Kritzinger 2008a). Early investigations suggest that “hut circles” is a misnomer. Ongoing studies agree with Summers’ explanation that the stone-ringed floors are “grinding places on their apparent openness and the consistent presence of grindstones” (Soper 2002:109; *see also* Summers 1958:82). In March 2009 Musiwa recognised evidence of gold-milling work in progress. Batteries of grinding grooves in flat outcrops increase the output potential of these pre-mechanical work places (fig. 2).



*Fig. 1. Panners' environmental damage, Nyachara River, Sanyatwe*

*Fig. 2. Grinding Grooves. A 2-kg sample from where the owner is standing at a milling site near Gungutsva Mine assayed 1.34 g/t gold. No seeds of cultigens were found to indicate this was a 'domestic' site.*

To say that “there is no history of mining” with regard to “gold processing” in the Eastern Highlands is to disregard the 21 Manyika gold- and ten iron-mining “localities” documented by Pereira as “discovered 1500” (Pereira 1857; Kritzinger, forthcoming). In defence of this historical evidence it is hoped to conduct an archaeomagnetic dating exercise on selected burnt-dhaka sites. Contact needs to be made with a geophysicist having experience in Zimbabwean magnetics for expert advice and sampling.

It is most unlikely that there is any threat to Ziwa National Monument. Environmental impact assessments obligatory for any future mine development must engage with National Museums and Monuments of Zimbabwe, encourage community involvement, respect the views of chiefs and address the

issue of culture invasion (Musiwa 2008:48-51). The recommendations will balance positive and negative factors related to socio-economic impact.

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**Note:** A full paper on this subject can be obtained from Ann Kritzinger [annkritzinger@gmail.com](mailto:annkritzinger@gmail.com) or the Editor on request.

## A Note on the Orbicular Granite in the Diana's Pool Area, Matopos, Rhodesia

*O.G. Garvie*

The orbicular granite, briefly described, was discovered by Owen Garvie in the Diana's Pool area in the south-eastern Matopos about 36 miles east of Bulawayo.

The orbicular granite outcrop, approximately 400 yards downstream from the Diana's Pool waterfall, is roughly triangular in shape. The surrounding country rock is Matopos Porphyritic Granite, which has a north-easterly foliation. Many small mafic inclusions are present in the granite and are probably inclusions of partly granitized amphibolite material.

The only other rock in the vicinity of the orbicular granite is a dolerite dyke approximately 10 to 30 feet wide extending in a north-westerly direction from the orbicular granite for a distance of about a quarter of a mile. There is no visible contact between the orbicular granite and the dolerite dyke, as here the dolerite dyke is broken into boulders and is difficult to trace further downstream from the orbicular granite.

The orbicular outcrop is small in extent, measuring approximately 150 feet long and 100 feet wide at its broadest. Most of the outcrop lies in the Diana's Pool stream and consists of large boulders. Because of their size and angular form, and their position adjacent to the true outcrop of orbicular granite within the Matopos Porphyritic Granite, it is unlikely that they have been transported any distance and therefore are in place.

The contact zone between the orbicular granite and the Matopos Granite can be seen on the northern bank of the stream and in patches in the stream bed. This consists of an outer coarse-grained pegmatitic quartz zone grading into an inner fine-grained aplitic zone.

The orbicular granite is made up of large and small orbs ranging in size from 2 to 8 inches in length and from 2 to 5 inches in width. In shape the orbs range from spheres to triaxial ellipsoids. The orbs make up approximately 60 - 70 % of the volume of the rock, and may be so closely packed that their outlines are modified by contact with each other, or else they may be separated by enough groundmass material that allows their form to be fairly regular. The cementing matrix between the orbs is granite in composition and in places shows a pegmatitic character. Most of the ellipsoids show a tendency towards orientation of the long axis in the direction of the foliation of the Matopos Porphyritic Granite.

Chemical analyses were carried out on various parts of the orbicular granite by the Geological Survey of South Africa and the National Metallurgical Institute in Pretoria.

A number of hypotheses have been proposed for the orbicular origin in granite, but it is doubtful that any one should be rigidly applied to all occurrences. Further detailed petrological studies are being carried out by the author in order to establish the true origin of these rare and beautiful rocks.

| Sample No.                         | 1            | 2            | 3            | 4            |
|------------------------------------|--------------|--------------|--------------|--------------|
| <b>SiO<sub>2</sub></b>             | 62.98        | 53.15        | 73.90        | 63.55        |
| <b>Al<sub>2</sub>O<sub>3</sub></b> | 19.57        | 20.33        | 11.03        | 16.82        |
| <b>Fe<sub>2</sub>O</b>             | 0.97         | 7.76         | 1.01         | 3.46         |
| <b>FeO</b>                         | 2.93         | 5.33         | 4.21         | 4.21         |
| <b>MgO</b>                         | 0.48         | 0.27         | 0.76         | 0.50         |
| <b>CaO</b>                         | 4.50         | 4.35         | 0.98         | 3.21         |
| <b>Na<sub>2</sub>O</b>             | 5.94         | 6.76         | 1.96         | 5.00         |
| <b>K<sub>2</sub>O</b>              | 1.66         | 0.50         | 4.71         | 2.25         |
| <b>H<sub>2</sub>O<sup>-</sup></b>  | 0.17         | 0.12         | 0.16         | 0.12         |
| <b>H<sub>2</sub>O<sup>+</sup></b>  | 0.20         | 0.21         | 0.62         | 0.52         |
| <b>TOTAL</b>                       | <b>99.34</b> | <b>98.78</b> | <b>99.24</b> | <b>99.55</b> |

1. Core of orbs, orbicular granite, Diana's Pool
2. Shell of orbs, orbicular granite, Diana's Pool
3. Matrix of orbicular granite, Diana's Pool
4. Whole-rock, orbicular granite, Diana's Pool

Adapted from the *Quart. News Bull., Geol. Soc S. Afr*, Vol. 12 (4), December 1969, pp. 11-12.

## The Origin of the Orbicular Granite at Diana's Pool, south-eastern Matopos, Rhodesia

*O.G. Garvie*

The Diana's Pool area, in the Matopos hills includes large bodies of amphibolite, migmatite and granitic gneiss. The orbicular granite itself lies within the Matopos Granite and is roughly triangular in shape and small in extent. The orbs have cores chiefly of plagioclase, biotite and occasional original hornblende surrounded by alternating plagioclase-rich and biotite-rich shells.

Radially oriented biotite, magnetite and plagioclase are common in the cores. Tangentially and concentrically oriented biotite and magnetite form the biotite-rich shells. Field and laboratory evidence suggests that the orbs formed as abnormal by-products during the granitization of granitization of amphibolite. Orbicular formation involves feldspathization with contemporary quartz enrichment.

Metamorphic orbs and liesegang rings are compared. Both result from diffusion processes that produce discontinuous periodic crystallization. Growth analysis, carried out by measurements of shell spacing, aid in determining the metamorphic mechanism of orbicule formation. The orbs of the Diana's Vow orbicular rock have shells exponentially spaced and resulted from rhythmic diffusion processes. Laboratory evidence suggests that the orbicule formation involved migration of Ca, Na and Si ions inwards towards the orb centres, and simultaneous outward migration of Mg and Fe ions away from the centres of crystallization.

Abstract, *A Symposium on the Granites, Gneisses and Related Rocks of Rhodesia, 1971*. Geol. Soc. S. Afr., Rhodesian Branch, Salisbury, p. 18.

## Timing of thermal stabilization of the Zimbabwe Craton deduced from high-precision Rb–Sr chronology, Great Dyke

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### Abstract

Dating low temperature events such as magmatic cooling or (hydro-)thermal surges in Archean and Proterozoic terranes is crucial in defining cratonal thermal stabilization after episodic continental growth during the Archean and Early Proterozoic. Rubidium–Sr chronology is potentially a powerful tool in this regard because of its low closure temperature, i.e.,  $\Delta T < 400^\circ\text{C}$  in most minerals, but has until now been hampered by its relatively low precision compared to high-temperature chronometers. Consequently, Rb–Sr age investigations have so far failed to provide high-precision age constraints on the cooling of rocks older than  $\approx 2$  Ga. Here, it is demonstrated that internal Rb–Sr microchrons can yield important, high-precision age constraints on the cooling history of Archean intrusions. After careful mineral selection and chemical treatment, a Rb–Sr age of  $2543.0 \pm 4.4$  Ma was obtained from the Archean Great Dyke, Zimbabwe Craton, in contrast to the intrusion age of  $2575.8 \pm 1$  Ma, yielding an ambient average cooling of  $\approx 5 \pm 2^\circ\text{C/Ma}$ . The non-disturbed magmatic Rb–Sr cooling age of the Great Dyke marks the final stage of Zimbabwe Craton stabilization and that the greater craton area did not experience any intensive later reheating event during metamorphic or tectonic events.

*Precambrian Research* **164** (2008), 227–232

## Major and Trace Element and Sr, Nd, Hf, and Pb Isotope Compositions of the Karoo Large Igneous Province, Botswana-Zimbabwe: Lithosphere vs Mantle Plume Contribution

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We report major and trace element abundances for 147 samples and Sr, Nd, Hf, and Pb isotope compositions for a 36 sample subset of basaltic lava flows, sills, and dykes from the Karoo continental flood basalt (CFB) province in Botswana, Zimbabwe, and northern South Africa. Both low- and high-Ti ( $\text{TiO}_2$  52 wt % and 42 wt %) rocks are included. MELTS modeling shows

that these magmas evolved at low pressure (1 kbar) through fractional crystallization of gabbroic assemblages. Whereas both groups display enrichment in light rare earth elements (LREE) relative to heavy REE (HREE) and high field strength elements, and systematic negative Nb anomalies, they differ in terms of contrasting middle REE (MREE) to HREE fractionation, which is greater for the high-Ti basalts. This reflects different depths of melting of slightly enriched mantle sources: calculations suggest that the low-Ti basalts were generated by melting of a shallow spinel-bearing (2% spinel) lherzolite, whereas the high-Ti magmas originated from a deeper-seated garnet-bearing (2-7% garnet) lherzolite. In most isotope plots, the high-Ti lavas together with the picrites define a common trend from Bulk Silicate Earth (BSE) to compositions with strongly negative eNd<sub>i</sub> and eHf<sub>i</sub> akin to those of some nephelinites and lamproites. The low-Ti rocks are shifted from BSE-like to more radiogenic Sr isotope ratios, indicative of upper crustal contamination. Trace element and isotope characteristics of the Karoo magmas require a combination of enrichment processes (subduction induced?) and long-term isolation of the mantle sources. We propose two distinct scenarios to explain the origin of the Karoo province. The first calls for polybaric melting of spatially heterogeneous, partially veined, sub-continental lithospheric mantle (SCLM). Calculations show that mixing between SCLM (BSE) and a strongly Nd-Hf unradiogenic nepheline-like component (sediment input?) could account for the compositional variations of most of the high-Ti group lavas, whereas the mantle composition responsible for the low-Ti magmas is more likely to be similar to a vein-free, metasomatically enriched SCLM component. The second scenario involves mixing between two end-members represented by the SCLM and its deep-seated alkalic veins and a sub-lithospheric (asthenospheric- or ocean island basalt-like?) mantle plume. In this case, the data are compatible with an increasing mantle plume contribution as the plume rises and expands through the lithosphere. Regardless of which of the two scenarios is invoked, the spatial distribution of the low- and high-Ti magmas matches the relative positioning of the cratons and the Limpopo belt in such a way that strong control of the lithosphere on magma composition and distribution is a mandatory requirement of any petrogenetic model applied to the Karoo CFB.

*Journal of Petrology* Advance Access published April 28, 2007

## **The relationship between regional stress field, fracture orientation and depth of weathering and implications for groundwater prospecting in crystalline rocks**

*Richard Owen, Abel Maziti and Torleif Dahlin*

### **Abstract**

In a uniform granite gneiss study area in central Zimbabwe, lineaments oriented parallel to the maximum regional compressive stress orientation exhibit the thickest regolith development, while lineaments oriented perpendicular to the maximum compressive stress show the shallowest development of weathered regolith. The principal fracture set orientations were mapped using aerial imagery. The regional stress field, estimated from global stress maps, was used to determine the stresses acting on each principal lineament orientation. Multi-electrode resistivity profiling was carried out across fractures with different orientations to determine their subsurface regolith conditions. The results indicate that the 360 and 060° lineaments, which are sub-parallel to the principal compressive stress orientation ( $\sigma_1$ ) exhibit maximum development of the regolith, while 130° lineaments perpendicular to  $\sigma_1$  do not exhibit significant regolith development. Since regolith thickness has been positively correlated with groundwater resources, it is suggested that fractures with orientations sub-parallel to the principal compressive stress direction constitute favourable groundwater targets. Knowledge of the regional stress field and fracture set orientations can be used as an effective low cost tool for locating potentially higher yielding boreholes in crystalline rock terrains.

*Hydrogeology Journal* (2007) **15**: 1231–1238

## **The A.E. Phaup Award for 2008**

**Citation for the winning paper adjudged as making a significant contribution to the furtherance of Zimbabwe Earth Sciences from refereed published scientific papers not considered for the award in 2007 and appearing in print in 2008.**

**Jens E. DANIELSEN, Torleif DAHLIN, Richard OWEN, Pride MANGEYA and Esben AUKEN. 2007. Geophysical and hydrogeologic investigation of groundwater in the Karoo stratigraphic sequence at Sawmills in northern Matabeleland, Zimbabwe: a Case History.**  
*Hydrogeology Journal*, **15**, pp. 945 – 960.

### **Abstract**

Geophysical and hydrogeological investigations have been carried out around Sawmills in Zimbabwe, Africa. The investigations are components of a larger investigation to assess the groundwater potential of the Karoo sedimentary basin with regards to supplying water to Bulawayo City. The Sawmills area was selected due to the availability of borehole logs indicating favourable stratigraphy for groundwater availability and due to the high yields from the aquifers measured from these boreholes. Data collected using two geophysical methods are presented here: transient electromagnetic (TEM) and continuous vertical electrical sounding (CVES) data. The data have also been processed using laterally constrained inversion (LCI). Because the CVES provides greater detail in the shallow subsurface, whereas TEM is more effective at depth, a more accurate image of the entire subsurface profile is provided based on using both methods. The results suggest that LCI of CVES and TEM data, in the subsurface at the required depths at Sawmills, is able to provide a substantially more accurate image of the subsurface than either method alone. The hydrogeological interpretation of the geophysical data is valuable for determining the depth to and thickness of the potential aquifer horizon(s) and for identifying the position of potential recharge zones.

Your sub-Committee, comprising Forbes Mugumbate and myself, considered a total of nine published papers on the geology and related disciplines of Zimbabwe for this year's presentation of the A.E. Phaup Award. With difficulty and after due deliberation the choice was narrowed to three contenders before deciding on the final winner. It gives me great pleasure to be able to present this citation, especially as the subject is within my own adopted discipline. The presentation for this winning paper serves to recognize a number of aspects relating to the development of ground water investigation and hydrogeology in Zimbabwe.

Firstly, it was in the Gwai Reserve, as the Communal Lands surrounding Tsholotsho were originally termed, that the application of Earth Resistivity for ground water investigation was first applied in 1934. James Crighton Ferguson, who had been using the geophysical method in Australia, had just joined the Geological Survey of Southern Rhodesia. It was he who first trained the ground water investigation officers of the Irrigation Department in the use of the Mega. Names such as Stobart Valaro, Les Hindson and Davidson come to mind for the far-reaching contribution they made to the establishment of rural water supplies in our country. Ferguson was to become Director of the Geological Survey and the inaugural Chairman of the Geological Society of South Africa, Southern Rhodesia Branch (our predecessor) in 1959.

Secondly, it is to recognize the very fine and effective ground water work achieved by the geophysicist to the Rhodesia Railways, Mr D. MacDonald, whose highly detailed investigation records from 1950 onwards represent a most valuable archive. Steam engines needed water and the long 220 km straight across the waterless Kalahari Sand between Sawmills on the Umguza River and Dete represented the greatest challenge. This work resulted in the investigation and development of large yielding well fields in the Nyamandhlovu aquifer, at Sawmills where artesian water was established, at the Gwayi River Station, Intundhla and Water Loop south-east of Dete. In 1962 Geoffrey Bond and MacDonald first described the hydrogeology of the ~400 metre-deep artesian boreholes at Sawmills that had, using a cable tool rig, penetrated the full Upper and Lower Karoo sequence into Basement and which form the basis of the paper here honoured.

Thirdly, we are to appreciate the very real Scandinavian support that has been given to the furtherance of hydrogeology in Zimbabwe – three of our winning authors represent Norway, Sweden and Denmark and we acknowledge the relevant project involvement, particularly that channelled through SIDA, the Swedish International Development Agency. Richard Owen, who I am happy to state had his formative hydrogeological experience with my own consultancy, has been largely responsible for establishing the Hydrogeology Group at the Geology Department, UZ. He brought a sophistication in his approach to the subject and through his own initiative established the strong links with Sweden, which eventually resulted in the granting by one of their institutions his well-earned Doctorate. Not only that, he has produced a list of worthy students, not least of which is Pride Mangye a co-recipient of the award tonight. It was Richard

Owen's group who represented the obvious choice of partner to join SWECO in their contract to investigate the time-honoured concept of the water pipe line to Bulawayo from the Zambezi. It was they who instituted the step-by-step approach by utilizing available water supplies on the way to the Zambezi. Underground water represents an important and cost-effective component to this available resource and the Nyamandhlovu Aquifer had been investigated and developed to augment Bulawayo's water supply during the 1992 drought. The Sawmills area represents the obvious next target for ground water elucidation in the project given the available information that includes detailed drilling and test pump data.

Basalts and sandstones of the Upper Karoo Group are exposed by down grading of the Umguza River through the Kalahari Sand cover at Sawmills. This allowed surface geological mapping to augment the vertical stratigraphic control given by the existing borehole logs, which was further refined by down-hole conductivity and natural gamma measurements. The structural and geological controls to the Karoo basin margin sedimentation and for the artesian aquifers that extend through the Lower Karoo needed to be understood. This was done through the careful screening, refining and application of geophysical methods. Eventually a combination of geoelectrical methods comprising continuous vertical electrical soundings (CVES) and transient electromagnetics (TEM) were adopted. The first dataset gave the best resolution along profiles of the shallow environment comprising in particular the 50 to 80-metre thickness of the Karoo Basalt above Upper Karoo sandstones and mudstones. The latter gave improved resolution for the deeper, down-faulted Karoo sedimentation but, due to the anisotropy introduced by interflow weathering within the basalts and the presence of interbedded resistant sandstone with more highly conductive mudstone and carbonaceous shale, it was found necessary to process the captured data through the application of laterally constrained inversion (LCI) techniques. In all 31 km of CVES profiling and 309 TEM soundings were completed over two field seasons under the guidance of geophysicists in their own fields of expertise. This involved students from a number of departments at UZ and resulted in the compilation of a minimum of two post-graduate degrees with the consequent gain in knowledge, particularly in the application of refined geophysical techniques within a very difficult hydrogeological environment. An interpretation of the combined resistivity sections and depth slices through the investigated area at Sawmills allowed a plausible structural model to be constructed that defines block faulting and stratigraphic layering. This in turn facilitates the economic location of boreholes, the drilling and testing of which represents the continued benefit of this positive investment. The ability within Zimbabwe to adapt and apply more sophisticated geophysical methods to important ground water studies in varying geological environments is commendable and now within our reach.

It is fitting, therefore, to recognize the import of this paper, as well as the initiatives and efforts made by the various authors, which have led to significant advances in the application of hydrogeology and geophysics to the meaningful development of elusive ground water resources in Zimbabwe. Surely this represents a window into the future well-being of Zimbabwe.

I thank you all and join with you in congratulating the authors. I ask Richard Owen to receive the certificates from the Chairman.

*Tim Broderick and Forbes Mugumbate*  
February, 2009

## **Citation for the Geoffrey Bond Award for 2008**

It gives me great pleasure and honour to write the citation for the Bond Award-winning BSc Honours dissertation for the 2007/2008 academic year. It is a miracle that the Department of Geology (with only two permanent members of staff against an established compliment of 17) managed to defy extreme odds of declining manpower availability as well as financial resource constraints to see the 2007/2008 Honours class to a successful end. So biting was the extent of the manpower shortage that we had to ask an external examiner (Dr Mulindelwa Lupankwa of Tshwane University - RSA) to help out with a third opinion on the dissertations! A total of five of these projects were submitted for examination.

All of them were of high calibre in terms of the clarity of their research objectives, methodologies, interpretations and the major conclusions arrived at. Clifford Maramba's dissertation was, however, outstanding, particularly in terms of both text and map presentation. The work was carried out in the Shamva Mine area on a presumed extension of a Shamva Mine orebody.

The project by Mr Maramba sought to explore the detailed relationship in terms of both structural continuity and mineralisation styles. A geological framework comparison approach was employed, with a good measure of success, to distinguish the two workings and revealed that both could be part of a continuous structural and mineralization system, even though the Danton deposit may not be continuous with that of the Shamva Mine.

The geological framework comparison approach used here is a practical tool, which the Shamva Mine authorities will find most beneficial to use in all their future exploration programmes around the mine and beyond. It is this practical application of Maramba's project methodology to modern day mineral exploration that makes it the most suitable to recommend for the 2008 Bond Award.

*Dr Dennis Shoko*

### **The geology and gold mineralisation relationships between Shamva Danton claims and Shamva Mine; Could Danton be an extension of Shamva Mine orebody?**

*Clifford Maramba*

#### **Abstract**

Shamva and Danton old workings are separated by approximately 2 km. They occur in the Bindura-Shamva Greenstone Belt about 90 km from Harare. Danton old workings and particularly its extension towards the Shamva Mine have not been investigated to establish their relationship to Shamva Mine in terms of gold mineralisation. A geological framework comparison approach was employed to distinguish the two workings and this revealed that both could be part of a continuous structural and mineralisation system, even though the Danton deposit may not be continuous with the Shamva Mine deposit. The Danton deposit is located in a pyritiferous volcaniclastic unit and its orientation aligns with the north-east Shamva Mine trend. Sulphides other than pyrite that characterize the volcaniclastic unit include pyrrhotite, chalcopyrite, sphalerite, arsenopyrite and galena. Alterations that are closely associated with the gold mineralisation are strong silicification, chloritization, saussiritization and carbonatization though calcite presence subdues gold values.

Gold mineralisation controls on both workings involve a number of parameters, which may not necessarily complement each other. For example gold often occurs associated with neither structure nor alteration, but relates to dense sulphide mineralisation. Danton and the extension towards Shamva Mine shows some significant anomalies that lie surficially on fractured to non-fractured zones with high order silicification and there is a positive correlation with Cu and Zn values. The continuity between Danton and the Shamva Mine displays discrete mineralised zones, which could be localized structural extensions to the main Shamva shear. This makes Danton a discrete orebody rather than a direct extension of the Shamva main orebody.

### **Nomination for the ‘Keith Viewing Award’, 2008 Presented at the AGM and Dinner, 27<sup>th</sup> February, 2009**

*Dr Francis Podmore*

For those present this evening who may not know, Professor Keith Viewing was the founder and inaugural Director of the Institute of Mining Research at the University of Zimbabwe in 1970. He was dynamic and inspirational and, with his colleagues, contributed greatly to the geological and mining industry in this country for many years. He left the Institute in the early 1990’s to become the Consulting Geologist for Anglo American before retiring into his own consultancy, Cermimco, in 1996. Continuing his good deeds in geology, ceramics and with the mining industry, Keith finally retired to Italy in October 2008. Before leaving he bequeathed a silver jug to the Society, which has now been designated the ‘Keith Viewing Award’ and will be given annually for the best presentation at the Society’s Summer Symposium. It has been left to the GSZ Committee to define what is meant by ‘best’ – it could be the longest, or the shortest paper, or the one with the most (or least) visuals. And the problem for the judge was that Dr Podmore, who was invited to attend the Symposium last November, had 18 very different presentations to compare, ranging from straight geology, hydrogeology, mineral exploration, instrumentation, geophysics and geochemistry to the specific problems faced by our mining community. And most of these were very good, and were delivered competently.

But in discussion with two senior and respected members of the Society (who shall remain nameless!) the criterion of ‘best’ was refined to become ‘most innovative and inspiring’. The 18 presentations were then narrowed down to a short-list of four. In alphabetical order these were:

Tim Broderick *et al.* – ‘Fumure – a new meteorite impact structure for Zimbabwe?’

Mike Kellow – ‘Ultra-detailed aeromagnetic surveys – new insights into the Perseverance Nickel Belt’

David Matyanga – ‘Challenges facing the industry going forward’

Lynsey Singh – ‘Breakthrough in the analytical performance of hand-held XRF’

It was hard to decide between these four – I wonder which one you would pick ....?

Dr Podmore felt the aeromagnetic paper, based on new instrumentation in a new aircraft designed by a syndicate including the author, which is able to fly ultra-detailed surveys at only 20 to 30 m ground clearance, and which has already been used in at least three areas of the country to produce spectacular results was both innovative and inspiring.

May I invite **Mike Kellow** of ACR to come forward and receive the Keith Viewing Award for its inaugural presentation. (In his absence Dr Martin Prendergast, as proxy, was presented the Award by the Chairman, Mr Collins Mwatawha.)

# News



## Geology Department, University of Zimbabwe

*Maideyi Meck*

The situation at the department remains much the same. The staffing situation has actually improved. The department has now managed to recruit one professor, all the paper work for whom is now done. He is Professor Isidro, formerly of the University of Eduardo Modhlane in Mozambique. Mr Chinoda and Mrs Chinguno will be joining the department as assistant lecturers. Mr Mupambo, a technician in geochemistry, has rejoined the department. We have also received numerous enquiries from former students who were affected by the world recession. Most of them expressed that when the salary issues are sorted out, they are interested in joining the department. Mr Chamunorwa Kambewa has now formally resigned.

The third year class still has two major courses that need to be taught before they can complete their degree. The first is Advanced Igneous and Metamorphic Petrology and the other is Geochronology. The other important activity for these students is for them to complete the field course. This has been hampered by a lack of resources. We only have the human resources to hand. An appeal to industry has brought in US\$150 and 400 litres of fuel but these proceeds are not sufficient as the minimum requirement is for 650 litres of fuel, and a total of approximately US\$1400.

The department has received the results from our external examiners for one of our MSc students. A draft thesis has been received from a PhD student. No progress has been recorded from the three M. Phil. candidates.

The department hopes to start taking in students once again, but only if two more lecturers are recruited before the start of the coming semester. If not, we will still not be in a position to attract new students.

### Contact details:

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| Mr. K. Musiwa       | GLF subcommittee | Mining, UZ  | <a href="mailto:kudzie@eng.uz.ac.zw">kudzie@eng.uz.ac.zw</a>                 | 0912 948915 |
| DG Direct line/Fax: | 263-4-303557     |             |  |             |

**Note:** DG – Department of Geology; MRC – Mineral Resources Centre; GLF – Geology Lecture Fund

# Geological Survey Department



ZIMBABWE

## *F.B. Mupaya*

The professional staffing situation at the Geological Survey remains critical. There are only 2 chief geologists in place, 3 geologists, 4 cartographers and 2 geophysicists. The Bulawayo and Gweru regional offices remain closed. However, relief is around the corner as the recruitment of technical staff has been marked as one of the requirements for the success of the Short Term Economic Recovery Programme (STERP). The department has been allowed to recruit geologists and as a result, interviews for 5 geologists have been conducted. The main challenge remains the retention of staff.

The bureaucracy remains congested with Exclusive Prospecting Order (EPO) and Special Grant (SG) applications. This situation, compounded by the proliferation of idle mining claims, is sterilizing the country against comprehensive mineral exploration activity. Due to the diverse mineral potential of the country, many companies and individuals continue to visit the department to enquire about investment opportunities. The negative status of exploration title has frustrated many of these investors. Hence the Mining Affairs Board has constituted a sub-committee to draft proposals for the Minister to open up the country for mineral exploration.

Mr Mupaya, board member of the Pan African Minerals Development Company (PAMDC), formerly ZIZA Ltd, attended a board meeting to interview candidates for the post of CEO. PAMDC will manage mining concessions jointly owned by South Africa, Zambia and Zimbabwe, which are located in the Northern Cape and NW Cape provinces of South Africa. Such partnerships may be extended into other technical co-operation projects, such as the revival of regional geological mapping in Zimbabwe.

With few field visits being made as a result of the shortage of resources, officers are concentrating on office-based activities that effectively “Mine the library”. F.B. Mupaya compiled information for a chapter on gold-copper deposits in the Guruve District for a publication on Copper Resources in Zimbabwe. F. Muzanenhamo has compiled literature on the Somabula deposits for a document on diamond discoveries in Zimbabwe. Mr F. Mugumbate is editing the final draft of his bulletin on *Guidelines for the Development of Small-scale Mining in Zimbabwe*.

## Mining Industry News

*Fadzanayi Bornwell Mupaya*

There have been several positive developments in our mining industry, which point to a brighter future. The liberalization of gold marketing recently pronounced by the Reserve Bank of Zimbabwe has stimulated renewed interest in the gold sector, one that had almost collapsed. To prove that independent gold marketing is a reality, Turk Mine became the first to use the new facility when they sold more than 20kg of gold to South Africa in March. Other companies are busy working on their gold export permits.

Mimosa Platinum Mines production rose by 7% by April 2009. This shows that although low metal prices have affected mining projects, well established mining concerns can still benefit from the existing momentum. Todal Mining has reported that it will complete its feasibility studies on the Selukwe Subchamber by end of May 2009. This development on PGM projects sets a strong foundation for expansion when the metal prices improve.

The political climate in the country is stabilizing fast with formation of the all-inclusive government. Currently, workshops are being held to map ways for rejuvenation of the economy. The Confederation of Zimbabwe Industries has already predicted an early recovery to the economy. The Chamber of Mines of Zimbabwe held a mining workshop to seek a way forward towards driving the economic recovery of the country. Several stakeholders attended the workshop that tackled issues including legislation, mineral exploration and beneficiation. The need to complete amendments to the Mines and Minerals Act was highlighted. Generally, the workshop emphasized that an enabling legal framework is the key to mining investment. To this end a delegate from the Chamber of Mines of Tanzania gave an account of how policies affect the mining industry. Poor mining policies under Tanzania's command economy killed the gold sector. With the liberalization of the economy, Tanzania now produces an average of 60 tonnes of gold annually. Also an average of one gold deposit is being discovered per year because ground is open to exploration. Zimbabwe can learn many lessons from the Tanzanian experience. The Ministry of Mines in Zimbabwe should minimize delays in processing applications for mining title in order to promote quick decision-making by potential investors.

On indigenisation, the Chamber of Mines workshop advised that the realistic stages of intervention in the mining cycle have to be identified. For instance, indigenous companies could benefit from supplying consumables. As to the ownership of mines, it was highlighted that indigenous Zimbabweans own the majority of mining claims in the country. The best way of indigenising the mining industry is therefore to empower the hundreds of small mines in attempts to transform them into productive ventures.

## News about Zim Geoscientists

*Edgar Chiteka* is enrolled at Rhodes University (South Africa) doing his MSc in Exploration Geology. This includes a spectrum of course-work and a thesis designed for 1 year full-time. It is designed for candidates wishing to further their skills in the broad field of mineral resources. The programme has a variety of postgraduate MSc courses in Exploration Geology and Economic Geology. It has been running since 1978 and is one of the longest standing of its kind with a curricula range from course-work dominated programmes to straight thesis studies. Workshops are conducted by specialists from industry and other universities as well as by the staff of the Geology Department at Rhodes University. Extensive field trips to southern Africa's

renowned mineral deposits also form an integral part of the programme.

*Leo Passaportis* is visiting Namibia from where he sent this picture of the Gibeon meteorite fragments on display in downtown Windhoek. A total of 77 pieces of this nickel-iron have been recovered since first reported by Capt. J.E. Alexander in 1838. The minerals kamacite and taenite make up 99% of the meteorite giving it a chemical composition comprising 90% Fe, 8% Ni and 0.4% Co.



Please provide us with news about yourself or other geologists. We need to keep in touch with all of you out there. [fmuqumbate@gmail.com](mailto:fmuqumbate@gmail.com) or [makari@zol.co.zw](mailto:makari@zol.co.zw)

## Research Funding Opportunities

### GSZ Research and Development Fund



The objective of the Research and Development Fund is to give financial assistance for the development of earth science research and training in Zimbabwe. This financial assistance shall be in the form of annual Grants. Grants shall be made for activities over the course of up to one year. Those wishing to continue beyond one year must make subsequent and separate applications. The purpose of the Fund is to support:-

- Research projects on earth science topics of interest (Note that grants from the Fund will not be made to support projects which result in results that are not available to all members of the geological community in Zimbabwe);
- Scholarships for postgraduate study in earth sciences;
- Field trips and short courses for the training of Zimbabweans in earth sciences; and
- Travel to conferences to present earth science results.

In recommending the award of Grants, the following shall be considered:-

- The objective and purpose of the Fund;
- Potential benefits of the proposed activity to the geological and mining communities in Zimbabwe, in terms of development and/or the generation of new knowledge;
- The availability of matching funds, source or provided by the applicants; and
- The aim of awarding more than one Grant in a given year.

Grants made from the Fund shall be on condition that:-

- Results from the supported activity will be presented to the Society via a talk and an item or items in the Newsletter;
- Submission to the Fund Subcommittee of an annual report by 31 December of the year in which funding is granted; and

- Submission of a financial report to the Fund Subcommittee, with copies of receipts, by 31 December of the year in which funding is granted

All applicants for the award of Grants from the Fund shall be Members in good standing for the current membership year. Normally, the principal applicant should have been a member in good standing for at least twelve months.

Applicants for Grants should submit to the Research and Development Fund Subcommittee an application containing details of the applicants, summary of the activity, justification of the activity, proposed methodology, timeframe, budget for application and details of matching funds, if any. If you would like to apply for support, please contact the Research and Development Fund Subcommittee Secretary, Applications for this year should be made to the Chairman, Mr Forbes Mugumbate.



## **SEG Timothy Nutt Memorial Fund**

A message from Judith Kinnaird, Professor of Economic Geology at the University of the Witwatersrand, shows that the SEG has decided this year to award grants from the Tim Nutt fund to allow students to attend the international SEG-GSSA conference on Economic Geology in Johannesburg in July. Consequently no more funds are available for this year but will be available again in 2009.

## **Society Activities**

### **CHAIRMAN'S REPORT 2008**

#### **1. Introduction**

Ladies and Gentlemen, I would like to welcome you all to this year's Annual General Meeting. A special welcome to our guest of honour, Paul Chimbodza, past chairpersons present, honorary members present, representatives of the School of Mines. I would like to welcome those members visiting from the UK who are here with us, Dr Martin Prendergast and Kevin Walsh. Dr Tony Martin's presence is noted and appreciated.

It has been a very exciting year for me and my committee members as we all experienced and enjoyed overwhelming support from our membership during the difficult times of 2008.

Our term commenced during the 'harmonized elections era', and continued through the June poll. In the interest of safety for members, we deferred all field activities to commence after the June elections run off.

The year ended with the global economic crisis, probably the worst since the Great Depression of the 1920s and 30s. This has seen a major recession in world commodity prices, whose effects portray a bleak future for the mining industry. Multi-national companies are announcing major cuts in their spending and are downsizing in their labour. Back home, because of the continued slide in our economy, this has probably been the worst year for our mining industry. The worst affected in the mining sector were gold and base metal production as most companies closed operations indefinitely, announcing that they were on care and maintenance. The platinum and coal sectors managed to register positive growth, although the effects of the current recession are now being felt. A number of players are presently involved in the platinum sector and we hope see these ventures come to fruition. The economy also needs to register real benefit from the extraction of diamonds in the Marange area.

The year 2009 started positively with the formation of the National Unity government. We hope outstanding issues on the mines and minerals amendment bill will be resolved. The issue of EPO licenses still needs to be resolved, as none have been awarded for quite some years now.

We also hope that, the Geology Department and other mining related disciplines will get the necessary support to offer the excellent services they used to provide to the industry. As I speak, these departments are near collapse due to brain drain and a lack of funding. The Geology Department has not recruited first-year students for a second year running. They have only one third-year class, which only receives lectures as when a lecturer is available. This is indeed a sad state that needs serious intervention and we should continue to engage relevant authorities to ensure that the Department does not collapse.

Next year, the Geological Survey is attaining an important milestone - its 100 years of existence. We hope that, it will be fitting to produce an updated Geological Map of Zimbabwe and for special field trips to be arranged to memorable geological sites. It would also be fruitful for geological information to be collated on the mineral rushes that have characterised Zimbabwe at the opening of the new century.

## **2. 2007 Committee**

Our committee members are Gayle Hanssen (Honorary Secretary), Forbes Mugumbate (Vice Chairman and Treasurer), Kudzi Musiwa (Summer Symposium), Tim Broderick (Newsletter Editor), Andrew du Toit (Summer Symposium), Daniel Chatora, Hillary Gumbo and Bornwell Mupaya (ZGS representative).

Altogether, 11 committee meetings were held and member's attendance was as follows:

Collins Mwatahwa (11), Forbes Mugumbate (10), H. Gumbo (8), Gayle Hanssen (8), Kudzi Musiwa (11), Tim Broderick (7), Andrew du Toit (10), Daniel Chatora (8), Bornwell Mupaya (9) Leo Passaportis (7). Overall, there was an 80% average attendance. Well done to all.

## **3. Membership**

Paid up membership stands at 76 ordinary, 1 associate, 7 institutional, and 13 honorary members. Professor Allan H Wilson, our Macgregor Lecturer, is the latest honorary member on the list.

The institutional members are as follows:

- *Platinum Exploration Ventures*
- *Canape Investments-ACR*
- *Mineral Resources Centre, University of Zimbabwe*
- *Musiwa Environmental Services (Pvt) Limited*
- *Samrec Vermiculite Zimbabwe (Pvt) Limited*
- *SRK Consulting Zimbabwe*
- *Zimbabwe Platinum Mines Limited*

## **4. Affiliated Organizations**

### **4.1 The Mennell Society**

Mennell Society representatives managed to attend 2 of our meetings. For the first time, we managed to get a balanced report on the state of affairs in the Geology Department from them.

### **4.2 Zimbabwe School of Mines**

This year we were represented on the School of Mines Board by Allan Mashingaidze. Kudzi

Musiwa also sits on the board.

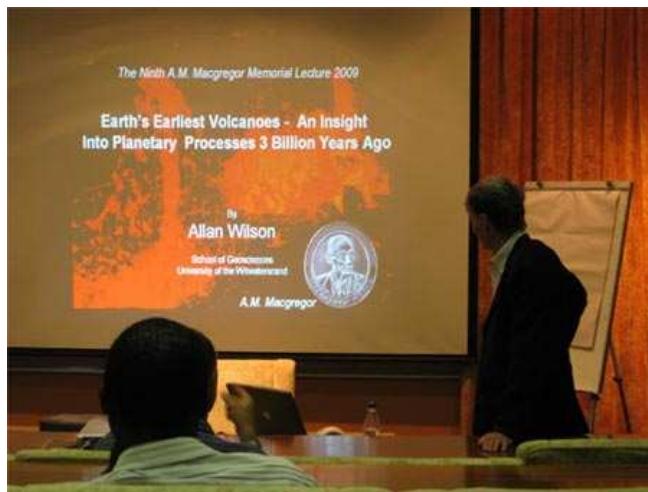
### 4.3 Sub-branches

Interest has been reignited to resuscitate the sub-branches with even suggestions being put forward to start a Europe sub-branch. The new committee has to follow up on this.

## 5. Society Activities

### 5.1 Macgregor Memorial Lecture

The 9<sup>th</sup> Macgregor Memorial Lecture was delivered in both Harare and Bulawayo by Professor Allan Wilson on the 9<sup>th</sup> and 12<sup>th</sup> February 2009 respectively. Allan, now at Wits University, delivered an inspiring talk entitled '*Earth's Earliest Volcanoes - an insight into planetary processes 3 billion years ago*'. Both lectures were well attended, and the audience included members of the public. Prof. Wilson is thanked for the effort he put in to make this event possible.



*Photo: LMB*

### 5.2 Field trips

Four field trips were held. We had hoped to make a trip to the Copperbelt, and also visit the Munali Nickel Project in Zambia. Hopefully these trips will happen in the near future

- The first field trip was to the Mountain View gold prospect north of Bindura on the 13<sup>th</sup> September 2008. The objective was to appreciate gold mineralization associated with quartz veins on the granite–greenstone contact. Seven members attended and a report was compiled by Benson Bhunu and Adolph Chikasha.
- The second trip was to the Mutare Alluvial gold project near Penhalonga, Mutare on 4<sup>th</sup> October 2008. This is a JV project between the Development Trust of Zimbabwe (DTZ) and Russians (Ozgeo). The objective was to appreciate activities at large mechanised alluvial workings on the Mutare River. The project was producing 50kg of gold per month at the time of the visit. Thirteen members attended and a report was compiled by Melusi Hlambelo.
- The third trip was to the supposed Fumure meteorite impact structure site in the North Marginal Zone of the Limpopo Belt. The trip was held on the 25 – 26<sup>th</sup> October 2008 with the objective of investigating the feature. Dr Sharad Master and his family joined the Geological Society team for this visit, which was also graced by the local braves. A report on the trip was made by Tim Broderick *et al.*

- The fourth and final trip was to the Great Dyke led by Prof Allan Wilson from the 10-12<sup>th</sup> February 2009. Hotspots visited on the Great Dyke included Ngezi, Unki and Mimosa mines. The visit revealed that there is still a lot to be studied on the Great Dyke. A report on the trip was made by T. Mawuva.

### **5.3 Summer Symposium**

The event was held on 28<sup>th</sup> November 2008 at the UZ Geology Department and was officially opened by Dr Teddy Zengeni. Eighteen presentations were made covering a wide variety of topics including challenges facing the Mining Industry, indigenisation, a pure diesel discovery, geophysics, geochemical applications to MINEX, XRF applications - BRUKER vs NITON, the agonies of deep drilling on the Great Dyke and on the subject of meteorite impact structures. Dr Francis Podmore is thanked for summarising the events of the day and for adjudicating on the best talk, the presenter of which will receive the inaugural Keith Viewing Award. This is a new award in recognition of the contribution of Dr Viewing to the advancement of earth sciences in Zimbabwe. The sponsors of the event are thanked - Zimplats, Todal Mining, Anglo Platinum and SMC.

## **6. Sub-Committee Activities**

### **6.1 Geologists Certificate of Competence**

This project, based on Professor K Viewing's suggestions, was deferred as it needs more time. The committee comprising Andrew, Tim, Leo and Hillary came up with recommendations for follow up including consultations with the Chief Government Mining Engineer. The object is to model the certification along the same lines as for the Mine Surveyors who are tested and certified for competence.

### **6.2 UZ Lecture Fund**

- Industry and other stakeholders have been sensitised as to the needs of the Geology Department. Zimplats and Cannister have sponsored the field trips for the past two years. Fuel and financial assistance were provided.
- Other companies like Mimosa and Rio Tinto have also provided logistical support to other mining related departments at the University of Zimbabwe.
- Thanks are extended to the committee members who are associated with these companies and to the companies themselves for this assistance.

### **6.3 Rand**

No applications to utilise the funds were made.

### **6.4 A.E. Phaup Award (T Broderick and F Mugumbate)**

The 2008 award will be presented at tonight's dinner. Thanks are due for the hard work of the sub-committee. David Love is also thanked for compiling a list of publications from those in the diaspora who may be eligible for this award.

### **6.5 Vinyu Award - ZSM**

This award is given to best final year student at the School of Mines and will also be presented this evening. It is in recognition of the late Dr Mike Vinyu's contribution to the profession of geology and earth science as a whole. Congratulations to the winner.

**6.6 Bond Award - UZ**

In recognition of Geoffrey Bond's contribution to the understanding of the geology of Zimbabwe, an award is given annually for the best honours degree geology project presented at UZ. This too will be awarded tonight for the best project assessed for 2007.

**7. Newsletter and Website**

- 3 Newsletters were published during the year.
- The Editor, Tim Broderick, kept the printing press going on. Well done to him and to all contributors.
- If you did not get a copy, check your membership status. Our Newsletter is not an election manifesto!

Our website was affected by the problems associated at the UZ. We hope it will fully functional in the future.

**8. Finances**

Our treasurer, Forbes Mugumbate will report on finances. Thank you for handling our finances remarkably well under extraordinary circumstances. Special thanks to the accountant who verified the accounts to be presented today.

**9. Closing Remarks**

I would like to take this opportunity to thank all my colleagues in the out-going committee for a job well done and more importantly to our membership without whose support we would have achieved nothing.

I wish the incoming committee headed by Forbes MUGUMBATE, the best in 2009.

THANK YOU, *Collins Mwatawha*

**Treasurer's Report**

The year 2008 posed a number of challenges to this country, resulting in the year being the most difficult for our economy. The year was characterised by hyperinflation, which culminated in a scale of economic collapse never witnessed anywhere outside a war zone. In response to the high inflation, the Reserve Bank of Zimbabwe re-valued the Zimbabwe Dollar twice, slashing several zeros. This, however, did not help as prices continuously rose rendering our dollar worthless and our local bank account became valueless. The result is that the Committee decided to adopt foreign currency subscriptions towards the end of year. The accounts presented at the AGM, therefore, refer to our FCA only.

The FCA was sustained by cash subscriptions from foreign members including some Zimbabweans in the diaspora and by local member's subscriptions towards yearend; by fuel coupon subscriptions from some members; by cash/fuel donations from companies; the Summer Symposium Lunch; and from a useful interest on the accumulation. We wish to take this opportunity to thank companies that made donations to the Society. Special mention is due to Todal Mining, Platinum Exploration Ventures, and Jeremy Prince. Constantine Ncube of Platinum Exploration Ventures and Collins Mwatawha checked and prepared the Accounts. We sincerely thank them

**Geological Society of Zimbabwe****Income and Expenditure Account****For Year February 08 to January 09**

|                      | 2008       | 2007          | 2006       |
|----------------------|------------|---------------|------------|
| <b><u>Income</u></b> | <b>USD</b> | <b>Z\$</b>    | <b>Z\$</b> |
| Subscriptions        | 306        | 68,207,800    | 152,130    |
| Donations            | 410        | 235,000       | 22,660     |
| Functions, trips etc | 445        | 514,150,000   | 879,400    |
| Interest Received    | 1,675      | 21,917,458    | 35,256     |
| Exchange Rate Gain   |            | 512,093,792   | 2,520,170  |
| Sale of Mugs         | 0          | 51,000,000    | 20,000     |
| AGM - 2007 dinner    |            | 525,000       | 8,700      |
| Sundry Revenue       |            | 0             | 500        |
|                      | 2,836      | 1,168,129,050 | 3,638,816  |

**Expenditure**

|                             |     |             |
|-----------------------------|-----|-------------|
| Newsletter and Publications |     | 0           |
| AGMs                        |     | 250,676,000 |
| Bank Charges                |     | 4,367,982   |
| Printing and Stationery     |     | 8,000       |
| Postage, Post Box           |     | 7,120,000   |
| Mugs                        |     | 0           |
| Functions, trips etc        | 440 | 234,257,000 |
| Miscellaneous Expenses      | 0   | 549,448     |
|                             | 440 | 496,420,982 |
|                             |     | 0           |
|                             |     | 8,053       |
|                             |     | 610,250     |

|                                       |              |                    |                  |
|---------------------------------------|--------------|--------------------|------------------|
| <b>Net (Loss)/Income for the year</b> | <b>2,396</b> | <b>671,708,068</b> | <b>3,028,567</b> |
|---------------------------------------|--------------|--------------------|------------------|

## The Great Dyke Field Trip

*T. Mavuwa*

The trip spanned three days between 10<sup>th</sup> and 12<sup>th</sup> February 2009 and was co-hosted by Zimplats, Unki and Mimosa mines. It started off at Zimplats' Selous Metallurgical Complex where we all gathered at around 8am. We were taken through induction, which a presentation on the Great Dyke geology and mining was given by Andrew du Toit. Drill core sections were then examined, some of which presented challenges in terms of where they correctly fit in the Great Dyke stratigraphy.

Towards the afternoon we drove to Ngezi Mine, located in the Sebakwe sub-chamber, making one stopover along the way in order to observe a greenstone belt xenolithic fragment with pillow structures within the mafic unit of the Great Dyke. At Ngezi Mine, after lunch at Eagle's Rest, we were taken to an excavation that exposes the Mafic Sequence of the Great Dyke overlying the MSZ close to a proposed new mine portal. Our visit to Ngezi Mine ended overlooking an open pit mining excavation where we could comprehend the mining sequence above the MSZ. In the afternoon it was time to drive to Gweru via Lalapanzi using the dirt roads running parallel to the Great Dyke. We arrived in the evening and camped at Antelope Park for the night.



In the morning we drove to Unki Mine, located in the Selukwe sub-chamber and arrived at around 9am. At Unki we went through induction and then received a Great Dyke geology and Unki mining presentation by Collins Mwatahwa. Next we endured a rough off-road drive up a rocky mountain to what we were told was a circular feature made up of pyroxenite and hartzburgite enclosed by gabbro-norite of the Mafic Sequence. Its petrography and stratigraphic significance have not yet been resolved from the ongoing prospecting activities that include mapping, drilling and rock dating. Of interest are serpentinized ultramafic rocks within the P1 and Mafic unit. It is also not yet clear whether some of the serpentinized rocks have an autolithic provenance or are xenolithic in origin, relating to the nearby Shurugwi Greenstone Belt.

We observed the Mafic-Ultramafic contact along a road cutting and then went to examine core before heading off to Shabanie Mine Club for the night.

In the morning we left Zvishavane for Mimosa Mine, located in the Wedza sub-chamber. A geology and mining presentation was done by their Chief Geologist and later we examined core before going into the field where we observed Great Dyke rocks outcropping in a stream and displaying acicular and oikocrystic augite textures.

In the afternoon we were taken to some ancient workings around Mimosa before leaving for Bulawayo to attend the Bulawayo presentation of the Macgregor Memorial Lecture by Professor Allan Wilson, visiting from the University of the Witwatersrand, at the Bulawayo School of Mines.



The lecture was entitled - “An insight into Planetary processes 3 Billion years ago”. It could be considered as a geological post-mortem that seeks an understanding of processes (mainly volcanic which are important in the formation of the earth) that were active and formed the earth about 3 billion years ago. By analysing volcanic processes currently happening on the earth today and comparing and contrasting the rocks and structures they form to those preserved and observed in Archaean rocks such as pillow structures and komatiites. Then invoking the principle of uniformitarianism where possible, logical conclusions could be made, that if preserved Archaean rocks and structures are similar to rocks currently being formed by volcanic processes, then the geological processes which operated 3 billion years ago and formed the earth should therefore be similar to the processes happening today such as on Hawaii.

We spent a night in Bulawayo and dispersed the following morning, having learnt how exploration for and the mining of the Great Dyke PGMs and associated base metals has evolved over the years and also how this is currently being done at Ngezi, Unki and Mimosa mines. Most of all we had been exposed to the geology, structural and economic challenges that these mines face and how technically they are trying to mitigate them in order to remain viable. The whole experience gave us a window into what the future holds for the Zimbabwe mining industry in general.

## Conferences

### FIRST WORLD YOUNG EARTH-SCIENTISTS CONGRESS 2009

25-28 October 2009, BEIJING – CHINA  
China University of Geosciences, May 2009

Delegate Sponsorship packages are available with a range of benefits and advertisement opportunities, see <http://www.yescongress2009.org/ioc/42.html>, or contact Elyvin Nkhonjera at [elyvinnkhonjera@yahoo.co.uk](mailto:elyvinnkhonjera@yahoo.co.uk).

The Geological Society of South Africa - Geoforum 2009  
9th and 10th July, 2009  
Mintek Conference Centre, Randburg, Johannesburg  
*Tackling the Financial Crisis: Future Prosperity*

[gssa@majesticinteractive.co.za](mailto:gssa@majesticinteractive.co.za)

**GEOLOGICAL SOCIETY OF ZIMBABWE:  
CONTACT DETAILS OF MEMBERS OF THE EXECUTIVE  
COMMITTEE**

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| Mugumbate, Forbes   | CHAIRMAN                                | fmugumbate@gmail.com            |
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| Du Toit, Andrew     | Summer Symposium/Website                | andrew.dutoit@zimplats.co.zw    |
| Gumbo, Hillary      | Society Talks                           | hgumbo@mweb.co.zw               |
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| Musiwa, Kudzie      | Society Talks                           | kudzie@eng.uz.ac.zw             |

## **Institutional Membership, 2008-09**

Anglo American Corporation Platinum Exploration Ventures

Canape Investments

Mineral Resources Centre, University of Zimbabwe

Musiwa Environmental Services (Pvt) Limited

Samrec Vermiculite Zimbabwe (Pvt) Limited

SRK Consulting Zimbabwe

Zimbabwe Platinum Mines Limited