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news

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THE MSA GROUP

12TH INTERNATIONAL KIMBERLITE CONFERENCE

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30 YEARS OF DIAMONDS IN CANADA

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Ekati, Canada's first diamond mine, Northwest Territories. Copyright © Arctic Canadian Diamond Company

SCIENTIFIC THEMES

1. Diamonds
2. Emplacement and Economic Geology of Kimberlites and Related Magmas
3. The Origin and Evolution of Kimberlites and Related Magmas
4. Diamond Deposits – Exploration and Mining
5. Cratonic Mantle – Petrology, Geochemistry and Geophysics

FIELD TRIPS

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2. Kimberlites from Across Canada
3. Slave Craton Geology
4. Northwest Territories Kimberlite Drill Core Collection
5. Advances in Drift Prospecting for Kimberlite in Canada

SEMINARS

Invited speakers present a state-of-science summary covering emergent topics followed by moderated questions and extended discussion.

1. Kimberlitic Olivine: Tracking Mantle Cargo and Kimberlite Melt Evolution
Dr. Geoffrey Howarth, University of Cape Town, South Africa

2. Large Type-II Diamonds: Genesis and Transport to Surface
Dr. Evan Smith, Gemological Institute of America

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Basaltic crags of Mnweni Pass, Drakensberg
(Photo: Trishya Owen-Smith)

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guest editorial

SACS revisited

Johann Neveling

Stratigraphy. The discipline of christening rocks and the occasional splitting of hairs. It is undisputedly one of the oldest, if not the oldest, branch of geology. Putting names to rock and developing schemes to organise these names occupied the minds of the pioneers of our science during the 19th century. It was, in a sense, the obsession of that age.

But what about our age? We are currently confronted by complex problems like global warming, infrastructure challenges, keeping up with the speed at which technology changes, pollution and, locally, a declining mining industry; there is complexity all around. On the other hand, the great technological strides made in recent years are providing us with tools we could previously only dream about. There is certainly a lot to mull over and irrespective of whether this is leaving our average reader excited or depressed, I am betting rands against dollars that this is not making stratigraphy a front-of-mind matter. However, to paraphrase an old saying—you may not be interested in stratigraphy, but stratigraphy is relevant to you!

The geosciences are complex and scientifically diverse, overlapping with every discipline imaginable. GSSA members work across wide geographical areas and the rocks that occupy our attention are unique in terms of type, genesis, age and a hundred other details. Comparing these can get confusing very quickly, but this is where stratigraphy enables us to order and make sense of our rocks and facilitate unambiguous geological communication, whether that be to an interested co-researcher or undecided investor.

In South Africa, the responsibility to regulate the stratigraphic nomenclature and definition of rock units and unconsolidated geological deposits falls to the South African Committee for Stratigraphy, more commonly known by its abbreviation, SACS. It is now more than 50 years old, but its origin can be traced even further back, to the first half of the 20th century. At that point in time, the South African geoscience community, much like their international peers, wrestled with many a stratigraphic problem. They developed various schemes to assist their work, but by 1963 the need for a more formal approach became apparent and at the GSSA conference of that year, a proposal was put forward by H. de la R. Winter that a South African committee on stratigraphic nomenclature should be established. By all accounts the proposal found wide favour, but it still took several years of consultation and discussion before the GSSA, together with the South African Committee for the International Union of Geological Sciences (IUGS), established SACS in 1970.

The first order of business was to develop the South African code for Stratigraphic Terminology and Nomenclature, which was published a year later (1971) and revised again in 1977. As we all know, coming up with a set of rules is an admirable thing, but it is quite a different task to apply them and do so in a way that yields the desired result. It therefore took the better part of a decade before the classification and nomenclature of South Africa's sedimentary and volcanic successions, as well as the associated igneous and metamorphic rocks, were brought into line with the requirements of the Code, with the publication of Handbook 8, Part 1, Stratigraphy of South Africa in 1980. Both code and nomenclature have evolved and been updated since then, but the

"Red Bible" still represents a seminal milestone in the history of South African stratigraphy.

It is worth our time to take a moment to reflect on SACS's affiliation with the IUGS. We all know that geology respects no borders; it is an international science in the true sense of the word. In order for geologists from different parts of the globe to communicate clearly, a standardised approach, terminology and nomenclature is an essential requirement. SACS's affiliation with the IUGS is a clear demonstration of the South African geoscience community's commitment to follow and uphold the rules, regulations and protocols accepted by the international geoscience community. Today SACS is a proud member of the International Subcommission on Stratigraphic Classification (ISSC) of the International Commission on Stratigraphy (ICS), which is, in turn the largest scientific body of the IUGS.

During the formative years leading up to the establishment of SACS, it was realised that the development and maintenance of a stratigraphic nomenclature has a natural home in the national Geological Survey. Therefore, soon after the formation of SACS, the Geological Survey was tasked to revise, in collaboration with other members of the geoscience community, the stratigraphic classification and nomenclature used in South Africa. SACS activities (meetings, publications, etc.) have been funded by the erstwhile Geological Survey, and since 1994 by its successor, the Council for Geoscience (CGS). The Geological Survey/CGS also maintained a database of the nomenclature of geological units, with their attributes and correlates over more than five decades. The SACS Secretary has traditionally been a full-time employee of the CGS.

Nevertheless, SACS has never been a single organisation entity and its work represents a collaborative effort. The establishment and evolution of the stratigraphic units represent contributions from various SACS Task Groups. There are made up of the most knowledgeable geologists in the relevant fields who are appointed based on experience and expertise and served in an honorary capacity. They in turn depend on the work performed in the wider geoscientific community. Thus, the stratigraphy system we have today represents the sum of contributions from thousands of geologists from the private sector, universities, research institutes and government.

Fast forward to the 21st century and stratigraphy is no longer the centre of the geological universe. Funding for stratigraphic studies has (largely) evaporated and a myriad of new disciplines is crowding out stratigraphy on university curricula. This impacts the (technical) composition of faculty and the skills and interests of industry professionals, which in turn makes it challenging to find suitably qualified professionals, with the required experience in stratigraphy, to serve on the SACS Task Groups. Even statutory bodies are not immune to these trends, with the CGS increasing its focus on applied fields over the past few decades. As a result, SACS has in recent years become almost dormant.

Yet, all is not doom and gloom. In both industry and academia there is still a need for a stable and up-to-date stratigraphic nomenclature. At the same time, progress and breakthroughs continue to be made in stratigraphy (whether by design or accident). The CGS's regional mapping programme has identified a number of stratigraphic problems that need attention. Technological advances and the development of the very new disciplines that are crowding out traditional lithostratigraphy at universities are also yielding valuable, new information. An obvious example is the advances in geochronology that are yielding numerous, highly accurate ages and leading to a revolution in chronostratigraphy. The stratigraphic database continues to grow, which underscores the

need for a functional and active SACS, which is dependent on input and support from the CGS, GSSA and academia.

The CGS recently recommitted its support for SACS and appointed a fulltime SACS Secretary (the author) to drive the resurgence of this multidisciplinary body. There is a great deal of work to be done, with the immediate focus being to make sure the National Committee and various SACS Task Groups are functioning and adequately resourced. The current lithostratigraphic nomenclature needs to be reviewed and updated and there is a pressing need to deal with any derogatory names that remained in South Africa's stratigraphy, something that many community members have already wrestled with. There is indeed a lot to do, but as in decades past, resolving these issues will have to be a community-wide endeavour.

Johann Neveling
SACS Secretary, Council for Geoscience

executive manager's corner

Craig Smith

The mining story that attracted a great deal of attention in May was the unsolicited attempt by BHP Billiton to buy the rump of Anglo American assets, mainly targeting the South American copper mines owned by Anglo American. Part of the deal was that the South African iron ore, platinum and diamond operations as well as the British fertiliser project had to be sold off first. As of month end, the Anglo American Board has refused three offers—and that is likely a better deal for Anglo shareholders. (Note that the author owns shares in both companies.) In my opinion the deal would have been detrimental to Anglo shareholders in the long term by increasing risk to the shareholders, even though the quantifiable risk is probably correctly calculated by BHP. But I am in agreement with the Anglo Board in that the less quantifiable future opportunities for Anglo are not priced into the offer. And whether intentional or not, acceptance of the deal would have been perceived as a vote of no confidence in South Africa. Besides, a single board of directors has more opportunity to screw up than two. That may be a cynical view, but neither board of directors has shot the lights out in recent years. It is difficult enough to show significant growth in the cyclic resource sector, but too many companies have downsized, outsourced or altogether ceased exploration without investing in the juniors. Right now diamonds are facing reluctant consumers and the threat of synthetics, iron ore cannot get to the ports because of a lack of rail capacity, and the PGEs are facing overproduction and falling prices because of the decreasing auto sales globally. However, sooner or later, the cycle will turn, and those sectors will do well. In the meantime, the offer has fast-forwarded Anglo re-structuring plans, which essentially mimic the BHP proposals but in a rather more ordered manner. We hope!

A scientific controversy that will presumably be considered by the rejuvenated South African Committee for Stratigraphy (SACS) concerns the status of a proposed new Epoch, the Anthropocene. The term was originally used by Eugene Stormer in the 1980s and popularised by Paul Crutzen in the early 2000s and has attracted controversy since. One can find various definitions in the literature; in essence, the Anthropocene refers to the geological age in which human activity has become the dominant influence on climate and the environment. The Anthropocene Working Group (AWG) was set up in 2009 for the purpose of defining and proposing the Epoch for consideration by the Subcommission of Quaternary Stratigraphy (SQS), which falls under the International Committee for Stratigraphy (ICS), itself a committee under the auspices of the International Union of Geological Sciences (IUGS). The AWG was given the go-ahead in April 2016 to define a global 'golden spike', which was presented at the 35th International Geological Congress in Cape Town in August of the same year. The AWG advocated that the first appearance of fall-out from the first hydrogen bomb tests in 1950 preserved in pristine sediment cores from Crawford Lake in Ontario, Canada, defined the lower boundary of

the Anthropocene. In October 2023, the proposal was rejected by the SQS on the grounds that the boundary was too narrowly defined, and would take the focus off other arguably more important effects of human activity such as the advent of agriculture a few thousand years ago, to the use fossil fuels a few hundred years ago, biodiversity loss and modern plastic pollution., among other proposed lower boundaries. The controversy will not be resolved any time soon. Can South African scientists contribute to the debate?

Craig Smith

president's column

Steve McCourt

Subduction invasion

Plate tectonics is now widely accepted as the Earth's Operating System and both divergent tectonics (continental rifting in NE Africa, seafloor spreading in the Red Sea and Atlantic Ocean Basin) and convergent tectonics (subduction zones around the Pacific Ocean Basin and the Himalaya collision zone) can be observed and measured at strategic locations within the current global tectonic framework. These concepts are relatively well understood and can be best illustrated using the Wilson Cycle in which ocean basins open and grow through rifting and seafloor spreading and start to close in response to subduction, leading to collision. **Subduction initiation** is the turning point of the Wilson Cycle, it marks the time after which the oceanic lithosphere created in the divergent stage is recycled back into the (upper) mantle. In textbook descriptions of the Wilson Cycle, the onset of subduction is often attributed to the spontaneous foundering of the passive margins of the ocean basin, but the processes involved are not discussed.

Mechanically, it is very difficult to initiate subduction in a mature ocean basin formed from the breakup of a supercontinent. This is because the oceanic lithosphere is old and cold and as a result thick and strong, making it resistant to breaking and bending which are both necessary conditions for the start of subduction. That said, if Wilson Cycles have occurred since the onset of plate tectonics, the fact that there is almost no oceanic lithosphere older than 200 Myr suggests that the initiation of new subduction zones along the passive margins of interior ocean basins could have been a common process in recent Earth history.[1]

Although regarded as the type-example of a passive margin basin, the Atlantic Ocean Basin has two fully developed subduction zones with slabs imaged in the upper mantle and unambiguous volcanic arcs, these being the Lesser Antilles and Scotia arcs. The initiation of these two subduction zones is related to stress transmission from the adjacent Eastern Pacific subduction system, although the exact mechanism by which this happened is a matter of debate.

The third region in the Atlantic Basin that has been investigated as a potential site for subduction initiation is the Gibraltar Arc at the western end of the Mediterranean collision belt. This arcuate west structure between the Iberian Peninsula and Africa, has been investigated over several years using seismic reflection studies and, more recently, gravity-driven numerical modelling. The results are reported in complimentary papers published by Duarte et al.[1-2] and outlined below.

Duarte et al.[1] relate the Gibraltar Arc to a retreating convergent plate boundary that is propagating

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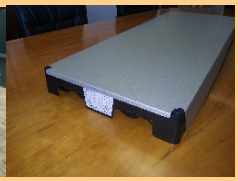

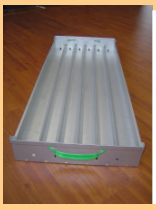


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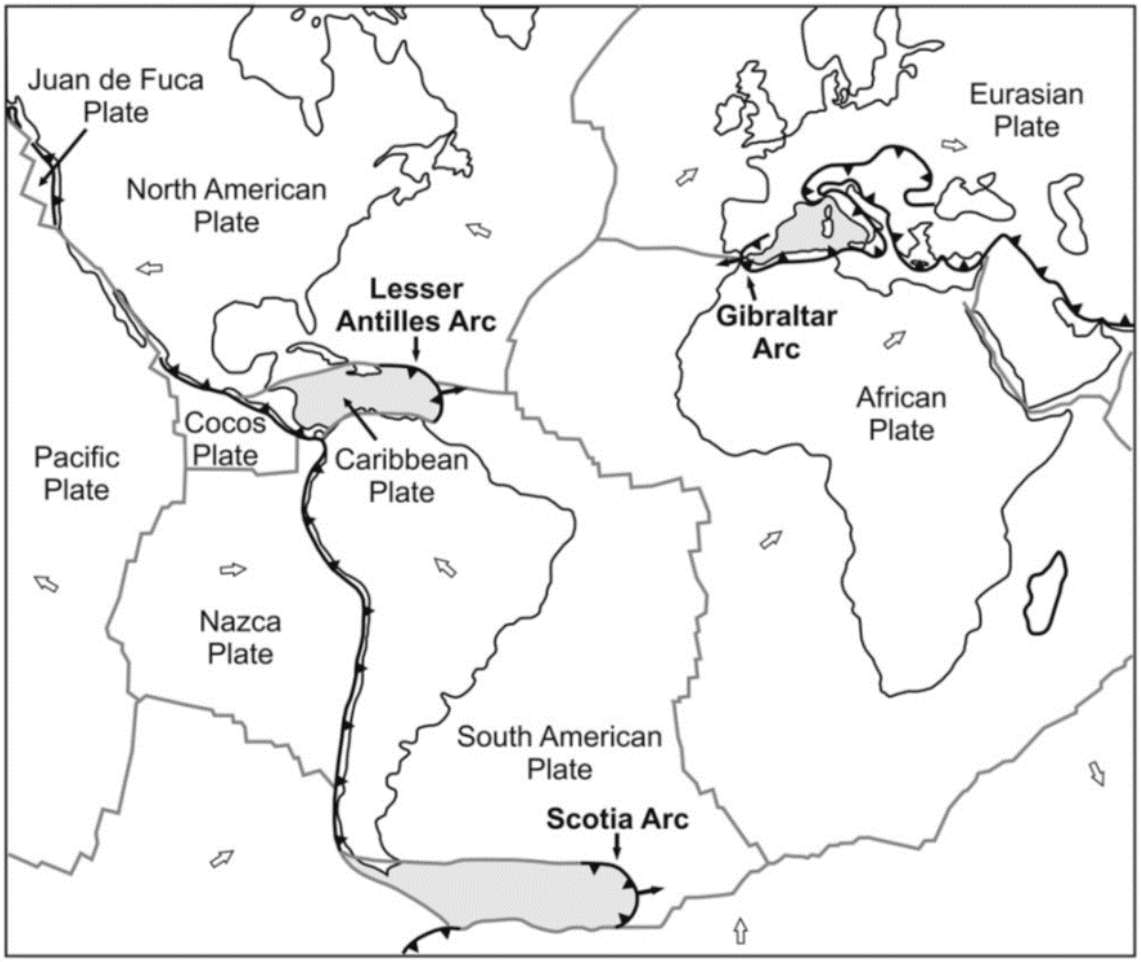
westwards into the Atlantic. The subduction zone developed during the Neogene due to the rapid rollback of an east-dipping oceanic slab located under the arc. Based on seismic reflection work in the area immediately west of the arc, Duarte et al.[1], published a new tectonic map of the southwest Iberia continental margin (SIM) and Gulf of Cadiz. The map (Figure 1 in Duarte et al.[1]) has three distinct tectonic features: an accretionary wedge, a system of NE–SW-striking thrusts and WNW–ESE-striking dextral strike-slip faults. The accretionary wedge, which lies within the Atlantic Basin, marks the propagation of the Mediterranean Alpine collision belt into the Atlantic Basin.[1] It is defined by an eastward-thickening pile of westward-thrust sediments (see Figure 2 in Duarte et al.[1]) that has a geometry compatible with ongoing subduction eastwards beneath the Gibraltar Arc, as previously recognized by Gutscher et al.[3]. The NE–SW-striking thrust system extends for ~300 km along the SIM and structures root deep into the basement. The WNW–ESE faults are interpreted as transfer zones connecting the two compressive tectonic systems, the Gibraltar Arc and the northeast–southwest thrusts.[1]

In a follow-up paper, Duarte et al.[2] report the results of a geodynamic, gravity-driven, numerical model that simulates the evolution of the Western Mediterranean over the last 30 Myr, including the formation of the Gibraltar Arc. The model was also run 40 Myr into the future to study the possible propagation of the subduction zone (which currently lies below the Gibraltar Arc) west into the Atlantic Basin.

The model starts at 30 Ma (time zero in the model) with a configuration that mimics the collision between Africa, Adria and Eurasia (see Figure 2A in Duarte et al.[2]). In response to these collisional tectonics, subduction could no longer be accommodated by the northward movement of Africa and slab rollback occurred. As a result, the trench retreated southwards across the Ligurian



Location of subduction zone arcs invading the Atlantic: Scotia, Lesser Antilles, and Gibraltar.[4]

Tethys (present-day Mediterranean) as illustrated in Figure 2B of Duarte et.al.[2] The details of the tectonics over the next 30 Myr are outlined by Duarte et al.[2], but of consequence here is an E–W oceanic corridor at 13 Myr that accommodates subduction as the slab rolls back to the west (Duarte et al.[2] Figure 2C). At 20 Myr, the slab squeezes into the Atlantic Basin (Figure 2D) and at 30 Myr, the Gibraltar Arc is formed with the trench positioned in the Atlantic Basin (Fig. 2E), mimicking the present-day configuration. Duarte et al. [2] noted that the deceleration of the slab retreat over the last 5 Myr reported by some researchers coincided with the trench entering the Atlantic Basin and suggested this could be due to a combination of factors such as a drop in slab-pull force, the need for the bigger Atlantic plate to bend and, linked to this, the mechanical problem of the narrow Gibraltar slab having to pull down the much wider Atlantic plate.

With regard to the future, Duarte et al.[2] report that from the present day, the trench retreat velocity will continue to decelerate for another 20 Myr, almost stop, and then slowly increase in speed. From this point forward, the subduction zone widens and propagates west into the Atlantic Ocean Basin (see Duarte et al [2], Figure 2F).

Based on the information documented by Duarte et al.[1-2], it can be argued that the formation of new subduction zones in Atlantic-type ocean basins is not linked to the "spontaneous foundering" of the passive margins but rather to the propagation of a subduction zone from a neighbouring, contiguous, basin. Subduction initiation is therefore an invasive process and new subduction zones are triggered by stress transfer from an adjacent convergent zone, with the result that the subduction zone "jumps", or is forced, into a neighbouring, contiguous, ocean basin. Duarte et al. refer to this process as 'subduction invasion' and regard it as a fundamental process in the closing phase of, at least, the current Wilson Cycle.

Steve McCourt

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Update:

In a previous column (September 2023), I outlined the arguments of the Anthropocene Working Group (AWG) of the Subcommission on Quaternary Stratigraphy (SQS) to recognise the Anthropocene as a formal geologic epoch within the Quaternary Period. The formal proposal recommended 1952 as the starting date for the Anthropocene.

The IUGS has however announced that at a SQS vote in February, the proposal was rejected by 12 votes to 4. Following this, the Chairs of the 17 Subcommissions of the IUGS endorsed the negative vote with 15 supporting and 2 abstentions. Those objecting pointed to a much longer history of human impacts on the Earth than the 70+ years proposed by the AWG.

Under current IUGS rules, this final decision cannot be appealed. One option is that the Anthropocene will be declared an event, an informal term geologists use to recognise great changes to the planet, like the Paleoproterozoic Great Oxidation Event and the Great Ordovician Biodiversification Event at circa 500 Ma.

professional affairs

What does it mean to be a professional?

This article seeks to offer some guidance for young professionals embarking on their corporate journey.

Three aspects are addressed: how to manage oneself as a professional individual; how to manage relationships with others (colleagues, managers, etc.); and how to develop one's career as a professional.

Underlying all these aspects is to adopt a perspective on taking responsibility for oneself and one's career.

Taking Responsibility

Taking responsibility needs to be distinguished from an attitude of victimhood—in which individuals respond to situations and events around them as a victim. The victim mentality views events and situations that affect us as always externally caused and out of our control, meaning that there are always other people or forces that are to blame for why things are not working for us or holding us back.

While it is true that externally caused situations do impact on us in life, the victim has an all-encompassing attitude that their life and everything that happens to them is as a result of the actions of others or external forces that they are totally unable to influence, and the victim therefore often carries an internalised sense of grievance.

Taking responsibility, on the other hand, means adopting an assumption that, while obviously we are impacted by the external world, we are nonetheless able to influence situations through our own perspectives and actions, and support ourselves and others in positive ways.

Of course taking responsibility is not always easy—especially if you have a difficult manager or are in conflict with someone who maybe has more formal power than you do. In such situations one needs to find courage or support in challenging or confronting someone, and trusting in one's own power to act and make a difference is also important.

While the victim is often unhappy with their situation, they are often also to some extent comfortable, as they do not need to do anything and when challenged they can easily resort to blame as their primary defence mechanism. Taking responsibility can appear harder, but in the long run is more likely to result in positive change.

Managing Oneself as a Professional

The first step is to decide to take responsibility for managing oneself and one's career. This means making a plan for what you want to achieve. The plan would normally involve some or all of the following:

Thinking about what you want to do with your professional life, including the type of work you want to do, the kind of business you would like to work for, and what training or development

you need to achieve these. Employment and training will not always be given to you on a 'silver platter'—you will need to make these happen and not just sit around waiting. In the early stages of your career this might mean seeking out an internship, or volunteering somewhere, as a way in. And have an 'elevator pitch' with which you can describe your professional goals in simple and straightforward terms.

As a professional, it is also important to manage oneself seriously—almost 'as a brand'. This means establishing an online profile—usually LinkedIn—where other professionals can view your profile, see your qualifications and work experience, etc. Also, your online footprint should always be 'serious'—remember anyone can potentially view anything you post on the internet, so your whole online presence needs to be attuned and aligned to the professional image you wish to project.

And remember, first impressions count and can make a big difference. So it is important to think about your dress code and how you show up when you meet people. Someone once told me that 'a good suit is an investment', and this is a useful perspective to have. Within the constraints of your budget, have some smarter clothes and shoes, and always try to be presentable.

Some basic ideas of professionalism are important to internalise. Meet your commitments so that people see you as reliable. Turn up on time for meetings—this shows respect for your colleagues' time as well as your own. Show concern and empathy for others, recognising that we all live in a stressful environment and everyone has their own struggles. And maintain professional boundaries—it is possible to be friendly with colleagues without having to be friends with everyone!

Managing Relationships with Others

Your success as a professional will to a great extent depend on building effective working relationships with other people—colleagues, managers, suppliers, customers, etc. To do this you will need to progressively acquire, throughout your working life, a range of softer or relational skills that you may not have learned at school or university. One of the core skills to develop is the ability to communicate effectively—in fact this is one of the most critical leadership skills.

Effective communication encompasses a whole sub-set of skills—learning how to present well in meetings, listening well to others, asking smart questions, and so on. This requires a lot of practice, observing others to see how they effectively communicate, and asking for feedback from trusted colleagues so that you can see how you are doing.

Communicating effectively will help you to achieve a number of important outcomes simultaneously—it will assist you to learn about the views of others (so you become wiser); it enables you to involve others in decision-making; and helps your colleagues to feel valued by you, so strengthening the relationships.

Another important consideration is to build a professional network. This should be a network of people you meet and engage with in your professional life. It can include former colleagues and managers, people you meet from other businesses or walks of life, contacts you make at formal events, conferences, etc. This network can be invaluable as a resource in the future, maybe when you are seeking a new job, or a change of direction, or establishing yourself as an entrepreneur. Generally, people in your network will be willing to assist or advise, and they also see you as part of their network as well, so it is a reciprocal set of relationships. Try and keep in touch with people in your network—meeting for coffee sometimes is great—and don't only contact people when you need them!

Developing Your Career

Do not leave your career to chance—a successful career will be something you choose for and build. And a key component of this will be to focus on your continuing professional development. Always think about the skills and competencies you need to develop for your next position or your next move.

Increasingly, as you progress to more senior positions and take on leadership responsibilities, the technical skills you developed in college or university will be taken for granted as your competitors will also have similar skills. As you move up the corporate ladder, the softer relational skills become more important. Apart from developing good communication skills (see above), it will be valuable to steadily develop a portfolio of softer skills so that you can differentiate yourself from others. This can include, for example, good problem-solving skills, knowing how to manage conflict, team leadership skills, effective presentation skills, providing leadership in crises, and so on.

An important part of managing your career is knowing how to manage stress. All jobs these days bring a degree of stress, and anyway we live in a stressful world. Stress is recognised to be a source of ill-health and premature death, so learning how to manage stress well is vital for all professionals. My tips include: take time off and take your leave—too many people falsely think that working long hours will help them progress up the ladder, whereas it just builds up stress! If it is possible, work from home sometimes—this can save wasted hours in the traffic and help you stay calmer. And also, learn how to manage your work time productively—many professionals neglect doing this, are constantly interrupted by emails, spend large amounts of time in unproductive meetings, and so on. Simple changes can help—have a day and a week plan for how you spend your time, when you do your emails, when you close your door, and so on.

Meeting management is very valuable in managing stress. Meetings take and sometimes waste huge amounts of time. It is valuable to try and ensure that important meetings are recorded so that if it is not always possible to physically attend you can nonetheless see the recording at a later point. And it can be useful to use AI tools to record and summarise decisions in real time.

Creating work–life balance is an important way to manage your stress and overall well-being—spending time to effectively care for your physical, mental and spiritual well-being.

Another important aspect of developing your career is to have a coach or a mentor who can support you on your journey. In the past, coaching was seen primarily as a remedial strategy when things were going wrong, or only for athletes and sportspeople, but increasingly coaching is viewed as valuable for all professionals as a mechanism for ensuring continuing support and having a sounding board in navigating the complexities of the corporate world.

Mark Turpin

Find out more about Mark at https://za.linkedin.com/in/markturpin

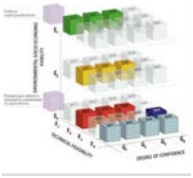
SAMCODES

SAMCODES Quarterly Snaps

SAMCODES App

- Development of the App is still ongoing for an improved interface and compatibility with iOS. Look out for more quizzes focusing on various SAMCODES topics.
- The SAMCODES App is available for download on the Google Play store and instructions for downloading the iOS version are available here: https://www.samcode.co.za/news/229-samcodes-app

Training programmes



The UNFC workshop was held on 20 February 2024 by the GSSA with over 100 attendees. The workshop covered various topics, including an update on the AMREC code and the draft UNFC and CRIRSCO bridging document, to be finalised in April 2024. The workshop recording is on the GSSA YouTube Channel and can be accessed via this link: 2024 United Nations Framework Classification on YouTube

AMREC is the African Mineral Resource Classification and Management System that is based on the UNFC's EFG axis, as opposed to Mineral Resource and Mineral Reserves. The focus of the AMREC is the African Mining Vision and the Sustainable Development Goals and it is used by governments and NGOs to identify and track mineral inventory, and not particularly relevant to public reporting for stock exchanges.

SAMCODES ESG Working Group Activities

The ESG Working Group is finalising work on incorporating ESG recommendations into the SAMCODES. A feedback session on ESG matters will be hosted later this year after consultations.

International Liaison

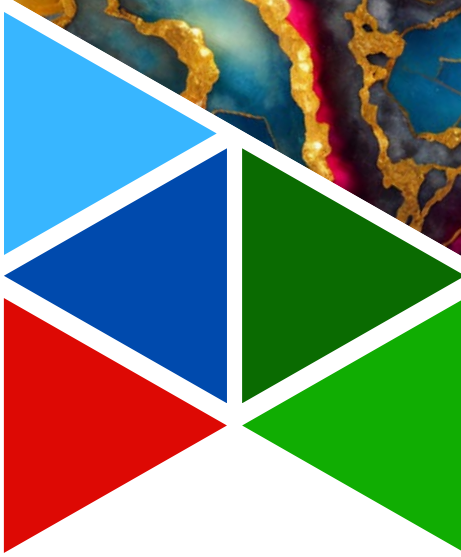
The CRIRSCO AGM will be held in Vancouver, Canada in mid-October 2024. Immediately thereafter, a Mineral Resource and Reserve conference will be hosted by CIM, also in Vancouver. CRIRSCO is also busy with CRIRSCO template updates, as the CRIRSCO definitions have been approved.

JSE Reader's Panel

Two new reviewers were ratified, who each have over 35 years' industry experience in Competent Person's Reporting.

Committee updates

SAMREC	Continuation of incorporation of ESG factors into SAMCODES and recommendations for additions into SAMREC Table 1 and SAMVAL
SAMVAL	Liaison with IMVAL for planning of conferences and alignment
SAMOG	SAMOG Code updates continued and will be finalised this year
SAMESG	Updates to SAMESG Guideline 2.0 and ESG Definitions guide
INDUSTRIAL	Updates to the Industrial Minerals guidelines are underway



MINSA

Mineralogical Association of South Africa

A division of the GSSA

Mineralogists, Scientists, Students, Enthusiasts.

Who We Are

MINSA was established in 1979 to foster interaction within the mineralogical community of South Africa. We are a specialist division of the Geological Society of South Africa (GSSA) and are affiliated with the International Mineralogical Association (IMA).

MINSA organises various events of interest to both professional and amateur mineralogists, geochemists and petrologists. We promote access to cutting edge developments in the field through meetings, symposia and workshops, the largest of which was the IMA2014 international conference.

Membership Benefits

- Opportunity to interact with peers in the mineralogy, petrology and geochemistry fields
- Reduced fees for attendance of symposia and workshops organised by MINSA
- Free attendance of quarterly topical talks by eminent scientists
- Participation in field trips to exciting and interesting sites, laboratories and factories of mineralogical interest, typically free of charge
- Events at which family participation is encouraged, in stimulating the interest of a new generation of mineralogists
- Quarterly newsletter of MINSA activities (The Geode) and upcoming events of interest to the community. Special themed editions are now a common occurrence
- Opportunity to address issues relating to the mineralogical community

Becoming a member is easy

Scan the QR code or click the sign up button.
Complete the membership form.
WELCOME!

Sign Up

all the news fit to print

UNIVERSITY OF JOHANNESBURG (including CIMERA)

Staff and Student News

UJ Geology annually recognises and celebrates its top achieving students at undergraduate level and in Honours. This is done retrospectively, and the 2023 winners are, by year, **Johannes Nel, Khumbudzo Makhoshi, Boitumelo Mashilela** and **Thabiso Sibanyoni**. Prizes include a certificate and various book and cash awards.

While still on the topic of top achievers, **Robyn MacRoberts** and **Gobona Lizzie Tau** won the best PhD and MSc speaker award, respectively, at the IMSG (Igneous and Metamorphic Studies Group) Meeting in January 2024 at Lake Eland Game Reserve (KwaZulu-Natal).

After an absence of five years, South African geologists will once again be conducting three seasons of fieldwork in the Antarctic after an NRF-

From left to right: top 3rd year, Boitumelo Mashilela; Head of Department, Prof. Marlina Elburg; top 2nd year & Rand Pioneer Prize winner, Khumbudzo Makhoshi; top 1st year, Johannes Nel; top Honours student, Thabiso Sibanyoni.

Robyn receiving her best-speaker award from Prof. Steffen Buettner.

Lizzie receiving her best-speaker award from Prof. Steffen Buettner.

SANAP grant was awarded to Dr **Herman van Niekerk**, and co-researchers Prof. **Marlina Elburg** and Prof. **Geoff Grantham**, of the UJ Geology Department. The first field season will begin in the austral summer of 2024/2025 and the last in the austral summer of 2026/2027. Research highlights for this funding cycle include the provenance of sedimentary rocks of the Ahlmannryggen Group, the palaeomagnetic characteristics of the Fingeren dyke swarm and the study of the Straumsvola alkaline complex. This will be done in conjunction with the training of MSc or PhD students, and the selection process for accompanying students for the first field season has already started. During the first season the team will be made up of four members, the second season six members and the last season again four members. Expedition members must be prepared to work in extreme field conditions, as fieldwork will be conducted to the south of the SANAE IV base, situated in Dronning Maud Land of Antarctica. They will travel by snowmobile and live in tents during the duration of the available field time, while dragging all their equipment, food and fuel on sledges behind their snowmobiles. Sailing orders for the polar ship the SA Agulhas II, their ride to the ice continent, have not yet been issued, but should be around the end of November or beginning of December of this year. The logistical planning for this year's expedition is currently underway and updates will be provided in the upcoming issues.

In late-2023, the Northern Cape Branch of the GSSA held a mini-symposium and field event "The Kalahari Manganese Fields event & excursion in remembrance of Prof. Nic Beukes". This took place in Kuruman on 10–11 November. **Prof. Bertus Smith** and **Prof. Bruce Cairncross** were among the invited speakers. Their respective talks were titled "Breakthroughs and shortcomings in understanding the deposition of the Hotazel Formation" and "The type-minerals of the Kalahari manganese field".

Prof. **Axel Hofmann** met up with Tony Martin in Zimbabwe in April to spend a couple of days visiting the Belingwe Greenstone Belt, where both had done mapping some decades back. It provided an opportunity to show staff from the geology department of the Midlands State University the remarkable geological record they have right at their doorstep. One classic site visited exposes stromatolitic limestones of the 2.7 Ga Cheshire Formation, preserving the oldest evidence for orbitally controlled sedimentary cyclicity.

Travelling in Antarctic during a previous field season, in diverse weather conditions.

Group photo with Tony Martin on stromatolitic limestones of the Cheshire Formation, Zimbabwe.

DSI-NRF CIMERA

DSI-NRF CIMERA co-sponsored and participated at the 2024 Igneous and Metamorphic Studies Group (IMSG) Meeting in KwaZulu-Natal, held from 21 to 25 January 2024. The conference included an icebreaker function, a field visit along the East Coast, a course dinner, and an award ceremony.

Several CIMERA-funded students presented: Casper Karadzandima (UJ), Merrily Tau (UCT), Nancy Kendi (RU), Sinelethu Hashibi (UCT), Minenhle Maphumulo (UJ), Robyn MacRoberts (UJ) and Kwame Fynn (UJ). Several CIMERA-affiliated academics also presented their work: Lauren Hoyer (UKZN), Steffen Buettner (RU), and Jeremie Lehmann (UJ). The CoE Manager also gave a presentation. Sixty delegates attended the conference, and academics and geology students from all over South Africa were present.

In February 2024, DSI-NRF CIMERA co-sponsored the Geological Society of South Africa Alex du Toit 3rd lecture, hosted at the School of Geoscience at

Close-up view of the 2.7 Ga stromatolites.

Prof. Michiel de Kock addressing delegates in the Geology exhibition room at the Barberton Museum.

the University of the Witwatersrand. During Prof. Christoph Heubeck's presentation, he honoured the work of Prof. Nic Beukes.

As part of the International Continental Scientific Drilling Programme (ICDP) BASE project, conducted under the auspices of DSI-NRF CIMERA, a geology exhibit was displayed in downtown Barberton. The exhibit was initially set up in an empty industrial hall used for BASE project drill core processing. It served the wider and very successful outreach goals of the project, and has been visited by a very large number of school learners from the Lowveld region and university students from across South Africa. This "make-shift" exhibit was transformed into a permanent exhibit room by CIMERA-BASE. The exhibit room is connected, and serves as an annexe, to the next-door Barberton Museum. The exhibit was formally handed over to the Barberton Museum on 29 February 2024.

DSI-NRF CIMERA students attended the Mining Indaba 2024 Young Leaders Programme, at the Cape Town International Convention Centre in Cape Town on 8 February 2024. The Young Leaders Programme provided insightful sessions with

Nikki Wagner, Kananelo Letete, Merrily Tau, Matthew Hales, Casper Karadzandima, Senamile Dumisa, Kwame Fynn, Fatima Chitlango, and Khanya Matiwane.

Kunene Project team members at Anglo American's core yard in Zango, Luanda, Angola. From right: UJ PI and Project Manager Jeremie Lehmann, Nthatisi Makhoba (Wits), Goitseone Motshabi (UP), Daniel Timpson (Wits) and Wits PI Ben Hayes.

seasoned industry speakers and academics. Mike Teke, Founder and CEO of Seriti Resources, as well as its new renewable energy arm, Seriti Green, shared his inspiring life journey and experiences in the mining industry, "This is your Life: A Personal Journey of Leadership in Mining".

The Anglo-American Kunene Project team visited Luanda, Angola, in March 2024 to sample drill core from the Kunene Complex. The team members included Prof. Jérémie Lehmann (UJ) and Dr Ben Hayes (Wits), and three new Anglo American-funded MSc students, Daniel Timpson (Wits), Nthatisi Makhoba (Wits) and Goitseone Motshabi (UP). The research objectives of the MSc projects will shed new light on the magmatic Ni-Cu-PGE sulphide potential of the Kunene Complex in southern Angola. Jérémie and Ben gave research seminars to postgraduate students and staff at Agostinho Neto University, and visited the Angolan Geological Survey to strengthen collaborative ties for the future. During these visits, they were joined by former Kunene Project MSc students Jimi Vila (UJ) and Agex Manuel (Wits). The Kunene Project operates under the Anglo-American-CIMERA MoA and is a flagship academia—industry partnership under CIMERA Focus Areas 2 and 5.

The DSI-NRF CIMERA administrative team participated in a long-overdue team-building activity at Glenburn Lodge and Spa, facilitated by Beach and Bush Adventures. The Indiana Jones-themed day was packed with activities.

DSI-NRF CIMERA team at the team building initiative. Left to right: Viwe Koti (UJ), Nikki Wagner (UJ), Susan Webb (Wits), Lizzie Tau (UJ), Khanya Matiwane (UJ), Zintle Daraza and Judith Kinnaird (Wits).

The CIMERA team past and present, at the recent 10th anniversary celebrations.

On the 5th of April 2024, CIMERA marked a decade of research excellence at the DSI-NRF CIMERA 10th Anniversary Celebration held at the Johannesburg Business School. Guests were welcomed by the CoE's Director, Prof. Nikki Wagner, from the University of Johannesburg, and the evening was expertly facilitated by the newly appointed incoming Co-Director, Prof. Susan Webb (University of the Witwatersrand). The current Co-Director, Prof. Judith Kinnaird (Wits), provided an exciting look-back at CIMERA's incredible journey. Toasting CIMERA's ten years of excellence in geology research excellence, Mr Frank Mazibuko, representing the NRF, delivered a heartfelt speech and well wishes for CIMERA's future endeavours.

Finally, during April 2024, the DSI-NRF CIMERA team toured several universities' Geology Departments in South Africa. They visited the University of the Free State on 15 April, the University of KwaZulu-Natal on 16 April, the University of Cape Town and the University of the Western Cape on 22 April, and Stellenbosch University on 23 April. Prof. Nikki Wagner, the Director of the CoE, shared a presentation on CIMERA's history, achievements, and plans. The tours concluded with a visit to the universities' facilities and equipment.

Compiled by ***Bruce Cairncross***

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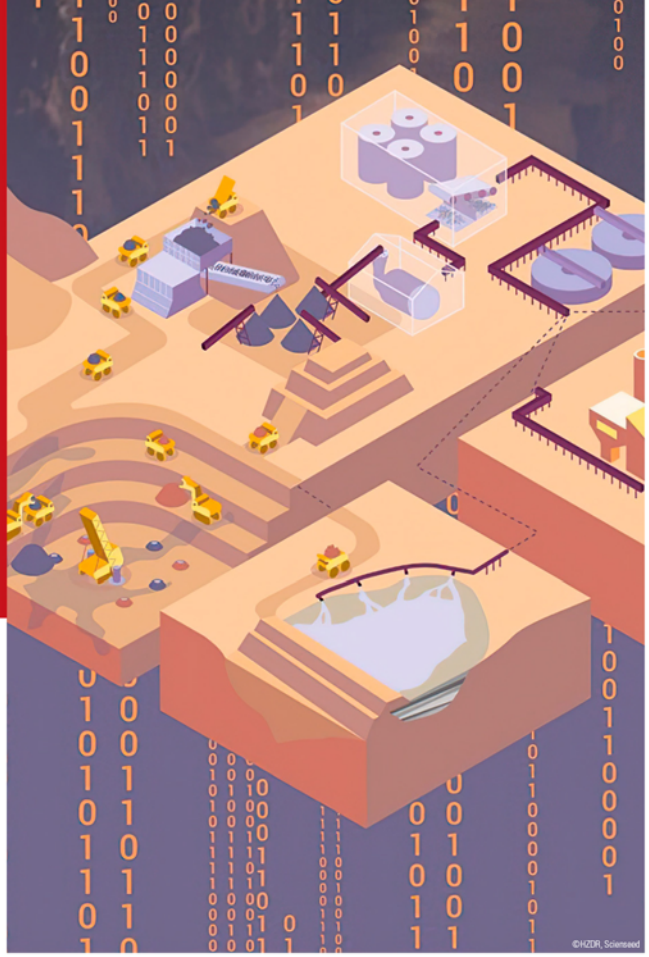
UNIVERSITY OF JOHANNESBURG

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG



HIF HELMHOLTZ INSTITUTE FREIBERG FOR RESOURCE TECHNOLOGY

HZDR HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

6-7 June 2024

DSI-NRF CIMERA Short Course

DSI-NRF CIMERA in collaboration with Helmholtz Institute Freiberg for Resource Technology invite you to attend a short course:

An Introduction to Predictive Geometallurgy.

The course is designed for Honours, MSc and PhD students, Postdocs and Industry representatives with knowledge on ore geology and mineralogy and/or mineral processing and/or mining engineering.

VENUE ▪ **G101, School of Geosciences, University of the Witwatersrand**

PRESENTER ▪ **Dr Raimon Tolosana-Delgado**
– Helmholtz Institute Freiberg for Resource Technology (HIF)

FEE ▪ **No charge**

DURATION ▪ **2 days**

MEDIUM ▪ **In person**

TOPICS INCLUDE
- **geometallurgy: from process mineralogy to value chain prediction**
- **beyond grade: geometallurgical data acquisition**
- **modelling ore bodies and ore concentration processes**
- **uncertainty and its influence in geometallurgical decision making**

Send an RSVP email to info.cimera@wits.ac.za to confirm attendance.

For more information send a message to Leonidas Vonopartis – leonidas.vonopartis@wits.ac.za.

KLEINZEE HOLDINGS

ALEKKOR RMC

Overberg Geoscientists Group

BCON MINING

Northern Cape branch
Geological Society of South Africa

The Northern Cape Branch of the Geological Society of South Africa

WEST COAST DIAMONDS EVENT & EXCURSION

Port Nolloth & Kleinzee
17th & 18th May 2024

MINROM

IMDEX REAL-TIME SUBSURFACE SOLUTIONS

Down Hole Survey cc

maxgeo

MARULA MINING PLC

AEMFC

REFLEX intelligence on demand

GEO-EXPLORE STORE

ASSMANG IRON ORE KHUMANI MINE

DIGITAL Surveying

NAMDEB A NAMIBIA DE BEERS PARTNERSHIP

Lisani Geological Services

neo energy metals

branches & divisons

Northern Cape Branch

Annual Report

The Northern Cape Branch of the Geological Society of South Africa strives to create awareness and opportunity in a province that has amazing potential and diversity. It provides a platform for industry professionals and businesses to connect and network through a professional body, together in participation of the growth and understanding of geological deposits and opportunities through networking and skills development. I am honoured to have been nominated once again to continue carrying the mantle for this vibrant branch from 2022 to 2024.

The year started off with members of the Exco meeting up for an online strategy session, whereby goals were set for the year and necessary structures put in place, including the formation of clusters and activities to better administer our vast province. Thereafter, we successfully hosted our West Coast Diamonds Event and Excursion at Port Nolloth and Alexander Bay, which was organised in part by what we intend to become our western "Namaqua cluster". The event will again be held on 17–18 May 2024, but will include the Kleinsee area. Various online talks were hosted on behalf of the branch in the first quarter of the year of 2023 and 2024. The NC Branch was represented at the Anglo American Kolomela Career Day 2023 and was once again invited to attend the Kolomela Career Day April 2024, to showcase the branch and educate the future young leaders of the world. The branch held a successful event in the region bordering the northern and central cluster—"John Taolo Gaetsewe and ZF Mgcawu District"—which was called the Kalahari Manganese Fields Event: In Remembrance of Prof. Nic Beukes. Future events planned include the Northern Cape Commodity Day, 1–2 November 2024. The NC Branch will be in partnership with the GSSA Namaqualand Diamonds Centenary Event, 11–20 March 2025.

We would like to thank our members, sponsors and interested parties for their continued support. We look forward to hosting future events for all stakeholders as we fulfil our mandate to promote awareness of geology and foster interest in the earth sciences within the region.

Loni Gallant
NC Branch Chairperson

Northern Cape Branch West Coast Diamonds Event & Excursion – Highlights

Diamonds are forever and so are the memories of yet another successful West Coast Diamonds Event.

The theme was Exploring the Diamond Industry: Insights on Alluvial Mining in RSA, including understanding the primary source of alluvial diamonds on the West Coast of RSA, the evolution of exploration techniques and beneficiation of these beautiful diamonds, which was showcased by interesting talks all round from our presenters Lyndon De Meillon, Mike De Wit, Gregory Katz, Collin Mbangu and Deoné Strauss, and followed by an exciting field trip hosted by Kabelo Mongalo, Kleinzee Holdings and BCon Mining.

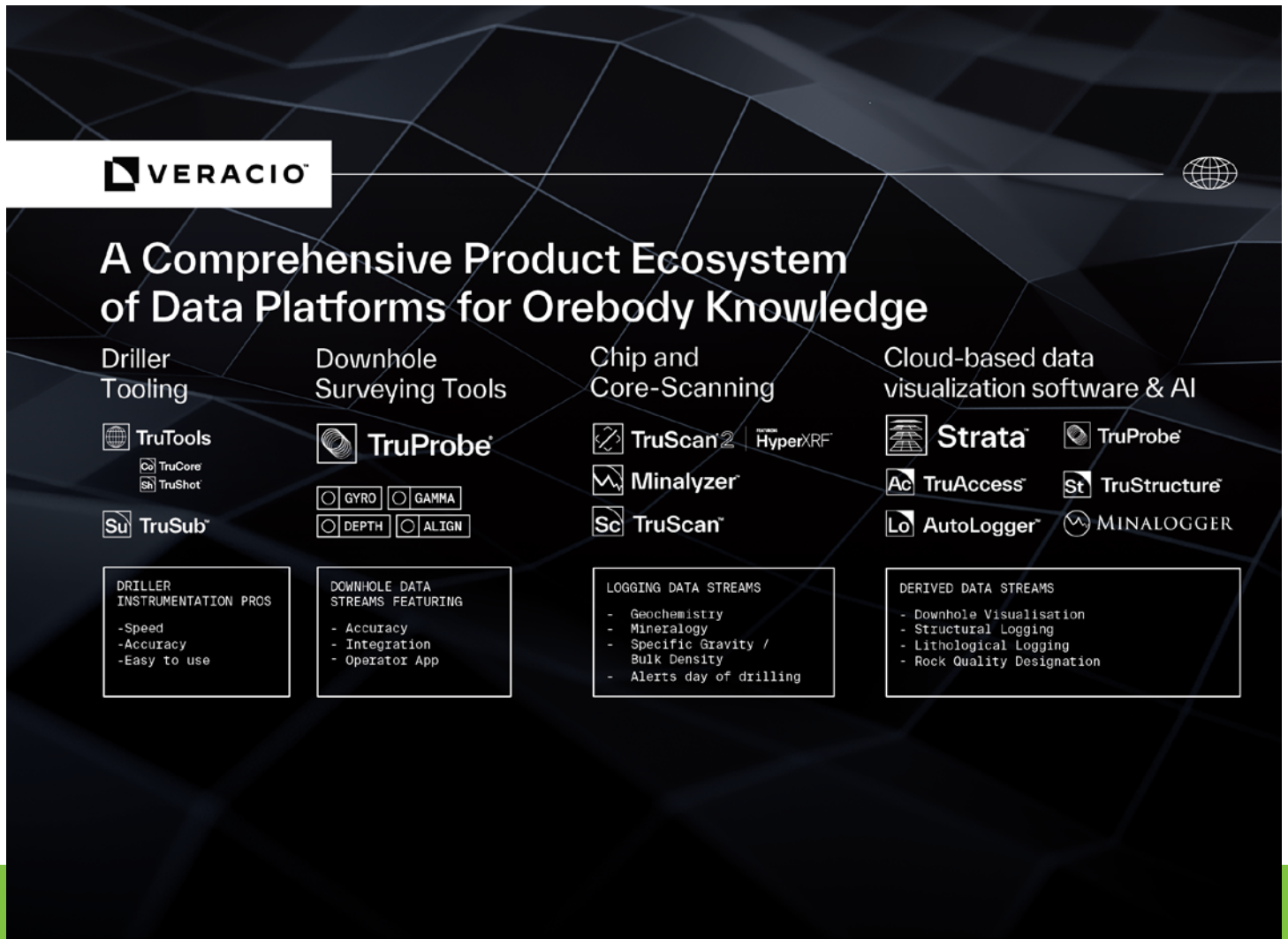
We would like to once again thank all the event delegates, speakers, NC Branch Exco and sponsors for an amazing event.

TÜVNORDGROUP

DMT Kai Batla (Pty) Ltd

dmt-group.com

johannesburg@dmt-group.com



geological hot pot

I reached The Big Seven Oh (70) in January this year and have been happily retired (?) for the past three years. I am typing this column at the Kalahari Cottages in Hotazel in the Northern Cape, assisting a junior exploration company with the evaluation of a few manganese prospects. Two weeks ago, I was in Zimbabwe looking at mica and lithium prospects. Hence the question mark after retired!

As you are aware by now, I keep an eye out on interesting geoscientific articles to chuck into my hot pot. But I will digress a bit from my usual menu and share with you some of my photographs from the start of my career. This came to me when I came across the article about the natural nuclear reactor at Oklo in Gabon, as nicely explained here.

The Lower Proterozoic Francevillian-age meta-sedimentary rocks host uranium deposits that have been mined in the past 30 years. The rocks also host high-grade manganese deposits. The discovery of the natural nuclear reactors was made by French scientists who detected a depletion in the uranium-234 isotope in some ore samples from Oklo. This is the isotope that is fissionable when it reaches a critical concentration. In the distant past, the hydrothermal fluids that percolated through the metasedimentary rocks to deposit the uranium minerals did so very efficiently. This resulted in the natural concentration of uranium-234 increasing to fissionable levels, and the triggering of nuclear chain reactions. There is indeed nothing new under the sun!

I started my working career with Esso Minerals Africa looking for calcrete-hosted uranium deposits in the Kenhardt area in the Northern Cape. After a year, I was relocated to Sutherland further south to join the Karoo sandstone-hosted uranium exploration team. Esso was in the middle of an extensive percussion drilling programme, and I had to quickly learn to "chase" after a drilling rig, having not even seen one before! We had to log the percussion chips, decide where the mineralised interval was (if present), and then site the next few drill holes. All the under the pressure of the driller's standing time (the hours the drillers charge the company if their rigs are idle).

High-grade uranium ore in the cliffs on the escarpment about 50 km east of Sutherland (Banksgaten farm).

REGISTRATION WITH

SACNASP
South African Council for Natural Scientific Professions

01 LEGAL COMPLIANCE NSP ACT (27 of 2003)

02 RECOGNITION AS A PROFESSIONAL

03 PUBLIC CONFIDENCE IN YOU AS A SCIENTIST

04 MARKETABILITY (EMPLOYERS REQUIRE REGISTRATION)

05 CODE OF CONDUCT – TRUST FOR ETHICAL VALUES

06 INPUT TO GOVERNMENT – SACNASP VOICING SCIENTISTS' INPUT AT MINISTERIAL LEVEL

07 NETWORKING – WEBINARS, WEBSITE NETWORKING PORTAL

08 POTENTIAL FAVOURABLE RATES FOR PROFESSIONAL INDEMNITY INSURANCE

09 CAREER ADVERTISEMENTS – EMPLOYERS ADVERTISE VACANCIES ON SACNASP WEBSITE AND SOCIAL MEDIA

10 VOLUNTARY ASSOCIATION EVENTS – NETWORK WITH FIELD OF PRACTICE PEERS AND GAIN VOCATIONAL CAREER ADVICE

11 FACILITATES LIFELONG LEARNING THAT IS CRUCIAL TO A PROFESSIONAL'S CAREER PATH – CANDIDATE MENTOR PROGRAMME

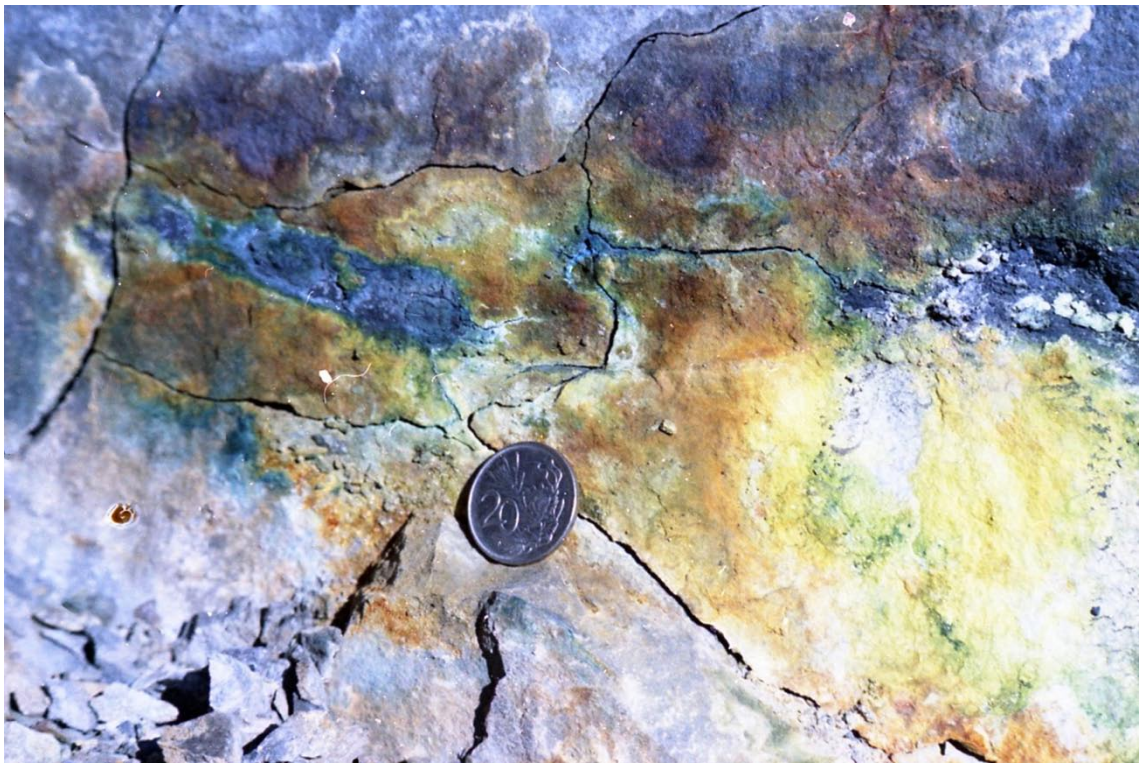
12 CONTINUING PROFESSIONAL DEVELOPMENT – ONLINE LEARNING

CMP and CPD

SCHOOL HIGH SCHOOL UNIVERSITY EMPLOYMENT

7 12 18 23 **Lifelong learning opportunities** 65

Uranium ore associated with organic nodules at the base of a thick sandstone bed. Tip of geological hammer just visible lower left for scale.



Oxidised Karoo uranium ore from the Sutherland area.

The demand for uranium, as is typical of most mineral commodities, goes up and down in cycles, largely dependent on the global economic conditions at the time. I was retrenched (if the word is still used by human resource practitioners) by Esso at the end of 1980 because they discontinued their exploration activities in South Africa. This was mostly due to the very sharp drop in the price of uranium, resulting from the discovery of the large and high-grade deposits in Canada and Australia. I then enrolled in the Master of Science course in Exploration Geology at Rhodes University in the next stage of my career.

Schramm percussion drilling rig in action on the escarpment.

Uranium is once again flavour of the month, and a "hot" topic in exploration circles. So old prospects up and down South Africa, as well as the rest of the world, are being given another look through. The Karoo uranium occurs in thick sandstone beds, mainly at the base of the units. These sandstones are well exposed in the cliffs along the escarpment, and one of the ways that Esso studied the sandstones was by abseiling down the cliffs at the Tierhok prospect. Panoramic photographs of the cliff faces were taken and used by a data recording geologist on the opposite side of the ravine separating Tierhok from the Suurkop "peninsula". The abseiling geologist conveyed his observations via two-way radio to the recording geologist. The

Dr Chris Cameron of Esso, who discovered the uranium deposit at Rystkuil south-east of Beaufort West, took to abseiling like a duck to water! A scintillometer is in the leather pouch.

A much younger me embarking on abseiling for the first time. Brian, a professional climber, was hired to ensure our safety.

Reconnaissance exploration by helicopter.

annotated photographs were then used to compile a depositional model for the sandstones, siltstones and shales, and presented in a comprehensive report. It is hoped that somewhere in Houston, Texas, there is in the Exxon Mobile (the parent company of Esso) archives a copy of this excellent report.

One of the reconnaissance exploration methods was by using a helicopter to fly along the edge of the escarpment. Scintillometers used to detect radiation were hung onto by the two geologists in the helicopter with its doors open. One of the unforgettable thrills (for me) was flying along merrily about 50 metres above the ground, then going over the edge of the escarpment with the ground dropping hundreds of metres down in an instant. Not recommended for those who suffer from vertigo!

George Henry

The challenging but beautiful terrain along the Great Escarpment east of Sutherland on Banksgaten. Esso had to hire a bulldozer to make tracks so that the drilling rig could get to the designated sites. The sandstones are the thinner beds in the image, while the thick unit at the top of the mountain is a dolerite sill.

Never published before! One of the hazards of exploration in the normally very dry Great Karoo are flash floods. I was on my way to the Tierhok prospect on Nooitgedacht farm south-southeast of Sutherland one morning when I had to cross a small stream, usually not more than a dry dip, to get to the gate. I drove my Chevrolet Nomad into the water that was about tyre-level high, and it stalled. I then decided to walk to the farmhouse about three kilometres away to get assistance. When the kind farmer and I returned about an hour later, the Nomad was not where it should have been – it had been carried by a rising current several hundred metres downstream! I had to shame-facedly report to my boss in Johannesburg what had happened by telephone at the farmhouse, and he took it in good grace. Thanks, Joe! The farmer pulled the Nomad out after the water subsided a day or so later, and it was sold to him at a nominal price. He managed to get it working again, I am glad to say.

GGPG

Global Geoscience Professionalism Group (GGPG)

At the Annual General Meeting held on 20 May 2024, the GSSA (as represented by Dr Tania R Marshall) took over the Chair of the GGPG for the period 2024–2026. The GGPG is an international body founded in 2021, having grown out from the Task Group for Global Geoscience Professionalism (TG-GGP), a working group of the International Union of Geological Sciences (IUGS).

The GGPG was developed to:

- Promote greater understanding of the role and importance of geoscience professionalism;
- Facilitate communication and collaboration between geoscience professional organisations;
- Provide easy access to geoscience professional organisations' standards, codes, continuing professional development, and complaints and discipline information; and
- Provide information on pathways to attaining geoscience professional qualifications.

The Executive for the 2024–2026 period is:
Chair: Dr Tania R Marshall (GSSA)
Vice Chair: Ms Michelle Hailonga (GCN)
Treasurer: Ms Andrea Waldie (GSC)
Secretary General: Mr Julio Santos (EFG)

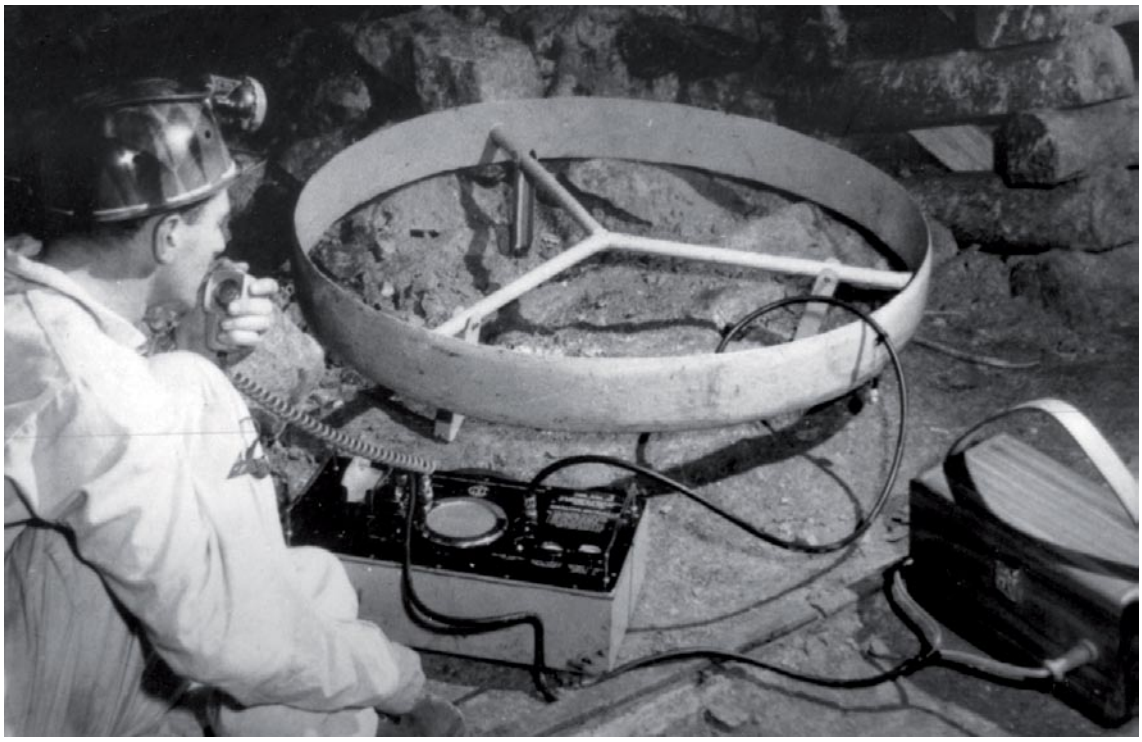
The GGPG currently has 16 member and observer organisations—Australian Institute of Geoscientists (AIG); American Institute of Professional Geologists (AIPG); Botswana Geologists Association (BGA); European Federation of Geologists (EFG); GeoAnsata (Brazil); Geological Society of Africa (GSAf); Geological Society of South Africa (GSSA); Geological Society of Zimbabwe (GSZ); Geoscience Namibia (GCN); Geoscientists Canada (GC); International Raw Materials Observatory (INTRAW); Professional Association of German Geoscientists (BDG); SF4 Expert Group for Raw Materials; Spanish Official Professional Association of Geologists (ICOG); and West African Institute of Mining, Metallurgy and Petroleum (WAIMM).

All professional and/or statutory geoscience organisations are welcome to join as full members or as observers. Please contact info@geoscienceprofessionals.com for further information.

GLOBAL GEOSCIENCE PROFESSIONALISM GROUP

geoheritage

Sending radio signals through rock



Fresh-air base set and large loop antenna.

A problem peculiar to mining is how to transmit radio signals through rock. Anyone who has ever ventured into the lowest levels of an underground multi-storey carpark knows that your favourite radio station you were listening to just a few minutes before has suddenly disappeared. Those radio signals were not just blocked by the reinforced concrete of the building, but they were absorbed by it too. This, then, is the problem confronting anyone underground in a mine who might want to communicate by radio. The range is pitiful. In fact, communications are often possible by shouting when nothing is heard on the fancy (and expensive) walkie-talkie you took down with you to talk to a colleague, using a similar radio, just a few metres away.

Whereas miners have managed without radio ever since the first brave individual ventured into the bowels of the Earth, there are situations when being able to communicate directly through the rock could well prove to be a life-saver. One good example is when there's been a rock-fall or a fire deep underground and a rescue team is despatched to take immediate action. Those rescue brigades, as they're known, were originally called Proto teams because of the Proto breathing apparatus they all wore on their chests. In 1938, Dr A.J. Orenstein, medical adviser to Rand Mines, realised how vitally important good communications were between the Proto team members and he asked Professor Basil Schonland, Director of the Bernard Price Institute (BPI) of Geophysical Research at Wits, whether radio would work underground.

Before any research could commence to answer the question, the Second World War broke out and the BPI became fully involved in developing South Africa's own radar system. One of the young electrical engineers involved in that task was Trevor Wadley, a recent graduate from Natal University. If any man could be dubbed a genius, Wadley certainly

deserved the title. His fame would be made after the war when he designed and developed two remarkable pieces of electronic equipment that completely revolutionised their fields. One became known as the Wadley receiver and the other was the Tellurometer. The receiver became the mainstay of all the Royal Navy's radio communication for three decades, while the Tellurometer, a distance-measuring instrument of unparalleled accuracy, set new horizons in the world of land surveying. But Wadley's first assignment at the newly formed Telecommunications Research Laboratory of the infant CSIR was to look into the feasibility of transmitting a radio signal over a useful distance through the incredibly hard quartzite rock found in deep gold mines.

Wadley did the sums and then built experimental apparatus that he took underground. Its performance proved that his theoretical analysis was correct: it was possible to transmit, directly through rock, over a distance of a few hundred metres using relatively low-powered equipment. The key to success was to use a much lower frequency than that of any portable transmitter such as those used by the army at the time. In fact, Wadley's calculations showed that the well-known "medium-wave band" familiar to everybody who listened to the SABC, and particularly to Springbok Radio, provided the longest range through rock when using the least amount of power. This latter aspect was important because equipment suitable for use underground had to be portable. It should be made clear that the period we're talking about—the late 1940s—was characterised by radio sets that resembled fairly large pieces of furniture embellished in carved wood with a multitude of knobs around a glowing dial. It wasn't the only thing that glowed. Inside the cabinet were a number of thermionic valves (or tubes to the Americans) that glowed a dull orange when they were operating. And those valves were the heart of all radio equipment in those days. The transistors of today only made their debut in 1948, while the ubiquitous "chips" with everything had to wait another thirty years before they appeared. So, the size and weight of the radio equipment of those days were the real problems.

The photograph below shows the portable set designed by the Chamber of Mines Research Laboratories in the late 1950s based on Wadley's specifications. The Protoman is wearing a nose clip and is breathing through a schnorkel tube so he was unable to speak and, therefore, could only transmit coded signals similar to Morse Code. At the "fresh-air base", some safe distance back from the raging fire underground, a larger more powerful radio was used and, being in the fresh air no breathing apparatus was needed. Carefully phrased voice signals were transmitted to the Prototeam, to which simple yes/no replies were expected by an agreed code using the Morse key on the portable transmitter. All radio equipment requires an aerial or antenna and the portable set had its loop antenna encased in the carrying harness around the brigademan's torso. A much larger circular loop was used at the fresh-air base (see image on pg 31).

Portable set designed by Chamber of Mines Research Laboratories in the late 1950s.

Manpack set of the mid-1960s.

Though it worked well over a range of about 300 metres, and sometimes more, the apparatus was simply too big and bulky and so the project foundered until transistors became abundant.

In the mid-1960s a solid-state transceiver—a combined transmitter-receiver—was designed using all the most modern techniques (see image above). It performed exceptionally well. Its antenna was a loop in the shape of an ellipse, for carrying convenience in the confined spaces typical of many mines.

The performance of this set was such that it even attracted the interest of the Americans, who purchased a half-dozen sets for trials in their mines. Numerous demonstrations of the equipment were undertaken in the South African mines in the belief that there might be other applications than rescue and fire-fighting, but miners being conservative, hard-bitten individuals were not convinced they needed radios! However, the Prototeams certainly did but, yet again, even though the military-style manpacks were much smaller than the earlier hardware they were still considered too bulky. The need therefore arose for a handheld transceiver and a prototype appeared in 1977. It too was based on Wadley's predictions about the optimum frequency to use.

The remarkable reduction in size was due to a novel electronic technique that was used to generate both the transmit and receive signals at exactly the right frequency. Again, the antenna was a loop of wire wrapped around the miner's torso.

Handheld transceiver with bodyloop antenna.

This equipment was given to a small electronics company in Johannesburg to manufacture and many hundreds subsequently went into service at Doornfontein Gold Mine, where they were used over many years to improve the efficiency of an experiment in cutting rock rather than breaking it by means of dynamite. This was a major research undertaking by the Chamber of Mines Research Organisation (COMRO). Based on the excellent performance and convenience of these small sets, a concerted effort was undertaken by the COMRO Electronics Division to design a far more sophisticated handheld unit that would satisfy a variety of mining needs that were by then being identified.

By 1978, the prototype was complete and came through all its underground tests with flying colours. A contract was then awarded to a Pretoria-based manufacturer of military radio equipment to turn the COMRO prototype into an extremely rugged handheld unit that would be "miner-proof"! The equipment in use by a Rescue Brigadesman wearing modern breathing apparatus with its full facemask is shown on the next page. They eventually had the equipment they so sorely needed.

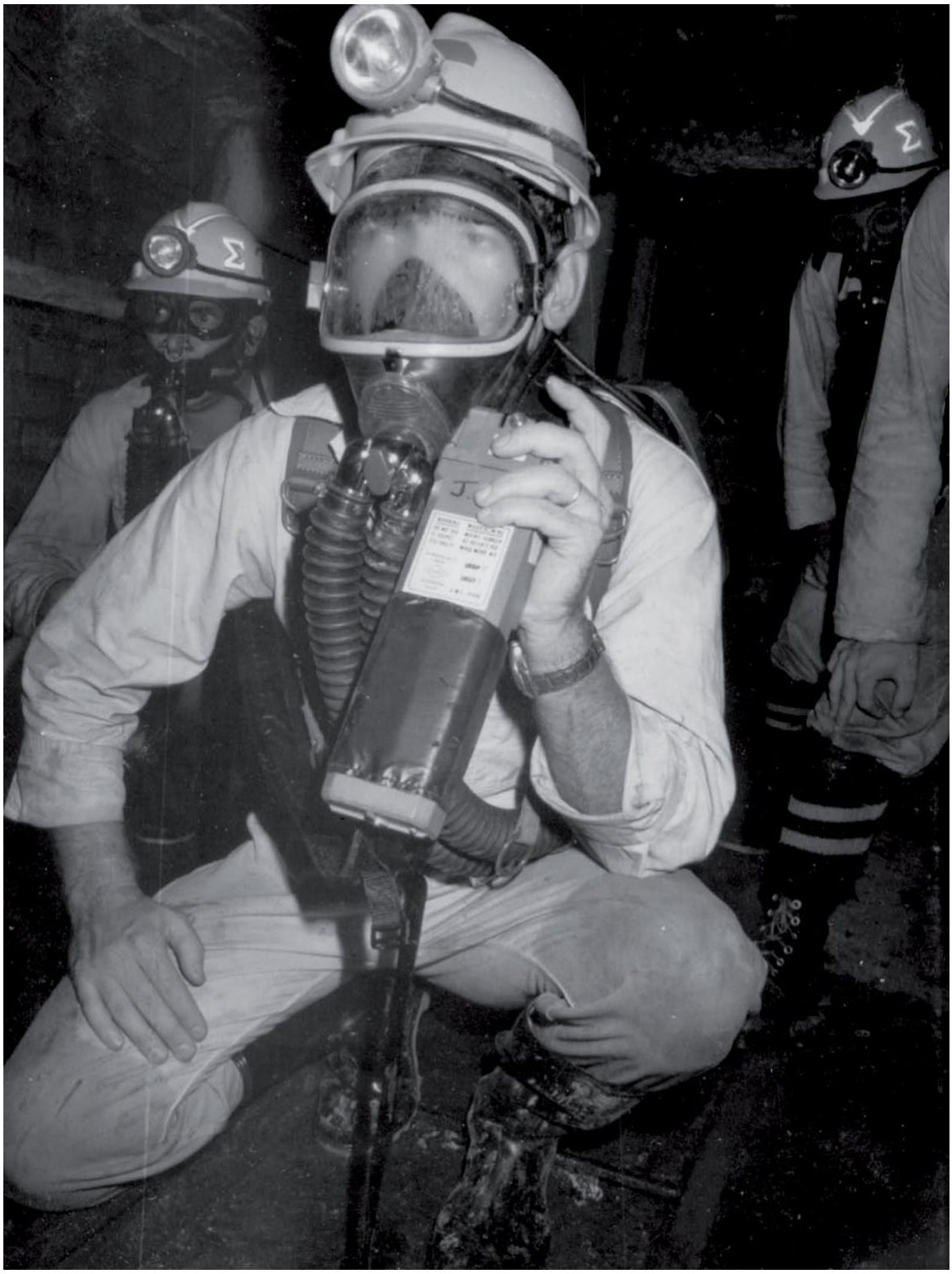
This was now the start of the commercial era where radio underground in mines became a business venture instead of a research and development exercise. A company came into being in Pretoria that handled the underground demonstrations and the marketing of the equipment not only in South Africa but in many other parts of the world. The brilliance of Trevor Wadley who pioneered it all had, once again, been recognised.

Brian Austin

Dr Brian Austin studied Electrical Engineering at Wits, and spent a decade in industry, mainly at the Chamber of Mines Research Organisation where he led the team that developed the world's first "direct-through-rock" underground radio system. He then joined Wits as an academic before emigrating to England, where he joined the Department of Electrical Engineering and Electronics at the University of Liverpool.

This article originally appeared on The Heritage Portal, and is reprinted with permission of the editor and author. It is an abridged version of the original article published in the South African Journal of Science, vol. 120 no. 3/4, Mar/Apr 2024.

Geoheritage



The commercial multi-purpose handheld transceiver.

Geoheritage

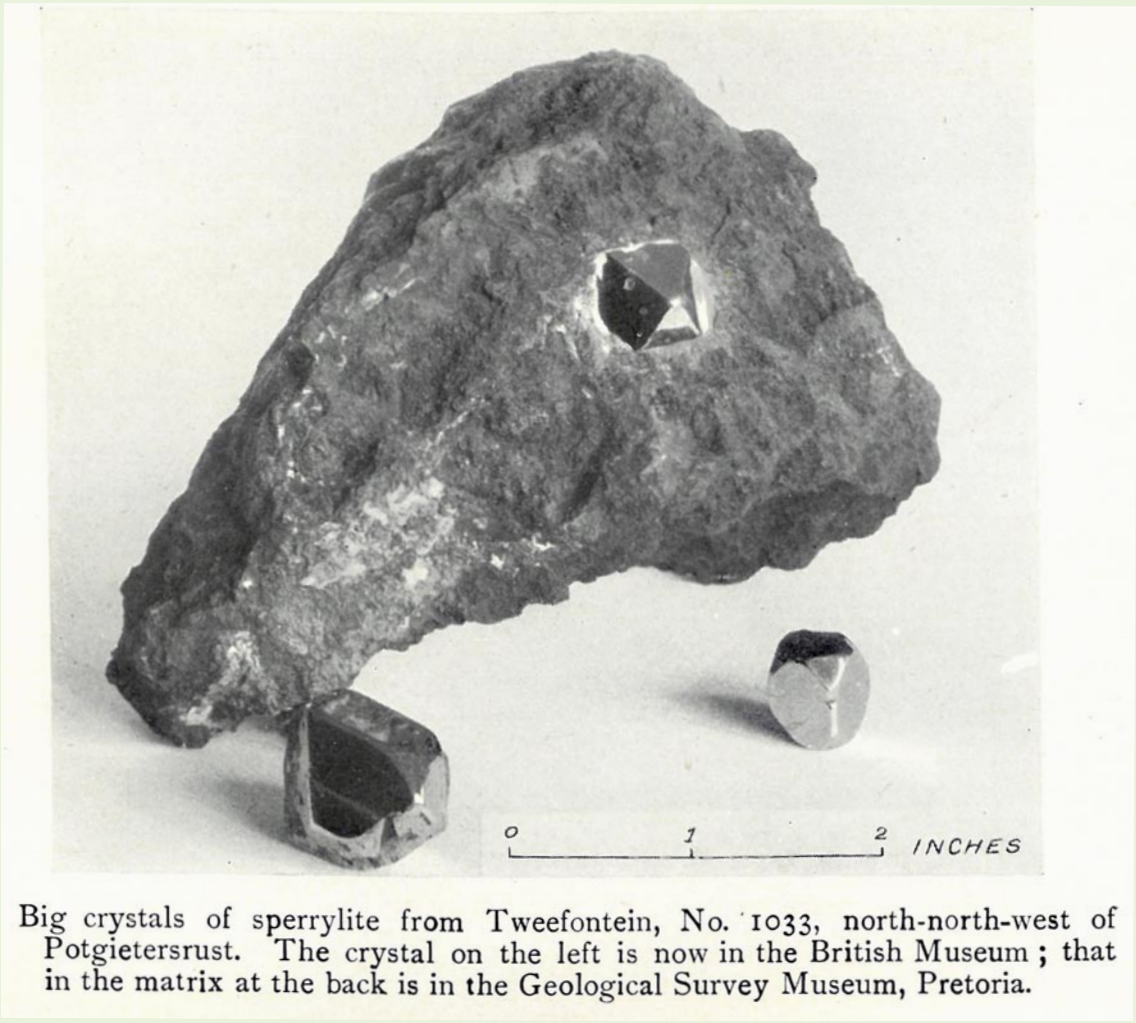
mineral scene

Sperrylite, Bushveld Complex, South Africa

In August this year, the GSSA celebrates the centennial anniversary of the discovery of the Merensky Reef. To coincide with this celebration, this issue's 'Mineral Scene' features one of the iconic mineral species from the Bushveld Complex, sperrylite $PtAs_2$. Sperrylite is a rare mineral, particularly as large, aesthetic specimens. It usually forms small, heavy, brilliantly lustrous, cubic-octahedral crystals. The Bushveld Complex platinum deposits in South Africa have produced some of the finest sperrylite crystals in the world.

In the Bushveld Complex, sperrylite crystals and associated rare sulphides braggite, cooperite and laurite are characteristic of the Merensky Reef.[1] Most are microscopic, but in the 1920s on the farm Tweefontein 238KR in the Mokopane district, large, perfect, tin-white crystals with a very high lustre were recovered from a limonitic gossan.[2] One of the largest measured 1.85 x 1.625 x 1.5 cm. These historical specimens are commented on by Wagner in his 1929 'Platinum Deposits and Mines of South Africa' book as ". . . crystals of sperrylite of a size

A 4 mm sperrylite crystal in gossan matrix. This is a historic specimen collected during the 1920s from the outcrop at Tweefontein. The specimen measures 2.5 cm.



Big crystals of sperrylite from Tweefontein, No. 1033, north-north-west of Potgietersrust. The crystal on the left is now in the British Museum; that in the matrix at the back is in the Geological Survey Museum, Pretoria.

The black and white photograph in Wagner (1929),[3] with his caption reproduced verbatim. The front left crystal is still in the "British Museum", now the Natural History Museum in London. It rests loosely on the soft brown gossanous matrix. Sadly, the other two specimens referred to as being in the Council for Geoscience collection in the now-Ditsong Museum (Geological Survey) were stolen during the 1970s.

previously undreamt of . . .".[3] Most were cubic, but there were also combinations of cubic and octahedral forms. These crystals have only recently been surpassed by larger crystals from Russia and Canada, but still remain iconic for the species.

At Insizwa in the Eastern Cape, sperrylite is fairly common in the massive ore and occurs as tiny crystals up to 0.2 mm on edge, associated with pyrrhotite, cubanite, and parkerite.

At the Mimosa Mine located on the Great Dyke, Zvishavane district, Zimbabwe, sperrylite occurs together with nickel and copper sulphides in certain horizons such as the Great Dyke's 'potato reef'.

Bruce Cairncross
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2. Wilson, W.E. (2010). Sperrylite from the Tweefontein farm, Limpopo Province, South Africa. *Mineralogical Record*, 41(2), 145–155.
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100 YEARS OF THE MERENSKY REEF

HANS MERENSKY - BUSHVELD COMPLEX

One hundred years later, the Geological Society of South Africa (GSSA) believes that this is a milestone worth celebrating. To honour Hans Merensky, platinum and all things Bushveld Complex related, the GSSA is organising a two-day scientific/technical conference (including a poster session as well as a trade show), combined with various pre- and post-Conference field trips to the Eastern, Western and Northern limbs and different social events during the period 15 -23 August 2024.

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symposium

Southern African Mineral Symposiums

The "1st International Gem & Minerals Symposium" was organised in September 1975 by the Pretoria Gem & Mineral Club in Pretoria on behalf of the Federation of South African Gem and Mineralogical Societies. Four overseas and three local mineralogists and gemmologists delivered a series of talks over three days and one day was taken up by field trips. The themes of the lectures were focussed primarily on overseas minerals and mineral localities and on gemstones.

Seventeen years later in 1992 the "First SA Mineral Collectors Symposium" was held at the Rand Afrikaans University in Johannesburg. This concentrated more on local content than the first symposium held in Pretoria. Thirteen local experts presented talks on various aspects of minerals, mineral localities, analytical techniques related to identifying minerals and gemstones.

In 2010 and 2012, two more successful local mineral symposium meetings took place in Pretoria, with 118 delegates attending the 2010 meeting and 76 attending in 2012.

Due to the success of these previous symposiums, the 5th Mineral Symposium will be held on 7 September 2024 at the prestigious Origins Centre at the University of the Witwatersrand.

The purpose of the symposium is twofold. Firstly, to get together the 'professionals' and the 'amateurs' who are experts in their respective fields and to have stimulating discussions on minerals, gemstones and related topics. Secondly, the symposium acts as a vehicle for promoting and highlighting minerals, mineral heritage, mineral collecting and mineral preservation in our region. It is envisaged to build on the success of the current symposium, and the previous ones, to hold these on a biannual basis in future. See you in 2024!

Enquiries: minsa@gssa.org.za

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CALL FOR SPEAKERS:
Topics must cover minerals, mineral collectors & collections, aspects of mineralogy, micro-mounts, analytical techniques used in identifying minerals, travelogues to interesting mineral localities, and related mineral/gemstone topics. Anyone planning to present a talk must submit the title and brief description (one paragraph) to the Symposium Speaker's Coordinator, Bruce Cairncross, at brucec@uj.ac.za. If the oral presentations are oversubscribed, speakers will be allocated on a first-come, first-served basis. Speakers will be required to write up a summary of their presentation, which will be bound together and provided to delegates on the day of the symposium. Details of the write-up will follow in the Second Circular. All delegates attending the Symposium will be required to pay the registration fee (to be announced in the Second Circular). All proposed presentations will be reviewed by the organising committee regarding their suitability for the symposium theme and may, at the discretion of the Committee, be accepted or not.

DEALERS:
Mineral dealers will be accommodated at the symposium to sell mineral specimens and mineral/gemstone-related material during the symposium. There will be opportunities for delegates to make purchases during the tea breaks, lunchtime, and after the conference. Details for dealers will follow in the Second Circular.

SPONSORSHIP:
The organising committee would welcome sponsors to assist in defraying the costs of the symposium and thereby keep the delegate's fee to a minimum. Delegates are responsible for their own travel and accommodation arrangements.

GSSA Geological Society of South Africa

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CALL FOR SESSIONS

For Geocongress 2025 to be a success, we need the input of the southern African Earth Sciences community! If you are interested in proposing a scientific session at Geocongress 2025, please use the "Sessions" tab on the congress web portal to create an account and to submit your proposal. The deadline for proposing a session is 9 July 2024. We look forward to receiving your proposals so that we can put together an exciting and diverse scientific programme.

FIELDTRIP QUESTIONNAIRE:

For us to decide on which fieldtrips to run, we ask that you indicate your fieldtrip preferences by completing the questionnaire provided on the "Fieldtrips" tab on the congress web portal as soon as possible.

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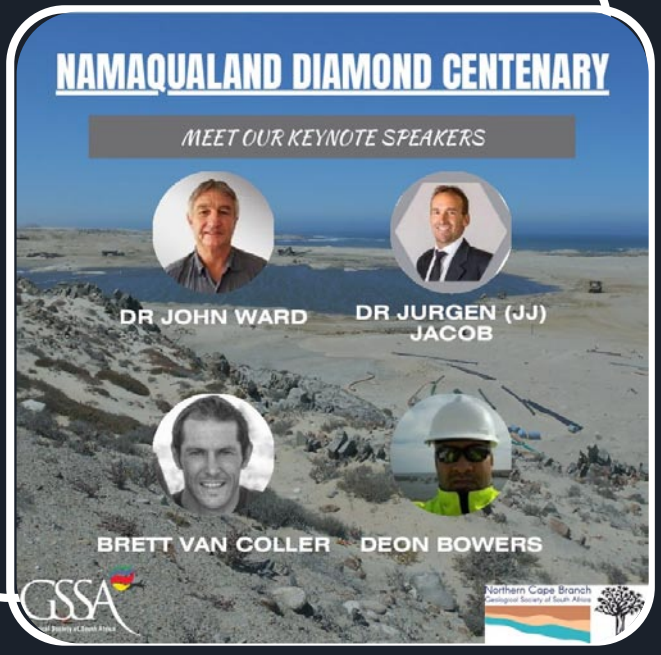

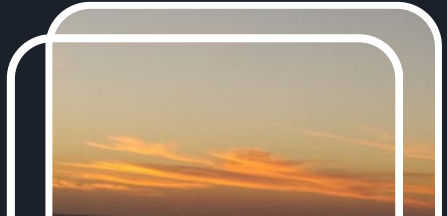

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06 AUGUST	INTRO TO DRILLING
15 - 23 AUGUST	100 YEARS OF THE MERENSKY REEF - CONFERENCE AND FIELD TRIP
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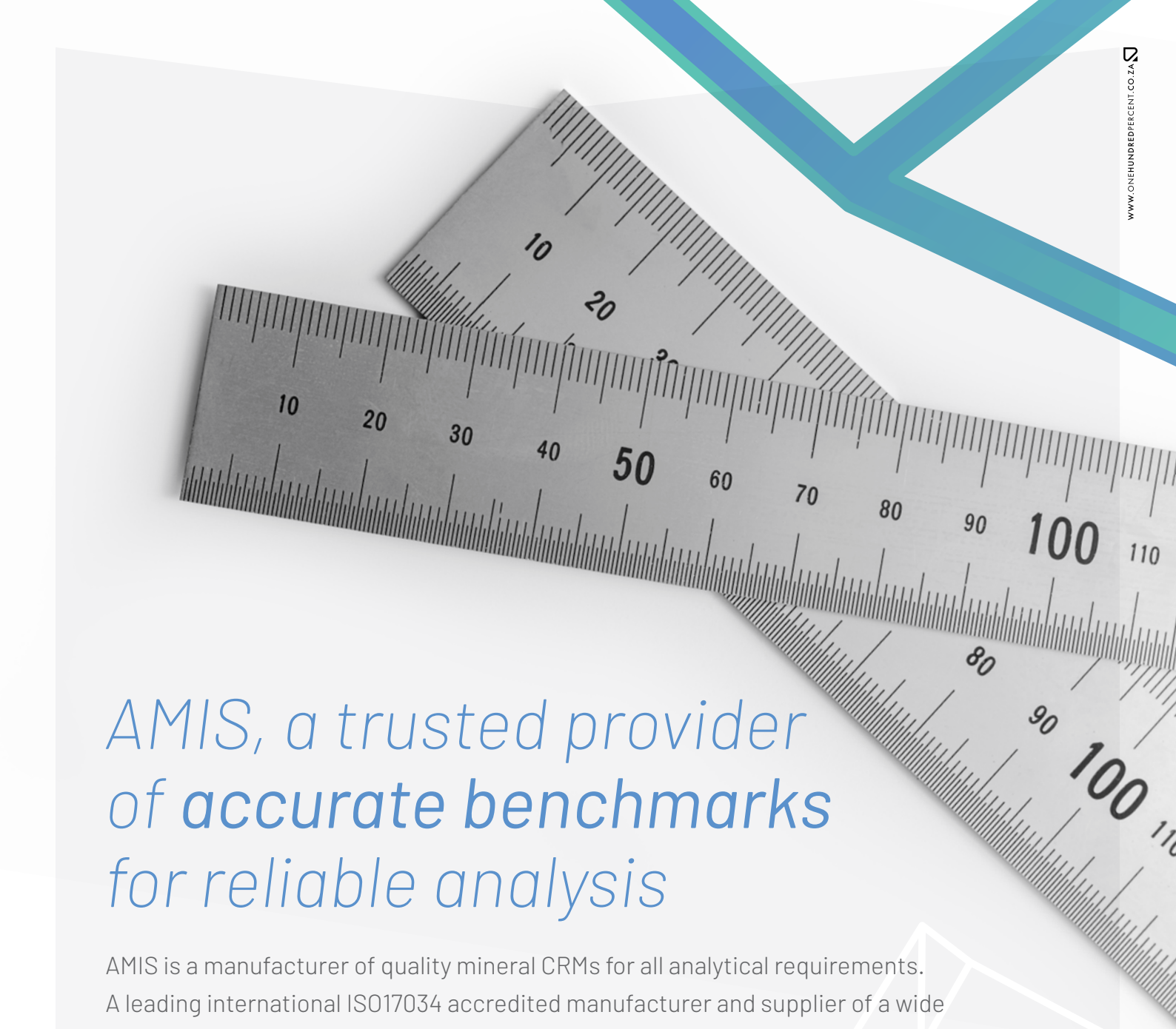

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