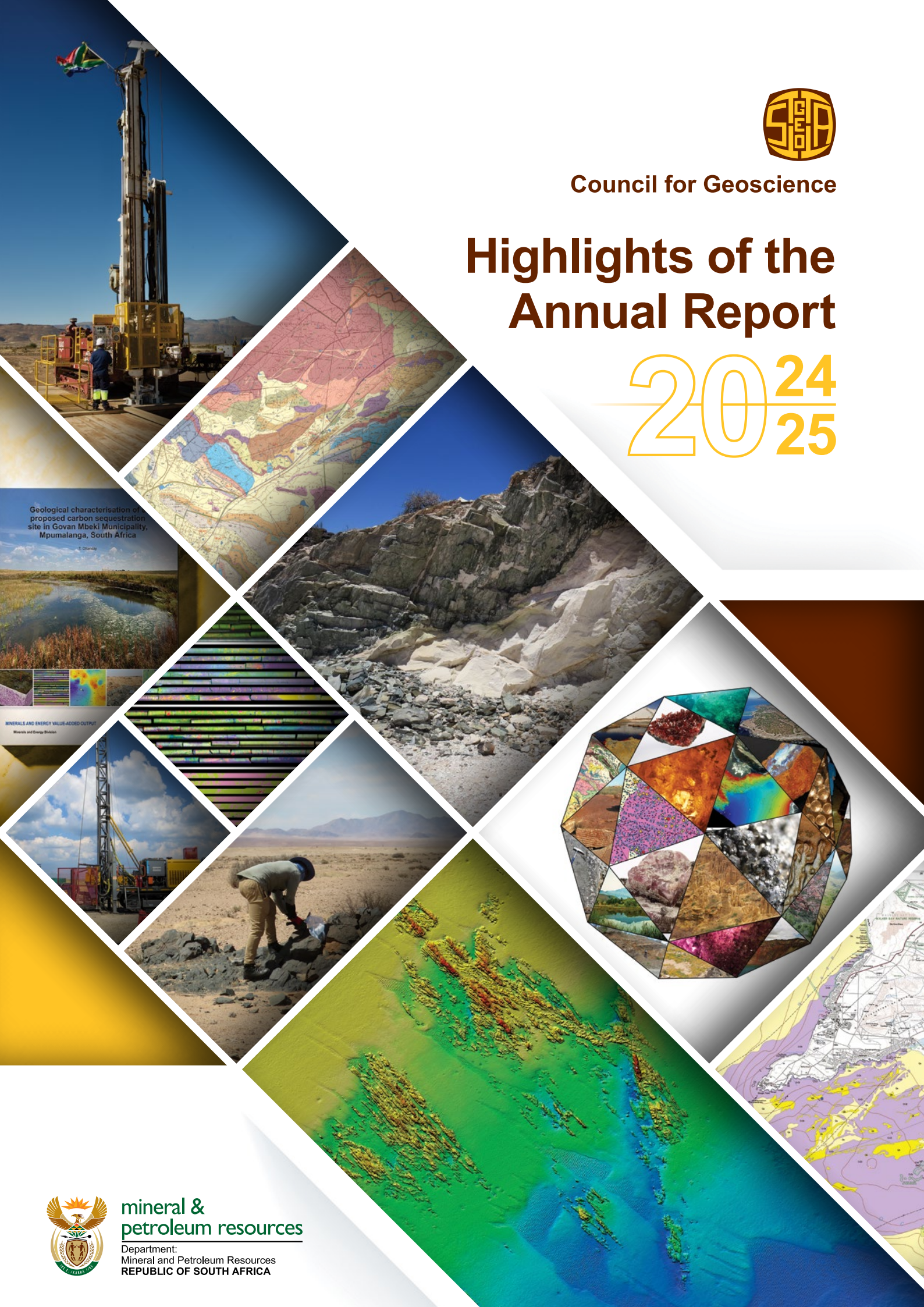




Council for Geoscience

Highlights of the Annual Report

20²⁴₂₅



Geological characterisation of
proposed carbon sequestration
site in Govan Mbeki Municipality,
Mpumalanga, South Africa

S. Chabale

MINERALS AND ENERGY VALUE-ADDED OUTPUT

Minerals and Energy Statistics



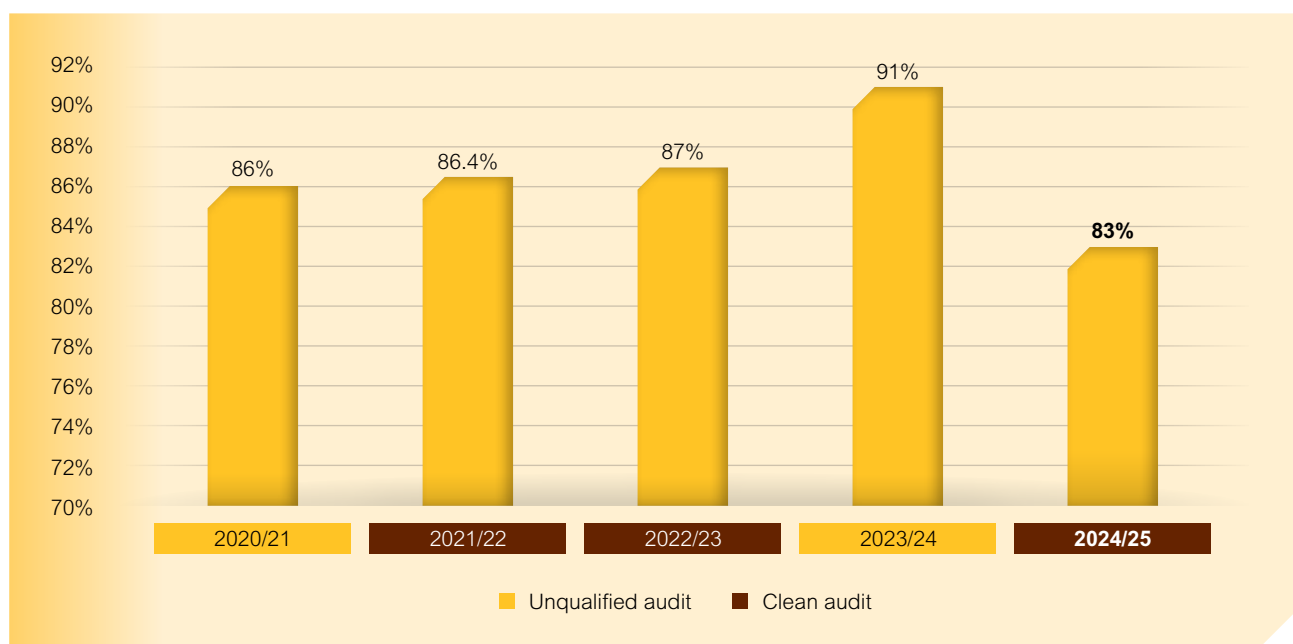
**mineral &
petroleum resources**

Department:
Mineral and Petroleum Resources
REPUBLIC OF SOUTH AFRICA

Organisational Performance

The year under review marks the end of the five-year planning cycle 2020–2025 and the beginning of the 2024–2029 Medium-Term Development Plan. It also represents the eighth year of continuous implementation of the current phase of the **Integrated and Multidisciplinary Geoscience Mapping Programme (IMMP)** as an instrument of delivery of the strategic re-orientation of the CGS. The IMMP decisively focuses on implementing the CGS mandate, inscribed in the founding legislation, the Geoscience Act (No. 100 of 1993) as amended. This includes collection, generation, compilation, interpretation and dissemination of high-quality geoscience data, information and knowledge for South Africa.

Over the five-year planning period 2020–2025, the CGS has demonstrated a generally positive trajectory in audit performance, signalling a maturing financial governance system. The CGS attained an unqualified audit outcome throughout the planning period, with clean audits attained in **2021/22, 2022/23 and 2024/25**. This achievement demonstrates a sound and well-governed financial management system as well as **contribution towards building a capable, ethical and developmental State**. Moreover, through the effective implementation of the strategic programmes, an overall performance achievement of 83% was realised by the organisation.



Overall organisational performance between 2020 and 2025

The CGS’s contribution to geoscientific initiatives, knowledge and national imperatives

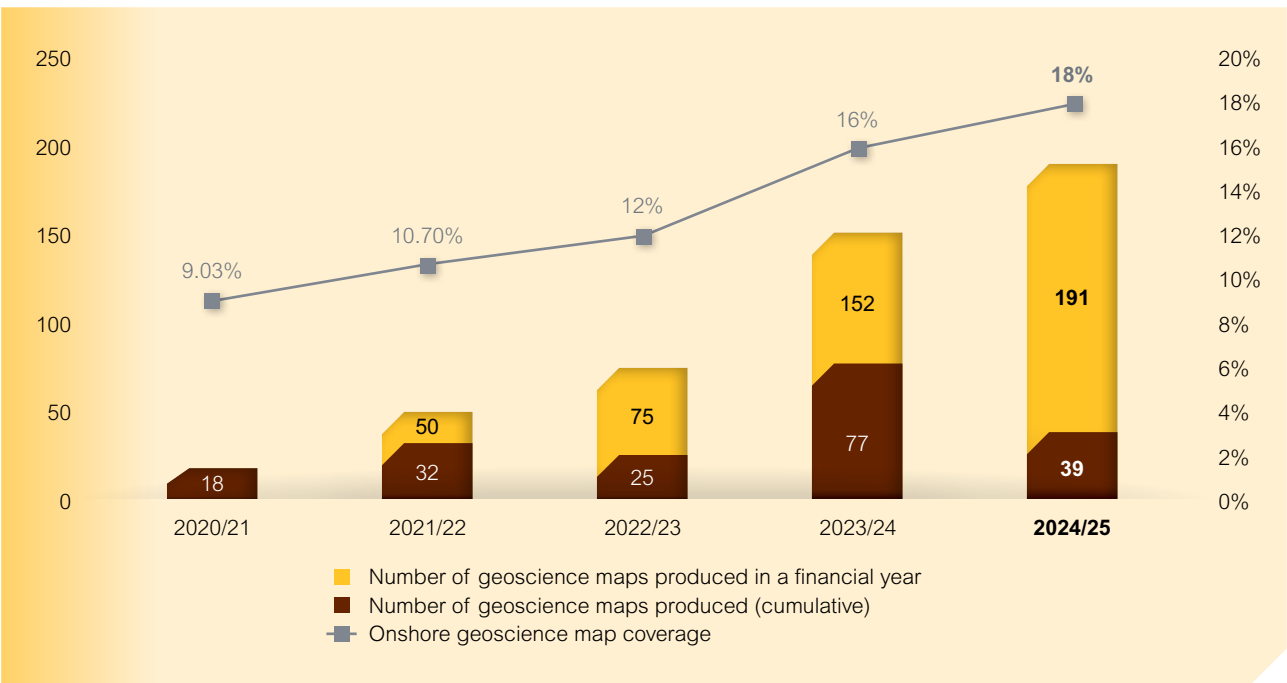
Since the strategic re-orientation of the CGS by adopting the IMMP Strategy, significant progress has been made to support national development imperatives, including South Africa’s intention **to attract a minimum of 5% of the global exploration expenditure through the application of geoscience information and knowledge**. This work finds expression through the implementation of the annual Geoscience Technical Programme (GTP) of the CGS, which produces geoscientific knowledge aimed at unlocking South Africa’s mineral and energy resource potential and supporting a just transition to a low-carbon economy.



The CGS contributed significantly to the development of the **National Exploration Implementation Plan and Strategy**, which had been adopted as a policy of the country. This led to the establishment of a **Junior Mining Exploration Fund**, in which the **CGS provides technical support to define key commodities to be considered**, localities/areas of focus, technical appraisals of work plans submitted, and scientific guidance and advice as to the direction and approach of exploration activities. The first window was opened in 2024/25 for **applications focusing on lithium, copper, nickel, graphite and rare earth elements**. More than 114 applications were received and processed by the CGS. This work provides a tangible framework to give expression to re-imagining the exploration landscape and mining in South Africa.



Fundamental geoscience mapping outputs aim to uncover South Africa’s mineral wealth potential and are furthermore benefited and leveraged to support safe and sustainable infrastructure development, judicious land use and environmental stewardship. In the wake of the 4IR, emerging technologies such as machine learning and AI techniques are being harnessed to generate geoscientific knowledge. **Value-added applied geoscience outputs** have been produced over the five-year planning period 2020–2025, **contributing to minerals, energy, groundwater, infrastructure development and optimal land use**, and focusing on various thematic applications of geoscience to contribute to national development imperatives.

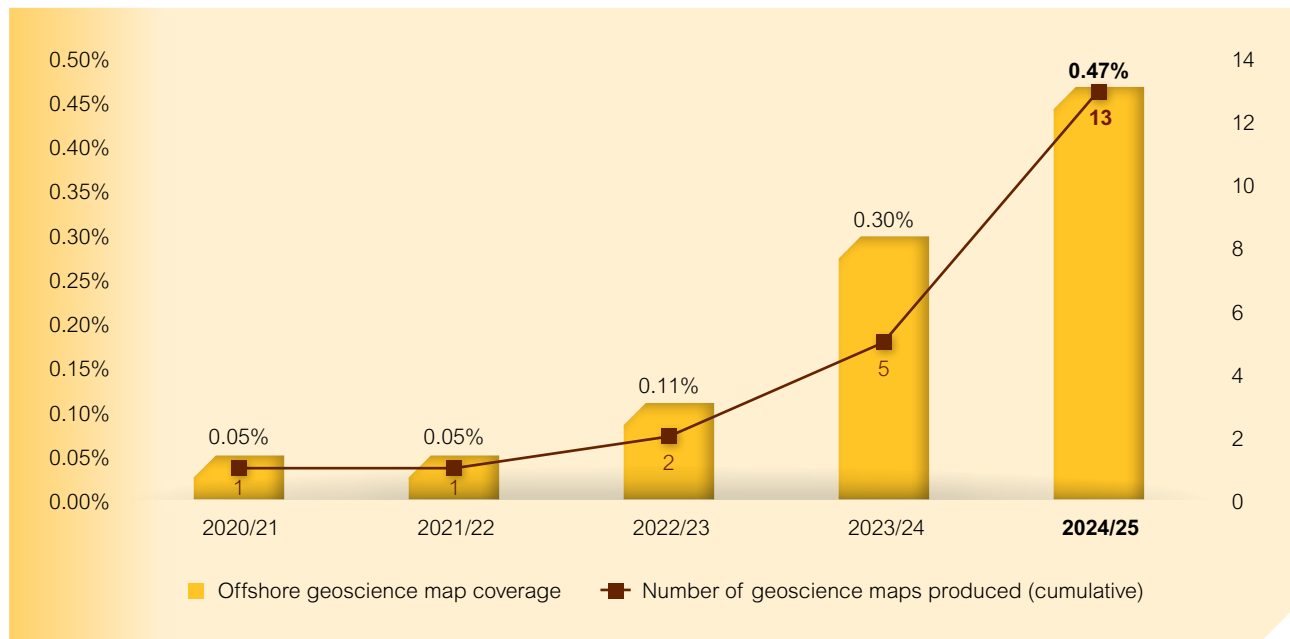


Onshore geoscience mapping coverage



A notable achievement spanning the five-year period is the continued production of 1:50 000-scale geoscience maps, through which critical geoscience knowledge is generated. Over the past five years, **a cumulative total of 191 new 1:50 000-scale onshore geoscience maps** have been produced, resulting in a cumulative onshore mapping coverage of **18%**. As a result of incremental knowledge and expertise gained through the systematic implementation of the onshore mapping programme, the five-year strategic target (16%) was exceeded by two percentage points.

The overall offshore mapping regions were expanded to incorporate Exclusive Economic Zones (EEZs) around all South African territories, at various mapping scales. Cumulative **offshore geoscience mapping coverage progressed to 0.47%** at the end of the 2024/25 to contribute towards unravelling the vastly untapped potential of **South Africa's blue economy**.



Offshore geoscience mapping coverage

The CGS's Minerals and Energy Mapping Theme focussed on characterising non-ferrous base metal associations, emplacement models and mineralisation potential in the Northern Cape Province; characterisation of alluvial diamond emplacements in the North-West Province; and interpretations of regional airborne geophysical datasets across the Northern Cape Province. The latter work considered the regional hydrogeological regime and baseline water chemistry in selected areas of the central Northern Cape Province, constituting valuable baseline information to guide sustainable groundwater management and informed decision-making.



A national value proposition and inferred implications of carbon storage adaptation on South Africa's coal value chain was concluded. Results of this study suggest that the South African coal industry could generate up to **R450 billion in annual revenue by 2050**. This is projected to be driven by the production of **approximately 350 million tonnes of coal per annum**. Cumulatively, this would account for around 20 billion tonnes of coal mined in South Africa, roughly one third of the country's total coal reserves. This **increase in production may result in the generation of at least 70 million GWh of coal-fired power** at current efficiencies. The findings further indicate that emissions from coal-fired power generation would remain at approximately 200 million tonnes of carbon dioxide per annum and could potentially be stored within the identified carbon storage reservoirs in the Govan Mbeki Municipality – subject to the finalisation of pilot-scale testing – with an inferred storage potential of up to 34 gigatonnes in the direct area of Leandra where the pilot site is located.



The CGS advanced **geohazard assessments to support infrastructure development and land use planning** across South Africa. In 2024/25, a seismic risk assessment was concluded for the City of Johannesburg region, with results presented in terms of median building damage for the residential, commercial and industrial buildings across the region. Calculations in this study were based on a scenario damage calculator to estimate the distribution of damage due to a single earthquake of magnitude Mw5.5, occurring along a NW-SE oriented fault, for a spatially distributed building portfolio, with a finite earthquake rupture used to derive sets of ground motion fields. The preliminary results provide insight into the risk due to seismicity and ground conditions. Additionally, the **CGS finalised its contributions to the Probabilistic Seismic Hazard Assessment (PSHA)** and the accompanying investigation reports and quality documentation for the Duynefontyn region, which hosts the **Koeberg Nuclear Power Station**. This project was implemented on a collaborative basis with Eskom, resulting in the **successful renewal of the long-term operating licence of the Koeberg Nuclear Power Station**. The PSHA provided a significant contribution in considering the renewal.

The CGS reviewed technical submissions for **nearly 1 100 developments on dolomitic land**, including dolomite stability reports and development plans, and responded to **over 360 technical queries**. In line with its commitment to customer-centric service delivery, the CGS met all its review responsiveness targets, maintaining an average turnaround time of **13 days** per submission during the period.



The CGS's **Mine and Environment Water Management Programme (MEWMP)** advanced sustainable mine water mitigation, focusing on the Witwatersrand Goldfields. Key achievements included finalising designs for ingress control measures at Elsburgspruit/Kimberley and Modderbee, completing berm construction at New Modder #14 shaft to prevent ~5 million litres/day of water contamination, and ongoing monitoring of critical ingress points. Efforts to support **coexistence of mining and the environment** included developing a draft decision-making framework integrating legal, geological, and environmental considerations. Under the **Integrated Research into Mine Closure (IRMC) Project**, the CGS contributed to the National Mine Closure Strategy and Derelict and Ownerless Mines Programme by combining strategies, developing a master plan for managing high-risk abandoned mines, and conducting ground stability assessments in eMalahleni using **machine learning to map subsidence risks**, thereby supporting safer, more sustainable post-mining planning.



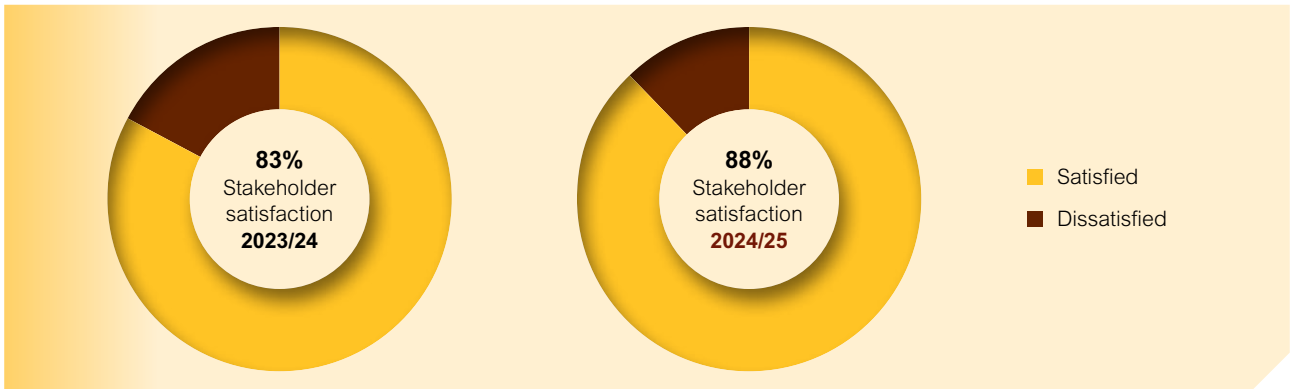
The CGS continued to provide **technical support to diplomatic missions** undertaken to South Sudan, Côte d'Ivoire and Niger, **with a view to finding areas of common benefit and applying innovative geoscientific techniques to accelerate development**. As the permanent Secretariat of the **Organisation of African Geological Surveys (OAGS)**, the CGS continued to facilitate the strengthening of geological surveys and Pan-Africanism between the various member states across the continent. Notably, the **OAGS** was fully incorporated as a non-profit company under legislative prescripts, and the next five-year strategic plan of the organisation was developed.



Beyond the borders of the African continent, the CGS continued **to serve as the technical expert on waveforms for the South African Council for the Non-Proliferation of Weapons of Mass Destruction**. Scientific research under this programme advanced with the application of data for civil applications in South Africa, particularly **the utilisation of infrasound data, to better differentiate between mining-related blasting events and natural seismicity**. Furthermore, the CGS participated in the Conference of the Parties (COP) 28 to advance the substantial progress made towards decarbonisation imperatives through the **Carbon, Capture, Utilisation and Storage intervention**.

Awareness of the CGS brand, services and products

During the 2020–2025 planning cycle, the CGS developed and implemented its **Integrated Communication and Stakeholder Relations Strategy**, resulting in an increased awareness of the CGS brand as well as raising the organisation's profile and visibility across digital and social media platforms. Strong **strategic relationships** were established **with government, industry, regional farming unions, traditional councils, and municipalities**, positioning the CGS as a trusted geoscience partner. Furthermore, prompt responsiveness to media enquiries and rapid dissemination of information on topical subjects such as earthquakes, sinkholes, water security, exploration activities as well as geoscience data requests, bear testament to the CGS's growing impact in society. **Stakeholder satisfaction** improved from **83% in 2023/24** to **88% in 2024/25** surpassing the 70% target and reflecting continuous improvement in service delivery and user experience.



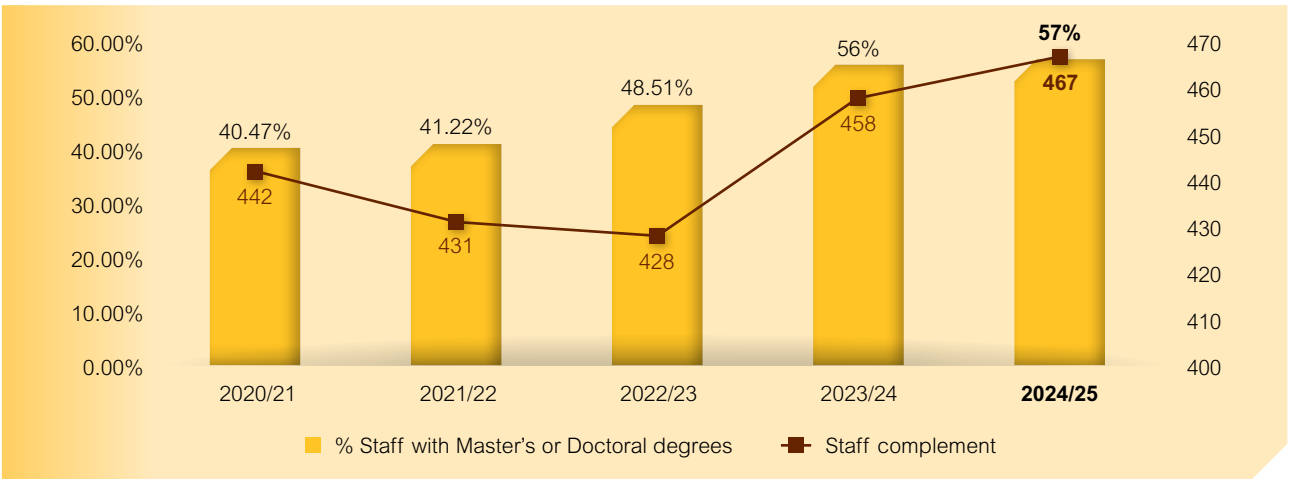
Stakeholder satisfaction survey results in 2023/24 and 2024/25

Geoscience research outputs (2024/25)

The CGS advanced geoscientific knowledge through a diverse range of publications, including **9 CGS publications, 22 peer-reviewed articles, 58 conference papers, and 51 media articles**. By leveraging new multidisciplinary data and external collaborations, the CGS produced additional co-authored and independently authored papers, strengthening the dissemination of research and supporting its mandate to expand South Africa's geoscientific knowledge base.

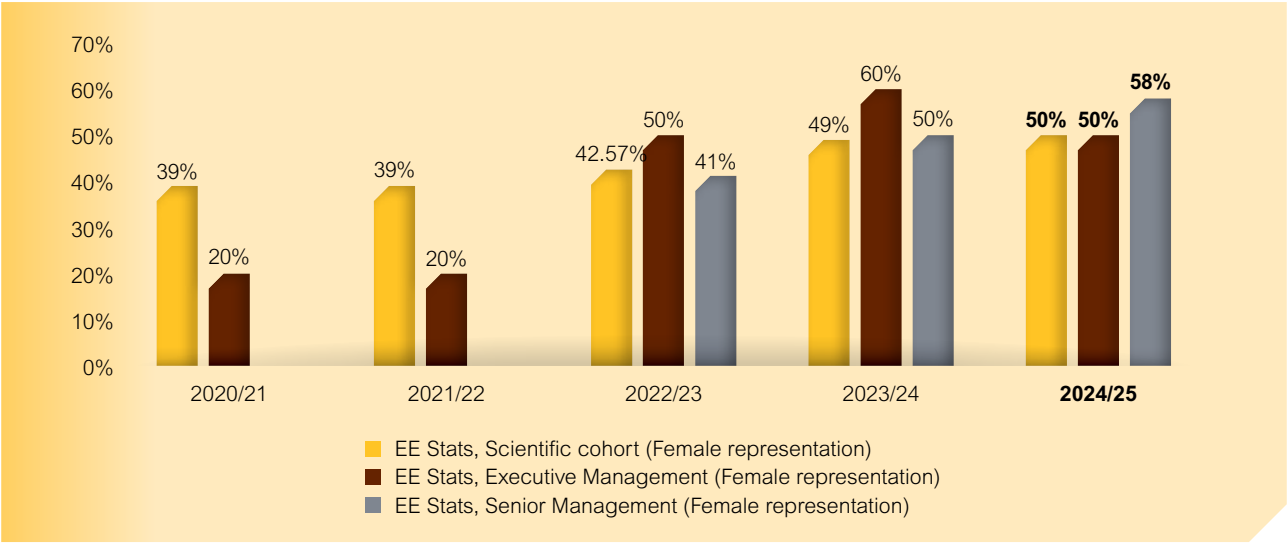
Building capable human capital

Between 2020/21 and 2024/25, the proportion of CGS scientific staff holding **MSc or PhD qualifications** increased from 40.47% to 57%, with **23 staff obtaining new MScs, and 10 receiving new PhD** qualifications. This growth in qualifications, alongside an expanding staff complement, reflects strengthened internal technical expertise and supports the organisation's goal of developing **capable human capital**.



Percentage of scientific staff with Master's or Doctoral degrees compared with total CGS staff complement from 2020 to 2025

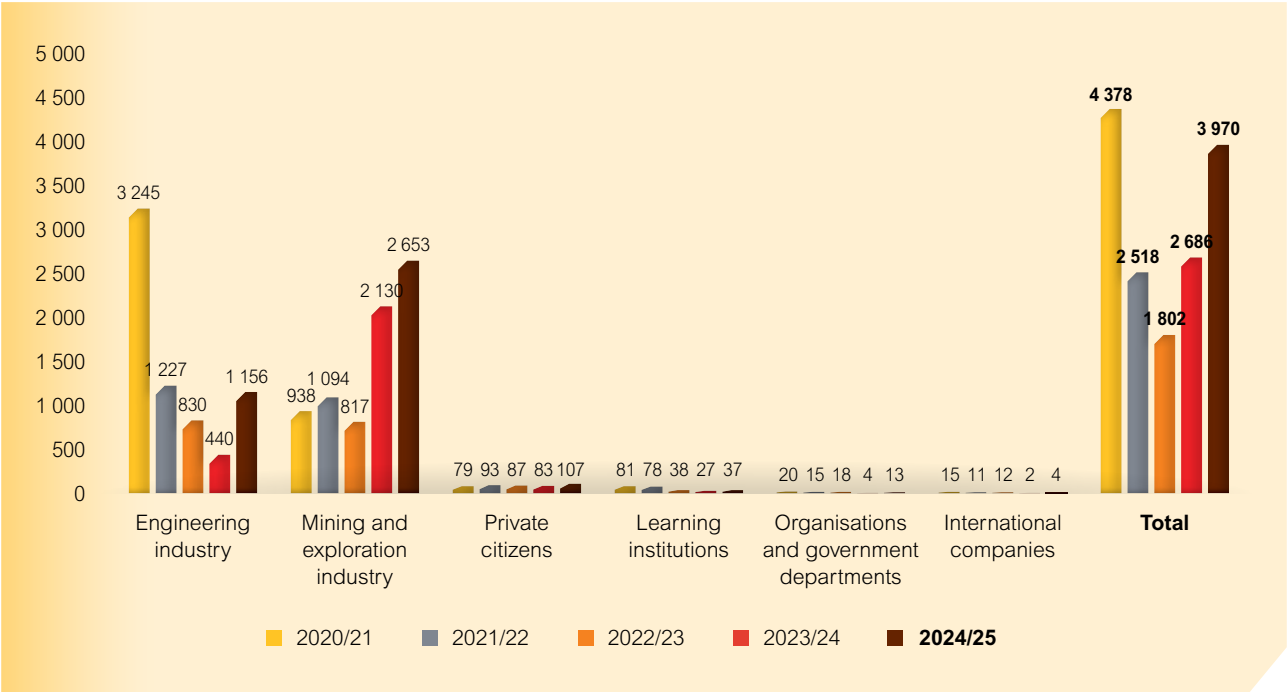
During the year under review, the CGS advanced **transformation**, achieving a 50:50 male-to-female ratio at Executive Management, **58% female representation** at Senior Management, and **50% female representation** among the scientific cohort, exceeding targets set in the Employment Equity Plan.



Employment equity statistics between 2020 and 2025

Geoscience data and information

Since its launch, the **Geoscience Data Management Portal** has attracted **4 200 registered users**, demonstrating **strong uptake across mining (1 037 users), engineering (1 013 users), education (439 users), and research institutions (394 users)**. Other sectors engaging with the portal include environmental management, water resources, agriculture, and sustainable development, reflecting the CGS's role in supporting exploration, infrastructure planning, academic growth, and inclusive societal development. The portal provides free and reliable access to a wide range of geoscience data, including borehole, mineral, geological, geotechnical, geochemical, seismic, and marine datasets, with the majority of requests coming from the mining and engineering industries.



Number of data and information requests, by industry, between 2020 and 2025



Council for Geoscience

280 Pretoria Street, Silverton, Pretoria, South Africa
Tel: +27 (0)12 841 1911
info@geoscience.org.za

www.geoscience.org.za

