

TANZANIA GEOLOGICAL SOCIETY



**Annual Conference Held at Golden Tulip Hotel, Zanzibar from 8th
to 11th November 2023**

Leading Theme

Accelerating Blue Economy from Geosciences Perspective

Tanzania Geological Society

2023

Table of Contents

Executive Summary	2
Day One 9 th November 2023	4
1. Registration and Poster session	4
1.1. TPDC Poster Presentation	4
1.2. Geita Gold Mining (GGM) Limited	4
1.3. State Mining Corporation (STAMICO)	6
1.4. Geofields Tanzania Limited	6
1.5. Tanzania Gemmological Center (TGC)	7
2. Opening of the TGS 2023 Annual Conference	7
3. Photo session	8
4. Keynote speech	8
5. Panel Discussion on Green Energy Potentials, Development and Technologies	9
6. Oral presentations	10
Day Two 10 th November 2023	11
1. Registration, keynote speech and oral presentations	11
2. Panel Discussion -Tanzania Mining Sector, Expansion from Gold to Strategic Minerals	11
3. Panel Discussion on Geotechnical Applications in Petroleum, Mining and Construction	13
Day Three 11 th November 2023	15
1. Arrival and Oral Presentations	15
2. Panel Discussion on Deep-Sea Resources, Exploration, and Development in Tanzania	16
3. Closing of the TGS 2023 Annual Conference	17
4. Awards and Photo Session	19
5. TGS Annual Meeting	20
6. TGS Organizing Committee Meeting	21

Executive Summary

The TGS 2023 Annual Conference took place at the Golden Tulip Hotel, Zanzibar. The event was preceded by a two-day excursion at different tourist attractions in Zanzibar. The excursion boasted about 130 geoscientists from different regions of both Tanzania's mainland and the Island, as well as a few foreign visiting geoscientists. The conference consisted of different discussion topics and presentations under the leading theme “**Accelerating Blue Economy from Geosciences Perspective**”. Several discussions and presentations covering different aspects of the blue economy were held. These aspects were viewed in terms of local, regional and global necessities, social-economical contribution, technological perspectives, resource availability, and environmental conservation. The conference offered a platform for discussions on several crucial geoscientific issues through the following conference sub-themes:

- Tanzania’s Mining Sector Expansion from Gold to Strategic Minerals
- Geotechnical Application in Petroleum Mining and Construction
- Contribution of Water to the National Economy
- Sustainable Coastal and Marine Tourism
- Deep Sea Resources, Exploration and Development in Tanzania
- Green Energy Potentials, Development and Technologies

Commencing from its official opening ceremony, the TGS 2023 Annual Conference was inaugurated by Hon. Shaib Hassan Kaduara, Minister for Water, Energy and Minerals (Zanzibar). Hon. Kaduara's inauguration was followed by multidisciplinary presentations and discussions on earth sciences and engineering. The TGS 2023 annual conference was a unique event that hosted several academic and industrial technical presentations and panel discussions. From geological exploration of minerals, hydrocarbons and underground water to geotechnical, geochemical and geophysical methods as tools for subsurface analysis linked to construction activities and exploration of mineral wealth, all were covered. Critical minerals and clean energy alternatives were also discussed and were agreed to be important for the development of the Tanzania economy.

Participants of the events were from the government institutions and private companies that made the event possible. The event was made possible by contributions from different stakeholders including **Twiga Barrick Gold Corporation, Tanzania Petroleum Development Corporation (TPDC), AngloGold Ashanti, TanzGraphite, Azurite, Geofields Tanzania Limited, Mwamba Mining, State Mining Corporation (STAMICO), Petroleum Upstream Regulatory Authority (PURA), Tembo Nickel, Ministry of Energy (Tanzania), National Microfinance Bank (NMB), Geological Survey of Tanzania (GST), Ministry of Water (Tanzania), National**

Environment Management Council (NEMC), Ministry of Blue Economy and Fisheries (Zanzibar), Ministry of Water Energy and Minerals (Zanzibar), Zanzibar Petroleum Development Corporation (ZPDC), Zanzibar Petroleum Upstream Regulatory Authority (ZPRA), Ministry of Water (Tanzania), Tanzania Gemmological Center (TGC), and University of Dar es Salaam (UDSM).

The TGS 2023 annual conference ended with major outputs that need to be followed. These outputs include the following:

- i. TGS to advise on the exploration and identification of groundwater resources to responsible authorities in Zanzibar.
- ii. TGS to table a proposal to responsible authorities in Zanzibar on the preparation of a geological map of Zanzibar to identify the nature of rocks and possible deposits that may be found in Zanzibar.
- iii. TGS to propose to responsible Tanzania Mainland authorities' key issues to be considered during progressive development of the blue economy policy.
- iv. TGS in collaboration with respective stakeholders to conduct awareness campaigns on both critical and strategic minerals (availability, exploration status and usage).
- v. TGS to advise the government on efforts to enhance the exploration and production of critical and strategic minerals especially the ones required for industrial use.
- vi. TGS to promote areas with small gold deposits (c. 100,000 to 1Moz) such as Mkurumu-Magambazi Province in the Southern East African Orogen of Tanzania since these are areas with existing preliminary data including high-resolution geophysical data and undercover mines.
- vii. TGS to advise the government on the application for the extension of the continental shelf.
- viii. TGS to investigate seabed mining training opportunities.
- ix. TGS to oversee strict adherence to professionalism amongst its members.
- x. TGS to advise the government on curriculum development and review.
- xi. TGS to advise the government on mining industry sustainability.
- xii. TGS to finalize the establishment of the Registration Board of Geoscientists (GRB).
- xiii. TGS to promote the exploration and development of REE fields.

Day One 9th November 2023

1. Registration and Poster session

The conference started with registration which ran from 7:30 to 9:00 AM, followed by a 30 minutes tea break. The guest of honor, **Hon. Shaib Hassan Kaduara**, the Minister for Water, Energy and Minerals (Zanzibar) arrived at 10.00 AM to inaugurate the event. The minister started by visiting the booths of participating companies, and poster stands to listen to poster presentations, after which he gave an opening speech. The booths visited are as outlined below.

a. TPDC Booth

At the TPDC booth, Ms. Maria Mselemu (TPDC staff) welcomed the Guest of Honour, Hon. Shaib Hassan Kaduara, and gave an introduction about Tanzania Petroleum Development Corporation (TPDC). She gave a brief discourse on natural gas production fields located at Mnazi Bay Mtwara which has 5 production wells, and Songosongo Island in Lindi Region which has 6 production wells. She highlighted that the output of Mnazi Bay and SongoSongo fields is transported to the Somanga Fungu receiving junction. Furthermore, the main pipeline from Mtwara supplies gas to TANESCO for electricity generation and other Industries like Dangote Cement, Goodwill Ceramics, Sapphire, Lodhia Steel Industry, and KNUF. Lastly, she mentioned TPDC also supplies natural gas to households and compressed natural gas for vehicles in Mtwara, Lindi, and Dar es Salaam.

To continue, Ms. Mselemu encouraged the use of natural gas due to the fluctuating fuel prices in Tanzania. She stated that TPDC currently has 6 gas stations and there is an intention to construct two gas stations in Zanzibar as well. She further added that, natural gas is cheaper than liquid fuels, TPDC controls the fluctuation of the fuel price and has a daughter company (TAN OIL) which deals with the importation of fuel. She concluded by informing the visitors that TPDC is currently in the process of constructing a fuel depot at Zuzu, Dodoma Region.

The guest of honor advised TPDC to expand natural gas distribution to ensure reduced fuel importation using foreign currency. More gas stations should be built in the country and citizens should be sensitized on the economic benefits of using natural gas in cars rather than diesel/petrol fuel.

b. Geita Gold Mining (GGM) Limited Booth

Mr. Erick Kalondwa (GGM) welcomed the Guest of Honour and commenced by giving a brief history of GGMs operations in Tanzania. He further added GGM has a total of 30 geologists 16

of whom were in attendance at the conference. He went on to talk about the mining methods GGM used for its operations, open pit and underground methods, as he demonstrated the roles of geologists in its operations in different sections. These sections are discussed below;

Exploration Discussions: Mr. Barnaba Shio (GGM) explained to the guest of honor how exploration is conducted at GGM. Commencing with soil sampling, the next step is sample analysis. After results from analysis are gotten, areas with positive signatures are delineated for drilling. Subsequent to drilling, drill samples analyzed, with results used for evaluation and interpretation by the evaluation section for further actions to be made.

Resource Geologist Discussion: Betty Bernard (GGM) explained the resource calculation procedures at GGM. These procedures are undertaken to quantify the resource at the deposit. If the calculated resource is feasible, then the mining planning department gets involved.

Mining Planning Discussions: Mr. Emmanuel Munuo explained the operations of the geology department subsequent to receiving resource data. It starts by conducting grade control, for quality control and quality assurance and to define the boundaries of the ore body. Knowledge of the shape informs blasting, which is conducted and monitored. He added that in a bid to reduce ore dilution, pillars are installed at the corners of the ore body and adjustments made progressively.

Underground Discussions: Under this section, the focus was on activities undertaken during underground mining, explained by Mr. Ndonge Dominico. He spoke about activities undertaken to delineate the orientation of the ore-body underground, touching face mapping and interpretations. He talked about grade control in sections of the face undertaken for QAQC and then modeling, all of which are important steps necessary for mining the ore.

Geotechnical Discussions: Martine Hamisi talked about wall stability in an open pit. He added there is monitoring of the pit walls to investigate any risks of wall failure. Importantly, he mentioned that geotechnical investigations help slope design of the walls in open pit mining operations.

Hydrological Discussions: Mr. Amos Samwel led the discussions of the hydrological section, which has as its primary task monitoring water levels in the mining areas. He stated GGM installs piezometers around the mining areas to gauge the water level in the areas undergoing mining and identify potential dewatering areas, which is applied in both open and underground mining. He added this section also monitors surface water quality in

collaboration with the Environment section. He further added, the sections also had the responsibility of water balance management, measurements of rainfall and evaporation rate.

Following these discussions were the GGM closing remarks given by Mr. Eric Kalondwa who talked about the contribution of GGM to economic development in the country. He also stated about 95% of workers at GGM are Tanzanians.

The Guest of Honour on delivering remarks, inquired if the government of Tanzania has shares in the GGM. He was then informed that the government and GGM are still in discussion.

The guest of Honour advised GGM to expand exploration to other minerals that are found in the Sea. He also inquired if the Tanzanians working in GGM can operate the mine without experts. He said Tanzanians have to aim to operate the mines and also advised geologists to work hard for the development of our country.

c. State Mining Corporation (STAMICO) Booth

The next stop was at STAMICO, where Mr. Alex Rutagwelela welcomed everyone and commenced with a brief summary of the key functions of STAMICO. He stated STAMICO deals with exploration, drilling and mining and has several mining projects including Stamigold Biharamulo, Stamigold Buhemba and Buckreef–Geita. He added the corporation also deals with coal mining in Kiwira, Songwe Region, Tanzania. One important aim of STAMICO which he observed, is to help small-scale miners obtain relevant information about the geology of the areas of their operations. Concluding, he mentioned STAMICO is also engaged in Rafiki briquettes trading in Dar es Salaam. The guest of honor advised there should be increased awareness in the society regarding the use of briquettes for environmental conservation.

e. Geofields Tanzania Limited Booth

At the next stop, Geofields Tanzania Ltd, marketing manager, Steve Goroi, commenced with explanations touching the core business of Geofields. He remarked Geofields is a private company engaged in mining and exploration drilling, providing services to other companies when needed. The manager mentioned Geofields has prospecting licenses in which exploration is currently being undertaken, with a plan to get into joint ventures with investors. The guest of honor recommended increased awareness, especially to Zanzibar students, about exploration and drilling activities.

d. **Tanzania Gemmological Center (TGC) Booth**

At this stop, Ms. Ester Njiwa from TGC presented gemstone products to the guest of honor. She further explained that TGC offers courses touching gemstones. Speaking, the guest of honor advised TGC to open a branch in Zanzibar to benefit from the high tourism traffic.

2. Opening of the TGS 2023 Annual Conference

The Guest of Honour entered the conference venue at 10:50 HRS. The TGS president, Dr. Elisante Mshiu, delivered a welcome address to the Guest of Honour and participants, welcoming everyone to the TGS 2023 Annual Conference. He provided a brief introduction about TGS, from its establishment in 1969. The TGS president highlighted some of the aims of the TGS as being:

- To bring together geologists from different parts of Tanzania
- To get a common understanding of geological research conducted in the country
- To advise the government on different geological activities undertaken in the country

The TGS president then welcomed the TGS General Secretary, Dr. Emmanuel Kazimoto. The General Secretary welcomed all TGS members and gave a note of thanks to participants from Zanzibar for helping with the preparation of the meeting. The meeting preparation committee included stakeholders from Zanzibar who played key roles in the accomplishment of the event. Subsequent to the address from the TGS General Secretary, the TGS president welcomed Prof. Abdulkarim Mruma, the immediate past president of TGS and the current Chairperson of its advisory board to address the participants.

Prof. Mruma commenced with a note of thanks to Zanzibar participants for their involvement in the preparation of the meeting. During his address he encouraged players in the mining and gas sectors to conduct exploration in Zanzibar, especially for oil and gas. The occurrence of earthquakes in the Zanzibar and Ruvu basins also made up part of Prof. Mruma's remarks. He proceeded to insist that the Geological Survey of Tanzania (GST) extend its mapping campaign to Zanzibar, to identify different geological features for the possible discovery of subsurface resources.

Thereafter, the TGS president taking the floor again mentioned all government institutions and private companies whose contributions and efforts ensured a successful TGS 2023 Annual Conference. He then recognized women's participation in geology studies and their performances in various industries. Ms. Christer Mhingo and Ms. Aziza Amour were mentioned as good examples of young women excelling at their university studies and continue to perform impressively in their current employment. Continuing, the TGS President explained the Theme of the 2023 Annual Conference “**Accelerating Blue Economy from Geosciences Perspective**”. He

concluded his talk by urging institutions to respect the professional standards associated with different tasks for projects to be successful.

The TGS President finally welcomed the guest of honor, **Hon. Shaib Hassan Kaduara**, at 11:10 HRS. The guest of honor who was representing the President of Zanzibar, **His Excellency Hon. Hussein Ali Mwinyi**. He thanked TGS for conducting the 2023 Annual Meeting in Zanzibar. During his address, the guest of honor insisted the Zanzibar Water Authority use hydrologists/geologists to identify new sources of water in Zanzibar. He remarked that geologists are working dedicated with respect to conducting exploration of minerals and identifying new deposits in Tanzania. He advised the Ministry of Water, Energy and Minerals to collaborate with the Geological Survey of Tanzania (GST) to prepare a geological map of Zanzibar to identify the nature of rocks and possible deposits that may be found in Zanzibar.

During the next activity, the guest of honor provided awards to members of two groups.

- The main sponsor of the event - Gold Sponsorship - Twiga Barrick Gold Corporation
- Recognition of the Outstanding Tanzanian Geoscientists
 - Prof. Eveline Mbede – Senior active TGS member and the first female geologist professor
 - Prof. Abdulkarim Mruma – Senior active TGS member and the immediate past TGS president (2010 – 2022)

TGS also gave a gift to the guest of honor for participating in the 2023 annual conference meeting.

3. Photo session and Closing of the Opening Ceremony

Group photos were taken with the guest of honor after which he the conference venue at 11:49 HRS

4. Keynote speech

Presenter: Prof. Evelyne Mbede, UDSM

Professor Mbede presented “A Comparative Analysis of the Helium and the Hydrocarbon System of the Rukwa Rift Basin, SW Tanzania”. Her presentation covered Helium formation mechanisms, and remarked that the Helium Rift System in the Rukwa Rift Basin may be different from the hydrocarbon system. She continued this is an important factor to take into consideration during policy formulation. She noted that there are examples from different countries where Helium and Hydrocarbons co-exist, but these should not be taken as universal models.

5. Panel Discussion on Green Energy Potentials, Development and Technologies

Moderator: Ezra Kazana

Panel Members

- Ministry of Water, Energy and Minerals: Said H. Mdungi
- ZPRA: Mohamed Said
- PURA: Rahima Ally
- -Rahma Ally: Zanzibar

Rahma Ally – Clean Energy: Speaking, he observed that clean energy is the energy produced from natural sources and the technology used to produce clean energy must be environmentally friendly. The world is transitioning from green energy. In Tanzania, there are ongoing efforts aimed at promoting the use of clean energy such as wind, solar, bioenergy (organic matter burned as a fuel) and hydroelectric power. He also remarked that the government is promoting the use of natural gas with minimum emission in flaring.

Mohamed Said – The Change of Technology: He mentioned that the petroleum industry can help in this transition period by using clean energy. He further added that there are currently many sponsors for promoting clean energy. Continuing, he observed that the adaptation of technology in the petroleum industry will help in the transition to clean energy technology. Concluding, he observed the country can use renewable energy in the carbon capture technique and then inject the captured carbon into other things or store them.

Said H. Mdungi – Director of Energy and Minerals Zanzibar: He commenced by expressing gratitude to TGS for conducting this year's Annual Conference in Zanzibar. He stated that in Zanzibar, energy is sourced from Tanzania's Mainland through submarine electrical cables, however they are in the process of changing to solar energy. He further mentioned that a feasibility study for the solar power project has already been conducted and in Unguja and Pemba, there will be 30MW and 15 MW projects respectively. He also mentioned, there is a signed memorandum of understanding with companies for wind projects in Zanzibar. Touching geothermal sources in Zanzibar, Mr. Said stated an MoU was signed with GST for exploration activities. Importantly, he observed there is also an amendment in the law to accommodate the promotion of clean energy in Zanzibar.

Recommended steps to promote clean energy

1. The Government should have a regulatory board for clean energy development.
2. Zanzibar through relevant authorities should have policies, laws, and regulations to manage clean energy.

3. The Government should give incentives to institutions or people who promote the use of clean energy.
4. The environmental sector should collaborate with the sector managing clean energy.
5. Awareness should be given to citizens about environmental conservation and the advantages of clean energy.

The panel discussion ended around 14:55 Hrs and was followed by a presentation session.

6. Oral presentations

Ezra Kavana: Potential, advancements, and technology associated with green energy, with a focus on energy efficiency project approvals, permits, and regulatory compliance requirements.

Japhet Nasson Fungo: Unveiling the Hidden Dangers of Geological Disasters in Tanzania: Threats, Preparedness, and a Vision for Tomorrow.

William A. Kalinga: Geological hazards and risk assessment in coastal regions for a sustainable blue economy.

Johannes Kakoki: Palynology: A powerful tool in oil and gas exploration and production, a key element of the blue economy in Tanzania.

Ernest Mulaya: The global scramble for 'Gold' Hydrogen, Helium and Lithium: Tanzania on a cusp of becoming a giant supplier?

Day 1 ended at 18:00 HOURS.

Day Two 10th November 2023

1. Registration, keynote speech and oral presentations

Day two began with a keynote speech, followed by oral presentations from different presenters. The keynote speech on Blue Economy in Zanzibar was given by the Principal Secretary for the Ministry of Blue Economy and Fisheries (Zanzibar) Hon. Aboud Suleiman Jumbe. Hon. Jumbe's speech, which ended with a fruitful discussion at around 10:45 HRS, covered Blue Economy Concepts and its practicality.

The following presentations succeeded the keynote speech:

Rose Sallema Mtui - Blue Economy investment activities and effects on local communities: A Case of Mtwara Coastal area, Tanzania.

Dunge Nyangena - Seafloor spreading kinematics at the Afar triple junction.

Shaidu Nuru - The deep basin and underlying basement structure of the Lake Tanganyika rift

Alex Rutagwelela - Geology and Geochronology of the Carbonatites in Southwestern Tanzania: Focusing on the Nb-Ta and REE deposits.

Gerald Chuwa - Geochemistry and U-Pb Zircon Geochronology of S-type Granites in the Karagwe Ankolean Belt, Northwestern Tanzania: Implications for Rare-Metals Mineralisation.

Japhet Fungo - Petrographic features of the Sangu-Ikola Carbonatites Southwestern Tanzania.

Mary Charles Moshi - Petrological, geochemical and mineralogical characteristics of Wigu Hill Carbonatite, Uluguru Mountains, Tanzania: Insights into carbonatite evolution and REE mineralization.

The oral presentations above (1-7) were followed by a lunch break (12:40 -13:40) subsequent to a one hour and twenty minutes panel discussion.

2. Panel Discussion - Tanzania Mining Sector Expansion from Gold to Strategic Minerals

- Convener: Engineer Kimogele Joseph Shigongo (APEX Resources)
- Panelists:
 - Geo. Bartholmew Mkinga – Pensena Metals
 - Geo. Sundi Malomo – Mining Commission
 - Geo. Maswi Solomon – Geological Survey of Tanzania (GST)
 - Geo. Manyama M. Makweba – Consulting geologist

- It was reported that GST has prepared a proposed guideline that provides descriptions necessary to define strategic mineral and critical minerals within the Tanzanian context. The proposal has considered main six factors to categorize the minerals including;
 - Technological Factor
 - Clean Energy Factor
 - Security and Defense Factor
 - Geopolitical Factor
 - Industrial Use
 - Economic Factor
- It was further discussed that the proposal has listed 31 minerals as strategic minerals and 11 critical minerals.
- Further, it was discussed that Tanzania still considers gold as the main mineral that contributes more to the mineral sector in terms of revenue, number of exploration licenses and employment.
- In conclusion, most speakers agreed that Tanzania is currently expanding from dependency on the gold production to other strategic minerals and critical minerals.

Recommended Actions:

- Tanzania and geoscientists should now increase focus on the exploration and production of industrial minerals that have proved to be among the major strategic minerals in Tanzania as the industrial sector is growing and most of the minerals can be the raw material of our industries.
- Because the world is seeking to achieve a zero pollution/clean energy, and there is the promotion of the use of electric cars, all minerals that support clean energy production are considered strategic minerals in the world as a whole, Tanzania should therefore think about aligning itself with future global opportunities.
- TGS and geoscientists should take note of the discovery of REE in the gold mineralization at the Nyanzaga gold deposit and advise/advocate to the existing mines and artisanal mines to undertake further studies at their deposits to probe for REE mineralization.
- TGS should advocate for eradicating challenges such as dispossession and displacement that are considered as main challenges observed in Lindi and other coastal regions caused by investing in the blue economy. Emphasis should be on sustaining the three main pillars (economic, social and environmental) and sector integration on implementing the Blue Economy Agenda.
- TGS and geoscientists should take note and emphasize to stakeholders and the government the existing potential of carbonatite deposits in Tanzania, currently

only 25% has been explored while most of the carbonatite bodies offer vital targets for LREE like La, Ce, Nd.

- o TGS and geoscientists should see the potential of the use of REE as raw material in industries, as the produced amount is exported to the overseas markets. Therefore, TGS should advocate to the government and stakeholders to seek to retain REEs for our own local industries.

Following the panel discussion were a series of oral presentations before a break. The presentations are listed below:

Benjamin C. Safi (presented by Gerald Chuwa) - The Nature and Characteristics of Select Handeni Gold Occurrences: Constraining Au-occurrences in the Neoproterozoic Mozambique Belt.

Kabete, Joas M - Potential discovery of > 1 Moz Au deposits from MkurumuMagamba Province in the Southern East African Orogen of Tanzania: a product of frontier exploration and basic research initiatives.

Ibrahim Mfungo - Geotechnical and geochemical characterization of building minerals and rocks in the Coastal Basin and Mozambique belt, eastern Tanzania; implication on the supply chain of quality building materials for construction.

3. Panel Discussion on Geotechnical Applications in Petroleum, Mining and Construction

Convener: Sudi Mpemba (Ministry of Water, Tanzania). Sudi Mpemba was a convener for two sessions as summarized below. The first was a panel discussion on Geotechnical Applications in Petroleum, Mining and Construction. It ran from 16:20 to 17:50. The second presentation session (17:50 – 18:35) – 3 presentations, each presentation lasted for about 15 minutes.

Panelists were

- Walid Suleiman Mohamed – instructor, KIST – Department of Mechanical Engineering and Aviation
- Geo. Neema Maganza – TPDC
- John Mbabasha -GGM
- Hezron Philipo – Ministry of Water
- Eng. Eliaza Wangwe - TANESCO

Preamble on Panel discussion – **Mr Sudi Mpemba**

- Brief introduction to geotechnical applications.
- Do we have enough geotechnical experts?

- Public awareness of the importance of geotechnical studies.
- Effects of ignoring geotechnical studies in mining, petroleum, water exploration, and construction projects.
- Involvement of the private sector in geotechnical investigations.
- Government policy in ensuring geotechnical studies prior to mining, construction, groundwater exploration, and construction activities.

Oral presentations:

The panel discussion on Geotechnical Applications in Petroleum, Mining and Construction was succeeded by the oral presentations which was the last session of the day. The details of these presentations are outlined below:

Denis S. Nkwabi - Application of High-Resolution Geoelectrical, Geomagnetic, and Ground Penetrating Radar (GPR) methods in geotechnical investigations.

Juma N. Kubingwa - Integrated geospatial and geophysical approaches for mapping groundwater potential in the semi-arid Bukombe district, Tanzania.

Venance E. Mboya - Timing of the Cenozoic magmatic intrusions in the offshore Tanga Basin, Tanzania: correlation to age equivalent deposits in the Eyasi-Wembere Basin and their implications for petroleum potential.

Day 2 ended at around 1840 HRS.

Day Three 11th November 2023

1. Arrival and Oral Presentations

The conference started with registration from 08:00. The first session was a keynote speech on deep sea resources followed by a block period of oral presentations.

The session ran from 08:30 to 11:15 AM details as outlined below:

- **John Mataro - The Mining Commission**

Keynote speech on Deep Sea Resources, exploration, and development in Tanzania. Mr John covered the involvement of the government (Ministry of Minerals) with international civil authorities.

- **Innocent Mvamba** - TPDC laboratory services. He presented some future plans of TDPC including expanding their services to operate internationally, increasing their laboratory capabilities and offering commercial services, having technical cooperation with the neighboring countries, and promoting scientific publications for field research. Another important aspect of their plan is encouraging young Tanzanians to expand in Petroleum fields and to get involved in exchange programs.

- **Faustine Matiku** - Tanzania Petroleum Potential: The 5th Bidding Round and Multiclient Arrangement.

- **Ernest Selestin** - Spatial distribution of petroleum system elements in the Pangani rift basin of north-eastern Tanzania based on interpretation of gravity and magnetic datasets. Ernest presented his research work which focuses on establishing the distribution of petroleum system elements in the Pangani rift basin. The study was achieved through qualitative and quantitative analysis of potential field data (gravity and magnetic data), provided by PURA and TPDC.

- **Abdon Makishe** (a retired TPDC staff member but currently a member of the committee on the PURA board as well as a founder and Chairman of Energy CARDS). Abdon gave a short presentation on Smart cities by using the Lindi region as a case study. He considered the effect of climate change. He remarked they have all the essentials for developing smart cities including maps (from PURA and TPDC), smart pipeline arrangements, smart building constructions, and Artificial Intelligence (AI) for decision-making in data management systems. He further added they have provided awareness on how to conserve smart cities.

Mr Abdon's presentation was followed by the health break from 11:15 to 11:45 a.m. before a panel discussion on Deep-Sea Resources, Exploration, and Development in Tanzania

2. Panel Discussion on Deep-Sea Resources, Exploration, and Development in Tanzania

The panel discussion on Deep-Sea Resources, Exploration, and Development in Tanzania lasted from 11:45 AM to 12:20 PM.

Convener: Abdul-Satar Maulid Salim (Ministry of Water, Energy and Minerals –Zanzibar)

Panelists: John Mataro - Mining Commission, Shaidu Nuru - TPDC, Abdul-Aziz Rajab - ZPDC, Wangese Matiku - PURA

- **John Mataro:** Mr John observed that deep sea resource mining is the process of retrieving mineral deposits from the deep seabed. He added that the minerals involved in deep-sea include the sulfide and oxides which are found on the seabed and cobalt and manganese found in the sea mount. Mr John mentioned that the biggest challenge deep-sea mining faces in Tanzania is the lack of awareness of deep-sea resources, their importance and how they can contribute to the economy of the country. Continuing, he further added other challenges lie in the process of exploration which is high-tech intensive. Proposing a way forward, he suggested an increased awareness to the institutions and encouraging large institutions and companies to invest in deep-sea mining projects.
- **Shaidu Nuru:** Talking about the petroleum sector, Mr. Nuru observed that the years between 1958 and 1975 witnessed significant growth leading to the establishment of the petroleum industry, with several hydrocarbon exploration projects being carried out. He stated the Tanzania Petroleum Development Company was established in 2000 and was involved in the establishment of different blocks for oil and gas exploration. Continuing, further emphasized the potentiality of Tanzania's coast for oil and gas exploration, and concluding he stated TPDC welcomes investors in Tanzania.
- **Abdul Aziz Rajab:** Mr Rajab speaking for Zanzibar Petroleum Development Company (ZPDC), stated ZPDC was established in 2018 to explore oil and gas in Zanzibar. He observed it is a national oil Company functioning like TPDC. Importantly, speaking on exploration, he observed that considering the MPSA of 2018, the exploration process has been categorized into three sectors. The onshore, transition (depth not more than 200m) and the offshore (depth more than 200m) sectors.
- **Wangese Matiku:** Mr Matiku from PURA speaking, touched on the available opportunity in exploration and utilization of deep-sea mining resources. He remarked the investment climate in the exploration and mining of deep-sea resources is increasingly favorable with many gains in terms of technological advancements.

3. Closing of the TGS 2023 Annual Conference

The ceremony commenced shortly after the arrival of the guest of Honor, **Hon Aboud Suleiman Jumbe, the Permanent Secretary, Ministry of Blue Economy and Fisheries, Zanzibar** around 1pm. His arrival was followed by the welcoming remarks from the convenor Mr. Abdul-Satar Maulid Salim (the representative of the Ministry of Water, Energy and Minerals, Zanzibar). Succeeding welcoming remarks was a 10 minutes cultural dance called “Ngoma ya Kibati ” by dancers from the Vocational Education and Training Authority (VETA).

The next session which lasted approximately 1 hour and 30 minutes saw a series of closing remarks by several high profile leaders present. The leaders present who addressed attendees were:

- Vice President – TGS: Ms. Rosemary Rwebugisa
- Managing Director – STAMICO: Dr. Venance Mwasi
- Chairman of Advisory Board – TGS: Prof. Mruma
- President – TGS: Dr. Elisante Mshiu
- Guest of Honor – Principal Secretary, Ministry of Blue Economy and Fisheries, Zanzibar: Hon. Aboud Suleiman Jumbe.

A brief of words from the dignitaries in chronological order commenced with a note of thanks from the TGS Vice President.

TGS Vice President: Ms. Rosemary

The TGS Vice President (Ms. Rosemary Rwebugisa) gave a note of thanks to all 2023 TGS participants including the board members, stakeholders from the government and private sectors, the academia and all geoscientists at large.

STAMICO Managing Director: Dr. Venance Mwasi

Speaking after the TGS Vice President, Dr. Mwasi gave a note of thanks to the honorable minister for honoring the invitation to this year’s annual conference. He proceeded to appeal to the Ministries to work together for the development of the nation. Dr Mwasi then congratulated the TGS members for their great creativity in running this conference which is beneficial due to the knowledgeable and relevant topics presented and discussed. He stated he was impressed by the involvement of the members in several scientific research avenues, as presented during the conference. He observed that the research had inspired many. Continuing the director reminded all of the vision 2030, “Minerals are life, Minerals are wealth”. In concluding, Dr Mwasi stated “when we have minerals, we have life and become wealthy”.

Chairman of TGS Advisory Board: Prof. Mruma

Shortly before the TGS President, Prof Abdulkarim Mruma addressed all present. He commenced by requesting the TGS participants to glorify and thank the Lord for the opportunity to be successfully present at this conference. He also observed that Blue Economy discussions have risen recently in Zanzibar, and this year's conference is the first in Zanzibar since the establishment of the TGS. Concluding he stated this furnishes opportunities for different sectors and promotes improving knowledge in geoscience fields for growth at both professional levels and the country at large.

TGS President: Dr. Elisante Mshiu

Dr. Mshiu commenced by thanking the guest of Honor, Dr. Aboud Suleiman Jumbe, for allocating time to be with TGS and attending the Conference. He observed it was a privilege for TGS to find out that he is also a geoscientist. Continuing, he observed there have been several scientific presentations at the TGS 2023 focusing on the Blue Economy. The TGS president noted that the geoscience discipline was previously considered to be challenging, especially for women. He further observed that the success of women, such as Prof. Evelyne Mbede, in geosciences has led to a rise in gender equality within the field, further stating this gives a good image to the society of geoscientists. Dr. Mshiu insisted geoscience be amongst the crucial disciplines for different government institutions. He mentioned STAMICO as an example of a government institution where geoscience expertise is vital. The TGS President then welcomed the Guest of Honor to address the conference participants.

Guest of Honor – Hon. Aboud Suleiman Jumbe.

The guest of honor thanked the TGS community for choosing Zanzibar to host the TGS 2023 Annual Conference, the first time since the establishment of TGS in 1969. He again thanked the Society for choosing the Blue Economy as a focus, from which important and knowledgeable topics were presented and discussed. He expressed hope that the presented research and ideas will reach the investors. Hon. Aboud recognized the efforts and contributions of different geoscientists in the natural resources sector including oil and gas, water and minerals. He expressed his gratitude towards the geoscientists for aligning the conference's main objective with the goals of the Government of the Republic of Tanzania and the Revolutionary Government of Zanzibar. He remarked the conference has been beneficial to the Government, furnishing more opportunities which are directly related to the Blue Economy. Concluding, Hon Aboud also stated the government will take into consideration all that has been discussed and suggested during the event.

4. Awards and Photo Session

This session ran from 02:30 p.m. to 03:00 p.m, commencing with the Guest of honor receiving special gifts from TGS, TPDC AND STAMICO. All other dignitaries then and members of the organizing committee then received their awards from TPDC as well.

Following the presenting of gifts and awards was the photo session, in six categories;

- The guest of honor, dignitaries and representatives from different institutions
- The guest of honor, dignitaries and TGS trustees
- The guest of honor, dignitaries, students and student leaders
- The guest of honor, dignitaries and the conference organizing committee
- The guest of honor, dignitaries and TGS advisory board members
- The guest of honor, dignitaries and the TGS Executive Committee

The awards and photo session was followed by a 30 minutes lunch break from 03:10 p.m. to 03:40 p.m.

5. TGS Annual General Meeting

The TGS Annual General Meeting commenced at around 03:50 p.m, having on its agenda the following:

- Opening
- Reporting 2022/2023 Activities
- Highlights of the TGS Financial Report 2022
- TGS Journal
- TGS Extractive Industry Solutions
- Elections
- Closing

The AGM was officially opened by the TGS President, followed by reporting on TGS 2022/2023 activities presented by TGS General Secretary, Treasurer and Editor. The TGS President took the floor again, and presented the TGS Extractive Industry Solutions (TEIS) Limited, a consultancy and investment vehicle owned by the Society. The next activity was TGS elections, during which discussions touching duration of terms and term limits for TGS leaders executive committee members was held. It was agreed that TGS leaders (executive committee) serve for 3 years per term and be eligible for a maximum of 3 terms in office. It was further agreed that the current leadership serve till 2025, when the next election will be due. Before the AGM closed, members were invited to select a venue for the next annual conference. A majority of TGS members agreed the TGS Annual Conference 2024 be held in Tanga region, northern coastal Tanzania. The TGS Vice President closed the AGM at 06:10 p.m.

6. TGS Organizing Committee Meeting

The TGS President expressed his sincere appreciation to the organizing committee for their efforts which were crucial to a successful conference. He further thanked the Ministry of Water, Energy and Minerals and the Ministry of Blue Economy and Fisheries for hosting, cooperation and contribution which was vital to the success of the TGS 2023 Annual Conference in Zanzibar.