



7th SGA-IUGS-UNESCO-SEG- Short Course on African Metallogeny

Energy Metals for a Sustainable Society

Windhoek, Namibia, 29th November– 3rd December 2021



organized by
 Society for Geology Applied to Mineral Deposits (SGA)
 Geological Survey of Namibia
 Namibian Uranium Association
 International Union of Geological Sciences
 Resourcing Future Generations

CONTACT and REGISTRATION

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PROGRAM

Sunday 28th

17H: Registration
 18H00-20H00 Ice-breaker party, welcome reception at the Ministry of Mines and Energy, Museum, 6 Aviation Road, Private Bag 13297, Windhoek

Monday 29th

09h00-09H30: Opening ceremony
 09H30-10H15: Challenges in Mining to meet economic demand by 2050 while achieving the Sustainable Development Goals.
(Edmund Nickless, chair RFG, U.K) online

Coffee break

11H00-11H30	Introduction to the Geology of Namibia (<i>Roy McG Miller, Patron of the Geological Society of Namibia</i>)
11H30-12H00:	Metallogeny of Namibia (<i>Mary Barton, Consultant, Namibia</i>)
12H00-12H30	Exploration Potential of Energy Metals in Namibia (<i>Aphary Muyongo, Geological Survey of Namibia</i>)

Lunch

URANIUM

Gabi Schneider

13H30-14H00	Uranium in circular economy and the Namibian uranium association (<i>Gabi Schneider, Namibian Uranium Association</i>)
14H00-14h30	Mineral System concept applied to Uranium deposits. (<i>Patrick Ledru, Université Lorraine, France</i>)
14H30-15H00	Genesis of granite-hosted uranium deposits in Namibia (<i>Paul Nex, University of Witwatersrand, South Africa</i>)
15H00 -15H30	Uranium Stewardship and its role towards nuclear fuel beneficiation (<i>Titus Nortin, Geological Survey of Namibia, Council for Geoscience, South Africa</i>)

Discussion

Coffee break

VANADIUM

Maria Boni

16H00-16H30	Vanadium in circular economy and primary Vanadium deposits in the world (<i>Maria Boni, University of Naples, Italy</i>)
17H00-17h30	Secondary vanadium resources (<i>Beate Orberger, Université Paris Saclay, Catura Geoprojects, France</i>)
17h30-18h00	The vanadium deposit in Otavi Mountainland, Namibia and Botswana (<i>Maria Boni, University of Naples, Italy</i>)

Discussion

Tuesday 30th

09H00-09H30:	The Mining Landscape for Sustainable Development and Climate Change: Trends, Issues and Opportunities (<i>Gavin Mudd, RMIT, Melbourne, Australia</i>) online
09H30-10H00:	The Return of the Kobolds: Cobalt's Critical Importance to Modern Technology (<i>Gavin Mudd, RMIT, Melbourne, Australia</i>) online

Coffee

ZINC

Markus Schäfer

- 10H30-11H00 General overview of zinc deposits and mineralization styles in southern Africa (*Markus Schäfer, Vedanta Zinc International, Namibia*)
- 11H00-11H30 Zinc exploration strategies and techniques, discovery case studies (*Markus Schäfer, Vedanta Zinc International, Namibia*)
- 11H30-12H00 The Gariep Belt Mineralization (Skorpion, Rosh Pinah, Gergarub) in Namibia (*Sheron Kaviua, Treval, Vedanta Zinc International, Namibia*)
- 12H00-12H30 Processing of Zn oxide ore at Skorpion refinery (*Eliakim Tshiningayamwe, Vedanta Zinc International, Namibia*)

Discussion

Lunch

COPPER

Kees Dekker

- 13H30-14h00: Economic Considerations for Exploration of Copper Deposits (*Kees Dekker, Consultant Mining Analyst/Mineral Economist*)
- 14H00-14H30: Sediment-hosted stratabound copper deposits - the house-rules (*Ben Mapani, Nambian University of Science and Technology*)
- 14H30-15H00: The Kalahari and West Congo Belts - Insights into structural controls on copper mineralization (*Mike Robertson, SEG lecturer*)
- 15H00-15H30: Metallogeny of the Matchless Copper belt (*Absai Vatuva, University of Namibia*)

Discussion

Coffee

Lithium and associated Critical Metals

Paul Nex

- 16H00-16H30: Lithium in circular economy (*Beate Orberger, Université Paris Saclay, Catura Geoprojects, France*)
- 16H30-17H00 Hard-rock Lithium deposits in Africa (*Paul Nex, Witwatersrand University, South Africa*)
- 17H00-17H30 The Karibib-Usakos deposits (*Simon Kahovera, Lepidoco, Namibia*)

19H00 Braai at Ministry of Mines and Energy, Jurassic Park, 6 Aviation Road, Private Bag 13297, Windhoek

Wednesday

- 09H00-09H30 Navigating the social issues related to exploration and mining for energy metals (*Deirdre Lewis, SLR Consulting*)
- 09H30-10H00 Public Policy and Resource Development (*Maeve Boland, University College Dublin, Ireland*)
- 10H00-10H30 African Mineral and Energy resources classification and management system (UNFC-AMREC) (*Anna Nguno, Geological Survey of Namibia*)

Coffee

Rare-Earth-Elements

Benjamin Walter– Pete Siegfried

- 11h00-11H30 REE deposits in alkaline igneous rocks and carbonatites: From mantle to mine (*Benjamin Walter, Karlsruhe Institute of Technology, Germany*)
- 11H30-12H00 Geomodels for HFSE, P, F and vermiculite deposits associated with alkaline igneous rocks and carbonatites (*Benjamin Walter, Karlsruhe Institute of Technology, Germany*)
- 12H00-12H30 REE deposit exploration: Common practice and new advances (*Benjamin Walter, Karlsruhe Institute of Technology, Germany*)
- 12H30-13H00 Carbonatites and REE mineralisation with some African examples (*Pete Siegfried, GeoAfrica, Portugal*).

Discussion

Lunch

WORKSHOPS on drill core samples: target features and minerals, handheld in-field analyses

Presentation (expected) of drones and hyperspectral camera: Helmholtz Institute, Germany

17H00: Closing Ceremony

Field trip

Thursday 2nd December

Morning

Departure from Windhoek at Safari Hotel: 6 am

Drive to Karibib and Rubicon Pegmatite: Visit Rubicon Li pegmatite

Afternoon

Namibian Geopark site and Eureka Monazite (E-TECH Resources project: [The Eureka Project - E-Tech Resources Inc. TSXV: REE.V](#))

Drive to Swakopmund: stay overnight

Friday 3rd December

Split in 2 groups

Morning

Group 1: Drive to Rössing Uranium mine, visit Rössing mine (Leader Gabi Schneider)

Group 2: Visit outcrops between Swakopmund and Arandis along Swakop and Khan Rivers (Leader: Paul Nex)

Lunch

Afternoon

Drive to Windhoek

Approximate arrival at Windhoek 18h

Lecturers



Mary BARTON is a Namibian based Geoscience Consultant. She has more than 10 years' experience in the mining industry with combined experience from both the regulatory and the commercial side. Mary holds MScs in Mineral Resource Management and in Geology from the University of Dundee and Curtin University, respectively. Her interests include exploration; geological modelling using 3D software; mineral ore systems; financial and risk analysis of mineral projects; and mineral policy. Mary is the African Regional Councillor for the International Association on the Genesis of Ore Deposits and is registered with the South African Council for Natural Science Professionals.



Maeve BOLAND is a Senior Geoscience and Policy Specialist at University College Dublin, co-funded by Geological Survey Ireland. She has worked in industry, government, the non-profit sector, and academia in Ireland and the U.S. She previously served as Director of Geoscience Policy at the American Geosciences Institute.



Maria BONI is retired Full Professor in Economic Geology at the University of Naples "Federico II", Italy. She has more than 40 years of experience in economic geology (MVT, Zn-Pb non-sulfides, V, Bx, Ni deposits). She has projects in Europe, Australia, Africa and Peru, in collaboration with PhD students and mining companies. She is SEG fellow and Associate Editor for Ore Geology Reviews.



Kees Dekker completed his MSc (Geochemistry) at the University of Utrecht, the Netherlands. He arrived in 1979 to work as an exploration geologist for Gold Fields of South Africa. Four years later he moved to Black Mountain Mine in the Northern Cape to work as a Senior Geologist. There he completed a BCom (Unisa) which he had started while in Namibia. His employer sponsored him completing an MBA at the Graduate School of Business in Cape Town after which he joined Gold Fields Head Office as a Senior Mining Analyst. At Gold Fields, he held a variety of positions, among others, Chief Economist and Assistant Manager of the Property Divisions. In 1995 he was transferred to Latin America to take responsibility for sourcing new business ventures on the continent, except for Brazil. In 1999 he left Gold Fields, but kept working mostly in New Business Development roles, except for 2½ years as Manager of RSG Global, later Coffey Mining, for Southern Africa. Since October 2012 he has been a freelance Mining Analyst/Mineral Economist in Namibia.



Patrick LEDRU has an Industrial Chair position, financed by Orano (previously AREVA) as a Researcher at the University of Lorraine, Nancy, France. He started his career in early 80's at the BRGM, French Geological Survey, mainly involved in the study of ancient orogens and structural control of the mineralizations. He directed GeoFrance 3D, a National Research program and was Associate Professor at the University of Lyon during 6 years. He had then the opportunity to spend 2 years early 2000's at the Geological Survey of Namibia, working on the geological interpretation of high resolution airborne radiometric and magnetic surveys with the GSN staff. He joined Orano in 2008 and has been in charge of uranium exploration during more than 10 years in Kazakhstan and Canada. He is presently SGA councilor.



Deirdre LEWIS is a Technical Director with SLR Consulting (www.slrconsulting.com) in Ireland, with a 30-year career as a professional geologist across Europe, Africa, Australasia and South America. She works mainly on minerals and renewable energy projects for both public and private clients internationally. Deirdre commenced her African exploration career in the Lake Victoria Goldfields of Tanzania in 1997 and worked subsequently explored for a range of commodities across southern and west Africa. She works on behalf of the EU, UN and World Bank on minerals, social and environmental projects in Madagascar, Mozambique, Mongolia, Mali, Niger, Burkina Faso, Zambia and Zimbabwe. She also was Project Director for the EU-UNDP *Baseline Assessment of Development Minerals* in Jamaica (2018). Deirdre is a past President of the *Institute of Geologists in Ireland* (2011-

2013) and is a member of the *Geological and Geographical Sciences Committee* of the Royal Irish Academy. She is also a member of the Technical Advisory Committee (Raw Materials) of the *Irish Centre for Research in Applied Geosciences (iCrag)*.



Simon KAHOVERA is currently the Exploration Manager of Lepidico Chemicals Namibia (Pty), a subsidiary of an Australian Stock Exchange (ASX) Listed company, operating in Namibia, and now finalising a Bankable Feasibility Study on their Lithium project with the aim of developing a vertically integrated business from mining to battery grade lithium chemicals production. Simon has research interest in geometallurgy, orebody characterisation, technical and economic review of mining projects and recently investment

banking in the mining and metals sector. He has 15 years of experience in exploration and mining in various commodities that include Lithium, REE, Diamonds, Iron ore, Manganese, Limestone, Gold and Nickel gained within greenfield to advanced exploration and mining projects within Namibia, Zimbabwe, South Africa and Sierra Leone. He has managed and participated as a key member in NI 403-101 and JORC code compliant Mineral Resource Definition and Preliminary Economic Assessment (PEA).



Roy McG MILLER started geological mapping in Namibia in 1964. In 1966 he joined the Geological Survey. He obtained a PhD from UCT in 1972. He was Director of the Geological Survey from 1980 to 1992. Thereafter he was Technical Manager at National Petroleum Corporation of Namibia for six years before becoming a consulting geologist. He was the driver behind the 1:1 million scale Geological Map of Namibia, the 1: 500 000 scale Geological Map of the Damara Orogen, the Special Publication on the Damara Orogen and the Henno Martin Commemorative Volume. He received the highest awards of the Geological Societies of Namibia and South

Africa, the Henno Martin Medal and the Draper Medal, respectively, awarded in recognition of his contributions towards improving the understanding of the geology of Namibia and Southern Africa. In 2008, he completed the 3-volume handbook on the Geology of Namibia. Behind his name are 96 published papers and maps, 56 published abstracts, and 18 excursion guides for international geological excursions in Namibia. He is a Fellow of the Alexander von Humboldt Foundation, Germany, the Geological Society of South Africa and the Society of Economic Geologists. He is Patron of the Geological Society of Namibia.



Ben MAPANI (Namibian University of Science and Technology)

is professor at the Faculty of Engineering (Department of Mining and Process Engineering). He has interests in structural geology, economic geology and geochronology, especially as associated with the recycling of continental crust and its effect on mineral deposit location. He has also researched on environmental geochemistry associated with ore deposits. He worked at the University of Zambia (1989-1997), University of Zimbabwe (1998-

2002); University of Namibia (2003-2019) and now NUST (2020-to present). At the University of Zimbabwe, he helped set up the Master Program in Exploration Geology. He has published 84 peer reviewed journal articles. He has graduated several PhD and MSc candidates.



Gavin MUDD is currently an Associate Professor in Environmental Engineering at RMIT University and specializes in assessing the sustainability of mining. The research has covered water use, energy, greenhouse gas emissions and climate change, rehabilitation, groundwater, surface water, pollutant emissions, tailings, waste rock, acid & metalliferous drainage (AMD) (etc), as well as more recently focusing on global resource assessments of primary and critical metals. His work is renowned for the rich data sets underpinning every paper. For this century, the research is showing that we have the mineral resources to meet Sustainable Development Goals (SDGs), with the key issues being mostly social, environmental and/or economic in nature.



Aphary MUYONGO (Geological Survey of Namibia) heads the Economic Geology Division of the Geological Survey of Namibia. He studied BSc - Geology and Chemistry, BSc honors - Geology ore stream, and an MSc degree in Applied Geology specializing in Mineral Exploration and Economic Geology. Aphary has over 17 years of geoscience experience of geoscience surveying and research at the Geological Survey of Namibia including private sector experience in uranium exploration. His research interest includes investigations of tectonometamorphic studies in relation to deposit settings and economic geology in general.



Paul NEX is currently Director of EGRI and Associate Professor of Economic geology at the University of the Witwatersrand. He obtained a PhD in 1997 for his work on uranium mineralization in Namibian sheeted leucogranites. He is principle research in Critical Minerals with CIMERA and his current research interests include critical raw materials, particularly antimony, germanium, lithium, tin and rare earth elements, uranium mineralization in Namibia and mineralization in the Bushveld Complex.



Anna NGUNO (Geological Survey of Namibia) is the head of the Regional Geoscience (Mapping) Division within the Geological Survey of Namibia (GSN), Ministry of Mines and Energy. For the past 22 years, she has been working as geologist in various posts at GSN. Her work experience includes but is not limited to compilation of Geological maps, coordinating geological mapping and research in collaboration with local and international research institutions and researchers; GIS and Remote Sensing and Geoscience data and information management. Mrs Nguno is a Geoscience Council of Namibia President, a Geological Society of Africa Councillor for Southern Africa, a Secretary-General, Sub-commission for Africa Maps, Commission for the Geological Map of the World, and a member of the AU- African Mineral and Energy Resources Classification and Management System (AMREC / UNFC- AMREC), Technical Working Group.



Edmund NICKLESS: from 1997 until his retirement in September 2015 Edmund was Executive Secretary of The Geological Society of London. Previous to that, he held senior posts within the British Geological Survey, the then Science and Technology Secretariat of the UK Cabinet Office and the Natural Environment Research Council. Since 2013 he has chaired a group on behalf of IUGS promoting a new initiative, Resourcing

Future Generations.



Beate ORBERGER is Associate Professor at the University of Paris Saclay, Orsay, France. In 2016, she founded Catura Geoprojects (Geoscience Conseil; www.catura.eu). She has 30+ years of experience in economic geology (Fe, Ni, Mn, PGE, Cr, Mo, Li) and geometallurgy. At present, she is scientific coordinator of several EIT financed projects (ANCORELOG: constructing combined drilling and on-line-on-mine-real time analytical expert systems to increase resource efficiency during exploration, mining and processing. She is general manager of the EIT Raw Material project ScaVanger (www.scavanger.eu). Recently funded projects (DysCOVERY, Scaleup and Valore) upscale processing for magnet recycling and Sc, V and Ga recovery from metallurgical residual solutions. She is SEG fellow and SGA councilor.



Mike ROBERTSON is a principal consultant with the MSA Group based in Johannesburg, South Africa. With an MSc on the structural controls of gold mineralization at the Sheba mine, Barberton greenstone belt, he has a particular interest in the application of applied structural geology to understanding controls on ore genesis and exploration targeting. This has led to work on orogenic gold deposits throughout Africa and in the Middle East, Western Australia and Russia. He has been involved in mineral exploration, both in industry and in a consulting role, for 29 years. Apart from orogenic gold deposits, he has worked on a wide spectrum of mineral systems including sediment-hosted stratabound copper and carbonate-hosted zinc-lead, nonsulfide zinc, magmatic nickel-copper-PGEs, volcanic-hosted massive sulfide deposits, and phosphate and bauxite deposits.



Markus SCHAEFER is Head of Exploration for Vedanta Zinc International where is part for the executive management team. He has 20 years' experience in mineral exploration, ranging from grassroots to mine site. In 2008, he was responsible the discovery of the Gergarub Pb-Zn deposit in southern Namibia.



Pete SIEGFRIED is Director of GeoAfrica Prospecting Services cc – a company providing exploration and geological services to the minerals industry. Specialist experience of about 30 years applicable to Industrial Mineral deposits including fluorite, apatite, REE, graphite, lithium, scandium, garnet, HMS and kyanite amongst others, are recognized. Pete has been consulting since 1990 and has been involved in all aspects of exploration, mining and resource development for large

mining companies (e.g., BHP-Billiton, RTZ, Yara, Solvay, Antofagasta, Vale, AngloGold-Ashanti). Pete also acts as an industry technical partner of Horizon 2020's HighTech AlkCarb Project, which is detailing new ways of modelling and looking at carbonatites and alkaline silicate rocks and their associated deposits of critical metals such as REE, Sc and Zr.



Gabi SCHNEIDER is the Executive Director of the Namibian Uranium Institute. She joined the Namibian Geological Survey in 1985 and served as its Director from 1996 to 2016. Her professional experience covers economic, exploration, and environmental geology, as well as management. She is an honorary life member of the Geological Society of Namibia, an honorary fellow of the Geological Society of London, and registered with the Namibian Geoscience Council and the South African Council for Natural Science Professionals. Furthermore, she serves on Namibia's Geoscience Council, and on the Commission for the Implementation of the World Heritage Convention in Namibia, and she is a member of the Board of Trustees of the Namibian Institute of Mining and

Technology. She is a member of UNESCO's Global Geoparks Council, and the Scientific Board of the International Geoscience Program of UNESCO. She played a leading role in the Strategic Environmental Assessment of the Namibian Uranium Province.



Nortin TITUS Chief geophysicist for the Government of Namibia continuously engaged via several international treaty organizations and academic networks, appointed to co-manage promotion of Namibia's natural resources with focus on essential requirements in mineral exploration and mining and as consequence, the development of long-term strategies on cross

border energy.

Eliakim Tshiningayamwe, refinery manager Vedanta Skorpion, Namibia



Benjamin WALTER is assistant professor and research fellow at the Karlsruhe Institute of Technology in Germany. His research in the Economic Geology and Geochemistry group is mainly focused on HFSE deposits associated with alkaline igneous rocks and carbonatites, and unconformity-related hydrothermal vein type deposits with base metal mineralization. During his work in the EU-founded HiTech AlkCarb project, he developed new exploration methods and geomodels for HFSE deposits.



Absai VATUVA, is head of the Geology Department of the University of Namibia, professor in Exploration and Economic Geology at the University of Namibia. He has 9 years of experience in economic geology on VMS, Fe Poly metallic Deposits, U Deposits. He has projects in Namibia, China in collaboration with MSc and BSc students and mining companies.

