

9th SGA-SGNS-IUGS-SEG-UNESCO SHORT COURSE ON AFRICAN METALLOGENY

**How can West Africa best use its mineral wealth for economic development ?**

25<sup>th</sup> - 29<sup>th</sup> November 2024

University Amadou Mactar Mbow, Dakar, Senegal

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**PANEL MEMORANDUM**

The 9<sup>th</sup> Metallogeny short course was hosted by Senegal, the SGNS and the University Amadou Mactar Mbow this year.

West Africa plays a key role as an important supplier of raw materials essential for the agriculture and/or the energy transition, in particular Titanium, Aluminium and Phosphates, examples selected for this short course. Can West Africa mine, concentrate, and produce intermediate metal compounds? This could enable the economic transition envisaged by the African Mining Vision 2050 and the Agenda 2063 of the African Union.

The two days fascinating program illustrated well the current situation including industrial projects, such as titanium-zirconium processing in Senegal, phosphate blending in Burkina Faso or the HYPHEN AFRICA project on Hydrogen production in Namibia. It paved the way for the panel discussion before leaving for mine and geosites visits.

The panel focused on:

**“What actions can be taken to ensure West Africa uses its mineral wealth for economic development?”**

Moderators: Beate ORBERGER, Mary Immaculate NEH FRU

The current African and West African situation, including its huge mineral resources, its young population, but lack of financial resources for developing the infrastructures and adapting the higher education system to the needs of the industry (many African countries are considered to be low or medium-income countries).

Our panel members have a deep understanding on the current African and West African situation also in the context of political conflicts and wars.

Short biographies are presented at the end of the document.

Actions for education, mining, processing, infrastructures and industrial development projects were discussed and proposed by: Prof. Olugbenga OKUNLOLA, Univ. Ibadan, Nigeria; Dr. Mahamadane DIENE, ENSMG, Senegal; Dr. David BARATOUX, IRD, France; Dr. Robert MORITZ, Geneva University, Switzerland

For the mining and processing sector (sustainability, environmental efforts, increase resource efficiencies, capital, investments etc). M. Felix EKRA, AFRICAN STAR Resources & Thor exploration, Senegal, gave important insights. For Infrastructure development, M. Ousmane MBAYE, Chamber of Mine, Senegal was our expert. Promising projects for industrialization were represented by Toni BEUKES from HYPHEN AFRICA, Namibia.



From right to left: R. Moritz, D. Baratoux, O. Mbaye, Mahamadane Diene, O. Okunlola, F. Ekra, B. Orberger, I.M. Neh Fru

### **Key recommendations of all our discussions with panel members and audience**

1. Improving education and training at all levels, and in particular in tertiary education. This provides competent and skilled human resources to industries, governments, schools and universities.  
Create decent and competitive conditions for research in geosciences to facilitate public-private partnerships with the mining industry, including
  - acquisition of analytical equipment with long-term sustainable plans for maintenance
  - increase the consideration for technicians and engineers in charge of analytical equipments, to facilitate the production of Africa-based data in all domains related to exploration and exploitation of mineral resources

- improve the funding systems for PhD students in African universities to offer highly-selective doctoral programs allowing them to be focused on their research
  - reappraise aspects of the Geoscience Curriculum for african students, especially at the senior undergraduate classes and at post graduate level to enable students to be well equipped for the multi-disciplinary nature of mining and minerals development and to prepare them at least basically for the mining value chain, from exploration to mine closure
2. Enabling the region to be self-sufficient for agriculture to feed the strongly growing population, through development of the phosphates value chain into fertilizer, one of the key-materials in West Africa.
  3. Increasing quality infrastructures (roads, trains, flights) to connect African countries, cities, villages for communicating, trading, and improving living standards all over the countries.
  4. Creating high-level, long-term industrial projects along the entire value chain at national and international level: Trans-Africa, with other continents to produce semi-and final industrial products in West-Africa, African.

Four important projects of presented in the 9<sup>th</sup> African Metallogeny short course program are exemplary:

- Titanium-Zirconium mining and processing (ERAMET Grande Côte Senegal (Khadim Bamba NDIAYE, ERAMET GC).
  - Alumina and phosphate concentrate from Thiès, Senegal: valuation of the deposit, ore, and process (Abdoul Aziz NDIAYE, ENSG & ESP).
  - Valorization of natural phosphates and blending: the case of Burkina Faso (Saga SAWADOGO, SEPB).
  - HYPHEN Africa, Namibia: Pioneering the African Green Hydrogen revolution (Tony BEUKES, Hyphen)
5. An important message for the students and young carrer engineers and geoscientists in the audience: Trust yourself, be honest, take actions, increase your competence and skills, network, communicate....

## Panelists and Moderators



**David BARATOUX** is a senior scientist at the French National Institute for Sustainable Development. He has about 10 years' experience in Mining Environments in West Africa. He was involved in the West African Exploration Initiative (WAXI project) focusing on the dispersion of chemical elements in regolith. He funded and led the International Laboratory for Responsible Mining in West Africa (LMI MINERWA, <https://miner-wa.org>, 2019, 2024, renewed for another 5-years period). He has mentored several master and PhD students in West Africa on various topics, including geophysics (radiometrics in the context of exploration), environmental issues associated with artisanal mining and remote sensing. He is also chairing an International Research Network focusing in Planetary and Space Sciences in Africa (AFIPS, <https://africapss.org>), with a focus on research topics having strong synergies with earth and environmental sciences. David holds a PhD in geophysics.



**Toni BEUKES** is a seasoned Namibian executive with 20 years of experience in the legal, renewable energy, oil, and gas sectors. She currently leads the Environment, Social & Governance (ESG) portfolio at Hyphen Hydrogen Energy, a major green hydrogen project in Namibia. Toni has held various roles under South Africa's REIPPP Programme, working with international wind energy companies including Nordex, Vestas, GE, and ENERTRAG. A qualified conveyancer and admitted attorney in Namibia, she holds a B.Juris and LL.B degree, and an MBA, and LL.M degrees (with Distinction) from the University of Dundee in Scotland. Toni is a Certified Director of the Institute of Directors of South Africa (IoDSA) and serves as a Director of the South African Renewable Energy Technology Centre (SARETEC).



**Mahamadane DIENE** is a lecturer and researcher in petrology and structural geology. His areas of research cover : Structural geology and geodynamics of the Palaeoproterozoic formations of Senegal and the West African Craton; Tectonic control of gold mineralisation in the Birimian; Tectonic control of Tertiary and Quaternary volcanism in the Senegalo-Mauritanian basin; the use of tectonic indicators in the research and development of geomaterials in the Horst de Ndiass area and in the Senegalo-Mauritanian basin. Structural study of slope stability in the Senegalo-Mauritanian basin and study of the environmental impact of mining and oil pollution. He was Director of Studies of the Institute of Earth Sciences from 2017 to 2023, when he was appointed Director of ENSMG (ex IST). He is member of several research groups: SAXI (South American Exploration Initiative), WAXI (West African Exploration Initiative), Member of the Scientific and Pedagogical Council of the Doctoral School of Physics, Chemistry, Earth, Universe and Engineering Sciences of Cheikh Anta of Cheikh Anta Diop University. He is also the author or co-author of several scientific articles on the geology of the ancient terrains of Senegal, the control of gold mineralization, basement hydrogeology and construction materials. He is also a member of the jury for several engineering and master's theses defended at UCAD and abroad.



**Koffi Felix EKRA** is a geologist with qualifications in mining exploration geology who has more than 15 years' worldwide experience in the mining industry. He has worked on mineral projects mainly in West Africa and Canada. Erka's skills are in all aspect mining exploration: Energy Resource Leadership Mining and Mineral/Environment/Strategic Management/Stakeholder Management/Business Risk Analysis. Ekra Koffi Felix is currently the Regional Manager of Thor exploration in Senegal and Cote d'Ivoire.



**Mary Immaculate NEH FRU** holds a PhD in Applied Geology from the University of Buea, Cameroon. She works at the Center of Geological and Mining Research as a Research officer. She is passionate about remote sensing applications to mineral exploration. Her PhD work was based on using remote sensing techniques in predictive mapping for sapphire exploration in the Adamaoua Region of Cameroon. Also, she studied the different heavy and indicator minerals associated to gem. Furthermore, she loved carrying out activities that will get more students into geosciences and coordinates the workshop activities involving students for SGA short courses.



**Ousmane MBAYE** is currently the Managing Director of Dangote Cement Senegal, a subsidiary of the multinational Dangote Cement Group present in several African countries. He holds a Master 2 in Finance and Accounting and has extensive knowledge and a wide range of financial practices. Ousmane MBAYE has more than 20 years of experience in the private sector, including 15 years in the extractive sector where he worked during the different phases of a mining company (investment research and exploitation). With this, Ousmane has a very good knowledge of issues related to the operation of mining companies in Senegal. Ousmane Mbaye is the President of the Chamber of Mines of Senegal (CDMS), a private non-profit association whose mission is to promote and protect mining investments in the country, and to foster the development of a dynamic and structured mining sector. Ousmane MBAYE is also President of SPIS (Professional Union of Senegalese Industries). This Union aims to bring together representative industrial players so that they can speak with one voice in defending the economic and social interests of the industrial sector. Ousmane Mbaye is also Vice-President of the National Council of Employers of Senegal



**Robert MORITZ** is professor emeritus at the University of Geneva in Switzerland. He has 40 years of experience with various ore deposit systems and, together with his students and research associates, he has investigated the metallogenic and geodynamic evolution of different orogenic belts. He has been associate editor of *Mineralium Deposita* for 17 years. From 2015 until 2023, Robert Moritz was a member and president of the Swiss IUGS national committee, and between 2012 and 2016, he has chaired the Earth's Resources group of the International Geoscience Program (IGCP). He has been councilor of the Society of Economic Geologists (SEG) between 2015 and 2017, and Regional Vice-President for Europe from 2021 to 2023.



**Olugbenga OKUNLOLA** holds a PhD degree in Economic Geology of the University of Ibadan, Nigeria, where he is currently a full Professor and Head, Department of Geology. He obtained in addition, professional proficiency Certifications from the University of Oxford, England (2016) and The British Geological Surveys England.(2010). He has 42 years' experience as a geoscientists that straddles the public service, industry and academia. He has served as a Special Adviser (Mineral Assessment) to the Director General of the Nigerian Geological Surveys Agency (NGSA) from 2006 to 2013. He is currently the President of the Geological Society of Africa, Past President of The Nigerian Mining and Geosciences Society, President of the Geoscience Information and Research in Africa Network (GIRAF) and Vice President for Africa, Association of Geoscientists for International Development (AGID).





**Beate ORBERGER** is an Economic Geologist, Professor at the University of Paris Saclay, Orsay, France. In 2016, she founded Catura Geoprojects (Geoscience Conseil; [www.catura.eu](http://www.catura.eu)). She has 30+ years of experience in metallogeny and geometallurgy. She is co-manager of the EIT Raw Material project ScaVanger, DysCovery, Scaleup, Valore, and the EU Horizon project EURO Titan, upscaling processing for metal extraction from metallurgical residues and EoL magnets. She is SEG fellow and at SGA responsible for the Metallogeny short courses in Africa. She graduated from RWTH Aachen University, Germany, holds a PhD from Institut National Polytechnique de Lorraine, Nancy France, a habilitation to direct research from Université Denis Diderot-IPGP, Paris, and a diploma in Corporate Governance (Corporate Governance Institute-Glasgow Caledonian University).

