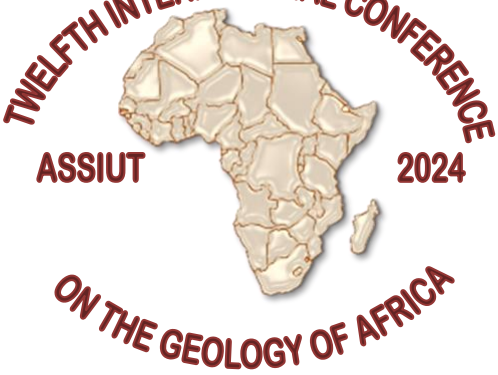
12th International Conference on the Geology of Africa



ATON RESOURCES INC.

IUGS

PROGRAMME AND ABSTRACTS

6-7 November 2024
ASSIUT-EGYPT

ASSIUT UNIVERSITY WELCOMES PARTICIPANTS OF

THE TWELFTH INTERNATIONAL CONFERENCE ON THE GEOLOGY OF AFRICA

Organized by

DEPARTMENT OF GEOLOGY

FACULTY OF SCIENCE
ASSIUT UNIVERSITY

6-7 November 2024

The Organizing Committee of THE 12TH INTERNATIONAL CONFERENCE ON THE GEOLOGY OF AFRICA (ICGA 2024)

....is delighted to welcome participants to attend the current 12th biennial conference at the Geology Department, Assiut University, Egypt. Certainly, the previous eleven successful conferences motivated the organizing committee to hold this important scientific meeting under the theme "Earth Sciences And Sustainable Development In Africa" .Scientists, researchers, industrial leaders, and non-governmental organizations(NGOs)are welcomed to present up-to-date advances pertaining theoretical / experimental research results and applied geological solutions for sustainable development of African countries. The current conference presents a collection of more than 100 research papers covering several branches of African Geology for better exploration and exploitation of the African resources. We hope that this goal can be achieved in the conference by providing a platform to have open discussions, knowledge sharing, and interactive sessions with field experts in the African Geology.

The organizing committeeexpress its deepest gratitude and heartfelt thanks for ATON RESOURCES COMPANY for its generous financial support of the conference. ATON's contribution given us the encouragement and motivation to pursue our goals of the conference with greater determination. ATON RESOURCES is a gold exploration and development company located in Egypt's Arabian-Nubian Shield. Focused on its Abu Marawat Concession, ATON is actively involved in transforming resource-rich Egypt into a world-renowned gold producer once again since 2005.

Finally, we thank all the participants, especially those who have presented their scientific contributions in the conference. We wish all our guests a pleasant stay and looking forward to meeting them again in forthcoming versions of the conference to maintain fruitful scientific collaborations for better sustainable development of African countries.

Organizing Committee

CONFERENCE BOARD

Patron:	***Prof. Dr. Ahmed El Minshawy*** *President of AssiutUniversity*
HonoraryChairman:	***Prof. Dr.Abdel-Hamid Abu-Sehly*** *Dean of Faculty of Science*
Chairman:	***Prof. Dr. Gamal ZidanAbdelAal*** *Head of GeologyDepartment*
General Secretary:	***Prof. Dr. Moustafa M. Youssef***

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Prof. Dr. Estella Atekwana
Prof.Dr. Mahmoud Senosy
Prof. Dr. Amr Said A. Deaf
Dr. Thomas Gentzis

PROGRAMME

TWELFTH INTERNATIONAL CONFERENCE ON THE GEOLOGY OF AFRICA

First Day, Wednsday, November 6, 2024

8.30 - 9.30: Registration
9.30 - 10.30: Opening Ceremony
Venue: Conference Hall - Faculty of Agriculture- Assiut Uni.

10.30 – 11.00 Coffee Break

SCIENTIFIC PROGRAMME

INVITED LECTURES (11.00-13.00)

Chair Persons:
Prof. Dr. Mostafa Youssef & Prof. Dr. Gamal Zidan

11.00-11.30:
Automated Seismic Data Interpretation Using Machine Learning, Examples From Western Desert And Off Shore Nile Delta; A Vision For The Future

Dr. Ali Bakr
CEO Rockserv

11.30-12.00:
Geopolymers: A Novel Geological Approach For Human, Industrial, And Environmental Applications

Dr. Hassan Soltan Ibrahim
Geology Department, Faculty of Science, New Valley University, Egypt

12.00-12.30:

Earth Resources In West Africa: A Case Study From Nigeria (On line)

Dr. Olugbenga Okunlola

Geological society of Africa /University of Ibadan, Nigeria

12.30-13.00:

African Meteorites; State Of The Art from the Moroccan Experience Prospective (On line)

Prof. Hassnaa C.Aoudjehane

Faculty of Sciences Ainchock, Hassan II University of Casblanca

ATTARIK Foundation for Meteoritics and Planetary Science

LUNCH

Scientific Sessions - First DAY

Wednesday, November 6, 2024

Venue: Department of Geology - Faculty of Science

Time	Room A *Seminar Room*	Room B *Lab 3*	Room C *Lab 4*
15.00-16.00	Session (1) Basement & Geochemistry-I	Session (2) Sedimentology, Strat.&Paleont.-I	Session (3) Remote Sensing -I
16.00-16.30	Coffee Break &Poster Session 1		
16.30- 17.30	Session (4) Basement & Geochemistry-II	Session (5) Sedimentologm Strat.&Paleont.y-II	Session (6) Remote Sensing-II

Scientific Sessions - Second Day,

Thursday, November 7, 2024

Venue: Department of Geology - Faculty of Science

Time	Room A *Seminar Room*	Room B *Lab 3*	Room C *Lab 4*
9.00-11.00	Session (7) Environmental Geology -I	Session (8) Geophysics-I	Session (9) Structural Geology And Tectonics
11.00-11.30	Coffee Break &Poster Session 2		
11.30 -13.30	Session (10) Environmental Geology -II	Session (11) Geophysics-II	Session (12) Petroleum Geology-I
13.30 – 14.00	Coffee Break &Poster Session 3		
14.00-15.00	Session (13) Hydrogeology		Session (14) Petroleum Geology-II
15.00	Closing Session		

LUNCH

SCIENTIFIC SESSIONS

FIRST DAY

Wensday, November 6, 2024

Venue: Geology Department

Room A: Seminar Room (Third Floor)
Room B: Lab 3 (Second Floor)
Room C: Lab 4 (Second Floor)

Room A (15.00 - 16.00)

BASEMENT & GEOCHEMISTRY - I

Chair Persons:
Prof. Dr. Zakaria Hamimi & Prof. Dr. Fawzy F. Abu El-Ela

15.00 - 15.15:
Re-Mapping the Neoproterozoicgranitoids of Gabal El-Sibai, Central Eastern Desert, Egypt, Using Landsat-8 OLI/TIRS Imagery, Petrography and Field Observation

Hassan O. Sedqi, Mabrouk S., Hassan Abass, Khairy S. Zaki & Awad Hafaz

15.15 - 15.30:
The protracted plutonism of the Humr Akarim granites in southeastern Egypt: Insight into the microstructures

Doaa Hashem, Chao Zheng, Yasser Bader, Mohamed Abu-Elrus, Ali Khudeir, Hassan Abbas

15.30 - 15.45:
Mechanism Of Assimilation And Fractional Crystallization Revealed In The Wadi Dib Alkaline Ring Complex In The Eastern Desert, Egypt

Eman Saad, Kazuhito Ozawa, Takeshi Kuritani, Sadeq Hamid and Ali A. Khudeir

15.45 - 16.00:

Geology of the Southeast Taiz block basement, Southwestern Yemen

Samir El-Gaby, Ali A. Khudeir, Sadiq H. Seif, Abdul-Hamid M. Naman, and Mohamed A. Abu EL-Rus

16.00 – 16.15:

Distinguishing Algorithm For Gold Deposit Types

Abdelhalim S. Mahmoud , Mansour M. Abdelsamad, , Ahmed I. Taha, Ahmed H. Mansour, Mariam E. Nassif, Sara Kh. Abdelfatah , Mera M. Saleebandand and Rabea A. Khaled

***16.00 – 16.30 COFFEE BREAK and* Poster Session 1**

Room A (16.30 - 17.30)

BASEMENT & GEOCHEMISTRY- II

Chair Persons:

Prof. Dr. Ali A. Khudeir & Prof. Dr. M. Abel Moneim

16.30-16.45:

Origin of Amphibole-Biotite-Fluorite-Rich Enclaves From Gabal El-Ineigi Fluorite-Bearing Granite, Central Eastern Desert of Egypt: Insights Into Fluoride–Calcium And Silicate Liquid Immiscibility

Hanaa A. El-Dokouny, Nasser M. Mahdy, Hany H. El Hadek, Mabrouk Sami , Rainer Abart , Mohamed S. Ahmed , Tehseen Zafar and Ioan V. Sanislav

16.45-17.00:

Geological And Geochemical Evaluation Of The Phosphorite-Bearing Deposits In Dakhla Oasis, Western Desert, Egypt.

Rehab Fekry Abdoo, Mohammed Ibrahim. El Anbaawy, Gebely Abdel maksoud. Abu El-Kheir, Said Mohamed Said, and Rania Abu-Ali

17.00-17.15:

Funding The Mineral Sector Of The Economy As A Key Drive Towards Its Growth And Development In Africa

K'tso Nghargbu, PhD

17.15-17.30: (On line)

Tectonic evolution of a Proterozoic gneiss Migmatite Terrain, Arabian- Nubian Sheild, Yemen: implication from a firstly discovered eclogitecoronites

Shawky Sakran, Salah Al-Khirbash, M. Abdelwahed, M.A.Takla

Room B (15.00- 16.00)

SEDIMENTOLOGY, STRATIGRAPHY AND PALEONTOLOGY - I

Chair Persons:

Prof. Dr. Magdy S. Mahmoud & Prof. Dr. Mamdouh F. Soliman

15.00 - 15.15:

Palynobiozonation, Depositional Environment and Sequence Stratigraphic Interpretation: A Case Study of Well B-1, Deep Offshore Niger Delta Basin, Nigeria

Halima O. Usman

15.15 - 15.30:

PalynologicalAnd Geochemical Investigations Of The Upper Cretaceous Duwi Formation, El-Sebaiya Area, Nile Valley, Egypt: Sequence Stratigraphy And Paleoenvironmental Reconstruction

Abdallah Rabea, Omar Mohamed, Ramadan S. Mohamed, Ahmed Mansour, Ahmed Ali

15.30 – 15.45:

Lower Eocene Mixed Carbonate Siliciclastic Ramp Facies, Sohag Governorate, Upper Egypt

Abdel hamid A. El-Shater, El-Sayed Sedek AbuSeif, Wafaa A. Soliman and Esraa H. Attia

15.45 – 16.00

StratigraphicalAnd Geochemical Characterization Of The Oligocene-Miocene Shale Successions From Northern Egypt

Yasser F. Salama, Ibrahim M. Abd El-Gaied, Samar R. Soliman, Mohamed El-Sayed, Zakaria M Abd-Allah

16.00 – 16.30 COFFEE BREAK
***and* Poster Session 1**

Room B (16.30 - 17.30)

SEDIMENTOLOGY, STRATIGRAPHY AND PALEONTOLOGY -II

Chair Persons:

Prof. Dr. Nageh Obaid Allah & Prof. Dr. Abdalla El Ayyat

16.30 -16.45:

The Paleocene/Eocene Thermal Maximum (PETM) Event At Gabal Duwi Section, Egypt: Stratigraphical, Mineralogical And Geochemical Investigations

Mamdouh F. Soliman, Nageh A. Obaidalla , Aya, M. M. Hussien

16.45 – 17.00:

***Anomoeodusteneidaensis* n. sp. (Pisces, pycnodontiformes) from the Late Cretaceous of Dakhla Oasis, Western Desert, Egypt**

Ahmed Mahmoud Marzouk, Luigi Capassob, Essam Eldein Kotb Zahran, Atef Masoud Abdelmwla ,Asmaa K. Mansoura, M. Kamel Mousa, Gebely A. Abu El-Kheir

17.00 -17.15:

New Materials of The Mosasaurids Reptiles From The Late Cretaceous of Dakhla Basin, Western Desert, Egypt

Gebely A. Abu El-Kheir, A.Tantawy and M. K.Mousa

17.15 – 17.30:

Late Cretaceous (Maastrichtian) Plesiosaur, Marine Reptile From The Dakhla Formation, Southwestern Desert of Egypt

Mohamed K. Mousa, A.Tantawy and Gebely A. Abu El-Kheir

Room C (15.00- 16.00)

REMOTE SENSING AND GIS - I

Chair Persons:
Prof. Dr. Moustafa M. Youssef & Prof. Dr. Mahmoud Senosy

15.00-15.15:
Applications of Microwave Remote Sensing (Insar) And Neo-Tectonic Data In The Detection Of Earthquake Activity In The Northwestern Side Of Gulf Of Suez Rift, Egypt

Abd-Elhadi S.A Mohammad, Karim W. Abdelmalik, Sherif M. Elhady, Ali M.A. Abd-Allah

15.15-15.30:
ASTER And Gamma-Ray Spectrometric Data Integration For Alteration Mineralmapping And Uranium Exploration In QashAmer-El-SelaArea, Southeastern Desert, Egypt

Eltorigy A. A. &Aboelkhair H.

15.30-15.45:
Lithological Mapping Of The Precambrian Rocks Using ASTER Data In East WadiZeidunArea, Central Eastern Desert Of Egypt

Hatem Aboelkhair, Zakaria Hamimi, Mahmoud El Tawpty, Hoda Raghab

15.45 - 16.00:
Contribution Of Remote Sensing, Geochemical And Field Investigated Data For Mapping And Assessing Rock Salt As A Raw Material For The Salt Industry: A Case Study Of SiwaArea, Western Desert, Egypt

Hatem M. Aboelkhair, Eman H. Atta

***16.00 – 16.30 COFFEE BREAK and* Poster Session 1**

Room C (16.30- 17.30)

REMOTE SENSING AND GIS – II

Chair Persons:

Prof. Dr. Moustafa M. Youssef & Prof. Dr. Mahmoud Senosy

16.30 --16.45:

Mapping Alteration Zones In El-Missikat–El-EridiyaGranites, Central Eastern Desert, Egypt Using Aster, Geophysical, And Reflectance Spectrometric Data

Mahmoud E. Hegazy, Hatem M. Aboelkhair

16.45 – 17.00:

Remote Sensing And GIS Applications For Health Risk Assessment Of Heavy Metals Contamination And Their Spatial Distrbiution In Quaternary Groundwater Aquifer, Sohag Governorate, Egypt

Bosy.A.Elhaddad, Mostafa.Redwan, Shaymaa.Rizk

17.00 – 17.15:

Coseismic Deformation and Fault Modelling of the Mw 6.8 Al-Haouz, Morocco Earthquake based on Insar data.

Mohamed Saleh, Mohamed I. Abdelaal and Mimoun Chourak

17.15 – 17.30:

Intgrated Remote Sensing and GIS Techniques for Drainage Basins Analyses and Geomorphological Study of The Eastern Part of Sohag governorate, Egypt

Abudeif M. A. Farghaly

Second DAY

Thursday, November 7, 2024

Room A (9.00.-10.30)

ENVIRONMENTAL GEOLOGY, HAZARDS AND GEOTOURISM -I

Chair Persons:

Prof. Dr. El Sayed Abu El Ella & Prof. Dr. A.El Shater

9.00 - 9.15:

Radioactivity of 226 Ra, 232Th, 40 K In Commercial Marble-Granite From The Biggest Local Marble Workshops, Tanta City, Egypt: Assessment Of Radiological Hazards And Recommendations

M. Th. S. Heikal, Rahma I. Sabrey, Aya S. Shereif &Y. Abdou

9.15 - 9.30:

Geochemical Dynamics And Environmental Implications of Aging Infrastructure: Strategic Insights For Climate Resilience And Sustainable Urban Planning In Developing African Cities

Mouataz T. Mostafa, Reham Y. Abu Elwafa, Hala A. Zekry, Mona Kaisar, Ibrahim H. Khalifa

9.30 – 9.45:

Advancing Aquifer Monitoring: Tdem's Application In Seawater Intrusion Detection Within Heterogeneous Coastal Aquifers of The Nile Delta

Reem A. El Naggar, Ayman I. Taha, Hany M. Shaaban, Eman R. Nofal, Hatem M. Aboelkhair

9.45 – 10.00:

Paragenetic Associations And Controlling Factors of Heavy Metals Accumulation In Sediments Across Varied Urban Settings: A Statistical Review

Mouataz T. Mostafa, Reham Y. Abu Elwafa, Hala A. Zekry, Mona Kaysar, Salman A. Salman, Ibrahim H. Khalifa

10.00 --10.15:

Geochemical Perspectives on Urban Environmental Stressors in Cairo, Egypt: A Representative Review of Inefficient Urban Planning and Climate Change Impacts on African Megacities

Mouataz T. Mostafa, Hala A. Zekry, Reham Y. Abu Elwafa, Mona Kaiser, Salman A. Salman, Ibrahim H. Khalifa

10.15 – 10.30: (On line)

Assessment of Synthetic Zeolites From Kaolin And Bentonite Clays For Waste Water And Fuel Gases Treatment

Ahmed Abdelhalim, Ahmed Melegy, and Dina Othman

10.30 – 11.00 COFFEE BREAK
***and* Poster Session 2**

Room A (11.00 -12.30)

ENVIRONMENTAL GEOLOGY, HAZARDS AND GEOTOURISM -II

Chair Persons:

Prof. Dr. Ezzat Ahmed &Prof. Dr. Abdel Hay Farrag

11.00 – 11.15:

Interstratal Dissolution Activities of Evaporite Deposits Along The Eastern Portion of Ar-Riyadh City, Saudi Arabia.

Bosy A El-Haddad , Ahmed M. Youssef

11.15 – 11.30:

From Ancient To Recent Floods, Advancements In Flood Hazard Management In Makkah City, Saudi Arabia

Bosy A El-Haddad , Ahmed M. Youssef

11.30 – 11.45:

Assessing The Impact of Water Level Fluctuations on Philae Island's Stability And Seismic Vulnerability Using GPS And HVSR Techniques.

Abdelhamid El bshbeshi, Ahmed Gomaa, Abdelmonem Mohamed, Amal Othman, Sayed Ali and Hosni Ghazala

11..45 - 12.00:

The Esna Shale As A New Source For Modern And Archaeological Pottery In Egypt

Abdelhamid A. El-Shater, Saye A. Abu Seif and Wafaa A. Soliman

12.00 - 12.15:

The Egyptian National Strong Motion Network After 15 years

Shaimaa.A Maamoun , Iman A.El-Nadr, Asem Salama and Medhat El Rayess

12.15 - 12.30:

The Western Desert: A Geotourism Strategy Plan For Aspiring Geoparks

Enas A. Ahmed

Room B (9.00 -10.30)

APPLIED AND THEORETICAL GEOPHYSICS -I

Chair Persons:

Prof. Dr. Mahmoud Senosy & Prof. Dr. Mohsen Attiya

9.00 - 9.15:

Earthquake Dynamics Along The Gulf Of Aqaba-Dead Sea TransformFault: An Update On Seismic Hazard

Rashad Sawires, and José A. Peláez

9.15 - 9.30:

Integrated Geophysical Investigation of Subsurface Geology and Depth to Basement in the Western Extension of New Aswan City Using TDEM and Magnetic Methods

Ahmed M. Meneisy, Ayman Taha, Mohamed Khalifa, Mohamed El Bohoty and Essam Ghamry

9.30 – 9.45:

Determination of local seismic site response using in-situ ambient vibration measurements: Case study, New Qena city

Ahmed Hamed , Assem E. El-Haddad, Mohamed I. Aglan and Ahmed M. Abdel Gowad

9.45 – 10.00:

Seismic Swarm Phenomena Recorded At Kalabsha Area, Aswan, Egypt

Haggag Hamed Mohamed

10.00 - 10.15:

Study And Evaluation Of The Seismic Zone Characteristics In Egypt

Abdelnasser Mohamed*, *Hamada Saadalla, Lucia Fojtikova, Mohamed Ezzelarab, Sayed Mohamed Ali and Martin Mazanec

10.15 - 10.30:

Monitoring Contamination in Soils Using Electrical Measurements as Indicators

Mostafa M. Mohamed*, *Mohamed M.Gomaa, Ahmed S. Elshenawy, Alhussein A. Basheer, and Adel Diab Kotb

***10.30 – 11.00 COFFEE BREAK and* Poster Session 2**

Room B (11.00.-13.30)

APPLIED AND THEORETICAL GEOPHYSICS - II

Chair Persons:

Prof. Dr. Gamal Zidan & Prof. Dr. Abdel Baset Abu Deif

11.00 – 11.15:

Evaluating Hydrocarbon Potential Of Miocene Formations In The Tawila Field, Southern Gulf Of Suez Basin, Egypt: A Geophysical Perspective

Mohammad A. Sarhan* & *El Sayed Selim

11.15 – 11.30:

Geophysical Evaluation of Jurassic Khatatba Reservoirs in JG Field, Abu Gharadig Basin, Western Desert, Egypt

El Sayed Selim* & *Mohammad A. Sarhan

11.30 – 11.45:

Recent Tectonic Structures of The Northeastern Egypt After 7.8 Mw Turkey–Syria Earthquakes Using Potential Data

Mostafa Ahmed Elwan

11..45 - 12.00:

Seismic Site Characterization At Aswan Industrial City In Southern Egypt

Maha Abdelbaset, Abdelnasser Mohamed, Awad A.A. Omran, Rashad Sawires, Mostafa Thabet

12.00 - 12.15:

Shallow Seismic Surveys And Geotechnical Properties Investigation In Aswan Industrial City, Upper Egypt

Maha Abdelbaset, Abdelnasser Mohamed, Awad A. A. Omran, Mostafa Thabet, Rashad Sawires

12.15 – 12.30:

Aeromagnetic Investigations For Geothermal Resources In Northern Part Of Egyptian Western Desert

Ghada M. Abd El-Aleem, Gamal Z. Abdelaal, Awad A. Omran, Haby S. Mohamed

12.30 - 12.45:

Real time detection of P wave arrivals and PGA estimation Using Vision Transformer

Iman Abu El Nader, Omar M. Saad, Islam Hamama, Emad B. Helal, and Shaimaa A. Maamoun

Room C (9.00.-10.30)

STRUCTURAL GEOLOGY AND TECTONICS

Chair Persons:
Prof. Dr. Moustafa M.Youssef & Prof. Dr. Ali Khudeir

9.00 - 9.15:
A New Earthquake Sequence Revealing Low Stress Drop And Strike-Slip Detachment Faulting At El-Nuqra Region In The Southern Part Of Eastern Desert, Egypt

Hamada Saadalla

9.15 9.30:
Structural Architecture of The Northern Galala Plateau: New Insights Into The Tectonic Evolution of The Gulf of Suez Rift

Mohamed Mahran, Wael Hagag, Gamal M. El Qot, Refaat Osman, Mahmoud Khairy Alawy and Zakaria Hamimi

9.30 – 9.45:(Online)
Structural Controls on Sukari Gold Mineralization, Egyptian Nubian Shield

Zakaria Hamimi, Mohamed Hassan Ali, Ahmed M. Meneisy, Ahmed Abd El Gaber, Mohammed H. Younis

9.45 – 10.00:
Geometry And Kinematics of The Middle To Late Miocene Salt Tectonics, Central Egyptian Red Sea Margin

Moamen Ali, Hemin Koyi, William Bosworth, Marco Ligi, Philip J Ball and Alessandro Decarlis

10.00 - 10.15:

Architecture And Evolution Of Relay Ramp At Wadi El-Nakhiel, Quseir Area Red Sea, Egypt: Insights From Outcrop Analysis.

Hassan Abbas, Ahmed Gad, Mostafa Youssef, and Ahmed-Reda M. El Younsy

10.15 – 10.30:

Structural Interpretation of The Southern Gulf Of Suez Based On Source Mechanism And Source Parameters of The Significant Earthquakes of The 27 December 2022 Seismic Sequence

Iman Abu El Nadr, Emad Kamal, Hamada Saadalla, Sherif M. Elhady, Medhat El Rayess, ShaimaaA.Maamoun, HazemBadreldinb and Ahmed Shalby

***10.30 – 11.00 COFFEE BREAK and* Poster Session 2**

Room C (11.00 -13.30)

PETROLEUM GEOLOGY – I

Chair Persons:

Prof. Dr. Awad Omran & Prof. Dr. Ali Bakr

11.00 – 11.15:

Impact of Lithofacies Distribution on Reservoir Quality: A Case Study Raha Formation In The Ras Budran Field, Off-shore Suez Gulf Basin, Egypt

Abdelhamid M. Salman, Mohammad A. Sarhan, Mohamed M. El Hossainy

11.15 – 11.30:

Lithological Control And Petrophysical Investigation: Matulla Reservoir Unit, Gulf of Suez Basin, Egypt

Abdelhamid M. Salman, Mohammad A. Sarhan , Mohamed M. Elhossainy

11.30 – 11.45:

Integrated Sequence Stratigraphy and Petrophysical Evaluation of the Miocene Rudeis Formation, Rabeh-East Field, Gulf of Suez Basin, Egypt

Mohamed M. Elhossainy , AbdouFarrag, AlaaSalema, Mohammad Abdelfattah Sarhan

11..45 - 12.00:

Reservoir Characterization and Oil Potentiality of the Early Cretaceous Alam El Bueib Formation in Arcadia Field, North Western Desert, Egypt

Rania Atef , Ahmed A. Radwan, Bassem S. Nabawy, Awad A. Omran and Ahmed Reda M. El Younsy

12.00 - 12.15:

Integrating Petrography, Spectral GR, XRF, And XRD Techniques As Powerful Tools To Estimate The Effect of Shale Types on The In-Suite Dual Formation: A Case Study In North Egypt

Walaa A. Ali and Sherif Farouk

12.15 – 12.30:

Geochemistry of Hydrocarbons and 1D Basin Modeling of the Source Rocks in the Asyut basin, Egypt

Nourhan K. M. Aref, Ali M.A. Abd-Allah and Mohamed H. Abdel-Aal

12.30 – 13.00 COFFEE BREAK
***and* Poster Session 3**

Room A (1300.-14.15)

HYDROGEOLOGY AND WATER MANAGEMENT

Chair Persons:
Prof. Dr. El Sayed Abu El Ela & Prof. Dr. Abdel Hay Farrag

13.00 - 13.15:
Hydrogeochemical And Hydraulic Characteristics of Riverbank Filtration At Selected Sites In Sohag Governorate, Egypt

Ahmed M. Masoud, Ahmed S. Osman, Rifaat A. Wahaab, and Ahmed A. Abdelmoneim

13.15- 13.30:
Modelling The Hydrogeochemical Processes Andsalinization Sources of groundwater Aquifers In The Western Nile Delta (Case Study: Abu Ghalib Area)

Sayed Mosaad, Mustafa Eissa, Heba Issawi and El Sayed El Abd

13.30 – 13.45:
Land Use/Land Cover Change Detection And The Prediction On Groundwater Resources In Wadi El Assiuti Plain, Eastern Desert, Egypt

Elsayed Abu El Ella and Mostafa Kamel

13.45 – 14.00:
Liver Fibrosis And Water Pollution

Raafat Mandour

14.00 - 14.15:
Mapping Groundwater Potential Zones Inwadiqena Basin, Eastern Desert Of Egypt: A Geospatial Intelligence And Multi-Criteria Analysis Framework For Sustainable Resource Management

Eltaher M.M. Shams, Rashad Sawires, Sahar N.E. Tawfik, and Hanaa R. Youssef

Room C (13.00.-14.30)

PETROLEUM GEOLOGY – II

Chair Persons:

Prof. Dr. Awad Omran & Prof. Dr. Ali Bakr

13.30 - 13.45:

Prediction of Well Log Responses Using K-Nearest Neighbors Regression

Ali Abdalsalam, Elhamy A. Tarabees, Osman Badran

13.45 – 14.00:

Integrated Geophysical And Geological Evaluation Of The Upper Cretaceous Abu Roash "F" Member, Azhar Oilfield, Beni Suef Basin, Egyptian Western Desert As A Potential Carbonate Hydrocarbon Source Rock

Ahmed Abdel Tawab Mohamed, Awad A.A. Omran, Amr S. Deaf, Ahmed M. Ali

14.00 – 14.15:

Petroleum System Analysis of The Komombo Basin, Southern Egypt: Insights From Basin Modeling And Hydrocarbon Geochemistry

Moamen Ali , Mohammed Y. Ali and Ahmed Abdelhady

14.15 14.30:

Reservoir Characterization And Facies Modeling Of The Kafr El Sheikh And Abu Madi Gas-Bearing Reservoirs In Disouq Field, Nile Delta, Egypt: Integrated Petrophysical, Pressure And Seismic Study

Mennat Allah Nafady, Munir Elmahdy, Ahmed A. Radwan, Bassem S. Nabawy, Ahmed Abdel Hady, Abdalla M. El-Ayyat and, Ezzat A. Ahmed

14.30 – 14.45:

Identification of Hydrocarbon-Bearing Zones Within The Early Cretaceous Reservoir Rocks Using Well Logging And Seismic Reflection Data In Al-Baraka Field, West Komombo, Egypt

Hamza A. Ibrahim, Mohamed O. Ebraheem, Hattem F. Ewida and Ahmed Hosny Senosy

14.45 – 15.00:

The Nile Delta Basin: A Wealth of Gas Reserves – A Comprehensive Review of the Late Miocene-Pliocene Gas-Reservoirs

Mohammad Abdelfattah Sarhan

15.00 Closimg Session

POSTER SESSIONS
FIRST DAY

Poster Session I:

Moderator: Prof. Dr. Mohamed Abdel Moneim

Hall 2nd Floor (16.00 - 16.30)

I. BASEMENT & GEOCHEMISTRY

(I-10 Poster)

Comprehensive Geochemical Analysis of Phosphate Rocks in AbuTarture Plateau: Implications for Fertilizer Potential and Agricultural Applications

Houda A. Khedr, Mohamed O. Ebraheem, Ahmed M. Zayed

(I-11 Poster)

The protracted plutonism of the HumrAkarim granites in southeastern Egypt: Implication for the post collision high potassium calc-alkaline magmatism

Doaa Hashem, Chao Zheng, Yasser Bader, Mohamed Abu-Elrus, Ali Khudeir and Hassan Abbas

II.SEDIMENTOLOGY, STRATIGRAPHY AND PALEONTOLOGY

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Characterization of lowest oxygen environments within ancient upwelling environments: A case study from the Campanian-Maastrichtianat west-central Sinai, Egypt

Orabi H. Orabi, Hassan I. Frahat, Faris M. Khadr and Maha M. Mohamed

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Larger foraminifera records from Egypt, Jordan, and Iran and the impact of the Mid-Cenomanian event (MCE) on the dissolution susceptibility of agglutinated foraminiferal

Orabi H. Orabi, Hatem F. Hassan, Ikhlas Alhejoj and RohallahHosseinzadeh

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Mohamed Youssef, Sherif Farouk and Saida A. Taha

(II-12 Poster)

Quantitative analysis of the paleocene succession of two sections exposed in the gebelkilabiya, and Nag El Qada areas along the Nile Valley, Egypt

Orabi H. Orabi, Heba Ismail, Saida A. Taha

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Implication of the depositional and diagenetic attributes on thepetrophysicalproperties of the Upper Cretaceous-Lower Paleogenesequence,wadiQueih area, Red Sea, Egypt

Alanoud A. Atia, Awad A. Omran, Ahmed R. M. El Younsy, Abdelhamid M. Salman and Nageh A. Obaidalla

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Tectonic Evolution of the Upper Cretaceous-Lower Paleogene successions at the Duwi Mountain Range, Qusier Area, Red Sea Coast, Egypt: evidence from stratigraphic studies

Nageh A. Obaidalla, Asmaa G. Thabet and Amr A. Metwally

(II-15 Poster)

Stratigraphical and Paleoenvironmental Inferences from Large Benthic Foraminifera for the Lower Eocene Section at Darb Gaga, Baris Oasis, Western Desert, Egypt

AbeerShreif, NagehA.Obaidalla, Moustafa H. El-Dawy

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Moderator: Prof. Dr. Abdalla El Ayyat

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(IV-13 Poster)

Current Motion And Short–Term Deformations In The Nile Delta Area From Gnss Data

Mohamed Rashwan, Mohamed Mahrous, Ali Radwan and Mahmoud Gomma

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Flash Flood Analysis And Risk Assessment Of Arid And Semi-Arid Basins: An Example Of Northern Galala Plateau, Egypt

Nesma S. Behery, Mamdouh M. Abdeen, Mohamed A. Yehia, Ali M.A. Abd-Allah, WalidA.M. Ogila

(IV- 15 Poster)

Seismic Hazards And Seismotectonic Studies For Sinai Peninsula, Egypt

S. I. Mostafa and Medhat El Rayess

(IV- 16 Poster)

Focal Mechanismsolution And The Assocciated Tectonic Trends At The West Of Bitter Lakes Area, Egypt

Farah A. Khedr, Medhat El Rayess, Tarek A. Seleem & Ahmed M. Hegazi

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(V-14 Poster)

Application Of Seismic Refraction And MASW Geophysical Techniques To Characterize The Subsoil Structure Under Damaged Buildings In Qeft City, Upper Egypt

Mahmoud Ahmed Abbas, Ahmed Mohammed Abdelgowad

(V-15 Poster)

Electrical Resistivity Measurements using Non-Destructive Electrodes: A Significant Contributions to the Applications of Electrical Resistivity in Near Surface Geophysics

Mostafa M. Eraky , Gamal Z. Abdelaal , Mahmoud M. Senosy and Reem H. Sayed

(V-16 Poster)

Magnetic Gradiometer Survey To Evaluate The Depth And Shape Of Subsurface Archaeological Features At El Dyabat Archaeological Hill In Akhmim, Sohag, Egypt

Hossameldeen A. Gaber, Abdelbaset M. Abudeif and Mohammed A. Mohammed

(V-17 Poster)

Mapping The Potential Buried Archaeological Objects Employing Magnetic And GPR Surveys At Arabah Al-Madfuna Settlement, Abydos, Egypt

Mohammed A. Mohammed , Abdelbaset M. Abudeif , Gamal Z. Abdel Aal and Hossameldeen A. Gaber

(V-18 Poster)

Seismic Activity and the Major Tectonic Structures in the Northeastern Part of Egypt

Sayed A. Dahy, Ahmed Hamed, Mohamed O. Ebraheem and Gad ElkareemAbdrabou

SECOND DAY

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V. APPLIED AND THEORETICAL GEOPHYSICS (2)

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Contribution of Geophysical Methods In Exploring The Archaeological Remains Near The Pyramid of Amenemhatiii In The Dahshour Area, Egypt

Ahmed M. Meneisy, Ashraf Khozym, Ahmed Awad, Mohamed Hamdallah, Ali Hamdan, Magdy Atya, William Harber

(V-20 Poster)

Mapping Hydrothermal Alterationzones of Gebel MU'TIQ Area Using ASTER And Aeromagnetic Data In Central Eastern Desert, Egypt

Osama A. Zaki El-Gharabawy

(V-21 Poster)

Depth Structural Mapping of Syn And Pre-Rift Rock Units Of Southeast Ghara At Southern End Of Gulf Of Suez

Osama El-Ghrabawy, ShaimaaAbd El Raheem, AlaaAref 1, Khaled Khalifa

(V-22 Poster)

Delineation Of Structural Characterization With Mineralization And Hydrothermal Alternation Zones Using Integrated Radiometric And High-Resolution Aeromagnetic Data, Southern Part Of Central Eastern Desert, Egypt

Haby Salaheldin Mohamed

(V -23 Poster)

Geophysical Characterization Of Subsurface Structures For Optimal Planning In The Abu Tartour Phosphate Mine

Gehad, M. K. Ahmed; Sensoy, M.M.; Mosaad A. Hussien and Gamal,Y. Boghdady

VI. STRUCTURAL GEOLOGY AND TECTONICS

(VI-7 Poster)

Structural Evolution Of El-Delihimmi Granites, Central Eastern Desert Of Egypt: Based On Field Investigations, Microstructures, And Magnetic Fabric

Hassan Abbas; Moustafa Youssef, Ahmed Awad, Ahmed Nasser Mahgoub, and Hayat Saleh

Poster Session III:

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VII. PETROLEUM GEOLOGY

(VII- 13 Poster)

Organic Petrography/Geochemistry And Sequence Stratigraphy Of The Post-Rift Aptian Mixed Clastic-Carbonate Deposits In Southern Tethys (Matruh Basin, Northwestern Egypt): Depositional Settings And Hydrocarbon Prospect

Amr S. Deaf, Thomas Gentzis, Miran M. Khalaf

VIII. HYDROGEOLOGY AN WATER MANAGEMENT

(VIII- 6 Poster)

New Lights On The Groundwater Settings Of El-Kharga Oasis Under Over-Pumping Conditions, The Egyptian Western Desert

Mahmoud H. Darwish, Hasnaa A. Mohamed, AbdelfattahElsayed Elsheikh, and Abdel Aziz A. Tantawy

(VIII- 7 Poster)

Hydro-Geophysical And Hydro-Chemical Characterization For The Groundwater Aquifer In El-Khanka Industrial Zone, Greater Cairo, Egypt

Yara A.Khalil, Ahmed. M. Abd El-Gawad, Ahmad. S. Helaly, Kamal A. Kamal

(VIII- 8 Poster)

Assessment of the groundwater quality with temporal change in El-Zayat arid desert area, Egyptian El-Dakhla Oasis

Mahmoud H. Darwish, and Asmaa G. Sayed

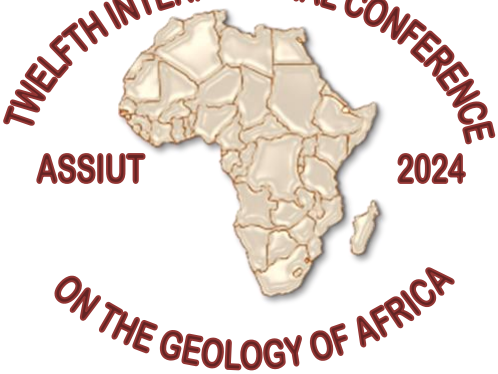
(VIII- 9 Poster)

Recent Approaches for Water resources assessment, A case study;Safaga and El-Quseir, Red Sea government, Egypt

Hanaa A. Megahed, Abd El-Hay A. Farrag, Manar.El Nokrashy

CLOSING SESSION

12th International Conference on the Geology of Africa



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ABSTRACTS

6-7 November 2024
ASSIUT-EGYPT

Invited Talks

(1)

AUTOMATED SEISMIC DATA INTERPRETATION USING ML MACHINE LEARNING, EXAMPLES FROM WESTERN DESERT AND OFFSHORE NILE DELTA A VISION FOR THE FUTURE

Dr. Ali Bakr
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Seismic data interpretation, including structural, stratigraphic, and quantitative interpretations consumes many terra bytes for storage. Using these terra bytes during any needed calculations and algorithms requires a longer time and usually has a dimensionality problem during data studying. Artificial intelligence and machine learning are outstanding tools for analyzing these variable data and solving the dimensionality problem. On the contrary, it is almost impossible to solve the dimensionality of these seismic data using the conventional method of seismic interpretation. Recently, many applications have been used, through machine learning, for fault interpretation, stratigraphic interpretation, direct hydrocarbon indicators (AVO), facies distribution, fracture distribution, thin beds, and seismic reservoir discrimination. This paper presents two examples of these applications to test the possibility of using machine learning in structural and stratigraphic interpretation. The work, has been done, using seismic attributes through the SOM map (Self Organized Map) technique and PCA (Principal Component Analysis) for displaying and

solving the dimensionality of seismic data attributes. The structural data from the ML application shows much more detailed structural resolution in a very short time compared with the conventional seismic structural interpretation. The stratigraphic data interpretation for an offshore submarine gas channel resulted in a complete resolution of the channel geo-body. This geo-body (deep marine gas channel) is extracted using an unsupervised machine-learning technique.

Keywords: AVO (Amplitude Versus Offset), SOM (Self Organized Map), PCA (Principal, Component, Analysis), ML (Machine Learning), and Geo-body.

(2)
GEOPOLYMERS: A NOVEL GEOLOGICAL APPROACH FOR HUMAN, INDUSTRIAL, AND ENVIRONMENTAL APPLICATIONS

Hassan S. M. Ibrahim
Geology Department at the Faculty of Science,
New Valley University, Egypt

Geopolymers are an advanced class of inorganic polymers formed through the reaction of aluminosilicate materials with alkaline activators, offering a sustainable alternative to traditional Portland cement. With their unique chemical and physical properties, geopolymers present significant advantages in clean and green construction by drastically reducing CO2 emissions during production, contributing to low-carbon building solutions. Their high durability, resistance to chemicals, and thermal stability make them ideal for a

wide range of applications, including construction of eco-friendly housing, road pavements, and infrastructure in harsh environments. Furthermore, geopolymers are being explored in medical fields for bone regeneration and dental applications due to their biocompatibility. In military and space sectors, geopolymers serve as insulation materials for nuclear reactors, rocket launch pads, and offshore petroleum piles, due to their resistance to extreme temperatures and radiation. Their environmental benefits, including the use of industrial waste byproducts, make geopolymers a key material in advancing sustainable and resilient technologies across various industries.

(3)
EARTH RESOURCES INWEST AFRICA: A CASE STUDY FROMNIGERIA

Olugbenga Okunlola
Geological society of Africa ,University of Ibadan, Nigeria

West Africa comprises generally of the Guinea rise formed by the southern half of the West African Craton. The narrow Pan African belt of the Rockellides on its western boundary is associated with some marginal reactivation of the Archean rocks. North of the Craton lies Infra Cambrian to Lower Palaeozoic sediments of the Taoudeni basin.The Eastern part isoverlain by sediments of the Volta Basin separated by the main Pan African rocks of the Togo-Benin-Nigeria

swell. This is crossed by the narrow Cretaceous Bida Basin and Benue Troughwhich link up with the Cretaceous to Recent Niger Delta Basin. Nigeria, which is part of the mobile belt East of the West African Craton is underlain by a lithologic heterogeneity that enables an array of mineral endowment. This heterogeneity manifest in rocks of the Basement Complex of Precambrian age,Cretaceous to Recent sedimentary successions, the Younger Granites and the Volcanics.

The rocks, especially the basement complex metasedimentary schist belts and those affected by the Pan African thermotectonic events have been the most significant and serve as host of the multivarious ore mineralization of Nigeria. The Younger Granite which is mainly of anorogenic origin host the major Tin rich horizons, while the sedimentary sequences host some metallicsnotably Pb-Zn base metals and the energy minerals of coal, lignite within the cretaceous to middle Benue trough. The vast hydrocarbon resources are hosted within mainly the tertiary-recent Niger Delta with minor payswithin the cretaceous Anambra Basin and Benue trough.

Nigeria economic mineralization couldbe broadly classified into metallic, non-metallic/industrial now globally referred to as development minerals, energy minerals and hydrocarbon (oil and gas). Out of the over 2000 minerals species known, only about 200 are of economic value of which Nigeria could boast of about 60 at different levels of commercialization potential. At least 20 economic metallic minerals are known to occur in Nigeria. They consist of:

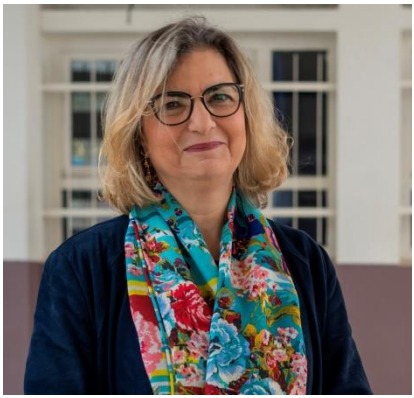
1. Iron ferrous alloy metal minerals including; iron ore (magnetite, hematite), manganese and titanium.
2. Non-ferrous base metals; lead, zinc, copper (malachite, azurite, chalcopyrite), chromium and platinum group minerals.
3. Rare metals; tin, tantalum, niobium, wolframite and lithium minerals, lepidolite, spodumene, cesium, beryllium.
4. Precious metals, notably gold and silver
5. Energy minerals; uranium, thorium
6. Platinum group metals; mainly platinum and palladium.

For the non-metallic/industrial minerals, they have been broadly sub-classified into silicate and non-silicate sub-class. In Nigeria, the

silicate minerals that occur in varying economic grades include; Silica minerals (silica sands, quartzite, diatomite), Feldspars (plagioclase, albite, orthoclase), Clays (kaolinite, montimorillonite and/or smectite), Micas (muscovite, biotite and lepidolite), Refractory silicates (talc, kyanite, sillimanite, wollastonite and asbestos), gemstones composed of precious and semi-precious, broadly tourmaline, beryl, quartz, (amethyst, rose), topaz amongst others. Aggregates minerals comprising different varieties of crystalline rocks, gravels and laterites make up the rest. The non-silicates development minerals include Carbonates, (limestones, marble, magnesite and marl), Sulphates (gypsum and barite), Halides (fluorite, brines) and phosphate.
The energy/carbonaceous minerals include coal, lignite, uranium, thorite and monazite. The hydrocarbon oil and gas which is also regarded as minerals could be classified along this group

(4)

METEORITES AND IMPACT CRATERS IN MOROCCO AND ARABIAN COUNTRIES: AN OVERVIEW



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During the last fifty years, meteorites have been a fantastic way to increase our knowledge about the origin of the solar system, the formation of planets including the Earth, the large impact-related

extinctions during the geological times .Their study allowed scientists to have a direct access to rocks from planets not yet directly explored, and also to rocks that represent the precursor of the actual planets, that have been fixed in the initial state of their formation as asteroids.

Meteorites: Arabic countries are very rich in meteorite finds. Collection of meteorites is essentially done in hot and cold deserts. Most of the Arabic countries contain large desert areas, explaining why they are a very good place for searching meteorites. Those meteorites are quasi totally exported out of their countries of find, by dealers, collectors or foreign scientists. All classes of meteorites are found in the hot deserts; a lot of them are rare and potentially very important for the scientific research in particular due to their origin: most of martianmeteorites, lunar meteorite, angrites and other rare types are from the hot deserts.

All meteorite falls since 2004 has been classified and submitted to the Nomenclature Committee of the Meteoritical Society by our team including the exceptional fifth Martian meteorite fall in Morocco "Tissint". Many valuable papers have been published on these falls allowing Moroccan researchers to comfort their position on this topic. A similar effort was done with meteorite finds in Morocco such as "Al Haggounia", "Anoual", "Bou Azarif", "Agoudal". Most other finds from the countries surrounding Sahara (Morocco, Algeria, Tunisia, Mauritania Mali, Tchad, Niger) are called by a serial name (North West Africa) followed by a number: NWA xxx . The lack of locality name means that we don't know the exact origin of the sample, thus we loose important scientific and patrimony information.

In Lybia and Oman, there are large meteorites strewnfields with known geographic coordinates and a serial name plus a number like Dar El Ghani (DAG xxx), Hamada Al Hamra (HAH xxx), Shisr xxx, In Egypte, there is one of the most famous martian meteorites falls, Nakhla, as well as the most ancient meteoritic iron, found in the King Tut treasure. In Saudi Arabia, there is a recent impact meteorite crater: the Wabar crater, while the black stone in the Kaba Al Mounaouara is said to be possibly a meteorite.

Despite of this richness, Arabic countries does not have laboratories devoted to research on meteorites, they don't have museums for the preservation of this patrimony that is lost quickly. Indeed, most

meteorites exported from Sahara are sold to private collectors with no benefits to science and to the countries. It's important to have a smart regulation as well as research centres and museums have to be created in Arabic countries.

Impact craters: In Arabic countries, the number of impact craters is 11, this number is very low comparing to those known in USA or Europe. In Morocco, the first impact structure has been discovered by chance during a systematic search of an iron meteorite "Agoudal". This structure is interesting: even it has been found in the Agoudal meteorite area, there is no relationship between both events.

Efforts are made to develop planetary sciences in Morocco and Arabic countries and to connect Meteoritics researchers and Astrophysicists by organising scientific meeting by the Hassan II University of Casablanca (Desert meteorite workshop August 2016, Arab Impact Cratering and Astrogeology Conference AICACII November 2011, 77th Meteoritical Society Meeting). This effort includes also communication on newspapers, radio and TV media to inform the large public about these sciences as well as the introduction of courses on the university curricula.

I- Basement, Geochemistry &Mineral Resources

(I -1 Oral)

RE-MAPPING THE NEOPROTEROZOIC GRANITOIDS OF GABAL EL-SIBAI, CENTRAL EASTERN DESERT, EGYPT, USING LANDSAT-8 OLI/TIRS IMAGERY, PETROGRAPHY AND FIELD OBSERVATION

Hassan O. Sedqi Osman*[1], Mabrouk Sami M. Sami[2], Hassan Abass[3], Khairy Saad Zaki[4], and Awad Fargahal A. Hafaz[5]

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Integration of remotely sensed data, field work in addition to petrographic observations, indicates that the Gabal El-Sibai granitic rocks have distinctive lithologic and petrographic characteristics. Image transformation techniques of using Landsat-8 (OLI) data successfully discriminated lithologic characteristics are evaluated for improving and re-mapping the lithological map of Gabal El-Sibai, Central Eastern Desert of Egypt. Different remote sensing methods, including as FCC, band ratio, PCA, supervised and unsupervised classification, and band ratios, were applied to satellite data to facilitate the identification of exposed Neoproterozoic granitic rocks in the study area. Best colour composite 752 FCC, band ratio 6/7, 4/2, and 5 and using Kaufman band ratios 7/5, 5/4, and 6/7 in RGB, as well as PCA 123 in RGB were chosen and utilised for comprehensive mapping of the various lithological units.The granitic rock of Gabal El-Sibai petrographically divided into of alkali feldspar granite (AFG) deformed and undeformed, which consider the main body, and alkali amphibole granite (AAG) at the peripheries in addition to gneissic granite at the eastern foot of (AFG) pluton. The AFG phase is dominated by composition ranging from biotite granite to alkali feldspar granite. The (AAG) represents the youngest granitic phase of magmatism in the studied plutons. Various patches of pegmatites and mineralized veins have been recorded near to contact with schistose metavolcanics. A new modified lithological map is produced for Gabal El-Sibai based on the remote sensing data, field investigation and petrographically description.

Keywords: Gabal El-Sibai, Pan-African basement, Landsat 8 OLI, PCA, and Band ratios.

(I-2 Oral)

GEOLOGY OF THE SOUTHEAST TAIZ BLOCK BASEMENT, SOUTHWESTERN YEMEN

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Detailed mapping of the Precambrian basement building up the up faulting Southeast Taiz block, Southwestern Yemen, revealed the presence of two conformable mappable units intersected by prominent an ENE-WSW trending sinistral transpressed shear zone, referred to as Hudaba shear. The lower unit, is dominated by high-grade granite gneisses (diatexites) and anatectic granites whereas the upper one is represented by a medium to high-grade rock association comprising gneisses, metatexitic migmatites, amphibolites, minor marble and calc-silicates. These metamorphites were found to be regionally metamorphosed under high T and medium P conditions as inferred from the presence of andalusite, sillimanite, cordierite, feldspars and the weakly to nonfoliated lensoidal anatectic bodies running conformable with the regional setting of the studied block. Structurally, the whole metamorphosed sequence forming the block bear evidences of polyphase deformation in addition to two metamorphic events (M1-2). Petrographical and mineralogical investigations indicate that the rock varieties of the whole metamorphosed sequence are derived from sedimentary and igneous parentages.

Keywords: Taiz block, Hudaba shear, Diatexites, Metatexitic migmatite.

(I -3 Oral (Online))

TECTONIC EVOLUTION OF A PROTEROZOIC GNEISS MIGMATITE TERRAIN, ARABIAN- NUBIAN SHEILD, YEMEN: IMPLICATION FROM A FIRSTLY DISCOVERED ECLOGITE CORONITES

***Shawky Sakran*[1]*, *Salah Al-Khirbash*[2], *M. Abdelwahed*[1], *Late M. A.Takla*[1]**

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[2]*Earth Sciences Department, Sultan Qaboos University*

This paper describes the tectonic evolution of a 2.3-1.7 Ga gneiss-migmatite terrain at the southeastern part of the Paleoproterozoic Arabian- Nubian Shield of Yemen. The geology and petrography of a discovered eclogite xenolith enclaved within the orthogenesis are taken into consideration in the construction of the proposed tectonic model. The gneisses and migmatites and the included eclogite xenolith are affected by three deformational phases D1, D2 and D3. D1 is represented by F1 folds on the major and minor scales generally of axial planes and folding axes of variable attitudes throughout the area of study. F1 minor folds are tight, isoclinal and intrafolial folds. S1 is a regional schistosity. Different types of L1 lineations are coaxial with F1 folds. D2 is a prolonged phase of deformation, resulting in folding and thrusting on the regional scale. F2 folds are of tight overturned and asymmetric styles generally plunging NNE. S2 foliation is an axial plane foliation and strain slip cleavage. L2 lineations are generally parallel to F2 axes. Mylonitic foliation is developed parallel to the thrust plane and is associated with NE trending stretched lineation. Ductile shearing along zones within the gneisses and migmatites is most probably coeval with this phase. D3 is a mild event resulting in open folds of NW axes and nearly vertical axial planes and is associated with kinking of the older foliations.The eclogite xenolith contains different types of corona structures. The first type consists of olivine or hypersthene in the core followed by diopside, and garnet in the outer rim. The second type consists of ilmenite in the core, followed by brownish hornblende and garnet in the outer rim. These coronites are interpreted by simple reactions between plagioclase and olivine of a parent mafic rock. The gneiss and migmatite rock

association in which the eclogite occurs indicates that this eclogite is a collision type eclogite. The eclogite xenolith may be captured from a mantel cumulate during the invasion of the granitic magma (the parent of the orthogneiss in the study area) predating the migmatization process. In another probable model, the eclogite xenolith may represent a deeply subducted oceanic crust which was subjected to high temperature high pressure metamorphism and finally captured by the invaded granitic magma. The present data sets are integrated to represent a robust tectonic model for the area of study.

(I-4 Oral)

FUNDING THE MINERAL SECTOR OF THE ECONOMY AS A KEY DRIVE TOWARDS ITS GROWTH AND DEVELOPMENT IN AFRICA

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Africa is undeniably endowed with huge mineral deposits, hence remaining the center of attraction/choice to key mineral and mining actors across the globe. African countries like Nigeria, South Africa and Democratic Republic of Congo are endowed with minerals such as gold, crude oil, cobalt, manganese, copper, tantalite and many others. These minerals hold huge prospects towards the transformation of Africa if properly harnessed. One of the major challenges in the mineral sector in Africa is low investment dominated by artisanal mining activities. This is due to high capital requirement for exploration and extraction. To develop this sector and harness the maximum wealth in the mineral sector in Africa, there is a need for targeted development of the mineral sector through enhanced funding. The objective of this paper is to examine innovative funding strategies and mechanism of the mineral sector for development. The paper

seeks to explore innovative funding mechanism such as establishment of the mineral/mining development bank, public-private partnership and establishment of trust/sovereign fund. The paper also explores cross-country comparison of funding of the mineral sector around the World in a bid to obtain lessons for funding in Africa.

Keywords: Funding, Africa, Mineral/Mining Development Bank, Trust/Sovereign Fund, Mining.

(I- 5 Oral)

DISTINGUISHING ALGORITHM FOR GOLD DEPOSIT TYPES

Abdelhalim S. Mahmoud*[1, 3*], *Mansour M. Abdelsamad*[1], , *Ahmed I. Taha1, Ahmed H. Mansour 2,3, Mariam E. Nassif1, Sara Kh. Abdelfatah1, Mera M. Saleeb1, Rabea A. Khaled4

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[4] *Faculty of computer and information technology, National Egyptian E-learning University, Giza, Egypt*

The determination of gold deposit type holds great economic significance since each gold deposit type displays its own grade and tonnage and consequently requires different exploration and exploitation strategies. While each type of gold deposit has distinct characteristics, there is often significant overlap between many deposits, making it challenging to accurately classify them. To differentiate between these deposit types, we collected geological, mineralogical, and geochemical characteristics, as well as ore-forming parameters, for 12 gold deposit types. A detailed classification scheme is utilized, covering four specific categories of gold deposits, namely orogenic, including greenstone-hosted, banded iron formation-hosted, or turbidite-hosted; reduced intrusion-related deposits; and oxidized intrusion-related gold deposits, which encompass Au-Cu-porphyry, Au-skarn, and high-sulfidation epithermal deposits, with a fourth class incorporating other deposit types, such as low-sulfidation epithermal, Carlin-type, and Au-volcanic massive sulfide deposits. The tabulated distinctive characteristics were used to construct a series of decision

trees for gold deposit type identification. The distinguishing algorithm is formulated in the form of a Java computer application. Three decision trees are employed for the purpose of ascertaining the type of gold deposit. If two decision trees yield a consensus on a particular type, the ore type identification is made accordingly. To validate the outcome, the user is prompted to respond to a series of questions pertaining to the identified type, with the accuracy rate of the responses must exceed 90%. Failure to meet this criterion will result in the decision tree being revisited, and the accurate data will need to be re-entered.

Keywords: Gold deposit classification, Gold exploration, Gold mining, Decision tree, Distinguishing algorithms, Java.

(I- 6 Oral)

ORIGIN OF AMPHIBOLE-BIOTITE-FLUORITE-RICH ENCLAVES FROM GABAL EL-INEIGI FLUORITE-BEARING GRANITE, CENTRAL EASTERN DESERT OF EGYPT: INSIGHTS INTO FLUORIDE–CALCIUM AND SILICATE LIQUID IMMISCIBILITY

Hanaa A. El-Dokouny[1], Nasser M. Mahdy[2,*], Hany H. El Hadek[3], Mabrouk Sami [4,5] , Rainer Abart [5], Mohamed S. Ahmed [6], Tehseen Zafar[7,*] and Ioan V. Sanislav[8]

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Gabal El-Ineigi fluorite-bearing rare-metal granite with A-type affinity, located in the Central Eastern Desert of Egypt, is distinguished by its abundance of large fluorite-quartz veins and mafic enclaves. Plagioclase (labradorite to oligoclase), Mg-rich biotite, and Mg-rich hornblende are the main components of mafic enclaves, with significant amounts of fluorite as essential phases, and titanite and Fe-Ti oxides (Nb-free rutile and ilmenite-rutile solid solution) as the main accessories. These enclaves are monzodioritic in composition, Si-poor, and highly enriched in Ca, Fe, Mg, and F compared to the host alkali feldspar F-poor Si-rich granites. Given the conflicting evidence for a restitic, xenolithic, magma mixing/mingling, cumulate, or bimodal origin for these enclaves, we propose that the mafic enclaves and felsic host granites are two conjugate liquids, with contrasting compositions, of a single parental melt. This is inferred by the normalized REE patterns that are similar. As a result, liquid immiscibility is proposed as a probable explanation for this mafic–felsic rock association. These enclaves can be interpreted as transient melt phases between pure silicate and calcium-fluoride melts that are preserved from the early stages of separation before evolving into a pure fluoride (Ca-F) melt during magma evolution. Due to element partitioning related to melt unmixing, the enclaves are preferentially enriched in Ca, F, Li, Y, and REE and depleted in HFSE (such as Zr, U, Th, Ta, Nb, Hf, and Ga) in comparison to the host granites. Furthermore, mafic enclaves exhibit W-type tetrad effects, while host granites exhibit M-type tetrad effects, implying that the REE partitioning, caused by liquid immiscibility, is complementary.
Keywords: silicate melt, mafic enclave, tetrad effect, liquid immiscibility, fluoride melt.

(I-7 Oral)

THE PROTRACTED PLUTONISM OF THE HUMR AKARIM GRANITES IN SOUTHEASTERN EGYPT: INSIGHT INTO THE MICROSTRUCTURES

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The Humr Akarim (HA) granite pluton is a long-lived, nested pluton emplaced incrementally in the Arabian-Nubian shield. The pluton consists of four magma pluses present in two separate masses. The first elliptical muscovite-pegmatite mass extends along NNW-SSE axis of a fold in a surrounding island-arc metavolcanoclastic and the second mass forms a composite dyke-like form extending NNE-SSW consisting of a medium granite sheet cross-cut by a NNE-SSW pegmatite–granite dykes and overlies another thick, coarse-grained granite sheet. U-Pb zircon dating indicates a crystallization age of 706 ± 13Ma (?) for the elliptical muscovite granite; 639.3 ± 8.3Ma for medium-grained granite sheet; 627.8 ± 5.0 Ma for pegmatitic granite dykes, and 620.2 ±9.4 for the lower coarse-grained granite sheet, suggesting crystallization from independent magma pulses. Although the HA pluses have the same constituent minerals, they exhibit different melt-assisted sub-magmatic to solid-state ductile deformation. By combining radiometric dating with the analysis of microstructures, we can track changes in the physical properties of the melt pulses, such as the crystal/melt ratio, temperature, rate of cooling, rheology and viscosity.
Keywords: Nested pluton, Submagmatic deformation, Radiometric dating, Microstructures,solid-state ductile deformation.

(I-8 Oral)

GEOLOGICAL AND GEOCHEMICAL EVALUATION OF THE PHOSPHORITE-BEARING DEPOSITS IN DAKHLA OASIS, WESTERN DESERT, EGYPT

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The current study presents an integrated investigation of petrographical, mineralogical, and geochemical data of the Upper Cretaceous phosphorite-bearing strata, west of the Abu-Tartur Plateau, in the Western Desert of Egypt. Fifty-five samples representing the phosphorite and the associated rocks were collected from six outcrops. Three facies are identified: phosphorites, carbonates and siliciclastics. Their mineralogy is quantified using X-ray diffraction (XRD): fluorapatite, dolomite, calcite, pyrite, quartz and smectite species. Atomic absorption spectrophotometry (AAS) permitted quantification of the major oxides: SiO2, Al2O3, MgO, Fe2O3, CaO, K2O, Na2O, P2O5, and SO3 as well as F and Loss of ignition (LOI). The statistical treatment of these geochemical data identified three significant controlling factors during and post-deposition of the study phosphorite and associated rocks. These factors represent the effect of the diagenesis of the phosphorites, argillaceous marine rocks and alumino-silicates, in a descending order of their relative strength. Trends of the analyzed major elements for the study samples are documented. Phosphorite, phosphatic rocks, dolomitized rocks, and siltstone-mudstone are recognized lithologies based on the chemical composition of the analyzed major oxides. The principal diagenetic processes affecting the study phosphorite-bearing rocks include dolomitization, pyritization, silicification, as well as bone dissolution, and micritization.
Keywords: Late Cretaceous; Phosphorite; Mineralogy; Geochemical parameters; Diagenesis; Egypt.

(I-9 Oral)

MECHANISM OF ASSIMILATION AND FRACTIONAL CRYSTALLIZATION REVEALED IN THE WADI DIB ALKALINE RING COMPLEX IN THE EASTERN DESERT, EGYPT

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Assimilation of crustal materials has been regarded as one of the important processes to produce chemical diversity of magmas. Because of low temperature of the crust, heat generated by crystallization of the magma is required to melt the cold solid crustal materials to be assimilated into the magma chamber. Geochemical mass balance models coupling assimilation and fractional crystallization (AFC) with consideration of energy balance was accordingly proposed (e.g., Spera and Bohrson, 2001). We studied ~600Ma Wadi Dib ring complex (WDRC) in the Eastern Desert of Egypt (Saad et al., 2023) to reveal evolution of thermal and material structures of a magma body and its surroundings. The WDRC consists of multiple circular rings of the oldest volcanic unit and the middle-stage plutonic unit, which are cut by the youngest dike unit. The plutonic unit is progressively more fractionated inwards from the oldest syenite outer ring to the youngest granitic core through quartz syenite inner ring. The sample initial 87Sr/86Sr and 143Nd/144Nd of rocks from the inner ring and granitic core show deviations from those of isochron initial ratios. The deviations are explained only by assimilation of an isotopically distinct exotic melt. An AFC model was developed to estimate Ma/Mc, ratio of mass assimilated to mass crystallized, and the exotic melt composition by reproducing Nd isotope ratios and trace and major element compositions of the three rock types. The Nd isotope ratios and chemical compositions of the exotic melt are comparable to those of the Neoproterozoic granitoids. The obtained Ma/Mc increases dramatically towards the granitic core. It is thus inferred that assimilation became effective only during the later stage with supply of exotic melts from the bottom boundary layer, where country rocks sunk from the carapace of the magma body by stoping in the earlier stage and underwent melting.

Poster Presentations

(I-10 Poster)

COMPREHENSIVE GEOCHEMICAL ANALYSIS OF PHOSPHATE ROCKS IN ABU TARTURE PLATEAU: IMPLICATIONS FOR FERTILIZER POTENTIAL AND AGRICULTURAL APPLICATIONS

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The present study mainly focuses on the geochemical analysis techniques of high (HPR), medium (MPR), and low (LPR) oxidized phosphate rocks, employing various techniques to uncover significant alterations in their chemical composition, mineralogical, morphological, and geometrical properties.The comprehensive analysis involves the measurement of major oxides and mineral phases using complete and XRD analyses, while optical microscopy is utilized to verify the minerals present. Additionally, the zeta sizer technique is employed to ascertain the size of representative samples. Within the Duwi Formation, it could be subdivided vertically into three remarkable informal lithostratigraphic units. Notably, HPR and MPR exhibit elevated P2O5 content (30.20 wt.% and 24.80 wt.%, respectively), contrasting with the decreased content in LPR (6.5 wt.%). These findings position HPR and MPR as promising high-reactive P fertilizers suitable for direct agricultural application and as valuable P fertilizer sources following nutrient balancing.

Keywords: Oxidized phosphate; Different Phosphate grades; Geochemical characterization; Tectonic activeties; Sedimentary sequence; Micro scale.

(I-11 Poster)

THE PROTRACTED PLUTONISM OF THE HUMR AKARIM GRANITES IN SOUTH EASTERN EGYPT: IMPLICATION FOR THE POST COLLISION HIGH POTASSIUM CALC-ALKALINE MAGMATISM

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The Humr Akarim granite pluton is formed of four granite pulses emplaced with temporal gaps. They comprise muscovite pegmatite (~ 706 Ma?), medium- grained granite (~ 639 Ma), pegmatitic granite (~ 638 Ma) and coarse-grained granite (~ 621 Ma) pulses. Each granite pulse shows evidence of magmatic-hydrothermal processes, including growing metasomatic megacrysts of alkali feldspars and quartz at the expense of the other magmatic assemblage. The geochemical data suggest that these granite pulses can be classified as the high-potassium calc alkaline type, which is dominant in post-collisional orogeny. Hafnium (Hf)-zircon model ages (HfTDM) of ~ 0.81-0.9 Ga of the granitic pulses are close to the crystallization ages, indicating juvenile protolith. Combination of zircon model ages with zircon εHf(t) (+11.3 – +4.5), suggesting that the granite pulses were generated by partially melting lower crustal materials with possible involvement of upper crustal materials. The pronounced tetrad effect on the normalized REE patterns of all samples and the fractionation of several CHARAC (CHarge-And-RAdius-Controlled) element pairs, such as Rb-Sr, Sm-Nd, Zr-Hf, La-Ta, Nb-and Y-H is good evidence on interaction with fluids on the late stages of crystallization.

Keywords: High-potassium calc alkaline granite, Granitic pulses, Post collisional granite, Partial melting, Magmatic-hydrothermal process.

II- Sedimentology, Stratigraphy and Paleontology

(II-1 Oral)

PALYNOBIOZONATION, DEPOSITIONAL ENVIRONMENT AND SEQUENCE STRATIGRAPHIC INTERPRETATION: A CASE STUDY OF WELL B-1, DEEP OFFSHORE NIGER DELTA BASIN, NIGERIA

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Palynofacies, depositional environment and sequence stratigraphic study of the strata penetrated by well B-1 in the deep offshore Niger Delta Basin, Nigeria, was carried out. Most of the previous researchers established biozones with alpha-numeric method. Accurate biozonation in line with international stratigraphic guide is essential for proper correlation of hydrocarbon bearing units in the Niger Delta. This research aims at studying sedimentary successions made up of alternation of shale and sandstone unitsin well B-1 to determine their ages, depositional environments, and establish their sequence stratigraphic framework. A total of one hundred and four ditch cutting samples within the interval 7900-13000 ft composited at 60 ft interval was analysed. The standard acid method of sample preparation for palynofacies and integration of gamma ray log data for paleoenvironment and sequence stratigraphic study was followed. The lithologic and textural characteristics indicate that the entire studied interval in well B-1 belongs to the Agbada Formation. The palynofacies analysis yielded low to moderate recovery of palynomorphs, abundant palynomacerals I and II, and moderate records of palynomacerals III and IV at different intervals. Based on international stratigraphic guide for establishment of biozones, four (4) palynostratigraphic zones was established in well B-1. *Magnastriatites howardii, Pachydermites diederixi, Crassoretitriletes vanraadshoveni* Taxon Range zones and *Stereisporites* spp.*Cyperaceaepollis* spp. Interval Zone were established for well B-1. The studied intervals were dated Early Miocene to Late Miocene based on the stratigraphic age range of marker species. The studied successions were deposited in marine environment with minor freshwater incursion. The

successions were divided into highstand systems tracts, lowstand systems tracts and transgressive systems tracts, and chronostratigraphic surfaces such as Maximum Flooding Surface (MFS), Sequence Boundary (SB) and Transgressive Surface (TS). The MFS and SB were dated 19.4, 15.9 and 7.4 MFS and 17.7 SB in well B-1 by correlation of the established palynozones with chronostratigraphic chart. The sandstone and shale units of the systems tracts are potential hydrocarbon reservoirs and seal rocks respectively.

Keywords: Biozonation, palynofacies, sedimentary environments, Sequence stratigraphy.

(II-2 Oral)

PALYNOLOGICAL AND GEOCHEMICAL INVESTIGATIONS OF THE UPPER CRETACEOUS DUWI FORMATION, EL-SEBAIYA AREA, NILE VALLEY, EGYPT: SEQUENCE STRATIGRAPHY AND PALEOENVIRONMENTAL RECONSTRUCTION

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Sedimentary phosphate deposits are the main source of phosphorus-bearing materials in Egypt. The lower member of the Duwi Formation is the most producing phosphorite lithological unit in El-Sebaiya area, Nile Valley. About 85 rock samples were collected from three sections (Fath 3, El-Gededa 1, and Badr 4). Lithologically, these samples include the uppermost part of the Qusseir Formation, the Duwi Formation, and the lowermost part of the Dakhla Formation. These samples have been analyzed for palynological and geochemical (major and trace elements) investigation. Palynofacies assemblages are characterized by the dominance of amorphous organic materials and phytoclasts, with a very low abundance of palynomorphs in some samples from Fath 3 and El-Gededa sections. Q-mode cluster analysis revealed three palynofacies assemblages in El-Gededa and Badr 4

sections and four palynofacies assemblages in Fath. Palynofacies indicating dysoxic to anoxic conditions from the proximal shelf to the distal basin. Palynological data were integrated with geochemical proxies to reconstruct the oscillation of sea level, where the increase in SiO2, Sr/Ca, Zr, Zr/Al, Ti, and Ti/Al indicates a regression phase, while the increase in CaO, Mn, and Mn/Al indicate a transgression phase. Three third-order transgressive-regressive (T-R) sequences have been recognized in the studied area.

Keywords: Sequence stratigraphy, Palynology, Phosphate deposits, Upper Cretaceous, Duwi Formation, Nile Valley.

(II-3 Oral)

LOWER EOCENE MIXED CARBONATE SILICICLASTIC RAMP FACIES, SOHAG GOVERNORATE, UPPER EGYPT

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In the Egyptian Nile Valley, the study area (east Sohag Governorate, Egypt) represents a minor slice of the El-Maaza Plateau, which is mostly composed of Lower Eocene carbonate succession. Three well-selected Lower Eocene sections were investigated at Wadi Bir Al-Ain, Awlaad El-Sheekh Village, and Hashem Al-Eseri Village. Thebes Formation (yellowish white laminated and bedded limestone with bands of chert and fine-sliciclastic beds) and Drunka Formation (conformably overlies the Thebes Formation and is distinguished by its snowy white color, more or less horizontality, and chert concretions) are the two distinct formations that make up the studied Lower Eocene succession. Field observations revealed that numerous structural elements (folds, faults, fractures, and shear zones) associated with the Pan African Orogeny influenced the areal distribution and lithology of this Lower Eocene sequence. These were followed by a series of tectonic reactivations, especially during the Cretaceous and Oligocene periods. Particularly in the Wadi Bir Al-Ain area, the carbonates of the Drunka Formation are often characterized by a characteristic depositional cyclicity. With more landward facies

covering more basinward facies throughout each cycle, these cyclic carbonate deposits show shallowing upward, reflecting shallow epi-continental environmental conditions. The Drunka Formation's cycle thickness and lack of truncated cycles indicate that the periodicity and amplitude of sea-level fluctuation were generally consistent, pointing to a eustatic process for relative sea-level change rather than a tectonic one. Rockfalls, joints, tilting, and faulting are examples of deformation featurs seen in Drunka Formation that could be post-depositional in nature. Additionally, there is no argillaceous lithic succession in Drunka Formation in the studied area. Consideration of the studied Lower Eocene rock units as carbonate ramp deposits was concluded on the basis of thorough field investigations, sedimentological and lithofacies of the studied Eocene succession and careful reading of published works of Eocene rock units in Egypt and other international localities (Thebes Formation in inner-middle ramp environmental conditions and Drunka Formation in an outer-ramp environment). Based on standard classification schemes, five microfacies of the studied carbonate rock units (lime mudstone, lime wackestone, lime packstone, lime grainstone, and lime dolostones) were identified from the petrographic microfacies analysis conducted on 82 representative samples of the studied Lower Eocene succession. These microfacies were considered a main tool to better understand the depositional environments of the studied Lower Eocene rock units.

Keywords: Lower Eocene mixed carbonate siliciclastic ramp facies; East-Sohag; Nile Valley, Egypt.

(II-4 Oral)

STRATIGRAPHICAL AND GEOCHEMICAL CHARACTERIZATION OF THE OLIGOCENE-MIOCENE SHALE SUCCESSIONS FROM NORTHERN EGYPT

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The aim of this work is to better understand and evaluate the black shale deposits from the Oligocene-Miocene succession at Maydoum area, North Western Desert, and El-Saf area north Eastern Desert, North Egypt. The studied shale deposits are dominated by benthic foraminifes such as *Spiroplectammina fahmi, Cancris planus, Valvulineria californica, Ammonia beccarii, Eponides cocoaensis, Cibicides refulgens, Cibicides perlucidus, Praeglobobulimina pupoides, Pseudononion japonicus* and *Lenticulina foliata*. The Carbon and Oxygen isotope analyses of the benthic foraminifers are used to evaluate the origin and the depositional conditions of the studied shale deposits. The $\delta^{18}O$ values of the studied foraminifera tests are fluctuated between 0.03 and 2.79 ‰. The variations of the stable isotope signals between different benthic foraminifera species are often attributed to differences in metabolic fractionation, organic matter fluxes and vertical microhabitat shifts. Geochemical analyses such as X-ray Diffraction (XRD), X-ray fluorescence (XRF), total organic carbon (TOC) and total carbon (TC) carried out on the shale samples to evaluate the significance of she studied shale deposits in hydrocarbon industry.

Keywords: Oligocene-Miocene, Western Desert, Eastern Desert, Oil Shale, Benthic Foraminifera.

(II-5 Oral)

THE PALEOCENE/EOCENE THERMAL MAXIMUM (PETM) EVENT AT GABAL DUWI SECTION, EGYPT: STRATIGRAPHICAL, MINERALOGICAL AND GEOCHEMICAL INVESTIGATIONS

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This work deals with the stratigraphical, geochemical and mineralogical characterization of the stratigraphic interval spanning the Paleocene-Eocene Thermal Maximum (PETM) at Gabal Duwi section, Egypt. Similar to the Gabal Dababiya Section (the GSSP section of the PETM), the strata deposited during the PETM interval

(Dababiya Quarry Member) at Gabal Duwi section consist of three distinctive thin phosphatic shale units enriched in organic matter, overlien by a calcareous unit. The basal unit is a laminated clay layer, with its base represents the base of the Eocene series. It is enriched in Al, Ti, Zr, Ga and Hf and is slightly phosphatic. The second unit is bone-bearing, with a higher content of phosphatic constituents than the basal clay layer. The upper unit is a coprolite-rich. These three beds are characterized by distinctive enhancement and high peak anomalies in chalcophile elements (Ni, Cd, Zn, Cu, Pb, Sn and U) and organic association elements (V, Mo, and Cr). In Egypt, these beds are well-known to record the isotopic and biotic signs of the PETM. The mineral phases of these four beds have been subjected to XRD investigations. The phosphatic components of the phosphatic shales have been extracted and subjected to SEM survey. Major and trace elements were analyzed using an inductively coupled plasma-optical emission spectrometer. The data are discussed in views of the redox conditions, biogenic input, detrital input, volcanic inputs as well as productivity during the deposition of the PETM interval at Gabal Duwi section. The three units of the phosphatic shales reflect deposition in anoxic H2S-containing bottom waters. The preliminary results indicate enhancing of biological productivity during the deposition of this successions. This may be related to the upwelling and/or increased nutrient supply.

Keywords: PETM, Clay, chalcophiles, productivity; redox conditions, phosphatic components.

(II-6 Oral)

ANOMOEODUS TENEIDAENSIS N. SP. (PISCES, PYCNODONTIFORMES) FROM THE LATE CRETACEOUS OF DAKHLA OASIS, WESTERN DESERT, EGYPT

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Right prearticular element of *Anomoeodus* pycnodont extinct fish was collected from Dakhla Formation, Western Desert, Egypt, dated to Maastrichtian age. The element is described as new species *Anomoeodus teneidaensis*. The hosting layers indicated marginal marine environment. The dental shape explains the main characteristic disposition typical of the genus *Anomoeodus* teeth which are elliptical to kidney shaped. The new species is characterized by mediolaterally spaces between the teeth of the primary and secondary rows, the alveoli of the medial row teeth are more inclined than in other species of the same genus.

Kewywords: Pycnodonts, *Anomoeodus*, Western Desert, Egypt,Late Cretaceous.

(II-7 Oral)

NEW MATERIALS OF THE MOSASAURIDS REPTILES FROM THE LATE CRETACEOUS OF DAKHLA BASIN, WESTERN DESERT, EGYPT

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The mosasurid are extinct predator marine reptiles, dominated in the Late Cretaceous period. They are migrated to the coastal environment for feeding and producing. The mosasurs had a snakelike and streamlined body with large skull and small limbs which modified into paddles. The mosasaurs occupied the shallow seas of the north Africa such as Morocco and Egypt in the Late Cretaceous period. In the recent years, Few materials of the mosasaurs are recorded in the Maastrichtian basal Dakhla Formation of the Western by the New Valley Vertebrate paleontology center.The present work describes new valuable materials of the mosasaurs, which are represented by well-preserved partial skeleton from the Maastrichtian layers of the basal part of Dakhla Formation, northeast Mut. These material contain well preserved separated skull elements such as premaxilla, maxillae, dentaries, frontal and the basicarnial bones, the different elements of the limbs are represents of the skeleton. Tens of separated and

conjugated vertebrae and ribs are collected in plaster jacked as parts of the mosasaur partial skeleton. The specimen is restored in the Vertebrate paleontology center of New Valley University. Many bony fish and other fragmented mosasaur elements are found associated to the studied specimen.The mosasaur remnants are very rare recording in north Africa, therefore, the discovery of the new mosasaur materials in the Western Desert of Egypt increase the Knowledge of the types, shapes, paleoecology and distribution of the mosasur reptiles not only in Egypt but also in Africa.

(II-8 Oral)

LATE CRETACEOUS (MAASTRICHTIAN) PLESIOSAUR, MARINE REPTILE FROM THE DAKHLA FORMATION, SOUTHWESTERN DESERT OF EGYPT.

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Late cretaceous deposits of the Dakhla oasis in southwestern desert of Egypt have diversity of marine vertebrate fauna include plesiosauridea, mosaauridea, turtles and fishes. The Plesiosaurs were one of the largest predatory Mesozoic marine reptiles that invaded coastal, open shallow subtidal and offshore environments. It was recorded from the Late Triassic to the Late Cretaceous, where they went extinct by the K/T boundary event. In Africa, they were reported in South Africa, Morocco, Angola and Egypt. The previous described Egyptian plesiosaurs were very fragmentary remains unidentified to infrafamilial level from the Maastrichtian. All the materials are preserved in the New Valley Vertebrate Paleontology Centre in New Valley University where they are currently being prepared for exhibition. This skeleton had been collected from the intertidal to subtidal deposits of the lower part of the Dakhla Formation, Maastrichtian age. The specimens represent the pelvic girdle include pubis, ischium and ilium of an elasmosaur. The associated fauna includes many scattered bone fragments of Mosasaurs, shark teeth and fishbones. The discovered specimen from the Dakhla Formation is relatively equivalent in time with Zarafasaurus occeanis of Morocco.

Keywords: marine reptiles, Late Cretaceous, Dakhla formation, plesiosaur.

Poster Presentations

(II-9 Poster)

CHARACTERIZATION OF LOWEST OXYGEN ENVIRONMENTS WITHIN ANCIENT UPWELLING ENVIRONMENTS: A CASE STUDY FROM THE CAMPANIAN-MAASTRICHTIAN AT WEST-CENTRAL SINAI, EGYPT

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Benthic foraminifera are one of the most commonly used indicators to infer paleodepth. The information on depth distribution of fossil benthic foraminifera is generally obtained from normal marine environments. The Campanian-Maastrichtian of west-central Sinai was deposited within the southern Tethys upwelling belt, with sea floors beneath this system characterized by poorly ventilated sediments approaching anoxia. This study was aimed at tracking the oxygen-poor gradient using benthic foraminiferal assemblages of organic-rich carbonates that are devoid of benthic foraminifera. Quantitative data were gathered on foraminiferal faunas from Gebel Nazzazat sections. Four distinct benthic foraminiferal assemblages characterize the organic-rich carbonate facies. These assemblages are distinguished by their species richness and composition, relative abundance, and dominance patterns. The low-diversity buliminid-dominated faunas correlate with high (up to 25 wt.%) total organic carbon levels, and inferred pore water oxygen levels range from nearly anaerobic to dysaerobic (up to 0.1 ml O2/l). Nonetheless, this section has benthic assemblage's indicative of low-oxygen pore waters (<0.1 ml O2/l) beneath the upwelling belt.

Keywords: low- oxygen, Campanian-Maastrichtian, Gebel Nazzazat, Sinai, Benthic foraminiferal.

(II-10 Poster)

LARGER FORAMINIFERA RECORDS FROM EGYPT, JORDAN, AND IRAN AND THE IMPACT OF THE MID-CENOMANIAN EVENT (MCE) ON THE DISSOLUTION SUSCEPTIBILITY OF AGGLUTINATED FORAMINIFERAL

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Three sections were collected from Egypt, Jordan, and Iran to investigate the Cenomanian sediments; one surface section was measured at the Musabaa Salama region of west-central Sinai representing the Raha Formation of Egypt and one surface section from Wadi Al Hasa, western Jordan and one collected at subsurface represented the Sarvak Formation of SW Iran (Dezful embayment). There is a correlation between the four larger benthic biozones identified in these sections in the late Cenomanian. The contact between the late Cenomanian and early Turonian in Egypt, Jordan, and Iran is characterized by the appearance of the barren interval, which is considered to be global since it has been reported at the same level in other Tethyan localities. Before the end of the Cenomanian of Egypt, Jordan, and Iran, the majority of agglutinated large and small foraminifera forms disappeared and were replaced by porcelaneous milioline forms.In the Musabaa Salama region of west-central Sinai, Egypt, a significant dissolution of agglutinating foraminiferal assemblages occurred before the Mid-Cenomanian Event (MCE). A significant shift in the deposition of laminated dysoxic layers and glauconitic shales has been observed in the Nezzazatidae Biozone,

which has been suggested to reflect a general decline in bottom water oxygen levels.

Keywords: Mid-Cenomanian Event, Dissolution, Nezzazatidae, Miliolidae, Egypt, Jordan, Iran.

(II-11 Poster)

CALCAREOUS NANNOFOSSIL BIOSTRATIGRAPHY AND PALEOECOLOGY OF THE MAASTRICHTIAN – PALEOCENE SUCCESSIONS IN UPPER NILE VALLEY, EGYPT

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Maastrichtian-Paleocene stratigraphic sequences at three land sections of the upper Nile Valley from south to north (Gabal El-Borga, Gabal El Sharawna, and Gabal El Nezzi sections) were studied to establish a detailed biostratigraphic framework and reconstruct paleoecological affinities. The stratigraphic sequence was represented by the Dakhla, Kurkur, Tarawan, Garra, and Esna Formations. The present study of calcareous nannofossils has led to the identify 40 calcareous nannofossil species belonging to 30 different genera. Poor to moderate preservation of the studied calcareous nannofossils was recorded. The biostratigraphic analysis of the calcareous nannofossils was summarized as follow: CC23, CC24, CC25 (Maastrichtian) and NP2, NP3, NP4, NP5, NP6, NP7/8, NP9 (Paleocene). The NP4 Zone was divided into six zones and subzones (NTp6, NTp7A, NTp7B, NTp8A, NTp8B, and NTp8C). Absences of CC26 and NP1 biozones refers to a hiatus between the Cretaceous/Paleogene (K/Pg) interval. The Danian–Selandian boundary characterized by the appearance of

Lithoptychius ulii, L. pileatus, and L. janii, which marks the second radiation of Fasciculithus. Maastrichtian in the study area is characterized by tropical flora, which indicates low surface water fertility. Taxa from warm-water oligotrophic environments are common in the Paleocene successions of the study area.

Keywords: Calcareous nannofossil, Biostratigraphy, Paleoecology, Maastrichtian-Paleocene, Nile Valley, Egypt

(II-12 Poster)

QUANTITATIVE ANALYSIS OF THE PALEOCENE SUCCESSION OF TWO SECTIONS EXPOSED IN THE GEBEL KILABIYA, AND NAG EL QADA AREAS ALONG THE NILE VALLEY, EGYPT

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The current study is dependent on qualitative and quantitative analyses of the calcareous foraminifera of the Paleocene succession at Gebel Kilabiya, and Nag El Qada areas along the Nile Valley, Egypt. In the Paleocene sequence, two rock units; the Dakhla Formation at the base and the Tarawan Formation at the top are studied. Four zones and five subzones of planktic foraminifera are identified. Benthic foraminiferal assemblages are analyzed quantitatively to interpret the sea-level fluctuations and depositional environments in the studied sections. The benthic foraminifera can be divided into two groups, the Midway-type fauna (MF) (continental shelf) and the Velasco-type fauna (VF) (bathyal and abyssal depths). During the P1c Subzone of the Kilabiya section, the shallow water conditions (middle neritic depth 50-100m) are indicated by the dropping in planktic percentage from 45% to 24% and species diversity from 19 to 5. Danian assemblages are characterized by abundant epifaunal trochospiral species, such as

Cibicidoides farafraensis, and Gyroidinoides girardanus. This dominance of the Danian benthic foraminiferal assemblages by epifaunal or mixed epifaunal/infaunal morphogroups suggests that the food supply to the benthos was less abundant. Nevertheless, the P3a Subzone shows a gradual deepening of the depositional basin starting at the uppermost part of the Dakhla Formation and continuing to lower two-thirds of the Tarawan Formation (P4a and half of P4c). Moreover, the increased percentages of infaunal morphogroups in the P3a Subzone indicate an increase in the nutrient flux to the sea floor.

Keywords: foraminifera, Gebel Kilabiya and Nag El Qada, depositional environments, Midway-type fauna, Velasco-type fauna.

(II-13 Poter)

IMPLICATION OF THE DEPOSITIONAL AND DIAGENETIC ATTRIBUTES ON THEPETROPHYSICALPROPERTIES OF THE UPPER CRETACEOUS-LOWER PALEOGENE SEQUENCE,WADI QUEIH AREA, RED SEA, EGYPT

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Petrophysical study of the outcropped rocks is important inforecasting their characteristics and quality.Thus, the response of the petrophysical parameters to the depositional features and the diageneticprocesses is vital in understanding the behavior of these rocks under different environmentalcircumstances. The present study represents detailed petrographical and petrophysical investigations ofthe Upper Cretaceous –Lower Paleogene sediments, Wadi Queih area, Red Sea, Egypt. This wouldprovide insights into the evolutions of sediments petrophysical properties in response to the originaldepositional features and the later diagenetic processes. The petrographic investigation pinpoints thecritical factors influencing the rock formations quality, such as facies types, grain size, pore types andmineral composition. On the other hand, various laboratory tools such as Mercury porosimeter,calibrated helium gas volume expansion porosimeter, gas permeability and Sonic Viewer have beenused for

measurements of different petrophysical parameters including porosity, permeability, graindensity, formation resistivity factor, resistivity, compressional and shear velocities of the collectedsamples. The spatial variability of various petrophysical parameters have been analyzed, interpreted andcorrelated with petrographic investigations and verified for the Upper Cretaceous-lower Paleogenesedimentary sequence exposed in wadi Queih area. It has been identified the spatial variability patternsand its link to geology beside to detect potential cyclicity in the petrophysical properties in the studiedheterogeneous sequence. Variation in both syndepositional and postdepositional processes are maincauses of sequence heterogeneities.

Keywords: Petrophysical parameters, Porosity, Permeability, Formation resistivity factor, Syndepositional andpostdepositional processes, Wadi Queih, Red Sea.

(II-14 Poster)

TECTONIC EVOLUTION OF THE UPPER CRETACEOUS-LOWER PALEOGENE SUCCESSIONS AT THE DUWI MOUNTAIN RANGE, QUSIER AREA, RED SEA COAST, EGYPT: EVIDENCE FROM STRATIGRAPHIC STUDIES

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This work depends on the details field and stratigraphy (Litho-& Bio-) studies of the Pre-Rift sequences (Upper Cretaceous-Lower Paleogene) at the Duwi Mountain Range. Six stratigraphic sections are arranged in South-North Profile, Gabal Hamadat, Nasser Mine, Beida Mine, Gabal Anz, Gabal Nakheil and Wadi Sudmeen. Lithostratigraphically, the Duwi (upper most part), Dakhla, Tarawan, Esna, and Thebes (lower most part) formations make up the succession. These rock units are well distributed in the different study sections with a variation in the thickness from one section to another. Biostratigraphically, Twenty one global planktonic foraminiferal biozones were defined, five for the Late Cretaceous (Maastrichtian), eleven for the Paleocene and five for the Early Eocene. Three syn-sedimentary tectonic events were recorded, the first and second tectonic events (TE I & TE II) were regional and lie at the

Duwi/Dakhla and the Hamama/Beida rock units boundaries. The geologic age of the TE I corresponds to the Campanian/Maastrichtian (C/M) boundary, whereas, the TE II took placed within the beginning of the Danian age. The third tectonic Event (TE III) was local and took placed at the Danian-Selandian (D/S) boundary within the Beida Member at Wadi Sudmeen section. These syn-sedimentary tectonic events were related to the Syrian-Arc Event which happened within the beginning of the Late Cretaceous (Turonian) and continued until the Eocene in Egypt. The TE I was marked by the occurrence of conglomeratic phosphatic beds at the Duwi/Dakhla formational boundary at all the study sections and was documented by missing of the latest Campanian and earliest Maastrichtian planktonic foraminiferal biozones. The TE II was located at the base of the Beida Member and marked by the missing of the lower Danian planktonic foraminiferal biozones at all the study sections. The TE III was local and was documented by the absence of the upper most planktonic foraminiferal biozones of the Danian Stage at Wadi Sudmeen section.

(II-15 Poster)

STRATIGRAPHICAL AND PALEOENVIRONMENTAL INFERENCES FROM LARGE BENTHIC FORAMINIFERA FOR THE LOWER EOCENE SECTION AT DARB GAGA, BARIS OASIS, WESTERN DESERT, EGYPT

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Four large Foraminiferal species belonging to the genera Nummulites and Operculina have been newly recorded from Darb Gaga section. Darb Gaga section is composed of Upper Paleocene-Lower Eocene succession consists of two rock units; Esna Formation at the base followed upward by the lowermost part of Thebes Formation. Esna Formation is subdivided into four members arranged from base to top as follows: El Hanadi, Dababiya Quarry (marker of the P/E boundary), Darb Gaga and Abu Had. The present work concentrates on the Abu

Had Member (upper most part of Esna Fm.) and the Thebes Fm.(lower most part) Operculinacanalifera d' Archiac, 1853 and Operculinasp.have been recorded from Abu Had member while Nummulitessolitariusde la Harpe 1883 and Nummulitespartschi de la Harpe, 1880 have been recorded from Thebes Formation. The present study aims to shed more light on the biostratigraphy and paleoenvironmental conditions prevailed at the study area depending upon biometric taxonomic and systematic study of large foraminifera in integration with field, litho- and bio-stratigraphical studies of the study area. The present detailed bio stratigraphical study of Operculines and Nummulites assigned Abu Had member and the lowermost part of Thebes to be Early Eocene in age (Ypresian) where Abu Had member is SBZ9 and the lowermost part of Thebes is at the base of SBZ10 according tothe stratigraphic shallow benthic zonal scheme of Papazzoni et al. (2017).
Keywords: Large foraminifera, Biostratigraphy, Paleocene/Eocene, YpresianPaleoenvironment, Nummulites,Operculina, Darb Gaga, Egypt

III- Remote Sensing and GIS

(III-1 Oral)

APPLICATIONS OFMICROWAVE REMOTE SENSING (INSAR) AND NEO-TECTONIC DATA IN THE DETECTION OF EARTHQUAKE ACTIVITY IN THE NORTHWESTERN SIDE OF GULF OF SUEZ RIFT, EGYPT

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Ground surface deformations require constant monitoring through establishing coherent investigations from remote sensing, neo-tectonic and seismological analyses to comprehend assess rate and mechanism of surface changes through time. The Northern Galala plateau was considered seismically active due to its structural position. InSAR time series analysis of complex ascending Sentinel-1 acquisitions through persistent scatterer interferometry PSI and small baseline subset SBAS methods, produced line-of-sight displacement velocity maps suggesting ground subsidence centered across Wadi Noaz, an uplift or left-lateral strike slip movement along the Ghweiba-fault-belt northwards and ground uplifts over the relatively flat plain beyond the eastern escarpment of the plateau. The detected long-term motion was directed generally E-W while N-S movements couldn't be retrieved. Therefore, further validations by live global GPS navigation network could resolve the inaccurate velocity estimations caused by non-deformational phase noise. Stress analyses of recent fractures discovered at populated stations lying west of the Gulf-of-Suez; that hosting fractures mainly oriented NE-SW to ENE-WSW and NW-SE fractures. PBT-axes and right-dihedral approaches deduced mean stress tensor for each station, collectedly retrieving present-day active transtension stress-regime potentially driven by Gulf-of-Suez rifting. The extension creating the NW-SE fractures was directed ENE-WSW synchronized to stresses responsible for the formation of the Gulf-of-Suez main listric faults including Abu Darag that continued through the investigated areas. While an NNE-SSW-oriented extension formed

NE-SW to ENE-WSWfractures resembling the E-W en-echelon faults at the transfer zones. Seismological analysis such as focal-mechanism solutions of frequently recurring earthquakes to locate their causative structural and to evaluate their hazard. The magnitudes and the frequency increased above the traced NW-SE ancient faults throughout the plateau which implies constant reactivation by the aforementioned tectonism.Seismological analyses narrowed down tectonically active zones for further fault-kinematic analyses linked with InSAR velocity estimates to distinguish the causative faults and predict future deformation behavior.

(III -2 Oral)

ASTER AND GAMMA-RAY SPECTROMETRIC DATA INTEGRATION FOR ALTERATION MINERALMAPPING AND URANIUM EXPLORATION IN QASH AMER-EL-SELA AREA, SOUTHEASTERN DESERT, EGYPT

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The present work used the integrated remote-sensing and groundgamma-ray spectrometric data toprospect of radioactive zones at Gabal Qash Amer – El-Sela area, Southeastern Desert of Egypt. Geologicalinterpretation of ASTER image correlated by fieldstudies revealed that the study area is mainly covered byintermediate metavolocanics, granodiorites, two-mica granites, biotite granites and muscovite granites. Theserocks were injected by pegmatitic and quartz veins and cutting by acidic and basic dykes. The applied ASTER dataenabled to identify uraniferous alteration zones hosted in the granitic rocks through the use of band ratios b4/b6and b5/b4 for clay and ferrous silicate alteration. The band ratio combinations of b12/b13: b11/b12: b14/b13 asR:G:B and b4/b6:b2/b1:b4/b3 as R:G:B were very useful for discriminate the granites from the metavolcanics andmapping different phases of the granite in the study area. Using reference spectra resampled by the ASTER data oflevel 2B05(surface

reflectance), two supervised classification techniques including the spectral angle mapper (SAM) and spectral information divergence (SID) used for mappingalteration zones in the study area. Field verificationand laboratory microscopic examination of thin and polished sections were used for confirming the results. Thefinal resulted maps of the alteration mineral zones involve kaolinite, montmorillonite, illite, chlorite, hematite,epidote and quartz. Ground gamma-ray spectrometric survey data were applied to check the surface distribution ofradioactivity, which may ascertain its compatibility with surface structures, and delineate the suitable locations forprobable valuable mineralization. The study revealed the existence of uranium mineralization in alteration zonesassociated with granites, along ENE-WSW trending shear zones as well as other isolated alteration zones. Threeuranium-bearing alteration zones hosted in granites were detected. These zones are characterized by ferrugination,silicification, grizenization and kaolinitization. The most promising alteration zones occur at the northeastern partof El-Sela shear zone. Another promising uranium anomaly is located to the west of the main shear zone, as well asthird anomaly, located at the southeastern part of Gabal Qash Amer. These zones and individual anomalies arecharacterized by very high radioactive anomalies (up to 3700 ppm eU). Other mineralized sites were detected inthe south-central part of Gabal El-Sela as well as in the eastern part of the study area. The final result of this studyconfirms that El-Sela granite can be considered as one of the most promising granite outcrops in Egypt, regardingits U-fertility.

Keywords: Mineralogy, Spectrometry, Remote Sensing, Alterations, El-Sela area, Egypt.

(III-3 Oral)

LITHOLOGICAL MAPPING OF THE PRECAMBRIAN ROCKS USING ASTER DATA IN EAST WADI ZEIDUN AREA, CENTRAL EASTERN DESERT OF EGYPT

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Remote sensing has seen significant advancements in recent years, particularly in multispectral imaging. The study area, located south of the Qift-Quseir highway on the western edge of the Central Eastern Desert (CED), is characterized by Precambrian foundation rocks. These rocks include shared and massive ultramafic rocks, metagabbros, metavolcanics, volcanoclastic metasediments, arc assemblage, gneissose granite, and older granite, which are unconformably overlain by sediments of the molasse basin.This paper explores the effectiveness of remote sensing (ASTER data) techniques such as False Color Composites (FCC), Band Ratio (BR), Principal Components Analysis (PCA), and Decorrelation Stretch (DC) in conjunction with fieldwork data and previously published geologic maps, in mapping the Precambrian rocks in the East Wadi Zeidun area.The applied ASTER data enabled to map Arc assemblage rocks using decorrelation stretch of FCC 7:3:1 in RGB. The band ratio combinations of b4/b7: b3/b4 : b2/b1 in RGB was very useful for discriminating the granites from the different rocks in the study area. Field verification and laboratory microscopic examination of thin and polished sections were used for confirming the results.

Keywords: Remote Sensing, ASTER, Precambrian rocks, Wadi Zeidun, False Color Composites, Decorrelation Stretch, Principal Components Analysis.

(III –4 Oral)

CONTRIBUTION OF REMOTE SENSING, GEOCHEMICAL AND FIELD INVESTIGATED DATA FOR MAPPING AND ASSESSING ROCK SALT AS A RAW MATERIAL FOR THE SALT INDUSTRY: A CASE STUDY OF SIWA AREA, WESTERN DESERT, EGYPT

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Siwa Oasis is one of several depressions scattered throughout the western desert of Egypt and is among the largest producers of rock salt in the country. This paper discusses the ability of remotely sensed

(ASTER and OLI) with field observation and geochemical data to map and assess rock salt in the Siwa Oasis area. Siwa Oasis is a morphotectonic depression and is intensively characterized by salt mineralization. To identify and map the salt rock in the study area, salinity index, band combination and band ratio combination were used. A Supervised classification technique was successfully also used for assessing the salt areas in the Siwa area based on field observation and remotely sensed data. A new OLI band ratio combination b6/b7:b6/b5:b4/b2 as R:G:B is applied successfully for mapping salt rock as a red color in the study area. Geochemical analysis of rock salt samples used to assess the quality of rock salt as a raw material for the salt industry. The results show that remote sensing data can be effectively used for mapping salt rock as well as the GIS technique can be used to determine the area of the rock salt and calculate the reserve assessment.

Keywords: Rock salt, Remote sensing, GIS, Supervised classification, Siwa Oasis.

(III –5 Oral)

MAPPING ALTERATION ZONES INEL-MISSIKAT–EL-ERIDIYA GRANITES, CENTRAL EASTERN DESERT, EGYPT USING ASTER, GEOPHYSICAL, AND REFLECTANCE SPECTROMETRIC DATA

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Satellite remote sensing analysis is widely used for geological mapping in arid regions and their abilities increase with the advanced satellite missions of higher spatial, spectral, radiometric and temporal resolutions. In this work, Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) imagery along with air-borne gamma-ray spectrometry and reflectance spectrometric measurements were used for studying El-Missikat – El-Eridiya granites and their associated alteration and/or mineralization zones. Geologic fieldwork revealed that the basement complex of the study area is composed of metavolcanics, older granitoids, younger gabbros, monzogranites,

syenogranites, and Nubian sandstones; these rock units are more or less cut by a number of felsic and mafic dikes. Airborne gamma-ray spectrometry data showed that syenogranites (especially in the northern parts of G. El-Missikat and the southern parts of G. El-Eridiya) have the highest radioactivity in the study area. Petrographic investigations and reflectance spectroscopy on rock slabs from the syenogranites revealed the mineralogical composition and reflected the ability of reflectance spectroscopy in detecting secondary minerals like clay minerals and iron oxides, especially in visible near-infrared (VNIR) and short-wave infrared (SWIR) spectrometric regions. ASTER imagery processing techniques successfully in mapping both rock units and alteration endmembers using spectrometric mapping methods like false colour composites (FCC), band ratio codes (BRC), feature-oriented principal component selection (FPCS), spectral angle mapper (SAM), mixture-tuned matched filtering (MTMF), spectral information divergence (SID). The SAM method is considered to be the most accurate when realized by selected ground control points. Other lithological and mineralogical indices using ASTER-TIR data like quartz index (QI) and silica percentage were used successfully to map the relative enrichment of silica within syenogranites as the radioactive mineralizations usually associated with red and black jasperoid veinlets. Also, a good relation between radioactive potentialities and alteration degrees (especially silicification) was recorded; this is besides the lineament density which represents the pathways of the mineralizing solutions. The results demonstrated the value of ASTER data for geological mapping especially if the processing has been based on a detailed knowledge of the rock mineral assemblages.
Keywords: ASTER, Remote sensing, El-Missikat, El-Eridiya, Eastern Desert.

(III – 6 Oral)

REMOTE SENSING AND GIS APPLICATIONS FOR HEALTH RISK ASSESSMENT OF HEAVY METALS CONTAMINATION AND THEIR SPATIAL DISTRBIUTION IN QUATERNARY GROUNDWATER AQUIFER, SOHAG GOVERNORATE, EGYPT

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Heavy metal hydrochemical elements (Cu, Zn, Cd, Pb, Co, Mn, NO_3, NH4, PO_4, Na, K, Ca, Mg, Cl, HCO_3 and SO_4) concentrations in forty groundwater samples from West Sohag, Egypt, were examinedto provide information on the accessibility of heavy metals in Quaternary aquifer. Evaluating groundwater quality is vital for ensuring the sustainability of ecosystems. Furthermore, multivariate statistical analyses, pollution indices (heavy metal pollution index (HPI), metal index (MI), degree of contamination (C_d), ecological risk index (ERI), and pollution index (PI)), and human health risk assessment (HHRA) of the heavy metals from the investigated samples were used to clarify their sources and assess their environmental and health impact. Various remote sensing and GIS techniques were applied to detect the spatial distribution of the polluted groundwater through detecting the polluted surface areas. The Landsat8 data of the study area were used to delineate the effect of uncontrolled wastewater activities and landfills around El-Dir village, west of Sohag governorate. The principal components analysis (PCA) with band combination (725 RGB) and minimum noise fraction (MNF) with band combination (726) were found very successful in mapping the polluted parts in the study area. The geochemical analysis results exposed significant differences in heavy metal concentrations in the study area, characterized by intense wastewater activities and uncontrolled landfills. Pollution indices presented medium to high water pollution levels, with HPI values varying from 20.23 to 128.60, MI values from 3.34 to 12.17, and Cd values from 2.90 to 11.73. Ecological risk shows high values across all samples. Totally, these heavy metals were found to be the main components contributing to the potential health risks posed by carcinogenic effects for local inhabitants. The

remote sensing techniques coupled with geochemical analysis were successful in detecting the spatial distribution of the hazardous effects of the uncontrolled wastewater disposable sites.

KeyWords: Remote sensing, GIS applications, Heavy metals, Quaternary aquifer.

(III –7 Oral)

COSEISMIC DEFORMATION ANDFAULT MODELLING OF THE MW 6.8 AL-HAOUZ, MOROCCO EARTHQUAKE BASED ON INSAR DATA

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On September 8, 2023, an earthquake of 6.8 Mw hit the region of Al-Haouz within Morocco's Atlas Mountains. Based on local reports, this event resulted in over 3,000 fatalities and extensive infrastructural damage, highlighting the seismic hazards in the slowly deforming mountain belt region. Despite its severe effect, Al-Haouz earthquake received limited scientific attention. Challenges such as the absence of surface rupture and ambiguous focal mechanism solutions have hindered the understanding of the kinematic behavior of fault rupture related to this event. In this work, we utilize Differential Interferometry (D-InSAR) enriched by a unique seismic aftershock dataset from the local seismic network to understand the fault mechanics of the earthquake. The D-InSAR was applied to the ascending and descending SAR scenes collected from the Sentinel-1 SAR mission. Relying on the D-InSAR results, we modeled both fault solutions: a steep northward dipping and a gentle southward dipping. The coseismic deformation results suggest that Al-Haouz event was caused by reverse thrust faulting, with a slight NE-SW strike-slip motion along the rupture zone. Both fault model scenarios fit the data well, with a slight advantage in the SWW dipping scenario aligning

with observed aftershock distributions. The preferred fault model has a strike of 128°, a dip of 31.5°, and a rake of 130°, exhibiting a maximum slip of 2.2 m at depths of 20-25 km.

Keywords: Al-Haouz Earthquake, Co-Seismic Deformation, InSAR, Fault modelling.

(III –8 Oral)

INTGRATED REMOTE SENSING ANDGISTECHNIQUES FOR DRAINAGE BASINS ANALYSES AND GEOMORPHOLOGICAL STUDY OF THE EASTERN PART OF SOHAG GOVERNORATE, EGYPT

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The eastern part of Sohag Governorate district shows many of geomorphic features and drainage basins. varies in their area, size, and characters. The importance of the study area represented by that it is occupied about 9428 Km2 representing about (85.5%) of the total area of Sohag Governorate,and the presence of many residential, agricultural, and industrial areas and development projects on it. In addition to its ability to establish many new sustainable development projects to preserve Soha. Any flooding or geomorphic hazardous will affects on many villages. Cites, agricultural and industrial areas, and the very important Sohag-Red Sea road (regional Saied-Red Sea asphaltic Road). Geomorphic features which represented by flood plain and agricultural land area, terraces, & hilly area, pediment, scarps, and Maaza Plateau, as well as many of dry Wadies and their fans were detected in the study area. These features belong to two main geomorphic units namely, the Nile Valley zone, and the Maaza Plateau Zone, which followed to the east by Wadi Qena zone. Based on landsat TM & ETM digitally enhanced images, topographic maps, digital elevation models (DEMs), and GIS modeling; several drainage basins were detected, and their maps were produced and analyzed in the study area. All these basins belong to the Nile Valley mega-basin, and could be classified into two main categories namely: (1) East Sohag drainage basins, which include 11 basins running westwards toward the Nile valley, and represented from north to south by: W.

Sflaq, W. Bir El-Ain, W. Abu Gelbana, W. Deir El-Hadid, W. El-Nazeiza, W. El-Keiman, W. El-Ahaywa, W. Talat Ammar, W. Qasab, W. Abu Nafokh and W. El-Mataheir.(2) Western side of Wadi Qena drainage basin, which drained its water southwards toward the Nile valley north of Qena city. These include 4sub-basins (tributaries), namely; W.Um Laseifa, W. Gordy, W. Um Glue, and W. Shwahen.

The drainage systems in the study area are of external and internal types. Most of them are well developed, highly integrated and mainly affected by the lithological units and structural features in the study area. The dendritic drainage network types are the most dominate in the study area. Structural pattern was recognized and reveals that trends NE-SW, ENE-WSW, and NW-SE, represent the most structural trends, which have possible relations to surface drainage systems. Integrated Remote sensing (RS) and (GIS) were used for calculating the morphometric parameters for studying drainage basins. Results reveals that, the bifurcation ratio varies from 2 to 5.25, the elongation ratio ranges between 0.4 and 0.9, the circular ratio ranges between 0.2 and 0.8, the stream frequency varies from 0.05 to 0.8 and the drainage densities range between 0.3 and 1.49. Based on GIS modeling, Flash hazard degree ware assessed according to the relation between both drainage density and frequency vs. Bifurcation ratio for each basin. The conducted hazard maps reveal that W. Qasab, and W. Abu Nafokh represents the most hazardous basins in the western sector of study area. Some other wadies such as : W. Sflaq, W. Bir El-Ain, W. Abu Gelbana, represents some hazardous degree. On the other side, in the eastern sector of study area (western flanks of Wadi Qena) W.Um Laseifa, W. Gordy represents the most hazardous sub-basins which causes some ruptures of Sohag - Red Sea asphaltic road.

Keywords: Sohag Governorate - Remote sensing - GIS modeling - Geomorphic features - drainage basins

IV- Environmental Geology ,Hazards and Geotourism

(IV-1 Oral)

RADIOACTIVITY OF 226 Ra, 232 Th, 40 K IN COMMERCIAL MARBLE- GRANITE FROM THE BIGGEST LOCAL MARBLE WORKSHOPS, TANTA CITY, EGYPT: ASSESSMENT OF RADIOLOGICAL HAZARDS AND RECOMMENDATIONS

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In order to assess the radiological hazards to human health in a living environment, the level of natural radionuclides (226Ra, 232Th and 40K) present in various building materials available in Egypt (Tanta city) as an example.Twenty various marble-granite samples were collected from the biggest workshops of preparing marble for house uses (marble kitchens and floors) as well as decoration of governmental buildings. On the basis of petrographic inspection, the mineral constituents of the samples defines granodiorite, monzo-granite, syenogranite and alkali feldspar granite. With respect on the level of natural radionuclides (238 U, 226 Ra, 232Th and 40K) present in various marble granites (Tanta city) were measured using Gamma-ray spectrometry (Na I detector) in the Nuclear Materials Authority, Egypt. Regarding, the activity concentration of 238 U 226 Ra, 232 Th and 40 K range between 62.00 to 334.80 Bq.kg with mean value 176.08, 4.44 –155.40 Bq/kg with mean value 43.85, 2.42-173.72 Bq/kg with mean value 56.96. and 165.89 to 2065.80 Bq/kg with mean value.1148,71 respectively. The radiological hazard parameters radium equivalent activity, gamma index, absorbed dose rate and the annual exposure rate of all studied samples are more or less than world average limits. Aside from the obtained data, the highest values of activity concentrations of 238U, 226Ra and 40K were recorded in the commercial reddish marble granites (alkali feldspar granute).. Consequently, the results are compared with the published data of

other countries and with the world average limits. Fairly, about half samples of the study were higher than the acceptable values, indicating not satisfied for building materials uses . The measurements help in the development of standard using and guidelines for the granite uses and management of building and decoration materials in our houses and governmental issues.

Keywords: Natural Radioactivity, Gamma spectroscopy (NaI detector), Commercial Marble-.granite, Radiation assessment. Tanta City.

(IV-2 Oral (Online))

ASSESSMENT OF SYNTHETIC ZEOLITES FROM KAOLIN AND BENTONITE CLAYS FOR WASTE WATER AND FUEL GASES TREATMENT

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The present work evaluated the synthesis, geochemical and mineralogical characterization as well as some industrial implementation of zeolites synthesized from some kaolin and bentonite resources in in Egypt. Several methods were used to synthesize zeolites, from kaolin samples and from bentonite samples to obtain zeolitic products with high purity and competitive price. In terms of mineralogy and geochemistry the characterization of the synthesized zeolites was conducted by using various methodologies including X-ray Fluorescence spectrometer (XRF), X-ray diffraction (XRD), scanning electron microscopy (SEM), cation exchange capacity (CEC), and have been examined by thermo-analytical methods (TGA and DTA). Based on the studied characterization of zeolites synthesized from bentonite and kaolin, along with comparing these zeolites to the ideal zeolites used in the following industries to determine which of the synthesized zeolites can be used as adsorbents of H2S to purify wastewater streams and fuel gases, which can be used to remove various ion like Co2+, Sr2+and Cs+ from the mixture of

organic and suspended solids aqueous solutions, also which can be used in industry as commercial catalysts for emission control of the nitrogen oxides (NOx) from various diesel engines in vehicles.

Keywords: Saini kaolin, North Egypt bentonite, Zeolites, synthesized, industrial assessment, water treatment.

(IV -3 Oral)

ADVANCING AQUIFER MONITORING: TDEM'S APPLICATION IN SEAWATER INTRUSION DETECTION WITHIN HETEROGENEOUS COASTAL AQUIFERS OF THE NILE DELTA

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Increasing population rates pose significant stresses on water resources, intensifying the need forsecondary water sources and more conscious consumption of current supplies. The Nile Delta coastalaquifer is increasingly threatened by seawater intrusion due to climate change and over-extraction. This exacerbates land salinization, infrastructure corrosion and stresses the local economy. Effectivemanagement and pattern recognition of saline and freshwater within the Delta aquifer are crucial tomitigating these threats and guaranteeing water susceptibility. The national groundwater qualitymonitoring network, established by the Research Institute for Groundwater, provides a vision for thegroundwater status on national and regional levels. However, with the Delta aquifer's complexity, more measurements and monitoring are always required. This study aims to explore the efficiencyof the Time Domain Electromagnetic (TDEM) method in delineating seawater intrusion within coastal aquifers. The time domain electromagnetic method was used to collect data along 50km. Thestations were selected perpendicular to the

shoreline towards Mansoura city to guarantee salinitygradient is obvious in the data. Appropriate data processing and interpretation provides significantinsight into the salt-fresh water interface. Integrating monitoring well data allowed for validation andcalibration of the geophysical model to ensure better results. TDEM data closely matched well data,showing seawater intrusion extending 40 km inland. Intrusion depth varied between 10 and 20 meters, with a further decline to 80 meters beyond the 40 km mark. This confirms TDEM'seffectiveness in mapping the salt-fresh water interface in the Nile Delta aquifer. This researchpresents TDEM as a viable and cost-effective alternative for tracking changes in aquifer parameters,potentially minimizing the need for extensive drilled monitoring well networks. This approach couldbe applied to other coastal aquifers facing similar challenges, ultimately improving watermanagement practices on a larger scale.

Keywords: Time Domain Electromagnetic (TDEM), Seawater Intrusion, Coastal Aquifers,Environmental Monitoring, Water Resource Management.

(IV -4 Oral)

PARAGENETIC ASSOCIATIONS AND CONTROLLING FACTORS OF HEAVY METALS ACCUMULATION IN SEDIMENTS ACROSS VARIED URBAN SETTINGS: A STATISTICAL REVIEW

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Urban environments act as dynamic hubs for the release and dispersion of heavy metals (HMs), driven by intensive anthropogenic activities, which exacerbate contamination, and bioaccumulation in ecosystems, and pose human health risks. For example, vehicular exhaust emissions are major contributors to elevated concentrations of Pb, Cu, and Zn in road dust, while Hg contamination is prevalent near healthcare facilities due to improper disposal of biomedical waste. Automobile repair workshops are also recognized as hotspots for Ni pollution, primarily from motor oils. Despite numerous studies investigating urban HM contamination, there remains a lack of studies that integrate information collected across diverse urban environmental mediums (e.g., road dust, roadside soils, runoff sediments, and surface waters) to identify overarching patterns of HM enrichment degrees linked to specific urban activities. Accordingly, this review systematically synthesizes geochemical data from a wide range of previous studies conducted across diverse urban settings, including residential areas, industrial zones, urban slums and informal settlements, and peri-urban areas. To uncover spatial patterns, potential sources, and inter-element relationships of HMs specific to each urban context and activity, we employ advanced multivariate statistical methods. Principal Component Analysis (PCA), Cluster Analysis (CA), and Factor Analysis (FA) simplify data complexity by identifying key components, classifying samples into distinct clusters, and uncovering underlying variablesto reveal contamination patterns, prevailing pollution sources, and the factors influencing HM distribution in urban environments. The analysis also incorporates data on physicochemical properties, such as pH and total organic carbon (TOC), which are essential factors influencing the mobility, bioavailability, and persistence of HMs. Through this comprehensive analytical approach, the review offers a framework for understanding the driving forces shaping the geochemical characteristics of urban settings and provides significant insights into the most polluting urban activities and their distinctive HM signatures, guiding effective remediation strategies.
Keywords: Source apportionment, Multivariate statistical analysis, Metals mobility, Geochemical dispersion

(IV – 5 Oral)

GEOCHEMICAL PERSPECTIVES ON URBAN ENVIRONMENTAL STRESSORS IN CAIRO, EGYPT: A REPRESENTATIVE REVIEW OF INEFFICIENT URBAN PLANNING AND CLIMATE CHANGE IMPACTS ON AFRICAN MEGACITIES

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This review provides an integrative geochemical insight into urban environmental stressors within the rapidly expanding megacity of Cairo, Egypt, positioning it as a representative case of African megacities that face the dual challenges of inefficient urban planning and intensifying climate change impacts. It systematically examines three primary categories of stressors-pollution (e.g., industrial effluents, agricultural runoff, untreated sewage, vehicular traffic, and open burning of waste), climate and temperature-related processes (e.g., Urban Heat Island Effect), and land use and urban development (e.g., urban sprawl and loss of green spaces)-while framing these within Cairo's specific climatic dynamics (e.g., extreme weather patterns), topographical features (urban landscape), geological settings, hydrological systems, and socio-demographic trends. Moreover, it explores how the city's characteristics, combined with anthropogenic influences, impact land use practices and environmental stability, complicating pollution and waste management. Furthermore, the study details how Cairo's underlying lithostratigraphy and soil compositions influence pollutant mobility and urban development capacity. Demographic pressures from rapid population growth and urban sprawl are addressed to highlight their cumulative impact on environmental degradation and resource scarcity. Accordingly, data

from recent studies are synthesized to propose evidence-based strategies, including sustainable urban planning, effective pollution control, advanced water management, accelerated renewable energy adoption, climate resilience initiatives, and public engagement. Notably, this review provides a framework applicable to other rapidly growing African urban cities, offering strategies to support the enhancement of quality of life.

Keywords: Urban pollution, Urban Heat Island Effect, Geochemical signatures, Traffic emissions, Legacy environmental issues

(IV-6 Oral)

GEOCHEMICAL DYNAMICS AND ENVIRONMENTAL IMPLICATIONS OF AGING INFRASTRUCTURE: STRATEGIC INSIGHTS FOR CLIMATE RESILIENCE AND SUSTAINABLE URBAN PLANNING IN DEVELOPING AFRICAN CITIES

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Aging infrastructure of urban metropolises in developing countries presents a complex environmental challenge. Rapid urbanization and climate-induced stressors undermine the structural integrity of essential urban components, including buildings, paved roadways, energy grids, transportation networks, and water supply systems. The deterioration of these infrastructures not only reflects physical and functional decline but also involves increasing economic, environmental, and social costs related to their maintenance and substitution. Key factors such as environmental conditions (e.g., chemical and physical attacks, urban-induced weathering, and pollutant interactions), material degradation (e.g., biodeterioration), inadequate maintenance, and passage of time (design lifespan exceeded) are considered the primary accelerants of infrastructure

degradation. The geochemical and mineralogical transformations reveal mechanisms like oxidation-reduction, hydrolysis, and leaching that compromise structural stability and release various contaminants (e.g., heavy metals and PAHs), thereby altering urban geochemical cycles and impacting soil and water quality. To effectively monitor and assess aging infrastructure, geochemical indicators, such as alteration indices (e.g., carbonation depth, sedimentary organic matter, chloride ingress, sulphate attack, pH Levels, Total Dissolved Solids (TDS), corrosion products, and heavy metal concentrations), are valuable methods. This review, therefore, discusses the geochemical processes driving infrastructure aging, highlighting the impacts of urbanization, environmental pollutants, and climate variability and emphasizing the importance of integrating geochemical techniques into urban planning to mitigate degradation and extend the lifespan of infrastructure. It further recommends effective adaptation measures, such as the criteria of selecting durable materials and the adoption of targeted environmental management practices. Additionally, it focuses on the challenges and limitations of conducting urban geochemistry studies in developing African megacities, such as limited analytical resources and socio-economic constraints to support sustainable urban development strategies that balance urban expansion with the preservation of environmental and infrastructural integrity in rapidly growing cities.

Keywords: Urban geochemical processes, Infrastructure degradation, Urban planning, Environmental pollutants

(IV -7 Oral)

INTERSTRATAL DISSOLUTION ACTIVITIES OF EVAPORITE DEPOSITS ALONG THE EASTERN PORTION OF AR-RIYADH CITY, SAUDI ARABIA

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Interstratal karst refers to dissolution acting on a soluble formation (high-solubility evaporite) overlain by caprocks (lower-solubility carbonate formations). Dissolution of evaporites, because of their

frequent lack of internal permeability, often occurs through the lateral and vertical migration of dissolution fronts. The edges in contact with undersaturated groundwater flow retreat inwards, and the evaporitic body shrinks like a melting block of ice. The complete or partial dissolution of the evaporites leaves behind: i) residues consisting of the insoluble (e.g., clays, marls) or less soluble (e.g., anhydrite, gypsum) components of the formation and ii) solution-collapse breccias related to the fragmentation and settling of overlying and interbedded strata. Interstratal dissolution by migrating solution fronts involves a reduction in the thickness of the stratigraphic succession and the subsidence of the overlying rocks and the ground surface. With sufficient time and hydrogeological and hydrochemical conditions, evaporite formations eventually vanish by dissolution. The present study was limited to investigating the eastern portion of Ar-Riyadh. The investigations were carried out with the help of geological maps, remote sensing images, and detailed field investigations. These investigations revealed that interstratal dissolution is a predominant action in the area, associated with hypogene actions (upward movement of groundwater), causing the dissolution of the Hith anhydrite Formation and collapsing the Sulaiy Formation as a breccia zone. In addition to that, nowadays, these interstratal dissolutions are initiated due to anthropogenic activities (dumping water in artificial depressions on the surface) and natural processes (intensive rainstorms). Different karstic features related to intrastriatal dissolution were mapped in the study area, including elongated canyons (pseudo horst and graben), active sinkholes, dome and basin structures, monoclinal tilting, slope stability problems, and front dissolution activities.

Keywords: Interstratal dissolution, Human-induced sinkhole, SA

(IV -8 Oral)

FROM ANCIENT TO RECENT FLOODS, ADVANCEMENTS IN FLOOD HAZARD MANAGEMENT IN MAKKAH CITY, SAUDI ARABIA

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Numerous cities in Saudi Arabia are frequently susceptible to the dangers connected with floods because of intense rainstorms. This vulnerability directly results from recent climatic changes that have influenced the country. Therefore, it is necessary to help decision-makers understand the dangers posed by weather hazards and the unchecked growth of urbanization. This study aims to locate and map the flood zones in Makkah City to lessen the susceptibility of those areas and incorporate those flood zones into the tactics used to prevent and combat the possibilities of flooding. The previous database indicates that Makkah City has seen more than 120 flood episodes over the past 14 decades. Approximately twenty percent of these floods were severe, resulting in significant human life and property losses. These floods cannot be erased from the collective memory of the people who live in the city. By combining satellite imagery and radar DEM, topographic and geological maps, rainfall records, and available statistical data, machine learning algorithms could map the flood zones most prone to flooding. This was made possible by the multisource and diachronic data as well as the approach that was utilized. This has enabled planners and decision-makers to acquire the tools necessary to manage the ever-changing urban space effectively and adequately.
Keywords: Natural hazards, floods, multisource data, urban extension, Makkah, Saudi Arabia

(IV-9 Oral)

ASSESSING THE IMPACT OF WATER LEVEL FLUCTUATIONS ON PHILAE ISLAND'S STABILITY AND SEISMIC VULNERABILITY USING GPS AND HVSR TECHNIQUES

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Philae Island in Egypt, adorned with the Philae Temple, is facing stability concerns due to rising water levels from the Aswan High Dam. The current study aims to use GPS to assess the elevation changes on Philae Island relative to water level fluctuations and microtremor measurements to evaluate the seismic vulnerability of temple buildings using the Horizontal to Vertical Spectral Ratio (HVSR) technique. GPS data were collected from three fixed points (FILA, UNIV, and EUNV), with one station located on the temple itself and the others in the surrounding area. Sixteen additional stations were selected to measure ambient noise around the temple. The GPS measurements showed an inverse relationship between the elevation of the fixed point on Philae Island (FILA point) and water levels between the High Dam and Old Dam. This effect exhibited a time delay, indicating the island's gradual response to water load variations. Seasonal fluctuations and rapid water level changes from dam operations had a significant impact on the island's elevation. The zonation map results indicated fundamental frequency (F0) values ranging from 0.92 to 1.22 Hz and horizontal to vertical ratio (H/V) peak amplitude (A0) values ranging from 2 to 13.5, consistent with the F0 outcomes. The Seismic Vulnerability Index (Kg) findings remained consistent when considering the effects of the amplification factor. The study's findings suggest that it can be utilized to develop management and conservation strategies to protect the Philae Temple from potential damage. It underscores the importance of continuous monitoring and recommends integrating GPS data with precise leveling and satellite imagery for a more comprehensive understanding.
Keywords: Philae Temples, GPS, Horizontal to Vertical Spectral Ratio (HVSR), Microtremor measurements, Vulnerability index.

(I-10 Oral)

THE ESNA SHALE AS A NEW SOURCE FOR MODERN AND ARCHAEOLOGICAL POTTERY IN EGYPT

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The Esna Shale as a raw material source for the modern and archaeological pottery industry in Egypt is not referenced in the literature. This study was aimed to qualify and quantify in detail the components of this shale in order to maximize its benefits economically and specifically industrially. The Esna Shale Formation in the west bank of the Nile Valley, Qena, Egypt has similar lithological characteristics. The petrographic, mineralogic, geochemical, and geotechnical characteristics were determined using several techniques including, microscopic, IR spectra, XRD, and XRF analyses. The Esna Shale Formation is texturally classified as silt and clayey silt. The bulk mineralogy of these shales shows that they are mainly of phyllosilicates, calcite, feldspars, and quartz. Their clay fractions consist entirely of poorly crystalline dioctahedral smectite with a fully turbostratic stacking mode (63%), I/S mixed layer (18%), kaolinite with lower crystal degree (13 %), and well- crystallized illite (6%). The general bulk chemical compositions of these shales differ significantly compared with the published average shale compositions. According to the particle-size distribution displayed on a Winkler chart, nearly all the samples are unsuitable for making ceramic products. The bulk mineralogy of this shale reveals that nearly all fall in the category of Cotto Toscano (porous products according to the classification of the Italian tile industry. Due to their high smectite levels, most samples, based on clay mineralogy, lie outside the theoretical composition field for bricks, whereas their chemical put them in the category of white stonewares.

Keywords: Esna Shale, XRD analysis, IR Spectra, Clay minerals, Quartz, Calcite.

(I-11 Oral)

THE WESTERN DESERT: A GEOTOURISM STRATEGY PLAN FOR ASPIRING GEOPARKS

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The Western Desert in Egypt presents a unique opportunity for sustainable tourism by combining geological and paleontological scientific research with cultural immersion. The region is renowned for its tangible and intangible heritage, mostly displaying its extensive desert landscapes, varied geological structures, paleontological quarries, and outstanding cultural heritage. The roadmap seeks to take advantage of the Western Desert's potential geosits for potential geoparks and to sustain equilibrium between economic development and safeguarding of its fragile ecosystems and Indigenous traditions. The approach focuses on the documentation, evaluation, and promotion of significant geosites, the development of a sustainable geotourism roadmap, and the active involvement of local communities. This enables tourists to actively participate in the area's abundant historical and archeological heritage. This initiative will promote and support responsible tourism practices, therefore guaranteeing long-lasting advantages for both the environment and the local communities in the Western Desert. The goal of developing an international roadmap is to establish the region as a prominent global attraction for those passionate about geotourism.

Keywords: Geotourism, Tangible heritage, Intangible heritage, Western Desert.

(IV-12 Oral)

THE EGYPTIAN NATIONAL STRONG MOTION NETWORK AFTER 15YEARS

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The main goals of establishing a National strong motion networkcouldbe summarized as having a quick report of earthquakeintensity, evaluation ofearthquake damage, earthquake early warning, emergency response control afterearthquakes, site response, characteristics of the sediments, and helping thearchitecture's diagnosis of the building codes and earthquake-resistant design. In order to approach these goals correctly and in time, quality control andevaluation should be implemented on a strong-motion network to get highqualitydata for engineering applications. The main aspects of quality controlfor the Egyptian National strong motion Network (ENSM) were applied.(ENSM) was established in free urban areas, and the Egyptian universitiescovered most of Northern Egypt and Southern Sinai with more advanced technicalcommunication and receiver systems. This network was established andoperated by the General Seismological Laboratory, Seismology Department inthe National Institute of Astronomy and Geophysics (NRIAG). The future planis to update this network to cover the whole of Egypt. This paper shows thedeveloping steps of controlling the quality of (ENSM) system with differentaspects and ways, starting with developing the ways of constructing andspreading National strong motion stations using noise test sites. Beside enhancingthe quality of data acquisition from triggered transmission mode toreal-time transmission mode. As a result of enhancing the quality of the(ENSM) system, the ability to record more earthquakes, whether local or regional,has improved. A list of significant numbers of events is obtained andutilized for studying the site response in many areas of the Nile Delta andsouthern Sinai. It is crucial to analyze and assess the quality of the strongmotionobservation system since

National strong motion data is the primarymethod used to comprehend the features of earthquake motion andseismicreaction.

Poster Presentations

(IV-13 Poster)

CURRENT MOTION AND SHORT–TERM DEFORMATIONS IN THE NILE DELTA AREA FROM GNSS DATA

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Sinking of the Nile Delta region of Egypt is one of urgent issues to be investigated due to its vital importance to numerous perspectives such as economic, environmental and social impact on the whole Egyptian territory. Nile Delta is the oldest delta in the Mediterranean Basin, situated in the middle of its eastern geodynamics progress. It represents a major strategic area for Egypt. Beside the Mediterranean Sea level rise, the Nile Delta may suffer from subsidence due to the reduction of the sediments supply after building the Aswan High Dam. In addition, oil and gas production plays an effective role in the Delta deformation. Nowadays, monitoring the Delta's crustal deformation is regarded as one of the most essential interests for research studies due to the strategic importance of the huge landform created by the Nile. This research aims to determine and interpret the crustal deformations for the Nile Delta either locally or regionally using GNSS data during the period 2014-2023. For this purpose, data from 10 GNSS permanent stations were analyzed. Using precise and accurate geodetic data, such as the Global Navigation Satellite System has been applied in the current work to evaluate the rates of crustal movements, including regional and local velocities, as well as the assessment of deformation characteristics, such as rates of dilatation, maximum shear and principal strain component analysis. Bernese 5.2 software was used to process data between 2014 and 2023 for ten Global Navigation Satellite System (GNSS) permanent sites. The result shows that the Delta has different geodynamic behaviors related to its structural properties as well as suffering from heterogeneous crustal

movement. The northeastern side of the Nile Delta may suffer from sinking under the Mediterranean Sea more than the northwestern side because of its high subsidence rates, Crustal movements and deformation parameters Show; VN average values: 0.75 mm/yr, VE average values: 0.81 mm/yr for local velocities and average values -6.60 mm/yr for vertical subsidence. Also, the area is characterized by medium shear strain, indicating that the risk of an earthquake is low.

Keywords: Nile Delta; GNSS; Deformation parameters; Bernese 5.2 software; Geodynamic.

(IV-14 Poster)

FLASH FLOOD ANALYSIS AND RISK ASSESSMENT OF ARID AND SEMI-ARID BASINS: AN EXAMPLE OF NORTHERN GALALA PLATEAU, EGYPT

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Despite persistent droughts in arid and semi-arid regions, destructive floods also strike those places due to a progressive climate changes. Six drainage basins that dissecting arid-semi-arid North Galala Plateau are selected to study the effects of the geological and geomorphological conditions on the morphometric parameters, runoff hydrologic-hydraulic results, and flood risk mapping and management. The lithological composition, slope, and affecting tectonic structures controlled the morphometric parameters. A predominate barren land and surficial rock mass weathering are interacted to promote 34.7% to 62.9% of rainfall amounts that transmitted into runoff amounts. Very low to very high discharge quantities, flooding inundation depth (up to 2 m) and velocity (less than 0.5 m/s) are the results of the basin shape, slope gradient, and network density. The basin length, relief, and main stream length are enlarging the runoff traveling times whereas the basin slope gradient, circulatory ratio, and form factor delaying the traveling times. Flood risk mapping and assessment implied following the traditional and morphometric approaches to explain the risk damages for the human life, vehicle driving and building structures.

The less elongated drainage basins provide higher flooding risk levels than the elongated ones. Long concentration time allows taking the precautions that significantly mitigate the discharge injury, while the large discharge quantities require more efficient mitigation measures. In turn, the present study attempts to recommend a new flash flood risk factor, is called Safe Time Value, STV, to estimate the required time for sitting and activate the mitigation measures and precautions. It should be noted that there is no risk time factor existed before. STV is a risk time dependent factor, which means that using the concentration time and lag time in respect the basin discharge, producing a specific STV for each area. The approach can be applied in the drainage basins that having more than 5 km2, semi-arid to arid, and receiving the same rainfall precipitation. The study provides the approach and sequence of estimating STV risk levels.

Keywords: Safe Time Value risk factor, flood peak discharge, flash flood assessment, arid and semi-arid drainage basins, Egypt

(IV-15 Poster)

SEISMIC HAZARDS AND SEISMOTECTONIC STUDIES FOR SINAI PENINSULA, EGYPT

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Sinai Peninsula is located in western Asia in northeastern Egypt. It is characterized by itsnumerous mineral resources, such as gold, copper, lead, zinc, tungsten, molybdenum,manganese, limestone, gypsum, iron oxides, sand, gravel, feldspar, kaolin, and marble,which are used in many industrial raw materials such as metallurgy, cement, and ceramicindustries. Sinai's coasts are characterized by the presence of ultra-pure white sand aswell as black sand deposits rich in titanium, zircon, manazite, rutile and garnet minerals.Sinai also has many coal, hydrocarbon, uranium, and thorium resources. In the southSinai, the red sea bifurcates into the Gulfs of Suez and Aqaba, which are characterized bymoderate to high seismic activity and the presence of earthquake swarms. To preservemineral and petroleum reserves,

protect facilities and installations, and eliminate anypotential human losses, the seismic hazard in Sinai is evaluated using probabilistic anddeterministic seismic hazard assessment techniques. The historical and recentearthquakes were collected into a complete homogenous catalog, and the study area wasdivided into 39 seismic sources plus a background seismic source according toseismicity, focal mechanism, and tectonics to build a seismotectonic source model takinginto account the impact of local and regional seismicity on Sinai. The recurrenceparameters were estimated for each source, and alternative attenuation relationships wereused to account for epistemic uncertainty. Hazard maps were created to indicate theground motion for peak acceleration and 0.1, 0.2, and 2 second-spectral accelerations.The probabilistic hazard maps were created to show ground motion at the 475-year returnperiod, while the deterministic maps show acceleration at the 50th percentile level for theselected probabilities of exceedance. Uniform hazard spectra and deaggregation ofhazards were estimated for some cities in Sinai. Some earthquakes were simulated tostudy the effect of magnitude and distance to some cities on acceleration values.Synthetic accelerograms have also been created to assist earthquake engineers inperforming nonlinear dynamic analysis of buildings. The results of this study are veryimportant in seismic risk assessment, microzonation, and engineering studies.
Keyword: Probabilistic seismic hazard assessment, deterministic seismic hazard assessment, seismichazard, seismic risk, microzonation, uniform hazard spectra, peak ground acceleration,and deaggregation.

(IV -16 Poster)

FOCAL MECHANISM SOLUTION AND THE ASSOCCIATED TECTONIC TRENDS AT THE WEST OF BITTER LAKES AREA, EGYPT

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In the current study, data from 1997 to 2023 have been used inthedetermination of the seismicity and focal mechanism solutions at the West of BitterLakes area. The information was collected, selected, and specific events wererelocated. A recent seismicity map is created using our updated data along with theprevious seismicity maps. In studying local, regional, and global seismicity and tectonic, earthquakesource mechanisms are the most significant. Earthquake focal mechanism solutionsrepresent one of the main sources of information about the stress pattern that occurs inthe area being studied and mapping the tectonic structures associated with a specificearthquake. The main objective of the current study is to determine the sourcemechanisms of recent moderate- and small-scale occurrences captured by the digitalENSN network during the period 1997-2023 utilizing the polarity of the first motionof the P-wave and, hence, understanding the associated tectonics and stress fieldpatterns. Results of source parameters of 30 earthquakes analyzed reveal the presenceof three categories, according to their predominance: E-W-trending faults, NWtrendingfaults, and NNE-trending faults. Concerning the focal mechanism solutions,the oblique-slip normal solution with right or left strike components is thepredominant, whereas the dip-slip normal and the strike-slip solutions are subordinate.

Keywords: focal mechanism, source parameters, first motion of P-wave, tectonictrends, Bitter Lakes area

V- Applied and Theoretical Geophysics

(V-1 Oral)

EARTHQUAKE DYNAMICS ALONG THE GULF OF AQABA-DEAD SEA TRANSFORM FAULT: AN UPDATE ON SEISMIC HAZARD

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The Gulf of Aqaba-Dead Sea Transform Fault (GoA-DSTF) is a significant plate boundary involving several countries, including Egypt, Saudi Arabia, Palestine, Jordan, Syria, Lebanon and Turkey. This extensive reach emphasizes the necessity of assessing seismic hazard in the region, particularly with major development projects like Saudi Arabia's NEOM underway, to ensure these initiatives' resilience against potential seismic events. This study updates the probabilistic seismic hazard in the GoA-DSTF region, focusing on peak ground acceleration (PGA) and spectral acceleration (SA) values. The assessment considers probabilities of exceedance of 10% and 5% over 50 years for B/C and C NEHRP (National Earthquake Hazards Reduction Programme) site classes. The analysis incorporates seismic activity from Egypt and surrounding areas, along with the European SHARE (Seismic Hazard Harmonization in Europe) seismic source model, covering both shallow crustal and intermediate-depth seismicity. Four ground-motion prediction equations have been used, accounting for earthquakes in shallow active crustal tectonic regimes and intermediate-depth events associated with the Cyprian Arc, in the Eastern Mediterranean region. A logic tree scheme integrates various parameters, including uncertainties in the Gutenberg-Richter b-value, maximum possible magnitude, and the alternative ground-motion attenuation models for shallow active seismic sources.The study identifies three key areas along the GoA-DSTF with notably higher hazard values: the central part of the Gulf of Aqaba, the region between the Dead Sea and the Sea of Galilee, and the northeastern extension of the GoA-DSTF where intersecting with the East Anatolian Fault, at the Hatay Triple Junction. The findings show that

Nuweiba (Egypt), Nicosia (Cyprus), Latakia (Syria) and Iskenderun (Turkey) consistently exhibit the highest seismic hazard values among all the cities analysed. The maximum spectral acceleration values for these cities, under B/C site conditions for return periods of 475 and 975 years, are 0.72 and 0.91 g, 0.69 and 0.86 g, 0.58 and 0.77 g, and 0.57 and 0.77 g, respectively. These results highlight the critical importance of addressing the seismic potential and seismic hazard in these regions for an effective risk mitigation and disaster preparedness.

Keywords: Seismic hazard, logic tree framework, ground motion prediction equation, soil conditions, uniform hazard spectrum, Gulf of Aqaba-Dead Sea Transform Fault.

(V-2 Oral)

INTEGRATED GEOPHYSICAL INVESTIGATION OF SUBSURFACE GEOLOGY AND DEPTH TO BASEMENT IN THE WESTERN EXTENSION OF NEW ASWAN CITY USING TDEM AND MAGNETIC METHODS

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In response to Egypt's burgeoning population, the government has embarked on an ambitious project of constructing several new cities. Among these developments lies an extension to New Aswan City, positioned on the western banks of the Nile. Originally spanning 3900 acres and later expanded to 18490.92 acres, New Aswan City boasts a meticulously crafted master plan that harmoniously blends residential, commercial, and recreational zones. This study focuses on delineating the basement depth and subsurface structures, with a particular emphasis on lithology identification, within the context of the expanding New Aswan City. The integration of different geophysical studies, specifically Magnetic and Time-Domain Electromagnetic (TDEM) data, serves as the foundation for this investigation. Magnetic data, processed through techniques such as Source Parameter Image

(SPI), power spectrum analysis, and two-dimensional modeling, offer insights into the depth to basement, subsurface structures, and lithology identification. Initial estimates suggest depths ranging from 1000m to 1600m for deep sources and 130m to 200m for shallow sources. TDEM data, collected from an extensive network of stations arranged in both east-west and north-south orientations, reveal the presence of three distinct geoelectric layers. The surface layer is characterized by alluvial deposits with varying resistivity values (53 to 3651 Ohm.m) and thicknesses (10 to 25m). The second layer comprises Silty Sandstone, exhibiting lower resistivity values (2.50 to 52 Ohm.m). Finally, the third layer predominantly consists of Shale and Clay, displaying very low resistivity values (less than one Ohm.m to 19 Ohm.m). Structurally, the encountered elements predominantly trend in the NE-SW, NW-SE, NNW-SSE, and E-W directions. Through the comprehensive analysis of geophysical data, this study contributes to the understanding of subsurface characteristics and geological features vital for urban planning and development in the region.

Keywords: New Aswan City; Magnetic data, TDEM; 2D modeling; Basement depth; Geoelectric layers.

(V-3 Oral)

DETERMINATION OF LOCAL SEISMIC SITE RESPONSE USING IN-SITU AMBIENT VIBRATION MEASUREMENTS: CASE STUDY, NEW QENA CITY

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One of the best methods for determining how much the geology has affected ground motion is the Horizontal-to-Vertical Spectral Ratio (HVSR) approach. Evaluating the site effect and vulnerability index at the extension of New Qena City is the main objective of this study. In order to accomplish this goal, a 250 m grid was used to capture 21

ambient vibrations records across the study region. The estimated fundamental frequency (f0) distribution is quite uniform and occurs at low frequencies, from 0.27 to 0.3 Hz. Whereas, the corresponding seismic wave amplitude (A0) ranges from 1.3 to 8.7 Hz. Ibs-von Seht and abd-elaziz equations, have been used to indicate that the loose sedimentary cover thickness ranges from 111.1 to 590.9 m and 104.9 to 600.8 m, respectively, that coincided with the occurrence of (f_0) at low value. Based on the estimated H/V amplitude and corresponding (f_0), the vulnerability index (Kg) for assessing the possibility of the ground for liquefaction. In addition, the ground shear strain (GSS) study to evaluate the possibility of landslides resulting from earthquakes in vulnerable areas at each tested point was calculated. It was observed that the vulnerability index varied from 2 to 246 throughout the examined region, due to the presence of the lowest fundamental frequency and the maximum amplification factor. Furthermore, the obtained GSS shows that, the lowest value observed at the middle part of the area, due to the existence of the loose sediments in the valley course which runs across the area.

Keywords: Horizontal-to-Vertical Spectral Ratio; New Qena City; fundamental frequency; vulnerability index; ground shear strain

(V- 4 Oral)

SEISMIC SWARM PHENOMENA RECORDED AT KALABSHA AREA, ASWAN, EGYPT

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Increase in the earthquake activity in a limited area within a certain period of time is called seismic swarm. Occurrence of the swarm-type earthquake activity in Aswan area is not frequent. During the period from 1982 to 2023, different earthquake sequences were recorded at Kalabsha area. The first seismic swarm occurred in 1982 during the loading cycle in the reservoir at Gabel Marawa along Kalabsha fault with a total number of 247 earthquakes, the largest event with (M 4.7). The second swarm occurred in 1987during the annual unloading cycle in the reservoir. It composed of 172 events within a focal depth from

5.0 to 10 km, the largest event with magnitude 3.4. While the third one is noticed on April 12, 2007, included 262 earthquakes with magnitude range 0.5 to 4.2 and a depth interval from 6.0 to 9.0 km located almost in the same location of the 1987 seismic swarm. It is noticed that, these sequences occur during both loading and unloading periods in the reservoir. Furthermore, the daily rate of either increasing or decreasing in the reservoir water level has no clear influence to cause such type of earthquake activity, where in many years the water level achieved higher values and higher daily changes without recording such phenomena. Focal mechanism solution for the largest event (M 4.2) in the 2007seismic swarm shows strike slip faulting with a normal component. Occurrence of the two swarms (1987 and 2007) almost at the same location and the focal depth gives an indication of an active source for accumulating seismic energy and that the swarm-type earthquake activity can be occurred at shallow and deep depths.

Keywords: seismic swarm-Aswan reservoir-focal mechanism.

(V -5 Oral)

STUDY AND EVALUATION OF THE SEISMIC ZONE CHARACTERISTICS IN EGYPT

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Monitoring of earthquakes in Egypt started from a long time ago (the end of the nineteenth century) when NRIAG installed the first seismic station in 1899. From this time until today, the monitoring system in Egypt updated several times specially after the felt damaged earthquakes 1981 Aswan earthquake and 1992 Cairo earthquake. After the occurrence of Aswan earthquake, a seismic monitoring network was installed around the northern part of Aswan Lake and after Cairo earthquake in 1997 the Egyptian National Seismic Network (ENSN) was constructed. Consequently, and due to the continues updating of

the Egyptian National Seismic Network (ENSN) it became one of the most important seismic networks in the region (North Africa, Mediterranean region and Middle East). The distribution of the seismic activity indicated that the earthquake activity is distributed in many zones in Egypt, Gulf of Aqaba, Gulf of Suez, Dahshor, Red Sea, and Aswan zones. These zones characterized by different seismic activity where each zone has its own This study is concentrating on Aswan seismic zone in South Egypt and Gulf of Aqaba in North Egypt as two important seismic zones. Aswan zone is characterized by the occurrence of swarm, shallow small to moderate magnitude earthquakes. The seismic activity in Aswan area is not related to the tectonic origin only but also it is triggered seismicity due to Aswan Lake. The Gulf of Aqaba zone is characterized by the occurrence of strong tectonic earthquakes where the epicenter of 1995 earthquake (Mw=6.9). The current study indicated that Aswan earthquakes have non negliable non double couple components, where Aqaba Gulf earthquakes have notable double couple components.

Keywords: Aswan seismic zone, ENSN, Seismic activity, Non double couple earthquakes., Egypt.

(V - 6 Oral)

MONITORING CONTAMINATION IN SOILS USING ELECTRICAL MEASUREMENTS AS INDICATORS

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One of the problems the environment faces is soil contamination. Academic Research might aid in controlling and limiting its spread. Contaminants known as polychlorinated biphenyls, or PCBs, are believed to be a serious risk to living organisms, particularly when it comes to soil and aquifer monitoring. PCBs often have no smell and are colourless to light yellow oil solutions. The Egypt Vision 2023

Sustainable Development Goals align with this initiative. This study aims to ascertain the extent to which electrical measurements can serve as a soil pollution monitor for polycyclic aromatic hydrocarbons (PCBs). For synthetic samples (shale and PCBs), several electrical properties (electrical conductivity, phase angle, dielectric constant, and impedance plane) were determined. To measure the electrical response at various levels of the pollutant, samples (shale) were contaminated with PCBs at varying concentrations. One of the problems the environment faces is soil contamination. Academic PCBs are regarded semi-insulating materials, whereas shale is considered semi-conducting. Electrical tests were taken at frequencies ranging from 10-1 Hz to 100 kHz. The results reveal that when contamination levels grow, electrical conductivity decreases while the dielectric constant increases. The phase angle continuously grows as the frequency increases until it reaches a point where it lowers. This can be interpreted as water increase makes the phase shift between current and potential response become closer, then starting to become wider, so it's made the phase shift decrease then increase. The results showed that electrical measurements can be used as a preliminary screening step for monitoring soil pollution, particularly with PCBs. It may offer a high-quality functional technique that is both cost-effective and non-invasive. This technology may allow for speedy evaluations and possibly assist massive environmental monitoring efforts.

Keywords: PCBs, Spectral Induced Polarization, Electrical, Contaminations, Soil.

(V-7 Oral)

EVALUATING HYDROCARBON POTENTIAL OF MIOCENE FORMATIONS IN THE TAWILA FIELD, SOUTHERN GULF OF SUEZ BASIN, EGYPT: A GEOPHYSICAL PERSPECTIVE

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This study undertakes a comprehensive geophysical evaluation of the Miocene Belayim and Kareem formations within the Tawila Field, situated in the Southern Gulf of Suez Basin, Egypt. The objective is to assess the hydrocarbon potential of these formations by integrating seismic data with petrophysical analysis from wireline logs across four key wells: TW-1, TW-2, TW-5 ST3-A, and TW-6. A detailed seismic interpretation of twenty-nine seismic sections reveals a complex fault system, characterized by NW-SE oriented normal faults that significantly influence the structural configuration of the Miocene sequence. These faults are integral in forming structural traps, which are conducive to hydrocarbon accumulation in the region. Petrophysical analysis of the well logs reveals promising indicators of reservoir quality within the Miocene Belayim and Kareem sandstones. The reservoirs are characterized by notable pay zones, with net pay thicknesses reaching up to 45 feet. The reservoirs exhibit effective porosity values of up to 18%, minimal shale content (less than 20%), and favorable fluid distribution, with water saturation levels below 40% and hydrocarbon saturation as high as 60%. These characteristics underscore the potential of these formations as prolific oil reservoirs. The findings of this study not only reaffirm the petroleum potential of the Belayim and Kareem formations within the Tawila Field but also provide critical insights into the structural and stratigraphic controls on hydrocarbon distribution in the Southern Gulf of Suez Basin. The integration of seismic and petrophysical data offers a robust framework for future exploration activities, suggesting that similar Miocene-aged formations in the vicinity may also harbor substantial hydrocarbon resources. This study contributes valuable knowledge to ongoing exploration efforts in the region, emphasizing the significance of detailed geophysical analyses in unlocking new reserves.
Keywords: Miocene reservoir; Gulf of Suez Basin; Belayim Formation; Kareem Formation; Structural traps; Petrophysical analysis; Hydrocarbon exploration.

(V – 8 Oral)

GEOPHYSICAL EVALUATION OF JURASSIC KHATATBA RESERVOIRS IN JG FIELD, ABU GHARADIG BASIN, WESTERN DESERT, EGYPT

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This study primarily aims to evaluate the oil potential of the Jurassic Khatatba Formation (Safa Member) in the JG Field, Abu Gharadig Basin, Northern Western Desert. The results are intended to support future exploration efforts not only within the Abu Gharadig Basin but also in adjacent basins. The analysis is based on twenty-nine seismic sections and wireline logs from five wells: JG-8 ST, JG-5 ST, JG-1 ST, JG-13, and JG-16. Seismic data analysis reveals a network of NE-SW and NW-SE normal faults intersecting the Jurassic section, which play a crucial role in forming structural traps capable of hydrocarbon accumulation in the study area. Petrophysical analysis of the well logs indicates positive indicators throughout the sandstones of the Safa Member, suggesting their potential as oil reservoirs in the studied wells. Key characteristics of the pay intervals include a substantial net pay thickness of up to 50 meters, effective porosity ranging from 0.12 to 0.18, low shale content (0.05 to 0.10), low water saturation (0.10 to 0.20), and high hydrocarbon saturation (0.80 to 0.90). These findings highlight the significant petroleum potential of the Safa Member in the Abu Gharadig Basin and offer valuable insights for future oil exploration, particularly in the eastern part of the study area and its surroundings.

Keywords: Jurassic reservoir; Abu Gharadig; Khatatba Formation;; Safa Member; Geophysical assessment.

(V – 9 Oral)

RECENT TECTONIC STRUCTURES OF THE NORTHEASTERN EGYPT AFTER 7.8 MW TURKEY–SYRIA EARTHQUAKES USING POTENTIAL DATA

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The recent seismic events in Turkey and Syria have had an impact on the tectonic plate of northeastern Egypt. The 7.8-magnitude earthquake that struck the area in 2023 not only caused immediate devastation but also triggered a series of geological responses. These responses may have altered the tectonic features of northeastern Egypt as the region is located at the intersection of the African and Eurasian plates. The ability of potential techniques to identify variations in the density and magnetic properties of the Earth, which point to various rock types and structures, makes them essential for comprehending the geological subsurface. The results show significant surface ruptures, with some fault segments shifting, as observed in satellite and radar imagery. Such movements are indicative of the immense forces at play and the dynamic nature of Earth's lithosphere. The earthquake sequence, including a magnitude 7.5 aftershock and numerous other aftershocks, illuminated half the length of the East Anatolian Fault with seismic activity, highlighting the fault's role as a major boundary between tectonic plates. The impact of such a powerful earthquake extends beyond immediate ground shaking; it alters the stress distribution along the fault lines, which can influence the occurrence and intensity of subsequent earthquakes.

Keywords: Northeastern Egypt, Earthquake, potential data, Turkey and Syria earthquake, Tectonic plate.

(V -10 Oral)

SEISMIC SITE CHARACTERIZATION AT ASWAN INDUSTRIAL CITY IN SOUTHERN EGYPT

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As part of the 2030 Egypt Vision, the Egyptian government has been developing a number of new cities to suit the needs of the industrial revolution, such as Aswan's New Industrial City near to the New Aswan City. Because of its closeness to an area with a comparatively higher seismic hazard, particularly along the Kalabsha and Seiyal Fault system, the evaluation and reducing any potential seismic risks before beginning any building or development projects are necessary. The goal of this work is toevaluate the impact of local geology on seismic motion and near earthquake activities in the proposed location of the Aswan's New Industrial Cityin terms of fundamental resonance frequency (f0) and related H/V amplitude values (A0) (amplification factor). Accordingly, ambient vibrations were recorded in twenty different locations in the New Industrial City for two hours duration during the daytime using the Taurus portable seismograph and a three-component, force-balance broadband seismometer (Trillium 120s). The horizontal-to-vertical (H/V) spectral ratio (Nakamura technique) was used to the acquired data due to its low cost and quick implementation. From the analysis of the spatial distribution of the fundamental frequencies (f0) and their accompanying amplitudes (A0) using the Geopsy program, it is found that the f0 value varies from 0.58 to 1.12 Hz within the proposed site, while the corresponding H/V amplitudes (A0) vary from 3 to 12. The output results of this research are important for resolving issues related to the building of various projects; improve structural safety, and earthquake-resistant structures.

Keywords: Site characterization, Nakamura technique, Fundamental frequency, Amplification factor, New Aswan industrial city

(V -11 Oral)

SHALLOW SEISMIC SURVEYS AND GEOTECHNICAL PROPERTIES INVESTIGATION IN ASWAN INDUSTRIAL CITY, UPPER EGYPT

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As a part of the Egypt 2030 Vision, the Egyptian government continues building several new cities to accommodate the rapidly growing population and meet the demands of the industrial revolution. One of these cities is the New Industrial city situated in close proximity to a region with a relatively higher seismic hazard, particularly along the Kalabsha and Seiyal Fault system, making it critical to assess and mitigate potential seismic risks for any construction or development projects. Shallow seismic surveys are used to get the compressional and shear-wave velocities (Vp and Vs) used in detecting lithology, structural features, geotechnical parameters, which are very useful for building and other civil engineering purposes. Consequently, the objective of this work is to investigate subsurface structure conditions, determine the dynamic characteristics of the rocks and study the effect of the near earthquake activities in the proposed location of the new Industrial Aswan city. To achieve this, ten seismic refraction profiles were conducted in the study area using 24-channel shallow seismic refraction seismograph, as part of a larger project that also included Multi-Channel Analysis of Surface Waves (MASW) measurements. Here, we present the results of the analyzed seismic data, which were processed to determine the compressional and shear-wave velocities (Vp and Vs), and create 2D block model for each measured profile in order to assist in estimating the range of engineering parameters for the identified soil layers. This includes elastic moduli (e.g., Poisson's ratio, bulk modulus, rigidity modulus, and Young's modulus), competence scales (e.g., material index, concentration index, stress ratio, and density gradient), and

bearing capacities (both ultimate and allowable). The results indicate that the near-surface section of the study area comprises primarily two geoseismic layers: a top layer of soil (sand from recent deposits) and a second underlying layer (Nubian sandstone), likely representing the bedrock. Distribution maps of depth, velocities and deduced geotechnical properties are constructed. In conclusion, these findings are recommended to be utilized as key input parameters for civil construction projects to ensure informed and effective design decisions, enhancing structural safety and resilience in the study area.

Keywords: Shallow seismic refraction, MASW, Geotechnical characterization, Hazard microzonation, Kalabsha and Seiyal Faults, Aswan New Industrial city.

(V -12 Oral)

AEROMAGNETIC INVESTIGATIONS FOR GEOTHERMAL RESOURCES IN NORTHERN PART OF EGYPTIAN WESTERN DESERT

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Geothermal resources in Egypt are useful as promising renewable energy. Little attempts have been carried out to expansively investigate the geothermal potentiality at the Western Desert. The present study is focused on the investigation of geothermal resources in the northern part of the central Western Desert. To achieve this objective, the available aeromagnetic data is firstly reduced to the pole (RTP), then filtered using tilt derivative (TDR) and Butterworth low and high pass methods. The major trends of the different predominant detected local and regional lineaments (probably, structures) have been determined and correlated with surface structures. To delineate the basement depth configuration, power spectral analysis of aeromagnetic data as well as constructing 2D modelling (verified by drilled wells data) were applied. The results have been used to estimate the curie point depth (CPD), geothermal gradient and heat flow maps for the study area. Obtained results imply that the depth to

the Precambrian basement rock changes from 1.2 km to 5.2 km with maximum depth reaches approximately 6 km in the middle part and the southwestern corner of the study area, whereas the recorded CPDs vary from 23 km to 35 km, geothermal gradients vary from 16 to 24 °C/km and the heat-flow attain values from 32 to 48 mW/m2. The southwestern part of the study area is characterized by relatively shallow basement surface as well as high geothermal gradient and heat flow indicating the possibility of fluid occurrence.

Keywords: Geothermal resources, Aeromagnetic data, Curie point depth, Geothermal gradient, Heat flow, Egyptian Western Desert

(V-13 Oral)

REAL TIME DETECTION OF P WAVE ARRIVALS AND PGA ESTIMATION USING VISION TRANSFORMER

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A fully automated system is designed for real-time earthquakes detection and peak ground acceleration (PGA) prediction based on a vision transformer (ViT) network. This system is an integrated deeplearning architecture for simultaneously picking the first arrival and estimating the PGA. ViT is considered a self-attention mechanism that guides the proposed network to extract the most significant features from the input seismic data. The significant feature of the picking model is the location of the P- arrival time. However, the meaningful features for the peak ground acceleration model are the amplitude and the location of the maximum amplitude. The P-wave arrival times are picked and considered as a reference to the PGA estimation model. The onset time of the P-wave phase is needed in many seismological applications, including locating earthquakes,

source mechanism analysis, and ground-motion processing.Egyptian National Seismic Acceleration Network (ENSAN) contains twenty stations which are distributed along Egypt. In this study, the ViT model was tested and applied on a continuous data set of ENSAN Aqaba stations during 2022. The network shows robust picking performance, compared to the manual picks for the SHR, NUB, TABA and HRG stations. The proposed ViT network enhances the PGA catalogue. In addition, the comparison of the model outcomes with the Egyptian National Seismic Network (ENSN) bulletin could performance for the PGA prediction as well as improving the early warning system.

Poster Presentations

(V-14 Poster)

APPLICATION OF SEISMIC REFRACTION AND MASW GEOPHYSICAL TECHNIQUES TO CHARACTERIZE THE SUBSOIL STRUCTURE UNDER DAMAGED BUILDINGS IN QEFT CITY, UPPER EGYPT

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The shallow seismic methods, including seismic refraction and 1D MASW, were used to investigate the shallow soil in the vicinity of five damaged building blocks in the village of El-Kalaheen. These building blocks exhibited structural problems including cracks, fissures and displacements between neighboring buildings. The results of both methods show that the shallow subsurface consists of two layers: a surface layer of loose sands, gravels, silts and clays and a compacted sandy clay layer that forms the bedrock in the area. The resulting seismic velocities were used to calculate the geotechnical parameters of the two layers, including Poisson's ratio, shear modulus, Young's modulus, material index and N-value. In addition, the shear wave velocities resulting from the 1D MASW method were used to

calculate the average Vs30 in the site. The calculated values of the geotechnical parameters show a gradual increase in the competence of the upper layer from fairly competent and loose in the south of the area to competent and denser in the north. The geotechnical parameters of the bedrock also show an increase from moderately competent in the south to denser and more competent in the north. Possible zones of weakness are also observed in the southern part of the site. The calculated Vs30 indicates a site with stiff soil classification.

Keywords: seismic refraction, 1D MASW

(V -15 Poster)

ELECTRICAL RESISTIVITY MEASUREMENTS USING NON-DESTRUCTIVE ELECTRODES: A SIGNIFICANT CONTRIBUTIONS TO THE APPLICATIONS OF ELECTRICAL RESISTIVITY IN NEAR SURFACE GEOPHYSICS

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In some field settings (e.g., tough limestone plateaus or asphalt covered areas) performing electrical resistivity measurements using the ordinary spike electrodes frequently not considered. Either it hard to "dig in" the electrodes or may be prohibited to drill in the ground (e.g., restricted monuments areas) as it might cause severe damages. Therefore, in such cases using non-destructive electrodes would help to accomplish what cannot be done by ordinary electrodes. In the present study, small non-destructive electrodes (flat base) for laboratory settings examination of limestone block and two non-

destructive electrodes (flat base and aluminium foil) were constructed and examined by performing 2D resistivity imaging in a field setting of tiles, concrete paved ground, granite, marble, and Quarry limestone. The main objective was to determine the applicability of these non-destructive electrodes and their accuracy to obtain reliable results and comparing it with the spike electrode. The present study showed that there was no significant difference between the electrical resistivity results obtained with ordinary electrodes and the non-destructive electrodes. The results indicate that the constructed electrodes used in this study provide the advantage of a fully non-destructive application and, therefore, the extension of geoelectrical methods to environments that, otherwise, would not have been considered suitable.

Keywords: non-destructive electrodes, 2D resistivity, spike electrodes, monuments areas, Assiut.

(V-16 Poster)

MAGNETIC GRADIOMETER SURVEY TO EVALUATE THE DEPTH AND SHAPE OF SUBSURFACE ARCHAEOLOGICAL FEATURES AT EL DYABAT ARCHAEOLOGICAL HILL IN AKHMIM, SOHAG, EGYPT

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Akhmim archaeological city is one of the most important historic sites in Egypt. It includes many archaeological landmarks that extend from the pre-dynastic era to the Islamic era, passing through the Pharaonic, Ptolemaic, Greek, Roman and Coptic eras. The selected site located about 5 km to the west of Akmim city and 2 km to the east of newly discovered archaeological tombs of Hawawish. The main target of this study is to allocate the archaeological targets such as graves, walls, and monuments at this site. This objective can be met by utilizing advanced geophysical methods, specifically the magnetic gradiometer technique. This survey was acquired in an area of 150 x 150 meter using GEM Overhauser magnetometer/gradiometer. This site was divided into nine equal grids with dimensions of 50 x 50 meters and

surveyed in continuous operation with “walking” mode with one meter line spacings. Based on the data from previous excavations, the initial plan was to limit the research depth to no more than 3 meters overall. After applying some processing techniques using Geosoft Oasis Montaj ver. 4.8 to the raw data, magnetic anomaly maps were produced. The final results reveal several anomalies that could suggest the presence of buried archaeological artifacts or graves, measuring approximately 3 to 5 meters in length and varying in depth from 0.5 to 3 meters. Consequently, this promising site may contain significant archaeological targets that need to be verified through excavation. The results of this study are expected to enhance both domestic and international tourism in Egypt, leading to an increase in tourist visits and contributing to economic growth.

Keywords: Magnetic, Gradiometer, Archaeology, Akhmim, Graves.

(V-17 Poster)

MAPPING THE POTENTIAL BURIED ARCHAEOLOGICAL OBJECTS EMPLOYING MAGNETIC AND GPR SURVEYS AT ARABAH AL-MADFUNA SETTLEMENT, ABYDOS, EGYPT

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As a result of new discoveries, there is a greater opportunity for development and investment in the Al-Arraba EL-Madfuna region of Abydos, Sohag Governorate, Egypt, which benefits tourism and increases the national economy. The Coptic monastery, which was originally established by Apa Moses, the patriarch of the Coptic Church during the ancient Roman Empire, has vanished inside the current market on this site, along with numerous tombs. The main target of this paper is to use advanced geophysical tools to prospect this site for these potential archaeological features. Two methods were used here; geomagnetic and ground-penetrating radar (GPR) to achieve this goal. This work was done in coordination with the Supreme Council of Antiquities. The G-857 proton-precession

magnetometer and GSSI SIR 4000 attached to a 200 MHz antenna were used for magnetic and GPR surveys, respectively. The data were processed and interpreted using Geosoft Oasis Montaj and REFLEXW v.5.8 software packages. The magnetic raw data were processed to give a clearer image of the archaeological targets. Butterworth high pass filter, first vertical derivatives, analytical signal, and tilt derivative were employed to carry out the processing stages. The results were analysed qualitatively and quantitatively to describe these anomalies and determine their locations, geometrical shapes, and depths. To determine the depth to these features source parameter imaging and 3D Euler deconvolution techniques were applied. From the inspection of the magnetic maps, the study site has a number of anomalies that occur and have geometric shapes of squares and rectangles with depths ranging from 0.7 m to nearly 4 m, that some of them may be related to potential archaeological objects. GPR findings reveal considerably scattered reflections along several profiles, which may indicate the presence of potential buried targets. The combination of the magnetic and GPR data indicated some degree of agreement in locating the most likely buried archaeological objects and estimating their depths (0.7 to 3 m) for most of the targets that were found. These findings recommend digging at this site and moving the market to prevent the loss of the buried artefacts so that they can be preserved as a target tourist attraction.

Keywords: Magnetic, GPR, Archaeology, Abydos, archaeological objects.

(V-18 Poster)

SEISMIC ACTIVITY AND THE MAJOR TECTONIC STRUCTURES IN THE NORTHEASTERN PART OF EGYPT

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In the present study, northeastern part of Egypt is considered as one of the fewest regions all over the world whereas evidence of historical activities has been documented during the last centuries. Instrumental, historical and pre-historical seismicity data indicate that large

destructive earthquakes have occurred quite frequently in the investigated area. Recent earthquake activity in the northeastern part of Egypt has been examined in relation to the tectonics and structures indicated by surface geology. Seismicity appears to be low compared to the rest of the Red Sea. The main aims in the present study are to redraw attention to the fact that the northeastern part of Egypt is seismically active and this result is associated with earthquake risk in the region. The interaction of the African, Arabian and Eurasian plates and Sinai subplate is the main factor behind the earthquake activities of northeastern part of Egypt. All earthquakes occur at shallow depth and are concentrated at four seismic zones, including the Gulf of Suez ,Gulf of Aqaba, around the entrance of the Gulf of Suez and the fourth one is located at The Sinai Peninsula. The seismicity map of the previous zones shows that the activity is coincide with the major tectonic trends of the Suez rift, Aqaba rift with their connection with the great rift system of the Red Sea and Gulf of Suez-Cairo-Alexandria trend.

Keywords: Seismic Activity, Tectonic, Structures, Northeastern.

(V -19 Poster)

CONTRIBUTION OF GEOPHYSICAL METHODS IN EXPLORING THE ARCHAEOLOGICAL REMAINS NEAR THE PYRAMID OF AMENEMHAT III IN THE DAHSHOUR AREA, EGYPT

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High-resolution magnetic and ground penetrating radar (GPR) geophysical surveys have been completed in an area near the pyramid of Amenemhat III in the Dahshour archaeological area of Egypt. This integrated geophysical survey is intended to quantitatively map and

clearly define the buried archaeological ruins in the region of investigation (ROI) defined by a 120 m by 60 m study area. In the magnetic survey, we used a Fluxgate FM (256) magnetometer instrument. To directly image anomalies identified in the magnetic survey and investigate features lacking a magnetic component, a detailed Ground Penetrating Radar survey was completed over three survey grids. The GPR data were used to obtain higher-resolution subsurface spatial details and better understand the magnetic survey results. The measured geophysical data was processed and visualized to illustrate the distribution of burial archaeological features over the study ROI. Using these integrated magnetic and GPR geophysical observations, we have identified archaeological features, including vertical shafts, mud-brick walls, burial chambers, and other more complex features.

Keywords: GPR, Magnetic Survey, archaeological investigation, Dahshour.

(V-20 Poster)

MAPPING HYDROTHERMAL ALTERATIONZONES OF GEBEL MU'TIQ AREA USING ASTER AND AEROMAGNETIC DATA IN CENTRAL EASTERN DESERT, EGYPT

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MU'TIQ Core Complex (MCC) is located approximately 60 kilometers west of Quseir along the Central Eastern Desert. MCC formed during the Precambrian period due to multiple deformations and metamorphisms. This study presents the geological mapping of the Gebel MU'TIQ area, including lithological discrimination, mapping hydrothermal alteration zones, and structure analysis based on Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) and aeromagnetic data. Three ASTER image processing techniques; Minimum Noise Fraction (MNF), Optimum Index Factor (OIF), and Principal Component Analysis (PCA) were integrated with the published geological maps to construct a detailed

geological map. On the other hand, the Feature-Oriented Principal Component Analysis (FPCA), Constrained Energy Minimization (CEM), and CET porphyry detection techniques are used to detect the hydrothermal alteration zones by identifying alteration minerals alunite, kaolinite, chlorite, epidote, calcite, hematite, jarosite, goethite, and porphyry-style mineralization. Besides, the surface and subsurface structural complexity maps have been constructed and the main trends of predominant faults across the MU'TIQ area are NW-SE and NNW-SSE that controlled the mineralized zones in addition to minor trends in NE-SW direction but in less significant order. There observed numerous prospective mineralized zones are identified as closely related to the MU'TIQ shear zone in the study area.

Keywords: MU'TIQ Core Complex, ASTER image processing, Alteration minerals, CET porphyry.

(V-21 Poster)

DEPTH STRUCTURAL MAPPING OF SYN AND PRE-RIFT ROCK UNITS OF SOUTHEAST GHARA AT SOUTHERN END OF GULF OF SUEZ

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This paper sheds light on imaging of shallow and deep structure complexity of southeast Ghara located at the southern end of the Gulf of Suez based mainly on analyzing seismic and aeromagnetic data. The analysis strategy included depth structural mapping of syn-rift (middle to late Miocene) formations and basement complex. The syn-rift sediments are identified utilizing 2D&3D-seismic data interpretation, while the basement complex is identified based on the 3D-magnetic inversion due to bad seismic reflectivity in pre-rift rock units. The results indicate that the Miocene and pre-Miocene structure complexity are southwest dipping blocks controlled by major listric

faults and associated with dip-slip faults that are considered the main cause of forming the tilted faulted blocks in the study area with trend NNW to NW and many cross faults in ENE and NE directions which represent the younger faults. One of these tilted faulted blocks forms the horst structure trend separating the Ghara and Eastern basins. The depth structure maps show that the depths of formations increase gradually westward and decrease eastward. The sub-basins located in the western part exhibit an average thickness reach of 16500 feet and are bounded by the salt ridge in the southeast, and the uplifted offshore basement in the northwest. The lowermost portion of Miocene formations (Nukhul formation) and pre-rift strata thickness is identified by knowing the depths of the basement and base of Rudies formation, which exhibit average thickness reaches 1800 feet. The structure complexity analysis shows promising locations to entrap and accumulate hydrocarbons. Whereas, the up-thrown side of interpreted faults indicates promising locations for hydrocarbon accumulations especially along the central to western portions of the study area.

Keywords: 2D &3D seismic data interpretation, aeromagnetic data analysis; structural imaging; 3D inversion; Southeast Ghara.

(V -22 Poster)

DELINEATION OF STRUCTURAL CHARACTERIZATION WITH MINERALIZATION AND HYDROTHERMAL ALTERNATION ZONES USING INTEGRATED RADIOMETRIC AND HIGH-RESOLUTION AEROMAGNETIC DATA, SOUTHERN PART OF CENTRAL EASTERN DESERT, EGYPT

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The current study aims to integrate the aeromagnetic data with aero radiometric data over a southern part of the Central Eastern Desert of Egypt to identify subsurface structural characterizations and hydrothermal alternation zones which are related to mineralization zones. To understand subsurface structural framework and geological limitations, the aeromagnetic data were subjected to several filters to analysis and interpret such as reduction to pole (RTP), horizontal

gradient magnetic (HGM), tilt derivative (TDR) and analytical analysis (AS) as well as Center of Exploration Targeting (CET) technique were used. To accomplish aims study the aero radiometric data were analysis to produce radioelements maps for determine the spatial distribution, concentrations and occurrence of each radioelement. Meanwhile, the hydrothermal alternation zones can be identified by determining the areas of the potassium-enrichment that related to ore or gold mineralization using the K/Th ratio map F-parameter, potassium ternary composite image maps. The results indicated that the hydrothermal alteration zones were associated with high structural densities regions that present the main pathways for hydrothermal fluids, where the occurrence of prospective mineralization within these regions may be high likelihood in NE-SW and NW-SE directions. Many shear zones were found in the study area which represent the best places of mineralization and running NW direction which associated with the Najd fault system. New mineralization zones were identified and suggested to be favorable regions for mineralization emplacement in the current study such as G. Umm Bisilla, El Nab'a, Um Saltit, Umm Salim, G. Abo Marwa,G. Umm El Rus and G. Atwani. The study area possesses a wide range of radioactivity resulting in radiogenic heat production (RHP) from characterizing geological and lithology of the area where granites rocks have been the highest value RHP while metavolcanic, serpentinites and metagabbro have the low value. G. Umm Bisilla, G. Kadabora, G. Umm Gheig and G. Hummer Waggat can be considered as heat production areas resulting to the highly radioactive mineral concentrations as well as using it for geothermal resource exploration.
Keywords: hydrothermal alternation zones, aeromagnetic data, aero radiometric data, granite, radioactive mineral, Radiogenic heat production (RHP).

(V -23 Poster)

GEOPHYSICAL CHARACTERIZATION OF SUBSURFACE STRUCTURES FOR OPTIMAL PLANNING IN THE ABU TARTOUR PHOSPHATE MINE

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Optimal planning of Abu Tartour phosphate mine requires an accurate understanding of the region's phosphate ore geology. The recent closure of the subsurface mine was primarily due to insufficient geological data, including unrecognized faults that concealed phosphate layers. The present study is integratinggravity and magnetic geophysical methods to characterize the phosphatic beds and identify critical geological structures. This comprehensive geophysical approach aims to address previous challenges and facilitate more efficient and economically feasible mining operations in the Abu Tartour region.Reduced to Pole (RTP) aeromagnetic and Bouguer anomaly maps were used, with filters such as analytical signal, first vertical derivative, high pass, and low pass applied to enhance data interpretation. Through 2D modelling of gravity and aeromagnetic data, the subsurface sedimentary sequence above the basement rocks was defined. The depth (related to the sea level) to the surfaces of the defined subsurface lock layers was determined. Accordingly, structure contour maps for the basement surface and the top surface of the Nubian sandstone were prepared. Furthermore, thickness contour map of the phosphatic rock was also prepared. From these maps in additions to the resulted filters maps the predominant subsurface structures which may be controlled the distribution of the phosphate layer in the study area were obtained. The defined subsurface structures are mainly folds and faults. The faults are of normal and strike slip types. The normal faults are crossing and bounding Abu Tartour plateau with downthrow directions outward from the plateau. However, the folds are of plunging to double plunging syncline and anticline types with axes extensions in NE-SW, NNW-SSE and NW-

SE directions. The subsurface thickness of the phosphatic beds is ranging between 0.8 to 37m. the limited thickness is recorded in the present minelocation; however, the maximum thickness is recorded at the troughs of the syncline folds which are located northeast and southwest of Tartour plateau. These results indicated that the present location of Abu Tartour mine is mostly wrong and not economic, however, the promising locations for extracting phosphate are away from the plateau. Accordingly, the most economically viable mining sites are in northeast and southwest part of study area, which led to the failure of mining in the current mine location.
Keywords: Abu Tartour Mine, Aeromagnetic, Bouguer gravity, Subsurface structures.

VI- Structural Geology and Tectonics

(VI-1 Oral)

A NEW EARTHQUAKE SEQUENCE REVEALING LOW STRESS DROP AND STRIKE-SLIP DETACHMENT FAULTING AT EL-NUQRA REGION IN THE SOUTHERN PART OF EASTERN DESERT, EGYPT

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The 22 March 2023 earthquake with a local magnitude 4.0 and its aftershocks are a new earthquakes sequence that took place in the study region northeast of Aswan, southern Egypt. A base seismicity map from 1900 to 2023 of southern part of the eastern desert of Egypt revealed a very low and scattered earthquakes activity regarding to number and with magnitude less than 4.0. The map view of the main earthquake and its aftershocks are distributed and concentrated along the NNW-SSE direction of the main faults segments in the study area. The movement on the fault obtained using full waveform moment tensor inversion revealed strike-slip faulting with minor reverse component with nodal planes trending NNW-SSE and NE-SW directions. Different decomposition scheme of the full moment tensor indicates crustal and natural type of faults represented by focal mechanisms with double couple component (DC) of 91 % and 9 % non-double couple one. The observed seismograms of the main event and its aftershocks are inverted to isolate the displacement source spectra from the attenuation and site effects using spectral inversion method (SIM). The obtained displacement spectra are modulated using Brune omega-square analysis to extract the dynamic source parameters of the studied events. The analysed waveforms of the selected earthquakes have corner frequencies f_C range from 3.1–6.8 Hz, source radius r vary from 160.5 to 348.6 m, seismic moments $M_O$range from 5.23E+18 to 7.78E+20 dyne.cm, moment magnitudes range from 2.2 to 3.7, and corresponding to stress drop value range from 0.2 to 55.0 bar. The obtained low stress drop value of the studied events interpreted and explained by the partial stress drop model due to aseismic creeping, detachments nature, and brittle shear failure of the associated fault segments. Our findings are valuable for

understanding the seismogenesis and valuable inputs for seismic hazard evaluation of the study region.

Keywords: El-Nuqra region, focal mechanism, crustal earthquakes, dynamic source parameters, low stress drop

(VI-2 Oral)

STRUCTURAL ARCHITECTURE OF THE NORTHERN GALALA PLATEAU: NEW INSIGHTS INTO THE TECTONIC EVOLUTION OF THE GULF OF SUEZ RIFT

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A general consensus that the Gulf of Suez Rift (GOSR) is a world-class laboratory for investigating the evolution of the epicontinental rift system and related structures. The present study addresses the Northern Galala Plateau (NGP), situated between the Cairo-Suez structural province and the Wadi Araba structure. The main objective of the study is to reappraise of the structural setting and tectonic evolution of the NGP within the frame of the tectonostratigraphic evolution of the GOSR. This is achieved through careful examination of structural fabrics at map-, outcrop-, handspecimen- and microscopic-scales, remapping, and inspection of the relation between tectonics and sedimentation. It is obvious that faults play a significant role in the structural/geomorphological shaping of the area. Based on overprinting and cross-cutting relations, the main faulting trends are sequentially arranged from oldest to youngest; E-W (to ENE-WSW), NW-SE (to NNW-SSE) and NE-SW. The first trend which led to the formation of conspicuous fault- and fault-line scarps in the area is affiliated to the Tethyan Rifting Phase of Northern Africa since Late Triassic-Jurassic time. Several lines of evidence attest reactivation of this trend throughout its long-lasting history. The second trend is GOSR-parallel, and is highly dissecting the NGP. The third trend crosses the abovementioned two trends, forming horsts and grabens in the Paleozoic-Mesozoic succession. Recording of remarkable subhorizontal slip-lineations with sinistral- and dextral senses along a

great number of rift-parallel and rift-cross faults make it possible to deduct a transtensional regime in the GOSR. It can be stated with reasonable confidence that main findings of the present study will contribute to our knowledge not only on the GOSR but also to the whole Afro-Arabian Rift System.

(VI -3 Oral)

STRUCTURAL CONTROLS ON SUKARI GOLD MINERALIZATION, EGYPTIAN NUBIAN SHIELD

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Gold, the most important noble metal, attracted human attention at the beginning of human history. The ancient Egyptian civilization is one of the oldest civilizations that mined and extracted gold from many localities in the Egyptian Nubian Shield (ENS). As in many other worldwide continental shields, gold deposits exist in a variety of settings, such as: orogenic (mesothermal)- and intrusion-related deposits, as well as gold-bearing VMS, although the first-type is the most dominant in the ENS. The present work highlights the structural controls on gold mineralization at Sukari Gold Mine (lying in the Nugrus Shear Belt; NSB), the first large-scale modern mine in North Africa and Arabia. Close-up investigation of Sukari main pit and neighborhoods in the whole NSB reveals five successive phases of deformations (D1-D5). D1 was an E-W (to ENE-WSW) shortening phase concurrent with the early assembly between East and West Gondwana lands. D2 was a N-S (to NNE-SSW shortening phase), most probably accompanying the arc accretionary event and the collision of the Eastern Desert Terrane (Gerf- or Aswan-Terrane) and the Gabgaba Terrane along the Allaqi-Heinani-Onib-Sol Hamed Suture Zone. D3 was a transpressional phase affiliated to the Najd Shearing Orogeny and can be subdivided into two progressive stages; D3a and D3b. D3a was concomitant to the main NW-oriented sinistral shearing that took place throughout the entire Najd-related high strain

zones in the Arabian-Nubian Shield. Ongoing of NW- shearing was accompanied by wrench-induced NNE-, NE- to E- oriented thrusting (with its top-to-WNW-, NW- and S-vergent). D3b was a crustal relaxation stage, during which Sukari granodiorite syn-kinematically-emplaced, and subsequently invaded by gold-bearing quartz veins and veinlets. D4 deformation was an ENE-WSW transtensional phase resulted in the formation of NNW-SSE centimeter – meter scale gold-bearing dilatant fractures. The latest deformation phase (D5) was a NE-SW post-accretion phase, resulted in the formation of NE-oriented dextral transcurrent shearing and related structures. Careful synthesis of the abovementioned polyphase deformation history indicates that key parameters controlling gold distribution in Sukari are D3b and D4.

(VI- 4 Oral)

GEOMETRY AND KINEMATICS OF THE MIDDLE TO LATE MIOCENE SALT TECTONICS, CENTRAL EGYPTIAN RED SEA MARGIN

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The Red Sea basin includes a thick Middle to Late Miocene evaporitic succession that underwent halokinesis and caused intensive reshaping of the seafloor and the development of salt-tectonic structures. However, the geometry and kinematics of these structures are still poorly understood. This study uses 2D and 3D seismic surveys and well data of the northern Egyptian Red Sea to systematically describe the distribution and morphology of salt structures, discuss their

initiation, and construct a kinematic model for their origin. Our results indicate that the massive salt layer developed into five major NW-SE to NNE-SSW trending salt walls, characterized by relatively irregular crests and moderately dipping flanks. In addition, several symmetrical and asymmetrical folds and two categories of normal faults (subsalt and suprasalt) have been recognized. Based on our observations, salt mobilization in the study area started in the Late Miocene, during the precipitation of layered evaporites, and continued until the present day. In the northern Egyptian Red Sea, seismic interpretation indicates that halokinesis was triggered by a combination of thin- and thick-skinned systems, where the latter played a major role. The salt layer was welded during the Quaternary as several sags and grabens developed above the salt diapirs. Thick-skinned physical models are compatible with our observations, supporting the impact of basement faulting on Red Sea diapirism.

Keywords: Salt tectonics, Salt walls, Evaporites, Quseir province, Northern Red Sea.

(VI-5 Oral)

ARCHITECTURE AND EVOLUTION OF RELAY RAMP AT WADI EL-NAKHIEL, QUSEIR AREA RED SEA, EGYPT: INSIGHTS FROM OUTCROP ANALYSIS.

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Fault linkage is a critical process in the development and evolution of fault systems. Normal faults often grow through the connection of separate fault segments via relay ramps, which can occur across various scales. These relay ramps not only facilitate the extension and propagation of faults but also play a significant role in hydrocarbon exploration. The fractures and enhanced permeability within relay ramps can create pathways for fluid migration (e.g. hydrocarbon). Understanding the Architecture and evolution of fault linkage and relay ramp structures is therefore essential for both geological studies and the energy industry.The unique, distinctive, and prominently

exposed Umm Karabah Breached Relay Ramp (UKBRR) at Wadi El-Nakhiel, cutting through the pre-rift rocks (Eocene Thebes formation) of the Red Sea, provided an opportunity for an in-depth examination of their intricate architecture and fault interactions. This study sheds light on the structural complexities and processes involved in the formation and evolution of relay ramps.The orientation of bedding within a relay ramp is variable, with dip directions influenced by the sense and magnitude of rotation around horizontal axes. Besides, Layer-parallel slip within a normal fault zone plays a crucial role in transferring horizontal movement between adjacent fault segments, and repeated episodes of bed-parallel slip during fault development result in the formation of intricate and complex fault zones within the UKBRR. Moreover, several antithetic faults have been identified within the UKBRR, which represent an essential mechanism in accommodating the vertical displacement.Finally, this study reveals that multiple mechanisms often operate in conjunction to facilitate the transfer of displacement across individual relay zones.

Keywords: Red Sea, Umm Karabah Breached Relay Ramp (UKBRR), layer rotation, Layer-parallel slip, antithetic faults.

(VI -6 Oral)

STRUCTURAL INTERPRETATION OF THE SOUTHERN GULF OF SUEZ BASED ON SOURCE MECHANISM AND SOURCE PARAMETERS OF THE SIGNIFICANT EARTHQUAKES OF THE 27 DECEMBER 2022 SEISMIC SEQUENCE

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On 27 December 2022, a moderate size earthquake (ML=5) occurred in the Gulf of Suez at 28.03° N and 33.47° E. It was widely felt as far as 500 km and well recorded by the seismic (ENSN) and accelerometer (ENSAN) local networks. The earthquake occurred about 53 km from the June 2013 earthquake of ML 5.1.The displacement spectra estimate corner frequency (in Hz) and long-period spectral level (in nm-s). These two parameters play a crucial role in estimating earthquake source parameters. The calculated seismic moment ranges from 1.96E+20 to 1.44E+22 dyne-cm. The computed seismic moment is converted to the moment magnitude. The determined corner frequency ranged from 5.2 to 9.8 Hz. The estimated source radius ranges from 136.2 m to 254.3 m, while the stress drop values range from 2.3 to 61.3 MPa.The moment magnitude, seismic moment, focal depth, and the best double couple mechanism are obtained for three earthquakes with a magnitude more than 4.0 of the 27 December 2022 seismic sequence. The best solution double couple mechanism revealed normal faulting with minor strike-slip movement dominated by NNW-SSE and NW-SE directions. The obtained mechanism of the 27 December 2022 earthquakes agrees well with the regional tectonic and local fault structure of the Gulf of Suez area. It is consistent with previous results and findings. The results of this research can be of interest to the seismic risk calculation process in the region, especially since the Gulf of Suez region is considered as one of the critical and economically promising places. Seismicity-derived estimates of the deeper crustal state of stress in the southern Gulf are more problematic.
Keywords: seismic sequence, focal mechanism, moment tensor, stress drop.

Poster Presentations

(VI -7 Poster)

STRUCTURAL EVOLUTION OF EL-DELIHIMMI GRANITES, CENTRAL EASTERN DESERT OF EGYPT: BASED ON FIELD INVESTIGATIONS, MICROSTRUCTURES, AND MAGNETIC FABRIC

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Gebel El-Delihimmi is an oval-shaped multiphase granite intrusion located in the Central Eastern Desert of Egypt. Understanding the relationship between tectonic events and the emplacement of El-Delihimmi granites remains difficult due to the presence of multiple phases and the absence of a clearly oriented fabric or visible foliation. Anisotropy of Magnetic Susceptibility (AMS) and microstructural analyses were used in this study to address this problem. The southern part of the pluton exhibits distinct shear-related and solid-state deformation, indicating significant tectonic activity. In contrast, the northern part reveals magmatic and sub-magmatic deformation patterns. These differences suggest that the southern portion was emplaced during activity of the Najd Fault system, while the northern segment intruded along pre-existing fractures; this is further supported by the magnetic fabric orientation of both the deformed and the undeformed granites, which consistently align in a NW-SE direction.

Keywords: Gebel El-Delihimmi, Najd Fault, Magneticfabric, Microstructure, Eastern Desert of Egypt.

VII- Petroleum Geology

(VII- 1 Oral)

IMPACT OFLITHOFACIES DISTRIBUTION ON RESERVOIR QUALITY: A CASE STUDY RAHA FORMATION IN THE RAS BUDRAN FIELD, OFFSHORE SUEZ GULF BASIN, EGYPT

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The Raha Formation is regarded as one of the most important reservoir rocks in the Ras Budran Field, which is situated in the Suez Gulf Basin of Egypt. This formation, which is primarily made up of sandstone with some limestone and shale sticks interbedded, is distinguished by a variable lithofacies distribution both laterally and vertically. The objective of this study is to investigate the lithological, sequence stratigraphical and petrophysical characteristics of the Cenomanian Raha reservoir rock in this field. To achieve this, three wireline wells (RB-A2, RB-B2, and RB-C4) were thoroughly examined. Sequence stratigraphic analysis generally subdivides into two systems of tracts: the transgressive tract (representing the lower and middle parts) and the highstand tract (upper part) within the Raha Formation. The petrophysical analysis exposed that the promising reservoir intervals within the Raha Formation between depths of 11200-11250 ft (50 ft thick) and depths of 11575-11620 ft (45 ft thick) in RB-A2 Well. However, in RB-C4 Well, the reservoir zones locate between depths of 11025-11060 (35 ft thick) ft and 11250-11260 ft (10 ft thick) in addition to 11325-11475 ft (150 ft total thick). In RB-B2, the promising zone locates between depths of 10725-10925 ft (200 ft thick). All of the wells under investigation had good reservoir quality in the hydrocarbon intervals, according to the quantitative study. High values of hydrocarbon saturation (0.50-0.90), effective porosity (0.11-0.16), and total porosity (0.12-0.18) define the reservoir

zones. On the other hand, low values in water saturation (0.10-0.50) and shale content (0.03-0.10) are recorded. Lastly, through linking sequence stratigraphic framework and petrophysical results, we can infer the influence of depositional processes on reservoir quality.

Keywords: Petrophysical assessment, Cenomanian, Depositional sequence, Raha reservoir rock, Ras Budran Field, Suez Gulf Basin.

(VII- 2 Oral)

LITHOLOGICAL CONTROL AND PETROPHYSICAL INVESTIGATION: MATULLA RESERVOIR UNIT, GULF OF SUEZ BASIN, EGYPT

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One of the supreme significant reservoir rocks in the Ras Budran Field, Suez Gulf Basin, Egypt, is implicated to be Matulla Formation. It is made up of sandstone and limestone interbeds with shale beds. It is further distinguished by differences in the distribution of the lithofacies along the lateral and vertical associations, which caused it to be a heterogeneous reservoir rock. Hence, the objective of this work is to investigate the lithological features and petrophysics of the Coniacian- Santonian Matulla reservoir rock in the field. To fulfill this objective, four wireline wells (RB-A2, RB-A7, RB-B2, and RB-C4) were thoroughly examined. The sequence stratigraphic analysis revealed that the Upper Cretaceous (Coniacian-Santonian) succession in the examined region can be categorized into a primary third-order depositional sequence, bounded by two significant depositional sequence boundaries. This sequence is further divided into three systems tracts, namely: lowstand, transgressive and highstand. The study area contains favorable reservoir zones within the Matulla

Formation between depths of 10655-10685 ft (30 ft thick) in RB-A2 Well, 10567-10578 ft (11 ft thick) in RB-A7, 10300-10325 ft in addition to 10350-10460 ft (135 ft total thick) in RB-B2 Well, and 10595-10600 ft (5 ft thick) in RB-C4. The quantitative analysis revealed that all of the wells under examination have good reservoir quality in the hydrocarbon-intervals. The reservoir zones are characterized by high values in total porosity (15%-19%), effective porosity (12%-18%), and hydrocarbon saturation (55%-65%). In contrast, low values are recorded in shale content (3%-10%) and water saturation (35%-45%). By linking these results with the sequence stratigraphic framework, we can infer the influence of depositional processes on reservoir quality. The vertical and lateral variability observed in the Matulla Formation highlights the role of tectonic activity and sedimentation rates in shaping reservoir characteristics. This information is vital for regional basin analysis and can guide exploration strategies across similar geological settings.

Keywords: Lithofacies variations, Sequence Stratigraphy, Systems Tracts, Petrophysical assessment, Matulla reservoir rock, Ras Budran Field, Suez Gulf Basin.

(VII- 3 Oral)

INTEGRATED SEQUENCE STRATIGRAPHY AND PETROPHYSICAL EVALUATION OF THE MIOCENE RUDEIS FORMATION, RABEH-EAST FIELD, GULF OF SUEZ BASIN, EGYPT

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This study conducts a comprehensive sequence stratigraphy and geophysical evaluation of the Miocene Rudeis Formation within the Rabeh-East Field, located in the Southern Gulf of Suez Basin, Egypt. The primary objective is to assess the hydrocarbon potential and sequence stratigraphic analysis of the formation by integrating seismic data with petrophysical analysis from wireline logs obtained from the

RE-22 well. Lithologically, the Rudeis Formation in the study well is mainly composed of intercalated shale, marl, marly shale and few of limestone. Quantitative petrophysical analysis of the thick limestone interval in the Rabeh East-22 Well identified 26 ft thick promising section between 4,569 and 4,595 ft, characterized by favorable reservoir properties, including an average hydrocarbon saturation of 53%, shale volume of 21%, total porosity of 20%, effective porosity of 15%, and a bulk volume of water of 0.07. The depositional sequence stratigraphic analysis indicates that the Middle Miocene Rudeis Formation in the region studied can be classified into a single third-order depositional sequence. This sequence is bounded by two significant sequence boundaries coincide with the top of the Nukhul and the base of the Kareem formations respectively and is primarily represented by a transgressive system tract (TST).

Keywords: Rabeh-East Field, Miocene Reservoir; Gulf of Suez Basin; Rudeis Formation; Sequence Stratigraphy, Systems Tracts.

(VII- 4 Oral)

RESERVOIR CHARACTERIZATION ANDOIL POTENTIALITY OF THE EARLY CRETACEOUS ALAM EL BUEIB FORMATION IN ARCADIA FIELD, NORTH WESTERN DESERT, EGYPT

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The Early Cretaceous late syn-rift sediments of Alam El Bueib (AEB) Formation, in the north Western Desert of Egypt, host some potential but poorly-explored reservoir targets. The controls on the depositional evolution and architecture of the Alam El Bueib sedimentary sequence are poorly constrained. Therefore, this study integrates seismic, sedimentological, and petrophysical data of the Alam El Bueib succession at the Arcadia oilfield in the north Western Desert to build some property models to predict the architecture of the potential

reservoir facies. It is a detailed study based on the availability of sedimentological data (petrography, SEM, and XRD), well log data (gamma ray, neutron, density, sonic, shallow and deep resistivity, and PEF logs), in addition to conventional core analysis data (grain and bulk densities, porosity, and horizontal and vertical permeabilities) for the AEB reservoir.Based on the petrographical description data, the studied samples are summed up into four microfacies associations (ferruginous siliceous quartz arenites, ferruginous and glauconitic siliceous quartz arenite, siliceous quart arenite, as well as glauconitic siliceous quartz wacke). Applying the porosity-permeability plot, Dykstra-Parsons, discrete rock type (DRT), the reservoir quality index (RQI)-flow zone indicator (FZI) plot, effective pore radius of Winland (R35), and the improved stratigraphic modified Lorenz technique (ISML), it is indicated that the studied AEB samples can be grouped into three reservoir rock types (RRTs). Among them, two RRTs are considered prospective. The reservoir zones are represented by a siliceous quartz arenite of well sorted very fine to silty-grained quartz with fair intergranular porosity of averages ~ 12.8 & 13.8 % and average permeability values equal 216.4 mD and 842.4 mD (for the RRT1-2). Its reservoir quality index (RQI) and flow zone indicator (FZI) indicates fair to good reservoir quality ($1.45 \leq RQI \leq 3.71$ μm, $11.75 \leq FZI \leq 17.40$ μm). The presence of argillaceous and/or micaceous materials in addition to the silt-sized grains reduced the reservoir quality in the direction from the RRT1 samples (fair to good reservoir quality, macro pore sizes, $16.8 \leq R35 \leq 43.3$ μm) to the RRT3 samples which are considered slightly tight reservoir (micro to nano pore sizes, $0.08 \leq R35 \leq 3.70$ μm).The AEB-IIIG member contains some oil-bearing intervals with a variable net-pay thickness ranging from 4.5 ft in Arcadia-7 to 47 ft in Arcadia-1X. The studied wells have average porosity values of about 10.8 % and average shale volume equals 13.4%. On the other hand, the average water saturation value is 33.9%. The AEB-IIIG member shows a medium to high hydrocarbon saturation value reaching 66.1%.

Keywords: Petrophysical characterization; Reservoir Rock Typing; Oil Potentiality; Arcadia Field; AEB Formation; Western Desert.

(VII- 5 Oral)

INTEGRATING PETROGRAPHY, SPECTRAL GR, XRF, AND XRD TECHNIQUES AS POWERFUL TOOLS TO ESTIMATE THE EFFECT OF SHALE TYPES ON THE IN-SUITE DUAL FORMATION: A CASE STUDY IN NORTH EGYPT

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This study investigates the effect of shale types and calcareous cement on the Jurassic sandstone reservoirs in the Matruh concession, north-western Egypt, which represents an important regional gas producer in the East Mediterranean region. A number of 7 wells were available from the EGPC and are used in the current study to assess the formation evaluation by estimating the petrophysical properties and facies distribution of the target intervals using the Techlog Quanti Elan module. There is a wide range of elastic properties in the Upper Safa Member. Most of the shale intervals behave ductilely and have a brittleness index (BI) of less than 40. Furthermore, it can be observed that the BI of the Lower Safa sandstone reservoir is comparatively greater when compared to the sandstone of the Upper Safa Member. The presence of calcareous cement and shale intervals in the Lower Safa shows higher ductility than the Upper Safa because of the increase in TOC content, which is consistent with high GR readings. Moreover, intervals that contain a significant abundance of elongated carbonate shell fragments also function as calcareous cement. In this capacity, they form thin, rigid layers that are embedded within permeable intervals. As a result, these layers decrease the porosity and permeability of the reservoir, leading to drilling complications. One such complication is the occurrence of dogleg behavior, which hampers the rate of penetration in these intervals. The type of shale present in the Jurassic Section sandstone reservoirs can affect the rock's petrophysical properties, potentially lowering its overall quality. The outcomes presented in the current study provide evidence

that the predominant clay type within the studied formation is mostly dispersed and laminated.

Keywords: Petrography, Formation Evaluation, Quanti Elan, XRD, XRF, shale types, Dual Formation, Western Desert.

(VII- 6 Oral)

GEOCHEMISTRY OF HYDROCARBONS AND 1D BASIN MODELING OF THE SOURCE ROCKS IN THE ASYUT BASIN, EGYPT

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This work emphasizes the hydrocarbon system in the Asyut basin using organic geochemistry and a 1D basin modelling through analysis of the cutting and mud gas samples collected from three wells, located in the Wadi Mahareeth, Eastern desert, Egypt. The total organic carbon (TOC) and Rock Eval pyrolysis (S2) results reveal the presence of three organic source rock types. The first source rock type is oil-prone and encountered within the Apollonia "C and D", Khoman, Abu Roash "A and B", Bahariya and Alam El Bueib Formations showing low to very high TOC (0.56-5.15 wt. %) and fair to very good hydrocarbon generating potential for oil generation where mature (S2 2.76-16.77 mg HC/g rock and hydrogen index (HI) of 326-584 mg HC/gTOC). The second source rock type is mixed oil/gas-prone and encountered within the Abu Roash "A, B and G", Bahariya, and within the Alam El Bueib Formations revealed high to very high TOC (0.84-4.11 wt. %) and fair to excellent potential for oil/gas generation where mature (S2 2.21-12.12 mg HC/g Rock and HI of 203-331 mg HC/gTOC). The third type is mainly gas-prone and appears within the Abu Roash "B, C, E, G" and Bahariya Formation which characterized by high TOC (1.12-2.24 wt. %) and low potential to generate mainly gas where mature (S2 2.06-3.98 mg HC/g Rock and HI of 117-218 mg HC/gTOC). The expulsion model indicates that the top of the oil window at approximately 1600 m and only hydrocarbon generation appears to have taken place from the Abu

Roash “A, B, E, G”, Bahariya and Alam El Bueib source rocks and no expulsion could have possibly occurred. These sediments should be in the early-mature stage, while the sediments of the lower section from the Alam El Bueib and older sediments are currently in the mid-mature stage.

Keywords: Asyut basin, Wadi Mahareeth, Source rock, Geochemistry, 1D Modeling.

(VII- 7 Oral)

PREDICTION OF WELL LOG RESPONSES USING K-NEAREST NEIGHBORS REGRESSION

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Well-log data plays a crucial role in characterizing and evaluating subsurface reservoirs. However, incomplete, or missing logs can hinder accurate analysis and interpretation of the reservoir properties. This research aims to develop a predictive model using the k-Nearest Neighbors (k-NN) algorithm to estimate missing well log. This study explores the application of the K-Nearest Neighbors (KNN) regression algorithm for predicting well log responses, specifically focusing on gamma-ray (GR) logs. The dataset, comprising different well-log variables, was first preprocessed to handle missing values and scaled using MinMaxScaler to normalize the features. Pearson correlation analysis evaluates the relationship between the target well log and other well logs, revealing significant correlations. The dataset was split into training and testing subsets in a 70:30 ratio, and a grid search was performed to optimize the KNN model's hyperparameters. The optimal model was determined to have 2 neighbors, yielding a test accuracy score of 91.5% and a training accuracy score of 0.97.4% . The model's performance was further assessed using the root mean square error (RMSE). The predicted GR values were then compared against the actual GR log, and the results were visualized to demonstrate the model's predictive capability. The results suggest that KNN can be a valuable tool in subsurface characterization, potentially

aiding in the Prediction of Well Log Responses and reservoir properties.

(VII- 8 Oral)

INTEGRATED GEOPHYSICAL ANDGEOLOGICAL EVALUATION OF THE UPPER CRETACEOUS ABU ROASH "F" MEMBER, AZHAR OILFIELD, BENI SUEF BASIN, EGYPTIAN WESTERN DESERT AS A POTENTIAL CARBONATE HYDROCARBON SOURCE ROCK

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Beni Suef Basin has a promising prospect for hydrocarbon production in the Egyptian Western Desert, so it has given a priority in exploration plans. Abu Roash "F" organic-rich carbonate rocks have been resulted in oceanic anoxia and deposited in the Global sea-level rise during the Upper Cretaceous event. In the present work, an integrated study using multiple datasets and techniques to determine 3D structural modeling of the Abu Roash "F" Member in Azhar Oilfield, Beni Suef Basin and to predict its lithofacies characteristics and potentiality as a source rock. In view of that, ten 2D seismic reflection sections and digital well logging data from 3 wells (Azhar-E2x, Azhar-E3 and Azhar-5) have been interpreted to predict the lithology variation, shaliness and total organic carbon (TOC) values along Abu Roash "F" using numerous methods. The available data of core analysis and geochemical Rock-Eval have been used to validate the obtained results. Based on the seismic interpretation and well-log correlations, structural cross sections, structural maps, isopach maps, and structural model are constructed to investigate the subsurface configuration of the Abu Roash F Member in the Azhar Oilfield area.The structural modeling reveals that the depth distribution is uneven, with fault patterns trending NW-SE, NE-SW, and E-W affected the Beni Suef Basin. The constructed isopach map indicates

that the Abu Roash "F" Member occurs with higher thickness (from 240 to more than 400 feet) in the northern and north-western parts, but decreases due central and southern portions (from less than 200 to 50 feet), probably due to the structural fault regime in the area. The neutron-density and M-N crossplots performed from well logging data analysis indicate that the lithology is represented mainly by limestone, mixed with dolomites and shales. Interpreted lithology variation of Abu Roash "F" Member has been represented vertically along the studied wells. The TOC content values derived from density logs and Δ Log R methods, vary from 2.08 to 9.17 wt% in Azhar-E2x well, 1.5 to 8.34 wt% in Azhar-E3 well, and 1.87 to 8.92 wt% in Azhar 5 well, indicating that the Abu Roash "F" Member acts as source rock with good to excellent potentiality in the Azhar Oilfield. Results of this work can serve as a basis for subsequent basin modeling, which are highly recommended to further investigate the petroleum system in the Azhar Oilfield.

Keywords: Seismic reflection, Well logging, 3D structural modeling, TOC, Hydrocarbon potentiality, Abu Roash F Member, Beni Suef Basin.

(VII- 9 Oral)

PETROLEUM SYSTEM ANALYSIS OF THE KOMOMBO BASIN, SOUTHERN EGYPT: INSIGHTS FROM BASIN MODELING AND HYDROCARBON GEOCHEMISTRY

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Komombo Basin is the only hydrocarbon-producing basin in southern Egypt. However, its petroleum system is still poorly understood, leaving numerous geological questions unanswered. This study integrates seismic, borehole, and geochemical data, coupled with 1D and 2D basin models, to evaluate the hydrocarbon potential and analyze the petroleum system within the Komombo Basin.

Geochemical data reveal four main source rocks: the B member of Six Hills, upper Maghrabi, Quseir, and Dakhla. The B member is interpreted as a very good source rock, characterized by Kerogen type II to II/III. The upper Maghrabi and Quseir are considered good to very good source rocks with organic matter type III and II/III, respectively. Conversely, the Dakhla Formation is recognized as a source rock of good to excellent quality with a mixed kerogen type of II/III. Temperature models highlight two heat anomalies during the Early and Late Cretaceous, aligning with the identified rift phases in the basin. The present-day thermal maturity model indicates that the B member is the only mature source rock that has entered the main oil window. However, in the deepest part of the basin, it reaches the gas window. Although the hydrocarbon generation from the B member began in the Early Turonian, most of the kerogen transformed into hydrocarbons during the middle Santonian-early Maastrichtian. Three migration scenarios were tested, however, the first scenario with the invasion percolation migration method aligns more with known hydrocarbon accumulations in the basin. The predicted accumulation zones are found within several sand units, including the A member, C member, sandy intervals within D-G members of Six Hills, and Sabaya-Maghrabi reservoirs. These zones are predominantly situated within structural traps. Comparative analysis using gas chromatograms between recovered oils from the reservoirs and an extracted bitumen sample from the B member source rock reveals a strong correlation among them.
Keywords: Petroleum system, 1D basin model, 2D basin model, Cretaceous basins, South Egypt

(VII-10 Oral)

RESERVOIR CHARACTERIZATION AND FACIES MODELING OF THE KAFR EL SHEIKH AND ABU MADI GAS-BEARING RESERVOIRS IN DISOUQ FIELD, NILE DELTA, EGYPT: INTEGRATED PETROPHYSICAL, PRESSURE AND SEISMIC STUDY

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Kafr El Sheikh and Abu Madi Formations are among the potential gas-bearing reservoirs in the Nile Delta, so many efforts have been excreted to characterize them. For Disouq Field in the north western part of the Nile Delta, and based on a full set of conventional well log data of four wells, the petrophysical properties and potentiality of these two formations were delineated. Based on the litho-saturation plot integrated with the neutron-density and M-N plots, it is indicated that the lithology of the studied reservoir indicates that both formations are composed mainly of shale sequences intercalated with some sand lenses and lobes acting as potential reservoirs. Based on the petrophysical data, the Kafr El Sheikh El Sheikh Formation is further subdivided into some zones; among these, the most important zones are the KES IIIA, KES IIIB, KES IIIC, and KES IIID. Petrophysically, the lithology was followed up laterally in Disouq Field. The petrophysical parameters indicates a high potentiality for both the Abu Madi Formation (7.77 m < Net-pay < 13.72 m, 20.8 % <∅e < 25.8 %, 34.4 % < Sw < 51.8 %, and 20.3 % < Vsh < 22.6 %) and the Kafr El Sheikh Formation (1.98 m < Net-pay < 10.0 m, 23.1 % <∅e < 25.3 %, 29.5 % < Sw < 42.4 %, and 29.0 % < Vsh < 32.0 %). The seismic Data referred to the presence of E-W trending 4-way dip

closure and a major N-S normal fault crossing the field with an anticline formed in its up thrown block. The RFT pressure data helped in defining the free water level (FWL) between the gas and the water aquifer at depths 7296 ft and 7850 ft for DSQ1-3 and DSQ1-5 wells, while in DSQ-2X well it is indicated that the water is present at shallower depths than two separated gas reservoirs referring to the presence of three isolated compartments. The integration between the well log and seismic data enabled more detailed delineation for the complex structural setting of the field and detailed characterization for its reservoir and petrophysical properties. This study is applicable to the similar 4-way dip closure, which is dominant in the Nile Delta and other similar prograding river-dominated deltas.

Keywords: Structural modeling; Facies and petrophysical modeling; Petrophysical characterization; Kafr El Sheikh Formation; Abu Madi Formation; Disouq Field; Nile Delta.

(VII- 11 Oral)

IDENTIFICATION OF HYDROCARBON-BEARING ZONES WITHIN THE EARLY CRETACEOUS RESERVOIR ROCKS USING WELL LOGGING AND SEISMIC REFLECTION DATA IN AL-BARAKA FIELD, WEST KOMOMBO, EGYPT

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Al-Baraka is the first explored oil field in the Komombo basin. The formation and evolution of Komombo basin were influenced by tectonic processes from the pre-early Cretaceous period. The main objectives of this study are to; identify hydrocarbon potential in this remote part of Egypt, evaluate and determine the interesting zones within the early cretaceous rocks for hydrocarbon accumulations in Al-Baraka reservoir. Using well logging data, the stratigraphic section and reservoir extent of Al-Baraka field were examined. Three-dimensional geometrical and structural models were also created using seismic reflection data. Al-Baraka reservoir rocks are made up of non-

marine sands and shales that were accumulated in a confined marine environment. By the careful interpretation of petrophysical data, different hydrocarbon-bearing zones (R2, R4, and R5) can be identified within west Al-Baraka-2 well. These zones were recognized in the Six Hills Formation members E and F of the early Cretaceous. Petrophysical analyses showed that these zones have moderate to good porosity (18.2–20.1%), low shale distribution (8.5–20%), and high average hydrocarbon saturation (42.5%) with high movability. Five zones were recognized based on the interpretation of 3D geometrical modeling. 3D structural modeling shows lateral extension and thickness variation controlled by the effect of faulting. The exploration of hydrocarbon in Komombo basin will contribute to the exploration of more rift basins in southern Egypt.

Keywords: Hydrocarbon-bearing zones; early Cretaceous; reservoir rocks; well-logging Seismic reflection; Al-Baraka; Komombo; Egypt.

(VIII- 12 Oral)

THE NILE DELTA BASIN: A WEALTH OFGAS RESERVES – A COMPREHENSIVE REVIEW OF THE LATE MIOCENE-PLIOCENE GAS-RESERVOIRS

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The Nile Delta Basin (NDB) is a significant gas province, boasting extensive natural gas reserves across various stratigraphic layers from the Late Miocene to the Pliocene epochs. This review article provides a comprehensive analysis of the NDB's Late Miocene-Pliocene gas reservoirs, focusing on the Abu Madi, Kafr El-Sheikh, and El-Wastani formations. Through a detailed examination of their petrophysical properties, depositional environments, and seismic interpretations, the article synthesizes the geological characteristics and exploration history of these key formations. The Abu Madi Formation, primarily composed of siliciclastic facies, has been a major gas source in last decades, with discoveries in both onshore and offshore regions. Similarly, the Pliocene reservoirs, particularly the sandstones of the Kafr El-Sheikh and El-Wastani formations, are prime targets for gas

exploration, with recent successful discoveries highlighting their potential. Despite substantial findings, the NDB remains underexplored, with significant potential for future exploration. This review aims to consolidate existing knowledge, guide future exploration efforts, and underscore the NDB's importance as a natural gas province in the eastern Mediterranean.

KeyWords: Nile Delta Basin, Messinian reservoir; Abu Madi Formation; Pliocene reservoir; Kafr El Sheikh Formation, El Wastani Formation; Petrophysical evaluation; Seismic interpretation

Poster Presentations

(VIII- 13Poster)

ORGANIC PETROGRAPHY/GEOCHEMISTRY AND SEQUENCE STRATIGRAPHY OF THE POST-RIFT APTIAN MIXED CLASTIC-CARBONATE DEPOSITS IN SOUTHERN TETHYS (MATRUH BASIN, NORTHWESTERN EGYPT): DEPOSITIONAL SETTINGS AND HYDROCARBON PROSPECT

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The Mesozoic Matruh rift basin in the northern Western Desert of Egypt contains along with other coastal rift basins (Shushan, Alamein, and Natrun) over 40% of Egypt's proven oil reserves. These basins were developed during the Permian-Early Jurassic periods as a result of Gondwana's split and the progressive opening of the Neotethys. Integrated organic petrographic/geochemical and sequence stratigraphic analyses were made on the Aptian Alamein and Dahab formations in the Siqiefa-1X well in the Matruh Basin to identify their depositional settings and hydrocarbon potential. The interpretations of the paleoenvironments and paleoclimatic conditions were mainly

based on the sedimentological significance of palynofacies and organofacies types, and ecological preference of certain palynomorphs. The sedimentary facies identified from cuttings samples and the well log (spontaneous potential) data provided supplementary evidences to the paleoenvironmental interpretations. The smoothed curve of the continental to marine palynomorphs (Cont/Mar) ratio indicated successfully the Neotethyan 2nd order sea level curve and reflected the major transgression and regression cycles. The detailed vertical stratigraphic changes of the Cont/Mar ratio indicated variations in the Neotethyan 3rd order sea levels, which reflected two regressive systems tracts (RST) and transgressive systems tracts (TST). Results indicated that the Aptian deposits were accumulated in proximal and distal deltaic settings under warm semi-arid to warm humid conditions. TSTs contain immature source rocks of better organic richness (1.3-2.6 TOC wt%) and organofacies quality (gas/oil-prone: HI = 175.7-203.9 mg HC/g TOC and oil-prone HI = 441 mg HC/g TOC kerogen types) than RSTs. This was related to the minor middle and late Aptian Neotethyan sea level rises.
Keywords: Aptian, Organic Facies, Sequence Stratigraphy, Hydrocarbon Potential, Neotethys, Egypt.

VIII- Hydrogeology and Water Management

(VIII- 1 Oral)

HYDROGEOCHEMICAL ANDHYDRAULIC CHARACTERISTICS OF RIVERBANK FILTRATION AT SELECTED SITES IN SOHAG GOVERNORATE, EGYPT

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Introduction: Access to safe drinking water is critical, particularly in developing countries, where contaminated water can lead to severe health issues. Riverbank filtration technology produces clean drinking water efficiently, sustainably, and at a lower cost. Many stations have been built in Upper Egypt and especially Sohag Governoraterelying on purifying the Nile River water. Purpose: This work aims to examine selected operating bank filtration sites in Sohag, Egypt, with a focus on some of the geohydraulics and operational conditions factors governing the effectiveness of this technology.

Method: To assess the quality of the water, samples were taken from pumping units, groundwater, and the Nile River. A hydraulic groundwater flow model was created using MODFLOW and MODPATH to replicate the flow of the riverbank filtration system and examine the system's hydraulic performance.

Results: The results showed that the water produced by the Riverbank filtration technique has a low percentage of pathogens compared to the Nile River. Also, the chemical elements, especially iron and manganese, have a lower percentage than ambient groundwater, but at higher concentrations than the Nile River water. Moreover, the hydraulic and hydrogeological characteristics such as abstraction rate, well depth, hydraulic conductivity of the riverbed, and distance from the River Nile are important and may affect the RBF hydraulic performance as well as its effectiveness.

Keywords: Riverbank filtration, RBF, Water quality, Modelling, MODFLOW, Riverbed.

.**(VIII- 2 Oral)**

LAND USE/LAND COVER CHANGE DETECTION AND THE PREDICTION ON GROUNDWATER RESOURCES IN WADI EL ASSIUTI PLAIN, EASTERN DESERT, EGYPT

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Today, land use/land cover (LULC) has become one of the major issues in a developed region. Therefore, it is always important to monitor (LULC) change within a certain period of time and predict patterns of future land use change on a spatial basis. The detection and prediction of (LULC) change is crucial for guiding land resource management, planning, and sustainable development. This study aims to develop an integrated approach for mapping and monitoring (LULC) changes in Wadi El-Assiuti plain and to investigate the impacts of LULC changes and development on groundwater level and quality using Landsat images and hydrological information in a Geographic information system (GIS) environment. This study employed the normalized differencing vegetative index (NDVI, the normalized difference built-up index (NDBI) and supervised image classification integrated with high-resolution Google Earth images to detect LULC changes observed of the Wadi Al-Assiuti plain. Several Landsat time-series images for the years 1987, 2000, 2010, 2014 and 2020 were used and selected. The observed changes in LULC are highly linked to the depletion in groundwater level and quality across the study area. The result of NDVI showed that the Agriculture lands increased from 1987 to 2020 about 75.96 km2 with growth rate of 15.54 % of the study area. The outcomes of supervised classification indicated that agriculture lands was increased from 1987 to 2020 about 74.04 km2 with growth rate 15.15%, this rate nearly corresponding to growth rate which extracted by NDVI in the same period. Urban areas increased in this region from 1987 to 2020. The proposed reclaimed lands increased from 1987 to 2010, and then declined again. On the other hand, the desert lands decreased from 1987 to 2014, and then

it's increased again to 2020. The study denotes that remote sensing data are completely effective to map biophysical resource. Overall accuracy and Kappa coefficient for classification was 81.5 % and 0.74 for 1987; 88 % and 0.84 for 2000; 92 % and 0.89 for 2010; 92.5% and 0.90 for 2014; and 91.5 % and 0.88 for 2020, respectively. In El Assiuti plain,the prediction and simulation of future land use growth have been represented by CA–Markov model. The best iteration numbers used for CA transition rules of the model were (i.e. 40, 60, and 100) were used to predict land use in 2030 and 2040. Based on the fruitful model confirmation, the future land-use maps of 2030 and 2040 were produced using the real map of 2010 and 2020, respectively.

Keywords: Land use /Land cover; CA–Markov; prediction; groundwater resources; remote sensing; GIS: Wadi El Assiuti: Egypt.

(VIII- 3 Oral)

LIVER FIBROSIS AND WATER POLLUTION

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Background: Several diseases have caused by contamination of surface and groundwater.
Aim of the work is to investigate the impact of iron overload in drinking water on liver pathology.
Materials and Methods: Samples of drinking water, blood and true cut liver biopsies taken from selected inhabitants. Those inhabitants were suffering from liver disorders. Samples of water, blood and true cut liver biopsies after having informed consent taken and undergone for determination of iron level. Measurement of iron level in water samples was carried out in duplicate with the use of GBC atomic absorption spectrophotometer, Taco company (Australia). Analyzed for serum iron level with a micro lab 200 spectrophotometer by using Iron-B kit, Biocon company (Germany).
Results: the mean value of iron in groundwater samples is higher than those permissible limits and then those of surface drinking water. Comparison between iron level in drinking water and human blood

samples shows positive relationship. The control group depended on drinking surface water and had normal liver function tests, whereas the patient group that depended on drinking groundwater had abnormal values in liver function tests. These data suggest that the polluted iron drinking water is the reason for the liver disorder of the patients. Siderosis was apparent among those patients drinking polluted iron water in comparison to control cases. The siderosis appears to be responsible for resistance to treatment of HCV and progression of fibrosis.

Conclusion; The accumulation of iron in liver leads to fibrosis. Iron depletion therapy could interfere with fibrosis development and possibly reduce the risk of hepatocellular carcinoma (HCC).

Keywords; Water, blood, liver, Iron

(VIII-4 Oral)

MAPPING GROUNDWATER POTENTIAL ZONES IN WADI QENA BASIN, EASTERN DESERT OF EGYPT: A GEOSPATIAL INTELLIGENCE AND MULTI-CRITERIA ANALYSIS FRAMEWORK FOR SUSTAINABLE RESOURCE MANAGEMENT

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Groundwater is a rare and valuable resource in arid and hyperarid areas. Over the past few decades, population growth, urbanization, and agricultural activities—particularly in developing countries like Egypt—have greatly increased the demand for water supplies. The purpose of this study is to apply a multi-criteria Analytical Hierarchy Process (AHP) in conjunction with remote sensing and geographic information systems methodologies to identify potential zones for groundwater recharge in Wadi Qena, Eastern Desert of Egypt. Using several data sources (e.g., Landsat-8 Enhanced Thematic Mapper Plus

and Shuttle Radar Topography Mission), as well as all available geologic, and hydrogeological data, thematic maps were prepared and combined based on 15 spatial criteria. Using AHP-based specialized knowledge and expert judgment, the study assigned weights to spatial criteria layers and classified Wadi Qena catchment area into five zones (from very high to very low). The model's accuracy was confirmed by comparing the obtained groundwater potential map with the available borehole data, and daily productivity from the groundwater aquifers within the valley. These results and insights can assist decision-makers in water-scarce areas in making informed decisions regarding the conservation and sustainable management of groundwater resources.

Keywords: Groundwater potentiality, Recharge, Remote Sensing, Geographic Information System, Analytical Hierarchy Process, Wadi Qena, Egypt.

(VIII-5 Oral)

MODELLING THE HYDROGEOCHEMICAL PROCESSES AND SALINIZATION SOURCES OF GROUNDWATER AQUIFERS IN THE WESTERN NILE DELTA (CASE STUDY: ABU GHALIB AREA)

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Salinization of groundwater aquifers is became among the causes endanger the stainability of in Abu Ghalib area, Western Nile Delta. So identifying the factors contributing to groundwater salinity and modelling the hydrogeochemical processes are paramount in the efficiently managing limited water resources in this arid area. A total of thirty-seven groundwater samples were collected from the Abu Ghalib area representing three main aquifers; the Quaternary, Miocene, and the Oligocene aquifers. The analyzed major cations and anions along with stable isotopes (δ18O and δ2H isotopes) were examined and results used to understand the geochemical processes

and salinization sources of those groundwater aquifers. The study indicates that groundwater is mostly affected by chemical weathering of the rock matrix and ion exchange processes, with only a minor influence from the evaporation factor. The chemical weathering is dominated by silicate weathering and cation exchange or reverse ion exchange processes. The NETPATH geochemical model results show that water–rock interaction, evaporation, and mixing are the main geochemical and physical processes controlling the groundwater quality. The stable isotopes data infer that the Quaternary groundwater is mixing with the Nile water and it has been enriched due to evaporation processes as the result of the arid climate dominating the study area. The majority of the Miocene groundwater is relatively depleted with the isotopic signatures and is plotted close to the GMWL, indicating that they are mostly derived from a recent meteoric source and have not undergone through evaporation processes indicating that the Miocene groundwater either mixing with old Nile water recharged to the aquifer before the construction of Aswan High Dam in 1969and recharge from the recent precipitation during the winter time.
Keywords: Geochemical modelling, Groundwater salinization, Stable isotopes, chemical weathering, Abu Ghalib area.

Poster Presentations

(VIII- 6 Poster)

NEW LIGHTS ON THE GROUNDWATER SETTINGS OF EL-KHARGA OASIS UNDER OVER-PUMPING CONDITIONS, THE EGYPTIAN WESTERN DESERT

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Evaluating the conditions of groundwater aquifers periodically, along with good management of the withdrawal and use of groundwater aquifers, is considered extremely important. The current study uses pumping test data to re-evaluate and determine the extent of change in the Nubian Sandstone Aquifer System (NSAS) conditions with over-pumping operations, as it is considered the main aquifer in El-Kharga Oasis, Egypt. The study area experiences high drawdowns and a marked decrease in Piezometric Heads due to heavy exploitation. Twenty-one pumping and recovery tests were analyzed to obtain the Hydraulic parameters of the groundwater aquifer, in addition, the depths and levels of fourteen groundwater wells were measured to assess the water movement patterns and the distribution of the Hydraulic Heads in El-Kharga Oasis. The results show that the effective porosity of the NSAS varies from 22.3% to 28.3% with an average of 24.7%, these values were used to estimate the Hydraulic Conductivity, which varies from 3.7 m/d to 16.1 m/d with an average of 8.07 m/d. Transmissivity values range from 75.6 m2/d to 1440 m2/d and the Storativity range from 0.00000028 to 0.01125. The Transmissivity and Hydraulic Conductivity values in the study area show that sand is the main component of the groundwater layers. According to the Transmissivity values, the NSAS has moderate to high potentiality. The Hydraulic Head measurements vary from -22.5 m. in the center eastern part to 85.6 m. in the southwest. Groundwater flows from southwest to northeast, westward, and north to the southwest in the southern, central, and northern parts respectively. The

results are beneficial for estimating groundwater aquifer potentials in El-Kharga Oasis.

Keywords: Groundwater; Nubian Sandstone Aquifer System (NSAS); Pumping tests; Transmissivity; Hydraulic Conductivity; El-Kharga Oasis; Egypt.

(VIII- 7 Poster)

HYDRO-GEOPHYSICAL ANDHYDRO-CHEMICAL CHARACTERIZATION FOR THE GROUNDWATER AQUIFER IN EL-KHANKA INDUSTRIAL ZONE, GREATER CAIRO, EGYPT

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An integrated study of electrical resistivity method and hydrochemical analysis has been executed at El-Khanka industrial zone in El-Qaluybia governorate, southeastern Nile Delta, Egypt. The objective of the study is to identify the groundwater potentiality and evaluate the impact of local hydrogeological conditions and anthropogenic activities on the groundwater quality. Moreover, assessing the suitability of the groundwater for drinking, irrigation, and industrial purposes. Twenty Vertical Electrical Soundings were conducted with AB/2 ranging from 1m to 150 m. Results of the electrical resistivity method revealed the subdivision of the studied subsurface section into four geoelectrical layers varying in their constituents. The Quaternary (sand and gravel) aquifer is the main water-bearing formation in the survey area with thickness ranging from about 22.5 to 30 m. It's overlaid by Nile silt and clay and underlain by sand and gravel with limestone intercalations and basaltic sheets. Additionally, Dar Zarrouk parameters were calculated, revealing that the majority of the study area falls into the moderately corrosive soil category and is highly vulnerable to pollution due to the thin clay cap. Hydrochemistry analysis was complemented by collecting and analyzing ten water samples both physically and chemically. The samples were subsequently subjected to further scrutiny to identify water types, and

their appropriateness for different purposes. Results indicated that the groundwater is alkaline in nature with varying salinity. Fresh water occurs near to Ismailia Canal reflecting the positive impact of the Canal on the surrounding area as a main source of recharge. Hydrochemical facies varied among mixed types, sodium-chloride type, and calcium magnesium-bicarbonate type based on Piper graph. According to the chemical analysis, it is concluded that the groundwater is not suitable for drinking but suitable for irrigation in the majority of the study area.

Keywords: Electrical Resistivity, Hydrochemistry, Groundwater quality.

(VIII- 8 Poster)

ASSESSMENT OF THE GROUNDWATER QUALITY WITH TEMPORAL CHANGE IN EL-ZAYAT ARID DESERT AREA, EGYPTIAN EL-DAKHLA OASIS

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Groundwater is considered one of the most important natural resources in arid desert areas, on which all human, agricultural, and industrial activities depend. This study aims to evaluate the change in groundwater quality with development operations between 2015 and 2023 and their suitability for different purposes in El-Zayat area, Kharga-Dakhla road, Egypt.Ten groundwater wells represent the Nubian Sandstone Aquifer System (NSAS) with various depths used to achieve the aim of this study. Major ions, total salinity, parameters such as Na%, SAR, EC, RSC, PI, MH, KR, SSP, Cl-, and six parameters of Water Quality Index (WQI) which are pH, TDS, Na+, K+, Ca++, Mg++, Cl-, HCO3-, SO4--, Fe++ and Mn++ are used to assess the groundwater for different purposes between 2015 and 2023. The results of the chemical analysis in 2015 and 2023 show that all groundwater samples are suitable for drinking, livestock and poultry, and industry and irrigation purposes where major ions (except Fe++ and Mn++), TH, and TDS are below the permissible limit. Fe++ and

Mn++ concentrations are above the allowable limit and can be treated. The groundwater quality maps in the study area in 2015 and 2023 show that the groundwater is permissible to excellent for drinking; excellent for livestock and poultry; highly suitable for industrial; and low to high suitable for irrigation purposes. According to the WQI, the groundwater quality is described as unfit to poor quality (2015 and 2023). The WQI calculated without Fe++ and Mn++ parameters, the groundwater quality was described as very poor to good quality (2015) and poor to Excellent quality (2023). Finally, there is a change in all results of this study between 2015 and 2023, whether, by increase or decrease, this is mostly due to the nature of the water-bearing Nubian sandstone sediments, human activities, and the environmental impacts accompanying development processes in El-Zayat area.

Keywords: Hydrogeology, GroundwaterQuality, NSAS, WQI, El-Dakhla Oasis, Egypt.

(VIII- 9 Poster)

RECENT APPROACHES FORWATER RESOURCES ASSESSMENT, A CASE STUDY;SAFAGA AND EL-QUSEIR, RED SEA GOVERNMENT, EGYPT

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Over the past decade, the Egyptian government has focused on the development of the Eastern Desert, with initiatives in new communities, mining, tourism, and agricultural reclamation. Groundwater, a critical resource in arid and semi-arid regions, is vital for sustainable development, often being the only available water source in areas with polluted surface water. This study investigates the groundwater potential and surface water hydrology in the Central Eastern Desert, between Safaga and El-Quseir, using remote sensing and geographic information systems (GIS). By analyzing thematic layers derived from digital elevation models (DEM) and Landsat ETM+ satellite imagery-covering rainfall patterns, slopes, geology,

drainage basins, and landforms-a geological map was created, and groundwater potential was assessed. The analysis identified eleven drainage basins with distinct characteristics: Wadi Ambagi and Wadi Barud exhibit dendritic and sub-dendritic patterns, while Wadi Safaga is structurally controlled. Groundwater potential zones were categorized into six types, revealing high and very high recharge potentials concentrated in the central and western regions. Conversely, low and very low aquifer recharge potentials were randomly distributed in the eastern part of the study area. The drainage basins of the Eastern Desert channel occasional rainwater towards the Red Sea, posing significant flood hazards. To mitigate these risks and enhance water availability, the construction of runoff control systems, such as dykes and partially effective dams, is proposed. The groundwater resources in the region are classified into four main aquifer units: the fractured crystalline Pre-Cambrian aquifer, the Nubian sandstone aquifer, the fractured limestone and sandstone aquifer, and the Quaternary aquifer. Among these, the Nubian sandstone aquifer is the most productive, while the fractured limestone and sandstone aquifer is primarily productive in the eastern part of the desert. The Quaternary aquifer, located along major dry washes (wadis), has limited potential, being recharged mainly by occasional rainfall. A detailed local assessment of these aquifers is essential for sustainable development in the region.