GEOKURDISTAN II - 2015

The Second Geological Conference of Kurdistan

Abstracts Volume

October 6-8th, 2015
Sulaimani, Kurdistan Region, Iraq

www.geokurd.com

Organizing Committee

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Program of GeoKurdistan II

Day 1 Tuesday	6th October 2015
09:00-10:00	Registration
10:00-11:30	Welcome and opening of GeoKurdistan II
11:30-12:00	Coffee Break
12:00-13:00	Session 1
13:00-14:300	Lunch (University Campus Restaurant)
14:30-16:00	Session 2
19:30-22:00	Dinner (Hawari Goizha Restaurant, Goizha Mountain)
22:00	Departure to the Hotel by bus

Day 2 Wednesday	7th October 2015
09:00-11:00	Session 3
11:00-11:30	Coffee Break
11:30-13:00	Session 4
13:00-14:30	Lunch (University Campus Restaurant)
14:30-16:00	Session 5
16:00-17:00	Closing Session (Discussion and Recommendations)
20:00-22:00	Dinner (City Cinema Restaurant, Sarchinar)
22:00	Departure to the Hotel by bus

Day 3 Thursday	8th October 2015 (Field Trip)	
8:00	Departure from the Hotel by bus	
09:00-09:30	Stop No.1.	Saidsadiq Town
09:30-11:00	Stop No.2.	Halabja Shahidan Memorial
11:15-12:00	Stop No.3.	Qulqula Sedimentary Melange (Near Health Center of Byarah)
12:15-12:45	Stop No.4.	Pillow lava outcrop
13:00-13:15	Stop No.5	Qulqula outcrop
13:30-14:30	Stop No.6	Restaurant stop with beautiful valley view
14:45-16:30	Stop No.7	Ahmed Awa Resort
16:30	Departure to the Hotel by bus	

Preface

GeoKurdistan II conference is an international meeting that brings together geoscientists interested in the geological studies on Iraqi Kurdistan Region and surrounding countries. It was founded over the last years here and has only limited activity in geological exploration and geological researches in Kurdistan due to the various conflicts that have engulfed the region. The purpose was to expand geological activities and to evaluate information about mineral resources and economic geology, water resources, oil and gas exploration, and environmental geology problems. The conference welcomes all varieties of contributions that can add to the geological knowledge of the area in all types of geological disciplines.

The main goal of this conference is to evaluate the present-day geological knowledge and information regarding raw material, water, and hydrocarbon resources and to motivate geologists to encourage geological studies and activities in Kurdistan. This we believe would build the basis for upgrading the academic and scientific levels at universities and enhance the performance of the Geological Directorates of Kurdistan.

From a scientific point of view, Kurdistan is interesting not only for its mineral resources and oil and gas prospecting but also as a key-locality within the Zagros orogeny. This requires more geological researches with topics such as stratigraphy, structural geology, tectonics, hydrogeology, paleontology, etc. The idea to organize this conference originated during the meeting between a staff member of the department of geology at University of Sulaimani and Kurdistan Geologists Organization in 2010. I am delighted that many Kurdish geologists from Kurdistan are supporting this idea. I also would like to use this opportunity

to pay our respects to that Peshmerga, who martyred in the defense of our country and as part of the international fight against extremism and terrorism. We will always remember them, and we also pray for those who have been injured in this war and wish them a speedy recovery. I am greatly indebted to all members of the organizing and advisory committees of this conference, and the geology department staff, without whose help this conference could not have taken place. My appreciation extended to the TOTAL and Halabja Group companies and the authorities of the University of Sulaimani and the Kurdistan Geologists Organization for their sponsoring and supporting the conference activities.

In Sulaimani, September 2015

Dr. Diary Ali Mohammed Amin

Chair/ Department of Geology

University of Sulaimani

GEOKURDISTAN II

The Second Geological Conference of Kurdistan

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Sulaimani, Kurdistan Region, Iraq

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List of accepted papers for presentation at GeoKurdistan II

After reviewing the submitted full text of articles by the organizing and advisory committees, the following papers have been accepted for presentation at the conference, GeoKurdistan II in 6-8th October 2015.

The Organizing Committee

List of Accepted papers:

Authors	Institution	Title of paper
Raad J. Fathi and Ali A. Abbas	Kirkuk University	A Geomorphological and Morphotectonical study of the Tawuq chai and khassa chai sub-basin Kirkuk Governorate - Iraq
Abdulla A. Omar, and Rebar T. Ali	University of Salahaddin	Extraction and Analysis of Tectonic Lineaments using Geoinformatic Techniques, in Tawke Oil Field, Duhok area, Iraqi Kurdistan Region.
Azhar Bety, Basim Al-Qayim, and Hikmat Al-Daghistani	University of Sulaimani, University of Mosul	Lineament Analysis Of Sulaimani Master Plan Area, Kurdistan Region, Iraq
Abdurahamn A. Bamerni	University of Duhok	Biostratigraphy of the Shiranish Formation
Waleed S. Shingaly	University of Salahaddin	Lithology and diagenetic processes of the Baluti Formation (Upper Triassic) in the Amadyia area, Kurdistan Region, Iraq
Dler H. Baban [1]and Hussein S. Hussein[2]	[1]Department of Geology, University of Sulaimani.,2Soran University	Characterization of the Tertiary Reservoir in Khabbaz Oil Field, Kirkuk Area, Northern Iraq
Sardar M. Balaky, Rzger A. Abdula , and Edres M. Perot	Soran University	Facies Analysis and Depositional Environment of Garagu Formation (Berriasian-Valanginian) in Gara Mountain, Gali Garagu, Sarsang District, Iraqi Kurdistan Region
Mohammed A. Al-Hajja, Ali I. Al-Jubourya, Aboosh H. Al-Hadidy	Mosul University North Oil Company, Kirkuk, Iraq	Facies Analysis And Depositional Environment Of Girbir Formantion North West Iraq
Mohamad Jalal Nouri Al-Brifkani	University of Duhok	Understanding the tectonical development of the two Thrust Zone in Iraq from the basic geological differences between them
Omer E. Al-Adwane Rasheed M. Yousuf, Salim M. Aldabbagh	University of Mosul	Radon Content of Recent Sediments in Relation to Tectonic Features at Mosul City and Neighboring Area.

Basim Al-Qayim, Shireen Hussein, Fouad M. Qader1, Salim H. Al-Hakari , Bestoon Shukor, Ziryan Sardar, Dler Ahmed, and Hawar Abdullah	University of Sulaimani , - Geological survey & Mineral Exploration Directorate, Sulaimani, Kurdistan, Iraq	Integrated surface –subsurface stratigraphic study of the Cretaceous petroleum system, Sulaimani area, Kurdistan, Iraq
Ali Abed Abbas and Raad Jalal Fathi	Kirkuk University	The use of radar data(Dem) to derive geomorphological information for the part of Alton Kopry using GIS
Hadi Amin Rasouli	University of Kurdistan, Sanandaj, Iran	Tectonic and Eustatic Signatures in Depositional Sequences of a Foreland Basin: Example from the Oligo-Miocene Asmari Formation of Southwest Iran
Bahman Rahimzadeh, Fariborz Masoudi1, Amir Ali Tabbakh Shabani	, Faculty of Earth Sciences, Kharazmi University, Tehran, Iran.Faculty of Earth Sciences, Shahid Beheshti University, Tehran, Iran.	Cr-spinel Mineral Chemistry from Sawlava Ophiolite Complex, Kurdistan, NW Iran, Geotectonic Setting Implication
Abdullah Mordi, Bijan Maleki, Nazir Anvar Mafakheri	Imam Khomeini International University., Department of petroleum Soran University	Determine the structural discontinuities in fractured carbonate reservoirs using FMS and VSP logs in the one of oil fields on West of Zagros
Farhad A. Hakeem	Salahaddin University	Assessment of Shiranish and Pilaspi Limestone for Concrete Aggregates, Shaqlawa area, Iraqi Kurdistan Region.
Farhad A. Hakeem[1], Mazin Y. Tamar Agha[2], Ahmed M. Aqrawi[1]	[1]Salahaddin University, Erbil, Iraq [2]University of Baghdad, Baghdad, Iraq	Suitability of Clays of the Beduh Formation (Lower Triassic) for Lightweight Aggregate, North Amadyia, Kurdistan Region - Iraq.

Fakhraddin M. Abdullah[1], Ali A. Sepahi[2] and Mohssen Moazen[3]	1. Department of Geography, University of Garmian, Kalar, Kurdistan Region, Iraq, 2. Department of Geology, Bu Ali Sina University, Hamadan, Iran, 3. Department of Geology, University of Tabriz, Tabriz, Iran	A mineralogical study of Fe skarn deposits in SE Saqqez, Kurdistan, Iran
Imad M. Ghafor and Ibrahim M. J. Mohialdeen	Department of Geology, University of Sulaimani	Fossils distribution from Garagu Formation (Early Cretaceous), diversity and Paleoennvironmental conditions, Kurdistan Region, Northeastern Iraq
Ghassan I. Aleqabi*, Michael E. Wysession*, & Hafidh A. A. Ghalib**	*Washington University in Saint Louis, **Array Information Technology,	Seismic Crustal and Upper Mantle Structure of Iraq and Surrounding Regions Inferred from Regional Waveform Inversion
Ghassan I. Aleqabi* & Hafidh A. A. Ghalib**	* Washington University in Saint Louis, ** Array Information Technology,	Seismic Hazard Assessment of Northern Iraq
Varoujan K. Sissakian[1] and Saffa F. Fouad[2]	[1]Private Consultant Geologist, Erbil, [2]Director General, Iraq Geological Survey, Baghdad	Geological Map of Sulaimani Quadrangle at scale 1:250 000

Asaad Fagheh Mohammad Ali Riahi Gholam Hosein Norouzi	Soran University, Kurdistan, Institute of Geophysics, University of Tehran, Iran, University College of Engineering, University of Tehran, Iran	Geological modeling using different geostatistic methods and extraction of the comprehensive reservoir model
Ali Kh. Al- Shwaily and Hala A. Salih	Iraq Geological Survey, Baghdad, Iraq	Geomorphology and mesoscopic fracture analysis on Wadi Shalghah area, E Erbil, Kurdistan Province
Lanja Hossain and Basim al-Qayim	Department of Geology, University of Sulaimani	Gis-Based Morphometric Analysis Of The Dewana Basin, Sulaimaniyah, Ne Iraq
Hawkar Omer Hama, Hazhar Hassan Ahmed, Razbar Frazil Majid, Nyan Tahir Omer	Ministry of natural resources, Kurdistan Region Governorate, Kurdistan	Crushed limestone as alternative for natural aggregate
Kamal H.Karim, Khalid M. Sharbazheri, Aras Al-Khafaf	Department of Geology, University of Sulaimani	Critical analysis of the type section of the Balambo Formation (Valanginian - Turonian), Sirwan valley, Kurdistan Region, NE-Iraq
Kifah N. Al-Kubaysi and Ali A. Abid	Iraq Geological Survey, GEOSURV, Baghdad, Iraq. Salahaddin University,	A new record of foraminifera species (Pseudortolina Marthaedouville) indicating the Late Maastrichtian Stage within the Aqra Formation in Chwarta area, Sulaimani Governorate, NE Iraq
Erfan Haji, Hojjatollah Safari, Maryam Agh Atabay, Behnam Shafiee Bafti Mehdi Mojallal	Golestan University, Gorgan, Iran	Studying Structural Characteristics of Saqez - Takab Region (NW of Sanandaj - Sirjan Zone) using GiT (Geo-Information Techniques)

Abdullah Lizan[1,3], Gang Tian[1,2], Shen Hong-Lie[1]	[1]. Department of Earth Science, Zhejiang University, Hangzhou, China; 2. Academy of Cultural Heritage, Zhejiang University, Hangzhou, China 3. Department of Basic Science, Sulaimani University, Sulaimani, Iraq	Application of Partial frequency band match filter on seismic reflection data
Mahmood A. Al-Mufarji Marwan Mutib Marwa S. Kashmoola	Mosul University, Kirkuk University	A new Simulation of Baba dome (Kirkuk Field), Jambur and Khabaz Structures using Geophysical Data
Fadhil I. Khudhur*, Bakir S. Ali**, Aras M. Tawfiq**, Hafidh A. A. Ghalib*** & Ghassan I. Aleqabi****	* Directorate General of Meteorology and Seismology, Erbil, Iraq, ** Directorate of Meteorology and Seismology, Sulaimaniyah, Iraq, ** Directorate of Meteorology and **** Washington University in Saint Louis, USA.Seismoloy, Sulaimaniyah, Iraq, *** Array Information Technology	Present Status of Monitoring Earthquakes in Kurdistan, Iraq

Sardar S.Fatah and Ibrahim M. J. Mohialdeen	Department of Geology, University of Sulaimani	Hydrocarbon generation potential and thermal maturity of Middle Jurassic Sargelu Formation in Miran Field, Sulaimani Area, Kurdistan region, NE Iraq
Sirwan H. Ahmed1, Amanj I.F. Qaradaghi1 and Aram Namiq	Department of Geology, University of Sulaimani	Surface and sub-surface study to interpret the Paleo Basin morphology during Hauterivian-Albian in Kurdistan and North of Iraq
Hadi Amin-Rasouli,	Dept. of Geosciences, University of Kurdistan, Sanandaj, Iran	Modified Folk Sandstones Classification
Warzer Jalal Mohammed Salih & Haval Rostam Hawez Talabani & Pshtiwan Tahsin Mohammed Jaf	Koya University	The estimation of Porosity and permeability value for well TT-4 through different techniques; well-logging, well-testing and core analysis
Hafidh A. A. Ghalib*, Ghassan I. Aleqabi**, Fadhil I. Khudhur***, Tawfiq Al-Yazjeen**** & Mahmoud Al-Qaryouti****	* Array Information Technology, ** Washington University in Saint Louis, **** Jordan Seismological Observatory and Geophysical Studies, Amman, Jordan, *** Directorate General of Meteorology and Seismology, Erbil, Iraq	The virtual Middle East Seismographic Network (vMESN) Concept and Implementation
Tola A.Mirza, Ibrahim M.J.Mohialdeen, Salim, H.Sulaiman, and Chro M.Fatah	Department of Geology, University of Sulaimani	Geochemical assessment of Naopurdan limestone for cement making-Chwarta area, Kurdistan Region, NE Iraq

Wimbledon, W.A.P., Mohialdeen, I.M.J., Andreini, G., Rehakova, D., Stoykova, K.	University of Bristol, Bristol, United Kingdom. , University of Sulaimani, Università degli Studi di Perugia, Perugia, Italy. Comenius University, Bratislava, Slovakia. Institute of Geology, Academy of Sciences, Sofia, Bulgaria	Jurassic /Cretaceous boundary beds in Kurdistan – a preliminary note on wider correlations
Omed M. Mustafa	University of Sulaimani, Department of Geology	Speciation of U, Se, As and Sr in Karst waters of Makook System, Kurdistan Region, Iraq
Hafidh A. A. Ghalib*, and Ghassan I. Aleqabi**	*Array Information Technology, **Washington University in Saint Louis	Seismicity, Velocity Structure and Tectonics of the Arabian Plate
Dara Faeq Hamamin, Salahalddin Saeed Ali, Rebar Aziz Qadir	University of Sulaimani, Department of Geology, Groundwater Directorate of Sulaiymaniyah, Sulaimani, Iraq	Groundwater Vulnerability Map Of Sulaimani Sub-Bsain Using Sintacs Model, Sulaimani Governorate, Iraqi Kurdistan Region
Dler H. Baban and Fadhil A. Lawa	Department of Geology, University of Sulaimani	Palynological and Stratigraphical Evidences on the Age of the Outcropped Khabour Formation near Chalki Nasara Village, Kurdistan Region, Northern Iraq.

AGENDA of GeoKurdistan II Sulaimani, Kurdistan, NE Iraq

Day 1

09:00-10:00	Registration				
Opening Session					
10:00-11:00	Welcome				
11:00-11:30	Geokurdistan : the Past and the Future , **Ibrahim M. J. Mohialdeen**, ibrahim.jaza@univsul.edu.iq				
Coffee Break					
	Hall 1		Hall 2		Hall 3
Session 1	Chair: Dr.Amanj I. Fattah	Seceretary: Dr.Irfan O. Musa	Chair: Dr.Kamal H.Karim	Secretary: Dr.Mushir M.Baziany	
12:30-13:00	GK2-17 Suitability of Clays of the Beduh Formation (Lower Triassic) for Lightweight Aggregate, North Amadyia, Kurdistan Region - Iraq ; **Farhad A. Hakee1, Mazin Y. Tamar Agha, Ahmed M. Aqrawi** farhadalhakeem@yahoo.com		GK2-34 Surface and sub-surface study to interpret the Paleo Basin morphology during Hauterivian-Albian in Kurdistan and North of Iraq; **Sirwan H. Ahmed, Amanj I.F. Qaradaghi, Aram Namiq** sirwan.ahmed@univsul.edu.iq		
13:00-13:30	GK2-38 Geochemical assessment of Naopurdan limestone for cement making-Chwarta area, Kurdistan Region, NE Iraq ; **Tola A.Mirza, Ibrahim M.J.Mohialdeen, Salim, H.Sulaiman, and Chro M.Fatah** tola.merza@univsul.edu.iq		GK2-13 Tectonic and Eustatic Signatures in Depositional Sequences of a Foreland Basin: Example from the Oligo-Miocene Asmari Formation of Southwest Iran; **Hadi Amin-Rasouli** h.aminrasouli@uok.ac.ir		
Lunch					
Session 2	Chair: Dr.Ghafour A.Hamasur	Seceretary: Dr.Salim H. Sulaiman	Chair: Dr.Ezzadin N. Baban	Seceretary: Dr.Omer Q. Ahmed	Chair: Mr. Varoujan Sissakin	Seceretary: Dr. Dara F. Hama amin
14:30-15:00	GK2-2 Extraction and Analysis of Tectonic Lineaments using Geoinformatic Techniques, in Tawke Oil Field, Duhok area, Iraqi Kurdistan Region.; **Abdulla A. Omar, and Rebar T. Ali** (abdulla.omer@su.edu.iq), (aaomar2001@gmail.com)		GK2-20 Seismic Crustal and Upper Mantle Structure of Iraq and Surrounding Regions Inferred from Regional Waveform Inversion; **Ghassan I. Aleqabi, Michael E. Wysession, & Hafidh A. A. Ghalib** ghassan@seismo.wustl.edu		GK2-5 Lithology and diagenetic processes of the Baluti Formation (Upper Triassic) in the Amadyia area, Kurdistan region, Iraq; **Waleed S. Shingaly** waleed_0076@yahoo.com	
15:00-15:30	GK2-9 Understanding the tectonical development of the two Thrust Zone in Iraq from the basic geological differences between them ; **Mohamad Jalal Nouri Al-Brifkani** mohjalal2003@yahoo.com		GK2-30 Application of Partial frequency band match filter on seismic reflection data; **Abdullah Lizan, Gang Tian, Shen Hong-Lie** lizanbeston@gmail.com		GK2-8 FACIES ANALYSIS and DEPOSITIONAL ENVIRONMENT OF GIRBIR FORMANTION NORTH WEST IRAQ ; **Mohammed A. Al-Hajja, Ali I. Al-Jubourya, Aboosh H. Al-Hadidy** malhaj2006@yahoo.com	
15:30-16:00	GK2-29 Studying Structural Characteristics of Saqez - Takab Region (NW of Sanandaj - Sirjan Zone) using GiT (Geo Information Techniques); **Erfan Haji, Hojjatollah Safari, Maryam Agh Atabay , Behnam Shafiee Bafti, Mehdi Mojallal**		GK2-41 Seismicity, Velocity Structure and Tectonics of the Arabian Plate; **Hafidh A. A. Ghalib, and Ghassan I. Aleqabi** hafidh.ghalib@arrayinfotech.com, ghassan@mantle.wustl.edu		GK2-10 Radon Content of Recent Sediments in Relation to Tectonic Features at Mosul City and Neighboring Area; **Omer E. Al-Adwane, Rasheed M. Yousuf and Salim M. Aldabbagh** drsalim_aldabbagh@yahoo.com	

Day 2

	Hall 1		Hall 2		Hall 3	
Session 3	Chair: Dr.Aram N. Toffiq	Seceretary: Dr.Azhar Bety	Chair: Dr.Khalid sharbazhery	Seceretary: Dr.Walid Shingaly	Chair: Dr.Hafidh Galib	Seceretary: Dr.Mahmood Al-Mufraji
09:00-09:30	GK2-1 A Geomorphological and Morphotectonical study of the Tawuq chai and khassa chai sub-basin Kirkuk Governorate – Iraq; **Raad J. Fathi and Ali A.** Abbas aaliazawi@yahoo.com		GK2-4 Biostratigraphy of the Shiranish Formation; **Abdurahamn A. Bamerni** abdulrhman.qasim@uod.ac		GK2-21 Seismic Hazard Assessment of Northern Iraq; **Ghassan I. Aleqabi & Hafidh A. A. Ghalib** ghassan@seismo.wustl.edu	
09:30-10:00	GK2-3 LINEAMENT ANALYSIS OF SULAIMANI MASTER PLAN AREA, KURDISTAN REGION, IRAQ; **Azhar Bety, Basim Al-Qayim, and Hikmat Al-Daghistani** azhar.bety@yahoo.com		GK2-19 Fossils distribution from Garagu Formation (Early Cretaceous), diversity and Paleoennvironmental conditions, Kurdistan Region, Northeastern Iraq; **Imad M. Ghafor and Ibrahim M. J. Mohialdeen,** drimadgh@yahoo.co.uk ibrahim.jaza@univsul.edu.iq		GK2-31 A new Simulation of Baba dome (Kirkuk Field) , Jambur and Khabaz Structures using Geophysical Data; **Mahmood A. Al- Mufarji, Marwan Mutib and Marwa S. Kashmoola** drmahmoud_2006@yahoo.com	
10:00-10:30	GK2-12 The use of radar data(Dem) to derive geomorphological information for the part of Alton Kopry using GIS; **Ali Abed Abbas and Raad Jalal** Fathi aaliazawi@yahoo.com		GK2-28 A new record of foraminifera species (Pseudortolina Marthaedouville) indicating the Late Maastrichtian Stage within the Aqra Formation in Chwarta area, Sulaimani Governorate, NE Iraq; **Kifah N. Al-Kubaysi and Ali A. Abid** akifahnoore@yahoo.com aliashoor@yahoo.com		GK2-32 Present Status of Monitoring Earthquakes in Kurdistan, Iraq; **Fadhil I. Khudhur, Bakir S. Ali, Aras M. Tawfiq, Hafidh A. A. Ghalib & Ghassan I. Aleqabi** hafidh.ghalib@arrayinfotech.com bakirsaeed958@yahoo.com	
10:30-11:00	GK2-24 Geomorphology and mesoscopic fracture analysis on Wadi Shalghah area, E Erbil, Kurdistan Province; **Ali Kh. Al- Shwaily and Hala A. Salih** hala_geo@yahoo.com		GK2-39 Jurassic /Cretaceous boundary beds in Kurdistan – a preliminary note on wider correlations; **Wimbledon, W.A.P., Mohialdeen, I.M.J., Andreini, G., Rehakova, D., Stoykova, K** ibrahim.jaza@univsul.edu.iq mishenka1@yahoo.co.uk		GK2-37 The virtual Middle East Seismographic Network (vMESN) Concept and Implementation; **Hafidh A. A. Ghalib, Ghassan I. Aleqabi, Fadhil I. Khudhur, Tawfiq Al-Yazjeen & Mahmoud Al-Qaryouti** hafidh.ghalib@arrayinfotech.com	
Coffee Break						
Session 4	Chair: Dr.Diary A. Amin	Seceretary: Dr.Omed Mustafa	Chair: Dr.Fadhil A. Lawa	Seceretary: Dr.Araz Al-khafaf	Chair: Dr.Farhad Hakeem	Seceretary: Dr.Haddi A. Rasouli
11:30-12:00	GK2-40 Speciation of U, Se, As and Sr in Karst waters of Makook System, Kurdistan Region, Iraq; **Omed M. Mustafa** omedgeology@gmail.com		GK2-11 Integrated surface –subsurface stratigraphic study of the Cretaceous petroleum system, Sulaimani area, Kurdistan, Iraq; **Basim Al-Qayim, Shireen Hussein, Fouad M. Qader1, Salim H. Al-Hakari , Bestoon Shukor, Ziryan Sardar, Dler Ahmed, and Hawar Abdullah** basim.alqayim@univsul.edu.iq		GK2-16 Assessment of Shiranish and Pilaspi Limestone for Concrete Aggregates, Shaqlawa area, Iraqi Kurdistan Region; **Farhad A. Hakeem** farhadalhakeem@yahoo.com	

	Hall 1	Hall 2	Hall 3
12:00-12:30	GK2-42 GROUNDWATER VULNERABILITY MAP OF SULAIMANI SUB-BSAIN USING SINTACS MODEL, SULAIMANI GOVERNORATE, IRAQI KURDISTAN REGION; **Dara Faeq Hamamin, Salahalddin Saeed Ali, Rebar Aziz Qadir** dara.amin@univsul.edu.iq salahalddin.ali@univsul.edu.iq rebarqaradaghy1983@gmail.com	GK2-22 Geological Map of Sulaimani Quadrangle at scale 1:250 000; **Varoujan K. Sissakian and Saffa F. Fouad** varoujan49@yahoo.com	GK2-26 Crushed limestone as alternative for natural aggregate; **Hawkar Omer Hama, Hazhar Hassan Ahmed, Razbar Frazil Majid, Nyan Tahir Omer** hawkarsteel@gmail.com
12:30-13:00	GK2- 25 GIS-BASED MORPHOMETRIC ANALYSIS OF THE DEWANA BASIN, SULAIMANIYAH, NE IRAQ; **Lanja Hossain** and **Basim al-Qayim** lanja@mail.com	GK2-43 Palynological and Stratigraphical Evidences on the Age of the Outcropped Khabour Formation near Chalki Nasara Village, Kurdistan Region, Northern Iraq; **Dler H. Baban and Fadhil A. Lawa** dler.mohamad@univsul.edu.iq	GK2-27 Critical analysis of the type section of the Balambo Formation (Valanginian - Turonian), Sirwan valley, Kurdistan Region, NE-Iraq; **Kamal H.Karim, Khalid M. Sharbazheri, Aras Al-Khafaf** karimgeology@yahoo.com
Lunch			
Session 5	Chair: Dr.Basim Al-Qayim / Seceretary: Dr.Fouad Q.Muhammed	Chair: Dr. Sardar Balaki / Seceretary: Dr. Abdula Moradi	Chair: Dr.Tola A. Mirza / Seceretary: Dr. Bahman Kahimzade
14:30-15:00	GK2-6 Characterization of the Tertiary Reservoir in Khabbaz Oil Field, Kirkuk Area, Northern Iraq; Dler H. Baban and Hussein S. Hussein dler.mohamad@univsul.edu.iq	GK2-7 Facies Analysis and Depositional Environment of Garagu Formation (Berriasian-Valanginian) in Gara Mountain, Gali Garagu, Sarsang District, Iraqi Kurdistan Region; Sardar M. Balaky, Rzger A. Abdula and Edres M. Perot sardar.balaky@soran.edu.iq	GK2-35 Modified Folk Sandstones Classification; **Hadi Amin-Rasouli** h.aminrasouli@uok.ac.ir
15:00-15:30	GK2-36 The estimation of Porosity and permeability value for well TT-4 through different techniques; well-logging, well-testing and core analysis; **Warzer Jalal Mohammed Salih & Haval Rostam Hawez Talabani & Pshtiwan Tahsin Mohammed Jaf** warzer.jalal@koyauniversity.org	GK2-15 Determine the structural discontinuities in fractured carbonate reservoirs using FMS and VSP logs in the one of oil fields on West of Zagros; **Abdullah Mordi, Bijan Maleki, Nazir Anvar Mafakheri** moradi_aba@yahoo.com	GK2-14 Cr-spinel Mineral Chemistry from Sawlava Ophiolite Complex, Kurdistan, NW Iran, Geotectonic Setting Implication; **Bahman Rahimzadeh, Fariborz Masoudi1, Amir Ali Tabbakh** Shabani b.rahimzade59@gmail.com
15:30-16:00	GK2-33 Hydrocarbon generation potential and thermal maturity of Middle Jurassic Sargelu Formation in Miran Field, Sulaimani Area, Kurdistan region, NE Iraq; **Sardar S.Fatah and Ibrahim M. J. Mohialdeen** sardargeo@yahoo.com	GK2-23 Geological modeling using different geostatistic methods and extraction of the comprehensive reservoir model; **Asaad Fagheh Mohammad Ali Riahi Gholam Hosein Norouzi** a.fagea@gmail.com	GK2-18 A mineralogical study of Fe skarn deposits in SE Saqqez, Kurdistan, Iran; **Fakhraddin M. Abdullah, Ali A. Sepahi and Mohssen Moazen** fakhraddin.mohammad@gmail.com
Closing Session	Chair: Dr.Pola Khanaqa	Seceretary: Dr. Diary A. Amin	Member: Rezhan J. Mohammed
16:00-17:30	Discussion and Recommendations		

GK2-1:

A Geomorphological and Morphotectonical study of the Tawuq chai and Khassa chai sub-basin Kirkuk Governorate – Iraq

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ABSTRACT

This study involves the geomorphological and morphotectonical Investigation of the Tawuq and khassa chai sub-basin located at the Kirkuk Governorate in North Iraq.

The geomorphological analysis and mapping of the area was carried out using aerial photographs and geological data landforms were classified into three groups depending on their shapes and formation processes such as the denudational- structural, denudational, and fluvial.

The longitudinal profile analysis of the Tawuq Chai River revealed that the structural and lithological factors were controlled by the changes in the river gradients as the result of the tectonic activity, while the khassa Chai River has been in equilibrium at geomorphological development stages due to the lack of tectonic activity.

GK2-2:

Extraction and Analysis of Tectonic Lineaments using Geoinformatic Techniques, in Tawke Oil Field, Duhok area, Iraqi Kurdistan Region

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ABSTRACT

Geoinformatic techniques applied for tectonic lineament extraction and analysis in Tawke Oil field, Kurdistan region of Iraq. Two satellite images have been used, which were Landsat ETM+ and ASTER images to extract lineaments both
Visually and automatically. It comprises several steps, which involve several enhancing techniques e.g. Color Composite, Spectral Rationing and Principle Component Analysis. From combination of all techniques, the final surface lineaments have been extracted. The final lineament map has been divided in to two maps; local lineament map which was checked in the field and regional lineament map which was confirmed by geophysical data (seismic and gravity data). Local lineaments are evaluated in order to extract further information on the spatial distribution and nature of the lineaments. For this purpose lineament density, length, and lineaments intersection maps are prepared. In addition; the field work was carried out to verify lineaments resulted from satellite images with the observed fractures on the ground through visiting of 17 stations
Around the Tawke anticline. Orientations of local lineaments (frequency and length) obtained from satellite image were compared with the orientation of fractures (frequency and length) that obtained from the field, using rose diagrams which show a similarities between them, as being concentrated in NE-SW, NWSE, E-W and N-S, as well as these Lineaments reflect a set and systems of fractures with in studied outcrops. Two types of fractures are recognized one are shear fractures and second are tension fractures. Stereographic projection figured out for confirming the direction of fractures in the field and analyzing the paleostress direction within studied area.

Geophysical data (gravity and seismic) have been used for confirming the regional lineaments. Integration has been made between satellite image lineaments and lineaments appeared in geophysical data (gravimetric and seismic lineaments) , there is a coincidence both in the positions, length and azimuths of gravimetric lineaments, seismic lineaments and lineaments appear on satellite image (i.e. surface lineaments). It has been observed that two mechanisms are responsible for giving the architectural shape of study area one is due to block-faulting related to basement faults activity from at least the
Middle Paleozoic and continued intermittently up to Late Tertiary, while the second mechanism is due to compressive horizontal stress that have been active since Middle –Late Cretaceous continued up to Late Tertiary.
Keywords: Satellite images, Lineaments, seismic, gravity, fractures,

GK2-3:

Lineament Analysis of Sulaimani Master Plan Area, Kurdistan Region, Iraq

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ABSTRACT

Modern technologies in the field of remote sensing and geographic information systems are used to process the available data to produce maps for lineaments types, distribution and lineaments density within the area of the master plan of Sulaimani city. Three scenes image of Spot satellite with panchromatic mode from date 12-2008 with ground resolution of 5 meter were selected for this analysis. Statically analysis of lineaments was taken in order to classify them according to their length and direction, also the general trend was found, then classification was done according to their density. For all analysis maps were produced by using Arc GIS program.

The results show four classes of lineaments according to their length short, linear, long and regional lineaments within NE-SW as a general direction within the study area. The distribution or the density of lineaments found to be 9.2 liners per km2 where the numbers of lineaments is 4365, with total length up to 3801 km.

Most parts of the area fall between low density, density and high density classes where very low and very high density classes cover small areas relatively according to the density of the lineaments.

GK2-4:

Biostratigraphy of the Shiranish Formation (Campanian – Maastrichtian) in the subsurface section of Khanke oil well No.1, Duhok area (North of Iraq)

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ABSTRACT

This study deals with the foraminiferal biostratigraphy of Shiranish Formation in Khanke oil well No.1, which is located about 23 km. southwest of Duhok city, northern Iraq. Shiranish Formation consists lithologically of alternation of limestone and marly limestone with few chert nodules. Sixty eight planktonic foraminiferal species belonging to 17 genera and 52 benthonic foraminiferal species belonging to 27 genera were identified. Seven biozones within the Shiranish Formation in the studied subsection were recognized. They are Rugoglobigerina rugosa Interval zone; Globotruncanita calcarata Total Range zone; Globotruncanella havanensis Partial Range zone; Globotruncana aegyptiaca Interval zone; Gansserina gansseri Interval zone; Contusotruncana contusa Interval zone and Abathomphalus mayaroensis Total Range zone. These biozones represent the Middle Campanian – Late Maastrichtian in age. The planktonic foraminiferal assemblages from the Shiranish Formation are of typical Tethyan characters.

Keywords: Biostratigraphy; Campanian – Maastrichtian; Kurdistan; Iraq.

GK2-5:

Lithology and Diagenetic Processes of the Baluti Formation (Upper Triassic) in the Amadyia Area, Kurdistan Region, Iraq

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ABSTRACT

Lithologic characteristics and diagenitic processes of the Baluti Formation (Upper Triassic) from two well-exposed sections are studied. The sections are located northwest (Sararu village) and southeast (Sarki village) of Amadyia district, within High Folded Zone, in the Iraqi-Kurdistan. The Baluti Formation consists of intimately interbedded green, gray to black shale and gray limestone with subordinate greenish gray marlstone; those do not alternate in a repeated fashion and are not strictly described as cyclic. Bioclastic limestone, intraclastic limestone, and peloidal limestone interbedded with invasively yellowish-gray shaley mudstone and fissile shale lithologies which are interpreted as slope and basinal units deposited in deeper water. Storms were a dominant factor in initializing down-slope transport from shallower-water settings. Polymictic limestone conglomerate and shallow-water-derived limestone, fossils and siliciclastic grains indicate that depositional slopes were steep enough at times to allow considerable transport from up-slope areas. The bioclastic and peloidal limestones then locally turn into the nodular limestone through early diagenetic modification in deep water. Petrographic evidences indicated that these deposits have undergone both shallow and deep-marine diagenesis with slightly influence of vadose and meteoric diagenesis. Following shallow-marine diagenesis, these intra- and bio-clasts were transported to the deeper part and were exposed to deep-marine water, which appear to have initiated deep-marine diagenesis. The evidence of deep-marine diagenesis is reprecipitation of the small amount of carbonate generated by dissolution of unstable grains (presumably aragonitic) into newly opened molds and partially filled primary pores as clear, fine to medium, equant calcite spar.

GK2-6:

Characterization of the Tertiary Reservoir in Khabbaz Oil Field, Kirkuk Area, Northern Iraq

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ABSTRACT

Tertiary reservoir representing by Jeribe, Anah, Azkand, and Azkand/Ibrahim formations has been studied from reservoir characterization point of view in Khabbaz Oil Field/ Northern Iraq.

Examined thin sections prepared from core rock samples which selected from the wells Kz-8 and Kz-9 revealed the existence of different microfacies in which are varies types of porosity such as interparticle, intraparticle, moldic, vuggy, and fractures have been noticed. In addition to these different types of diagenesis features are represented mainly by cementation, dolomitization, recrystallization, and dissolution.

The available log data for the wells Kz-11, Kz-14, and Kz-16 have been used in characterizing the reservoir properties of the studied formations. The detected lithologies from porosity logs showed domination of limestone, dolomitic limestone, and dolomites in addition to few thin beds of anhydrites in Jeribe Formation and thin beds of sand dominated lithologies in Azkand Formation. Clay content has been calculated from gamma ray log along the studied sections and appeared to be mostly of dispersed clay type as shown from density-neutron porosity crossplot of Thomas-Stieber. Correction from the effect of clay content has been done for all the measured sonic, density, and neutron porosities. The available porosity and permeability values which measured from core tests in the well Kz-9 for the formations of Jeribe, Anah, and Azkand have been adapted to formulize the best equation for calculating permeability in the other studied wells which have no core test measurements but only log data (Kz-11, Kz-14, and Kz-16 wells).

Depending on porosity, permeability, and shale content; the studied sections have been subdivided into seven reservoir units in the wells Kz-11 and Kz-16, and for eight reservoir units in the well Kz-14.

Key words: Khabbaz, Tertiary, Log analysis, Reservoir characterization.

GK2-7:

Facies Analysis and Depositional Environment of Garagu Formation (Valanginian- Hauterivian) in Gara Mountain, Gali Garagu, Sarsang District, Iraqi Kurdistan Region

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ABSTRACT

Facies analysis and depositional environment of Garagu Formation (Valanginian-Hauterivian) in the Gara mountain in Gali Garagu of High Folded Zone, Sarsang District, northern Iraqi Kurdistan is studied. Lithologically, the formation consists of oolitic sandy limestones, with marls and sandstones in its upper and lower parts and organic detrital limestones in its middle part. The petrographic study of carbonate rocks on 30 thin sections shows that the limestones are dominated by mudstones.The skeletal grains include variety of benthic foraminiferas, gastropods, brachiopods, echinoids, pelecypods, green algae, calpionellids and ostracods. Non-skeletal grains include: ooids, peloids and intraclasts. Garagu sandstones are immature, lithic subarkos to subarkose and occur as medium to thick beds within the lower and upper parts of the formation, and composed mainly of sedimentary rock fragments with minor amount of quartz and feldspars (plagioclase). The X-ray diffraction analysis of the bulk shale samples revealed that the abundant clay mineral in the Gargau Formation is kaolinite and non-clay minerals include calcite, quartz, geothite and nacirite. The formation can be divided into three lithologic devisions from base to top: lower oolitic; middle organic detrital limestone; and upper oolitic. Eight different microfacies were recognized which were subdivided according to their environmental interpretation into two basic types of facies associations; shelf margin (shoal) and shelf lagoon association. Generally the Garagu Formation represents shallow water environment with two high energy belts in the lower and upper parts.

Key Words: Facies, Carbonate, Garagu, Lagoon, Gara.

GK2-8:

Facies Analysis and Depositional Environment of Gir Bir Formantion, North West Iraq

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ABSTRACT

Abstracts, Upper Cretaceous successions of the Gir Bir Formation (Cenomanian-Early Turonian) were studied in 15 wells from northwestern Iraq. The formation is composed of recrystallized, partly dolomitized limestone with local silicification. Benthonic foraminifera (Miliolids, Alveolina, and Orbitolina), rudist and peloids are the main constituents. The studied succession has been affected by several diagenetic events such as; dolomitization, recrystallization, micritization, dissolution, compaction and silicification. Facies analysis revealed that seven microfacies subdivided into eleven submicrofacies could be distinguished, reflecting secondary sedimentary environments including; outer shelf, slope/shoal, rudist buildups, back reef/shoal, and protected lagoon in a regressive shallowing-upward sequence. Lateral facies variation showed that reefal facies were commonly located in northwestern parts of the study area, whereas lagoonal facies existed in eastern and southeastern parts. Rimmed carbonate platform is the acceptable model for the Gir Bir Formation.

Keywords: Gir Bir Formation, Facies, rudist buildups, rimmed platform.

GK2-9:

Understanding the Tectonical Development of the Two Thrust Zone in Iraq From the Basic Geological Differences Between them

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ABSTRACT

Comparison between the Northern Thrust zone and the Zagros Thrust zone of Iraq reveals some basic differences between them. The differences are related to the timing of the opening and closure of the Neo-Tethys Ocean. This implies that the two processes were diachronous.

The Arabian indenter represents a protrusion and irregularity in the shape of Arabian plate margin. The indenter resulted in earlier collision in the Northern Thrust zone in comparison with the Zagros Thrust zone.

The basic differences between the two Thrust zones include the presence of Paleozoic rocks in the Northern Thrust zone, lesser thicknesses of the Mesozoic and Cenozoic rocks and the near complete absence of igneous bodies or exotic terranes. On the contrary the Zagros Thrust zone is characterized by the thick Mesozoic and Cenozoic sediments, plenty of igneous bodies and volcanic extrusion as well as thick flysch sedimentation exemplified by the Tanjero formation. These differences were deciphered by the style and timing of the opening and closure of the neo -Tethys ocean during a complete Wilsonian cycle.

KEYWORDS, Thrust zone, Comparism, Paleozoic rocks, Tectonical development

GK2-10:

Radon Content of Recent Sediments in Relation to Tectonic Features at Mosul City and Neighboring Area

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ABSTRACT

Thirty Three recent sediment (5 surface wadi filling and 13 flood plain + 15 soil at 0.7m depth) samples were selected from different localities namely (from south to north) : Al-Sallamya + Lazzaga villages, Hawi Al-Kanessa, Shuraikhan, Al-Mallaeen Quarter, Tel-Kief, Wadi Al-Malah, and Fifeal area. The collected samples were subjected to traditional geochemical test and analysis in aaddition to Radon gas measurement using solid plastic nuclear detector CR-39 (Columbia Resin) in the field (cup irradiation technique) and in the laboratory (test tube irradiation technique). Sodium hydroxide etched detector were investigated under optical microscope to count the track density and later Radon gas exhalation measurements (Bq.m-3) were calculated. Variation in Radon gas measurements were displayed and followed in contour maps and discussed in relation to the obtained geochemical data and to know faults and other structural features in the studied area.

Key words: Rn measurement techniques, Rn content in recent sediment, Rn-geochemical properties relation, Rn - tectonism and seismicity relations.

GK2-11:

Integrated Surface – Subsurface Stratigraphic Study of the Cretaceous Petroleum System, Sulaimani Area, Kurdistan, Iraq

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ABSTRACT

The Cretaceous sequence of northeast Iraq form an important petroleum system in housing potential source rocks such as the Balambo, Sarmord and Shiranish Formations. It also includes an important reservoir rocks supplied with good secondary porosity such as the Qamchuqa and Kometan Formations. This study examined surface and subsurface sections of these units from Sulaimani area of Kurdistan region of northeast Iraq using stratigraphic analysis, microfacies investigations, lithostratigraphic correlation and fracture analysis in an attempt to characterize these units at this area and to give an insight regarding the stratigraphic architectural impact on the development of their petroleum system. Microfacies analyses show the occurrences of deep to shallow marine facies. It ranges between basinal foramineferal- Oligostiginal grainstone to wakestone (Balambo, Sarmord, Kometan, Shiranish, and parts of the Tanjero Formations) to bioclastic -foraminiferal packstone to wackestone of the Qamchuqa Formation. The Dolostone part is characterized by medium to coarse crystalline planar-e to planar-s type

mosaic. The fracture analysis of some of the studied units reveal that most of these fractures are related to the folding phase of the strata during the evolution of the Zagros belt supported by paleostress analysis which indicates important northeast stress direction.

The Late Cretaceous units of the Kometan, Shiranish, and Tanjero Formations in both outcrop and neighboring subsurface sections, show little stratigraphic differences within the study area from elsewhere in northeast Iraq. The Early Cretaceous units of the Balambo, Sarmord and Qamchuqa Formations, however, show lateral and vertical stratigraphic variations in lithology and thicknesses in both northward and westward directions. The basic difference is the change of the deep marine Oligostiginal marly limestone of the Balambo Formation into the dolomitized platform carbonates of the Qamchuqa Formation in both direction. This lateral changes passes through a transitional zone of interfingering relation, which is up to 15Km in width. This zone plays an important role in developing the Cretaceous petroleum system of the area.

GK2-12:

The use of radar data (Dem) to derive geomorphological information for the part of Alton Kopry using GIS

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ABSTRACT

Radar data HgT is one of the important sources used in many of geographical information system GIS. Such data are more accurate and efficient than spatial data. In addition, various geomorphologic, geologic and geographic data that could be dealt with in various geographical information could be derived due to the availability of attached spatial and digital information illustrated by tables showing geographical scene under study. Radar data are also characterized by the possibility of exporting data with various modes including DEM, DXF, XYZ, Arc Ascii, Geo Tiff etc. DEM that could be derived from radar data is the base for most of geomorphologic and geographical studies and features, such as geomorphologic analysis of area, geomorphologic imitation like calculating slope, terrains concavity and convexity, deriving information pertaining to hydrologic surface like atomic development, water division line and form coefficient. DEM could also be used in vision determination, roads planning and floods prediction.

This study aims at using digital elevation model (DEM) derived from radar data as part of Alton Kopry derive information related to Alton Kopry geomorphology. This include the calculation of inclination coefficient, slope, direction and range of concavity and convexity.

Radar statements of the American shuttle N36Hgt are used as source for data to derive DEM using Global Mapping and Arc GIS softwares with their 3D analysis in addition to WMS software exported to Arc GIS to

calculate inclination, slope and shadow analysis after transforming DEM from vector to raster.

Final practical outputs are in GIS software and they explain the quantity of data and information derived from DEM in the form of maps showing the geomorphologic features like contour, inclination, slope and shadows analysis.

The study sums up with the following:

The accuracy of outputs derived by GIS to calculate inclination, slope, direction and shadow maps.

The possibility of GIS to conduct mathematical operations on maps and analyze results in the form of maps to calculate inclination coefficient and analyzing results with maps.

Results of map outputs show the position of inclination, slope and direction.

The possibility of maximum use of radar data given the shuttle in various scientific fields, like geology, geomorphology, hydrology, geography, engineering and agriculture.

Keywords: digital elevation model; global mapper; ARC.GIS

GK2-13:

Tectonic and Eustatic Signatures in Depositional Sequences of a Foreland Basin: Example from the Oligo-Miocene Asmari Formation of Southwest Iran

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ABSTRACT

The Oligo-Miocene Asmari Formation (up to 500 m) and its time-equivalents in the Persian Gulf foreland basin are one of the world's most important petroleum reservoirs in southwest Iran. It is unconformably underlain by the basinal deposits of the Eocene-Oligocene Pabdeh Formation and is unconformably overlain by the continental deposits of the Middle Miocene Gachsaran Formation. Field and petrographic investigations of 10 outcrop and subsurface sections of the Asmari Formation in the northwest of the basin led to recognition of dominantly shallow marine carbonate, siliciclastic and evaporite facies. These are arranged into 7 depositional sequences that are correlated with the Oligo-Miocene eustatic sea-level cycles. In the southwest distal sections, the Lower and middle Asmari sequences (Chattian-Aquitanian) consist of mixed carbonate and siliciclastic facies, which change laterally to pure carbonate or carbonate and evaporite facies in the proximal area to the northeast. These sequences are absent towards the Zagros thrust belt, where the dominantly carbonate facies of the Upper Asmari (Burdigalian) unconformably overlies the Eocene Shahbazan Formation.

The Asmari Formation was deposited in the Persian Gulf foreland basin related to NW-SE trending Zagros orogenic belt. Both eustatic sea-level changes and regional tectonics were responsible in controlling lateral and vertical facies variations of the Asmari succession. The predominantly carbonate facies and correlation of Asmari sequences with global sea-level cycles suggest a strong eustatic control during deposition.

Siliciclastic intervals in the mixed siliciclastic-carbonate deposits are interpreted to represent forebulge uplift as a result of tectonic loading of the thrust sheets. The shallow marine pure carbonate/carbonate-evaporite intervals that cover the proximal foredeep or the entire foreland basin appear to be the consequence of both eustatic sea-level changes and tectonic quiescence.

Keywords: Asmari, Facies, Sequence stratigraphy, Tectonic event, Depositioal environment

GK2-14:

Cr-spinel Mineral Chemistry from Sawlava Ophiolite Complex, Kurdistan, NW Iran, Geotectonic Setting Implication

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ABSTRACT

Ophiolitic ultramafic rocks associated with chromitite lenses are studied in detail from Sawlava ophiolitic complex along the Zagros suture in the northwest of Iran. Except one small window in Miana village almost all primary silicates in dunites and wehrlites have been altered to serpentine; however, Cr-spinel is the surviving phase left. Chemistry of the Cr-spinel minerals from small chromitite lenses within the ultramafic units provides information about the primary petrological characteristics. The Cr# of the Cr-spinels is between 0.76 to 0.82 in chromitite lenses, 0.58 to 0.67 in dunite and 0.49 to 0.52 in wehrlite. Al2O3 values and FeO/MgO ratio in the chromitite lenses indicate a boninitic melt for the source magmas of the Cr-spinels. The low values of Ti and high contents of Al and high Cr# in peridotite Cr-spinels reveal a pronounced rate of partial melting (25-35%) for peridotites. This suggests that Sawlava complex source was mantle wedge with elevated degrees of partial melting. Olivine, clinopyroxen and Cr-spinel minerals chemistry shows the characterization similar to those in abyssal to supra-subduction zone (SSZ) peridotites which suggest a for arc basin setting for the generation of the chromitite lenses from Sawlava ophiolites.

Key word: Cr-Spinel, Chromitite, Sawlava ophiolitic complex, Zagros, Iran.

GK2-15:

Determine the structural discontinuities in fractured carbonate reservoirs using FMS and VSP logs in the one of oil fields on West of Zagros

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ABSTRACT

A large number of oil reservoirs in west of Iran and Iraq's Kurdistan, are of fractured carbonate type. In these reservoirs, study on the discontinuity and their role in changes of the static and dynamic properties, can help us to identify the flow system and the hydrocarbon reserve estimate. Fractures are the most important factor in production of these reservoirs. The faults and foldings cause complication in the reservoirs structures. The VSP seismic data due to its low resolution, shows the major faults and the formations borders, but will not be able to determine the small changes and complexity of the structure. The FMS log, easily recognize microstructures. Therefore, with a combination of large-scale VSP data and small - scale FMS data, we can make the static 3D models. In the present paper, the FMS and VSP data are used for the case study. The results show that well have been cut by faults that exception first fault to the south slope, all 5 faults dip to the north. To create the faults planes, AutoCAD software was also used and the results are shown in this paper.

Key Words: fracture carbonate reservoirs FMS log, VSP log, and west of Zagros.

GK2-16:

Assessment of Shiranish and Pila Spi Limestone for Concrete Aggregates, Shaqlawa area, Iraqi Kurdistan Region.

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ABSTRACT

Limestone of Shiranish and Pila Spi formations were evaluated as concrete aggregates through this study. For this purpose two outcrops had been selected; the first outcrop is Pila Spi Formation at Pirmam Anticline, and the second outcrop is Shiranish Formation at Safin Anticline. Both these outcrops are located at the High Folded Zone, between Erbil and Shaqlawa cities.

Chemical analysis for the studied samples shows that the limestone of Shiranish Formation has more calcite proportion, while the limestone of Pila Spi Formation is dolomitic. This was supported by the X-ray analysis and staining process by Alizarin Red S. To assess the studied limestone for concrete aggregate, the samples has been crushed and sieved into two grades, 4-30 mm (coarse aggregate) and finer than 4 mm (fine aggregate). The coarse portion is used instead of pebble and the fine portion is used instead of sand in concrete mixture. Eight briquettes in dimensions 15 cm3 for each sample were formed. Two ratios of cement: fine aggregates: coarse aggregates were tested; 1: 1.5: 3 and 1: 2: 4 respectively. These raw materials were mixed with water in two ratios; 1:0.5 and 1: 0.75 for cement: water ratio respectively.

The compressive strength tests show that the concrete prepared from Shiranish limestone aggregate give a best results when compared with that prepared from Pila Spi limestone aggregate. These results proved that the Pila Spi limestone is suitable for using as aggregate in manufacturing concrete masonry only after twenty eight days soaking in water. While Shiranish limestone is suitable for using as aggregate in

manufacturing concrete masonry after seven and twenty eight days soaking in water, as well as aggregate in manufacturing concrete foundation, column and roof after twenty eight days soaking in water. In addition to that, other concrete briquettes were formed from both formations, after soaking the limestone aggregates in water for 24 hours before forming the concrete, and showed bad results in the term of consistency.

Keywords: crushed limestone; dolomitic limestone; concrete; compressive strength.

GK2-17:

Assessment of Suitability of the Beduh Deposits (Lower Triassic) for Lightweight Aggregates, North Amadyia, Kurdistan Region - Iraq.

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ABSTRACT

This study deals with the assessment of deposits of the Beduh Formation (Lower Triassic) for lightweight aggregate. It is carried out on channel samples of three exposures (Beduhe, Sararu and Nazdur) at north of Amadyia. Lithologically, the formation consists of alternation of reddish purple, reddish brown and greenish grey shale with subordinate thin sandstone beds and some siltstone streaks.

XRD analysis revealed that the studied samples are composed mainly of clay minerals such as illite in major proportion with kaolinite, chlorite, smectite and mixed-layer illite-smectite in minor proportions. The non-clay minerals are quartz and calcite, in major proportions and minor proportions of feldspar and hematite. Grain size analysis showed that the raw materials are composed mainly of clay and silt, with subordinate sand. The plasticity index of these shales is high due to high clay content. Chemical analyses show that the raw materials are composed essentially of silica, alumina, calcium oxide and relatively a less proportion of iron oxide, and appreciable amounts of MgO, K2O, Na2O, TiO2 and MnO.

The raw materials are ground and sieved to two sizes: fine size (less than 0.075 mm) and coarse size (less than 1.00 mm). Water is added

(about 12-15 %) to the sieved samples and thoroughly mixed, pelletized by hand to lumps named here pellets (about 18-20 mm diameter). The pellets are dried and fired at different temperatures with different soaking times. The evaluation physical tests (bloating, porosity, water absorption and bulk density) shows that the best results achieved through flash firing at 1120°C with soaking time 30 minutes and rapid cooling, after pre-heating to about 300 to 350°C for 10 to 15 minutes. The coarse raw materials (less than 1.00 mm) show better results than the finer size (less than 0.075 mm).

Keywords: Beduh shale; bloating; lightweight aggregate; flash firing.

GK2-18:

A mineralogical study of Fe skarn deposits in SE Saqqez, Kurdistan ,Iran

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ABSTRACT

The Ranga Rezhan and Hassan Salaran Fe skarn deposits are located approximately 20km southeast of Saqqez city, Kurdistan province, western Iran. These Fe skarn deposits have been formed along the contact between SE Saqqez Granitoid Complex and Permian limestones in Ranga Rezhan and Hassan Salaran villages. The Ranga Rezhan Fe skarn deposit is divided into endoskarn and exoskarn. Endoskarn is composed of alkali feldspar, quartz, plagioclase, epidote, garnet, magnetite and sphene. Generally, exoskarn is divided into garnet skarn zone and epidote skarn zone. The mineralogy of exoskarn includes andraditic garnet, clinozoisitic epidote, magnetite, hematite, goethite, pyrite, chalcopyrite, calcite, siderite, quartz and clay minerals. Iron ore body of Ranga Rezhan has occurred along the contact between G1 granitoids and recrystallized limestons. Ore minerals in the Ranga Rezhan iron ore are magnetite, hematite, chalcopyrite, goethite, and pyrite. Magnetite is the predominant mineral and has been formed in oxidation phase of high-temperature degree. The sequence of mineralization of the ore minerals is 1- magnetite, 2- hematite, 3- pyrite 4- chalcopyrite and 5- goethite.

The Hassan Salaran Fe skarn deposit is divided into endoskarn and exoskarn. The main minerals of endoskarn are alkali feldspar and quartz. The accessory minerals include plagioclase, epidote, magnetite and

arfvedsonite. Exoskarn of Hassan Salaran iron skarn is different from exoskarn of Ranga Rezhan iron skarn and it is only composed of epidote skarn zone. The mineralogy of this zone includes epidote, magnetite, hematite, goethite, rutile, pyrite, chalcopyrite, calcite, siderite, clay minerals and quartz. Ore minerals in the Hasan Salaran Fe ore body are magnetite, hematite, pyrite, chalcopyrite, goethite and rutile. The sequence of mineralization of the ore minerals is 1- magnetite, 2- hematite, 3- rutile, 4- pyrite, 5- chalcopyrite and 6- goethite.

Keywords: Fe skarn deposits; ore minerals; ore body; endoskarn; exoskarn

GK2-19:

Fossils distribution from Garagu Formation (Early Cretaceous), diversity and Paleoennvironmental conditions, Kurdistan Region, North Iraq

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ABSTRACT

The most recent studies reformed the occurrence of Garagu Formation, Dohok area, Kurdistan Region, Northeastern Iraq. The present paleontological study, in the type locality, aids the recognition of the formation. Recognizing fourty six (49) species and genera of the (Benthonic and Planktonic Foraminifera, Ostracoda, Algae, and Coral,) with Gastropoda shell, and Echinodermata spicules, which are described and figured. The stratigraphic distribution and diversity of these fossils assemblages indicate the Hauterivian-Barremian age of the Garagu Formation. The fossil assemblages in the Garagu Formation are characteristic for a shallow marine setting with local transitions to continental facies, shelf lagoonal environment and open platform.

Key Words: Garagu Formation, Microfossils, Paleoenvironment, Dohok, Kurdistan, Iraq.

GK2-20:

Seismic Crustal and Upper Mantle Structure of Iraq and Surrounding Regions Inferred from Regional Waveform Inversions

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ABSTRACT

The shear-wave (S-wave) velocity structure of the crust and its effect on seismic-wave propagation are of fundamental interest in many geophysical studies. S-wave velocities and layer thicknesses have a dominating influence on the waveforms of Rayleigh waves. Rayleigh wave waveforms from the Northern Iraq Seismographic Network (NISN) are inverted to constrain the crustal and upper mantle velocity structure in Iraq and surrounding regions. The inversion uses a niching genetic algorithm (NGA), which optimizes four parameters of earth properties at different frequencies and in different sub-populations: P-wave velocity, S-wave velocity, density, and Earth layer thicknesses. Each subpopulation separately performs the genetic-algorithm processes of selection, crossover, and mutation of the velocity models, with the niching function removing models that are too similar in order to maintain distinct subpopulations. Using both observed earthquake surface-waves waveforms and synthetic forward-modeled waveforms; we obtain regional S-wave profiles for the crust (including top-most sedimentary layers), and the upper mantle. We demonstrate that the NGA method is a robust means of interpreting observed surface-wave waveform data.

GK2-21:

Seismic Hazard Assessment of Northern Iraq

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ABSTRACT

Seismic hazard assessment is the estimation of the likelihood that an earthquake will occur in a given geographic area, within a given window of time, and that it develops ground motion acceleration or intensity at a specific place within a specific area that exceeds a given threshold. It can be used as a tool for rational planning and designing in seismically active areas. For seismic hazard quantification, statistical analyses of earthquake catalogs of northern Iraq and surrounding regions are carried out to estimate the rate and spatial distribution of earthquake events as a function of magnitude and geographical location. Most techniques for estimating the likelihood of occurrence within a specific area are based on historical data of that region. An essential step in characterizing seismic hazards in a region is to determine the frequency and location of past earthquakes. Earthquakes tend to cluster around the most active faults. Kernel density estimators using a Gaussian kernel are applied to assess seismic hazard in the area. We performed Probabilistic Seismic Hazard Analysis (PSHA) to quantify the probability of exceeding a given ground motion in the area. The highest probability of seismic hazard exists in the northeastern part of Iraq and the Zagros regions. The seismic hazard is lowest to the west and south of northern Iraq, in the Mesopotamian valley. The comparison between the obtained results and the seismotectonic models of Iraq reveals that the current distribution of regional earthquakes agrees with the seismotectonic provinces of Iraq.

Keywords: seismic, hazard, risk, probability, PSHA

GK2-22:

Geological Map of Sulaimaniyah Quadrangle, at Scale of 1: 250 000

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ABSTRACT

The geological map of Sulaimaniyah Quadrangle at scale of 1: 250 000 was first compiled by Iraq Geological Survey (GEOSURV) during 2007 depending; mainly on the available geological maps at scale of 1: 100 000, which were compiled from interpretation of aerial photographs, besides some other maps quoted from Kurdistan Series of geological maps and small parts mapped by GEOSURV during 1972 – 1974. The present geological map (2nd edition) also prepared by GEOSURV; however, includes a lot of updated data acquired from detailed geological mapping carried out during 2008 – 2009, and data acquired during systematic checking trips executed during 2007 – 2013 by the current authors. The updated geological map of Sulaimaniyah Quadrangle is attached by a geological report that describes the: Geomorphology, Structural Geology and Tectonics, Stratigraphy, Hydrogeology and Mineral Resources. Within all these subjects a lot of update data is presented, especially in Stratigraphy, and Structural Geology and Tectonics. The most updated parts of the Geological Map of Sulaimaniyah Quadrangle at scale of 1: 250 000 are those which are covered by Geological Maps of Sulaimaniyah, Qara Dagh and Halabja Quadrangles at scale of 1: 100 000, and more precisely the Sulaimaniyah Quadrangle, which is totally updated. The stratigraphic units are more accurately mapped and presented on the map, especially in the vicinity of

Sulaimaniyah – Pera Magroon – Surdash – Haladin – Mawat – Azmir. The Quaternary sediments are more precisely presented on the map. Concerning the structural and tectonics, the structural elements; including anticlinal and synclinal axis and different types of faults are also more precisely presented on the current map too. However, still there are some parts that need updating within the current map, especially in areas where igneous and metamorphic rocks are exposed and in the extreme northeastern and northern parts of the map.

Key Words: Geological ma, Quaternary sediments, Cretaceous formations.

GK2-23:

Geological modeling using different geostatistics methods and extraction of the comprehensive reservoir model

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ABSTRACT

Determination of petrophysical parameters by using available data has a specific importance in exploration and production study in oil and gas industries. For example modeling of corrected permeability as a petrophysical parameter can help in decision making that may be have high financial risk such as drilling. The objective is to construct a comprehensive and quantitative characterization of a carbonate reservoir in an oil field. In the study, the geological reservoir model is developed in two steps, first the structure skeleton of the field is constructed and then reservoir property is distributed in it by applying new geostatistic methods. Permeability is modeled utilizing three techniques including: kriging, Sequential Gaussian Simulation (SGS) and collocated co-simulation using modeled effective porosity as secondary variable. Kriging is very simple to model the reservoir permeability and original distribution of the data changes considerably in this model. Also the SGS simulated model is noisy and heterogeneous but it retains the original distribution of the data. finally, the addition of a secondary variable in third method is obtained a much more reliable model of permeability.
Keywords: Geostatistic methods, Reservoir Modeling, Structural Modeling, Permeability.

GK2-24:

Geomrphology And Mesoscopic Fracture Analysis on Wadi Shalghah Area, East Rbil / Kurdistan Province

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ABSTRACT

Wadi Shalghah area is located 14 km east Erbil city, within Erbil governorate in Kurdistan Province. It occupies an area of 300 km2, The study area is located, physiographically, within the foothills province. It is a hilly area with almost constant relief differences, it rises towards north and northeast, the highest points located at the northeastern margin, whereas the lowest point is located within the valley course, Geomorphologically, due to the presence of Bana Bawi anticline and the clastic hard sandstones and soft claystones, the study area is built up of several geomorphological units: units of Structural-Denudational Origin, Units of Denudational Origin, Units of Fluvial Origin and Units of Depositional Origin, tectonically, it lies within Low Folded Zone of the Outer Platform of the Arabian Plate, it is a part of the southwestern limb of NW-SE trending BanaBawi anticline.

Mesoscopic fractures were measured from (30) stations of 10 m x 10 m dimensions, distributed along the study area, they were grouped into two orthogonal extensional sets (F1 and F2 fracture set) and two conjugate shear systems (S1 and S2 fracture system).

GK2-25:

Gis-Based Morphometric Analysis of the Dewana Basin, Sulaimaniyah, Kurdistan, Iraq

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ABSTRACT

An integrated remote sensing data in a detailed morphometric study of the Dewana drainage basin, Sulaimani Governorate of the northeastern part of Iraq. The basin is considered as a good example of a medium scale drainage basins of a mountainous terrain with variable geomorphological processes and landscapes. Major basin divides recognized by the homoclinal ridges of Baranan mountain to the northeast and Sagerma mountain to the southwest.

Satellite images as well as Digital Elevation Model with topographic, geologic, and structural maps were used in addition to field investigations to perform a GIS-based drainage network and morphometric analysis. Arc GIS 9.3 was used to digitizing, measuring and drawing the spatial data of these analyses. Detailed morphometric analysis was applied to the Dewana basin, using variable geomorphological and hydrogeomorphological parameters, by calculating network aspects from two sets of topographic maps at scale of 1:20,000 and 1:50,000. Different sets of morphometric parameters were calculated such as: linear, relief and aerial parameters. Morphometric analysis results are discussed and correlated with each other and to standard values to evaluate fluvial-geomorphic evolution of the basin. The study shows that the Dewana basin is of the 6th order drainage basin, with relatively, high values of drainage density and basin relief which implies that surface runoff is not rapidly removed from the basin, making it susceptible to sheet flooding, gully erosion and landslides. Shape parameters of the basin indicate that it has elongated form, which reflects strong structural controls on the morphology of the basin. Drainage pattern is dominated by dendritic, sub-parallel to sub-trellis types which emphasize structural controls in addition to variable lithologic characters of the basin rocks.

GK2-26:

Crushed limestone: As alternative for natural aggregate in Qaradagh area, Kurdistan region NE of Iraq

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ABSTRACT

The Late Eocene limestone rocks of Pila Spi Formation from Qaradagh area in Sulaimani Governorate, Kurdistan region (NE of Iraq) have been selected as alternative for natural aggregate in paving roads and constructions. The collected sample from the section was analyzed from chemical and engineering point of view. Field investigations in the area were adopted. The laboratory tests including (Particle Size Analysis, Los Angeles Abrasion, Specific Gravity, Water Absorption, Soundness, and Sulphate Content) had been done for the crushed limestone aggregates and compressive strength had been done for 12 concrete cubes. The cubes volumes are (15* 15*15 cm3) according to [11]. The aggregate mix design consists of (4, 2, 1.5) with 0.5 water/ cement ratio according to [3]. The test results of the aggregate was compared with the international standard tests and it revealed that these materials are acceptable as alternative for natural sand and gravel with average compressive strength is (37.4 MPa) for specific mix design.

Key word: Pila Spi Formation, Mix design, Compressive strength.

GK2-27:

Critical analysis of the type section of the Balambo Formation (Valanginian-Turonian), Sirwan valley, Kurdistan Region, NE-Iraq

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ABSTRACT

Balambo Formation (Garau Formation in Iran) and its equivalents such as Shuaiba, Qamchuqa and Mauddud are very important formation since they occur nearly in all oil field in Iraq and Iran. The first definition of the Formation is carried out in 1947 in the Sirwan Valley and the type section is located on the southwestern limb of the Balambo Anticline, about 11km to the southwest of Halabja town, 3km to the east of Kawta village. In the present study, the first definition is critically analyzed in the field and laboratory by foraminiferas and nanofossils aging. The analysis shows many problems in the thickness, stratigraphy, location and its relation to Kometan and Shiranish formations. Many structural and topographic characteristics (of the section) are shown to prove that the thickness of the type section is less than that indicated previously in the first definition. The lithology and paleontology of the type section in the Sirwan valley confirms the presence of the Kometan Formation which has the age of Turonian-Late Campanian and has conformable contact. This is opposite to the first definition which was stated the absence of Kometan Formation and presence of erosional unconformity (missing sediment of Santonian-Middle Campanian) with overlying Shiranish Formation. The location of the type section is not clear and it is combination of the three different sections of different areas which are located in the imbricated Zone. Topographically and structurally, the sections are so complex that a now day's geologists will never think to select them as a type section for dentition a stratigraphical units.

GK2-28:

A New Record of Foraminifera Species (Pseudoritolina Marthae Douville) Indicting the Late Maastrichtian Stage Within the Aqra Formatian In Chwarta Area, Sulaimaniyah Governorate, NE Iraq

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ABSTRACT

The Late Maastrichtian foraminifera of Aqra Formation were identified by studding 53 samples from one outcrop section (Mukaba section) in the north eastern limb of Azmar Anticline, Chwarta area, Sulaimaniyah governorate, NE Iraq. Three formations are exposed in the section (from the oldest to the youngest) Shiranish Formation; composed of marl and marly limestone, Tanjero Formation; composed of calcareous sandstone, shale, siltstone and claystone and Aqra Formation composed of massive dolomitic limestone.

Sixty seven species of benthonic and planktonic foraminifera related to (35) genera were identified. An importuned Maastrichtian species of foraminifera (Pseudorbitolina marthae DOUVILLE) was founded and recorded for the first time within the Aqra Formation

According to the identified foraminifera, suggest that the age of Aqra Formation was of Late Maastrichtian.

GK2-29:

Studying Structural Characteristics of Saqez – Takab Region (NW of Sanandaj – Sirjan Zone) Using GiT (Geo Information Techniques)

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ABSTRACT

Saqez – Takab Region, as the northwestern part of Sanandaj – Sirjan deformed and metamorphosed Zone (NW part of Zagros Orogen, NW of Iran) has been studied in this research for detection of structural characteristics and events. First, the structural fracture map of the area was drawn using RS (Remote Sensing) methods. These fractures (lineaments) were classified to 3 different sets by their length values: the Major, Main and Minor Faults. Then 21 stations were selected for the filed study based on the foregoing map; focusing on the maximum intersection points of the main faults with the others. In the next step, detected lineaments (faults) were checked and structural, geometric and kinematic characteristics of them were calculated in the field

observations. The rose diagram of each station (strike data of the faults) was drawn and compared to the other stations. Intensity (I) values were calculated and mapped for studying the distribution model of the fractures (drawing Isofracture map). Then the major detected faults in the field observation were got names and mentioned on the final map with their movements illustrating symbols. Analyzing the kinematics containing the senses of movements and P-Axis values were done and mapped, too. This study suggests at least 3 main stress axis conditions. Based on comparison of the strike values of the outcropped faults, fault plane orientations by the poles, P-Axes values (directions), observed lateral displacement relationships and the other evidences, it was concluded that the oldest fault set is oriented N135 and is dextral. The younger set is N70 with both sinistral and reverse slipping; and the youngest one has a mean direction of N15 with a sinistral displacement.

Key Words: Saqez – Takab Region, Sanandaj – Sirjan Zone, GiT Techniqes, RS Methods, Kinematic Analysis, Isofracture Map, Structural Fracture Map, Fault Classification.

GK2-30:

Application of Partial frequency band match filter on seismic reflection data

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ABSTRACT

The properties of geophones are important factors for high-resolution seismic exploration and have a great influence on data quality.

High-resolution seismic exploration does not mean high-frequency exploration. If the natural frequency of the geophones is too high, not only the low-frequency energy will be suppressed and the frequency bandwidth will be reduced; but also the effective frequency band will fall into the nonlinear area, producing nonlinear distortion and lowering resolution.

In this paper we combine the advantage of three kinds of different geophones with high, low, and conventional frequencies to broaden the effective bandwidth of the acquired data. For this purpose; we have designed a partial frequency band matched filter which can combine the advantages of low and high frequency to conventional data. This process is modeled by introducing a richer wavelet with different dominate frequency and amplitude, by applying this filter to the conventional data; the effective bandwidth has broadened and both resolution of the section and S/N ratio has been improved.

GK2-31:

A new Simulation of Baba dome (Kirkuk Field), Bai Hassan and Khabaz Structures using Geophysical Data

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ABSTRACT

The Study area is located in Kirkuk Governorate in the north /eastern part of Iraq. It includes the oil fields of Khabaz, Bai Hassan and Baba dome, with geological structures trending NW - SE within the transverse Kirkuk block.

The histograms of density logs are plotted for wells of K-229, BH-86 and KZ-13. It is generally noticed alternative contrasts of the lithostratigraphic sequence which may be causing attenuation or reduction of the gravity anomalies.

The gravity map of the study area is characterized by negative values decreasing towards the north/east. The map also displays the presence of two gravity highs over Kirkuk and Bai Hassan structures and contour disturbing over Khabaz structure.

The enhancement techniques (geokriging, smoothing interpolation, directional derivative, digital filters and maths difference) which were applied to the gravity and magnetic data correlated by geological and tectonic feartures. A gravity traverse (A-A–) across Qara Chauq, Khabaz and Kirkuk structures is studied and the regional field is estimated with

upward continuation and inspection approaches. In addition, the gravity anomaly of Khabaz structure is studied with the calibrated regional field. Accordingly, two alternative gravity traverses (B-B–) and (C-C–) are adopted which verify the previous conditions. The geophysical models of Kirkuk, Bai Hassan and Khabaz structures across the above traverses are designed using all the available information.

The present study shows after a detailed quantitative simulation that the extension of Kirkuk structure is (6 km.) instead of (4 km.) according to the geologic section taken from North Oil Company (NOC). It also indicates the presence of basement uplift with (11.3 km.) and (9 km.) depth beneath (B-B–) and (C-C–) traverses, respectively. Furthermore, it also displays basement block under Bai Hassan and Khabaz structures with depth 11.6 km. and 10.2 km., respectively.

Key words: Geophysical simulation, Baba dome, Qara Chuq, Bai Hassan, Khabaz.

GK2-32:

Present Status of Monitoring Earthquakes in Kurdistan, Iraq

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ABSTRACT

Kurdistan, Iraq, is located at the leading northeastern edge of the Arabian plate. Its tectonic framework is a manifestation of the northeast translational and counterclockwise rotational motion of the plate and its collision with the Iranian and Turkish plateaus. Historically, this dynamic setting has subjected the region to frequent seismic activity. Starting in 2005 Kurdistan embarked on collaborative projects to establish an advanced seismographic network that covers the region. The goal is to collect an unprecedented wealth of high quality data that can be effectively used to understand the seismotectonic framework and eventually the seismic risk throughout the region. In 2006 the North Iraq Seismographic Network (NISN) was deployed. It consists of ten three-component broadband stations equipped with STS-2 seismometers, 24 bits Q330 digitizers and 20GB Baler storage devices. In 2008, the five-element KSIRS array was added to further improve the

network's local and regional monitoring capabilities. KSIRS is equipped with STS-2 seismometers, 26 bits Q330HR digitizers, 16GB Marmot data loggers, and radio and satellite communication systems. The data are analyzed using the Antelope software system installed at the centers in Sulaimaniyah and Erbil. Since inception some of the NISN stations have been relocated. Plans are underway to build permanent underground vaults and equip all the stations with telemetry. So far this seismographic network has outperformed the international community's reporting of the regional seismicity by 8:1. Participation in the virtual Middle East Seismographic Network (vMESN) has also greatly enhanced the NISN network performance. Keywords: NISN, KSIRS, Kurdistan, Iraq, earthquakes, seismic network, seismic stations.

GK2-33:

Hydrocarbon generation potential and thermal maturity of Middle Jurassic Sargelu Formation in Miran Field, Sulaimani Area, Kurdistan region, NE Iraq

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ABSTRACT

The total 61 unwashed cutting rock samples of Sargelu Formation from both Miran-3 (M-3) and Miran-4 (M-4) wells have been investigated in this study. The area of interest is Miran Field; which locates in the High Folded Zone, about 30 Km Northwest of Sulaimani city, Kurdistan region, NE of Iraq. The samples have been tested by Rock-Eval Pyrolysis and Vitrinite reflectance in order to determine organic richness, hydrocarbon potentiality, types of organic matter, and thermal maturity level of the Sargelu Formation in Miran Field.

The Total Organic Carbon content (TOC wt. %) for the Sargelu Formation ranged from 0.99-6.56 wt. %, average 2.23 wt. % for M-3 well, and between 0.86-6.41 wt. %, average 2.74 wt. % for M-4 well. It considered as a very good source rock based on TOC wt. % content. The data reveals that this Formation in both wells has low amounts of HI (average 58, and 68 mg HC/g TOC for M-3 and M-4 wells, respectively), low amounts of S2 (average 1.28, and 1.44 mg HC/g Rock for M-3 and M-4, respectively), as well as low amounts of Pyrolysable carbon (PC wt. %). While, the samples have high value of Residual Carbon (RC wt. %). Thus, the Sargelu Formation has low potentiality and it is classified as a poor to fair source rock for releasing hydrocarbons. According to the interpretation of the Rock-Eval data, the kerogen types of Sargelu Formation are mostly admixture between type II and type III kerogen. This result is also supported by microscopical approach, which indicating

that the dominant organic matter populations within the samples are solid bitumen. However, the ability of Sargelu Formation is only remain for gas generation in the studied Field.

The analyzed samples reveal high values of thermal maturity based on the values of equivalent vitrinite reflectance (eq.VRo %). The value of eq.VRo% is between 1.5%-1.55% for M-3 well and between 1.4%-1.45% for M-4 well, which indicate post mature; i.e. gas generation zone. Whereas, peak mature is assigned based on the production index (PI) parameter (average of PI is 0.33 and 0.27 for M-3 and M-4 wells, respectively). Maturity assessment bases on Tmax is not applicable, because of the effects of mud additives, therefore this parameter is not depending for the maturity assessment in the present study.

Key words: Sargelu Formation, Kurdistan, Hydrocarbon potentiality, Solid bitumen, Thermal Maturity.

GK2-34:

Surface and sub-surface study to interpret the Paleo Basin morphology during Hauterivian North of Iraq

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ABSTRACT

Basin configuration and evolution of western flank of the Tethys can be modelization during Hauterivian-Albian depend on (1) detail study of the outcrops in Northeastern Kurdistan and (2) seismic interpretation in the southeastern Iraq and western of Kurdistan.

During Hauterivian-Albian the Kurdistan was path through series basin changes. The obvious laterally and vertically facies changes are mostly related to the final active rifting phase of the Tethys as well as the Kurdistan was located in the passive margin of the depositional basin.

During Hauterivian-Barremian the northwestern flank of the Tethys extend to the extreme northwestern of Iraq. From the west to east deposition of shallow clastic, inner-shelf facies, outer-shelf (Sarmord Formation) and deep open-sea (Balambo Formation) consequently indicate the gradationally increase of sloping of the Tethys toward the basin. The absent of shallow facies between deeper facies explain no any large scale extensional fault in the seismic lines are clearly indicate no any active graben formed during this period. Consequently during Hauterivian-Berriasian most possibly the rifting progression of the Tethys was slow.

The Aptian period is the time of development the reefal platform between shallow facies (NahrUmr Formation) in the west and deep-open sea (Balambo Formation) in the east. The large Qamchuqa Platform is vigorous with opening of the Tethys. The development of Qamchuqa platform leads to terminate the outer-shelf and changed into the semi restricted shallow basin in the west. The fast vertically and laterally facies change during Aptian indicate the active period of NNW-SSE extension faults corresponding to the Tethys rifting.

During Albian the continuous development of the Qamchuqa reefal platform and deep-open-sea in the east indicate nearly same situation as much as Aptian time. But in the northwest and west the dominant marly facies of Upper Sarmord Formation developed that is deeper than shallow clastic NahrUmr Formation. From the Seismic line and interpretation we clearly identified the NW-SE trend graben in the Kirkuk and Mosul area. Occurrence of the graben nearly perpendicular to the main Qamchuqa reefal indicating of the development of the NW-SE and WNW-ESE trending extension fault as a result of the flexibility of the Arabian Plate between final steps of rifting and initiating the Arabia-Eurasia obduction event.

Key Words: Kurdistan, Sarmord Formation, Qamchuqa Formation, shallow facies, NW-SE trend, graben.

GK2-35:

Modified Folk Sandstones Classification

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ABSTRACT

The Folk's method of sandstone classification has been very commonly used by many sedimentologists. However, problems may be encountered using this method of classification. The problems include the size of matrix, the components used in the poles of triangular diagram, inability to classify some sandstone samples and the fact that the description of sandstone and its position in the diagram do not always match. In the proposed modified Folk classification, all of these problems have been resolved, the boundary between grain and matrix size is chosen to be 0.0625 mm, and if the matrix is 10 to 50%, wacke term is preferred. To use this term, it is enough to add wacke to sandstone name after omitting the arenite, if it was.

Keywords: Folk's classification, Modified Folk, Sandstones, Matrix

GK2-36:

The estimation of Porosity and permeability value for well TT-4 through different techniques; well-logging, well-testing and core analysis

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ABSTRACT

Studying the porosity and permeability in a particular formation from well TT-4 will be an address in this paper. Porosity and permeability are the most important physical reservoir rock properties which play a key role during the exploration of oil and gas fields in terms of the total volume estimation of hydrocarbon in place and the ability of the reservoir rock for production which are required for field development plan.

The data from three different techniques; well-logging, well-tesing and core analysis have been assessed and examined to estimate the value of porosity and permeability. Each of these formation evaluation methods has been applied in different stages in the life of the well. The problem here is the lack of data for some intervals from each technique; this led to make the analysis being more complex.

The result indicates that a wide range in the value of porosity and permeability for each technique at different intervals. In some cases, permeability has been defined through the porosity value since there was not a direct value of permeability.

GK2-37:

The virtual Middle East Seismographic Network (vMESN) Concept and Implementation

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ABSTRACT

At the 7th Gulf Seismic Forum on January 22-25, 2012, Jeddah, Saudi Arabia, Ghalib et al. (2012) proposed the establishment of vMESN. It is a virtual seismographic network that all Middle East countries operating telemetered seismic stations can equally exploit to monitor earthquakes in and around their respective territories. The overarching goal of vMESN is to advance the teaching and practice of seismology and research among member countries. It is a scientifically and economically rewarding concept with high return on modest investment in resources and infrastructure. It is also technically feasible to implement at member data centers to greatly improve the capability and coverage of their national networks when augmented with international stations in the region. The integrated real-time data that vMESN provides is invaluable for research and development in seismology and earthquakes engineering. Presently, vMESN is implemented and operational at Jordan, Erbil and Sulaimaniyah Seismological Observatories (JSO, ESO and SSO, respectively) and at Array Information Technology (AIT) data center in Maryland, USA. At no cost to the host and member countries, AIT is contributing real-time data from the international stations in the region; Jordan is contributing real-time data from their Jordan

Seismological Network (JSN), and Kurdistan from their KSIRS array and some of the North Iraq Seismographic Network (NISN) stations. Three-component data from a total of 72 stations is currently being automatically shared and independently processed at the aforementioned data centers. The Antelope, and soon SeisComp 3, real-time software system is configured to automatically acquire, forward and process the data. The invitation is open to all countries in the Middle East to join vMESN, if they commit to the requirement of sharing data in real-time over Internet. Each member country continues to maintain full control over their networks' data and over what to acquire and forward to others. Also, each member country continues to independently process the data and publishes bulletins in accordance with its technical practices, standards and regulations.

Keywords: vMESN, Middle East, earthquakes, seismographic network.

GK2-38:

Geochemical assessment of Naopurdan limestone for cement making-Chwarta area, Kurdistan Region, NE Iraq

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ABSTRACT

The Naopurdan limestone klippe is covering about 19.28 Km2 from Chwarta area- Sulaimani City. Fifteen samples were collected from this limestone body and subjected to elemental analysis by X-ray fluorescence technique. The analysis was carried out in Mass Cement Company. Petrographical study indicates to the presence of different fossil content such as Nummulites spp (N. perforates; N.milliucaput; N.globulosa; N.atacicus; N.bahyranses)., Alvelinaspp(A. eleptica; A. aragoensis; A. oblonga; A. fusiformis)., Miliolina ; Algae (Lithothaminum sp.; Cympolina sp.); echinoid bioclasts; corals; andOrbitolites; Coskinolinasp; Somalina sp. Index fossils indicate the Middle Eocene age for this limestone body. The formaniferal wackestone and packestone microfacies are the most common facies in the studied samples, as well as recrystallized limestones observed in two samples. The depositional environment as deduced from lithology and fossil content is shoal of marine environment.

Petrological study indicated that the limestone samplesare crystalline and dominantly composed of calcite with CaCO3 content more than 95 %. Geochemical analysis results of fifteen handpicked samples indicated that the limestone from the Naopurdan Formation shows LOI range between (38.50% to 43.29%), Si02(0.11% to 7.92%), CaO (55.19% to 45.82%), A12O3(0.01% to 0.97%), Fe2O3(0.02 % to .46%) and MgO 0.37 % to 4.29 %, K2O, Na2O, and SO3 are present in traces. The lime saturation factors (LSF)of studied samples have widely differing values ranging from 188.64 to 7543.5, but most have values above the limits required for high quality cement. Thus a claystone rocks from Red Bed Series have been added to reach the set point of LSF in the clinker.All materials after mixing proved that they meet the specification required for clinker production.

GK2-39:

Jurassic /Cretaceous boundary beds in Kurdistan – a preliminary note on wider correlations

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ABSTRACT

Ammonites, nannofossils and calpionellids have been studied from Chia Gara Formation at Banik village (Zakho area, Duhok Governorate, Kurdistan). New micropalaeontological work at Banik makes it possible for the first time to identify useful western Tethyan Jurassic /Cretaceous boundary marker species (calpionellids and nannofossils) and to make precise correlations with the boundary interval in Europe.

Keywords: Nannofossils, Calpionellids, Chia Gara, Banik, Kurdistan.

GK2-40:

Speciation of U, Se, as and Sr in Karst waters of Makook System, Kurdistan Region, Iraq

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ABSTRACT

Speciation of trace elements in water system is essential for understanding of the mobility, toxicity, bioavailability and transport characteristics of these elements. This study presents an evaluation of different factors affecting speciation of uranium (U), selenium (Se), arsenic (As) and strontium (Sr) in karst waters of Makook karst system. Results show a temporal variability of U, Se, As and Sr species within the different karst aquifers. The abundant species are U(VI), U(IV), Se(IV), Se(VI), As(V), As(III), Sr_2^+ and $SrHCO_3^+$. It is observed that these species are significantly controlled by pH, redox (pE), temperature (T), dissolved organic carbon (DOC), dissolution of calcite and dolomite minerals and variation of springs discharge. Mineralogical content of the host rocks controlled the speciation of the studied elements as well. Therefore, different aquifers show different speciation responses for the same element. This study is significant, because it illustrates the speciation mechanism in karst waters, which was poorly constrained previously.

Keywords: Karst water, Speciation, Makook karst, DOC, Kurdistan Region

GK2-41:

Seismicity, Velocity Structure and Tectonics of the Arabian Plate

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ABSTRACT

The deployment of the North Iraq Seismographic Network (NISN) and of the array KSIRS and the implementation of the virtual Middle East Seismographic Network (vMESN) produced a wealth of unprecedented data for use in studying the seismicity, velocity structure and some aspects of the tectonic activities associated with the Arabian plate dynamics. Recent studies using stationary Global Positioning System (GPS) stations in the region clearly show the northeast trending transitional and counterclockwise rotational motions of the plate. Most of the seismicity is occurring in the crust along the Zagros and Taurus mountain ranges and their foothills, along the Dead Sea transform fault and along the rift zones in the Red Sea and the Gulf of Aden. Earthquakes with magnitude greater than 5 mb are not frequent. Likewise, intermediate and deep earthquakes are uncommon in the region. The great majority of the earthquakes occur as a result of the continental collision between the Arabian plate and the Iranian and Turkish plateaus. Preliminary analysis of the earthquakes' spatial distribution suggests likely alignment with the faults in the region. Moment tensor analysis of the larger events, carried out as part of the routine data processing, suggests their focal mechanisms vary from normal, reverse to strike-slip depending on the local stress pattern and the event's location relative to the Zagros and Taurus suture zones. The three-dimensional crustal seismic velocity structure of the Arabian plate and surrounding regions estimated from the dispersion of Rayleigh surface waves reflects the impact of the overlying 5-10 km thick

sedimentary column on the morphology of the crystalline basement, the Conrad and Moho discontinuities whose depths range from 20-25 km and 40-50 km, respectively. The teleseismic P-wave receiver function analysis provided an independent verification of the velocity models beneath the various stations used in the study of the region. In summary, the resulting models show remarkable correlation between the distribution of shear velocities and the major physiographic and tectonic provinces of the Arabian plate, Turkish and Iranian plateaus. It also helped delineate the extent of the Red Sea rift and the roots of the Zagros and Taurus mountain ranges.

Keywords: Arabian plate, seismicity, velocity structure, source mechanism

GK2-42:

Groundwater Vulnerability Map of Sulaimani Sub Bsain using Sintacs Model, Sulaimani Governorate, Iraqi Kurdistan Region

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ABSTRACT

The present study is located in Complex and Unstable Platform of Arabian Plate within the Zagros Fold Thrust Belt (ZFTB) expanded over an area of 523 Km2 in the Sulaiymaniyah governorate. Lower Cretaceous and Holocene formations are the dominant strtigraphic units exposed in the area. The Alluvium Intergranular, Karstic Fissured and Complex aquifers are the main water bearing beds occur in the area of question. This research is initiated in 2014-2015, deals with the evaluation of groundwater vulnerability to pollution using SINTACS model in addition to the assessment of the validity of four scenarios applied in this work "Normal, Relevant, Drainage impacts and Nitrate scenarios" with the spatial distribution of nitrate "NO_3" map which is constructed from 96 nitrate samples collected from domestic and agriculture water wells, emergence from kahrez and springs in benefit with the Geographic Information System (GIS). Although the SINTACS method gives satisfactory outputs in evaluation of groundwater vulnerability to pollution, but it cannot be used for reliable assessment of the groundwater pollution risk. Therefore, it is necessary to calibrate the original scenarios with nitrate distribution in order to obtain more accurate results.

Keywords: Vulnerability; SINTACS; Aquifers; Nitrate pollution, Semi–arid; GIS

GK2-43:

Palynological and Stratigraphical Evidences on the Age of the Outcropped Khabour Formation near Chalki Nasara Village, Kurdistan Region, Northern Iraq

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ABSTRACT

The siliciclastic predominate sequence of the Khabour Quartzite-Shale Formation crops out in Kurdistan Region within a narrow strip which runs semi-parallel to Iraq/Turkey border line, within the Imbricated and Thrusted Ora Zone, in front of the Bitlis Suture Zone which resulted from the collision of the Arabian and Anatolian plate. The studied samples from Chalki Nasara section appeared to be deposited within shallow marine environment and considered as a part of the Tectono-megasequence Ap.2.

The identified palynomorphs within the prepared palynological slides were all acritarchs with no observation of other known Lower Paleozoic palynomorphs like chitinozoa, scolecodonts, and graptolites. The identified acritarch species are among those which well documented in Cambrian and Ordovician periods Acanthodiacrodium angustum, Dactylofusa squama, Cristallinium cambriense, Saharidia fragilis, Acanthodiacrodium ubuii, Polygonium gracile, Acanthodiacrodium achrasii, Gonisphaeridium tener, Actinotodissus formosus, Polygonium pungens, Actinotodissus spinutisus, Cymatiogalea membranispina, Polygonium symbolum, Actinotodissus crassus. Accordingly and depending on the three distinguished acritarch assemblage palynozones the age of the lower unit of Khabour Formation in the studied area determined as Late Cambrian-Tremadocian.

The dark brown and black colors of the identified palynomorphs within the formation indicated to thermally post mature condition of the organic matters. On the other hand, kerogen type I appeared to be the dominated quality of the existed organic matters and that based on the ratio between the different organic matter components.

Key words: Kurdistan, Khabour, Paleozoic, Acritarchs

Geological Field Trip Guide

Thursday 8/10/2015

Crossing the Zagros Suture Zone

Hosts

Prof. Dr. Basim Al-Qayim

Dr. Salim Al-Hakary

Dr. Mushir Qadir

Department of Geology, University of Sulaimani

Trip Program:

Day 3 Thursday 8th October 2015

08:00-16:30 Field trip to Halabja, Hawraman, Ahmed Awa Resort

Crossing the Zagros Suture Zone

Hosts: Prof. Dr. Basim Al-Qayim, Dr. Salim Al-Hakary, and Dr.Mushir Qadir

Department of Geology, University of Sulaimani

08:00		Departure from the Hotel by bus
09:00-09:30	Stop No.1.	Saidsadiq Town
09:30-11:00	Stop No.2.	Halabja Shahidan Memorial
11:15-12:00	Stop No.3.	Qulqula Sedimentary Melange
12:15-12:45	Stop No.4.	Pillow lava outcrop
13:00-13:15	Stop No.5	Qulqula outcrop
13:30-14:30	Stop No.6	Restaurant stop with beautiful valley view
14:45-16:30	Stop No.7	Ahmed Awa Resort
16:30		Departure to the Hotel by bus

Preface

Sulaimani city located at the High Folded Zone close to the margin of the imbricate northeastward zone. Both zones consist of marine sequences of the Arabian Plate margin with varying intensity of structural deformations. Northeastward comes the most complicated zone of the Zagros orogeny "The **Zagros Suture Zone** ". It consists of Tectonostratigraphic sheets of different domains, thrust over each other and the Arabian margin sequence during the convergence history of the Afro-Arabian Plate with the Sanadaj-Sirjan Iranian plate. The Zagros Suture Zone in Kurdistan includes the following components:

- Radiolarite Suites (Qulqual Formation)
- Ophiolite complexes
- Tertiary Sedimentary- Volcanic sequences (Walash- Naopordan Gp)
- Avroman Limestone (Bisotune Carbonate Platform)

The trip includes seven stops along the road from Sulaimani to Ahmed Awa as follow:

Fig.1: Field trip route from Sulaimani City to Ahmed Awa Resort.

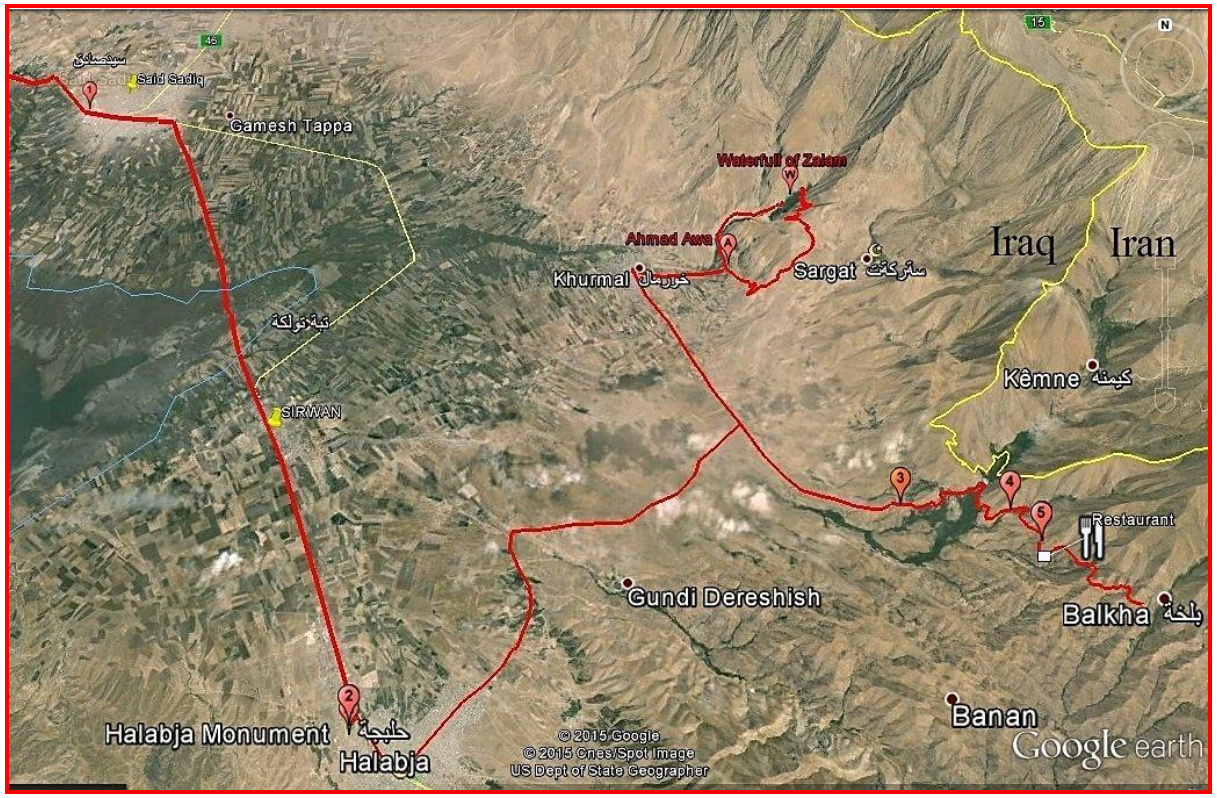


Fig.2: Locations of the examined stops.

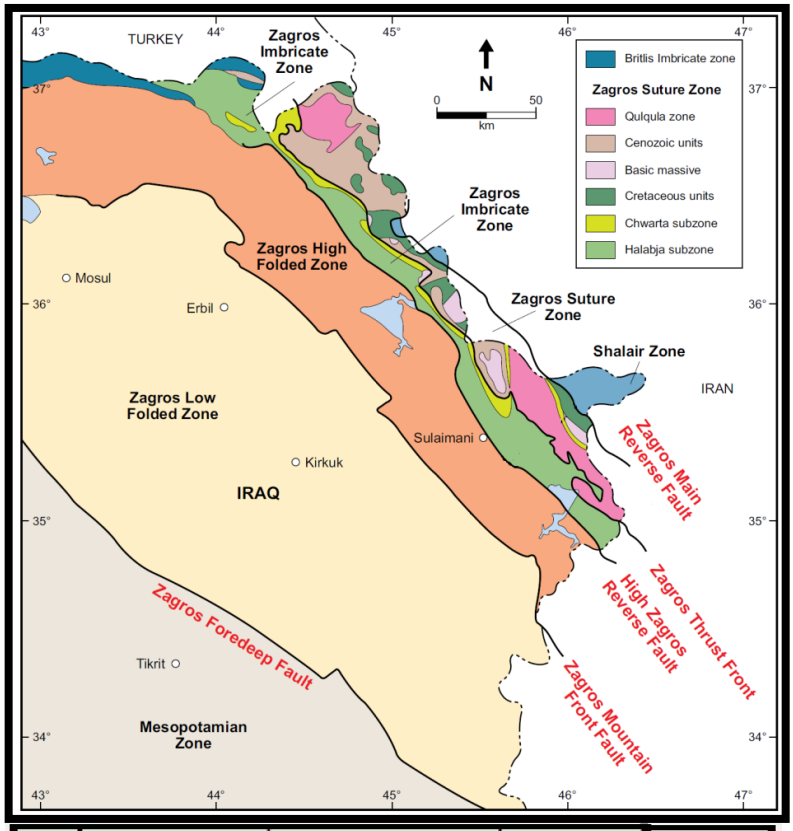


Fig.3: Tectonic Subdivisions and Boundaries of Kurdistan Region.

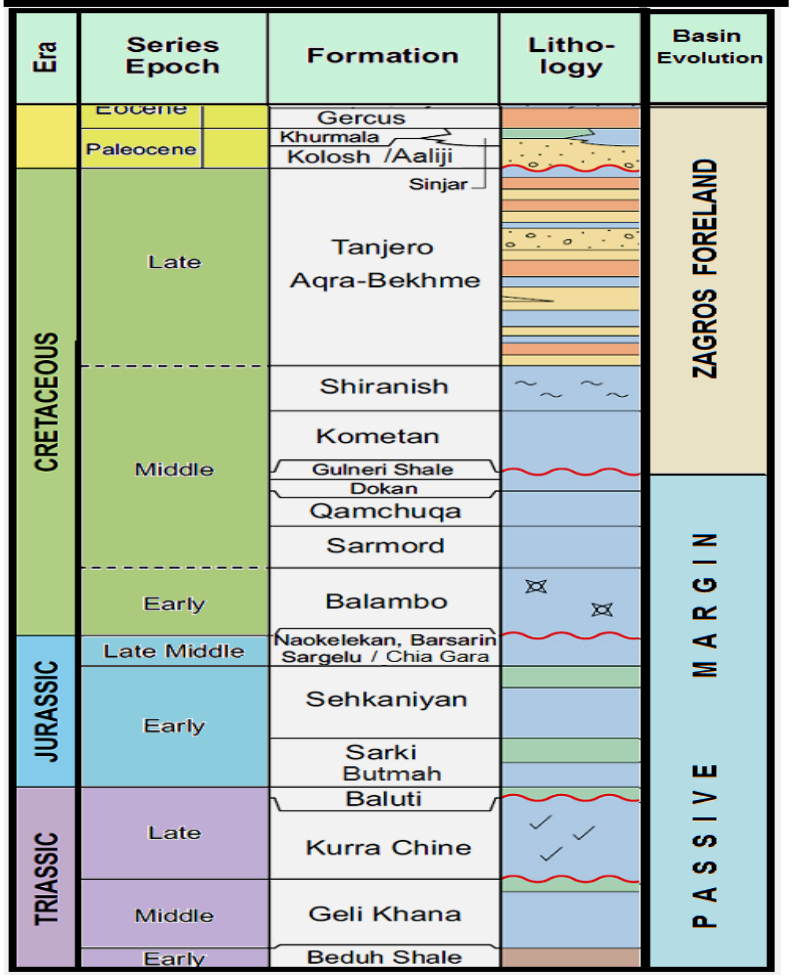


Fig.4: Stratigraphic Column of Sulaimani Area.

Stop (1)

(Sayed Sadiq Town)

Outcrop on the left-hand side of the road characterized by intensively deformed (Crenulated limestone) light gray, uniform bedded limestone of the Kometan Formation. This outcrop marks the margin of the imbricate zone.

Stop (2)

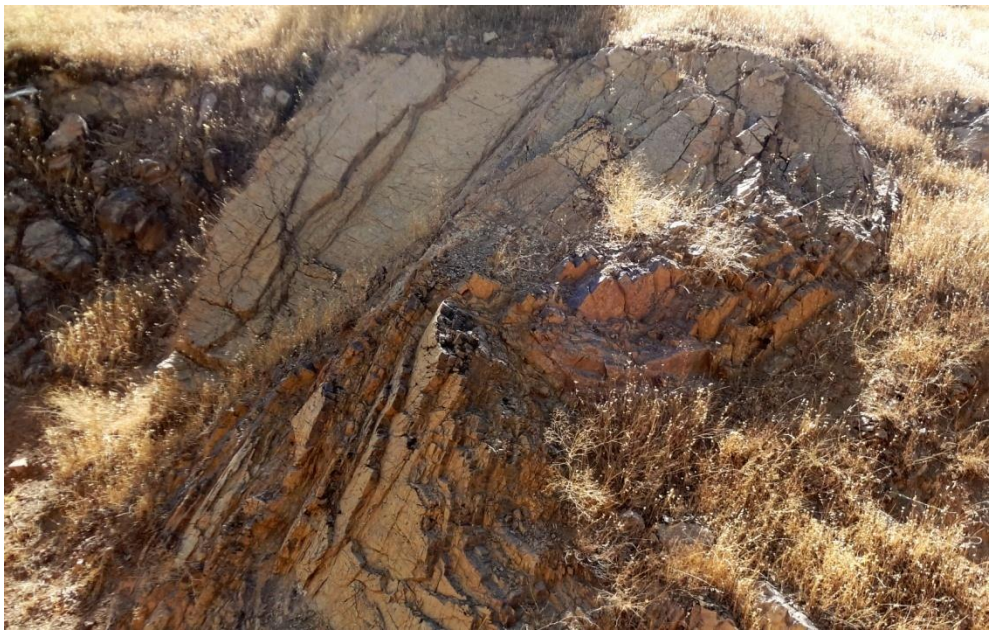
(Halabja Shahidan Memorial)

A visit to the Halabja Shahidan Memorial in tribute to the mortars of Halabja city people that became a victim of a ruthless chemical weapon attack in 1988.

Stop (3)

Qulqula Sedimentary Melange

This outcrop displays the tectonic nature of the Qulqula Gp which shows mixed sedimentary facies mingled together during thrusting and emplacement process



Stop (4)

Pillow Lava outcrop

Basic volcanic intrusions were reporting from within the Qulqula Radiolarite Group. This outcrop shows suspected pillow lava occurrences with amygdaloidal basalts.

Stop (5)

Qulqula Outcrop

An intensively tectonized red siliceous –cherty pelagic mudstone facies of the Qulqula Radiolarite Formation. These facies is one of the oldest. This unit deposited, at the Early Cretaceous time, on the older deposited sequences, at proximal parts of the broad Neo-Tethys abyssal plain.

Stop (6)

Restaurant Stop with beautiful valley view

Stop (7)

Ahmed Awa Resort

Incredible waterfalls of Ahmed Awa represents a popular tourist spot, which is locating within limestone units in front of the thrust Avroman limestone body.

Looking forward to seeing you in

GEOKURDISTAN III