



PUBLICATIONS 2013

1. Al-Amri, A. M. (2013): Seismotectonics and seismogenic source zones of the Arabian Platform. K. Al Hosani et al. (eds.), Lithosphere dynamics and sedimentary basins in the Arabian plate and Analogues, *Frontiers in Earth Sciences*, doi: 10.1007/978-3-642-30609-9-15.

Abstract:

The lithospheric structure of the Arabian Platform has been derived from complete regional waveform modeling and surface wave group velocities. Waveforms from events in the Zagros possess clear Pn, Sn and Lg. The Arabian Platform has an average crustal thickness of 40 km with relatively low crustal velocities of 6.07 km/s and 3.5 km/s for P-and S-wave velocities, respectively. P-and S-wave velocities immediately below the Moho are slower in the Arabian Shield than in the Arabian Platform. Lower velocities in the Arabian Platform crust indicate a bulk felsic composition. The Platform is covered by thick sedimentary cover (4 km). Sedimentary thickness on the Platform increases towards the Arabian Gulf, where it reaches a maximum thickness of nearly 10 km. The relatively slow and thick sedimentary structure plays a strong role in the surface wave dispersion of paths crossing the region. Long-period ground motions are of concern in the Arabian Gulf region. Basin structure traps and amplifies surface waves. Large earthquakes in the Makran and Zagros could have wide spread, far-reaching damage. Long-period ground motions from distant earthquakes in the Zagros Mountains can be large enough to impact the eastern Gulf. Large earthquakes in the Zagros can result in felt and possibly damaging ground motions at long-periods (1–10 s). Such ground motions are of concern for large engineered structures, such as tall buildings and long bridges with resonant periods in the same band (1–10 s). Twelve seismogenic source zones were delineated and identified based on seismological and geological parameters with the higher priority given to the spatial distribution of epicenters. These source zones are composed of systems of faults whose boundaries do not traverse generally other tectonic units. Some of the seismogenic source zones are relatively large due to scarcity of earthquakes in the Arabian Platform.

2. Al-Amri, A. M. and Rodgers, A. J. (2013): Improvement of seismicity parameters in the Arabian Shield and platform using earthquake location and magnitude calibration. K. Al Hosani et al. (eds.), *Lithosphere dynamics and sedimentary basins in the Arabian plate and Analogues, Frontiers in Earth Sciences*, doi: 10.1007/978-3-642-30609-9-14

Abstract:

The sites are quiet and noise surveys at a few stations indicated that seismic noise levels at KACST stations are quite low for frequencies between 0.1 and 1.0 Hz, however cultural noise appears to affect some stations at frequencies above 1.0 Hz. Broadband waveform data is generally comparable with data from the Global Seismic

Network operated by the Incorporated Research Institutions for Seismology (IRIS-GSN). No Evidence was found of timing problems with the data. The sample rate (currently set at 100 samples/second) can be lowered to 50 samples/second without any loss of information. The current high sample rate has several unwanted consequences. Firstly, the high sample rates taxes network communications and computational facilities. Secondly the high sample rate requires additional memory requirements when the data are archived. Reducing the sample rate to 50 would immediately reduce the load on tape and disk memory by 50 %. Variability of lithospheric structure is revealed by the need for different models for the regions of the northwest of Saudi Arabia (the Gulf of Aqabah/Dead Sea), the Arabian Shield and the Arabian Platform. Travel time analysis and surface wave group velocities confirm the variability in structure and the need for path-dependent models. We measured surface wave group velocities for a number of earthquakes with paths sampling the Arabian Platform. Inclusion of these measurements in a tomography study shows a rich pattern of structure.

3. Al-Malki, M. A. and Al-Amri, A. M. (2013): Seismic zones regionalization and hazard Assessment of NW Arabian Shield and southern Red Sea Region. K. Al Hosani et al. (eds.), Lithosphere dynamics and sedimentary basins in the Arabian plate and Analogues, *Frontiers in Earth Sciences*, doi: 10.1007/978-3-642-30609-9-16.

Abstract:

From the distribution of both historical and instrumental earthquakes, it is noticed that there are more than five hundreds of earthquakes have occurred in the area. Their magnitudes range from 2 B M B 8.0. Most of earthquakes are epicentred along the transform faults of the southern Red Sea and southern Arabian Shield. The seismological catalogue is completed for earthquakes with magnitude less than 3 from 2001. About 218 earthquakes have relocated using more recent crustal structure models to enhance their location. Depending on these data there are four seismic source zones have defined for the area and these are; Sanaa-Dhamar zone; Southern Red Sea zone; Northern Yemen and Middle of Red Sea source zone. From the recurrence study of earthquakes, it is found that the b value for the southern part of Arabian Shield is relatively high (1.06) compared with b values in the southern Red Sea ($b = 0.57-0.88$) which reflects the heterogeneity of the crust. Due to the separation of Arabian plate from the African one in the northeastern direction, the earthquakes that occurred along the Red Sea are of normal fault type from the location of their epicenters on the axial trough. On the other hand, the presence of transform faults bisected the Red Sea with NE-SW directions confirm the presence of some earthquakes with transform focal mechanism. The focal mechanisms of the recent earthquakes confirm that most of earthquakes in the southern Red Sea represent the strike-slip movements trending NE-SW. While the earthquakes on the land in the southern Arabian Shield occurred as a result of the vertical movement trending NW parallel to the axis of the Red Sea. The results show that the value of PGA is different from one city to another one.

4. Al-Dabbagh M. E. (2013): Effect of tectonic prominence and growth of the Arabian shield on Paleozoic sandstone successions in Saudi Arabia. *Arab J Geosci.*, 6: 835-843.

Abstract Paleozoic successions in Saudi Arabia are exposed around and bordering the south, north, and northeastern edge of the Arabian shield. They are represented by the Wajid group in the south and by the Taymah, Tabuk, Qalibah, Huj, and Buraydah groups in the north and northeast. The Wajid group includes Dibsiyah, Sanamah, Khusayyan, and Juwayl formations. The Taymah group includes Siq, Amai'er, Quweira, Saq, and Qasim formations. The Tabuk group includes Zarqa, Sara, and Hawban formations. The Qalibah group includes Baq'a, Qusaiba, and Sharawra formations. The Huj group includes Tawil, Jauf, and Jubah formations. The Buraydah group includes Berwath, Unayzah, and Khuff formations. The Wajid group form one block in the south and the other groups form another block in the north, and they can be correlated. There are similarities between the northern belt which consists of the Cambro-Ordovician formations of the Tayma and Tabuk groups and the southern belt which consists of the Dibsiyah and Sanama formations of the Wajid group. Similarities include sandstone composition, sedimentary environment, paleocurrent directions, unconformities, tectonic events, and influence of Gondwana glaciations. These formations and probably some or all the rest of the Paleozoic formations used to form one block but later separated after erosion caused by gradual tectonic growth, uplift, and prominence of the Arabian shield. During early Paleozoic time, the process started by poststabilization then sedimentation and at a later stage the growth and uplift of the shield occurred gradually. Growth of shields is a fact and it is the only way to explain the exposure of the Wajid sandstone on top of the highest mountain of the shield which exceeds 3,000 m in As Sawdah in Asir area in southwestern Saudi Arabia. The sandstone sediments of these outcrops were deposited on a low lying basin before been raised to this elevation.

5. Abdelbaset S. El-Sorogy & Hamdy Nour & Emad Essa and Mohamed Tawfik (2013): Quaternary coral reefs of the Red Sea coast, Egypt: diagenetic sequence, isotopes and trace metals contamination. *Arab J Geosci*, DOI 10.1007/s12517-012-0806-0

Abstract:

This study focuses on the diagenetic sequence under marine and meteoric conditions as well as isotopes and trace metals contamination in Quseir and Gebel Zeit areas along the Egyptian Red Sea coast through a series of modern and fossil corals, *Porites lutea* and *Favites pentagona*. The diagenetic sequence begins with deposition of thin fringes of syntaxial aragonite and micritic high-magnesian calcite in the modern corals to completely altered *Porites* and partially altered *Favites* to low-magnesium calcite in the oldest Pleistocene unit. Average $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ values of Pleistocene corals in the two studied areas were lower than those of modern corals. Values of modern corals and lower fossil unit indicated coralline limestone, while those of middle and upper fossil units indicated fresh water influences. Average values of trace metals in modern corals were higher than those of Pleistocene counterpart except for Mn. Modern coral samples recorded enrichment in the average values of Pb, Zn, and Mn at Quseir area and enrichment in Co, Cu, and Ni at

Gebel Zeit area. This may be attributed mostly to different tourist activities, landfill due to increase urbanization and nearby of Quseir area from the old phosphate harbor at El Hamrawin area, as well as oil exploration and production activities in the Gulf of Suez area. Also, results indicated that most samples of Porites have high concentration of trace metals than in Favites, especially in Cu, Zn, Mn, and Pb. This may due to high amounts of intergranular porosity and high total surface area of Porites in contrast to Favites.

6. A. K. Abdel-Fattah, M. Fnais, M. F. Abdelwahed, A. El-Nekhely, and W. Farid (2013): FAULT ORIENTATIONS IN THE UPPER CRUST BENEATH AN INTRAPLATE ACTIVE ZONE IN NORTHERN EGYPT. *Earth Planets Space*, doi:10.5047/eps.2012.12.005, in press

Abstract

The present study aims to demarcate the active fault orientation in the upper crust of Dahshour Seismic Zone (DSZ) in Northern Egypt and its relation to the regional tectonics. High-resolution earthquake relocations and focal mechanism solutions were determined using the double-difference location method and the forward modelling of the amplitude spectrum constrained with P-wave polarities, respectively. Up to 244 earthquakes were relocated by measuring differential travel times between events, as obtained from cross correlation waveform analysis. The relocated hypocenters exhibited a seismogenic crust of 6 km thickness (most of hypocenters have a focal depth of 18 to 24 km). Incorporation of hypocentral distributions and focal mechanisms depicts distinct fault planes trending to the NW and ENE to EW randomly distributed in the whole dislocation zone. The reactivation of these pre-existing faults is attributed to the northern Red Sea-Gulf of Suez rifts and the closure of the Neotethys, respectively; implying a potential impact of the regional tectonic process on the deformation acting in the upper crust of local seismogenic zones of northern Egypt.

7. Al-Zahrani H., Al-Amri A. M., Abdel-Rahman K. and Fnais M. (2013): Aftershock sequence analysis of 19 May, 2009 earthquake of Lunayyir lava flow, northwest Saudi Arabia. *International Journal of the Physical Sciences* Vol. 8(7), pp. 277-285, 23 February, 2013

Abstract:

Aftershock sequence of 19th May, 2009 Lunayyir earthquake (Mw 5.7) has been recorded by deploying seismic stations immediately after the occurrence of the main shock. Analysis of this sequence clarified that; the major part of cumulative seismic moment released during the first hours after the occurrence of the main shock; their orientation is north west (NW) parallel to the Red Sea axial trend along Najd faulting system; it is clustered at two depths; from 5-10 and 15-25 km beneath Lunayyir area; illustrated successive periods of maxima and minima; decayed rapidly following the relation of $n(t)=37.28 t^{-0.6}$. Fault plane solutions for five large events indicate normal faulting is the major mechanism. These findings are in agreement with the north east (NE) (transform fault) trend runs crossing the Red Sea into Shield area where the activity has been initiated and travelled through the Lunayyir area. While the NW Najd faulting system runs parallel to the Red Sea axial trend and intersected with NE fault trend underlying Lunayyir area. Accordingly, it can be concluded that, the recent earthquake activities at Lunayyir lava flow area are related to the present-day Red Sea tectonics. Monitoring earthquake activities through installing permanent seismic

network around the area is highly recommended.

8. Al-Zahrani, H. A., Fnais, M. S., Al-Amri, A. M. and Abdel-Rahman, K. (2013): Tectonic framework of Lunayyir area, northwest Saudi Arabia through aftershock sequence analysis of 19 May, 2009 earthquake and aeromagnetic data. *International Journal of Physical Sciences* vol. 7(44), pp. 5821-5833, 23 November, 2012.

Abstract:

Permanent and temporary seismic stations that were deployed at Lunayyir area before and shortly after the occurrence of the 19 May, 2009 earthquake swarm (Mw 5.7) have recorded a number great of events. The main objective is to determine the tectonic framework of the area and prepare more representative tectonic model for the area. Through the detailed analysis of aftershock sequence it is clarified that; 1) the major part of the cumulative seismic moment has been released after the occurrence of the largest aftershock (mb 4.8) during the first hours after the main shock; 2) except the first day (20 May, 2009), no event with local magnitude above 4.0 was recorded during the observation period; 3) their distribution oriented NE and NW; 4) it is clustered at two depths; from 5 to 10 and 15 to 25 km beneath Lunayyir area; 5) it is characterized by successive periods of maxima and minima; and 6) the number of aftershocks decayed rapidly after the occurrence of the mainshock following the relation of $n(t)=37.28 t^{-0.6}$ within the first two weeks and changed later for the other two weeks. Fault plane solutions for eighty-four events indicated normal faulting mechanism for the majority of events while strike-slip components accompanied some of the events. Aeromagnetic maps for Lunayyir area confirmed the presence of shallow and deep-seated faults oriented NE and NW. NE (transform fault) trend runs across the Red Sea into a Shield area and could be interpreted as a channel of magma connecting the Red Sea and Lunayyir area. Whereas, NW (Najd system) faults are predominant through the Shield area and intersected with NE fault trend underlying Lunayyir area. Upwelling magmatic intrusions was initiated at the intersected points causing earthquake swarm. Then, Lunayyir area is highly affected by the present- day Red Sea active tectonics.

9. Chatterjee, K. Manoharan and M. Mukhopadhyay, 2013. Reservoir petrophysical properties of Cretaceous sediments in the Cauvery Basin, eastern continental margin of India. *J. INDIAN GEOPHYSICAL UNION* (in press).

Abstract

The Cauvery Basin (CB) is one of the largest petroliferous basins developed at the Eastern Continental Margin of India (ECMI) where the sediments thicken to as much as 8,000 m. Hydrocarbon bearing formations in the basin belong to Cretaceous age. Both microscopic and macroscopic heterogeneities for the cored rocks corresponding to depths of 2169 – 2669 m are studied for their rock mechanical and petrophysical properties. Petrophysical and rock mechanical properties have been correlated with satisfactory to good degree of fit. The ratio of compressional wave velocity (V_p) to shear wave velocity (V_s) decreases with the increase of effective porosity of the core samples. The best fit regression can be used for estimation of porosity from the ratio of V_p and V_s values as well as density values for this similar type of rocks in the Cretaceous sediments of Cauvery basin.

10. Elkhedr Ibrahim (2013): Geoelectric Resistivity Survey for Site Investigation in East Matruh Area, North Western Desert, Egypt. *World Applied Sciences Journal* 21 (7): 1008-1016

Abstract:

Geoelectric resistivity survey was conducted for investigating two industrial sites to the east of Matruh city, northwestern coast of Egypt. The process of site investigation is controlled by the occurrence of groundwater, nature of bedrock, and presence of shale or clays as prerequisite information for any developmental project. For this purpose, thirty two vertical electric soundings have been conducted on Alam ElRoom and El-Daba'a sites. The resistivity data was calibrated with nearest boreholes in order to guide the interpretation of the resistivity data. The results were presented in the form of litho-resistivity sections. Four subsurface layers were delineated from the interpretation of the results. The sections start with the Holocene calcareous sand (1-5 meters) and ended with the fissured oolitic limestone in Alam ElRoom site and shale intercalated with marl in El-Daba'a site that are saturated with saline groundwater. The increase of salinity of the groundwater in this area could be referred to the location of the investigated sites partially within the splash zone of the sea and consequently the effect of splashing water is expected. The hard and compact limestone bedrock is present in both sites at depth varies from 3 to 10 m and with thickness up to 20m. In El-Daba'a site, the hard limestone bedrock is sandwiched within shale layers and fractured by the E-W faults of the epiorogenic movement that took place during post-Miocene time, while in Alam ElRoom site the geological situation is different where the bedrock limestone is underlain by the fissured oolitic limestone and overlain by calcareous sand. The presence of incompetent shale and clayey layers with faulting the bedrock layer in El-Daba'a site should be taken into consideration during the foundation design and it is expected that the buildings with foundation constructed by either rafting or piling can survive in this site.

11. Fnais M.S., El-Araby H. M., Kamal Abdel-Rahman, Elawadi I. and Al Soma A. (2013): Crustal structure of the Northwestern part of the Arabian Shield in Saudi Arabia deduced from gravity data. *Scientific Research and Essays*, Vol. 8(12), pp. 466-484, 25 March, 2013. DOI 10.5897/SRE12.734.

Abstract:

The present-day tectonics of the Northwestern Region of Saudi Arabia is affected by the tectonics related to the Red Sea floor spreading. The tectonic movements related to the Red Sea floor spreading create great variations in the crustal structure and depth of Moho discontinuity through this region. Gravity data have been acquired from Earth Gravitational Model (EGM-2008) and analyzed to estimate the crustal thickness under this region. 2-D gravity modeling have been conducted along eleven profiles oriented ENE-WSW and NW-SE to verify the lateral variations of the crust and mantle beneath these profiles. Accordingly, the upper layer of the crust is represented by sedimentary rocks underlying by basement layer that extends until the Moho discontinuity. The crustal thickness increases eastward, and the depth to the Moho is 25 km in the western part, along the Red Sea and increased upto 38 km through the Arabian Shield. These results are in agreement with the previous deep seismic and seismological investigations. The relation between recent earthquake swarms at Harrat Al-Shaqah area and the variations of Moho depth through the Northwestern Region has been clarified. It can be concluded that, these earthquake activities are of crustal

origin and occurred due to the stresses exerted upon the pre-existed faults by mantle upwelling in this region. These results can be confirmed by the presence of the recent volcanic activities that experienced the Western Region of Saudi Arabia.

12. H.A. Ghrefat (2013): Classification and Evaluation of Commercial Bottled Drinking Waters in Saudi Arabia. Research Journal of Environmental and Earth Sciences, Accepted for publication.

Abstract

: This study reports an evaluation on the quality of 54 brands of bottled drinking waters currently consumed in Saudi Arabia. The relationships among eight selected major chemical ion variables (calcium, magnesium, sodium, potassium, chloride, sulfate, bicarbonate and nitrate) were examined by correlation analysis, principal component analysis and hierarchical cluster analysis. Principal component analysis identified three factors, which are responsible for the data structure explaining ~ 64% of the total variance of the data set and allowed to group the selected parameters according to common features. Hierarchical cluster analysis classified the evaluated water brands into different groups based on the similarity of water quality characteristics. The results demonstrated that the water brands have a diverse character reflected by their chemical compositions and are dominated by Na- Ca- HCO₃-Cl type water. Total hardness values classified most of the studied brands into soft to moderately hard water. Generally, the physical and chemical constituents lie within the acceptable boundaries established by Saudi Arabian Standards Organization, International Bottled Water Association, Food and Drug Administration and World Health Organization for drinking water.

13. Gabtni H., Jallouli C., Mickus, K., Zouari H., Turki M.M. (2013). Geodynamics of the Southern Tethyan Margin in Tunisia and Maghrebian domain: new constraints from integrated geophysical study. Arab. J. Geosci. 6:271-286.

Abstract

The geodynamic evolution of the Southern Tethyan Margin of Tunisia is investigated using geophysical studies. Analysis of gravity and seismic reflection data in the Maghrebian domain and Southern Tunisia reveals the geodynamic role played by the North Saharan Flexure (NSF) in the evolution of the Southern Tethyan Margin. The Saharan Atlas Mountains (Atlasic Basin) and the African Craton (Telemzan High) are separated by the NSF which is a regional-scale feature that may represent a significant basement discontinuity that has controlled the Paleozoic, Mesozoic, and Cenozoic evolution of the Tunisian and Maghrebian Tethyan Basin.

14. Kassem, O. M. K., Al Bassam, A. M., and Zaidi, F. K. (2013): Structural and mechanical controls on intrusion related to Mahd Ad Dahab area, Arabian Shield, Saudi Arabian. Journal on Geological & Earth Sciences, volume 1, Number 1. (Accepted)

Abstract

Mahd Ad Dahab area is located on the western side of the Arabian Precambrian Shield. In the study area, Mahd group rocks are deposited along margin of active extensional volcanotectonic basin. These rocks are associated with the major geologic structures which are attributed to various deformational stages of the Precambrian basement. Field geology, finite strain and microstructural were carried out and the relationships between the lithological contacts and major/minor structures have been studied. The Rf and Fry methods on the metavolcano-sedimentary samples from 3 andesite samples, 2 lower agglomerate samples, 7 lower rhyolite samples, 3 upper agglomerate, 1 upper tuff sample and 2 rhyolite porphyry

samples were used in Mahd Ad Dahab area. Finite-strain data shows that a low to moderate range of deformation of the metavolcano-sedimentary samples and axial ratios in the XZ section range from 1.10 to 2.50 for the Rf method and from 1.15 to 2.35 for the Fry method. Furthermore, the short axes are subvertical associated with a subhorizontal foliation. We conclude that finite strain in the deformed rocks is of the same order of magnitude for all units of metavolcano-sedimentary rocks. Furthermore, contacts formed during intrusion of plutons with some faults in the Mahd Ad Dahab area under brittle to semi-ductile deformation conditions. In this case, finite strain accumulated during superimposed deformation on the already assembled nappe structure. It indicates that the nappe contacts formed during the accumulation of finite strain.

15. Mahmoud A. Galmed, Mohamed F. Aly, Ahmed Smadi, G. Hassan Abu Azzam (2013): Taphonomic and diagenetic aspects of the Late Cretaceous *Libycoceras ismaeli* (Zittel) from Northern Jordan. *Arab J Geosci* 6:573–583.

Abstract

Taphonomy and diagenesis of the ammonoid *Libycoceras ismaeli* (Zittel) have been approached in order to interpret the post-mortem depositional history during the Late Cretaceous of Jordan based on the comparative analysis of composition and taphonomy. The Campanian– Maastrichtian Al-Hisa Phosphorite Formation is exposed in northwestern and central Jordan is rich in cephalopods. It consists of alternating thin-bedded limestone, more or less silicified or calcified phosphorite layers, thick- and crossbedded oyster lumachells, and lenses and layers of minable phosphate. The sphenodiscid ammonite *L. ismaeli* (Zittel) predominantly occurs in the middle part of this formation. *L. ismaeli* is associated with different nautiloid and baculitid species. The mode of occurrence of the studied ammonoids suggesting that they are best interpreted to be nekto-benthic, not nekto-planktic. Taphonomic and diagenetic studies of transversely sliced specimens were carried out by means of polarizing and scanning electron microscope.

16. Şen, Z., Al AlSheikh, A., Al-Turbak, A. S., Al-Bassam, A. M., and Al-Dakheel, A. M. (2013). Climate change impact and runoff harvesting in arid regions. *Arabian Journal of Geosciences*, 6(1), 287-295.

Abstract

The most significant large-scale environmental challenge that many countries, especially in the arid and semi-arid regions of the world, will face in the middle and long-term are water scarcity problems, which are attributed to climate change impacts such as temperature increase, abundance of high solar radiation, and aridity in addition to population pressure. In many countries, current water resources use already exceeds sustainable and renewable supply. Various methodologies are suggested to increase the sources of water supply, among which one of the alternatives is rainwater and runoff harvesting (ROH). Water scarcity and additional stress are among the most specific problems in arid and semi-arid regions, where vegetation cover is very weak under extensive solar irradiation effects with high evaporation rates. Present global warming, climate change impacts, and their future patterns are expected to cause increase in the evapotranspiration rates and hence reduction in the groundwater recharges. Under such circumstances, any simple but effective water storage augmentation facility as the artificial groundwater recharge gains vital importance for sustainability of water supply and survivals in desert ecosystems. Although intensive and frequent rainfall events are rare they generate significant surface water flow during occasional floods and especially flash floods with huge amounts of surface water. It is, therefore, necessary to enhance artificial groundwater recharge from consequent frequent runoffs through suitable hydraulic

structures. This paper aims at assessing the importance of ROH systems for domestic supply in arid regions with specific reference to the Kingdom of Saudi Arabia. For this purpose, it presents ROH from the surface flows in depressions of Quaternary wadi deposits in arid and semi-arid regions.

17. Mogren, S. and Mukhopadhyay, M., 2013. Gravity modeling for the rifted crust at the Arabian Shield margin – Further insight into Red Sea spreading. Proc. International Conference on Geology & Geophysics 2013 Beijing China in **Open Journal of Geology** (in press).

Abstract

A large variation in elevation and gravity anomaly prevails from the Red Sea coast to the interior of the Arabian Shield (AS) across the Asir Igneous Province (AIP); the Asir Mountain (AM) is developed on AIP. Here the elevation varies from 45-2700 m, corresponding changes in F.A. are from -30 to +220 mgal and B.A. from +22 to -175 mgal. Regression relationships between elevation and gravity anomalies demonstrate significant changes in trend at about 400 m threshold of elevation across the pediment west of AM, at about 45 km inland of the shoreline, flanking the Hizaz-Asir Escarpment (HAE). Gravity anomaly variation along a traverse taken across HAE and AIP is interpreted here in terms of anomalous masses in crust as well as due to deeper crustal configuration. 2D gravity interpretation is, in part, constrained by surface geology, available geologic cross-sections for crust, interpretations from the IRIS Deep-Seismic Refraction Line, and to a lesser extent by the available gross results from shear-wave splitting and receiver function analysis. The gravity model provides probable solutions for the first time on geometric configuration and geophysical identification: (a) for the seaward margin of the mid-Tertiary Mafic Crust (TMC) below sediment cover of the Asir pediment that coincides with the 400 m threshold elevation. This signifies an anomalous uplift at the rifting phase. Moho below TMC extends from 10-22 km depth across HAE and west margin of AIP, (b). thinned continental crust below the Asir margin whose upper layer coincides with a seismic reflector at about 22 km depth, (c). Rift-margin characteristic detachment fault associated with basaltic flows on top surface of TMC at its inner margin, (d). Two geologically mapped low-angle normal faults dipping to the east developed between the basic rocks intruding the AIP and (e). felsic pluton farther east within AS. Large scale igneous activity followed by intense deformation affecting AIP clearly owes their origin to the rifting architecture of the AS at the Red Sea extensional margin.

18. Marc A. Rosen and Yousef Nazzal: Energy Sustainability: A Key To Addressing Environmental, Economic and Societal Challenges. Research Journal of Environmental and Earth Sciences. (Accepted for publication).

Abstract:

Sustainability is a critically important goal for human activity and development, particularly in the area of energy. Energy resources are critical for economic development and living standards, but their use causes significant environmental impacts. Given the pervasiveness of energy use, energy sustainability is a key to addressing environmental, economic and societal challenges. To achieve energy sustainability, many factors that need to be including harnessing sustainable energy sources, utilizing sustainable energy carriers, increasing efficiency, reducing environmental impact and improving socioeconomic acceptability (e.g., community involvement, affordability, equity and land use). To demonstrate the factors and their importance to energy sustainability, the Red-Mediterranean-Dead Seas Canal Project is considered as a case study. Conclusions are provided related both to steps

for energy sustainability.

19. Yousef Nazzal, Bassam A. Abuamarah, H.A. Kishawy and Marc A. Rosen (2013): Considering Environmental Sustainability as a Tool for Manufacturing Decision Making and Future Development. Research Journal of Applied Sciences, Engineering and Technology (accepted for publication).

Abstract:

The natural environment and the manufacturing function are becoming inextricably linked. Profitability, productivity and environmental consciousness are increasingly viewed as integral of manufacturing organizations. For manufacturers, environmental sustainability is dependent upon decisions made throughout a product life cycle which includes research, development and manufacturing processes. The present research study describes how environmental sustainability, manufacturing, decision making and green manufacturing are important for the future development and the main priorities in developing new manufacturing processes. The study discussed various models and concepts to make the links among the above mentioned variables and reached to important conclusion that collaboration is needed for increased research and knowledge, exchange in the field of environmental sustainability.