1. Abdallatif, T., El Emam, A., Suh, M., El Hemaly, I., Ghazala, H., Ibrahim, E., Odah, H., and Deebes, H. (2010). Discovery of the causeway and the mortuary temple of the Pyramid of Amenemhat II using near-surface magnetic investigation, Dahshour, Giza, Egypt, Geophysical Prospecting, vol. 58, 307–320.

Abstract

The main outbuildings of the Amenemhat II pyramid complex in Dahsour were yet to be discovered due to a very long subjection of the area to the military authorities and also the demolition of the pyramid itself. We describe the discovery of some of these outbuildings using near-surface magnetic investigations. A gradiometer survey was conducted in the area east of the pyramid to measure the vertical magnetic gradient with a high resolution instrument at 0.5 m sampling interval. The data showed some undesirable field effects such as grid discontinuities, grid slope, traverse stripe effects, spikes and high frequencies originating from recent ferrous contamination. These undesirable effects were addressed to produce an enhanced display. We have successfully detected four main structures in the area east of the pyramid; the causeway that connected the mortuary temple with the valley temple during the Middle Kingdom of the 12th Dynasty, the mortuary temple and its associated rooms, ruins of an ancient working area and an Egyptian-style tomb structure called a Mastaba. An improved recognition for these structures was accomplished by using the analytic signal and Euler deconvolution techniques. Excavation of a small part within the study area has proven the reliability of magnetic discoveries and the shallowness and composition of the detected features.

2. Fnais, M.S.; Kamal Abdelrahman; Al-Amri, A.M. (2010): Microtremor measurements in Yanbu city of Western Saudi Arabia: A tool for seismic microzonation. Journal of King Saud University (Science) (2010) 22, 97–110

Abstract:

Microtremor measurements are one of the most popular world-wide tool for estimation of site response especially within the urban area. This technique has been applied over 85 sites distributed regularly through Yanbu metropolitan area with an ultimate aim of seismic hazard microzonation for ground-shaking site effects. The horizontal to vertical spectral analysis (H/V) was carried out over all the sites to estimate both the fundamental resonance frequency and its corresponding amplification for the ground vibration. In most sites, H/V curve for amplitude spectra display a clear peak suggesting the presence of a soil-bedrock impedance contrast. Other sites, however, show more than one peak indicating the presence of more than one impedance contrast through sedimentary cover. The estimated values of fundamental frequency range from 0.25 Hz up to 7.9 Hz increases with decreasing depths of basement rock. It has lower values at the central zone extending from north to south compared to the eastern and western parts of Yanbu area. On the other hand, the estimated values of amplification factor ranges from the value of 2 to 5, where the higher values prevailing through the central zone with increasing thickness of sediments. Analyses of the acquired data set have clearly shown that, both of two parameters vary

considerably through Yanbu city. This could be due to lateral variations in soil thickness and/or variations in the soil type at Yanbu area. These results show the 2D and 3D effect of basin geometry. The estimated values for the fundamental frequency from microtremor data are compared with that from shear-wave velocity structure within the area of interest and show an excellent agreement.

3.   BATAYNEH, A.T.; ELAWADI, E.A., and AL-ARIFI, N.S., 2010. Use of geoelectrical technique for detecting subsurface fresh and saline water: a case study of the eastern Gulf of Aqaba coastal aquifer, Jordan. Journal of Coastal Research, 00(0), 000–000. West Palm Beach (Florida), ISSN 0749-0208.

Abstract

Geoelectrical measurements using the vertical electrical sounding method were conducted on the eastern Gulf of Aqaba (GOA) coast in Jordan. The objectives of the study were (i) to map the Quaternary sediments in areas where little is known about the subsurface geology and to infer shallow geological structure, and (ii) to identify formations that may present fresh aquifer waters, and subsequently to estimate the relationship between groundwater resources and geological structures. Data collected at 47 locations were interpreted first with curve-matching techniques, using theoretically calculated master curves. The initial earth models were double-checked and reinterpreted using a one- dimensional inversion program in order to obtain final earth models. Resistivity measurements show three zones with different resistivity values, corresponding to three different bearing formations: (i) a water-bearing formation in the west containing GOA saltwater; (ii) a transition zone of alternate layers of silt, sand, clay, and clayey sand; and (iii) strata saturated with fresh groundwater in the east and disturbed by the presence of clay and clayey sand horizons.

4.   Mohamed Metwaly, Gad El-Qady, Usama Massoud, Abeer El-Kenawy, Jun Matsushima and Nasser Al-Arifi (2010): Integrated Geoelectrical survey for ground water and shallow subsurface evaluation: Case study at Siliyin spring, El-Fayoum, Egypt, International journal of earth science, Vol. 99, No. 6, pp. 1427-1436.

Abstract

Siliyin spring is one of the many natural fresh water springs in the Western Desert of Egypt. It is located at the central part of El-Fayoum Delta, which is a potential place for urban developments and touristic activities. Integrated geoelectrical survey was conducted to facilitate mapping the groundwater resources and the shallow subsurface structures in the area. Twenty-eight transient electromagnetic (TEM) soundings, three vertical electrical soundings (VES) and three electrical resistivity tomography (ERT) profiles were carried out around the Siliyin spring location. The dense cultivation, the rugged topography and the existence of infrastructure in the area hindered acquiring more data. The TEM data were inverted jointly with the VES and ERT, and constrained by available geological information. Based on the inversion results, a set of geoelectrical cross-sections have been constructed. The shallow sand to sandy clay layer that forms the shallow aquifer has been completely mapped underneath and around the spring area. Flowing of water from the Siliyin spring is interconnected with the lateral lithological changes from clay to sand soil. Exploration of the extension of Siliyin spring zone is recommended. The interpretation emphasizes the importance of integrating the geoelectrical survey with the available geological information to

obtain useful, cheap and fast lithological and structural subsurface information.

5. Mukhopadhyay, B., Fnais, M., Mukhopadhyay, M. and Dasgupta, S., 2010. Seismic cluster analysis for the Burmese-Andaman and West Sunda Arc – Insight into subduction kinematics. GEOMATICS, NATURAL HAZARDS & RISK (Taylor & Francis, London), 1: 283-314.

Abstract

The Burmese–Andaman Arc System (BAAS) and the West Sunda Arc (WSA) in NE Indian Ocean are well known for their high seismic hazard and tsunami potentiality. Seismicity is caused by eastward subduction of the Indian plate to intermediate focal depths below the BAAS, but the penetration depth goes even deeper to about 500 km below the WSA. The seismicity map and its correlation to crustal and mantle faults for this extensive plate margin are presented. This is achieved by using frequency–magnitude relationship to select larger (mb_5.0) and comparatively well-recorded events from the available earthquake catalogue that span for a period of little more than a century (1906–2008). Barely 14% of the events qualify the treatment, and the events so selected are subjected to cluster analysis using a statistical function 'point density'. The clusters found for the arc demonstrate significant relationship to subduction geometry in their respective areas; 11 out of a total of 13 clusters commonly originate below the fore arc. Earthquakes within the individual clusters have linear fractal geometry consistent with the traces of seismogenic surfaces that actually produce them. Correlation of clusters to seismologic depth sections and the composite results derived from 518 CMT solutions of earthquakes establish a close spatial relationship between the shape and orientation of the clusters with stress axes and regional tectonics. This provides a three-dimensional perspective on the stress distribution within the respective clustered seismic

6. Mukhopadhyay, B., Acharya, A., Dasgupta, S. and Mukhopadhyay, M., 2010. Relationship between earthquake swarm, rifting history, magmatism and pore pressure diffusion – An example from south Andaman Sea, India. **J. GEOL. SOC. INDIA** (Springer), 76: 164-170.

Abstract

An extraordinarily strong and persistent earthquake swarm (Andaman swarm 2005) originated in the Andaman back-arc following the aftershock sequences of the 26 December 2004 Sumatra earthquake. The swarm (n = 651, mbmax= 5.9) came mainly in two phases: January 26-31 and Feb. – Aug. 2005, in an area of size 90 x 40 km2, at the centre of which lies a broad bathymetric depression and high gravity zone. The swarm demonstrates a complex faulting series, initially the strike-slip motion followed by normal faulting in repetitive sequences, whose representative fault planes orient at high angle to the regional faults. The swarm character as well as the distribution of stress-axes and their correlation to tectonic features lends speculation for formation of a nascent rift segment in NW-SE direction at the doorstep of the Sewell Seamount. The swarm has given rise to 21 episodes of rifting activities of variable time extent within 26 -31 January 2005. The r-t plots corresponding to the swarm data, modelled with variable hydraulic diffusivity (D) values 4, 6, 8 and 10 m2/s, suggest for excess pressure front from ascending magmatic fluid. This eventually heralded the rifting; causing pore pressure perturbations that propagated in accordance with known diffusion parabolic Equations

7. Mogren, S., A.H. Al-Ghamdi, A.H. and Mukhopadhyay, M., 2010. Central Arabia Salt Basin inferred by gravity modeling. **GeoCanada2010 – Working with the**

Abstract

Riyadh Salt Basin (RSB) in central part of the Arabian Platform (AP) contains thick salt deposits at depth. The salt layers are overlain by younger sediments which are, in turn, covered by Phanerozoic marine limestone. Most of the oil-gas fields in the Arabian Platform are known for deep-seated salt diapirism as well as for their characteristic gravity anomaly signatures. Here we report the results of gravity forward and inverse modeling for the southern part of RSB covering an area of approximately 40,000 sq. km, on the basis of terrain-corrected Bouguer Anomaly (BA) and Decompensative Isostatic Residual Anomalies (DA). The combined use of BA and DA is found to be a potentially powerful geophysical tool for investigating shallow-depth geologic bodies, below cover rocks in a rather large terrain like the Arabian Platform where, no other geophysical control exists. 3D gravity models interpreting the basement relief under this part of RSB are partly constrained by eight drill holes penetrating to depths of approximately 3 km in the sediments overlying the salt column, as well as the relevant density information. The present approach in gravity modeling better delineates the RSB configuration below the cover rocks and also determines the thickness of the salt layer that directly overlies the basement. On a plan view, RSB has a complex architecture; the fault systems bounding it orient in different directions transgressing deeper into the basement, suggesting tectonic deformation of the salt layer in deep basin areas. Such basement faults demarcate the Ar Rayn terrane boundary beneath cover rocks in the Arabian Platform, while other faults belong to the Najd fault system.

8. Dasgupta, S., Mukhopadhyay, B. and Mukhopadhyay, M., 2010. Next impending earthquake in northern Burmese Arc – Search for a probable precursor. **MEMOIR GEOL. SOC. INDIA**, 75: 69-80.

Abstract:

Subduction of the Indian plate below the Burmese Arc (BA) up to depths of about 200 km in a continental environment presents a unique opportunity to focus on seismogenic behaviour of active tectonic blocks. Northernmost 450 km stretch of BA outof-its 1100 km total length is seismically most active, where, the Benioff zone dips at $40°$-$45°$ degrees eastward and the Arc itself takes a sinuous bend following the Tripura Fold Belt and the Naga Belt of Schuppen. The continuing subduction is responsible for accumulation of huge residual strain at lithospheric margins. Character of elastic strain that is released from time to time from this rather short portion of the plate boundary and the pattern of recurring major earthquakes provide the basis for the present study. Five major earthquakes occurring here since 1964 (when ISC data became available) are:[17.10.1969 (6.1), 6.8.1988 (6.6), 9.1.1990 (6.1), 5.1.1991 (6.1), and 6.5.1995 (6.3)]. Using these, the seismic quiescence and the corresponding b-values are estimated as precursors, where an active seismic cycle distinguishes the alternate domains of quiescence (Q1, Q2 and Q3) and active seismicity. It is found that prior to the occurrence of 6.8.1988 earthquake (mag. 6.6), there are many short and intermediate term precursors (Q1, Q2 and Q3), change in seismicity rate and b-value, that are either absent or camouflaged prior to the mainshocks of 9.1.1990 (6.1), 5.1.1991 (6.1) and 6.5.1995 (6.3). Seismicity pattern for last seven years (2002 to June 2008) starts with Q1 (2002, 13 events/yr, b = 1.45), increase in background seismicity (2003-2004, 30 events/yr, b = 1.45), Q2 (2005, 19 events/yr, b = 0.86), increase in background seismicity (2006-May 21st 2008, 22.8 events/yr, b = 1.08), and followed by Q3 for nearly one month up to the end of June 2008. Such Q3 quiescence should immediately follow a fore - main - aftershock sequence. Typical tectonic set up for north part of BA and its seismic history suggest for the magnitude of the impending

event as 6.0 M or greater that is likely to be associated with a strike slip fault or a thrust (with appreciable strike slip). The exact size and timing of the event cannot however be deciphered from the available teleseismic data alone; this evidently requires data from local network on active blocks.

9. Kassem, O. M. K. & Abdel Raheim, S. 2010: Finite -strain analysis for the metavolcanic-sedimentary rocks in the Gabel El- Mayet area, Central Eastern Desert, Egypt. Journal of African Earth Science, Vol. 58, pp. 321-330.

Abstract

Finite-strain was estimated in the metavolcano-sedimentary rocks, which surround by serpentinites of Gabel El Mayet area. Finite strain shows a relationship to nappe contacts between the metavolcano-sedimentary rocks and serpentinite and sheds light on the nature of the subhorizontal foliation typical for the Gable Mayet shear zone. We used the Rf /ϕ and Fry methods on feldspar porphyroclasts and mafic grains from 10 metasedimentary and 6 metavolcanic samples in Gabel El Mayet region. Our finite-strain data show that the metavolcano-sedimentary rocks were moderately deformed and axial ratios in the XZ section range from 1.9 to 3.9. The long axes of the finite-strain ellipsoids trend W/WNW in the north and W/WSW in the south of the Gabel El Mayet shear zone. Furthermore, the short axes are subvertical to a subhorizontal foliation. The strain magnitudes increase towards the tectonic contacts between the metavolcano-sedimentary rocks and serpentinite. The data indicate oblate strain symmetry in the metavolcano-sedimentary rocks. Hence, our strain data also indicate flattening strain. We assume that the metasedimentary and metavolcanics rocks have similar deformation behaviour. The fact that finite strain accumulated during the metamorphism indicates that the nappe contacts formed during the accumulation of finite strain and thus during thrusting. We conclude that the nappe contacts formed during progressive thrusting under brittle to semi-brittle deformation conditions by simple shear and involved a component of vertical shortening, which caused the subhorizontal foliation in the Gabel El Mayet shear zone.

10. Farhat B., Benassi R., Jallouli C., Ben Mammou A., 2010. Contribution de la gravimétrie à l'étude de la structure de la plaine de Mornag (nord-est de la Tunisie): implications hydrogéologiques. Hydrological Sciences Journal. 55(8):1396-1404.

Abstract

This study is based on the analysis of gravity data of the Mornag plain. Its purpose is to increase the knowledge of this basin's structure. A residual anomaly map was first calculated from the Bouguer anomaly by removing a regional gradient. The computed map provides information on the ground density variation within the shallow sedimentary basin of Mornag. In order to highlight the different structures of the basin, we have calculated the magnitude of the horizontal gradient (MGH). This technique allowed us to determine the gravimetric lineaments which represent the contrasts in density and then deduce a structural map of the surveyed area. This map constitutes a very useful document for planning future hydrogeological exploration in the Mornag plain region.