Geophysical Research Abstracts
Vol. 18, EGU2016-2133, 2016
EGU General Assembly 2016

3D Seismic Imaging over a Potential Collapse Structure

Roland Gritto (1), Daniel O'Connell (2), Ali Elobaid Elnaiem (3), Fathelrahman Mohamed (4), and Fadhil Sadooni (3)

(1) Array Information Technology, Berkeley, United States (roland.gritto@arrayinfotech.com), (2) Fugro Consultants, Inc., Lakewood, USA (d.oconnell@fugro.com), (3) Qatar University, Doha, Qatar (fsadooni@qu.edu.qa), (4) Arab Center for Engineering Studies, Doha, Qatar (fatelrahaman60@yahoo.com)

The Middle-East has seen a recent boom in construction including the planning and development of complete new sub-sections of metropolitan areas. Before planning and construction can commence, however, the development areas need to be investigated to determine their suitability for the planned project. Subsurface parameters such as the type of material (soil/rock), thickness of top soil or rock layers, depth and elastic parameters of basement, for example, comprise important information needed before a decision concerning the suitability of the site for construction can be made. A similar problem arises in environmental impact studies, when subsurface parameters are needed to assess the geological heterogeneity of the subsurface. Environmental impact studies are typically required for each construction project, particularly for the scale of the aforementioned building boom in the Middle East.

The current study was conducted in Qatar at the location of a future highway interchange to evaluate a suite of 3D seismic techniques in their effectiveness to interrogate the subsurface for the presence of karst-like collapse structures. The survey comprised an area of approximately 10,000 m2 and consisted of 550 source- and 192 receiver locations. The seismic source was an accelerated weight drop while the geophones consisted of 3-component 10 Hz velocity sensors. At present, we analyzed over 100,000 P-wave phase arrivals and performed high-resolution 3-D tomographic imaging of the shallow subsurface. Furthermore, dispersion analysis of recorded surface waves will be performed to obtain S-wave velocity profiles of the subsurface. Both results, in conjunction with density estimates, will be utilized to determine the elastic moduli of the subsurface rock layers.