INVESTIGATION OF SEISMOTECTONICS OF ROBATKARIM FAULT BY GPR

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Iran is an earthquake prone-region located on the Alp-Himalayan seismic belt. Unfortunately, innumerous faults lay across the crust of the earth's surface in this area and frequent and destructive occurrence of earthquakes in the past are a reality that cannot be overlooked and these faults can be considered as a potentially serious threat. Fortunately, improvements in Engineering Seismology have minimized these risks. Parand complex is located at 30 km in south of Tehran and a main fault of the Robatkarim passes near this complex. Ground Penetrating Radar (GPR) survey was conducted across the Robatkarim fault in Tehran (Iran) in an effort to locate an active fault zone and to investigate the shallow geological structures High-resolution geophysical imaging can aid in the study of active faults by providing subsurface information about the geologic structure and deformational patterns present. We collected Ground Penetrating Radar (GPR) data across the active Fault in order to image and quantify fault displacement and assess off-fault deformation. The GPR surveys span the Fault and consist of a high-resolution 50 MHz 3-D grid and a longer 25 MHz 2-D line. Depth of imaging ranges between ~25 m for the 50 MHz Antenna and ~40 m for the 25 MHz Antenna. A seismotectonic map shows geologic, seismological, and other information that is pertinent to seismic hazards but previously was scattered among many sources of active fault zones.

The Robatkarim fault is dividable into two segment-northwest and southeast in view of the general trend of fault that is north-west and south-east with the length of 91 km. Robatkarim fault is a high angle reverse fault with left lateral strike-slip component. This fault is located in central part of seismic area of Iran and return period of earthquakes are longer. Therefore it can be said that the Robatkarim fault is amongst potential reactive faults (Kianifar and Poorkermani, 2000). A photo of this fault has been shown in a trench road near Robatkarim that filled with gypsum mineral (Figure 1).

Studies of active faults have revealed an apparent underestimation of geologic fault displacement and slip rate estimates when compared to short-term geodetic estimates (e.g., Dixon et al., 2003; Friedrich et al., 2003, 2004).This discrepancy may be attributable to unmapped fault strands or subsidiary faults associated with major faults and more diffuse, off-fault, deformation. Ground Penetrating Radar (GPR) can aid in the study of active faults by providing images of the subsurface at meter to sub-meter scale resolution in a non-invasive and cost effective fashion when compared to other methods (such as drilling and trenching. GPR surveys have been used to image faults and document off-fault deformation in varying geologic settings (Bano et al., 2002; Chowet al., 2001; Demanet et al., 2001; Rashed and Nakagawa, 2004).

Ground Penetrating Radar surveys near Parand City delineate a continuous, near-linear feature with a radar signature. The radar response consists of linear events and offset/flexured reflectors, showing a geometric correlation with the known fault zone at a control site. The asymmetric linear events at the control site are consistent with dipping planar reflectors matching the known direction of dip of the faults. The strike of the mapped linear feature near Parand city is consistent with previous observations with Poorkermani (1390). Figure 1 shows that the positions of the identified responses form a near straight line with a strike of $65^{\circ}-85^{\circ}$, which is consistent with the suspected strike of the fault as inferred from regional structure and tectonics discussed in this paper. Subsurface excavations at locations near Parand City are required to absolutely constrain the interpretation of the geophysical data.

Figure 1. A photo of Robatkarim Fault in trench of Road (see toward east)

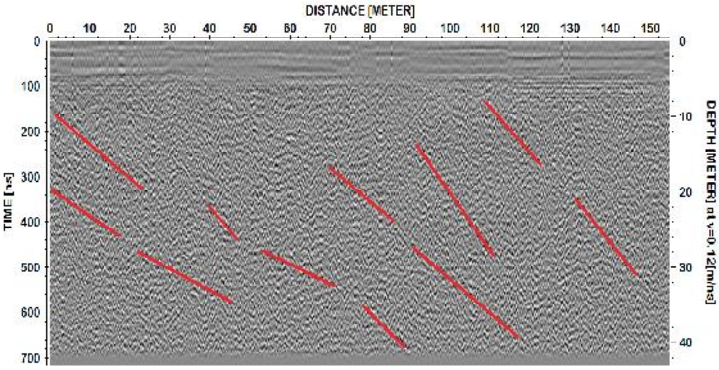

Figure 2. GPR Profile. The interpreted location of faults based on linear events

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