

Use of GPR Prospecting for Imaging Active Faults in the Urban Area of Baku, Azerbaijan

TAKAO MIYATA¹, FEGAN ALIYEV², ARIF GASANOV³

¹*Department of Earth and Planetary Science, Kobe University, Kobe, Japan*

²*International Ecoenergy Academy, Baku, Azerbaijan*

³*Republic Center of Seismic Survey, Baku, Azerbaijan*

Many earthquakes occur in the Azerbaijan and Caspian Sea region. On 25 November, 2000, though two epicenters of earthquakes (Mw6.2 and Mw6.1) were in the Caspian Sea, 25 km south-southeast of Baku, Azerbaijan, their earthquakes hit its mega-city. Accordingly, we have a cooperative research project on the Regenerative study of Urban Infrastructure in Baku, Azerbaijan from the point of disaster prevention (Representative: Shiro Takada) between Azerbaijan and Japan. On August in 2005, we investigated the NNW-striking active faults at ten sites, BK1-BK7 and SB1-SB3, in Baku and its vicinity, using a GSSI ground-penetrating radar (GPR) unit and 100 MHz antenna. At all sites, the GPR survey was conducted across a slope and small-scale depression. The length of each survey line is 50 to 300 m. The range of the two-way travel time was used 150 ns, additionally 250 ns for the 100 MHz antenna. The obtained GPR data were processed to accentuate geologic features by high pass filtering, low pass filtering and migration. The time profile changed to a depth profile by the wide-angle measurement. The following GPR results were obtained: (1) we found detection of an anomalous reflector, characterized by a nearly-vertical, weak (dark) zone and discontinuity of the reflected signal, on GPR profiles. (2) The width of the zone is 10-15 m on the GPR profile. Judging from the GPR results and observations, the discontinuity and zone can be interpreted respectively as a fault and fracture zone, saturated water. Secondly, the width of the dark zone is almost similar to those of fracture zone in the Shabandag-Balamdar Mountains. Thirdly, we found two NNW-striking active faults on the Absheron Peninsula. One is a hidden fault in the urban area of Baku. The other is a right-lateral strike-slip fault in the Shabandag-Badamdar Mountains, 3-5 km west of Baku. Along the fault, the ¹⁴C age of 34, 930±430 yr B. P. was obtained from the organic material in the sand bed near the ground surface. The strike-slip fault near Baku is assumed to have an activity after the formation of the sand bed. Therefore the fault information acquired is thought to be very important for disaster prevention in Baku.