Surface Rupture of the Changureh Earthquake in northwest Iran on June 22, 2002

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The M 6.3 Changureh Earthquake occurred on June 22, 2002 at 7 : 28 (local time) in the Abegarm region, 225 km west of Tehran City, Iran. Epicenter is N 35° 40' 12" and E 48° 55' 48". Although the earthquake magnitude is relatively small, it caused a severe damage for the adobe-style buildings occupied in Abdarreth-Changureh area. The geology of this area is composed mainly of the Miocene strata (claystone, siltstone, red sandstone, conglomerate and marl). Their strata are partly covered with the Quaternary thinly-bedded gravel. In the area between Changureh village and the east of Abdarreth village, surface ruptures appeared distinctly (Fig. 1). Therefore we will report promptly them.

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Fig.1. Seismotectonic map in the Abegarm-Avaj region, northwest Iran(modified from Bolourchi, 1979). An asterisk means an epicenter of the Changureh Earthquake. Strike of surface rupture is generally WNW-ESE. The length of the surface rupture is about 15 km. Red line; Surface rupture, Blue ellipse; Severe damage area of the seismic intensity VII in EMS-98 scale.

Fig. 2. Severe damages of the adobe-style building in Abdarreth village (N 35° 48' 52", E 48° 59' 43"). The severe damage produced along a westward extension of the surface rupture shown in next Fig. 3. A in Fig. 2 is the same building as in Fig. 3. Red broken line; Surface rupture, Photographs of Figs. 2-6 taken 23 July, 2002.

Fig. 3. A surface rupture (F) appeared at Abdarreah village. The building (right of figure) above the surface rupture was destroyed.

Fig. 4. The surface rupture (F) appeared on a hill on the Miocene strata at Abdarreah village during the earthquake. Along the rupture, the western side thrust up to the eastern side. The thrust plane has a strike of $N 56-66^{\circ} W$ and a dip of $32^{\circ} SW$. A vertical displacement is a range of 5–10 cm. Pencil for scale.

Fig. 5. The surface rupture (F) is easily traceable from B of Fig. 3 to the east (left). It cuts spurs and valleys.

Fig. 6. A dried-up river, striking $N 34^{\circ} E$, was ruptured in 2002. It is located at 10-km east of Changureh village ($N 35^{\circ} 46' 54''$, $E 48^{\circ} 59' 43''$). The strike of the four fractures (F) is $N 88^{\circ} E$ (or W). Spacing of the fracture is 1 to 5 m.