8th International Conference on Seismology & Earthquake Engineering
11-13 Nov. 2019, Tehran, Iran

SITE EFFECTS AT DASHT-E ZAHAB IN EZGELEH-SARPOL-E ZAHAB EARTHQUAKE

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Keywords: Site effects, Dasht-e Zahab, Ezgeleh-Sarpol-e Zahab Earthquake

Seismic motions and increase the potential for damage and collapse of engineering structures can be strongly influenced by source and path effects and also by surface and sub-surface geological and topographical conditions in the vicinity, known as “local site effects”. Site effects are widely recognized as an important factor of seismic risk. Local site effects can significantly amplify seismic motions and increase the potential for damage and collapse of engineering structures. Site amplification has been observed during many earthquakes (for example, the 1985 Michoacan, Mexico, and the 1989 Loma Prieta, California, earthquakes in the world and evidence of this can be found in Iran as the 1990 Manjil – Rudbar and the 2003 Bam earthquakes and also this research present findings in this regard related to Ezgeleh-Sarpol-e Zahab Earthquake, there were different damage situation at Dasht-e Zahab due to local site effects. On November 12, 2017 at 21:48 local time, a major earthquake of magnitude 7.3 struck west of Iran. The epicenter of the earthquake was near the Iran–Iraq border and it was approximately 45 km from Sarpol-e Zahab city in Kermanshah province. This event was felt in an extended area in Iran and Iraq, with an intense shaking duration of at least 100 s, and peak horizontal ground acceleration of 0.68 g. Based on site visit of Dasht-e Zahab after earthquake by the first author of this paper and investigation of damage assessments published in this area and Geology condition and also tectonic setting of Dasht-e Zahab as shown in Figure 1 that would be to understand well enough the physics of site effects on it.

The difference is generally ascribed to vertical offset and exhumation across two major basement-cored reverse faults, the Zagros Foredeep Fault along the foreland deformation front, and behind it the Mountain Front Fault, which regionally marks the frontal outcrop of Oligocene-Miocene Asmari limestone (Berberian, 1995). In contrast with the Fars arc, there is no firm evidence for basal Infracambrian Hormuz salt deposits in the northwestern SFB (Edgell, 1991; Kent, 1979). However, mechanical considerations point to an equivalent decoupling horizon in the Lurestan arc that allows the deformation front to advance southwestward over the Arabian plate (McQuarrie, 2004). Mesozoic strata of the Lurestan arc are also distinct, with fewer neritic limestones and more pelagic shales than in other parts of the Iranian Zagros (Casciello et al., 2009; Sepehr et al., 2006). There are three main detachment-forming horizons within the Lurestan cover sequence, each giving rise to folding of a distinctive wavelength (Casciello et al., 2009; Farzipour-Saein et al., 2009; Vergés, Goodarzi, et al., 2011). NW-SE trending surface anticlines form “whaleback” ridges expressed in resistant limestones of the Cretaceous Bangestan group and the Oligocene-Miocene Shahbazan-Asmari formations, while synclines typically expose Miocene-Pliocene Gachsaran evaporites and Agha Jari and Bakhtyari sandstones and conglomerates (Figure 2).

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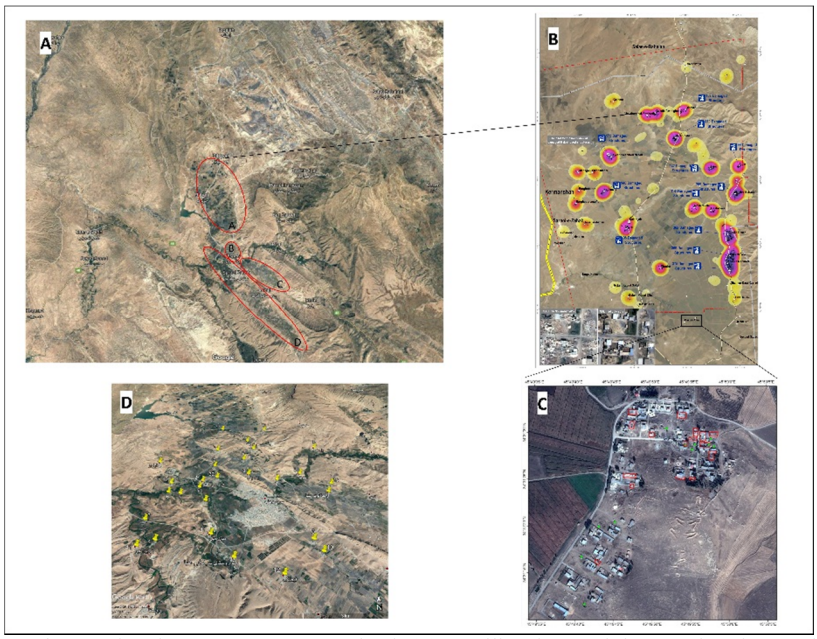

Figure 1. (A) Dasht-e Zahab area, four major damage zones recognized, (B) satellite-detected damaged and potentially damaged buildings and the related density of damage in the areas north of Sarpol-e-Zahab county, (C) damage structures and temporarily shelters in Dastak Olia shown by red polygons, (D) damaged structures analyzed in field.

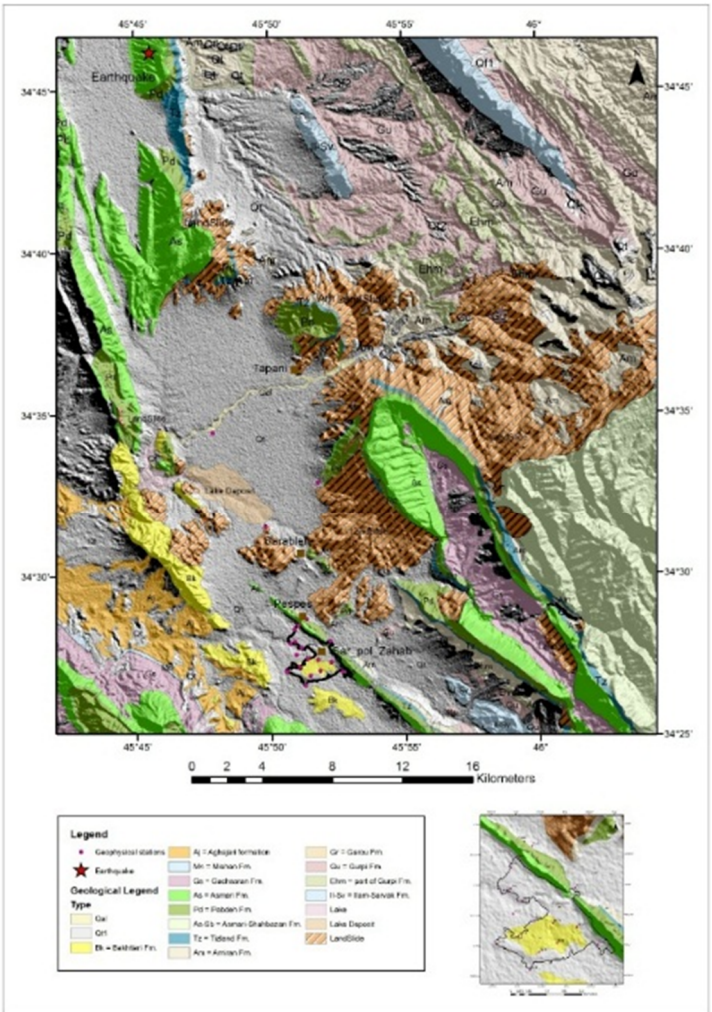

Figure 2. Geological map of the Zahab plain (modified after NIOC, 19). Elevations to the east and north of the plain are formed by the cliff-making Asmari limestone, while to the west the Bakhtiari conglomerate forms lower elevations. Note extensive distribution of landslides in the region.