

REPLY TO M. BERBERIAN'S COMMENT ON THE PAPER, A. MOHAJER-ASHJAI AND
A. A. NOWROOZI "THE TABAS EARTHQUAKES OF SEPTEMBER 16, 1978
IN EAST CENTRAL IRAN," G.R.L. NO. 9L0391

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Abstract. The Tabas earthquake of September 16, 1978, $M=7.7$, has been associated with extensive thrust faulting; there has been some confusion about the fault-length associated with this earthquake. At least 70 km of fresh surface faulting is associated with this earthquake together with several branches of secondary faulting.

We thank Mr. Berberian for his interest in our paper, however, his aberrant comments have provided this opportunity for us to clarify several points. See Berberian (1982).

1. Earthquake Faulting at Surface

We have estimated at least 70 km of surface faulting associated with the Tabas earthquake of September 16, 1978, of magnitude $M_S=7.7$, not 40 km as he claims. See Nowroozi et al (1980) for detail. In our preliminary field report we stated occurrence of several sets of fresh faulting and fractures on the ground within the area of maximum damage, with the most prominent fresh faulting about 40 km showing a pure thrust movement. We observed and reported up to 11 parallel sets of faulting within a belt of 2 km wide. Berberian reports eight segments. He criticizes us for drawing the fault trace as a straight line with the length of 40 km. In figure 2 of Mohajer and Nowroozi (1979), only the isoseismal map of Tabas earthquake was given, thus the highest intensity was drawn either as lines or hashed zones, and the purpose for presentation of figure 2 had been to show the meizoseismal area in relation to the extent of surface fracturing. In order to resolve this probable confusion we present our observation of surface faulting associated with this earthquake in figure 1. The interested reader is referred to Nowroozi et al (1980) for details of earthquake faulting and aftershock observations.

2. Origin of the Seismicity Map of NE Iran

We are not sure what has made Berberian delighted, Nowroozi never had the same map in his several papers, the subject of each paper is different. Nowroozi (1971) published a paper on seismo-tectonic of the Persian Plateau, eastern Turkey, Caucasus, and HinduKush region, where he relocated over 1500 earthquakes in the region. He published the epicentral location which has been used widely.

Nowroozi (1972), published focal mechanism of

earthquakes in Persia, Turkey, West Pakistan, and Afghanistan and Plate Tectonics of the Middle East. See also Nowroozi (1973) a reply to Tchalenko (1972); Nowroozi (1976), published seismotectonic provinces of Iran, see also Nowroozi (1979), Comparison Between Instrumental and Macroseismic Epicenter a reply to M. Berberian, thus it is not clear to us what has been abandoned. The figure I of Mohajer and Nowroozi (1979) is based on over 20 earthquakes that have occurred on Iran and have been relocated, probably Berberian has overlooked the fact that he also has used the relocation epicenter of Nowroozi (1971, 1976), thus the maps look alike to him because they show similar locations.

General seismicity maps of Iran have been published by many authors much earlier than Berberian's in 1976. References to all these maps and their various sources, we believe were irrelevant and out of context to the scope of our letter on the Tabas earthquake and his aberrant reply. Nevertheless, it should be noted that the original historical seismic information is that of Ambreseys (1968), Nabavi (1972), Tchalenko (1975), and Nabavi (1977). In the 20th century locations given by ISC and USGS were used, if and when the relocations of Nowroozi (1971 and 1976) were not available. We did not see the reason to reference a particular compilation by Berberian (1976) mainly because this particular compilation does not list the locations of epicenters. We believe he has only plotted on the Tectonic map of Iran which is the work of Stocklin and Nabavi (1973), the epicentral locations of Nowroozi (1973, 1973), the locations given by ISC and USGS, and the historic locations given by Ambreseys (1976) and Nabavi (1972).

3. "Moderate" and "Minor" Damage, or "Severe" Damage

We had designated the Tabas area as having the potential for severe damage on our seismic zoning map, Mohajer-Ashjai and Nowroozi (1978), prior to the occurrence of the September 16, 1978 Tabas Earthquakes. Our conclusion has been based on the 20 km margin on both sides of the known Quaternary Esfahak Fault, or Northwestern branch of the Nayband Quaternary Fault, see Mohajer et al (1975), and general inferences of attenuation properties and seismic potentiality versus fault lengths in Iran. For his false quotation on the previously known Quaternary Fault near Tabas, we refer to Neotectonic map of NE Iran published by Mohajer et al (1975). Part of this map is presented here as additional evidence as figure 2, unfortunately, Berberian is taking our words out of context, we never

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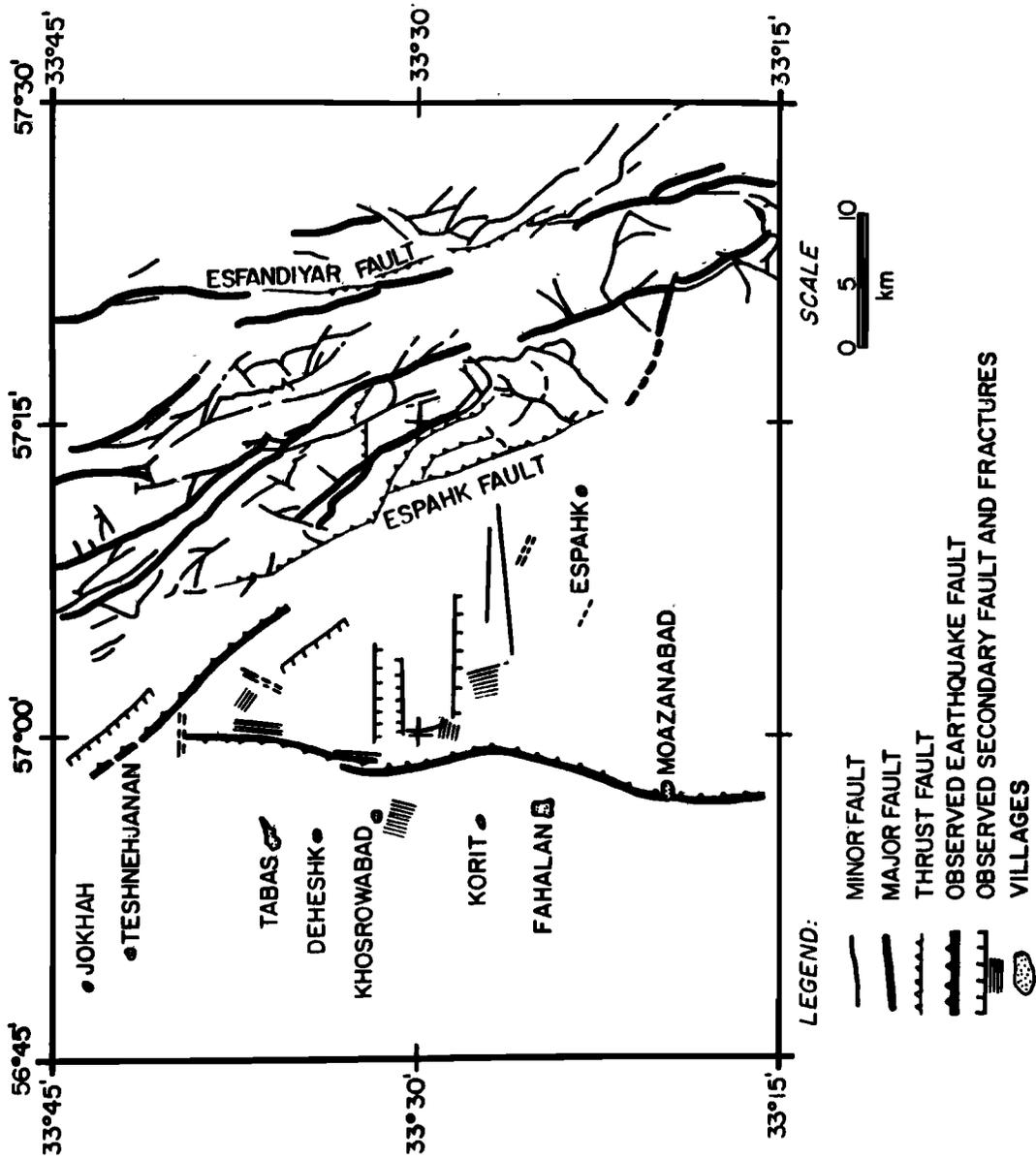


Fig. 1. Observed earthquake fault following the Tabas earthquakes.

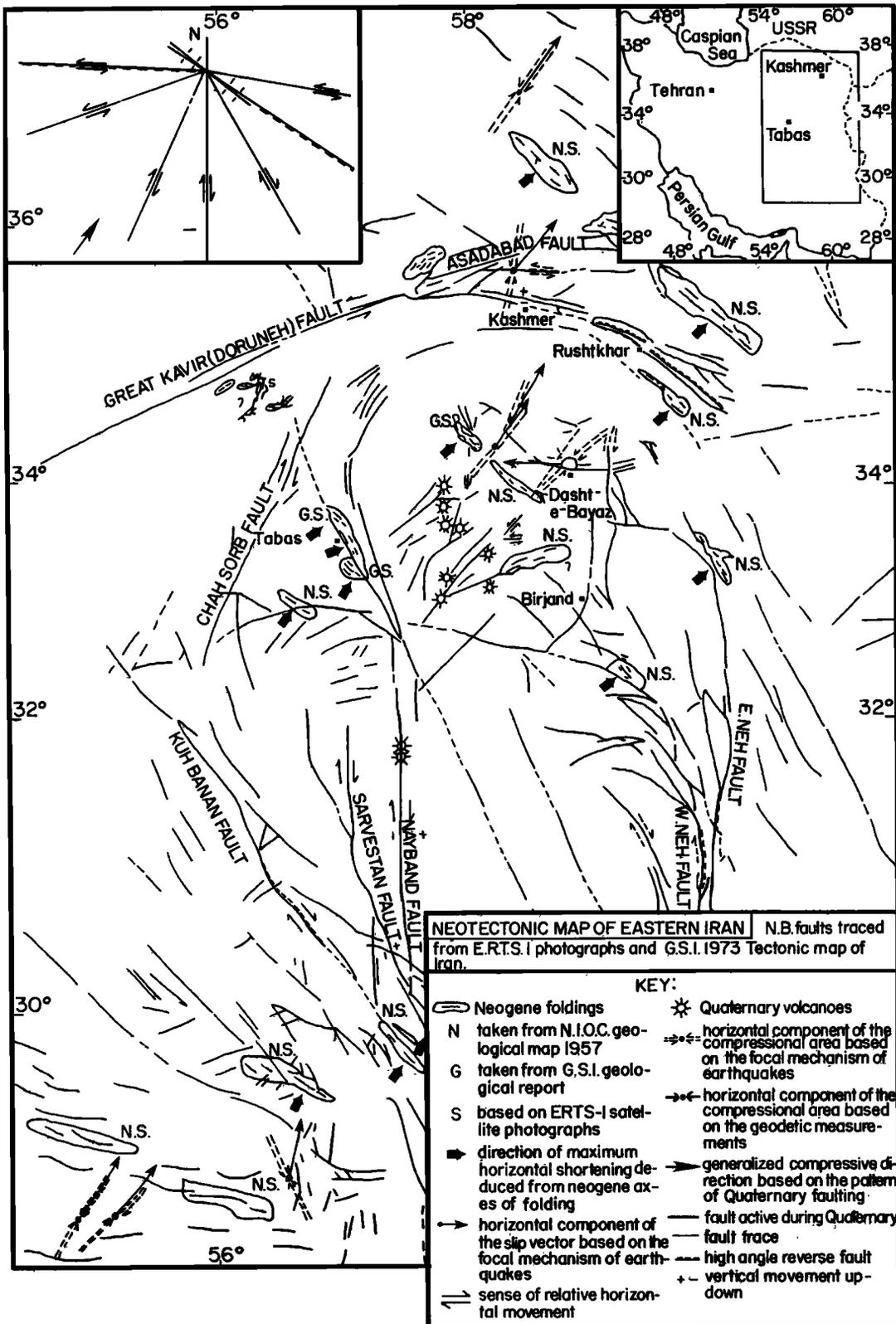


Fig. 2. Neotectonic map of Eastern Iran (after Mohajer, et al., 1975).

state "look, we predicted it," however, we believe "look, the area of moderate or minor seismicity in Iran, may be quiet, even for several centuries but, eventually have potential of generating major earthquakes." Certainly Tabas has been such an area.

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