ANALYSIS OF THE APRIL 9 2013 EARTHQUAKE IN THE SOUTH WESTERN PART OF THE ZAGROS REGION IN IRAN BASED ON TELESEISMIC SPECTRA

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On April 9, 2013, a large earthquake occurred in Boushehr province (M_W= 6.3) in southwestern Iran (Figure 1a). Study of instrumentally earthquake records show that some of the large earthquakes with magnitude greater than 6 had occurred in the Zagros region during the past 30 years (Figure 1a).

The principal purpose of this paper is to determine the dynamic characteristics of this earthquake through an analysis of teleseismic data. Active faulting in Iran is related to the convergence between the Eurasia and Arabia plates, which occurs at about 40 mm yr^{-1} at longitude 60^0 E and is mostly accommodated by distributed shortening within the political borders of Iran (Berberian et al. 2001). While much of this shortening is taken up in the main earthquake and mountains belts of the Zagros, Alborz and Kope Dagh (Quttmeyer et. al., 1979), some is also accommodated in central Iran.

The theoretical foundation for the proposed method comes from the well-known analytical expression derived by Keilis-Borok (1960) and already applied to a number of earthquakes,

$$M_0 = [\Omega_0(P)4\pi\rho R\alpha^3]/R_{\theta\varphi} \quad (1)$$

Where ρ (2700 kg/m^3) is the density (6.0 km/sec) the P wave velocity, Rθø depends on the source radiation pattern (assumed 1.6, Riznichenko, 1992), R is the hypocentral distance from the source. The physical meaning of W_o is the product of pulse width and amplitude, and it is closely related to the mean value of seismic energy arriving in the time window considered (Bolt, 1983). The corner frequency f_o was selected as the intersection of the low frequencies level (W_o) and a straight line that fit the spectral roll of, the slope of the lower of the two frequency bands was used (Figure 1b).

Source radius was calculated with Brune model (Brune, 1970) from the spectral corner frequency (Source radius r_0 =2.34 $\alpha/2\,\pi f_0$). Final estimates of each source radius were obtained using a linear average of the individual estimates available for that event. Teleseismic determination of body wave (P) spectra, interpreted in terms of the circular seismic source model, are used to estimate the parameters seismic moment (M_o=6.53 ×10^{18} N/m) , corner frequency (fo= 0.23 hz), source dimension (R=10.21km).

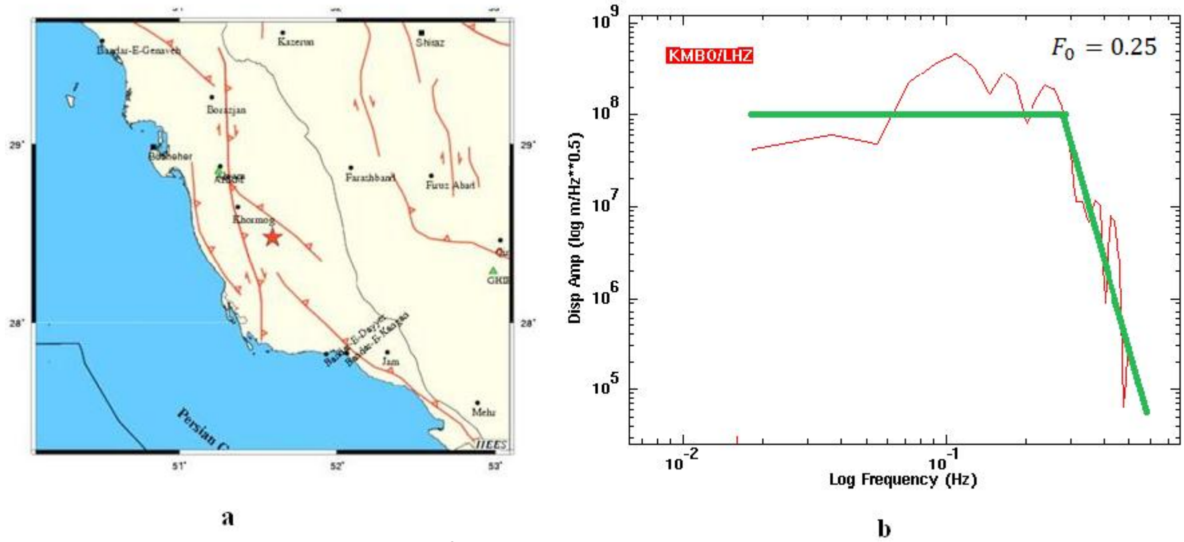

Figure 1. a) Epicenter location (red star) of April 9 2013 earthquake and tectonic map; b) source spectra calculated by using Brune model (1970)

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