



31 JULY 2005 BALA-ANKARA EARTHQUAKE ACTIVITY **Preliminary Report (Updated, August 9,2005)**

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Introduction:

On 31 July Bala (Ankara) earthquake occurred at 00:45 local time. According to Kandilli Observatory National Earthquake Monitoring Center, the epicenter of the earthquake that measured of magnitude $M_l=5.3$ is about 12 kilometers south of Bala district of Ankara City (Figure 1). The earthquake was felt strongly in Ankara, Bolu,Kırőehir, Yozgat, Aksaray cities and surrounding villages. Initial reports indicate no people were killed, but the damage were considerably in the villages, including Sarıpınar, Bahçekaradalak and Yeniyapanőyhli of Bala district. The reason for the damage was that the buildings in the village were soil-roof and jerry built. Following the occurrence $M_l=5.3$ a total of more 998 earthquakes were recorded between 31 July-06 August 2005 by National Earthquake Monitoring Center. Many seismological centers have reported the earthquake. The parameters of the July 31,2005 Bala Earthquake has as given by KOERI,CSEM,USGS (Table 1).

Table 1. A preliminary solutions of Bala (Ankara) earthquake by seismological centers.

Origin Time (U.T.C)	Coordinates		Depth (km)	Magnitude (M)	Source
	Lat.	Lon.			
21:45:00.99	39.44	33.09	5.3	5.3	KOERI
21:45:01.04	39.43	33.11	10	4.7	CSEM
21:45:04.00	39.34	33.08	10	5.3	USGS

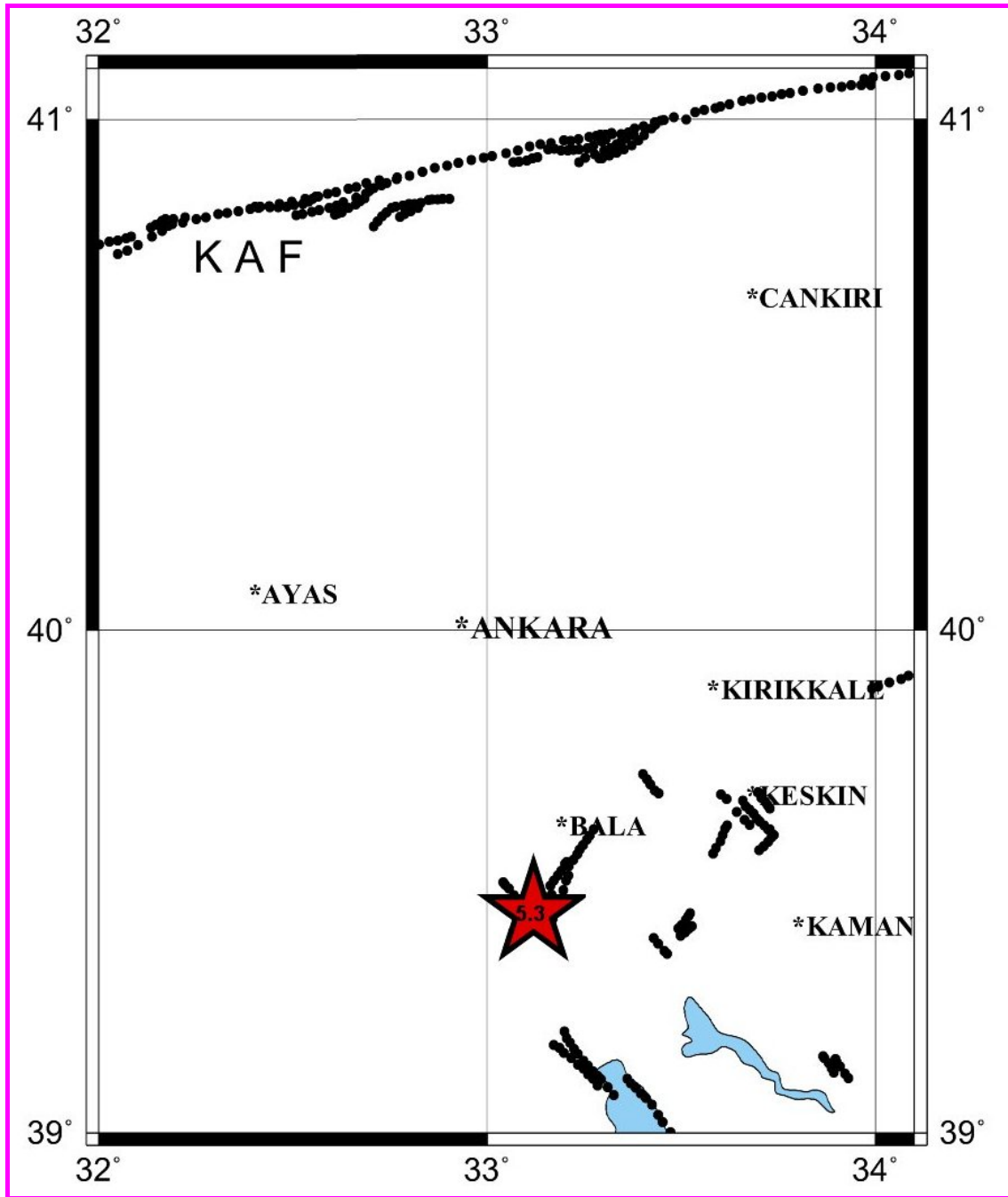


Figure 1. The epicenter of Bala-Ankara earthquake.

Due to the presence of the internal deformation of Anatolian block and several active faults in the region, Bala-Kula area is the important region where moderate earthquakes occur quite often. The instrumental seismic activity of the study region is presented between 1900-2005 (Figure 2). On April 21, 1983 Kulu-Bala earthquake ($M_b=5.1$) is one of the important earthquake which occurred in the region at the last times.

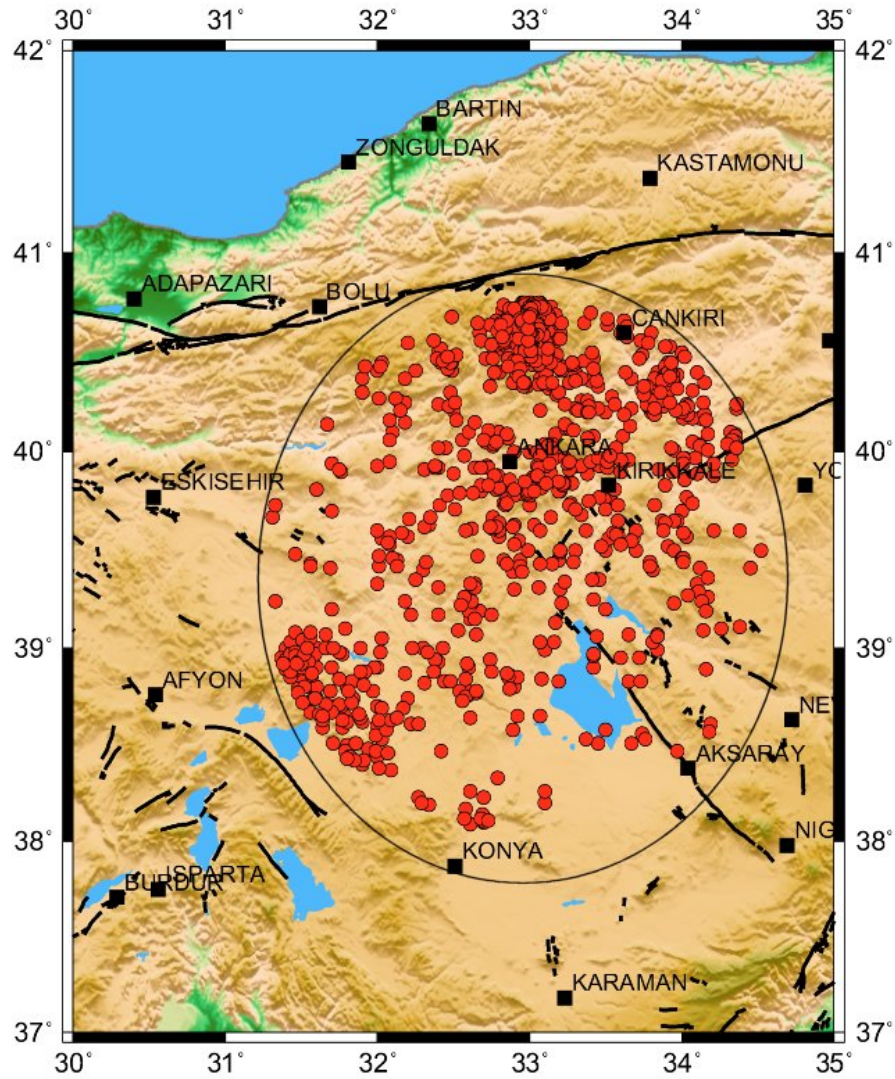


Figure 2. Seismicity of the earthquake region for the period of 1900-2005 with magnitudes, $M > 2.5$ (The black circle indicates the area with radius of 150 kilometers from the earthquake epicenter).

In the region, NE-SW and NW-SE trending faults caused the Bala earthquake activity. Figure 3 shows the distribution of the earthquake hypocenters ($M > 2.5$) for two days in the earthquake region. The arrival time difference of P-S phases of the earthquakes at the near Kaman station is between 6.0-8.0 sec.

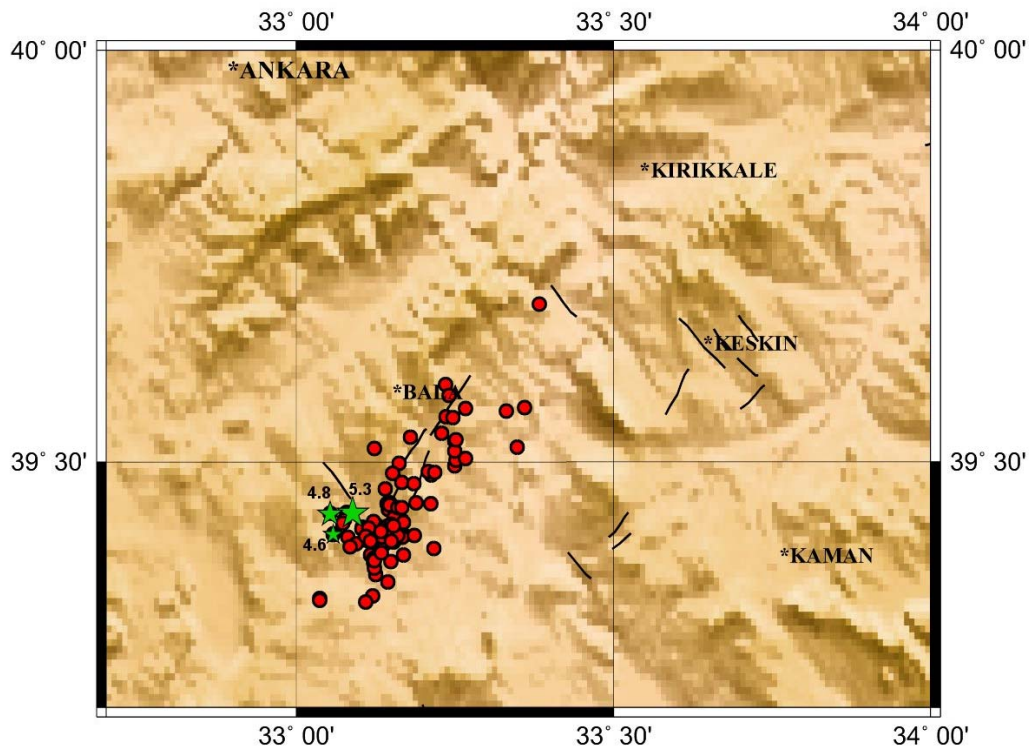


Figure 3. Seismic activity of the earthquake region for two days with magnitudes, $M > 2.5$.

The new earthquake activity began on July 31, 2005 at 18:18 local time with the $M = 4.3$ earthquake, and continued with $M = 4.8$ (02:41 L.T), $M = 4.6$ (03:45 L.T) earthquakes. In the region, this activity continued at the morning with many earthquakes. The distribution of the earthquakes between 31 July-06 August-2005 with days is illustrated in the following figure (Figure 4).

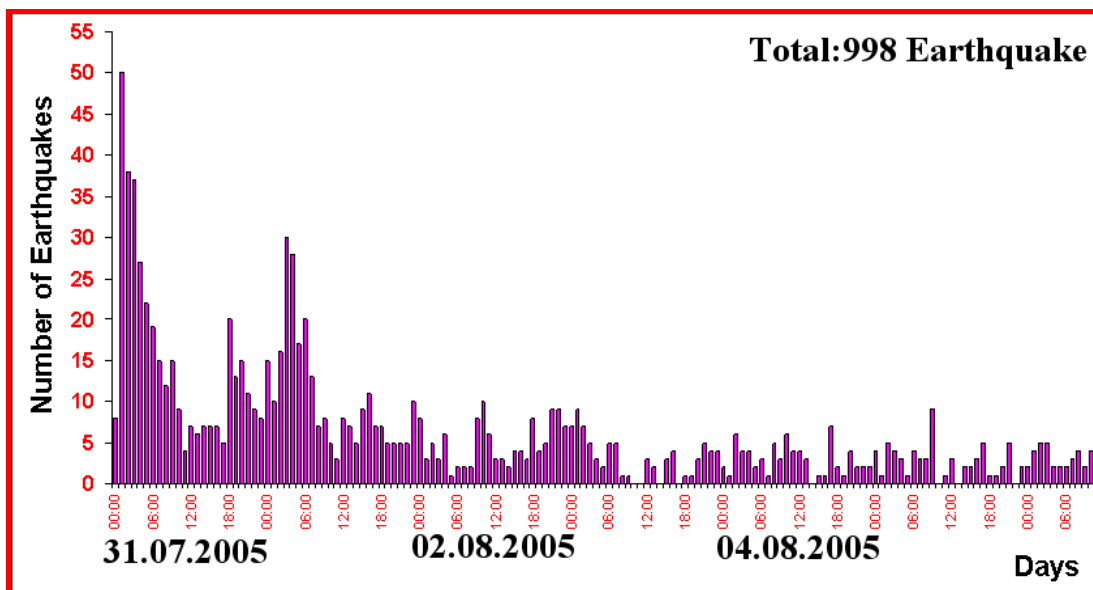


Figure 4. Distribution of earthquakes occurred between 31 July-06 August 2005

Focal Mechanism Solution:

Kikuchi and Kanamori (1991) technique was used for the focal mechanism solution in this study. According to this technique, the correlation between observational and theoretical seismograms can be found by applying inversion for different focal depths. 31 July 2005 (MI=5.3) earthquake indicated a strike slip fault which has a vertical component with oblique fault (Figure 4). The moment magnitude of its was calculated of Mw=5.2 (Table2).

Table 2. According to this study; Bala earthquake source parameters (Seismic Moment,Strike,Dip,Rake) presented.

Seismic Moment (N*m)	Strike (degree)	Dip (degree)	Rake (degree)
Mo = 8.1538x10 ²³	32.2	83.7	166.0

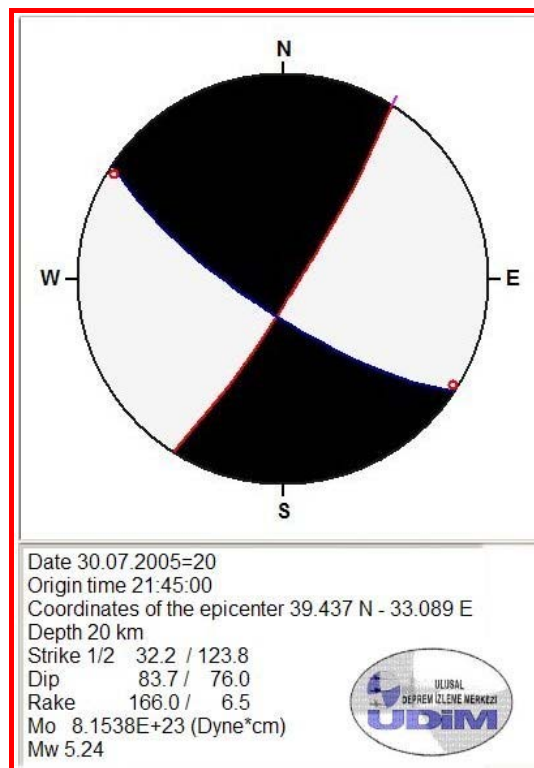


Figure 4. Focal mechanism solution of Bala earthquake (MI=5.3).

Earthquake activity in the region generally starts as an earthquake swarm and continues at along time. Although, swarms do decrease in activity over time, it is common to have several earthquakes of similar size over several days to weeks. Earthquake series generally occur in Turkey such as the western part of Turkey, Karaburun area, Denizli region, Midilli- Edremit Marmaris and Gökova Gulf.

The statistic information of the evaluated earthquakes is given by Kandilli Observatory National Earthquake Monitoring Center (Table 3).

Table 3. The statistic distribution of located Bala earthquakes by KOERI in the study region (31 July – 8 August, 2005).

Magnitude	Number of events	
M		Total
2.5-2.9	20	
3.0-3.4	114	
3.5-3.9	20	
4.0-4.4	5	
4.5-4.9	3	
5.0-5.4	1	163