

2 JULY 2004 DOĞUBAYAZIT (KARAKOSE-AĞRI) EARTHQUAKE

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Introduction

In Doğubayazıt district of Agri city, an earthquake occurred at 01:30 local time on Friday, July 2, 2004. Initial reports indicate 17 people were killed and 35 people were injured. Particularly, about 1000 houses, suffered severe damage in the earthquake, which struck 15 villages in Doğubayazıt district near the epicenter of the earthquake.

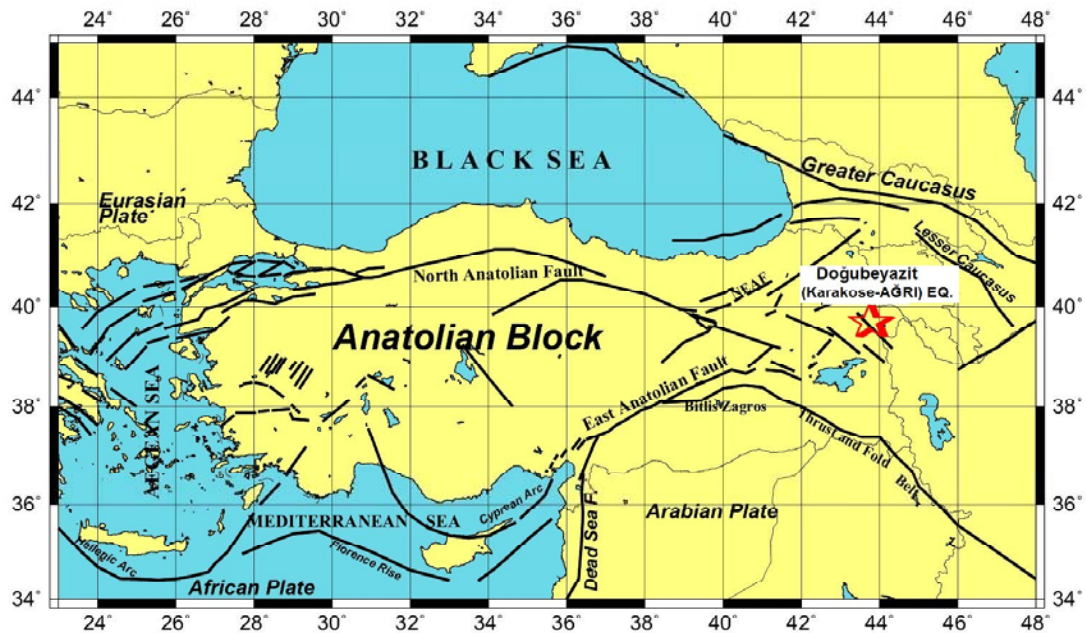
The epicentral area was reported 22 kilometers north-northwest of the district of Doğubayazıt, measuring 5.1 on the Richter scale by Kandilli Observatory National Earthquake Monitoring Center. The reason for the serious damage and casualties was that the buildings in the village were soil-roof and jerrybuilt.



Widespread damaged himis buildings in Yığınçal Village

The damage were considerable especially in the villages, including Bozyayla, Bardaklı, Karabulak, Yığınçal, Sağlıksuyu, Günyolu, Gültepe and Sazoba, 300 buildings were heavily damaged, 200 were moderately and 500 buildings were slightly damaged. This earthquake was felt in Ağrı,İğdır, Kars cities and Iranian.

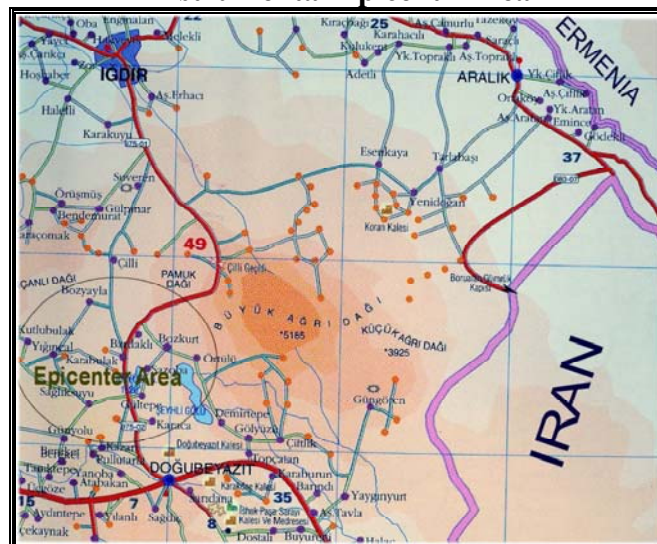
Major tectonic entities of the Turkey surrounding area



A preliminary solution of earthquake by the different seismological centres (1/7/2004)

Origin Time (U.T.)	Coordinates		Depth (km.)	Magnitude				Source
	Lat.	Lon.		Mb	Ms	Mw	Md	
22:30:07.2	39.63	43.95	5.0	5.1	5.0	5.0	5.1	KAN-Turkey
22:30:13.3	39.67	43.69	40.0	5.1				CSEM-France
22:30:12.8	39.83	43.82	19.0	5.3	4.8			USGS-USA

Instrumental Epicentr Area



The epicenter of the earthquake was in the Yığınçal village. This earthquake caused the destruction of practically all the traditional houses of the villages in Yığınçalı-Sağlıksuyu and surrounding 15 villages. Due of the hot weather in the earthquake region, many people were living at plateaus that caused reducing the number of the deaths. The earthquake was felt at near cities and strongly in Yığınçalı village. Many houses were damaged in the Yiginçali where 17 people of 67 were killed because of the traditional houses are made of stones and himis-adobe. The damage was occurred in the other villages in the region but no people were killed, about 35 people injured there. Near the epicentral area, namely the villages of Kutlubulak and Sağlıksuyu where only 4 people were injured due to many people were living in tents at plateaus during this earthquake.



Himis type structures collapsed over 15 village

Following the occurrence of the mainshock, five aftershocks with magnitudes between $M= 2.8- 3.5$ were recorded in the region. The Turkish Red Crescent Society had sent 500 tents and 500 blankets to the area along with two mobile kitchens. Turkish Armed Forces also sent the area a Natural Disaster Aid Rescue Division. Particularly, the rapidly preliminary results of the Kandilli Observatory and ERI National Earthquake Monitoring Center about the location and magnitude of the earthquake played an important role for the first aid to the affected population.

Tectonic

Generally, the tectonics of the region are controlled by the collision of the Arabian and Eurasian Plates.

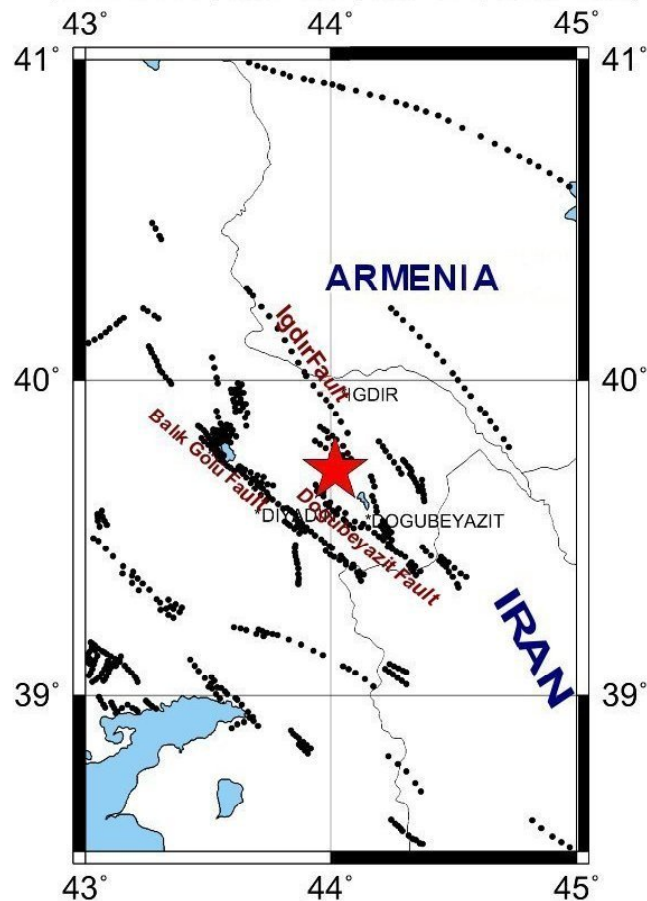
The east Anatolian plateau and Lesser Caucasus are characterised and shaped by three major structures:

- (1) NW-and NE-trending dextral to sinistral active strike-slip faults,
- (2) N-S to NNW-trending fissures and/or Plio-Quaternary volcanous, and
- (3) A 5-km thick, undeformed Plio-Quaternary continental volcano-sedimentary sequence accumulated in various strike-slip basins (Koçyiğit at all., 2001)

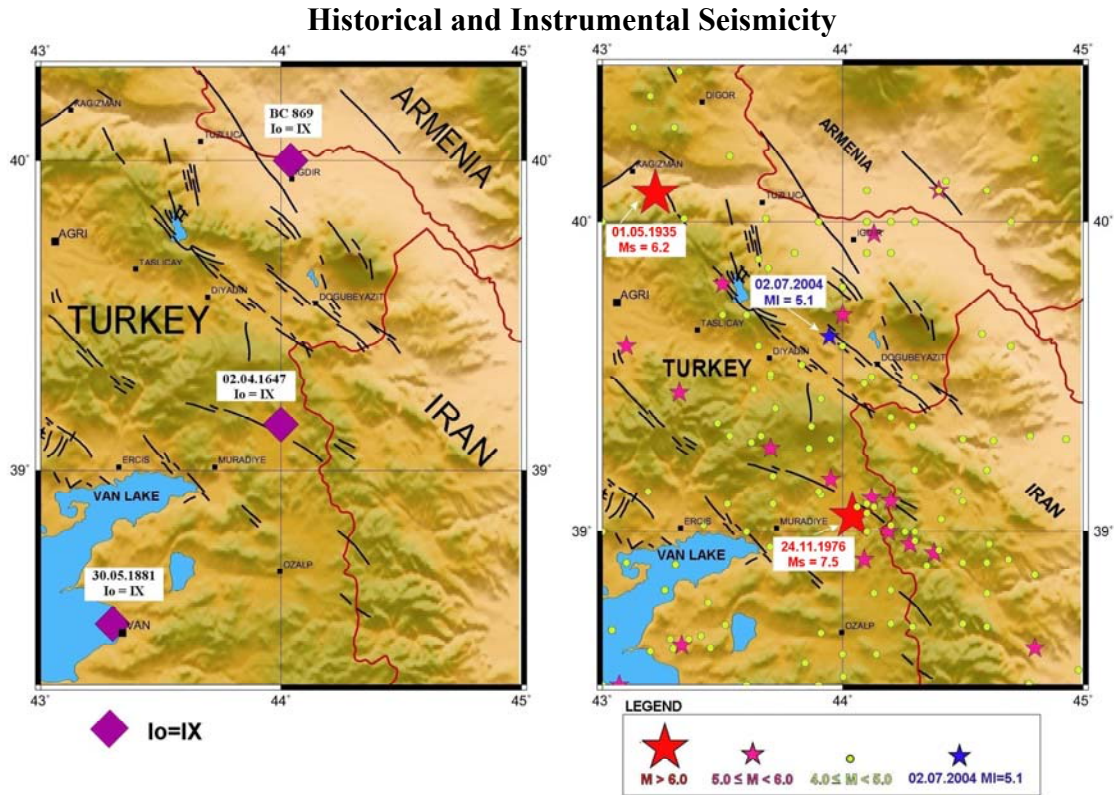
In contrast to the situation in the east Anatolian plateau and the Lesser Caucasus, the Transcaucasus and the Great Caucasus are characterised by WNW trending active thrust to reverse faults, folds, and 6-km thick, undeformed continuous Oligocene-Quaternary molassic sequence accumulated in actively developing ramp basins. Hence, the neotectonic regime in the Great Caucasus and the Transcaucasus is compressional-contractional, and Oligocene-Quaternary in age; whereas it is compressional-extensional, and Plio-Quaternary in age in the east Anatolia plateau and the Lesser Caucasus.

There are many active faults in the region (Şaroğlu et al., 1992). These faults are the Lake of Balık, Doğubayazıt, Iğdır and Ağrı. The epicenter of the earthquake was between the north of Doğubayazıt fault and the south of Iğdır fault.

2/7/2004 DOĞUBEYAZIT-AĞRI EARTHQUAKE (01:30 LT; Md=5.0, MI=5.1, Mw=5.0)



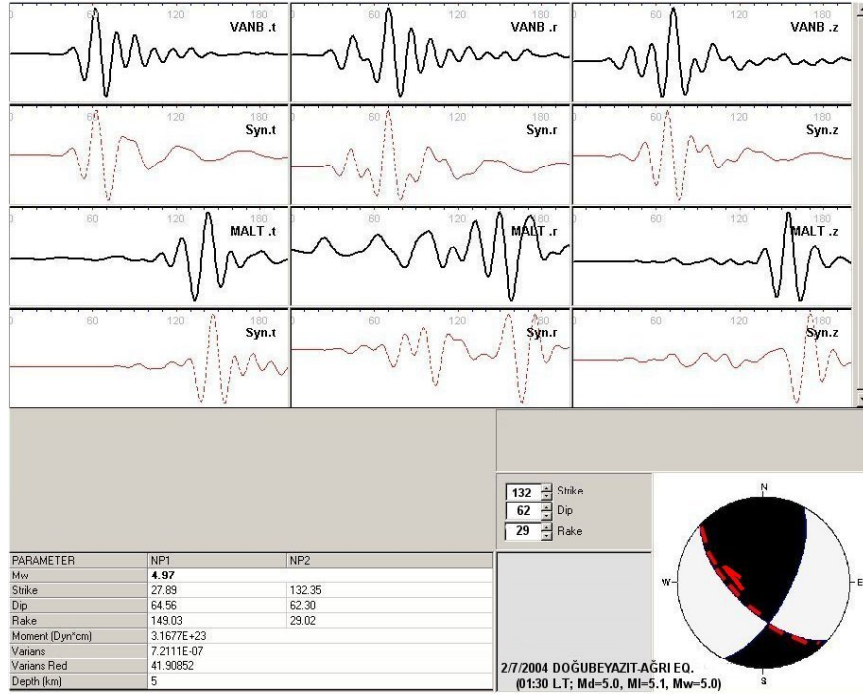
Orientation patterns of various neotectonic structures and focal mechanism solution of recent earthquakes that occurred in the east Anatolia plateau and the Caucasus fit well with the N-S directed intracontinental convergence between the Arabia plate in the south and the Eurasian plate in the north lasting since Late Miocene or Early Pliocene in places (Koçyiğit at all., 2001)



In historical times, two important earthquakes occurred in the region that were the earthquakes of BC 869 and 1647 caused damage and casualties. In instrumental period, 1935 ($M_s=6.2$) and 1976 ($M_s=7.5$) earthquakes occurred in the region (Eyidoğan at all., 1991). On the other hand, the spatial distribution of the earthquakes with magnitudes between 5.0-6.0 has a direction north to northwest that agrees well with the general tectonic system of the region. The other an important earthquake in the region was the 1988 Spitak-Ermenia Earthquake with magnitude of $M_s=6.7$ (Kalafat at all., 2000). The region between Ermenia and the Iranian border is a tectonically active region that experiences destructive earthquakes.

Earthquake Mechanism

The fault plane solution of the earthquake was calculated from digital broadband stations in three components. According to the this analysis, 02 July 2004 Doğubayazıt earthquake shows the left-lateral strike slip fault that has a reverse component. The original and calculated synthetic waveforms with a moment magnitude are seen the below figure.



Focal Mechanism Solution

Acknowledgments

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