

Geological and Seismological Observations after 8 August 2019 Bozkurt (Turkey) Earthquake

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ABSTRACT

Introduction. Turkey and nearby countries, located on a highly seismic zone, are under the earthquake threat that is the most popular natural hazards risk for the area. An earthquake with a magnitude of $M=6.0$ has hit Bozkurt, Denizli located in the western part of Turkey on August 8, 2019 at 14.25 (GMT) (Figure 1). The depth is given as 6.96 and 8 km, respectively by AFAD and the BU. The foreshock was recorded just five minutes ago before the main shock as $M=4.2$. The number of recorded aftershocks are 359 (17 of them 3.0-3.9 and rest <3) and they continued during six months. The epicenter are close to many provincial centers nearby. Their population is more than a million people. This paper presents geological and seismological observations after 8 August 2019 Bozkurt (Turkey) earthquake, felt in a rather large area.

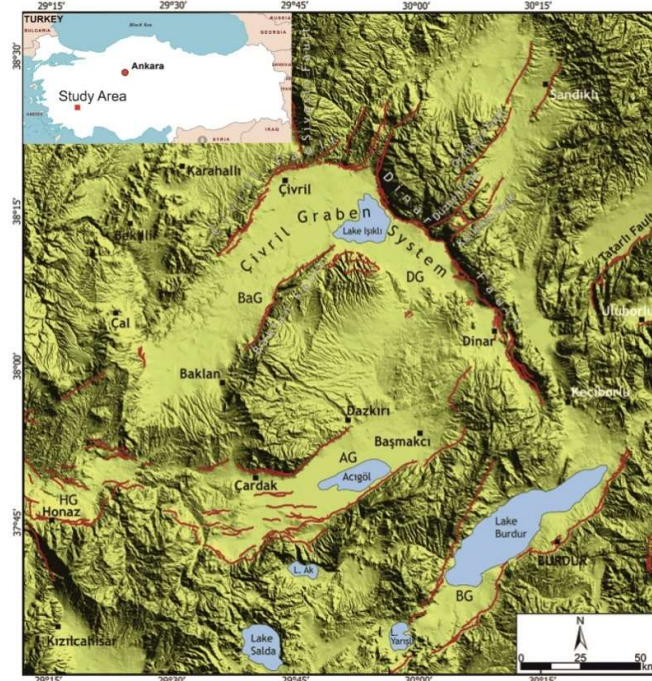


Figure 1. Location map, active faults and graben systems at inner SW of Anatolia (AG: Acıgöl graben, BG: Burdur graben, HG: Denizli graben, BaG: Civrili-Baklan graben, DG: Dinar graben) (Özalp et al., 2018)

Geological settings. In addition, clastic units consisting of Eocene aged sandstone and conglomerate and carbonate rocks also outcrop. The basin infill of the Acıgöl graben consists of terrestrial clastic sediments consisting of Miocene-Pliocene conglomerate, sandstone, mudstone, claystone and marl units. Quaternary aged alluvium and slope debris are observed at the top. The graben margins are dominated by delta fans that are of mainly coarse material. The sediment sizes are getting smaller towards the center of the basin. Bozkurt and Cardak, the densely populated fields nearby, are located on Quaternary aged alluvium.



Tectonic settings. The study area is located on the inner SW Anatolia where is dominated by graben systems. It is on the Acıgöl Graben and many other can be traced nearby like Civril-Baklan, Burdur Grabens (Figure 1). They are all in NW-SW direction and bounded by active fault line. These faults caused some remarkable earthquakes like Burdur (M=5.9) at 1971 and Dinar (M=6.1) at 1995. Acıgöl Graben is mainly in NW-SW direction but it turns to E-W at the west end. Maymundagi fault is also parallel to the graben and forms the northern boundary along 14 km than it continues towards Alikurt village in E-W direction along 17 km. Gemis fault bounds the graben in the south and its length is about 25 km. It reaches up to Gemis village and after it splits up several segments (1.5 km to 9 km) mainly in E-W direction.

Seismological features. The region is very active in terms of seismicity. Bozkurt town is located on the Gemis Fault. Seismic activity of the area has been known for long time both from instrumental and historical records (AFAD, 2019). When the earthquake focal mechanism solutions are analyzed, BU stated that the fault forming the earthquake is a normal fault in the E-W direction, and AFAD suggests an approximately WNW-ESE direction with 44° dip angle to south that is Maymundagifault. However, the epicenter point of the fault is on the north of the Maymundagi fault. It means Maymundagi fault has not caused the earthquake. Slope directions and focal mechanism solutions of the both faults Gemis fault has produced the earthquake. Since the Gemis fault that forms the earthquake is inclined north, the epicenter point of the earthquake appears in the north, therefore in the Bozkurt region. In other words, the focal centers of the main earthquake and aftershocks are located in the northern region of the graben. The epicenter points are concentrated on the northern part of graben around Bozkurt town as Gemis fault inclination is towards north.

Conclusions. Bozkurt, Denizli located in the western part of Turkey, has been hit by an earthquake with a magnitude of 6.0 (M) on August 8, 2019. The earthquake has caused hundreds of aftershocks during six months. The ground motion has produced observable damage in a rather large area. Although the earthquake is moderate, its effects on the structures were serious. This paper presents the geological and seismological observations on the affected area. The epicentre of the main shock is on the Maymundagi that is a part of Gemis Fault segment in WNW-ESE direction. Although the epicentre is far away from many crowded towns on the plain, it has caused some seismic damages on the reinforced concrete (RC) and masonry structures. Some villages like Dutluca Armutalan and Mecidiye are close to epicentre and they showed less damage because of the stiff rock foundation compared to the ones on the alluvium.

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