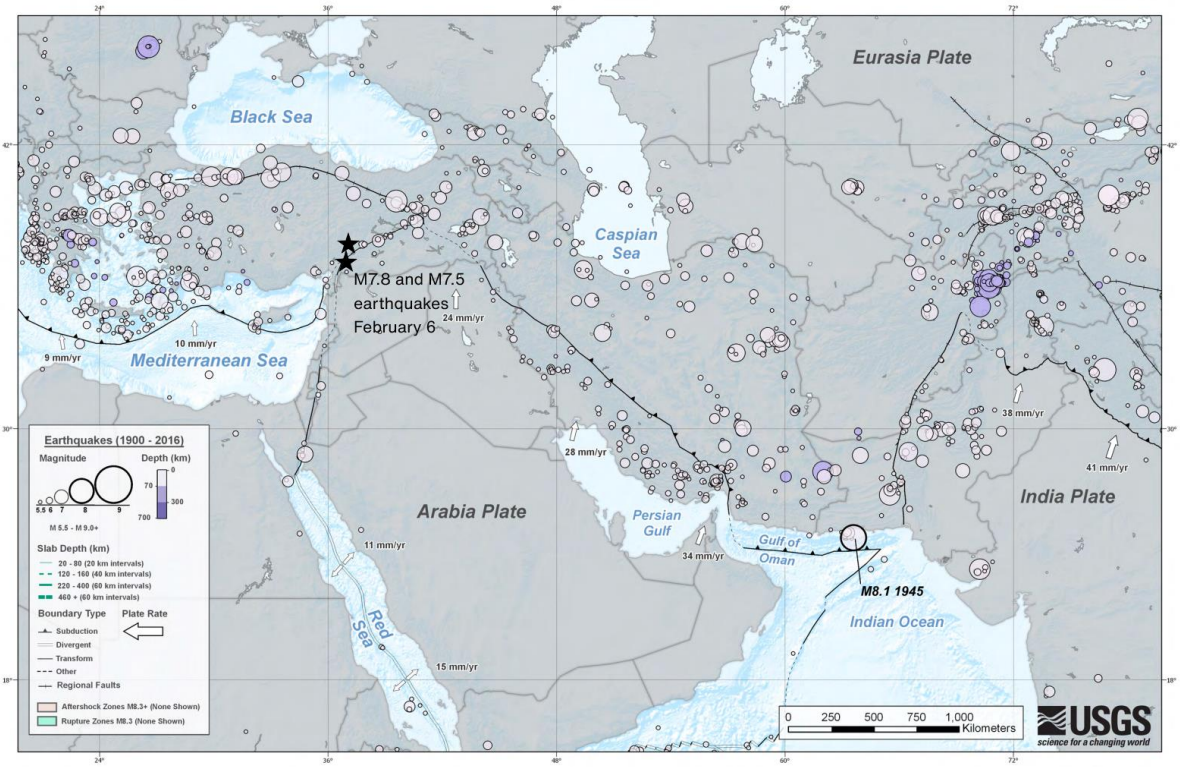
Turkey and Syria: Earthquake

Overview

Starting in the early morning hours on February 6, a series of strong earthquakes occurred in southern Turkey and shook the Turkish-Syrian border region, resulting in thousands of fatalities and tens of thousands of injuries, causing notable material damage in both countries, and affecting millions of people across the region. Based on the initial estimates, total economic losses were anticipated to reach into the billons (USD).

Seismological Recap

The Earthquakes resulted from strike-slip faulting at shallow depth of 5 to 20 km. The location was in the vicinity of the triple-junction between the Anatolia, Arabia, and Africa plates, a region of generally high levels of seismicity and earthquake activity. The mechanism and location of the earthquakes are consistent with that happened in the past either the East Anatolian fault zone or the Dead Sea transform fault zone.



The main shock – magnitude 7.8 earthquake

The first notable earthquake struck at 1:17 (UTC) in Kahramanmaras province, about 26 km (16 mi) east of Nurdagi and about 34 km (21 mi) northwest of the city of Gaziantep. The event had an estimated

depth of 17.9 km (11 mi) with a **magnitude of 7.8** and intensities up to level IX (violent) on Modified Mercalli Intensity (MMI) scale.

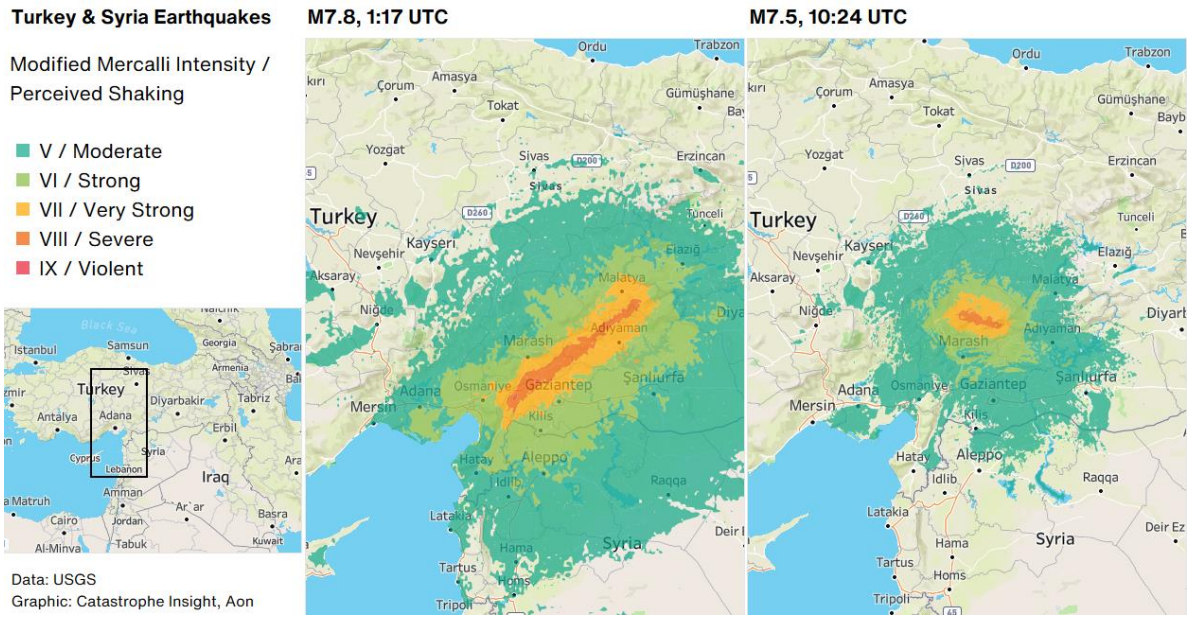
According to the United States Geological Survey (USGS), “the magnitude 7.8 earthquake resulted from strike-slip faulting at shallow depth. The event ruptured either a near-vertical left-lateral fault striking northeast-southwest, or a right-lateral fault striking southeast-northwest. The preliminary location of the earthquake places it within the vicinity of a triple-junction between the Anatolia, Arabia, and Africa plates. The mechanism and location of the earthquake are consistent with the earthquake having occurred on either the East Anatolia fault zone or the Dead Sea transform fault zone. The East Anatolia fault accommodates the westward extrusion of Turkey into the Aegean Sea, while the Dead Sea Transform accommodates the northward motion of the Arabia peninsula relative to the Africa and Eurasia plates.”

Aftershocks

The first strong aftershock struck eleven minutes later (1:28 UTC) about 10 km (6.2 mi) southeast of the main epicentre at a depth of about 15 km (9.3 mi) and a **magnitude of 6.7**.

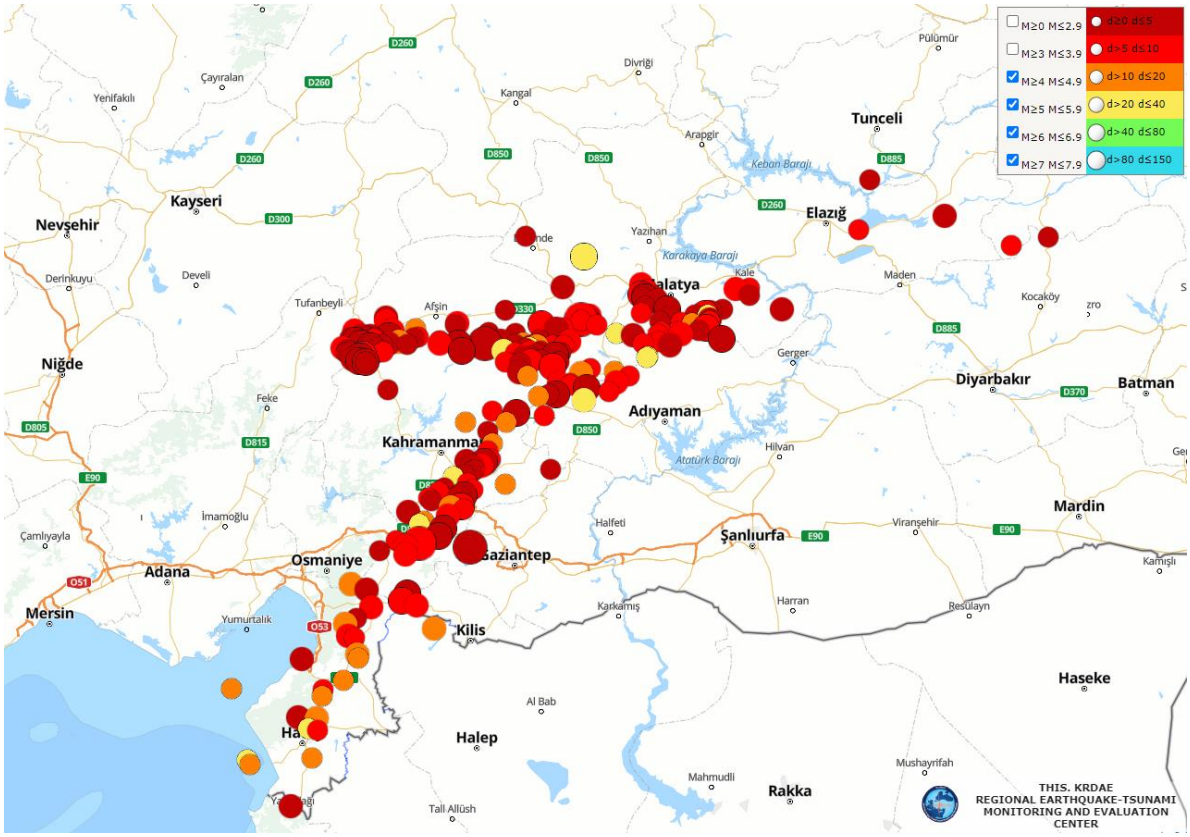
A subsequent significant earthquake occurred approximately nine hours later, at 10:24 (UTC) roughly 100 km (62 mi) north of the previous two events at a depth of about 10 km (6.2 mi) and a high **magnitude of 7.5**.

Based on USGS’s report, “the event ruptured either a near-vertical left-lateral fault striking east-west, or a right-lateral fault striking north-south. The preliminary location of the magnitude 7.5 earthquake places it within the vicinity of a triple-junction between the Anatolia, Arabia, and Africa plates. The location and mechanism of the earthquake, along with aftershocks that have occurred since the M7.8 earthquake nine hours earlier, are consistent with the February 6 earthquake sequence having occurred within the broad East Anatolia fault zone, though not necessarily all on the same fault strands. The East Anatolia fault zone accommodates the westward extrusion of Turkey into the Aegean Sea.”



Information as of February 8, 21:00 UTC

Numerous smaller but significant aftershocks with magnitude lower than 6 were recorded across the tectonic region throughout the day and can be expected to continue for the following days and weeks. In total, there have been hundreds of earthquakes of various intensity. The map below, provided by the Kandili Observatory and Earthquake Research Institute (KRDAE), shows all +M4.0 earthquakes that occurred in the region between February 1-8. Tremors from the strongest earthquakes were detected elsewhere, even more than 5,500 km (3,400 mi) away from the main epicentre.



Historical Context

The events took place in the area of the East Anatolian Fault and the Dead Sea Transform Fault Zones, a region of generally high levels of seismicity and earthquake activity. Both, southern Turkey and northern Syria have expected significant earthquakes in the past. The strongest earthquake (based on magnitude level) to hit the region in the past 50 years was a M6.7 earthquake on January 24, 2020, claiming at least 41 fatalities, no fewer than 1,600 injured people, and thousands of damaged buildings, causing an estimated economic loss of 340 million (USD 2023). Stronger earthquakes usually occur in the areas of different fault zones across Turkey. In Syria, Aleppo city was devastated several times historically by large earthquakes, notably in 1822, claiming estimated 20,000-60,000 deaths

Given the even more violent nature of the latest events, they are expected to pose the deadliest and the costliest events to hit the region of south Turkey in the modern era. Table below highlights five costliest and deadliest earthquake events that occurred in Turkey since 1950.

Information as of February 8, 21:00 UTC

Date	Location	Magnitude	Economic Loss (2023 $ billion)
August 17, 1999	İzmit	7.6	28.4
October 23, 2011	Van	7.1	2.0
November 12, 1999	Duzce	7.2	1.8
March 3, 1992	Erzincan	6.9	1.6
June 27, 1998	Adana	6.3	1.0

Date	Location	Magnitude	Fatalities
August 17, 1999	İzmit	7.6	19,100
November 24, 1976	Çaldıran	7.3	5,300
August 19, 1966	Varto	6.8	2,500
September 6, 1975	Lice	6.7	2,400
October 30, 1983	Erzurum	6.9	1,300

Event Details

The situation related to the latest events remains very dynamic, death toll estimates and material damage assessments in the affected area are still evolving. Current reports indicate over 12,000 fatalitities and no fewer than 58,000 injured people.

Acoording to the latest report of the Turkish Disaster and Emergency Management Presidency (AFAD) released on February 8, more than 9,000 people died and no fewer than 50,000 others were injured across the provinces of Kahramanmaras, Gaziantep, Sanliurfa, Diyarbakir, Adana, Adiyaman, Osmaniye, Hatay, Kilis and Malatya in **Turkey**. Over 5,000 building collapsed and thousands more were damaged in those ten provinces. Local support teams together with international search and rescue teams include almost 100,000 persons who are working in the area.

Earthquake damage in cities of Gaziantep (left) and Diyarbakir (right)
Source: ASAD

Information as of February 8, 21:00 UTC

In **Syria**, the situation is similarly disastrous, with collapsed buildings across the region and including the cities of Aleppo, Harim, Atmeh, Latakia and Hama that were probably the most affected by earthquake. As of February 8, the Syrian Ministry of Health and Syrian Arab News Agency (SANA) reported no fewer than 3,000 fatalities and more than 3,700 injured people.

According to the USGS's reports, table below summarises number of people exposed to different intensity of shaking that was triggered by two strongest earthquake tremors. On February 6, the World Health Organisation warned that a total death toll can possibly reach as high as 20,000 casualties due to continuing aftershocks and subfreezing conditions.

Earthquake	Modified Mercalli Intensity	Perceived Shaking	Affected Population (thousands)
Magnitude-7.8, 1:17 UTC	IV	Light	235,000
	V	Moderate	22,000
	VI	Strong	12,000
	VII	Very strong	5,000
	VII	Severe	540
	XI	Violent	70
Magnitude-7.5, 10:24 UTC	IV	Light	61,000
	V	Moderate	17,000
	VI	Strong	3,000
	VII	Very strong	350
	VII	Severe	100

Financial Loss

As of this writing, it is still too early to estimate the total economic and insurance impact of this significant event. However, based on the widespread scope of extreme damage on property and infrastructure, it was initially anticipated that total economic losses will reach into the billions of USD. Relatively high portion is going to be covered by insurance. As the Natural Catastrophe Insurance Pool (DASK) noted, the take-up rate of the compulsory earthquake insurance scheme is approximately 52% in the Malatya Province, 45% in Adıyaman and 65% in Gaziantep.

Source Information

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The United States Geological Survey (USGS)
The Turkish Disaster and Emergency Management Presidency (AFAD)
The Syrian Arab News Agency (SANA)
Kandili Observatory and Earthquake Research Institute (KRDAE)

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