

Turkey Earth Quake – 27 December 1939 (2_51)

The Quake

“Once more a great disaster has visited a country, caused this time not by man’s inhumanity to man, but by a gigantic force of nature.” - “It is not likely that the new upheavals will teach the geologist anything new. They are evidence that nature has not yet finished with the earth.” - “What we urgently need is some method of predicting quakes and warning a threatened population.” (Extracts from the NYT Commentary on 29 December 1939).



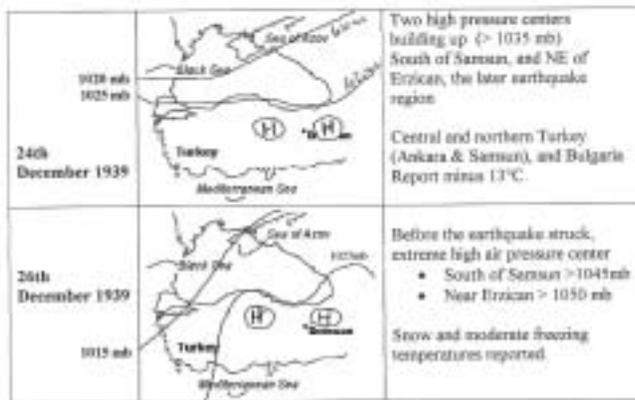
On Wednesday 27th December 1939 (after foreshock on 26th 23:57:16h G.C.T), a devastating earthquake in the north-easterly highlands of Anatolia shook the whole of Turkey, at 1:57:35 hours a.m. local time. There had been foreshocks on 21st November 1939 near Terzhan/Turkey, and tremors were reported in England, San Jose, Manila, etc. (NYT, 22 December 1939). A quake with a force of 8 recorded on the Richter scale shook the Anatolia earth taking the life of about 35,000, injuring 100,000 and making several hundred thousand homeless. 90 villages and 15 cities over an area of 30,000 square kilometres were completely destroyed. The earthquake produced a tsunami wave of up to 3-4 metres, respectively of a one meter high wave crossing the eastern part of the Black Sea from the South to the North, as recorded in several Russian stations. What followed after the earthquakes were bitter cold, storms, heavy rains, floods and snow. It became a very hard period for the Turkish people. Most of their powerful neighbours were at war, while their government tried to manage the matter on its own. This massive earthquake occurred during the transition from autumn weather to winter. What were the weather conditions when the event happened? What was the contribution of this event to the extreme war winter 1939/40 in Europe? The arctic winter of 1939/40 was already well on its way in December. (A)

Further details: (A) Winter 1939/40, 2_11; North Sea cooling, 2_16.

Weather conditions before the earthquake

First indications that Central Europe had been ‘conquered’ by an anti-cyclone weather system, preventing milder maritime air from flowing through the middle of the continent, were available in the first half of December 1939 itself. Most significant deviation from the average weather became visible

just a week before the earthquake struck. Between 21st and 22nd, temperatures dropped to below minus 30°C in Finland north of the Arctic Circle. Around the same time (20th December), Northern Turkey had two high pressures of 1,040 mb attracting cold air from Siberia via the Caspian Sea. A low pressure (1,010 mb) shortly took control over Southern Turkey on 22nd, the high pressure returned again with two centres on 24th (ca. 1,040 mb), the pressure centre above 1,040 over the location of the epicentre on 25th, increasing to above 1,045 mb on 26th (02 hours), which increased over Eastern Anatolia to ca 1,050 mb during the early morning and presumably remained high until the earth trembled violently.



From 24th on, very low temperatures in Central and Northern Turkey accompanied the high pressures; (according to German and English weather charts). While it is up to geological scientists to say whether the high air pressure or the low temperatures could have influenced the earth quake timing, by hours or days, an immediate link to the arctic conditions in Finland's North. (A), seems difficult to establish. On the other hand, this investigation has shown that along the West Front (Maginot Line/Westwall) a lot of humidity had been taken out of the atmosphere, and the land corridor from Poland, Ukraine and eastwards may have been so dry, that cold air from the North-Eastern Depth (Siberia/Central Asia) could reach Turkey with little resistance (B)

Further details: (A) Russian-Finnish war, 2_41; (B) Rain-Making, 2_31.

It seems that in the affected area a high snow cover and severe cold prevailed prior to the quake, which contributed, presumably significantly, to the emerging catastrophe¹. Only a few days before the quake struck, on 21st

¹ Leuchs

December 1939, at least the Western Black Sea experienced a severe snowstorm with very unseasoned and deep freezing temperatures. (See below: Events). For a couple of days cold and very dry air came rushing in from the Far East. On the other hand, it seems that cold air did not travel very much beyond Turkey, at least it did not reach the Adriatic Sea. This actually occurred almost within hours after the quake.

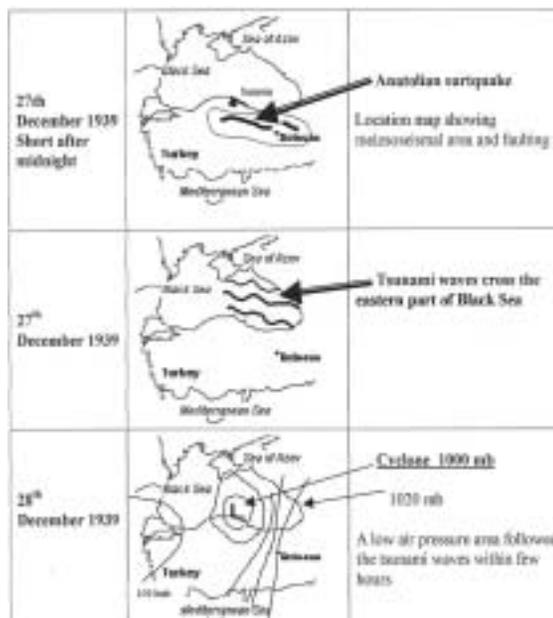
What happened after the earthquake?

All information on the Anatolia quake for readers interested in news was published by the NYT. The New York Times did a marvellous reporting job under the prevailing difficult conditions. While the NYT even became almost philosophical in its comments on December 29, (see above) about geology, the meteorological impact of the quake is highly interesting for practical purposes as well. Did the quake and its meteorological side effects contribute to the emergence of the extremely cold war winter of 1939/40 in North Europe?

At the Turkish Black Sea coast, about 150 km away from the epicentre, the quake generated a strong tsunami wave of up to a metre height that crossed the eastern part of the Sea in less than one hour. It started with a retreat of

water seawards (by ebbs) of 50 metres and a flooding (of 20 m) of the land.² The wave reached a height of 50 centimetres at Sevastopol in 46 minutes and with a height of 53 cm at Novorossiysk in 27 minutes. The number of maximum waves was two for Sevastopol, one for Novorossiysk and ten for Yalta (max height 14 cm, running period 20 minutes).

It does not need much guessing that the tsunami waves released enough 'energy' stored at sea surface to enable the formation of a forceful low pressure on the North coast of Turkey within hours of the quake.



² Dotsenko

³ Bernaerts, Black Sea

At a level of 20 to 40 metres below the surface, the Black Sea has in December still a substantial portion of the summer heat at hand (about half of the min/max. 7°C March, 12°C October), (source: by personal communication). Further its surface and deep-water bodies are of different hydro structure, the upper layer being rather thin and limited to about max. 100 -150 metres³, with certainly enough heat for an active cyclone towards the end of December.

At the time the earth quake struck, i.e. on the night of 27 December 1939 at 02 o'clock, there was a low pressure (995mb) over the Southern Ukraine, and another low pressure (1,005mb) at the Bulgarian/Greek/Turkish triangle, that moved south over the Aegean Sea during the next 24 hours. Meanwhile the low pressure over Ukraine moved into the southern Black Sea (off the city of Sinop/Turkey), halfway between Bulgaria and Georgia. The previous high-pressure centre was still in place ca. 600 kilometres away in Eastern Anatolia. At this short distance the air pressure difference of at least 35 mb, generated strong winds that brought hardship to Turkey with cold, wind, snow and floods. It would also certainly have contributed to the sudden cold and snow further west in Yugoslavia and Italy during the last days of the year. The low-pressure cyclone disappeared within the next 24 hours, while the high pressure over Eastern Anatolia stabilised (29 December) over a short period. On 31st December a number of low-pressure centres prevailed in the Black Sea area, (Aegean Sea, 1,000mb; Southern Black Sea, 1,005mb; Sea of Azov/Rostov, 1,000mb)⁴.

Recent research

Recently A.C. Yalciner⁵; “The Source Mechanism of 1939 Black Sea Tsunami” (2004), described the movement of the tsunami as follows:

The sea receded 50m, and then advanced 20m near Fatsa town. The sea also receded 50-60 m in Giresun, moreover in Ordu, the eyewitnesses at the harbor observed that the sea initially was calm, then receded about 15 m and returned to its original position in 5-10 minutes. The tsunami crossed the Black Sea and was recorded on tide-gauges in Soviet harbors with a height of 50 cm in Sevastopol and Novorossiysk, and 40 cm in Tuapse. The intensity of this tsunami can be considered as intensity III-V according to the new tsunami intensity scale of Papadopoulos and Imamura, 2001. Since the epicenter of the earthquake was far from the sea, the source mechanism of this tsunami is uncertain. The wave might have originated either directly

⁴ Seewarte

⁵ Yalciner

from rupture, or from the secondary fault in the Black sea, or from a submarine landslide triggered by the earthquake.

Summary

Taking into account events listed below, it is quite obvious that the quake on 27th December 1939 had a devastating meteorological effect for Turkey and the region, extending temporarily up to Italy. On the other hand, there is hardly any indication that the quake and the tsunami that were followed by a substantial low pressure in the Black Sea region had any influence on the Northern and Central European weather processing conditions. This part was clearly influenced by other forces that had already been prevalent when the Turkish quake occurred. But it should be noted that, at a very early time of the winter season plenty of cold air could travel easily from Asia to the south-western flank of Europe, which presumably contributed to the cold spell in the Danube river countries on 22nd December, although the cyclone (970mb) over the Gulf of Bothnia/ North Finland too could have assisted this event.

The tsunami of 27th December may have contributed, though in a small measure, to the wider regional conditions leading to the severe war winter of 1939/40. The freezing of the sea near Odessa in early January is within the average. Certain extreme situations (e.g. stormy conditions in late February) can be attributed to the unusual weather conditions in Central and Northern Europe during January and February 1940.

Chronicle

6 December 1939; Severe earthquake, probably in Central America. (NYT, 6 December 1939).

22 December 1939; Early morning hours; a low pressure (965mb) over the Gulf of Bothnia/ North Finland, and a high pressure over Western Rumania (1,035mb) control the weather in Northern and Central Europe⁶.

22 December 1939; A very severe snowstorm brought shipping in the Black Sea and lower Danube river to a standstill on Thursday (21 December). At the coast the temperatures dropped to 15°C below zero. The storm in Bucharest caused considerable damage. (Hamburger Anzeiger, 23/24 December 1939). Snow also fell all over Bulgaria on December 21-22, starting a new cold weather episode (down to -16°C); on December 24th in Northern Bulgaria -20°C; December 25th until the earth quake in Turkey on

⁶ Seewarte

⁷ Seewarte

27th more moderate temperature below zero, showing no specific weather anomalies, (according to the Bulgarian newspaper 'Zora'; by personal communication).

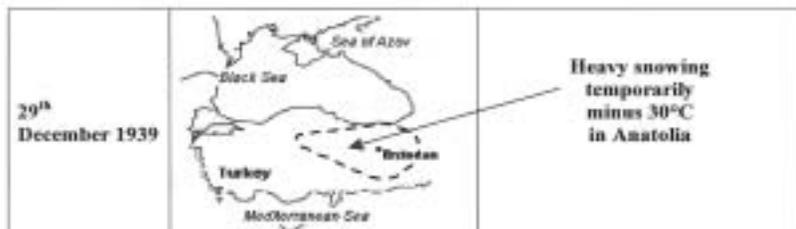
24-27 December; Baltic countries temperatures: In the Eastern parts of the Baltic countries (Russian West border) the temperatures fell to minus 17°C from 24th to 25th, and below 20°C one day later, extending to the Baltic coast, with minus 14°C in Klaipeda and minus 17°C in Gdynia (Bight) on 27th December 08-00 O'clock⁷.

28 December 1939; 6,000 die in Turkey as quakes are felt around the world. Successive aftershocks take heavy toll of life and property in Anatolia regions. Los Angeles Area shaken. Central America is affected – London seismograph broken due to severity of tremors. (NYT, 28 December 1939). "Three additional tremors, subzero weather (minus 17°C) and blizzard winds, .." - "Temperatures 22 degrees below zero (minus 30°C) and strong winds from the Black Sea claimed many victims..." (NYT, 29 December 1939).

28 December 1939; Tremors registered in California (116 miles south of Berkeley) South Africa, Italy. (NYT 29 December 1939).

28 December 1939; In New York record cold of 11.9° F; Four inches of snow reported in parts of State; Storms throughout the East. (NYT, 28 December 1939).

28 December 1939; Pope to visit the Italian King Victor Emmanuel today, for the first time since 1870, (NYT, 28 December 1939), see next: "28 December 1939".



28 December 1939; Rome. "A cold dreary rain did nothing to dim the brilliance of the ceremony that began shortly before 10 o'clock." - "...to see the Pope at all in such a weather." (NYT, 29 December 1939).

29 December 1939; "10,000 soldiers with shovels, had cut through mountainous drifts of snow" - "The continued cold – as low as 22 degrees

below zero Fahrenheit – seemed to be the greatest threat.” (NYT, 30 December 1939).

29 December 1939; Temperatures in Turkey temporarily minus 30°C. Casualties in the Erzingan’s region about 42,000. (Neue Zürcher Zeitung, 29 December 1939).

29 December 1939; Ice closes Danube to German supplies; Rail traffic expected to be hampered by snow (NYT, 30 December 1939) “Cold winds have been blowing recently westwards from Russia, and the constantly low temperature in the river valley indicates a general freeze will set in soon.” (NYT, ditto).

29 December 1939; From Agram in Yugoslavia minus temperatures of 32°C are reported. (Neue Zürcher Zeitung, 31 December 1939).

30 December 1939; Turkey: New quakes add to toll in Turkey. Many more villages reported destroyed – Relief efforts hampered. Floods in West Anatolia. Erzingan’s casualties in quake at 42,000 – Allied and other Governments speed aid. (NYT, 31 December 1939).

30 December 1939; “In Naples region today an unprecedented severe snow storm...”. Rome’s heaviest snowfall in recorded history - six inches - made the Romans feel as New Yorkers did in the 1888 blizzard. There had been nothing closer to this since the snowfall for three days from December 16 to 18, 1846”. (NYT, 31 December 1939) .

30 December 1939; Cold wave over the Riviera. Genoa rapid fall of temperature, extensive snowstorm. Trieste reports heavy winter storms. Malians had –10°C. (Neue Zürcher Zeitung, 31 December 1939).

1 January 1940; “Turkish people suffered a third natural disaster today, following earthquake and floods, when terrific storms swept the Black Sea. Huge waves were dashing against Anatolian shores, and it was feared that many ships were floundered.” (NYT, 2 January 1940).

2 January 1940; Floods in Turkey affect quake relief. (NYT, 2 January 1940).

3 January 1940; More Turks killed as flood spreads. “Earthquakes, floods and bitter cold continue in many sections of Turkey.” - “The flood zone in European Turkey, near Adrianople, was still large but as rain moderated the rise was checked”. (NYT, 3 January 1940).

3 January 1940; New quake in Turkey levels ten villages. (NYT, 4 January 1940).

11 January 1940; Sea freezing near Odessa. Very low temperatures over the Black Sea. Rumania caught in minus 33°C, (according to the Bulgarian newspaper ‘Zora’; by personal communication).

13 January 1940; The Balkan suffered from the effect of subnormal temperatures today with Northern Rumania the hardest hit, reporting eleven deaths by freezing. The temperatures fell to 25.6 degrees below zero Fahrenheit (-31.5°C) in Northern Rumania, and many villages in the Dobruja were snowbound. (NYT, 14 January 1940).

13 January 1940; Yugoslavia was the least affected of the Balkan countries, but at Belgrade heavy snow upset train schedules. (NYT, 14 January 1940).

13 January 1940; The mercury fell to 7.6 degrees below zero in Budapest (-22°C), but was rising. The Danube River, frozen over farther south, remained open here, but ice floes made navigation dangerous. (NYT, 14 January 1940).

Further climate conditions in late 1939:

- Concerning North and Central Europe, (Winter 1939-40, 2_11);
- Cyclones pushing south towards the Mediterranean Sea, (Violent weather, 2_52);
- Sea ice conditions in the North Sea, (North Sea cooling, 2_16);
- Weather and war conditions in Finland, (Russian-Finnish war, 2_41).