

**Data from investigation on seismic Sea waves events
in the Eastern Mediterranean from 1500 to 1800 A.D.**

Part 4

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1. INTRODUCTION

Tsunamis from 1500-1800 A.D., in the Eastern Mediterranean Sea between 31-44 N and 18-36 E excluding the Black Sea and the Italian coasts of the Adriatic Sea is the object of the present paper.

2. DESCRIPTION OF EVENTS

1. *1508 May 29. South Coasts of Crete ($m=iii-$), north coasts ($m=iii$).*

(G C: $35\frac{1}{2}$ N — $25\frac{1}{2}$ E, I=X)

Ref: Various MSS in 38 and 52

It is true that on that date, an earthquake happened in Crete, particularly in Heracleion. However, in the A. Galanopoulos Catalogue (1961), from which the data about the earthquake were taken, no reference whatever is made to the seismic sea wave.

From several manuscripts (Bibliography 38-52), however, it seems very likely that the earthquake was followed by sea waves.

2. *1509 September 14. Constantinople (Istanbul), (m=iii—).*
Ref: 35, 9, 33, 12, (p. 538), 30, 5.

In the middle of September 1509 a catastrophic earthquake occurred in the Hellespont which devastated Constantinople, Gallipoli and many other towns, in particular these situated on the European coasts of the Sea of Marmara. In Constantinople thousands of houses collapsed together with a large portion of the walls. The aqueduct of the city and many public buildings were also destroyed. Large portions of some towns on the coast sunk into the ground and many houses were engulfed in chasms which the shock opened into the ground. Tschorum is said to be one of the towns which perished in this manner.

With the first shock the sea rushed inland, over the walls and flooded the streets in the city as well as many settlements outside the walls. The district of Galatas was heavily damaged by the sea-wave which in this part of Constantinople caused a great number of casualties.

These events are described in some detail by many writers (1). From the earlier narrations it appears that the shock was not of any exceptional magnitude. The church of St. Sophia lost only some of its recent plaster while many byzantine buildings suffered practically no damage. It was the down-town residential quarters that collapsed and the walls by the shore which by themselves were unstable structures. It seems also probable that the sea inundated the city where the walls were thrown down by the shock, and that in no other part of the coast the wave caused any concern.

3. *1534. Coasts of Israel. Jaffa (m=iii).*
Ref: 58 (p. 193).

Not found in contemporary writers.

(1) Hammer (1936). Hammer (1928). Knolles (1503). Anonymous (1699).

4. *1546 January 14. Coasts of Israel and Lebanon. From Gaza to Jaffa (m=iii+).*

(G C: $38\frac{1}{2}$ N — $26\frac{1}{2}$ E, I=VII).

Bernhertz on the authority of Fincellius (Wunderzeychen, vol. 2, p. 221) and Zacharias Rivander (1581). We have not been able to consult these references. A wave is also mentioned by Hoff (p. 255), Techner, and Braslafski.

5. *1612 AD. November 8. North Coasts of Crete (m=v—).*

(G C: $35\frac{1}{2}$ N — $25\frac{1}{2}$ E, I=VIII).

Ref: 12 (p. 555), 52 (p. 488), *Meroure de France Paris. (1612, Nr. 1, Suppl.)*.

During the last three weeks of November 1612 a large number of rather strong earthquakes occurred in the Mediterranean. One of them occurred between November 9 and 13th in Crete and caused considerable damage. It is said that during this earthquake a large number of ships and sailing vessels were either thrown on land or sunk at sea (1). Although it is not mentioned that this was the result of a sea-wave, it seems very probable that this earthquake was followed by a seismic sea-wave.

The earthquake data have been obtained from A. Galanopoulos Catalogue (1960, p. 25). He refers that according to H. Sieberg (1932 a) the earthquake was followed by seismic sea-wave.

6. *1622 May 5. Ionian Island. Zante.*

(G C: $37\frac{1}{2}$ N — 21 E, I=X).

Ref: 27.

A. Galanopoulos (1961, p. 11) mentions that according to A. Sieberg (1932 a) the earthquake occurred at 5 of May in the area of Ionian islands was accompanied by a seismic sea wave.

Sieberg using Barbiani (1863) as evidence, mentions an earth-

(1) *Mercure Francais* (Supplem. 1, p. 2, 1612). Raulin (1960, p. 426).

quake in Zante and a seismic sea-wave at the Ayos Sostis promontory on May 5, 1622. Barbiani mentions an earthquake in Zante on that date, but we have been unable to find information about a sea-wave, either in this author or in other known authors of that period (Gallicioli, 1795).

7. *1629 March 9. Islands of Cythera and Crete (m=iii?).*
 (G C: 36 N — 25 E, I=VII).
 Ref: *Various MSS in 38 (p. 104-5), 52 (p. 488).*

Information about this event is derived from various manuscripts (Bibliography 38 and 52). A. Galanopoulos, in his Catalogue (1961, p. 11) on the authority of H. Sieberg (1932 a), refers to the creation of Tsunami during this earthquake. He defines the geographical co-ordinates of the epicenter and its force, but he fixes a date 10 days before, that is February 27, 1629.

8. *1633 November 5. Zante, South Coasts (m=iii—) on the promontory of Agios Sostis.*
 (G C: 37½ N — 21 E, I=X).
 Ref: 13, 16, 11, (p. 14).

From Bonito (1691) we learn that on November 5, 1633, a destructive earthquake occurred in the island of Zante. The shock he says, was felt as far as in Verona and Mantova (1). Bonito says:

« ...on the 5th of November 1633 a fierce earthquake shook Zante. Many house collapsed and many people perished. The promontory of Saint Sostis subsides, mountains were thrown down and in many places the ground opened up and fire was ejected from chasms. The sea rose and with a great force surged the land and caused damage... ».

(1) Magnati (1688) mentions an earthquake of great violence in the Adriatic Sea which was felt also in Mantova in November 5, 1633. He doubtless alludes to the earthquake in Zante.

Similar descriptions of the November 5, 1633 (1), earthquake in Zante we found in Coronelli (1762) and Riccioli (1771). It appears that as a result of the earthquake, part of the cliffs of the promontory of St. Sostis on the south coast of the island collapsed into the sea and formed a small islet. This most probably, set up the sea-waves which Bonito and Riccioli describe.

9. 1646 April 5. Constantinople (Istanbul), ($m=iii$).

Ref: 36, 5, 32 (p. 110).

In Pinar's earthquake catalogue, we find an earthquake which occurred in Constantinople on April 1646. As a result of the shock 136 ships, we are informed, were thrown on land. This event we also find in Huot (1837) who adds that the earthquake shock itself was not severe. Nevertheless, the sea rushed inland so violently that 136 sailing ships were cast on shore.

The original source of information seems to be a letter of Dr. Vivoli, to which unfortunately we have not had access.

It is quite clear that what Huot describes is the result of a seismic sea-wave which it is of interest to notice that in this case was caused by a rather mild shock.

From Malle (1858) we learn that on April 5, 1646, an earthquake occurred also in Italy. Magri (1647) says that this earthquake caused much damage in Livorno where sea-waves damaged the ships at anchor in the harbour of the town. Mallet regards these two earthquakes to have occurred simultaneously on the 5th of April 1646. On the basis of the available information on these two events it is difficult to appreciate this coincidence. If Mallet's view was correct, it is difficult to distinguish whether the event of April in Constantinople was the result of a strong

(1) Sieberg on the authority of Barbiani (1863) dates an earthquake in Zante and a seismic sea-wave on the promontory of St. Sostis on May 5, 1622. Barbiani mentions an earthquake in Zante in this date but not a seismic sea-wave. For the date implied by Sieberg we can find no mention of a seismic sea-wave in that author as well as in any of the authorities of the time consulted. Gallicoli (1795).

sea-wave which was set up by the Livorno earthquake or of a local seismic sea-wave.

10. 1650 AD. October 9. Thera ($m=vi$), West Coasts of Patmos ($H=30$ m), East Coasts ($H=27$ m), Ios ($H=18$ m), Siki- nos ($m=v$), Kea, Crete ($m=iv-$).

(G C: $36\frac{1}{2}$ N — $25\frac{1}{2}$ E, I=VIII).

Ref: 38 (p. 95-100), 52 (p. 489), 17, 20, 55, 56 (p. 426).

At the end of 1650 a submarine outbreak occurred in the Aegean Archipelagos. At a point about 4 miles to the northeast of the island of Thera (Santorini) a volcanic eruption gave rise to a shoal, as a result of which huge waves broke upon the shores of many islands in the Aegean. The eruption lasted three months and it was preceded and followed by severe earthquakes, Fouque (1879), Reck (1936).

In September 14, prior to the eruption and appearance of the shoal, strong earthquakes shook the island of Thera which intermittently continued until the day of the paroxysm on the 29th of the same month at which the shoal emerged. From contemporary accounts (1) we learn that during the period between 14th and 29th of September the sea around the island was much agitated. Big waves were rushing inland from time to time while great rock slices fell in the sea. On the 29th of September, when the shoal made its appearance, a huge wave devastated the island, in many places where the shores were flat invaded the coast for two miles. On the west coast of the island of Patmos the wave reached heights over 100 feet while on the east coast the sea rose to 90 feet, Criticos (1957, p. 112). On the island of Ios the height of the wave was 60 feet and on the island of Sikinos the sea advanced over 300 yards inland. On the island of Kea sailing ships were carried into the interior and many vessels were cast on the shores of Crete.

(1) Manuscript by Constantinos Daponte, dated 1671, Santorini, Naxion Manuscript, no date. Manuscript from the Docheiarian Codex. Sacred Mount Monastery Archives no date. Conf. Ross (1912) p. 166-171.

Smaller waves of local nature followed the earthquakes and the eruption of the first days of December.

It is also interest to notice that although the heigh of the sea-wave near Thera was colossal, it did not propagate very far. A thorough search in the literature of the time shows that although in places at some distance from Thera the eruption was felt and caused some concern, the wave was not felt at all.

It is also of interest to notice that of the eight major eruption (1) of the volcano at Thera since 197 BC, only that of 1650 AD produced a sea-wave which was large enough to be chronicled.

11. 1667 April 6. Dalmatian coasts. Ragusa (Dubrovnik). ($m = iii +$).

Ref: 14 (p. 881), 12 (p. 570), 44 (p. 12), 28 (p. 107, 54 (p. 15).

12. 1667 November 30. Asia Minor. Smyrna ($m = ii$).

(G C: $36\frac{1}{2}$ N — $25\frac{1}{2}$ E, I=IX).

Ref: 12 (p. 572).

1) These eruptions are of 197 BC, 46 AD, 726, 1573, 1650, 1707, 1866 and of 1925. Some writers refer also to 19 AD, 60, 1457 and 1508. The first two of these we have already shown that they are products of erroneous dating of the 46 AD eruption. The event of 1457 was not an eruption but an earthquake shock, which produced a huge rock-slide. It occurred in November 25, 1457, and it is mentioned by Dapper (1670). A similar event occurred in 1508, which, however, Akylas (1925) maintains to had been an eruption, but Dapper classifies as a collapse of a steep face of the island. Conf. Ross (1912) pp. 161-176. For these eruption see: Strabo (lib. 1, par. 57); Seneca (Quest. Natur. lib. ii, par. 26, lib. vi, par. 21); Plutarch (De pyth. Oraculæ, par. 11); Justinianus (lib. 30. par 4); Pliny (Hist. Nat. lib. ii, 202); Eusebius (Chronicon Olymp. 145.2); Dio Cassius (60.29); Avrius Victor (Claudio 41); Orosius (Saxon, lib. vi, par. iv, 4); Cedrinus (p. 197); Theophanes (p. 404); Nicephoros Gregoras (Historiae p. 37); Tournefort (1717) p. 267, vol. 1; Choisal - Gouffier vol. i, p. 24; Nouveaux Memoires des missions de la Companie de Jesus dans le Levant (1715) vol. i, p. 127; Vouros, (1837) Nr. 4, etc.

13. 1672. *Thera (Santorini)*.
(G C: $36\frac{1}{2}$ N — $25\frac{1}{2}$ E, I=IX).
Ref: 27 (p. 13).

A. Galanopoulos (1961, p. 13) refers that according to F. Montandon (1953) the island of Thera (Santorini) which was shaken by an earthquake which was accompanied by a seismic sea-wave.

14. 1672^{*} April. *Islet of Stanchio*.
(G C: 40 N — 26 E, I=VIII).
Ref: *Dresdner Gelehrt Anzeiger, Dresden* (No. 14, 1756), 32, 41, 31, 27.

In *Dresdner, Gelehrt, Anzeiger, Dresden* (No. 141756, p. 13) and *Bibliography* 42 (p. 111), 32 (p. 324) where the sinking of a small island is mentioned, no data were found to prove the creation of sea-waves.

A. Galanopoulos (1961, p. 13) mentions that according to A. Sieberg (1932) and F. Montandon (1953) the earthquake was followed by tsunami.

15. 1688 July 10. *Asia Minor. Smyrna (m=ii)*, 7, 32 (vol. 2, p. 37).
Ref: *Histoire de l'Academie des Sciences, Paris*, (vol. 2, p. 37), 32a, 31 (p. 338).

16. 1723 February 21. *Ionian Islands. Leukas (St. Maura) (m=iii?)*.
(G C: $38\frac{1}{2}$ N — $20\frac{1}{2}$ E, I=IX).

A. Galanopoulos (1961, p. 15) mentions the event on the authority of Tsitselis.

Tsitselis, in « *Cephalinian Melanger* » mentions that during the earthquake of February 18, 1723, sea-waves were also created. According to Partsh, earth tremors started on February 8, but the main tremor occur.

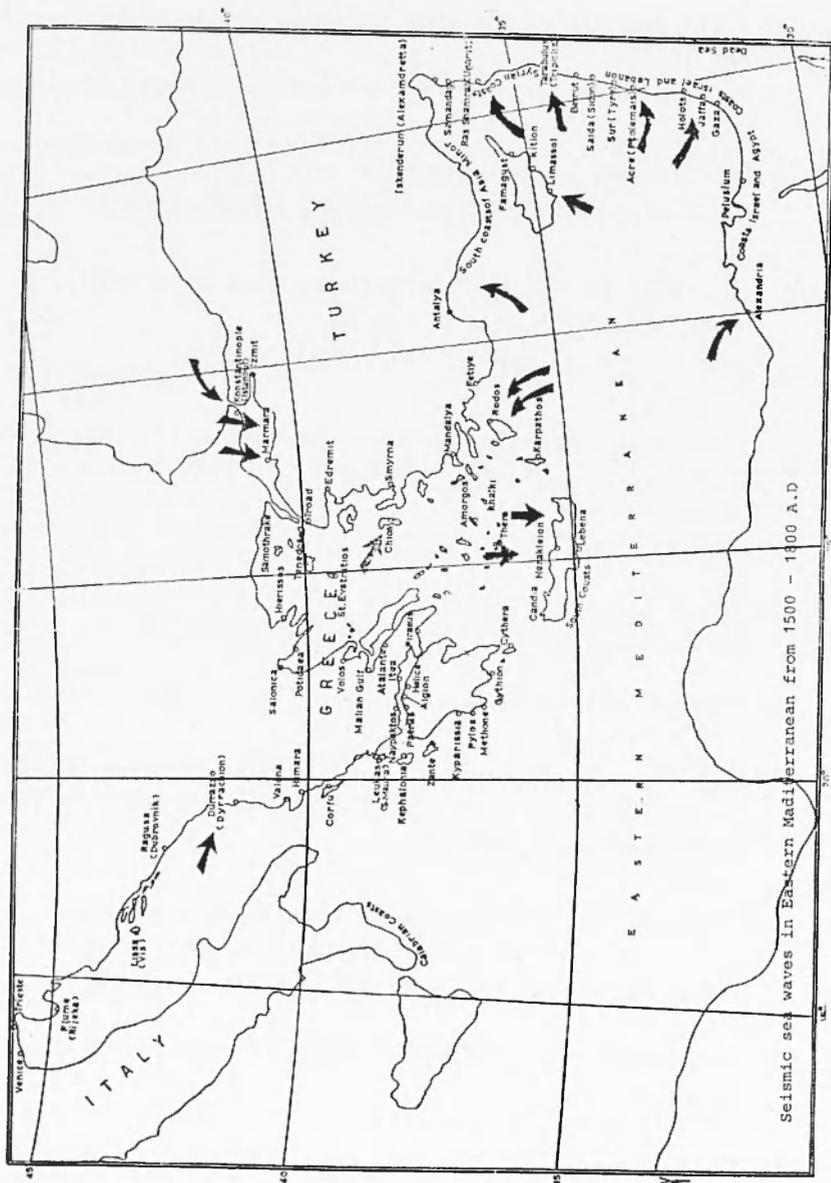
« 1723, February 18. At 2 a.m. an earthquake took place which almost destroyed the houses, and did not stop the whole

night. The sea turned towards the land and went back... » Vol. B, 1960, p. 428.

Barbiani does not mention a seismic sea-wave.

17. 1732. *Ionian Islands. Corfu* ($m=ii$ —).
Ref: 11 (p. 20), *Parnasso, s Athens* (March 1732, p. 549).
18. 1748 May 14. *North Peloponnesus. Aigion* ($m=iii$).
(G C: $38\frac{1}{4}$ N — $22\frac{1}{4}$ E, I=IX).
Ref: *Parnassos, Athens*, (Vol. 14, p. 66), 21.
19. 1750 September 17. *Adriatic Sea. Fiume (Rijeka)* ($m=iv$).
Ref: *Mercure de France, Paris*, (April 1751), 53.
20. 1752 July 21. *Syrian coasts* ($m=iii?$).
Ref: 61.
Sieberg (1932), p. 200. no authority is quoted.
21. 1759 October 30. *Coasts of Israel and Lebanon Acre* ($H=2,50$ m) ($m=iv$ —).
Ref: *Mercure de France, Paris* (December 1759), *Gazette de France, Paris* (March 1st, 8th, 1760), *Mercure de France, Paris* (February 1769).
22. 1766 May 22. *Constantinople. (Istanbul)* ($m=ii$).
Ref: *Gazette de France, Paris* (July 4, 1766), *Journal Historique, Paris* (vol. 7, p. 447), 18, (p. 137), 38 (p. 78).
23. 1791 November 2. *Ionian Islands. Between Zante and the mainland* ($m=iii$ —).
(G C: $37\frac{3}{4}$ N — 21 E, I=IX).
Ref: 37, 11.

Information has been obtained from Mallet (1850-1858), Barbiani D. and Barbiani B. (1864), A. Galanopoulos (1961, p. 18). mentions earthquake but no tsunami.



Seismic sea waves in Eastern Mediterranean from 1500 - 1800 A.D.

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