



Τ.Ε.Ι ΚΡΗΤΗΣ – ΠΑΡΑΡΤΗΜΑ ΧΑΝΙΩΝ

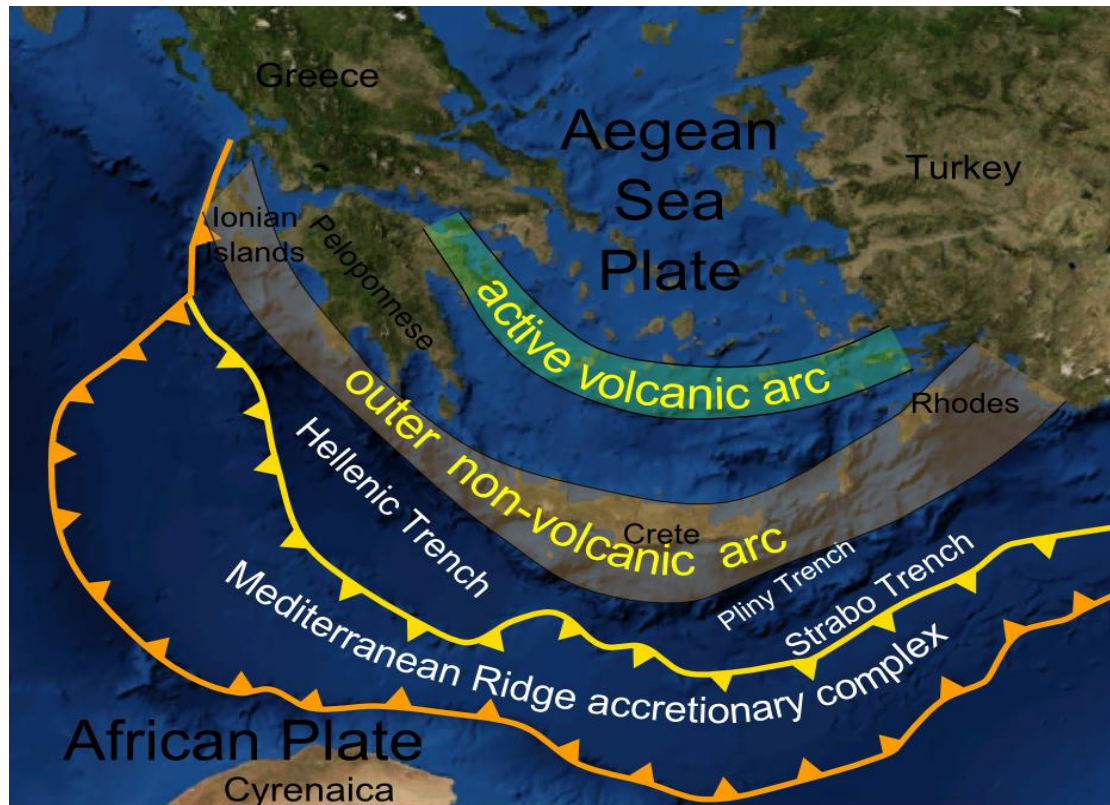
ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ ΦΥΣΙΚΩΝ ΠΟΡΩΝ ΚΑΙ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

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WADATI DIAGRAMS IN THE FRONT OF THE HELLENIC ARC

ΔΙΑΓΡΑΜΜΑΤΑ WADATI ΣΤΟ ΜΕΤΩΠΟ ΤΟΥ ΕΛΛΗΝΙΚΟΥ ΤΟΞΟΥ



ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ:

ΚΑΤΣΟΥΛΑΚΗ ΦΑΝΗ 1777

ΠΑΝΤΕΛΗ ΑΓΝΗ 1797

ΕΠΙΒΛΕΠΩΝ ΚΑΘΗΓΗΤΗΣ:

ΒΑΛΛΙΑΝΑΤΟΣ ΦΙΛΙΠΠΟΣ

ΧΑΝΙΑ 2018

ΠΕΡΙΛΗΨΗ

Η παρακάτω εργασία εξετάζει μέσω των διαγραμμάτων Wadati, τη σεισμικότητα στο Ελληνικό Τόξο και πιο συγκεκριμένα γύρω από το νησί της Κρήτης. Για την πραγματοποίηση της πήραμε δεδομένα από 134 σεισμούς που έλαβαν χώρα από τον Ιανουάριο του 2011 ως τον Δεκέμβριο του 2016. Αρχικά κάναμε μια ιστορική ανασκόπηση και έπειτα μιλήσαμε για το σημερινό γεωτεκτονικό καθεστώς. Στη συνέχεια αναφερθήκαμε στη σεισμικότητα του Αιγαίου, τη θεωρία των λιθοσφαιρικών πλακών, τα ρήγματα και την τάση παραμόρφωσης. Μετά μιλήσαμε πιο αναλυτικά για την ζώνη Benioff, τα διαγράμματα Wadati και το λόγο του Poisson. Τέλος, παραθέσαμε τους πίνακες με τα δεδομένα που πήραμε από κάθε σεισμό, τα διαγράμματα Wadati καθώς και τα συμπεράσματα που προκύπτουν από την ανάλυση των αποτελεσμάτων.

ABSTRACT

The following project examines, through the Wadati diagrams, the seismicity at the Hellenic Arc and more specifically around the island of Crete.

In order to realize it we took data from 134 earthquakes which took place from January 2011 until December 2016.

Initially we made a historical review and then we talked about the present geotectonic regime. Next, we reported on the seismicity of the Aegean sea, the theory of the lithospheric plates, the faults and the deformation stresses. After that we talked more detailed about the Benioff zone, the Wadati diagrams and Poisson's ratio.

Finally we listed the charts with the data that we received from every earthquake, the Wadati diagrams as well as the conclusions which came from the analysis of the results.

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CHAPTER 1

HISTORY

For many years, the tectonic development of Crete and the South Aegean sea are considered to be the result of the final Alpine compressive tectonic and the later neotectonic tensile.

It has been proved that the alpine orogen constitutes a combined orogenetic structure that was created in different geological periods. More specifically, during the tertiary period of the final continental crash (Eurasia and Gondwana) the climax of the orogenesis and the elevation of the Alpine ranges were created. At this stage, the Oceanic crust of Tythios, which was crushed by the two continents, disappeared. Finally, the Mediterranean sea was formed, and after that the African plate sank under the European one and as a result the Hellenic curvature was created.

Greece belongs to the Alpine system and more specifically to the south branch of the orogenetic system of Tythios, which was located between Eurasia and Gondwana. The Hellenic curvature is the only part from the whole system of Tythios, where the orogenesis continues to take place until this moment and which has all the geodynamic characteristics of a developing orogenetic arc. After the end of the alpine tectoro-genetic action, the neotectonic action began, which formed the final shape of the Hellenic territory.

PRESENT GEOTECTONIC REGIME

The Hellenic arc (Aegean arc), as it was referred before, is the creation of a combination of phenomena which were the results of the convergence of the lithospheric plates of Europe and Africa. From the geophysical researches which took place in the Mediterranean Sea it has been realized that in specific areas the thickness of the crust is very thin (10-20 km) in contrast to the continental around the Mediterranean areas where the thickness fluctuates from 24 to 50 km. As a result, despite the doubts and arguments, it is generally accepted that there is Oceanic crust in the Mediterranean, especially in the east Mediterranean at the south of Crete, Rhodes and Cyprus (Levadinou Sea).

The main morpho-tectonic elements from which the Hellenic arc consists are:

- The outer arc (outer sedimentary arc) includes the western outer ranges of continental Greece, Crete and Dodecanese.
- The Hellenic peripheral trench which surrounds from the outer (curved part) the sedimentary arc, from the Ionian sea to the south of Crete and Rhodes and constitutes a system of deep underwater immersion (depths 2000-5000 m).
- The volcanic arc of the Aegean, which is located in the inner part and is constituted by the active pleo- quaternary volcanoes of Santorin, Milos, Nisiros, Methana, Krommionia, Lichades, Kos, Patmos, Antiparos and Psathoura. Those volcanoes are connected with the immersion and melting of the African plate at depths of about 150 km, behind the frontal convergence of the plates.

- The back-arc basin which is created by the tension trends behind the arc and especially behind the prism enhancement. In the Hellenic area it is mainly identified with the Cretan sea.
- The Mediterranean ridge which constitutes a sub water elevation of the crust and which crosses Eastern Mediterranean in the south of the Hellenic peripheral trench, parallel to the Hellenic arc.

SEISMICITY OF THE AEGEAN SEA

The insular area of the Aegean sea as well as the seafront areas of Greece around it (and of western Turkey) constitute one of the most seismic regions on Earth with a intense and fast deformation. As a result, this fact leads to the formation of a great number of faults.

Recent researches have shown that earthquakes in the area of the Aegean and the surrounding areas are due to:

- a) compressional powers which are pulled on the limits of this region by three neighboring lithospheric plates as they move. And
- b) tensile forces which are pulled inside the lithosphere of this area and are created by causes located inside or in the bottom of the lithosphere of the Aegean.

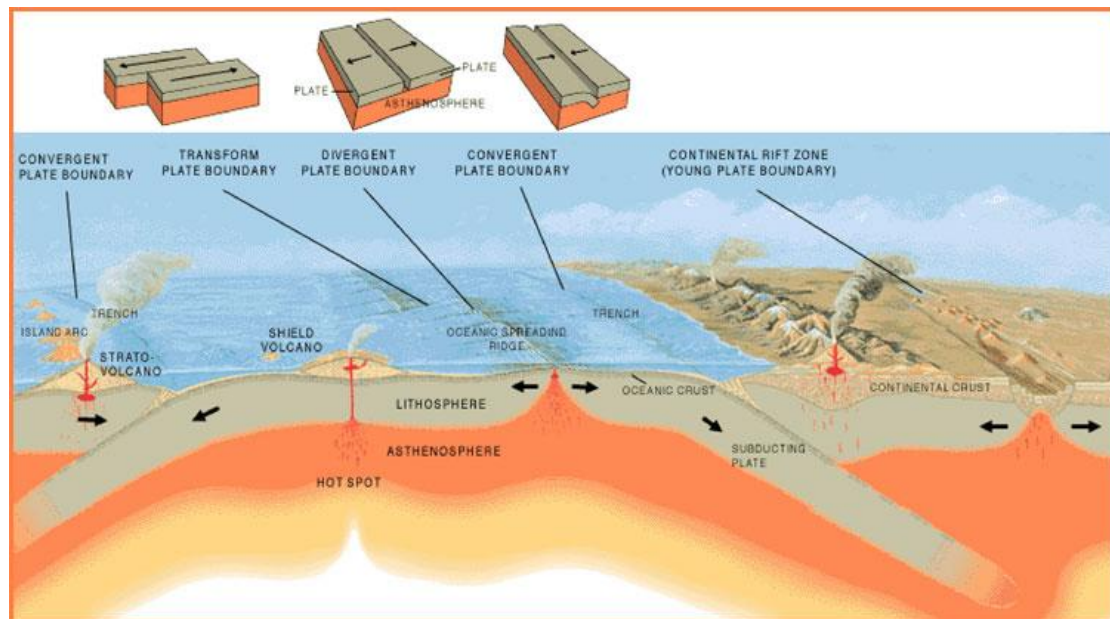
THEORY OF LITHOSPHERIC PLATES

In 1914, Alfred Wegener formulated the theory of movement of the lithospheric plates which was accepted by Harry Hess on the bases of seismic and geophysical data which proved that the power that moves the lithospheric plates comes from the movements of the material of the upper mantle.

The movements that the lithospheric plates conduct are:

- A divergent boundary. This movement takes place when two tectonic plates move away from each other. Along the rift earthquakes happen frequently and magma spurts from beneath the rift and rises from the mantle. It fills the gap and it becomes solid rock. New crust is formed on the edges of the plates. This magma becomes solid and is transformed into basalt which is located under the bottom of the ocean. In this way the oceanic crust, made of basalt, is created at divergent boundaries.
- A convergent boundary. This movement happens when two plate come together. The edges of one or both plates buckle from the collision and form a rugged mountain range. When this happens, one plate bends the other down into a trench deep in the sea floor. Parallel to the boundary, a chain of volcanoes is often formed both to the mountain range and the trench, and as a result the area is shaken by powerful earthquakes on both sides of the boundary. In case that a colliding plate is covered on its stop with oceanic crust then it is pushed down into the mantle and begins to melt. The other plate is filled with magma which becomes solid and forms a new crust. This magma is solidified into granite and is the material which creates the continents. Therefore, continental crust, which is made of granite, is formed and oceanic crust melts at convergent boundaries.
- A transform plate boundary. In this movement two plates slide past each other. Structures, either natural or human- made that cross a transform boundary split into pieces and direct opposite. On

the line of the boundary rocks grind together and pulverize creating an undersea canyon or a linear fault valley. The plates grind against each other and in this way earthquakes happen over a wide boundary area. Contrary to convergent and divergent boundaries, there is no magma and as a result the crust cracks and breaks but it is neither created nor destroyed.



FAULTS

The surface of the earth has both big and small cracks, the faults, where earthquakes take place regularly. When elastic deformation energy aggregates at a fault, increasing stresses develop inside the rocks. If those stresses surpass the fracture limit of the rock then it breaks.

The faults are distinguished depending on the direction and the trend of the relevant movement on the two sides of the fault.

- Regular fault: when the upper side of an inclined fault slides downwards.
- Inverted fault: when the two convergent forces push the upper side of the inclined fault to slide upwards.
- Horizontal fault: when the fault stretches vertically inside the rock and the sides of the rocks slide horizontally along the fault. (clockwise or anti-clockwise).

DEFORMATION STRESSES

As we have already mentioned at the Hellenic arc as well as the stresses that are created inside the rocks, seismologic studies have proved that at the outer (curved) part of the Hellenic arc, strong convergent trends are exercised. These deformations are mainly inverted faults which are realized inside the sea sediments at the South of Crete and Peloponisos. In contrast, at the whole area inside the Hellenic arc, from Crete to Northern Macedonia and Thrace, the whole Aegean sea and the continental area, convergent stresses are exercised. The convergent stresses have a general direction from North to South

and cause normal faults mainly from East to West. The faults at the trench of the Northern Aegean appear to have strong horizontal component of clockwise direction and are an exception.

BENIOFF

The Benioff zone of the Hellenic arc stretches all over the South and central Aegean. It is roughly divided into three territories:

- A territory which gives surface earthquakes 0-60 km and includes Crete, Rhodes, South Peloponnesus and South Eptanisa.
- A zone which coincides with the volcanic arc and gives earthquakes of about 100 km epicentral depth.
- Finally, a zone which is relative to the South part of the African plate, roughly located in the central Aegean and gives earthquakes of average depth of about 160 km.

From the focus depths and the position of the epicenters of the earthquakes it can be presumed that the African plate submerges in an angle of 15° deg., near Crete, while in the area of the volcanic arc in the central Aegean the curvature reaches 35-38° deg.

Benioff zones are sloped almost flat zones where earthquake activity is high and which is generated by the crash of an oceanic crustal plate going downwards with a continental or Oceanic plate overriding it. These zones take place at subduction zones which are located at boundaries of crustal plates. The dips of the zones usually range from 40 to 60° deg. A slip along the subduction thrust fault or a slip on faults on the plate going downwards can cause earthquakes, which happen as the plate is pulled into the mantle due to extension and bending. The zones are also known as the Wadati-Benioff zone.

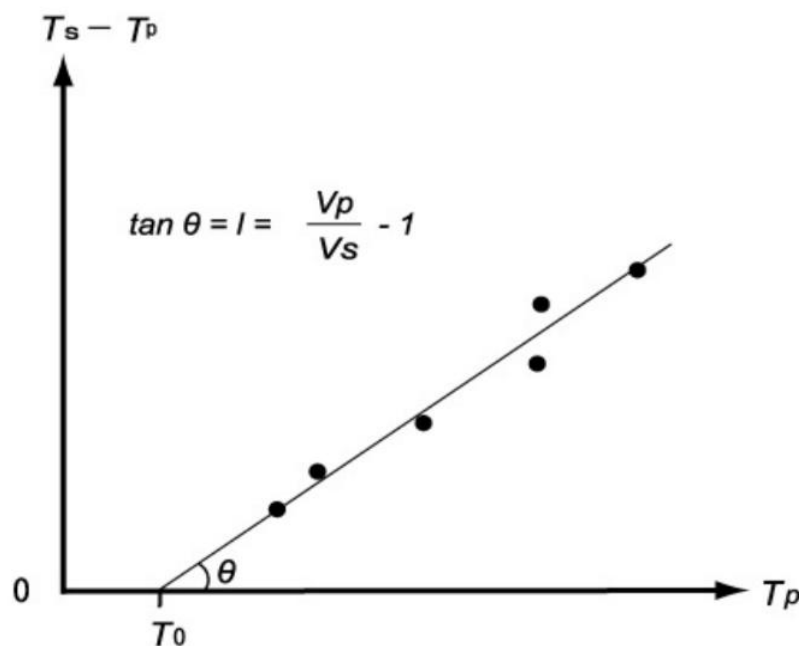
A Wadati–Benioff zone (also Benioff–Wadati zone or Benioff zone or Benioff seismic zone) is a seismic planar zone relative to the plate going downwards in a subduction zone. If along the zone there is differential motion a lot of earthquakes are produced, the epicenter of which can be at depths of about 670 km.

Wadati- Benioff zone earthquakes are produced under continental margins and volcanic island arcs, over active subduction zones. A slip along the subduction thrust fault or a slip on a fault in a plate going downwards can produce such earthquakes, which is the result of bending an extension as the plate is pulled into the mantle. Seismologists can map the three- dimensional surface of a subducting plate of oceanic crust and mantle due to the deep- focus earthquake along the zone.

CHAPTER 2

WADATI – POISSON RATIO

The Wadati diagram is the most common way of analysis for local earthquakes. The observation of an earthquake at a number of stations is the following Wadati diagram.



(l = slope, V_p = Velocity of P waves, V_s = Velocity of S waves)

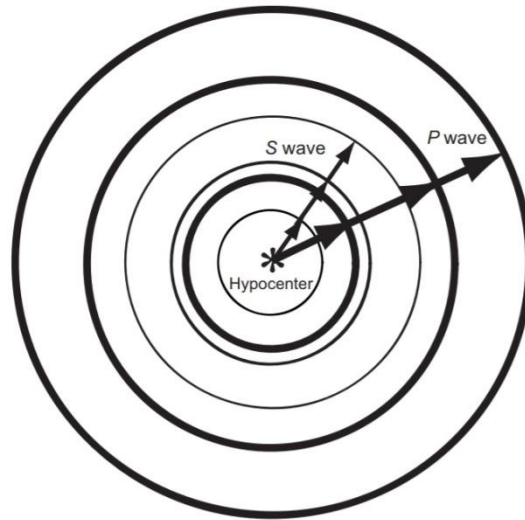
Wadati diagram is used for the following purposes:

- Determining the origin time (T_0) of an earthquake.

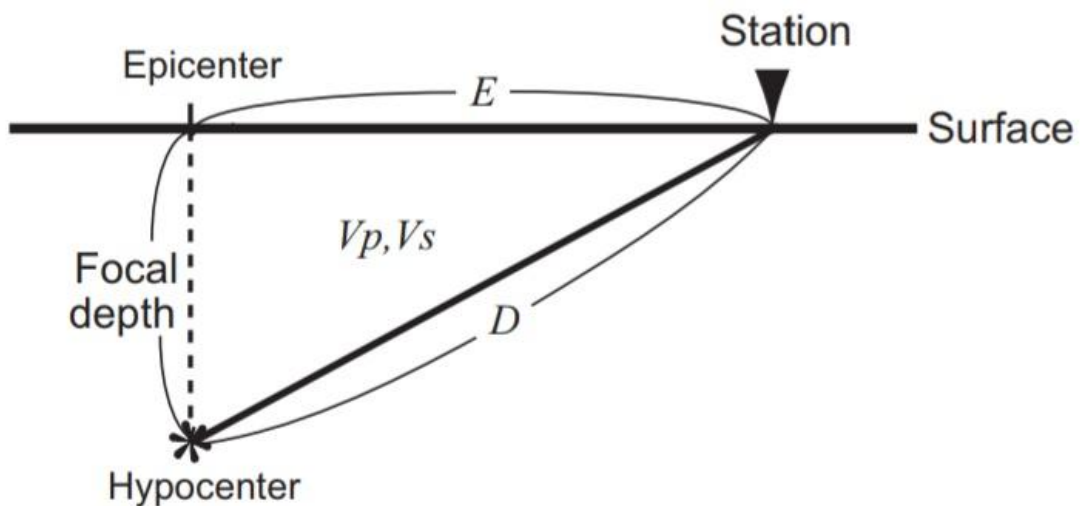
Origintime: The moment of the time when the fissure of the rocks begins at the epicenter along with the transmission of the seismic waves towards all directions.

The point where the P-time axis interceptscan give us the origin time of the earthquake when an S-P time is zero in either way. P waves are 1.7 times faster than S waves. In order to calculate the origin time, we need to use T_p (P wave arrival time) , T_{sp} (S – P time) and l (slope) as following:

$$T_0 = T_p - (T_{sp} / l)$$



- Estimating the hypocentral distance.



We are able to estimate the hypocentral distance by the following equation:

$$D = \frac{V_p}{\frac{V_p}{V_s} - 1} * T_{sp}$$

If we consider that V_p and V_p/V_s are constant, the measures of S-P time give us D with the following equation:

$$k = \frac{V_p}{\frac{V_p}{V_s} - 1} \quad \text{Then} \quad D = k * T_{sp}$$

k : is Oomori coefficient.

Taking into account that almost all earthquakes take place in the upper crust of the Earth where $V_p = 5,7 - 6$ km/s and $V_p/V_s = 1,73$, then k is about 8 . In the case of volcanic regions we know that $V_p = 4$ km/s and $V_p/V_s = 1.8$ km/s, then k is about 5.

- Determining the V_p/V_s ratio

There are a lot of kinds of seismic waves that move in a different pattern. Seismic energy from earthquakes is reflected as body and surface waves.

Body waves: Are longitudinal waves which are transmitted to all the Earth layers, they have greater velocity and frequency than surface waves. There are two types of body waves:

1) Elongated P-waves: They are shock or pressure waves which have greater transmission velocity and as a result they are recorded by the seismometers first. In isotropic and homogenic solids the transmission direction of a P wave is always longitudinal. As a result, the particles in the solid vibrate along the axis of propagation of the wave energy.

α : P wave velocity

λ : first Lamé parameter

μ : second Lamé parameter

ρ : density of the material through which the wave is transmitted.

$$\alpha = \sqrt{\frac{\lambda + 2\mu}{\rho}}$$

2) Transverse S- waves: These are slower but much stronger than the elongated waves. During the transmission of the S waves the points on the rock material vibrate vertically on the direction of the wave transmission and therefore changing the shape of the rocks.

β : S wave velocity

μ : second Lamé parameter

ρ : density of the material through which the wave is transmitted.

$$\beta = \sqrt{\frac{\mu}{\rho}}$$

Surface waves: The waves which are transmitted towards all directions but follow only certain layers of the surface part of the Earth. They have lower frequency and velocity than the body waves and for this reason they are recorded by the seismometers after the body waves.

1) Love waves: They are the first of the surface waves and are transmitted by elastically disfiguring the crust on a horizontal planar, vertically to the direction that they travel to.

2) Rayleigh waves: They are the slowest of all the types of seismic waves but also the most complicated, since they are transmitted surfacely and they move the ground towards every direction.

Poisson Ratio (ν):Is the ratio of transverse contraction strain to longitudinal extension strain in the direction of stretching force. Tensile deformation is considered positive and compressive deformation is considered negative. The definition of Poisson's ratio contains a minus sign so that normal materials have a positive ratio

ν : Poisson ratio

V_p : P- wave velocity

V_s : S- wave velocity

$$\frac{V_p}{V_s} = \sqrt{\frac{2(1-\nu)}{1-2\nu}}$$

- Probing P and S findings

By using the Wadati diagram we can check the quality of the results before we spot its epicenter of the earthquake. The results which are far from the straight line of the Wadati diagram are unreliable and must be reinvestigated.

CHAPTER 3

In order to realize the papers that we have stated below, we visited the websites

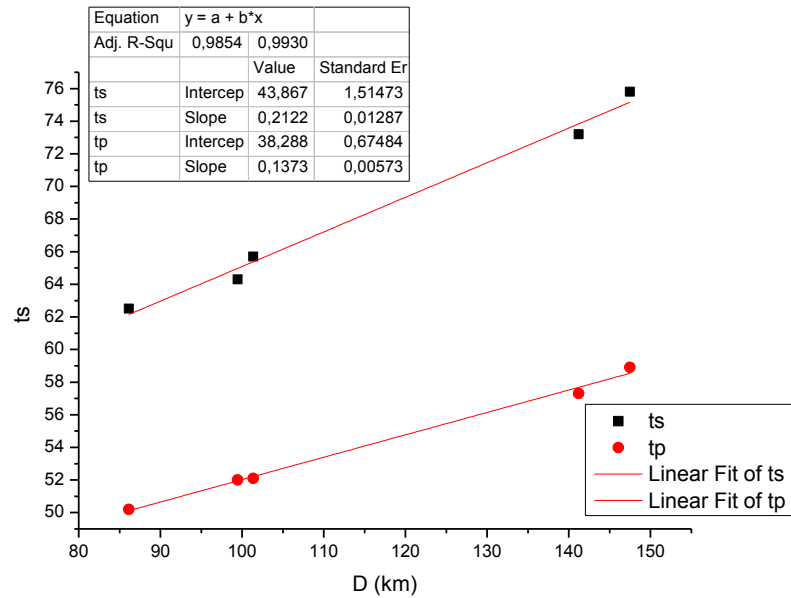
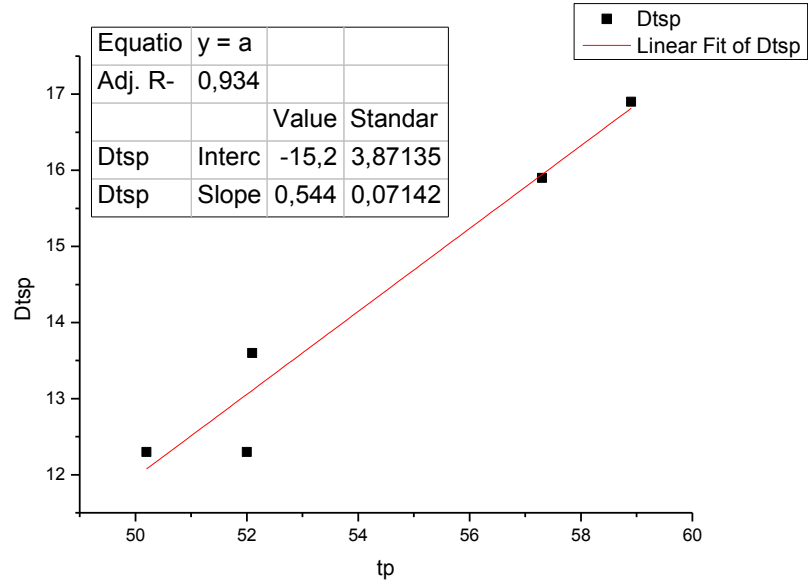
<http://bbnet.gein.noa.gr/HL/databases/database> and <http://geophysics.geo.auth.gr/ss/> so as to gather the data we needed and make a Wadati diagram. We measured the origin times of P (t_p) and S (t_s) waves, the epicentral distance (D_{tsp}), we calculated the hypocentral depths (D) and we designed the Wadati diagrams for earthquakes of 4 – 6.2 Richter from the year 2011 to 2016.

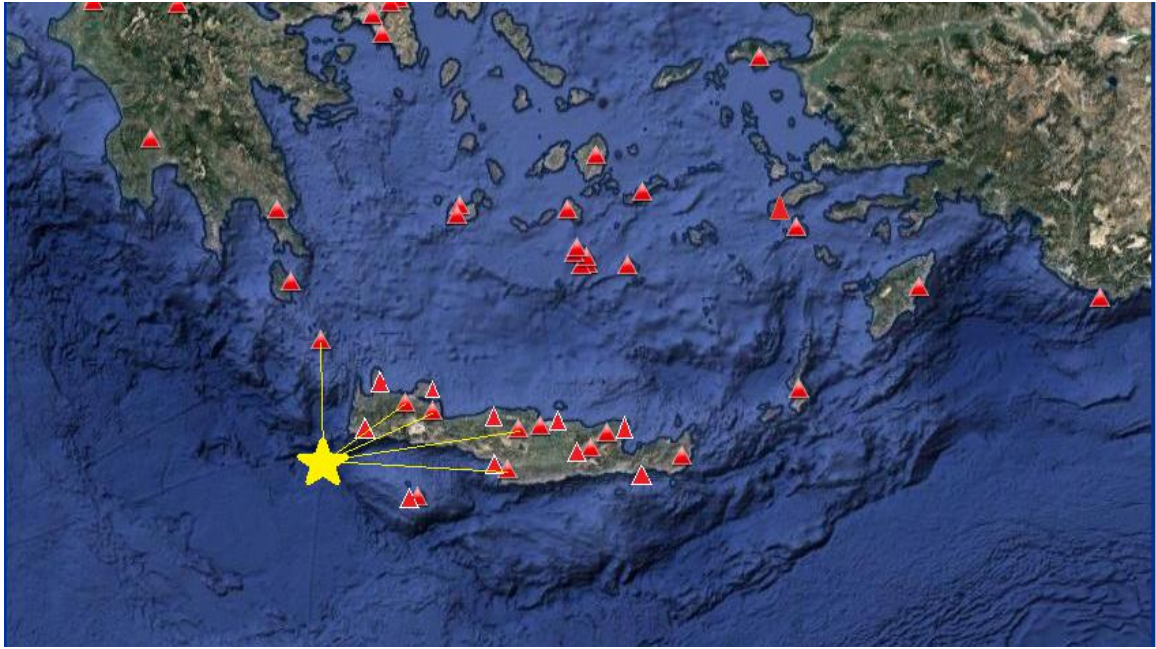
We cited for every earthquake, two Wadati diagrams: One with the surface distance in relation with the t_p times and one with the hypocentral depth in relation to the t_s times. We also designed a map which indicates the seismic epicenter and the stations that we received the data and the measures from.

EARTHQUAKES DURING 2011

8 FEBRUARY 2011 (4.3 ML 4.2 Mw, depth 30.4km)

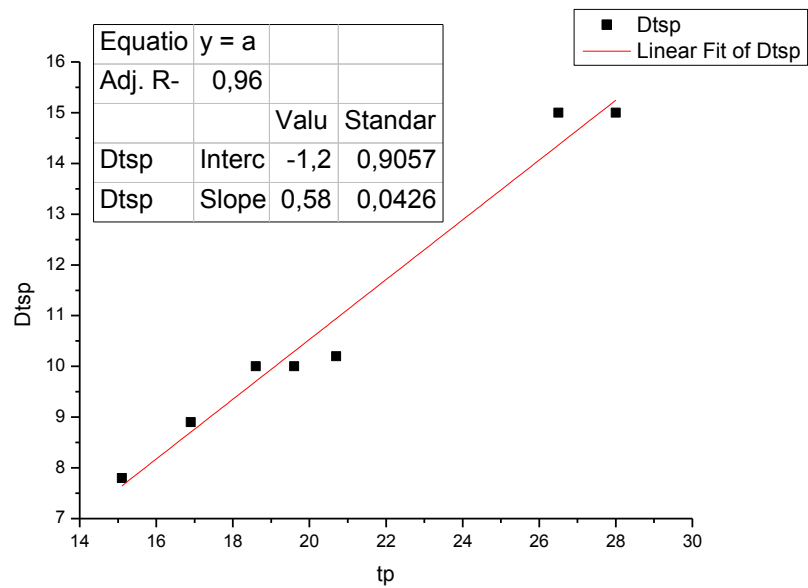
station	ts	Tp	Dtsp	Dop(km)	D(km)
IMMV	62,5	50,2	12,3	80,6	86,14244
VAM	64,3	52	12,3	94,7	99,45979
ANKY	65,7	52,1	13,6	96,7	101,3659
SIVA	73,2	57,3	15,9	137,9	141,2111
IDI	75,8	58,9	16,9	144,3	147,4675

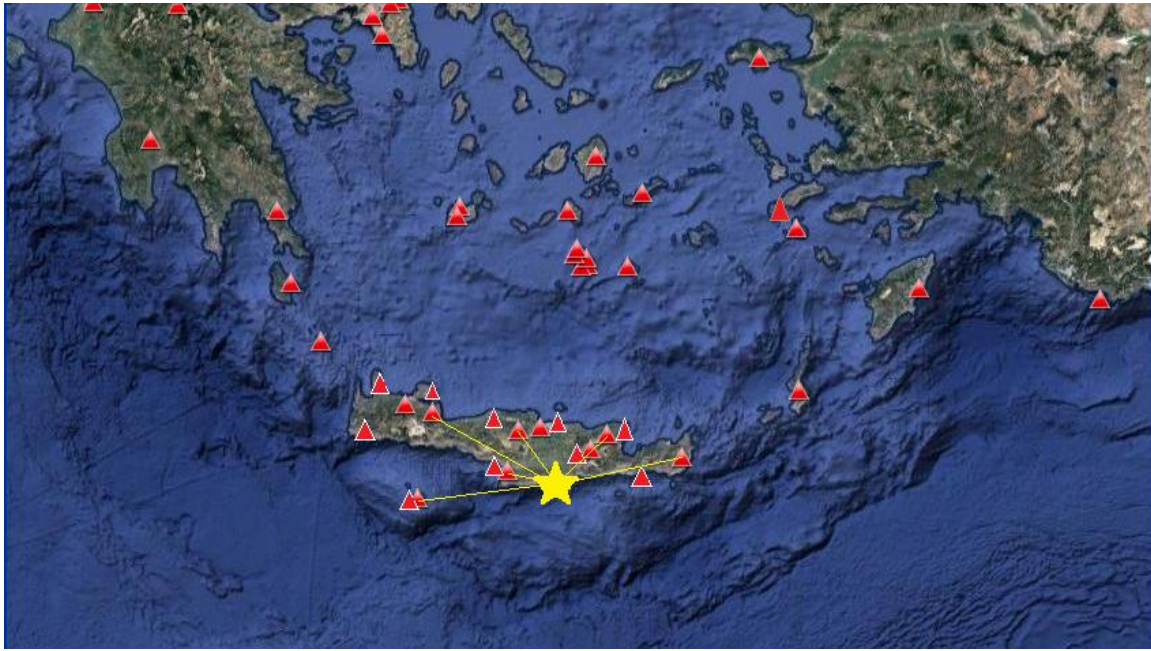
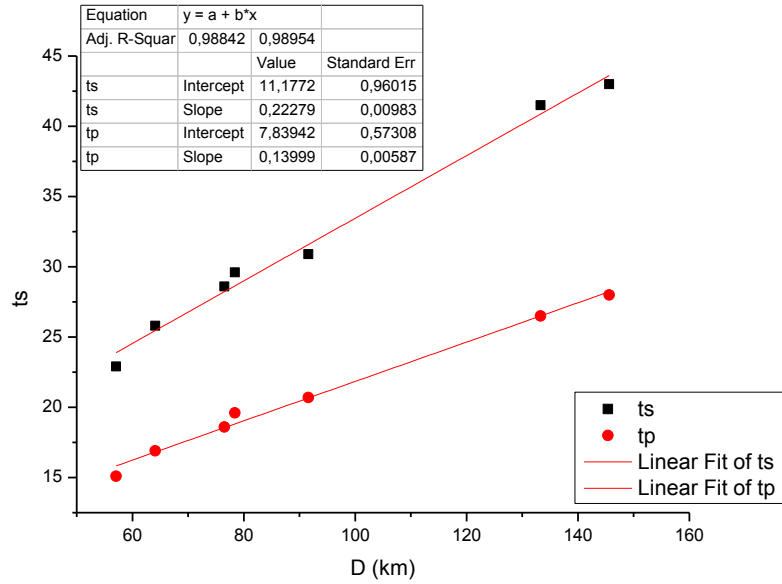




28 FEBRUARY 2011 (5.2 ML 5.2 Mw, depth 53km)

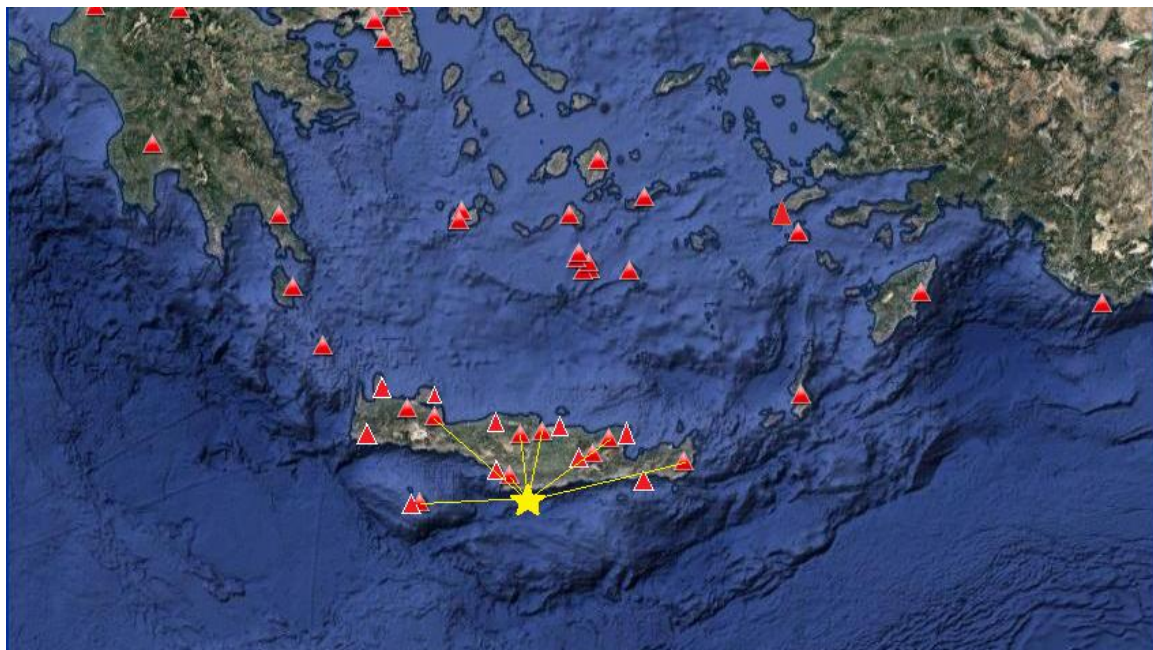
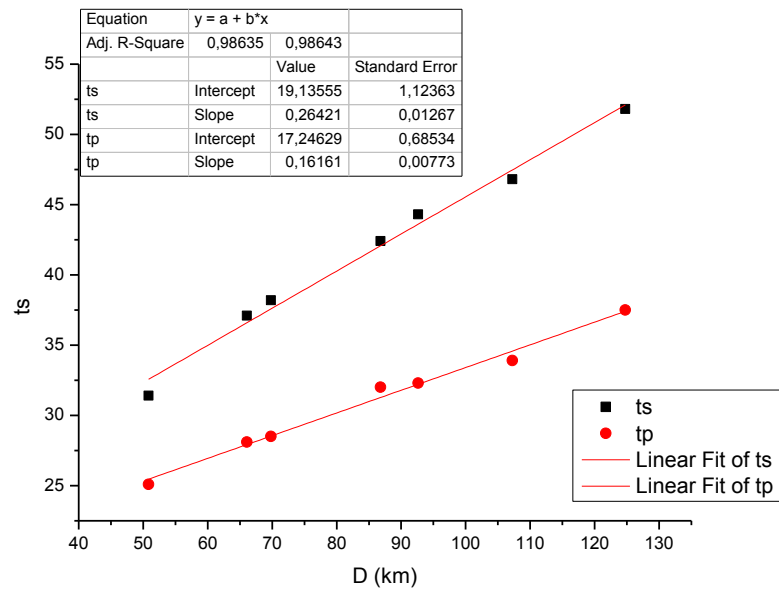
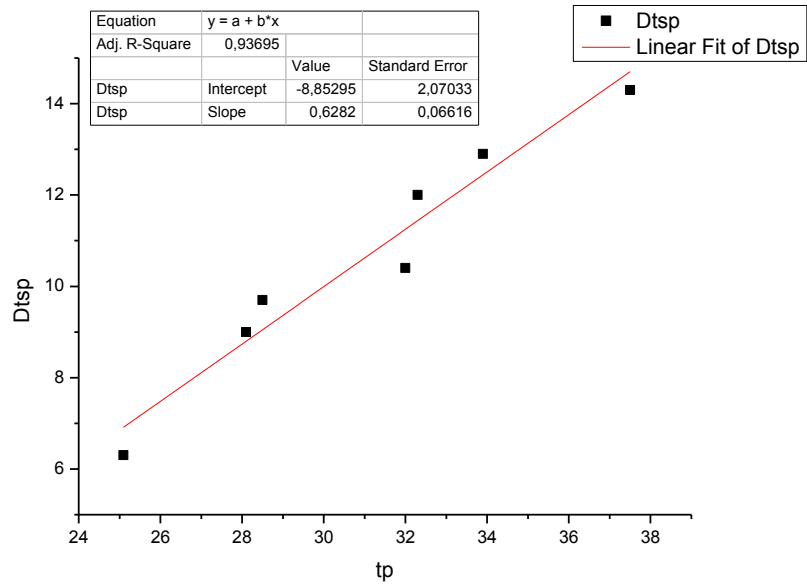
station	ts	Tp	Dtsp	Dop(km)	D(km)
LAST	22,9	15,1	7,8	21,2	57,08275
NPS	25,8	16,9	8,9	36,1	64,12652
SIVA	28,6	18,6	10	55,2	76,52477
IDI	29,6	19,6	10	57,8	78,42092
ZKR	30,9	20,7	10,2	74,7	91,59198
GVD	41,5	26,5	15	122,3	133,2902
VAM	43	28	15	135,6	145,5897





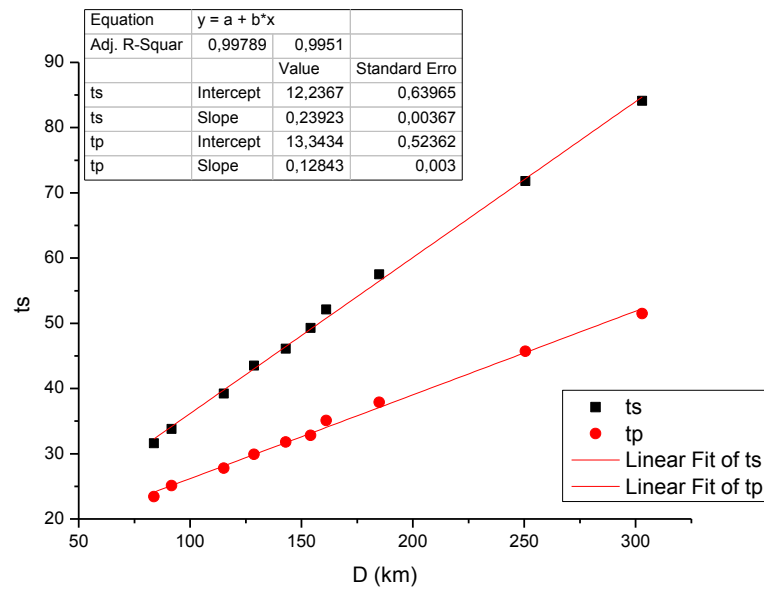
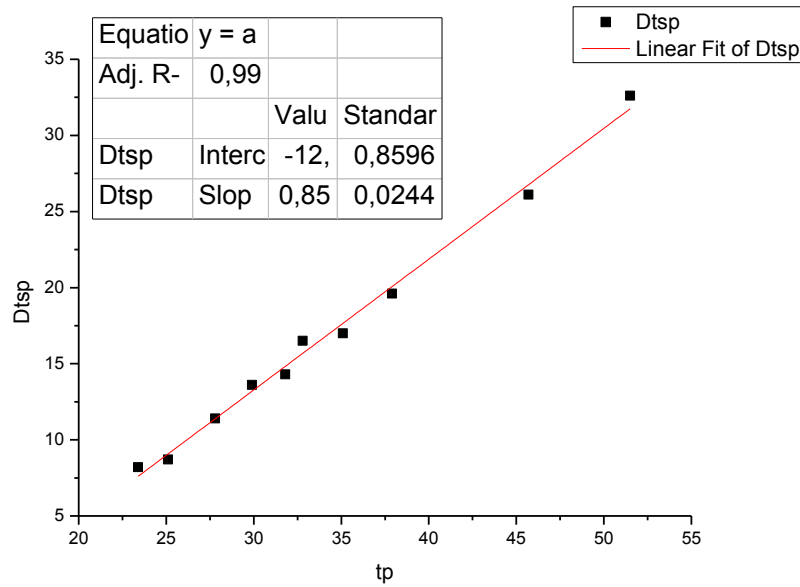
6 MARCH 2011 (4 ML 3.9 Mw, depth 42.5km)

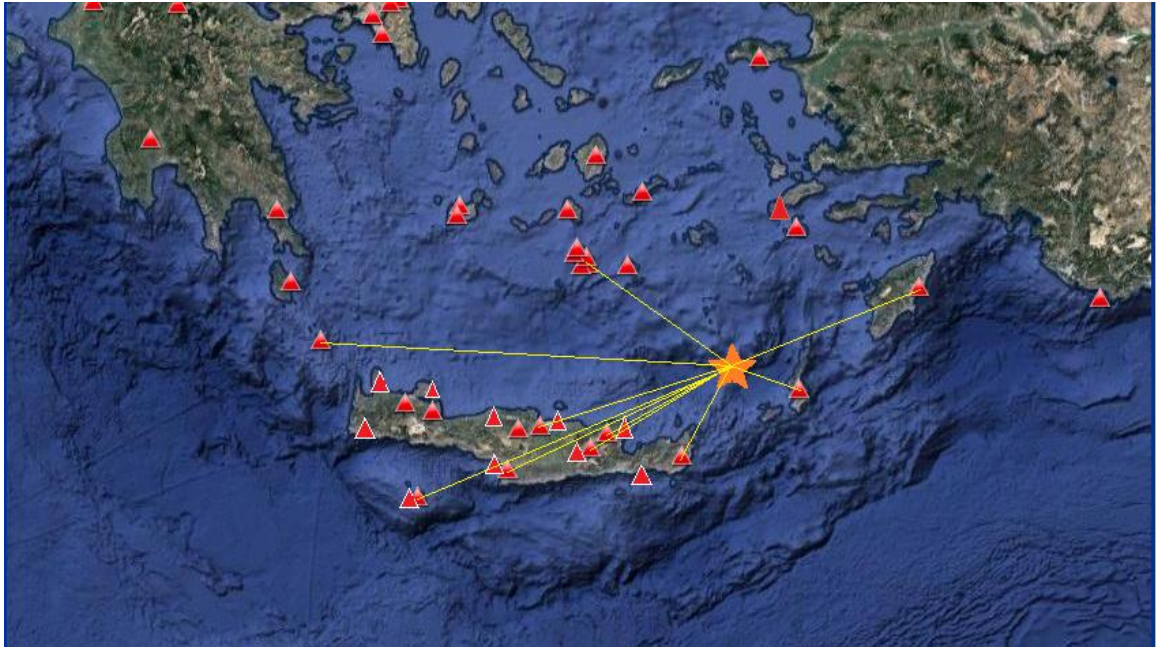
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	31,4	25,1	6,3	27,9	50,83955
IDI	37,1	28,1	9	50,6	66,08033
IACM	38,2	28,5	9,7	55,4	69,82414
NPS	42,4	32	10,4	75,7	86,8144
GVD	44,3	32,3	12	82,3	92,62581
VAM	46,8	33,9	12,9	98,47	107,2501
ZKR	51,8	37,5	14,3	117,3	124,7619



1 APRIL 2011 (6.2 ML 6 Mw, depth 63.1km)

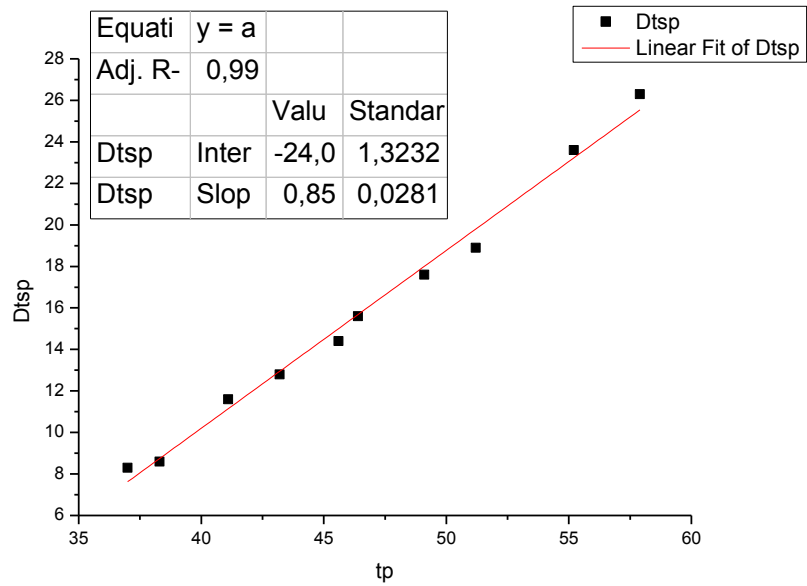
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	31,6	23,4	8,2	55,1	83,77124
ZKR	33,8	25,1	8,7	66,6	91,74514
NPS	39,2	27,8	11,4	96,4	115,2153
LAST	43,5	29,9	13,6	112,2	128,7263
SANT	46,1	31,8	14,3	128,3	142,9773
IACM	49,3	32,8	16,5	140,6	154,1103
ARG	52,1	35,1	17	148,3	161,1661
SIVA	57,5	37,9	19,6	173,8	184,9001
GVD	71,8	45,7	26,1	242,5	250,5751
ANKY	84,1	51,5	32,6	296,3	302,9444

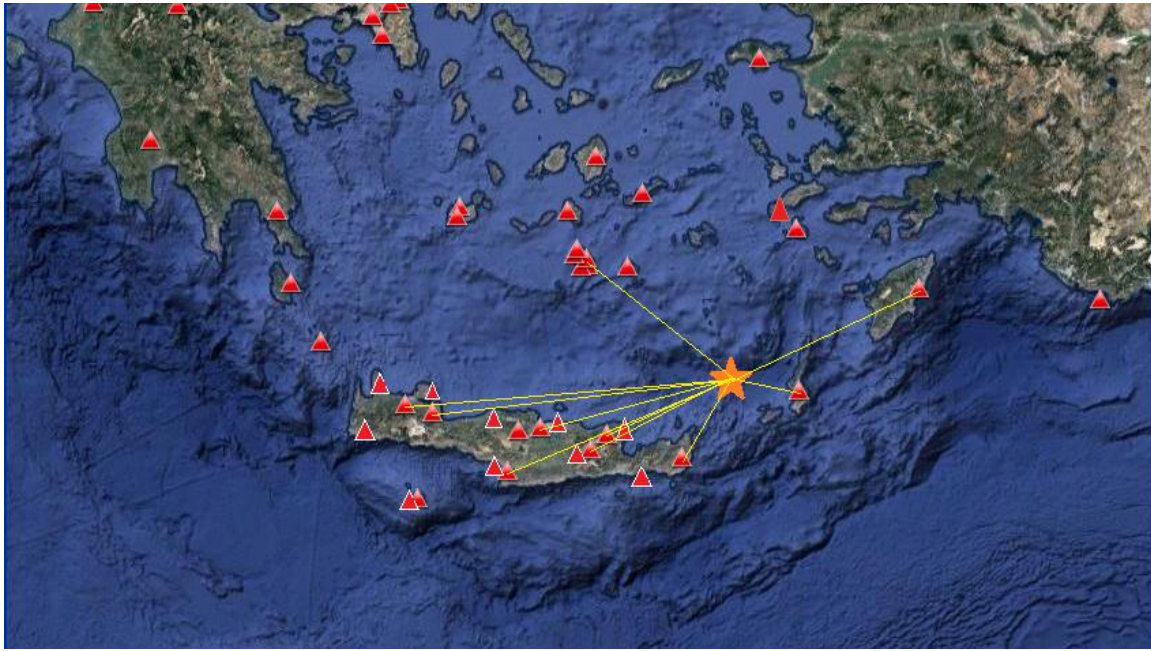
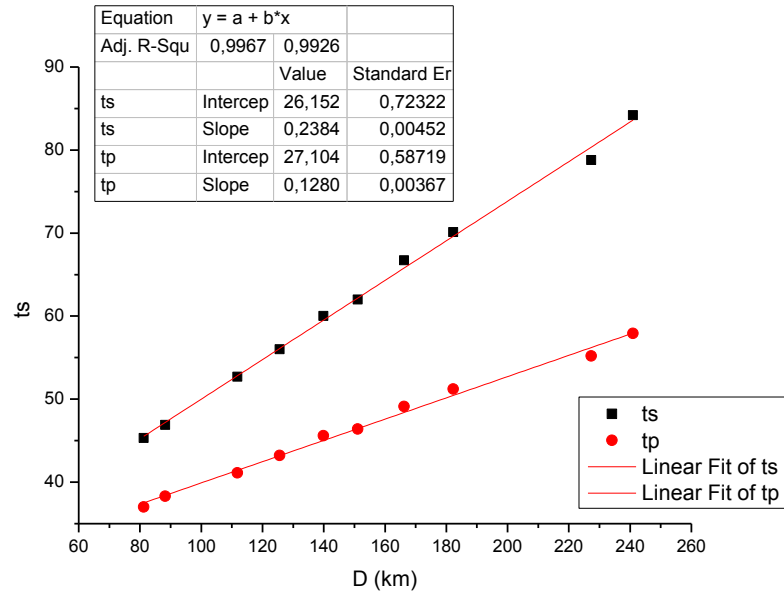




1 APRIL 2011 (4.2ML ,depth 58.4km)

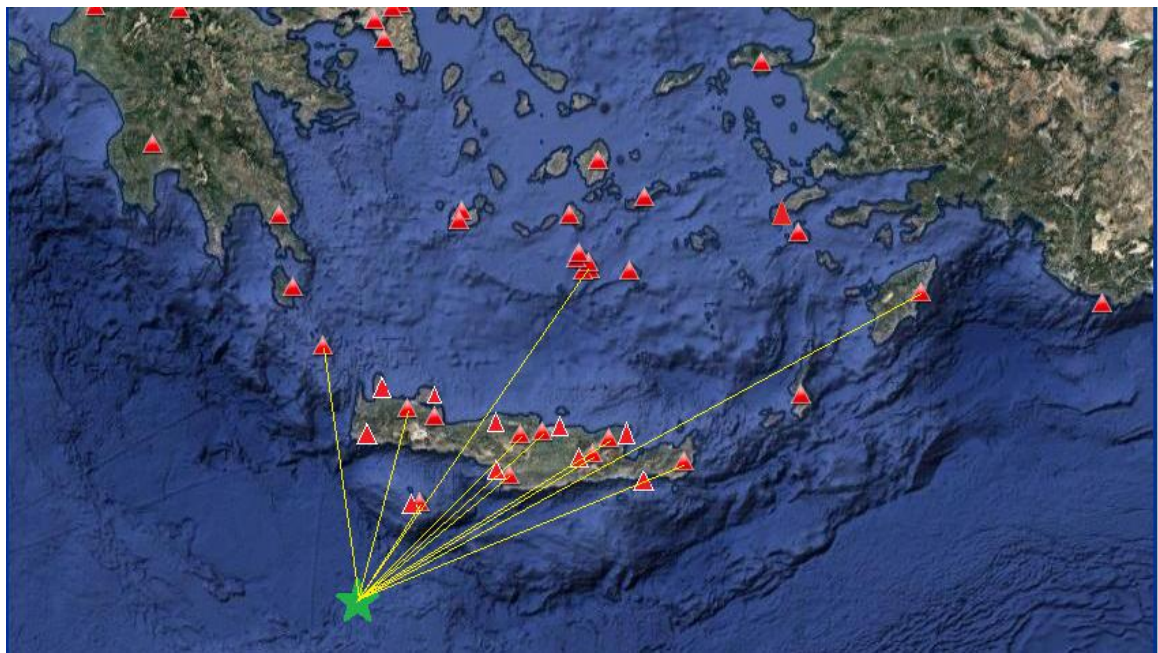
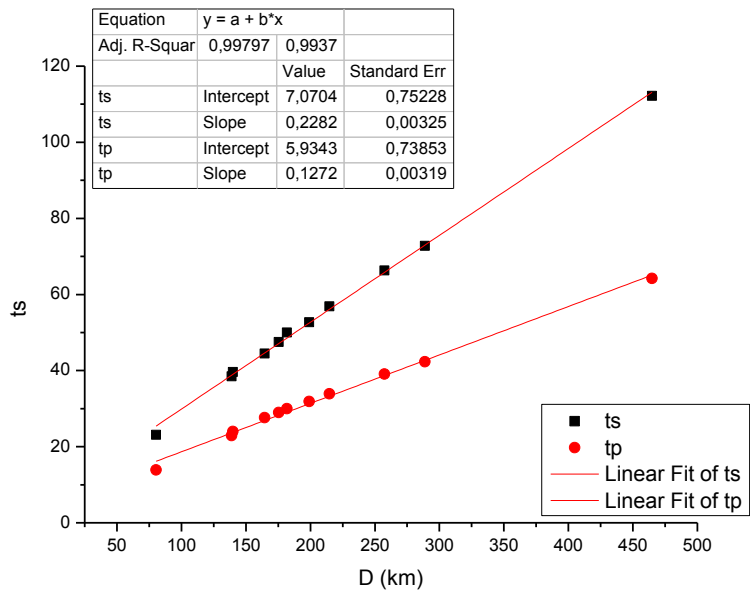
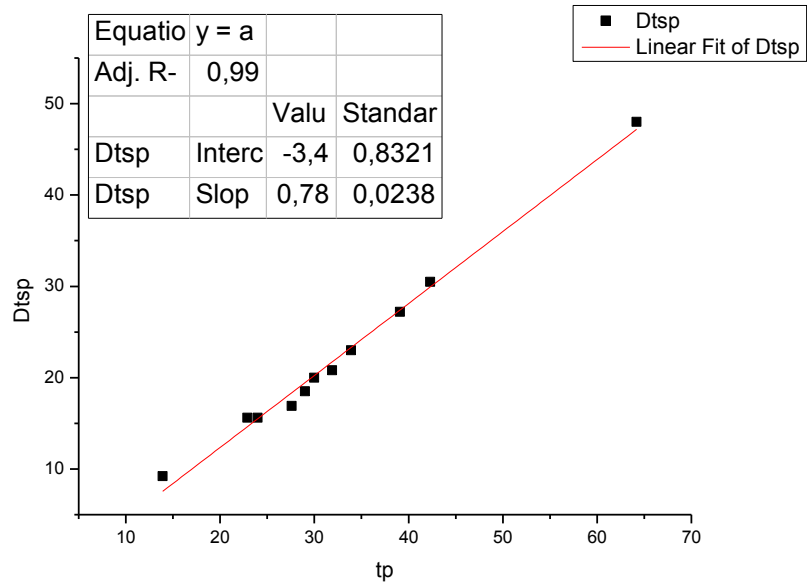
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	45,3	37	8,3	56,5	81,25768
ZKR	46,9	38,3	8,6	66,2	88,27797
NPS	52,7	41,1	11,6	95,4	111,8558
LAST	56	43,2	12,8	111,2	125,6025
SANT	60	45,6	14,4	127,1	139,8748
IACM	62	46,4	15,6	139,4	151,1387
ARG	66,7	49,1	17,6	155,6	166,1984
SIVA	70,1	51,2	18,9	172,7	182,307
VAM	78,8	55,2	23,6	219,7	227,3294
IMMV	84,2	57,9	26,3	233,8	240,9834





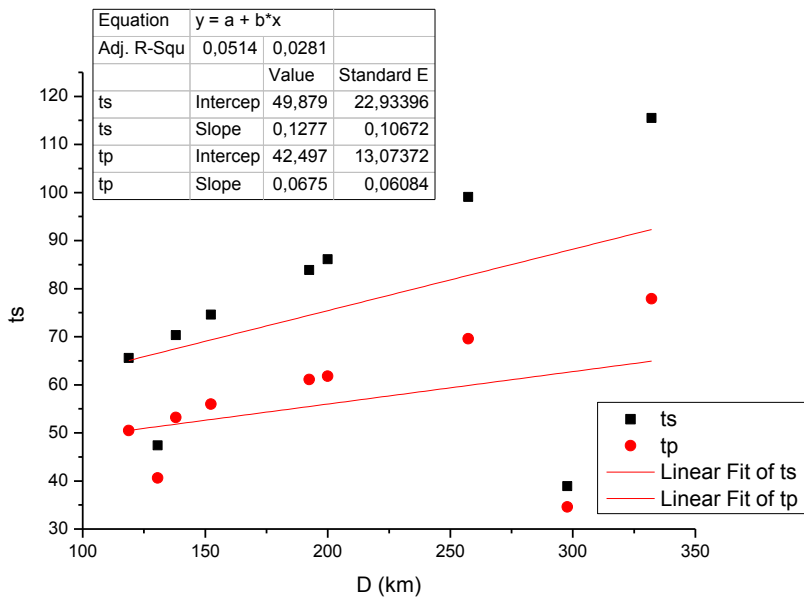
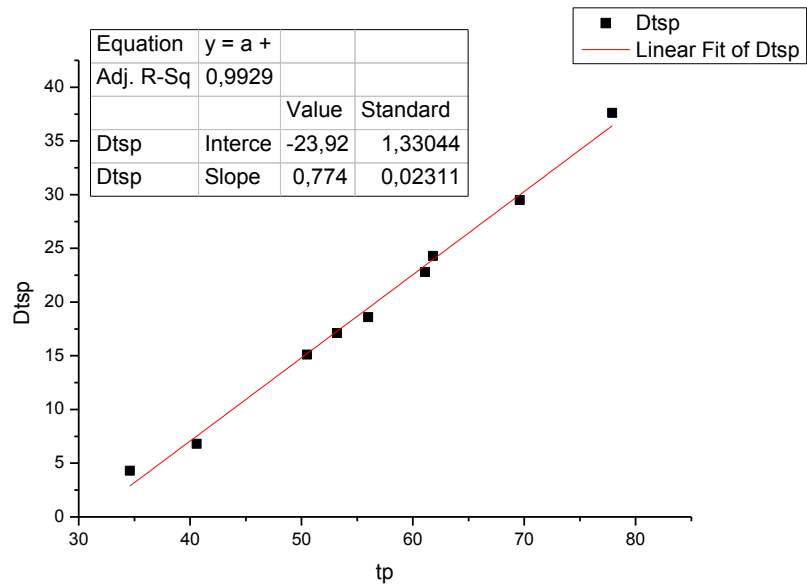
19 MAY 2011 (4.5 ML 5 Mw ,depth 21.9km)

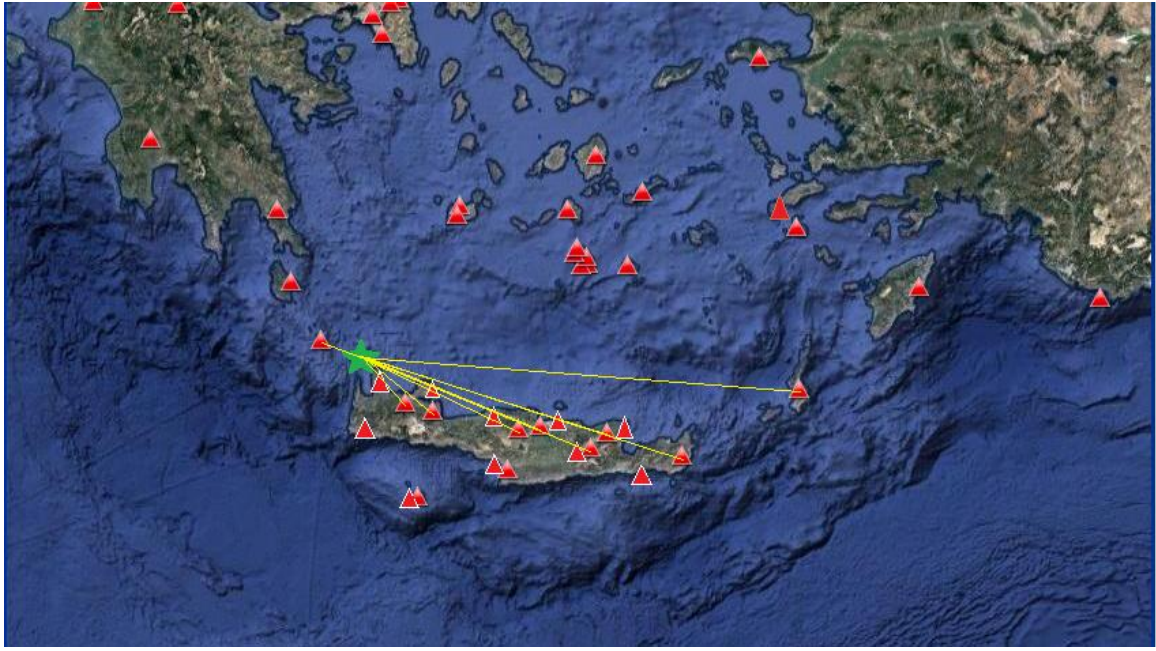
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	23,1	13,9	9,2	77,4	80,43861
IMMV	38,5	22,9	15,6	137,3	139,0356
SIVA	39,6	24	15,6	138,2	139,9244
IDI	44,5	27,6	16,9	163,1	164,5637
IACM	47,5	29	18,5	174,1	175,472
ANKY	50	30	20	180,5	181,8237
LAST	52,7	31,9	20,8	197,8	199,0087
NPS	56,9	33,9	23	213,7	214,8192
ZKR	66,3	39,1	27,2	256,5	257,4332
SANT	72,8	42,3	30,5	288	288,8315
ARG	112,2	64,2	48	464,3	464,8162



27 MAY 2011 (4.6 ML 4.3 Mw, depth 20.6km)

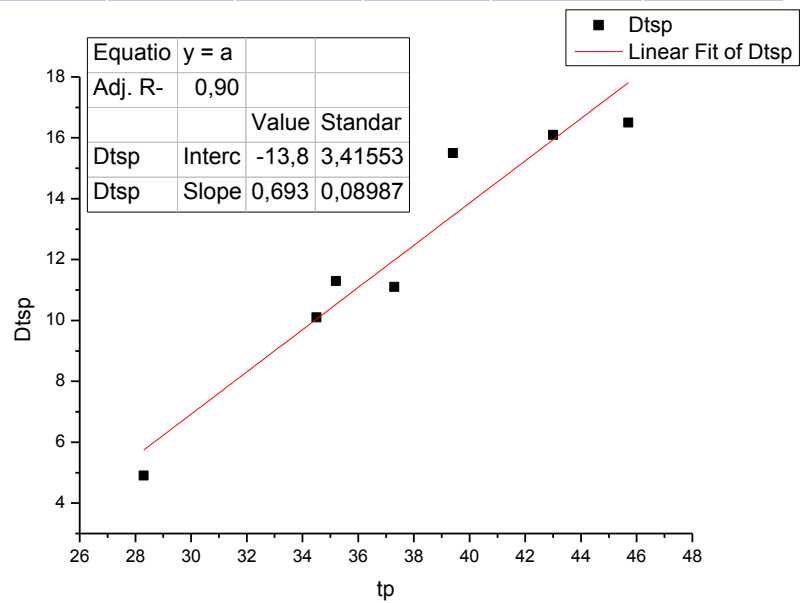
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	38,9	34,6	4,3	297	297,7136
IMMV	47,4	40,6	6,8	129	130,6345
GVD	65,6	50,5	15,1	117	118,7997
IDI	70,3	53,2	17,1	136,5	138,0457
IACM	74,6	56	18,6	150,9	152,2996
LAST	83,9	61,1	22,8	191,3	192,406
NPS	86,1	61,8	24,3	198,9	199,9639
ZKR	99,1	69,6	29,5	256,5	257,3259
KARP	115,5	77,9	37,6	331,5	332,1394

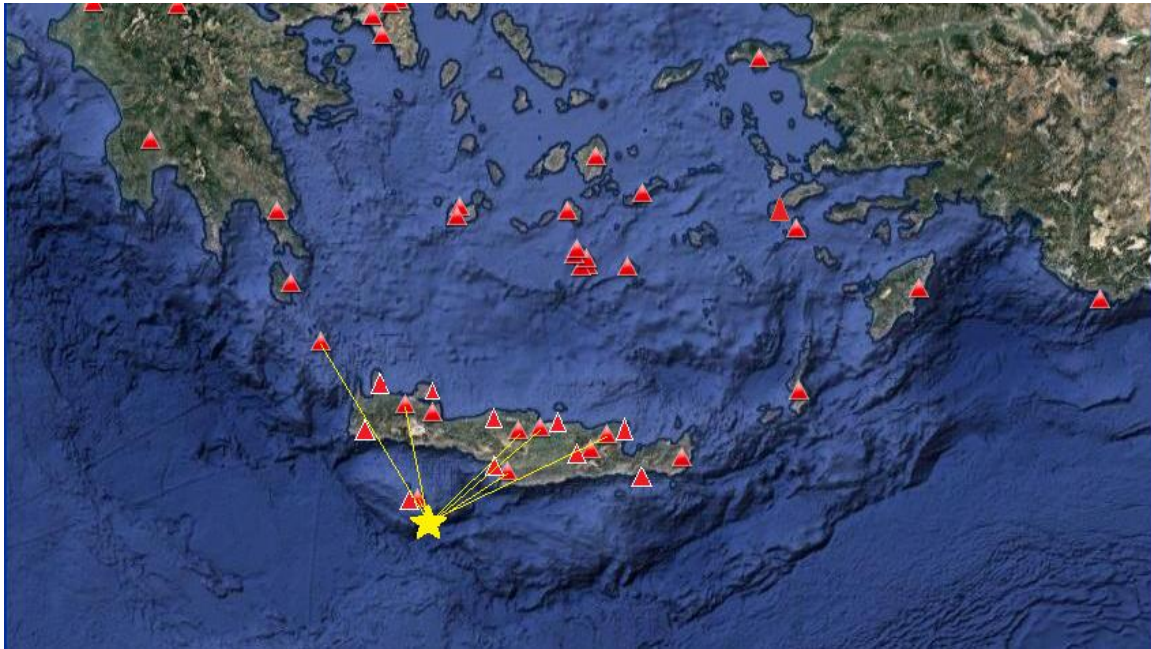
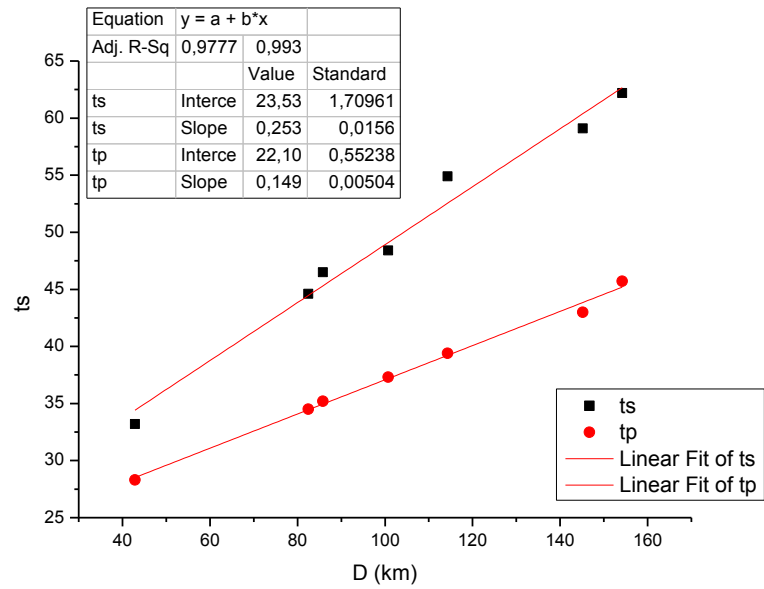




1 JULY 2011 (4.1 ML 4 Mw, depth 42.6km)

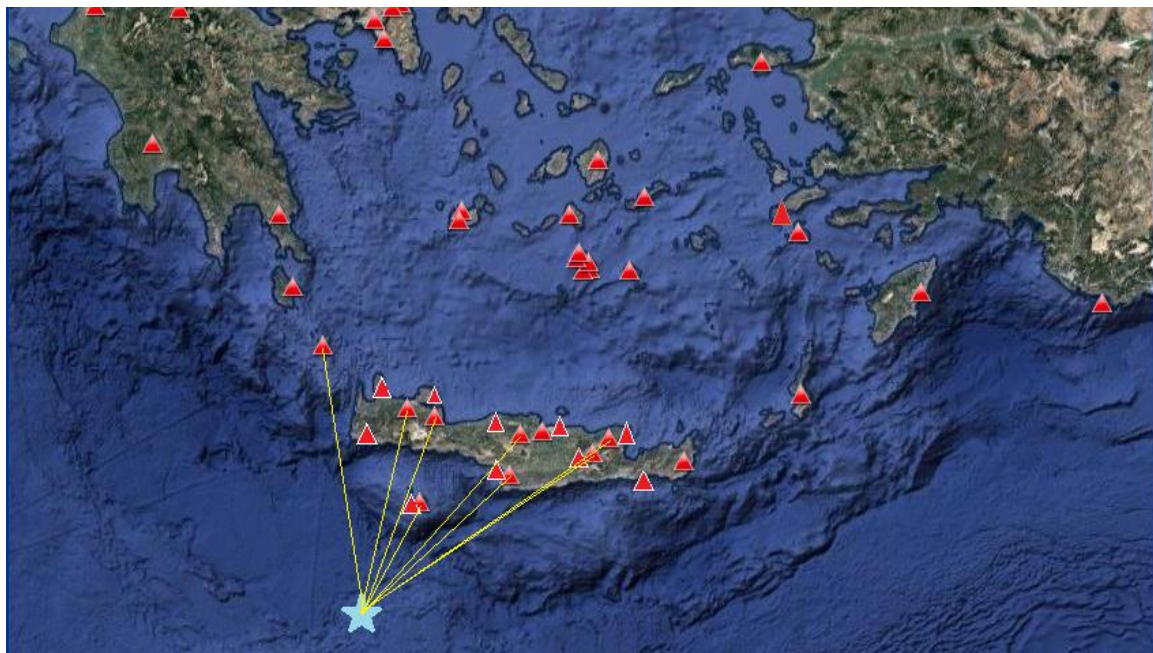
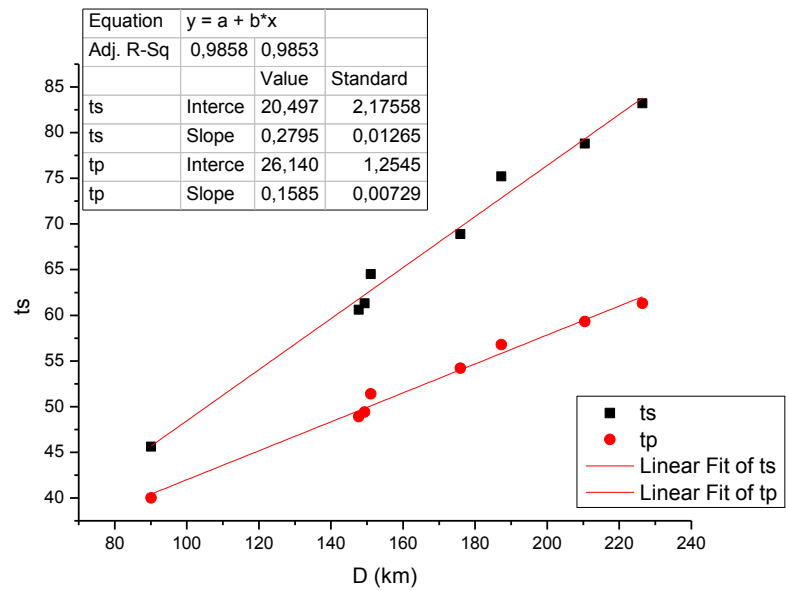
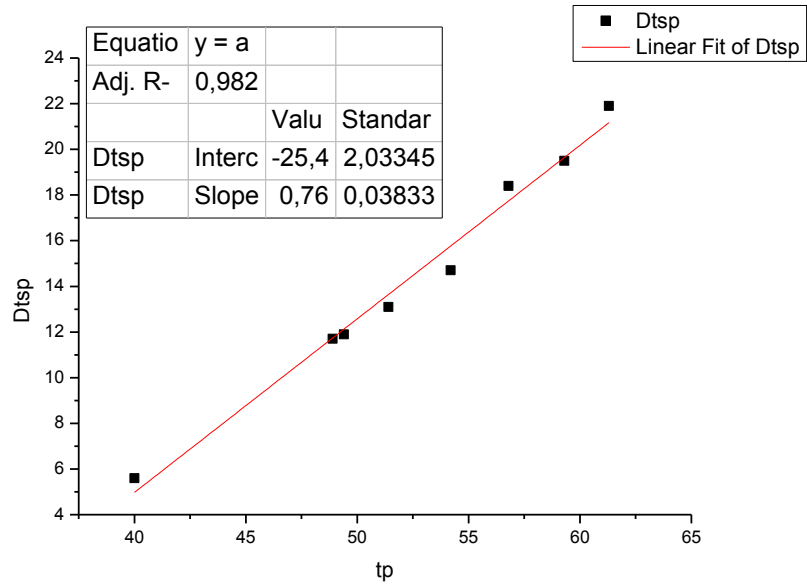
Station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	33,2	28,3	4,9	4,9	42,88088
SIVA	44,6	34,5	10,1	70,6	82,45678
IMMV	46,5	35,2	11,3	74,5	85,81964
IDI	48,4	37,3	11,1	91,3	100,7494
IACM	54,9	39,4	15,5	106,1	114,3327
ANKY	59,1	43	16,1	138,8	145,1902
NPS	62,2	45,7	16,5	148,2	154,2012





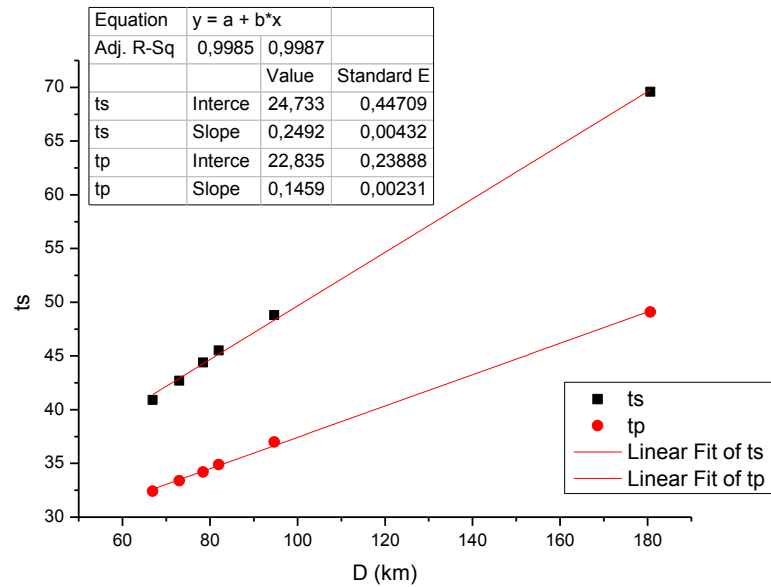
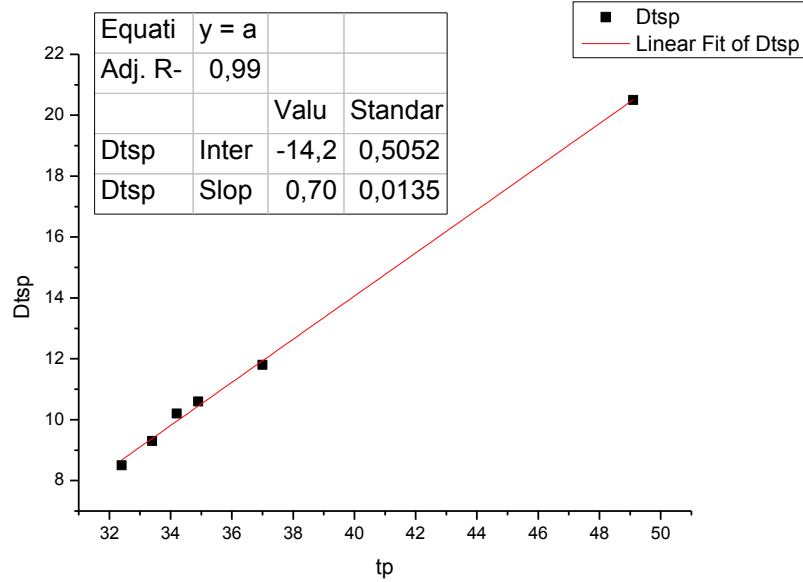
13 SEPTEMBER 2011 (4.7ML 5 Mw ,depth 10.2km)

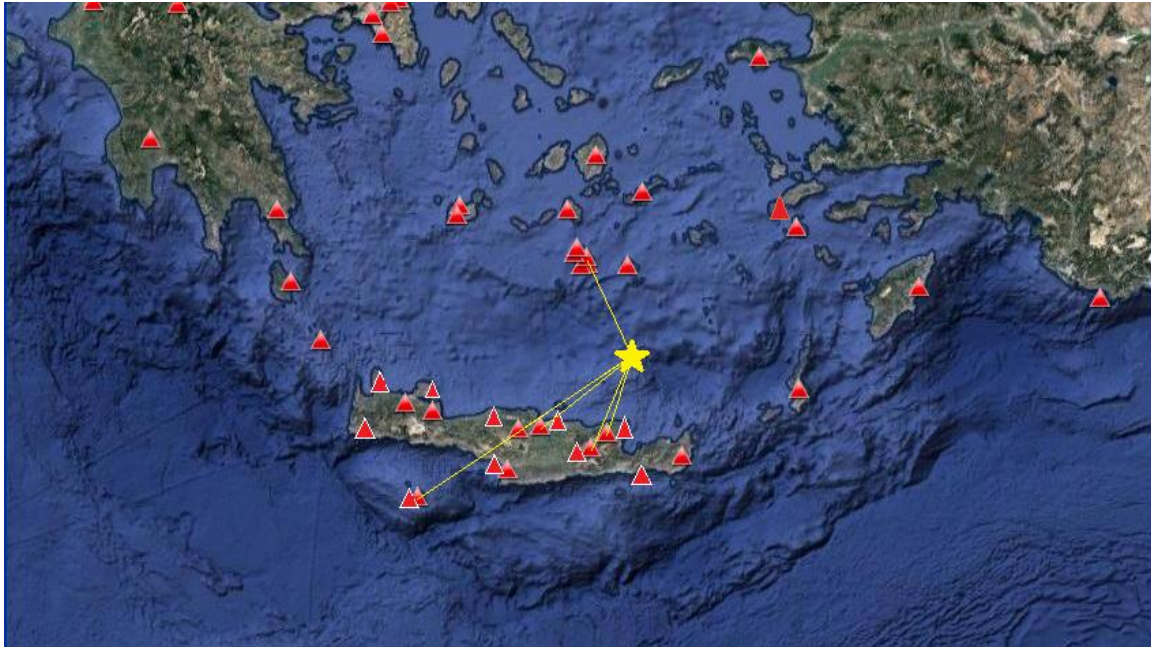
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	45,6	40	5,6	89,5	90,07935
IMMV	60,6	48,9	11,7	147,4	147,7525
VAM	61,3	49,4	11,9	149	149,3487
SIVA	64,5	51,4	13,1	150,7	151,0448
IDI	68,9	54,2	14,7	175,6	175,896
ANKY	75,2	56,8	18,4	187	187,278
LAST	78,8	59,3	19,5	210,2	210,4473
NPS	83,2	61,3	21,9	226,2	226,4299



15 SEPTEMBER 2011 (4.5 ML 4.2Mw, depth 30.6km)

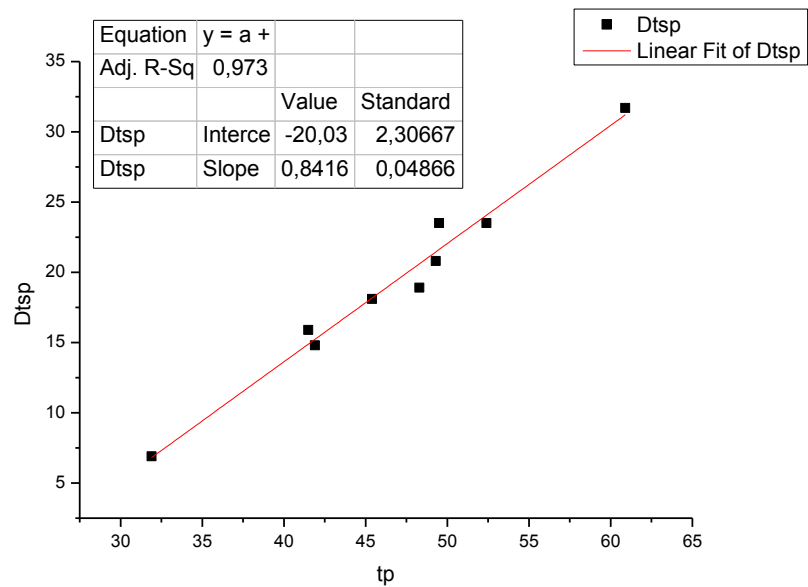
station	ts	tp	Dtsp	Dop(km)	D(km)
NPS	40,9	32,4	8,5	59,5	66,90747
SANT	42,7	33,4	9,3	66,3	73,02089
LAST	44,4	34,2	10,2	72,2	78,41683
IACM	45,5	34,9	10,6	76,1	82,02177
IDI	48,8	37	11,8	89,6	94,68115
GVD	69,6	49,1	20,5	178	180,6111

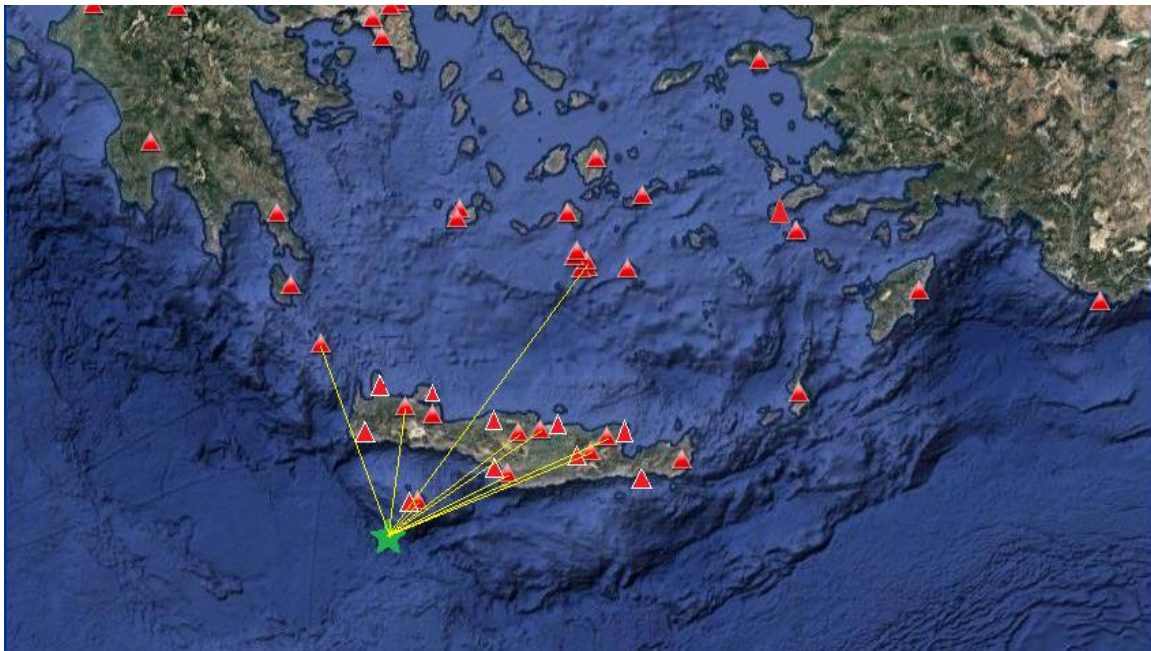
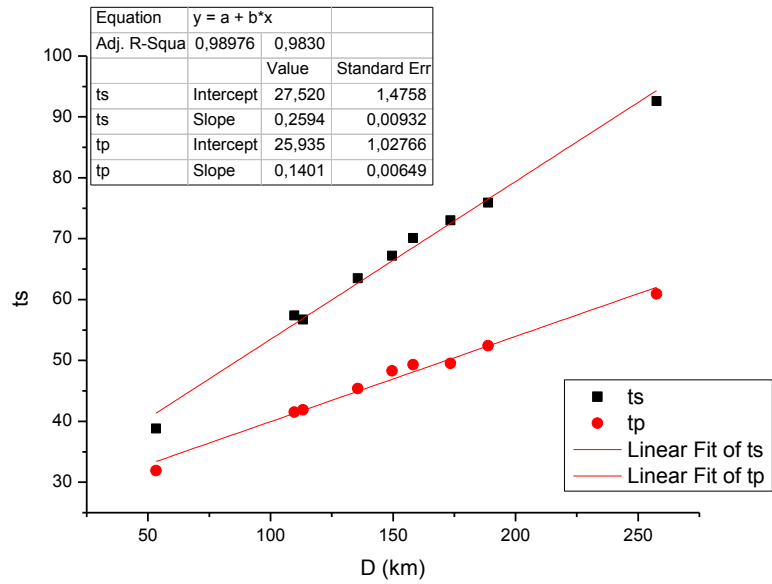




27 SEPTEMBER 2011 (4.7 ML 5.4Mw , depth 27.8km)

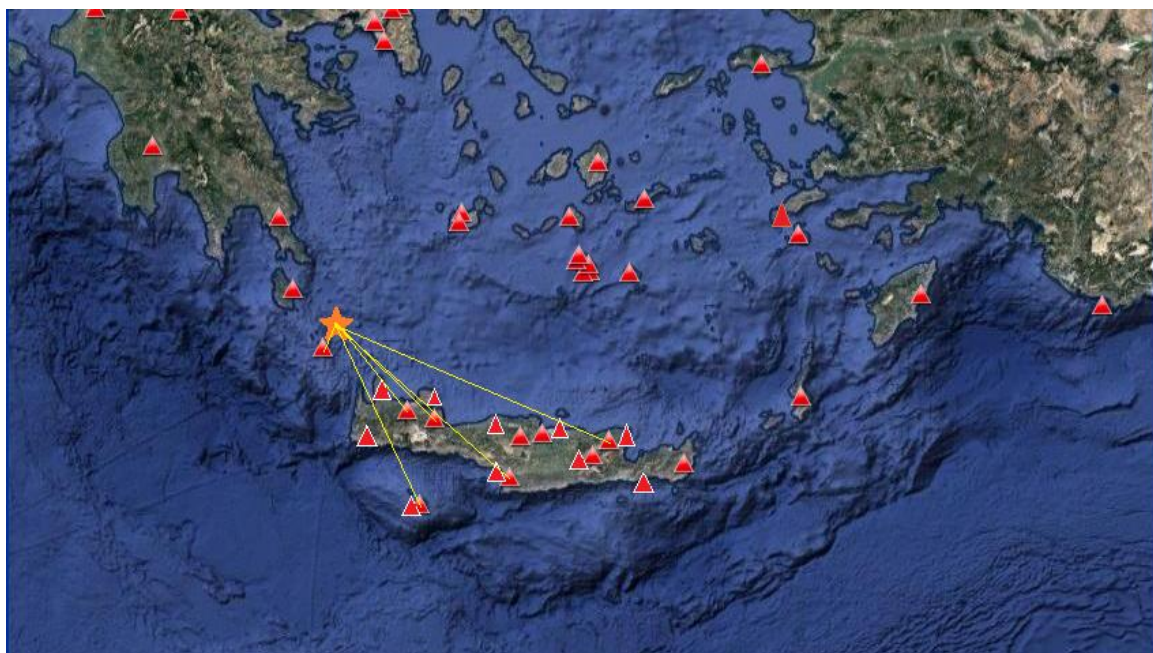
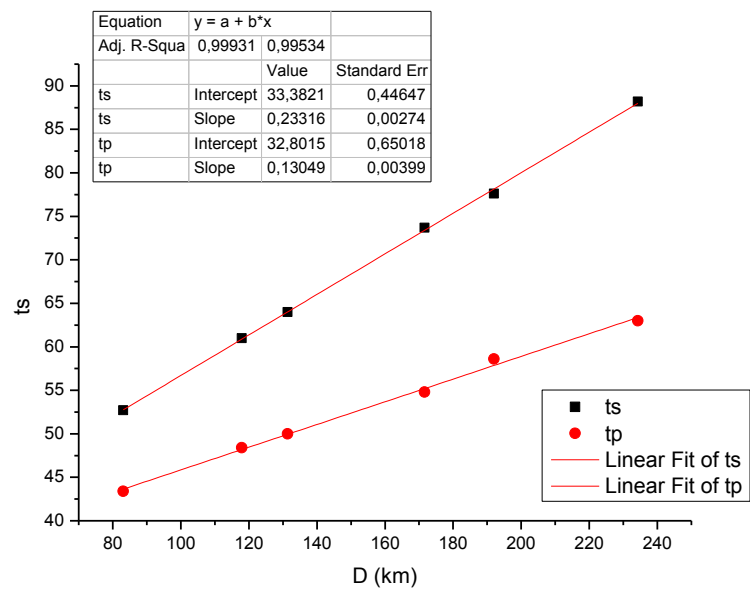
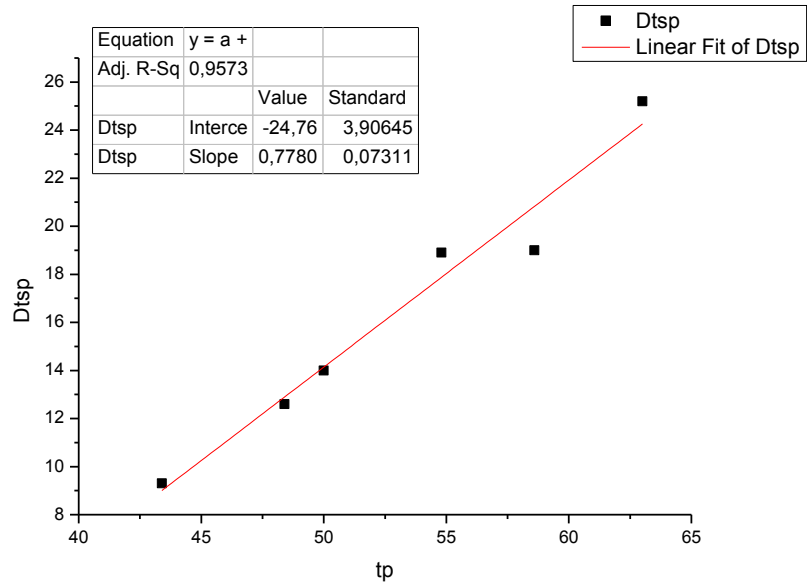
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	38,8	31,9	6,9	45,5	53,32063
SIVA	56,7	41,9	14,8	109,8	113,2646
IMMV	57,4	41,5	15,9	106,1	109,6816
IDI	63,5	45,4	18,1	132,8	135,6786
IACM	67,2	48,3	18,9	147	149,6056
ANKY	70,1	49,3	20,8	155,7	158,1624
LAST	73	49,5	23,5	171,2	173,4424
NPS	75,9	52,4	23,5	186,8	188,8573
SANT	92,6	60,9	31,7	256	257,505





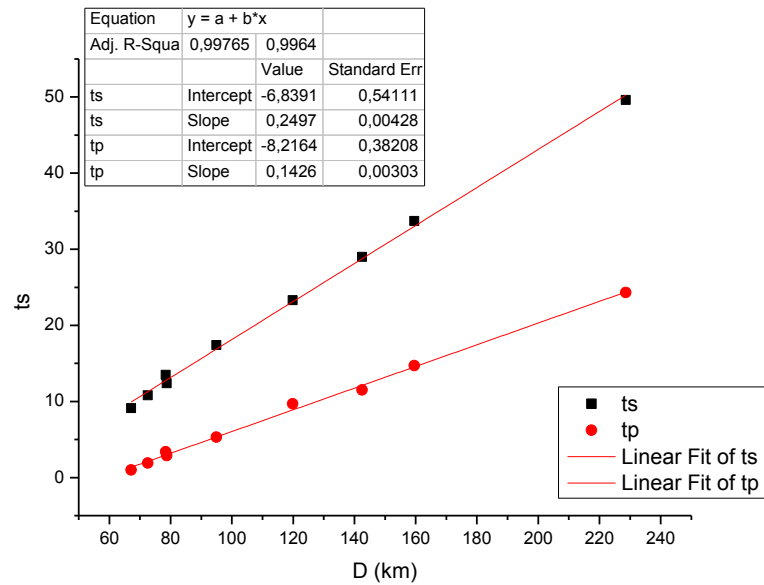
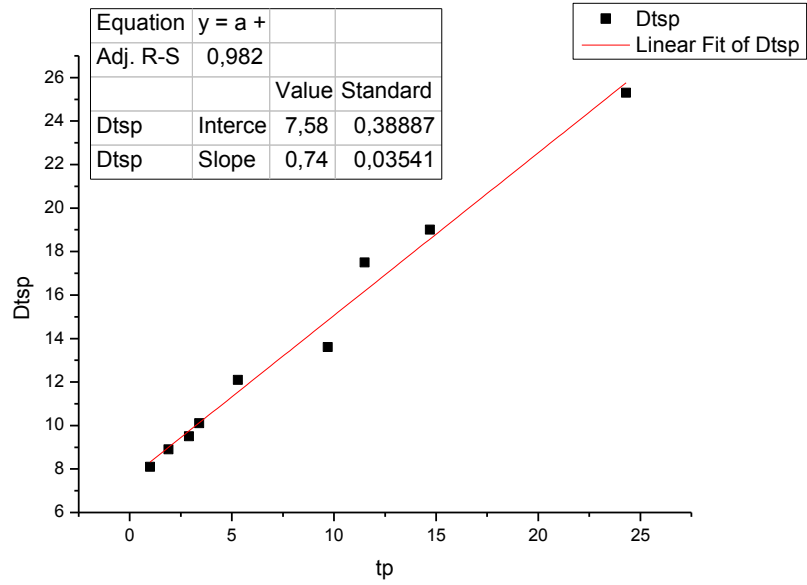
5 OKTOBER 2011 (4 ML 3.9 Mw ,depth 78.8km)

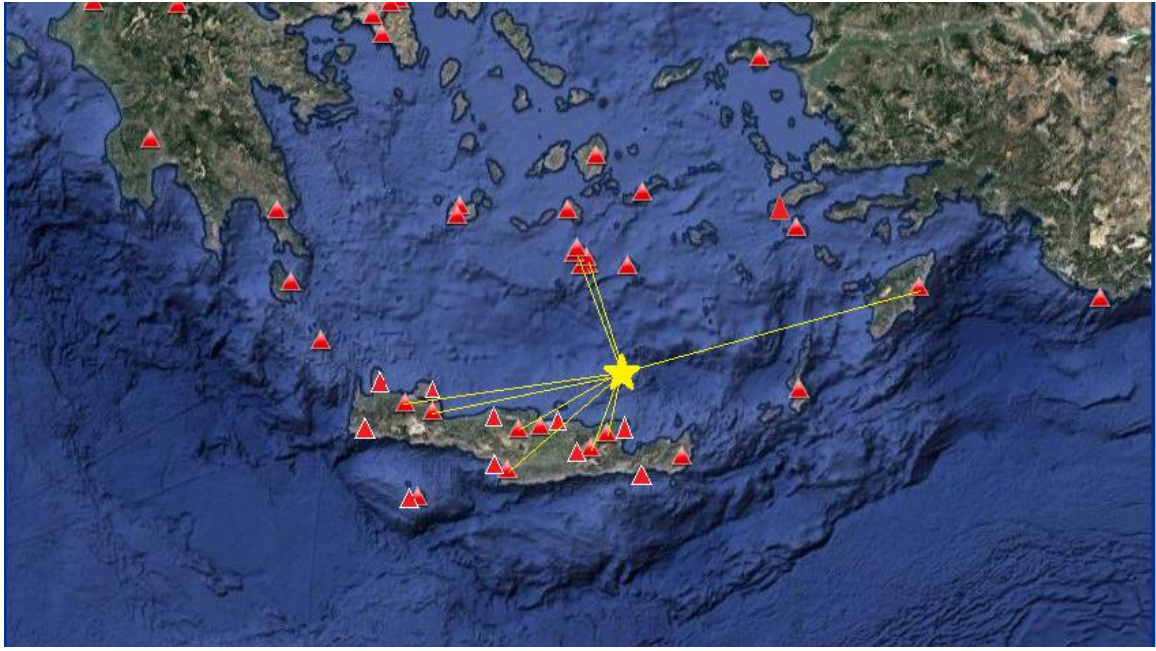
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	52,7	43,4	9,3	26,4	83,10475
IMMV	61	48,4	12,6	87,7	117,9014
VAM	64	50	14	105,1	131,36
GVD	73,7	54,8	18,9	152,5	171,6557
SIVA	77,6	58,6	19	175,1	192,0142
NPS	88,2	63	25,2	220,6	234,2516



6 NOVEMBER 2011 (4.8 ML 4.6 Mw, depth 30.3km)

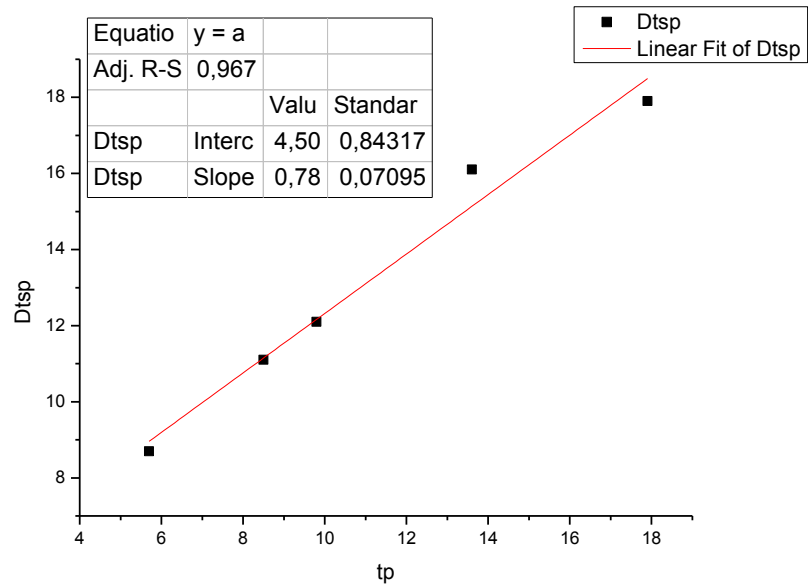
station	ts	tp	Dtsp	Dop(km)	D(km)
NPS	9,1	1	8,1	59,9	67,12749
SANT	10,8	1,9	8,9	65,9	72,53206
LAST	12,4	2,9	9,5	72,7	78,76154
THT2	13,5	3,4	10,1	72,3	78,39247
IDI	17,4	5,3	12,1	90	94,96362
SIVA	23,3	9,7	13,6	116	119,892
VAM	29	11,5	17,5	139,3	142,5573
IMMV	33,7	14,7	19	156,7	159,6026
ARG	49,6	24,3	25,3	226,6	228,6168

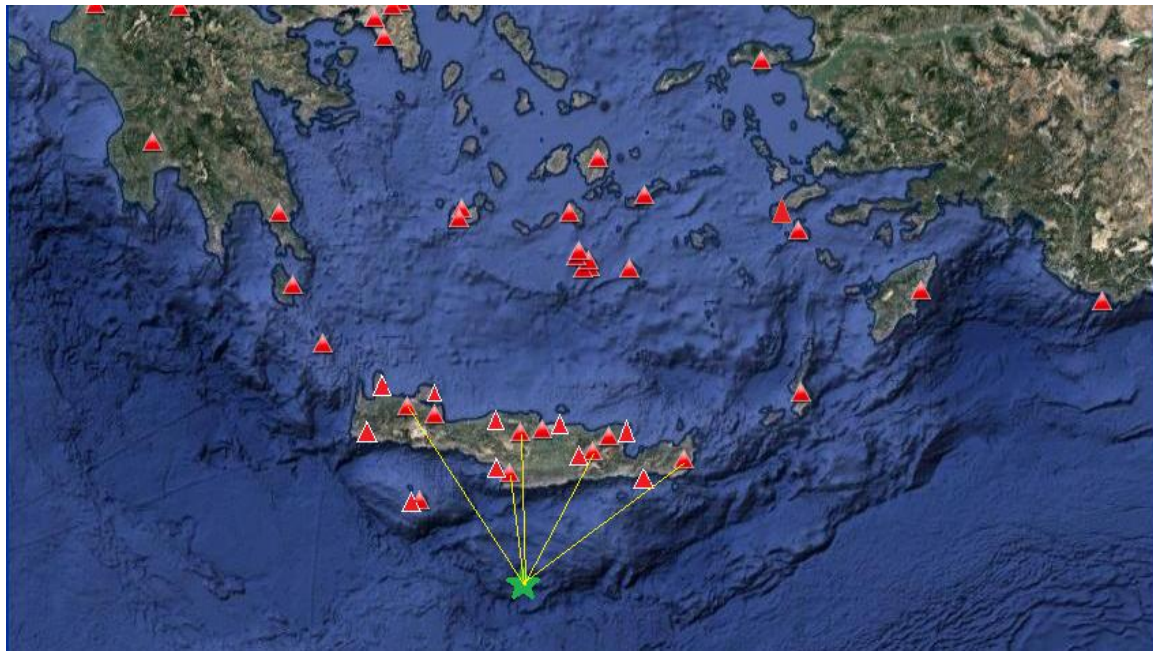
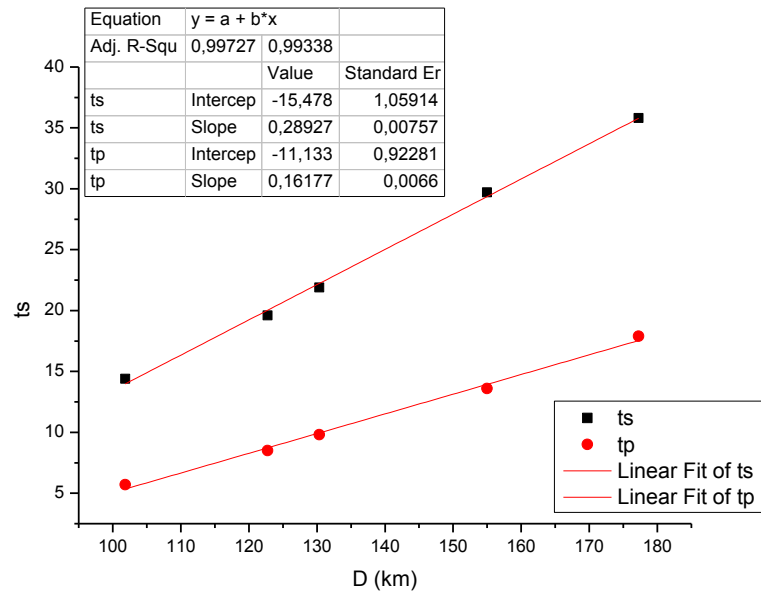




23 NOVEMBER 2011 (5.1 ML 5.3Mw, depth 9.5km)

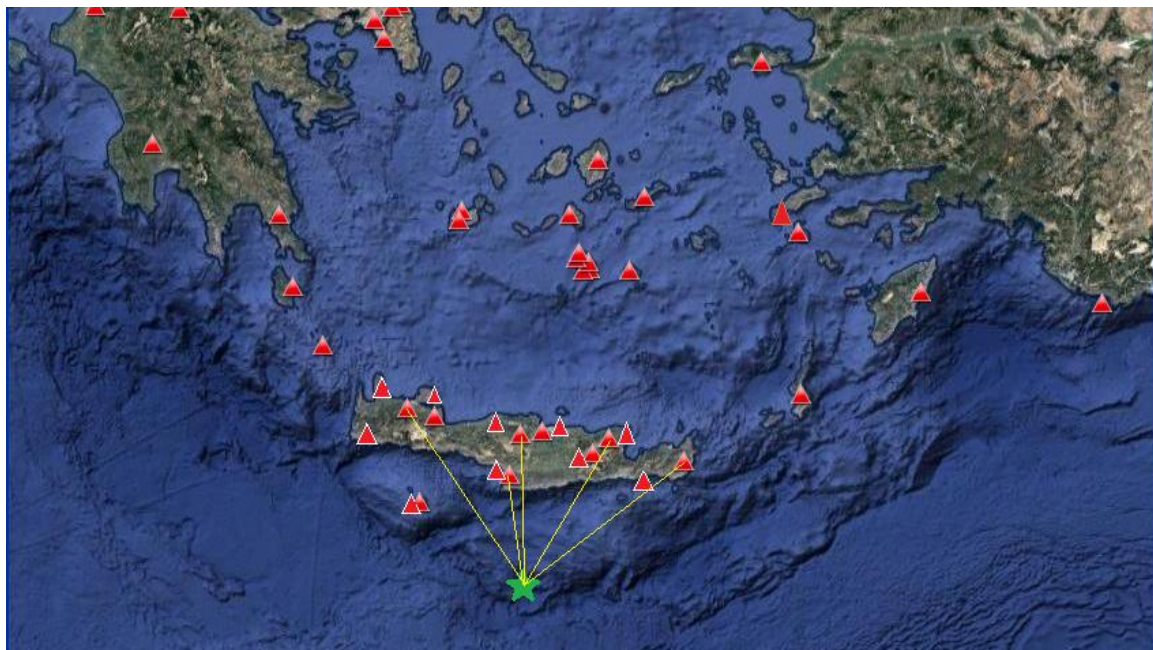
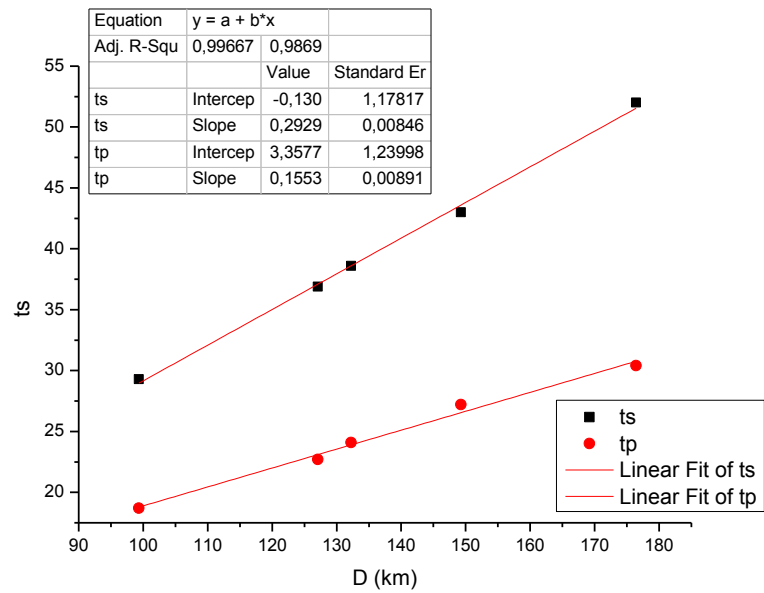
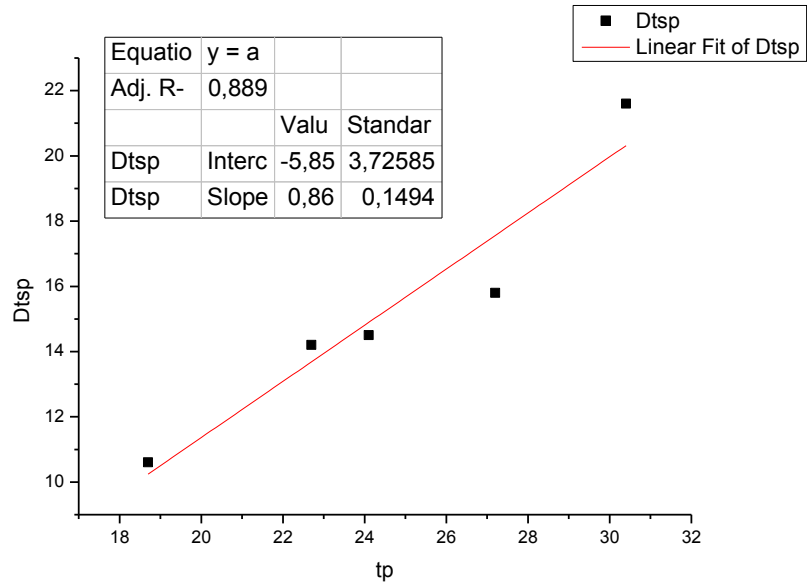
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	14,4	5,7	8,7	101,4	101,844
LAST	19,6	8,5	11,1	122,4	122,7681
IDI	21,9	9,8	12,1	130	130,3467
ZKR	29,7	13,6	16,1	154,7	154,9914
IMMV	35,8	17,9	17,9	177	177,2548





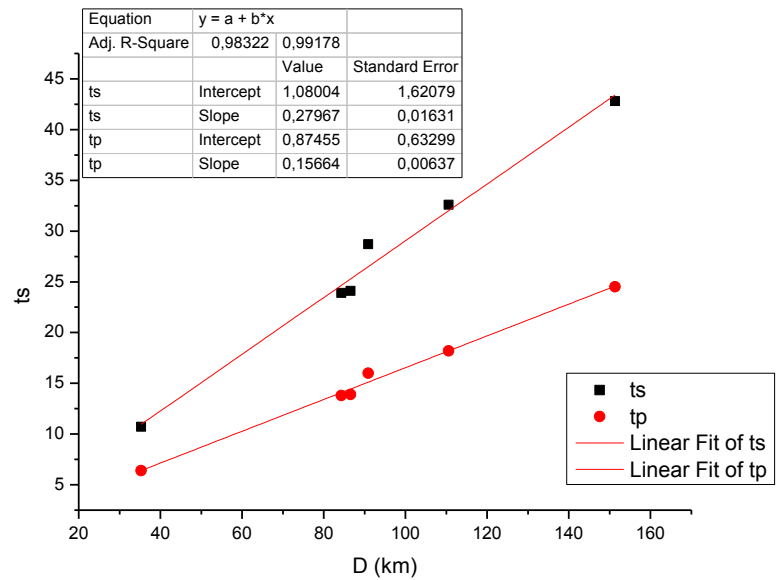
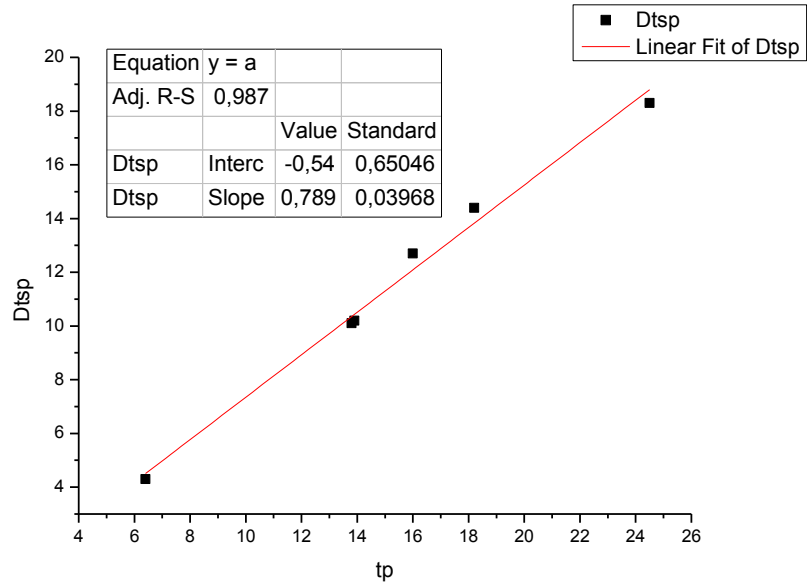
23 NOVEMBER 2011 (4.3 ML 4.5 Mw, depth 15km)

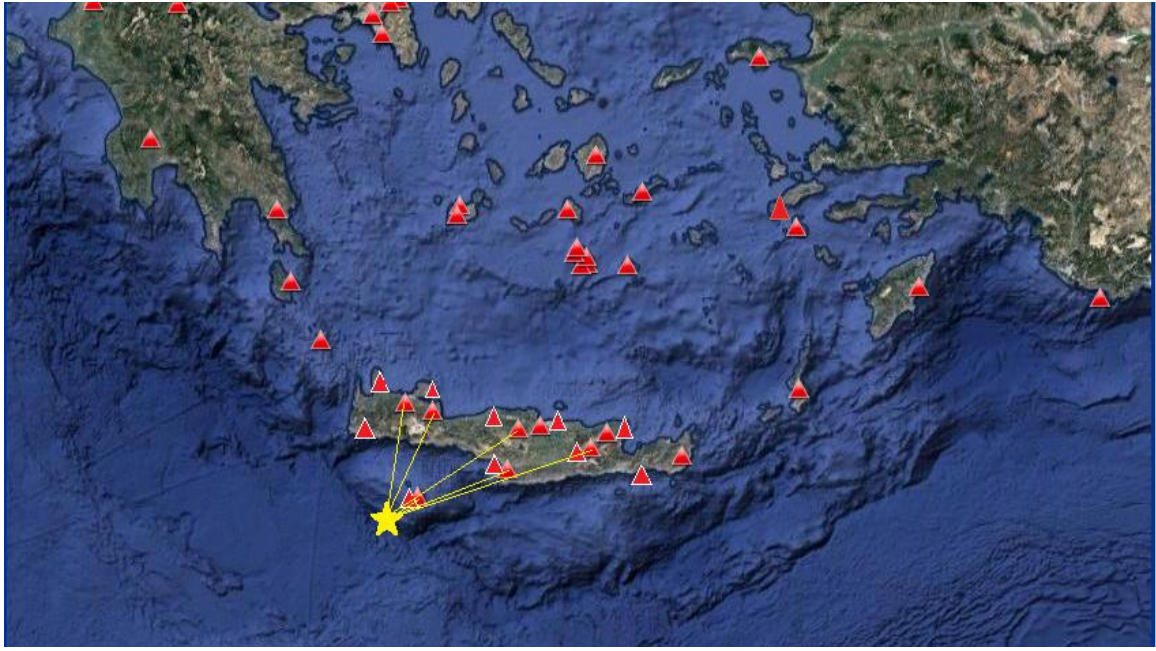
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	29,3	18,7	10,6	98,2	99,33902
IDI	36,9	22,7	14,2	126,2	127,0883
NPS	38,6	24,1	14,5	131,4	132,2534
ZKR	43	27,2	15,8	148,5	149,2557
IMMV	52	30,4	21,6	175,8	176,4388



9 DECEMBER 2011 (4.4 ML 4.3 Mw, depth 30.5km)

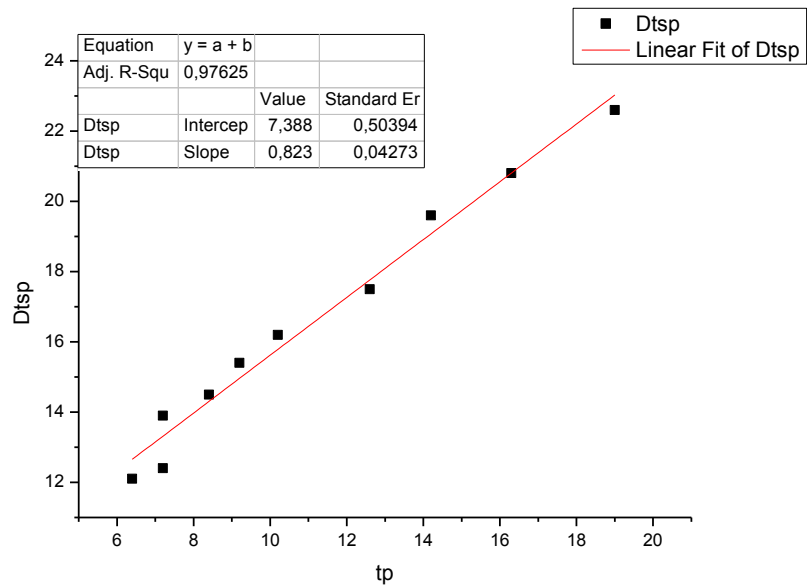
Station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	10,7	6,4	4,3	17,8	35,31416
VAM	23,9	13,8	10,1	78,6	84,3102
IMMV	24,1	13,9	10,2	81	86,55201
SIVA	28,7	16	12,7	85,6	90,87139
IDI	32,6	18,2	14,4	106,3	110,5891
LAST	42,8	24,5	18,3	148,2	151,3059

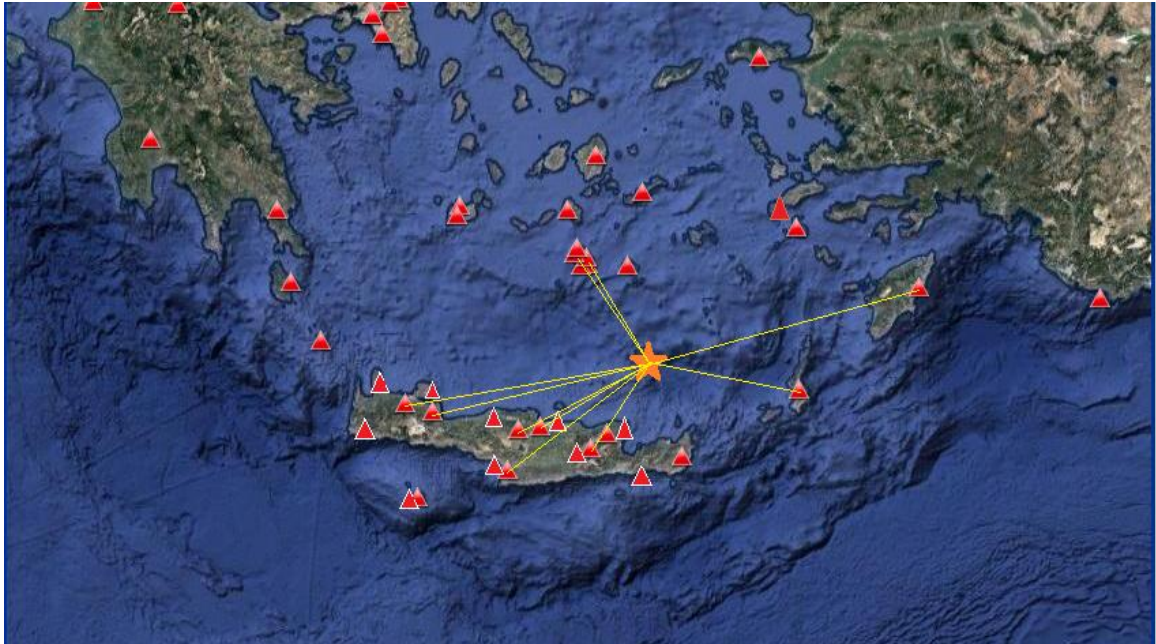
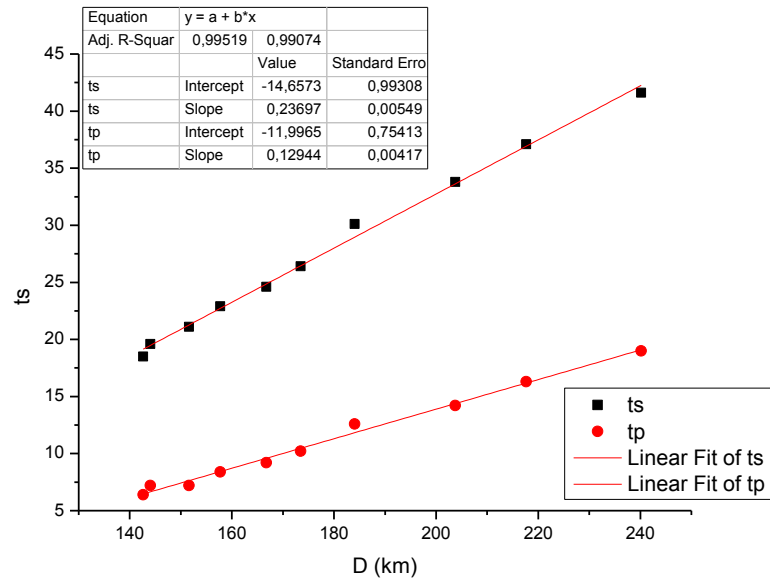




21 DECEMBER 2011(4 ML 4.2Mw, depth 125km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	18,5	6,4	12,1	68,7	142,6348
THT2	19,6	7,2	12,4	71,6	144,054
LAST	21,1	7,2	13,9	85,8	151,6135
IACM	22,9	8,4	14,5	96,2	157,7322
IDI	24,6	9,2	15,4	110,4	166,7728
KARP	26,4	10,2	16,2	120,3	173,4851
SIVA	30,1	12,6	17,5	135,1	184,0571
VAM	33,8	14,2	19,6	160,9	203,7494
IMMV	37,1	16,3	20,8	178,2	217,67
ARG	41,6	19	22,6	205,1	240,1895

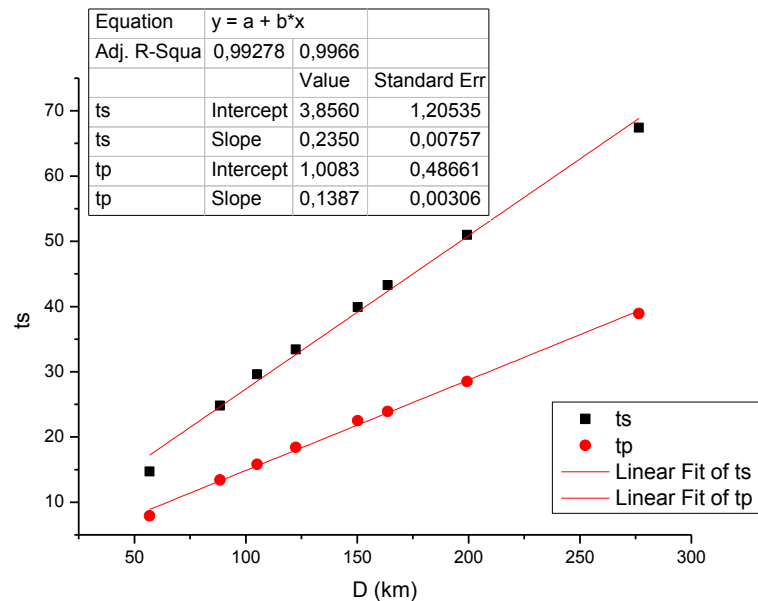
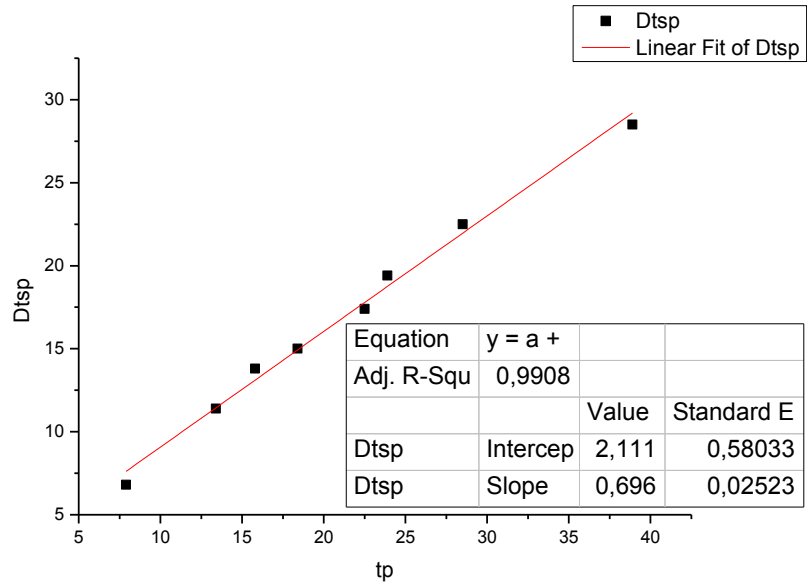


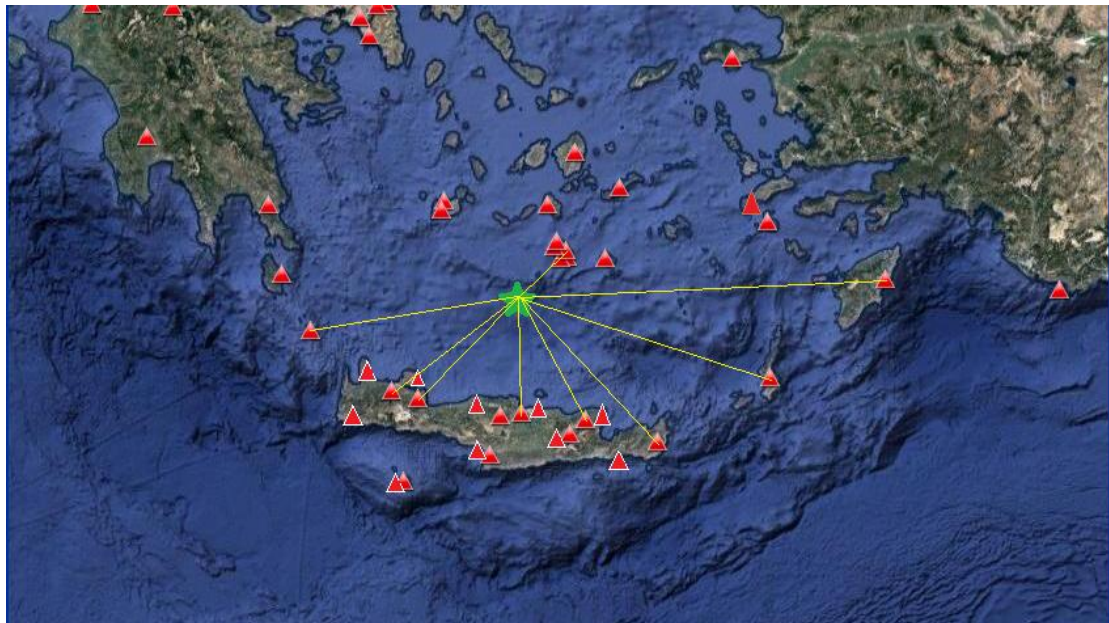


EARTHQUAKES DURING 2012

26 JANUARY 2012 (5.3 ML 5.3 Mw, depth 28.7 km)

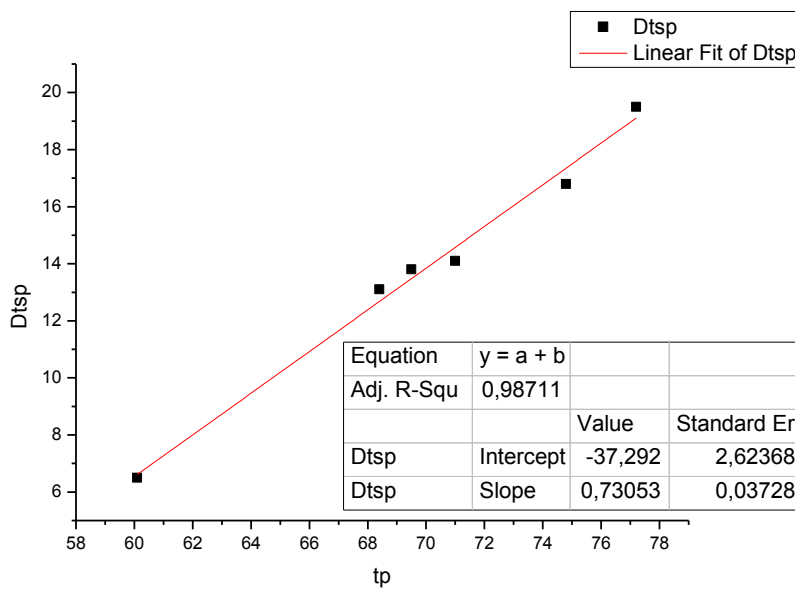
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	14,7	7,9	6,8	49	56,78635
IACM	24,8	13,4	11,4	83,6	88,3892
NPS	29,6	15,8	13,8	101,1	105,0947
IMMV	33,4	18,4	15	119	122,412
ZKR	39,9	22,5	17,4	147,5	150,2662
ANKY	43,3	23,9	19,4	161,2	163,7349
KARP	51	28,5	22,5	197,2	199,2775
ARG	67,4	38,9	28,5	275	276,4936

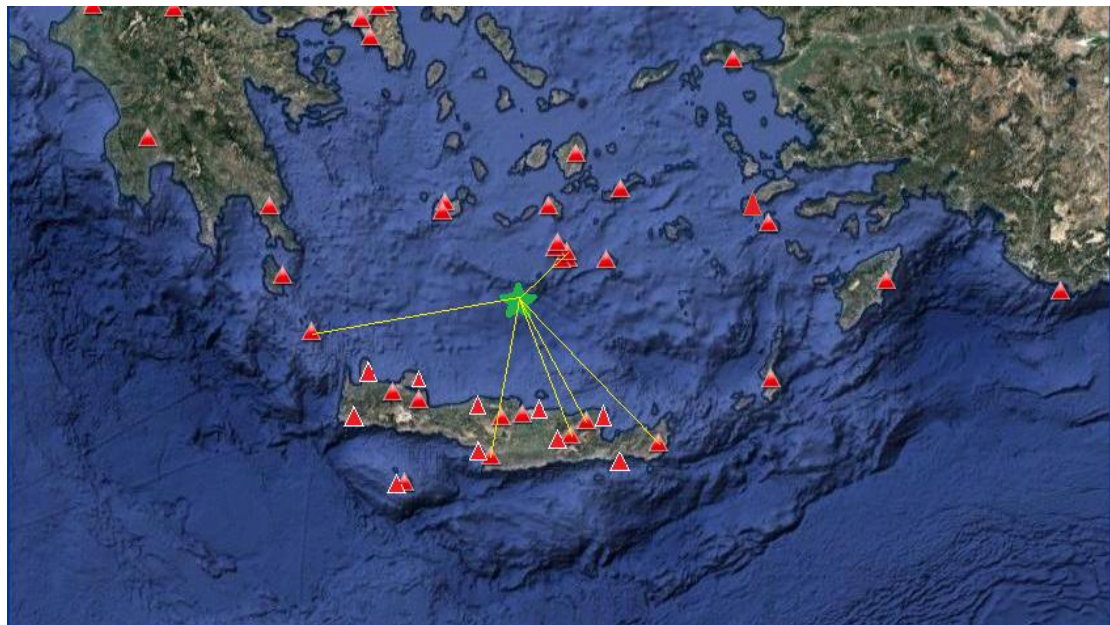
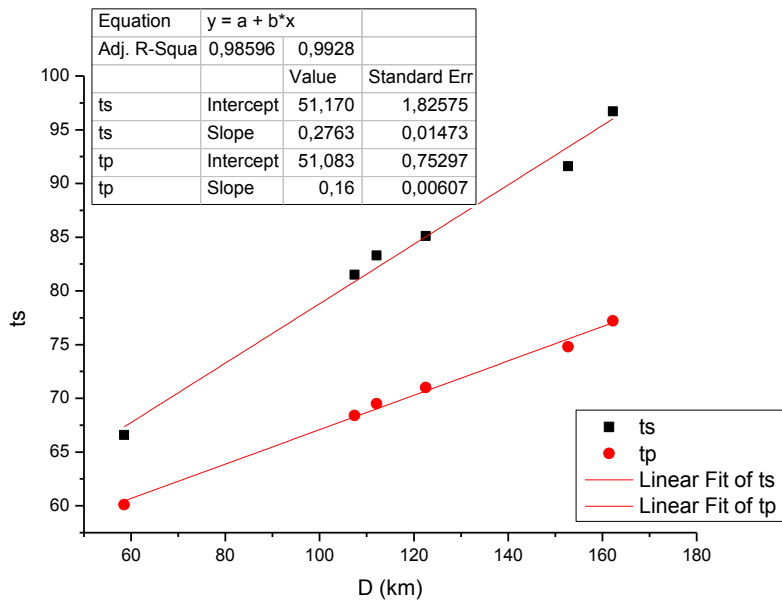




26 JANUARY 2012 (4 ML 4.3 Mw, depth 30.8 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	66,6	60,1	6,5	49,8	58,55493
NPS	81,5	68,4	13,1	102,9	107,4107
LAST	83,3	69,5	13,8	107,8	112,1137
SIVA	85,1	71	14,1	118,6	122,5341
ZKR	91,6	74,8	16,8	149,6	152,7377
ANKY	96,7	77,2	19,5	159,3	162,2502

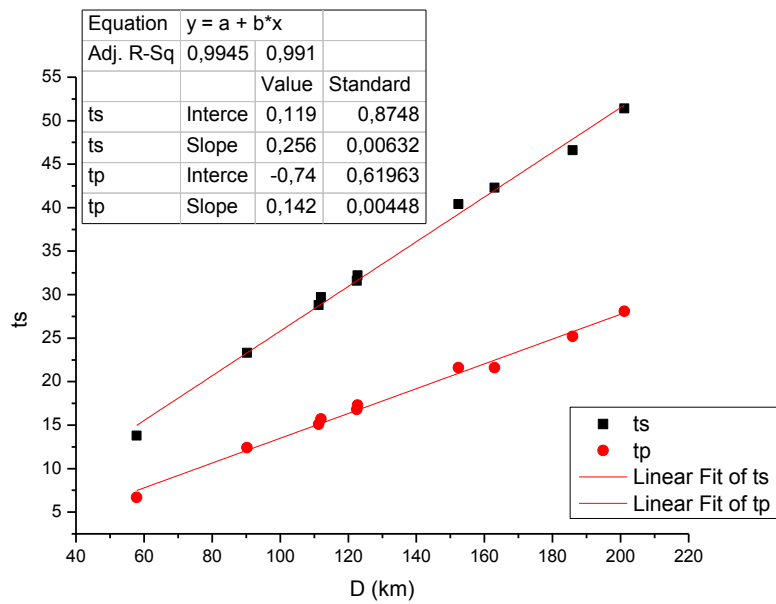
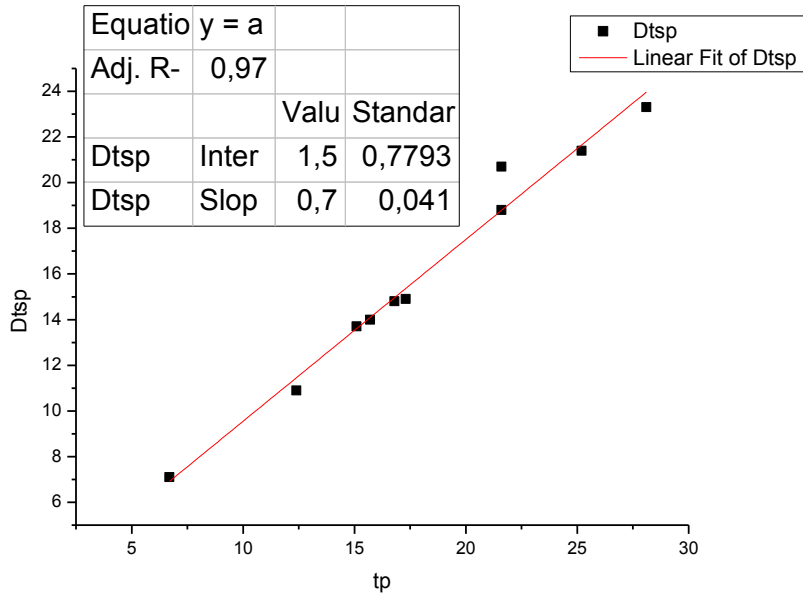


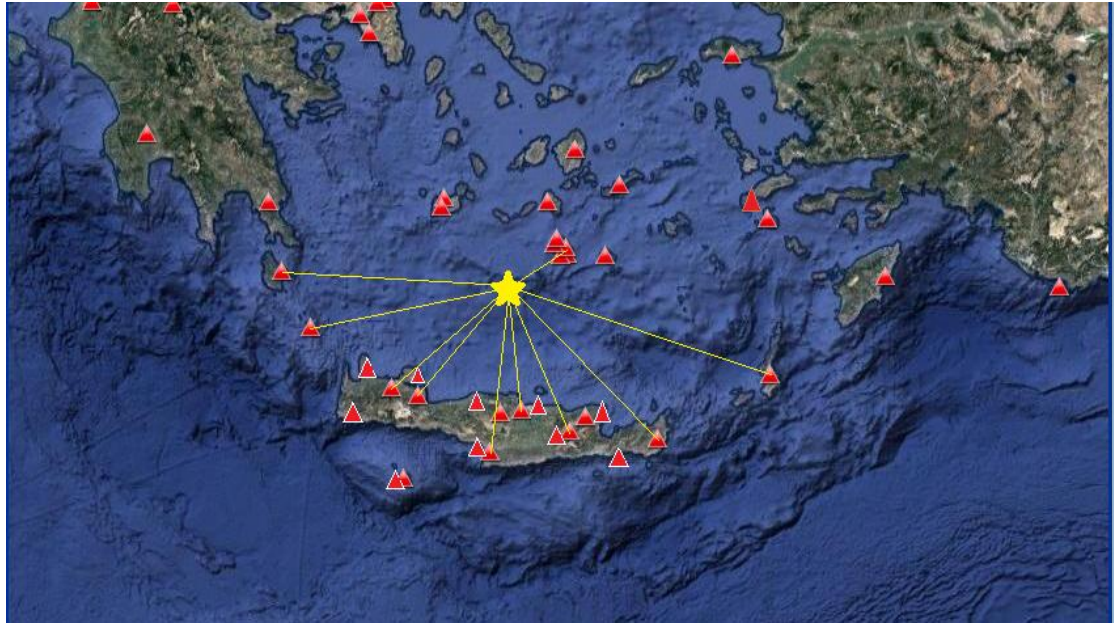


26 JANUARY 2012 (4.3 ML 4.2 Mw, depth 30.6 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	13,8	6,7	7,1	49,1	57,85473
IACM	23,3	12,4	10,9	84,9	90,24616
VAM	28,8	15,1	13,7	107	111,2895
LAST	29,7	15,7	14	107,7	111,9627
IMMV	31,6	16,8	14,8	118,6	122,484
SIVA	32,2	17,3	14,9	118,9	122,7745
ZKR	40,4	21,6	18,8	149,3	152,4036
ANKY	42,3	21,6	20,7	160,1	162,9981
KTHR	46,6	25,2	21,4	183,4	185,9353

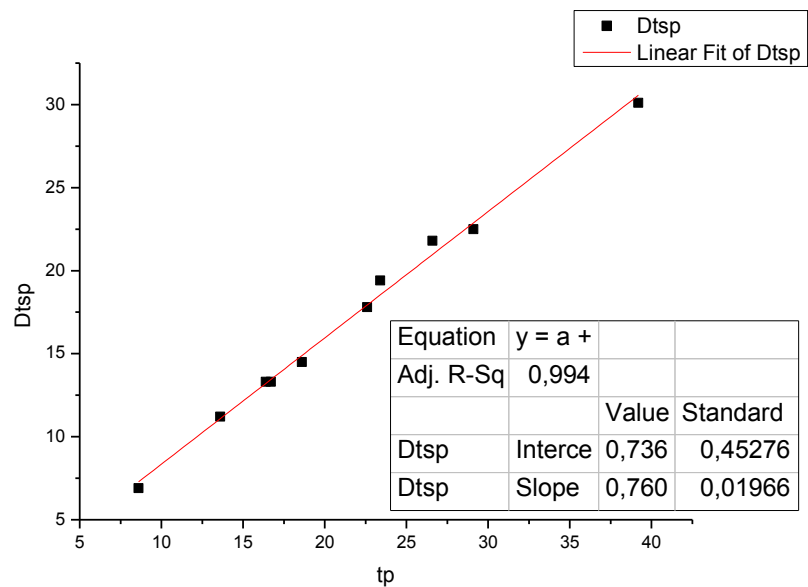
KARP	51,4	28,1	23,3	198,8	201,1412
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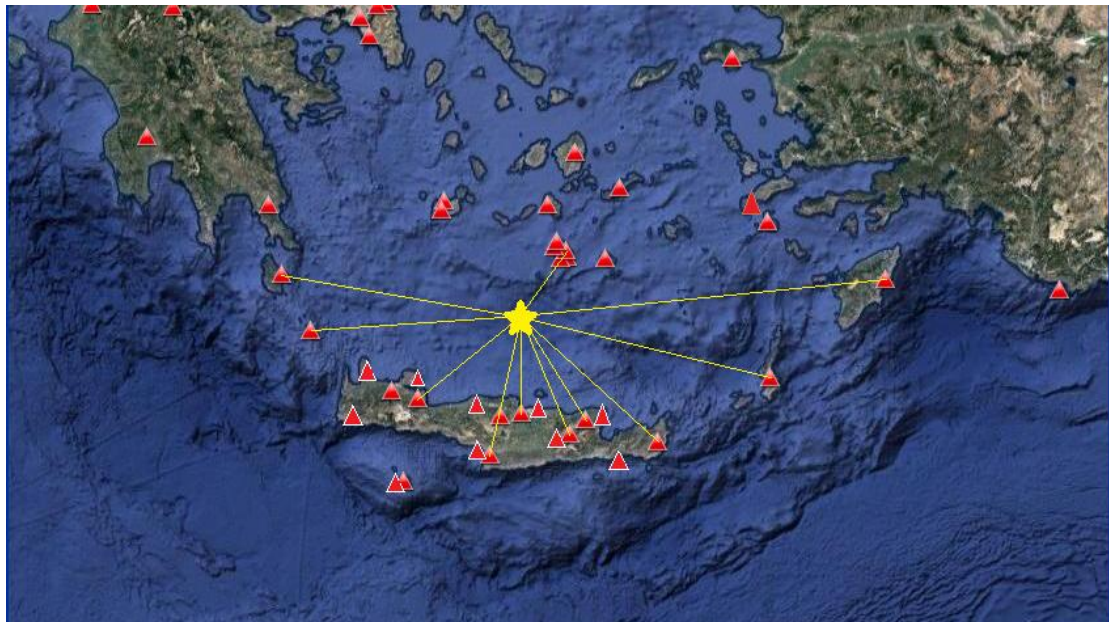
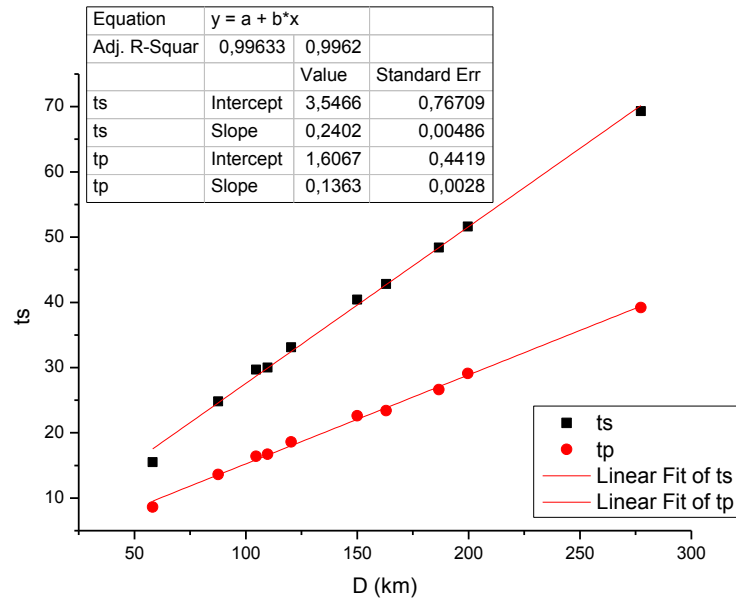




26 JANUARY 2012 (4.1 ML 4.3Mw, depth 29.2 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	15,5	8,6	6,9	50,3	58,16124
IACM	24,8	13,6	11,2	82,6	87,60936
NPS	29,7	16,4	13,3	100,5	104,6561
VAM	30	16,7	13,3	105,9	109,8519
SIVA	33,1	18,6	14,5	116,8	120,3947
ZKR	40,4	22,6	17,8	147,2	150,0683
ANKY	42,8	23,4	19,4	160,4	163,0362
KTHR	48,4	26,6	21,8	184,4	186,6976
KARP	51,6	29,1	22,5	197,5	199,6469
ARG	69,3	39,2	30,1	275,8	277,3415

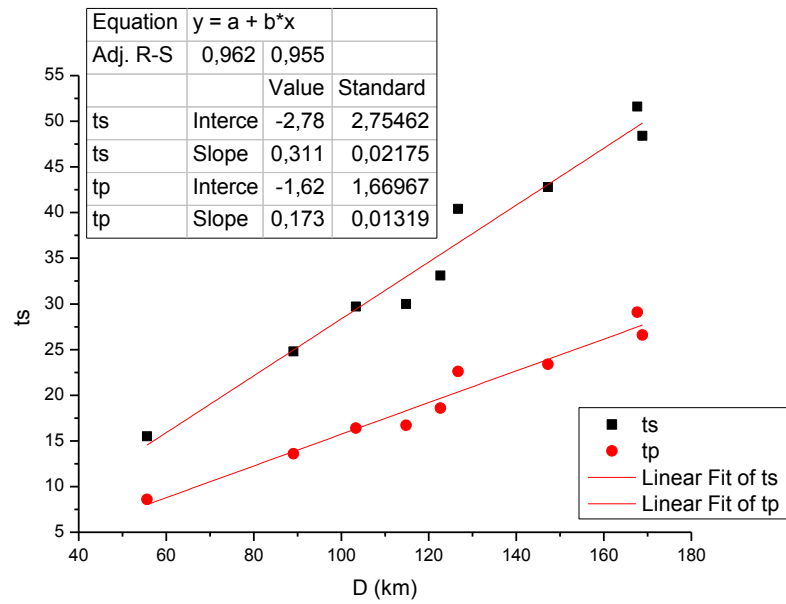
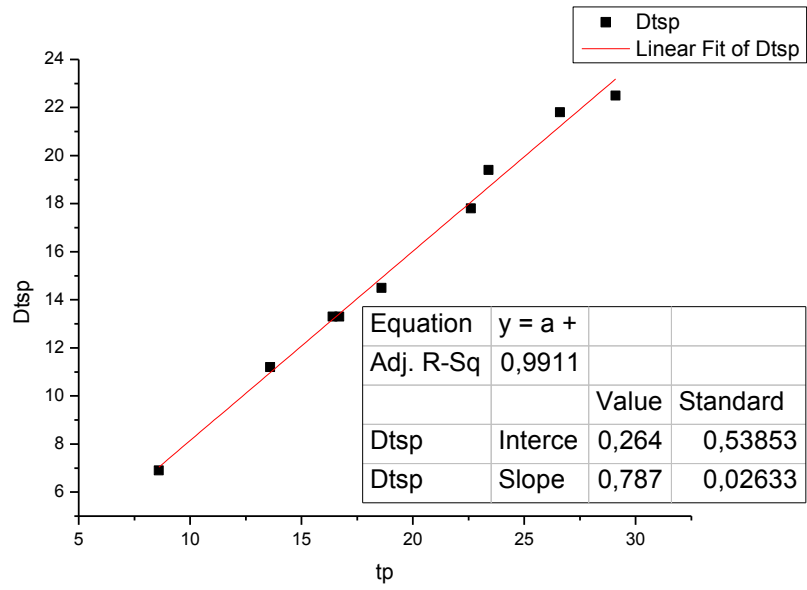


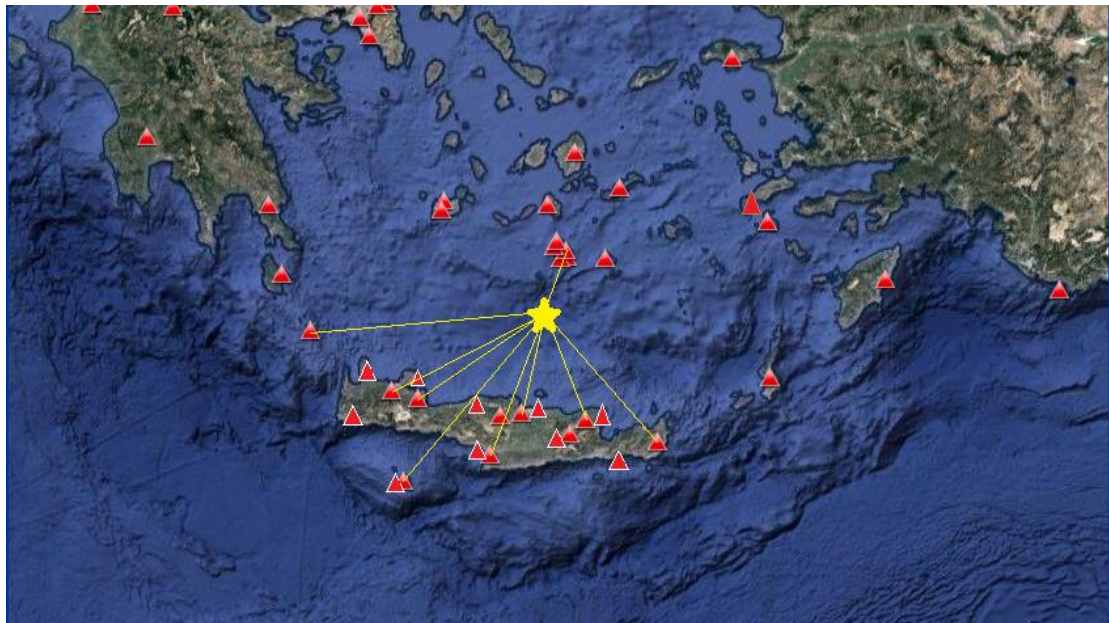


27 JANUARY 2012 (5.2 ML 5.4 Mw , depth 31.3 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	15,5	8,6	6,9	46	55,63893
IACM	24,8	13,6	11,2	83,4	89,08002
NPS	29,7	16,4	13,3	98,5	103,3535
VAM	30	16,7	13,3	110,5	114,8475
SIVA	33,1	18,6	14,5	118,6	122,6607
IMMV	40,4	22,6	17,8	122,8	126,7262
ZKR	42,8	23,4	19,4	143,9	147,2647
ANKY	48,4	26,6	21,8	165,9	168,8268

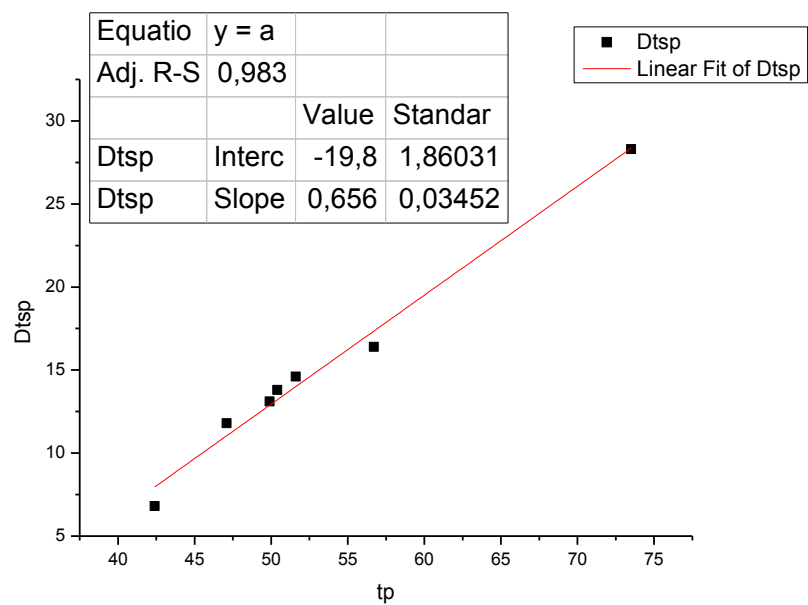
GVD	51,6	29,1	22,5	164,7	167,6478
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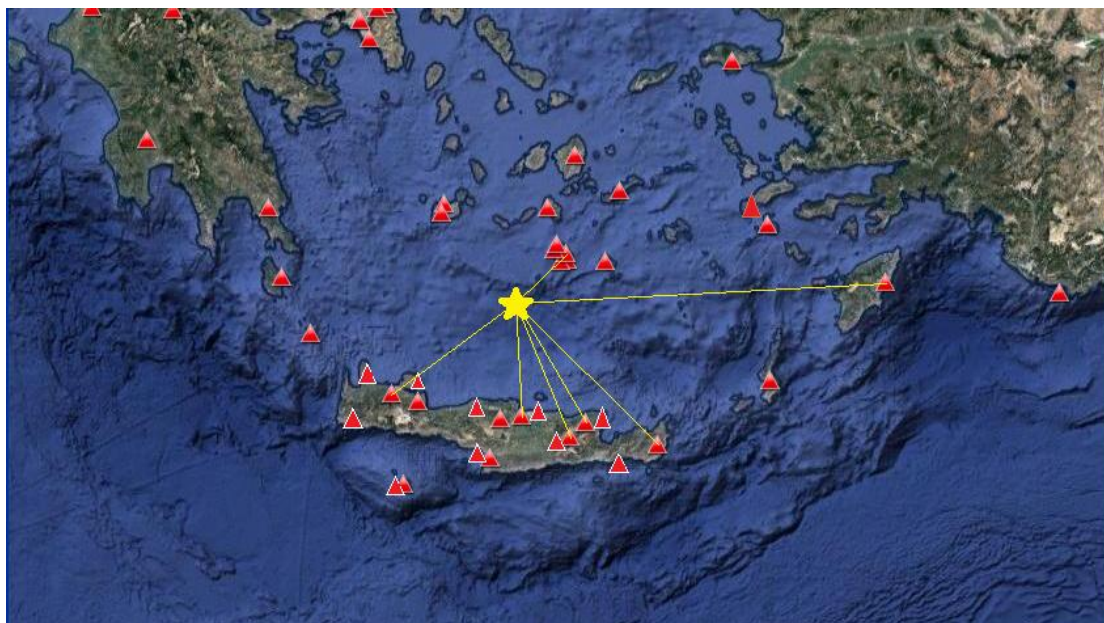
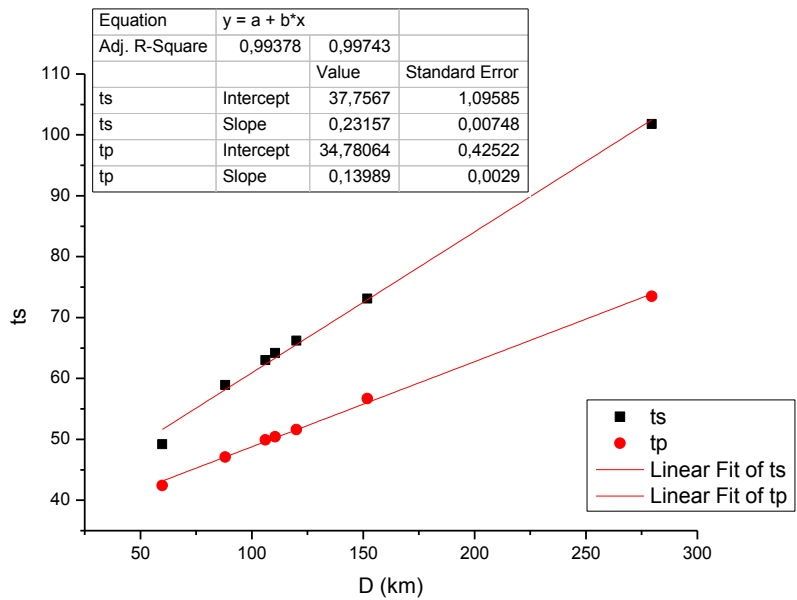




27 JANUARY 2012 (4.4 ML 4.3 Mw , depth 30.2 km)

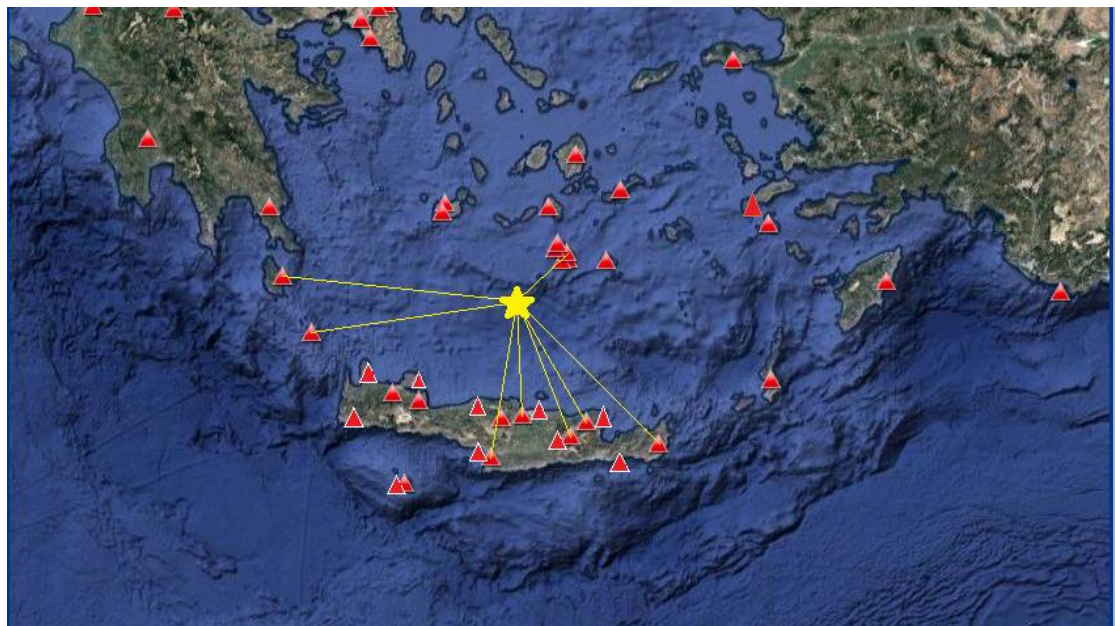
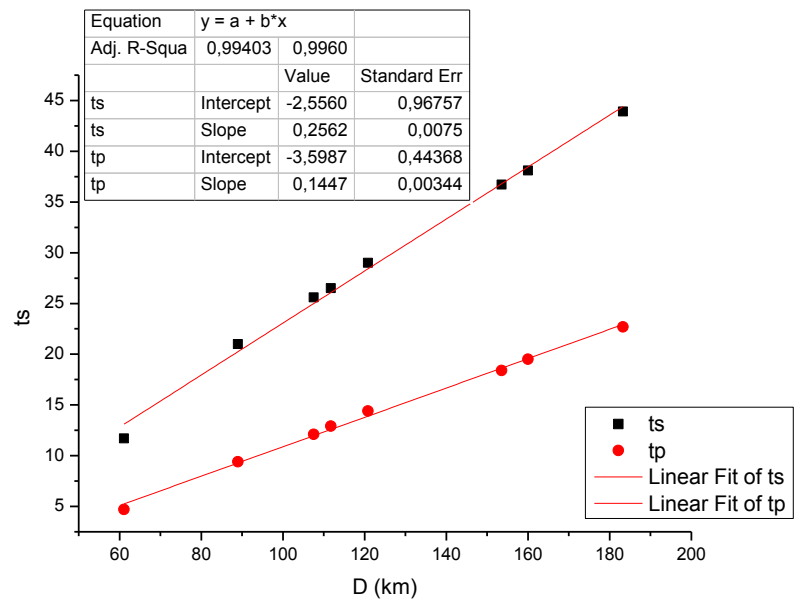
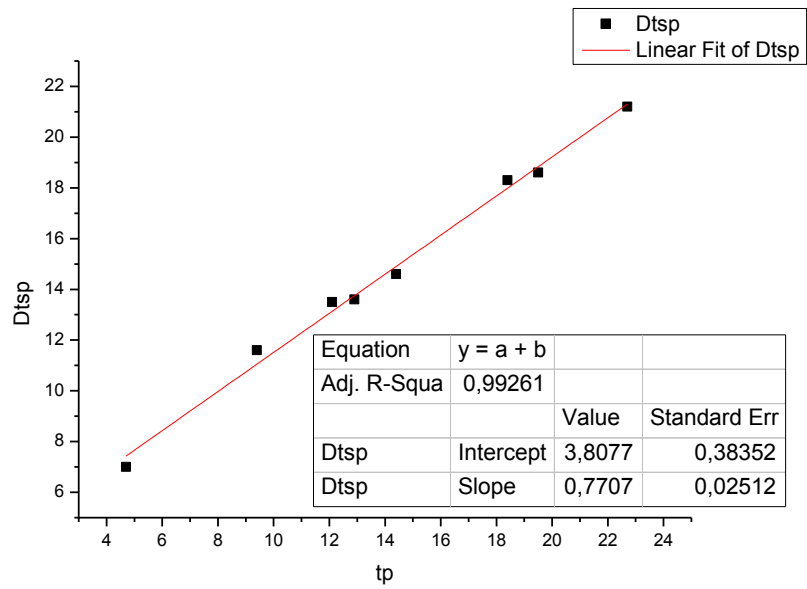
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	49,2	42,4	6,8	51,7	59,87428
IACM	58,9	47,1	11,8	82,7	88,04164
NPS	63	49,9	13,1	101,7	106,0893
LAST	64,2	50,4	13,8	106,3	110,5067
IMMV	66,2	51,6	14,6	116,2	120,0603
ZKR	73,1	56,7	16,4	148,8	151,8337
ARG	101,8	73,5	28,3	277,9	279,5361





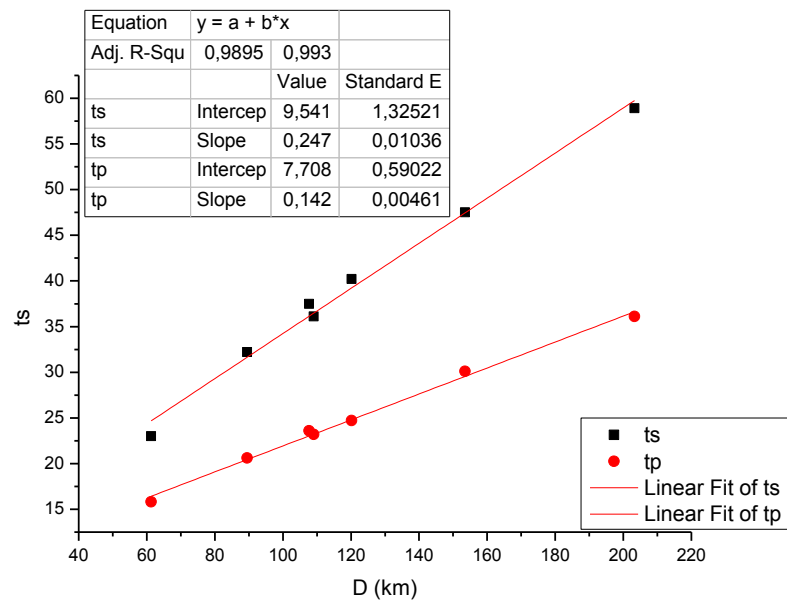
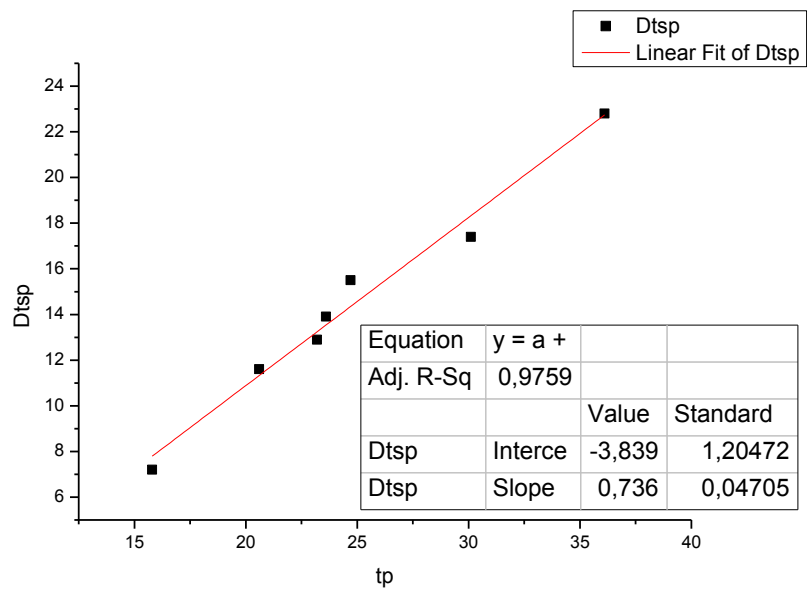
28JANUARY 2012 (4.9 ML 4.7 Mw , depth 31.1 km)

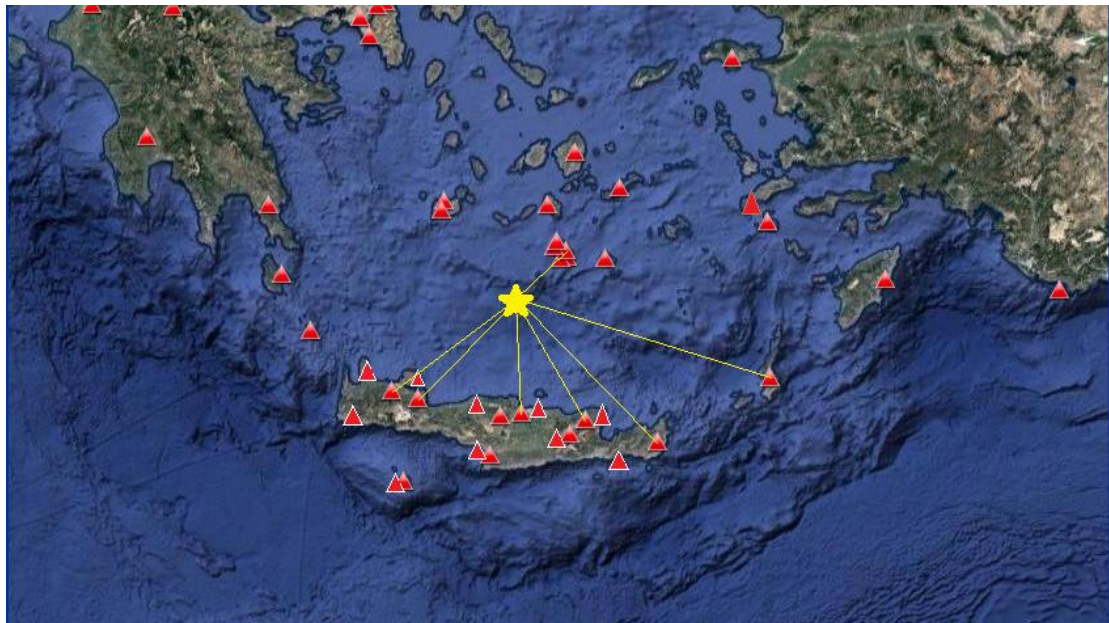
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	11,7	4,7	7	52,5	61,12234
IACM	21	9,4	11,6	83,3	88,9864
NPS	25,6	12,1	13,5	102,9	107,5551
LAST	26,5	12,9	13,6	107,3	111,772
SIVA	29	14,4	14,6	116,7	120,8246
ZKR	36,7	18,4	18,3	150,3	153,5245
ANKY	38,1	19,5	18,6	156,9	159,9916
KTHR	43,9	22,7	21,2	180,6	183,2923



29JANUARY 2012 (4.5 ML 4.7Mw , depth 32.5 km)

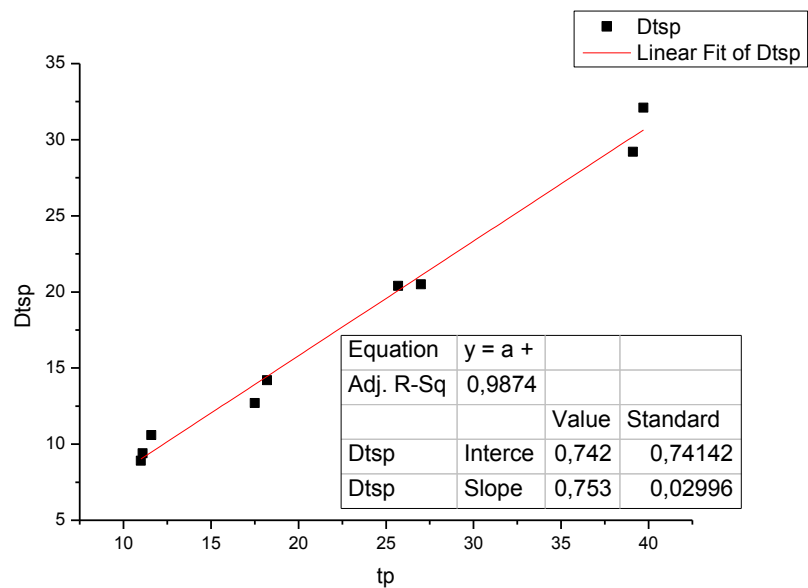
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	23	15,8	7,2	52	61,32088
IACM	32,2	20,6	11,6	83,4	89,50871
VAM	36,1	23,2	12,9	104,1	109,0553
NPS	37,5	23,6	13,9	102,7	107,7197
IMMV	40,2	24,7	15,5	115,7	120,178
ZKR	47,5	30,1	17,4	150	153,4805
KARP	58,9	36,1	22,8	200,7	203,3144

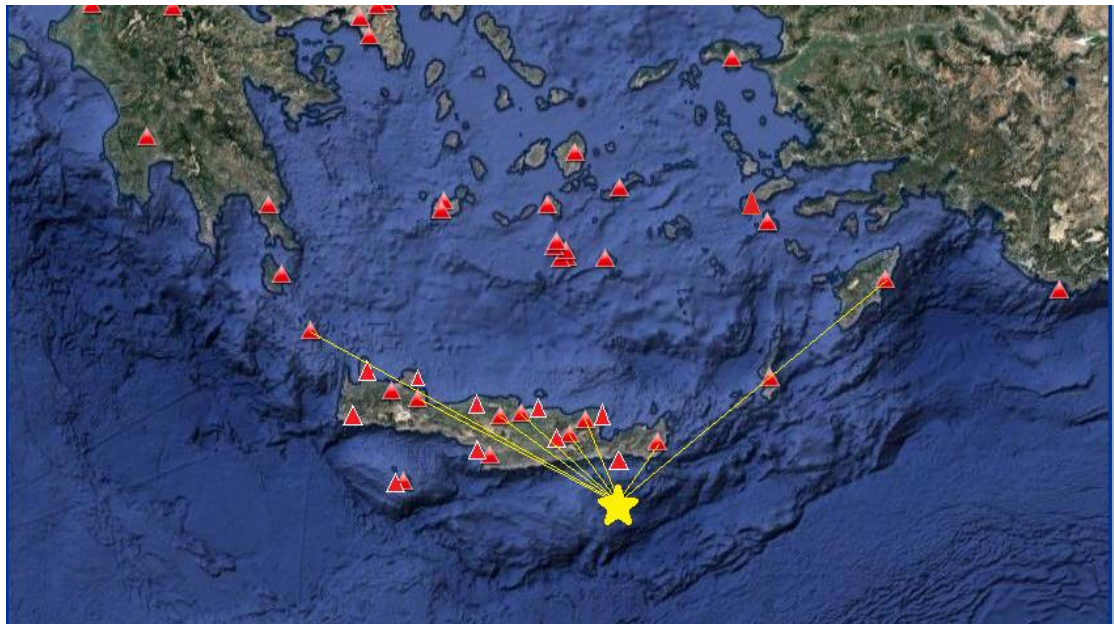
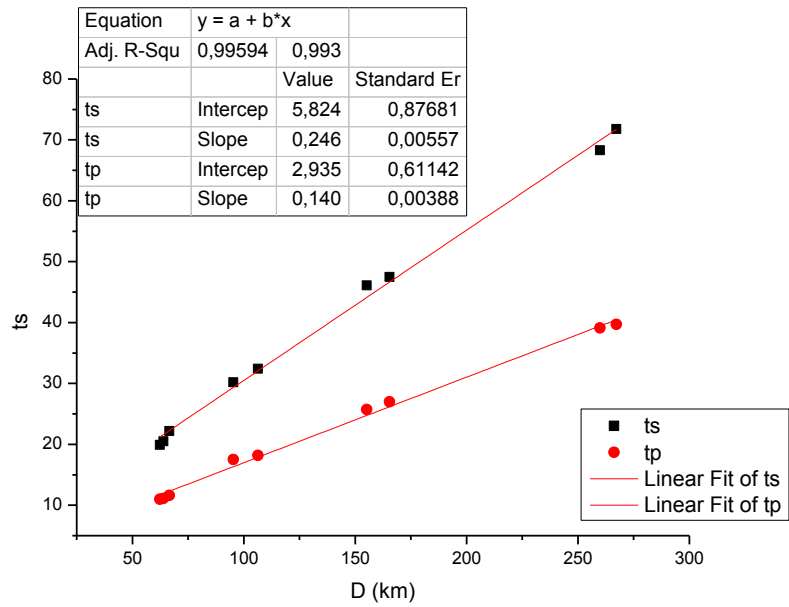




2 MARCH 2012 (4.3 ML 4.1 Mw , depth 33.5 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
LAST	19,9	11	8,9	52,6	62,36193
ZKR	20,5	11,1	9,4	54,5	63,97265
NPS	22,2	11,6	10,6	57,5	66,54698
IACM	30,2	17,5	12,7	89,2	95,28321
IDI	32,4	18,2	14,2	100,9	106,3159
KARP	46,1	25,7	20,4	151,5	155,1596
VAM	47,5	27	20,5	162	165,4275
ANKY	68,3	39,1	29,2	257,7	259,8683
ARG	71,8	39,7	32,1	265,1	267,2083

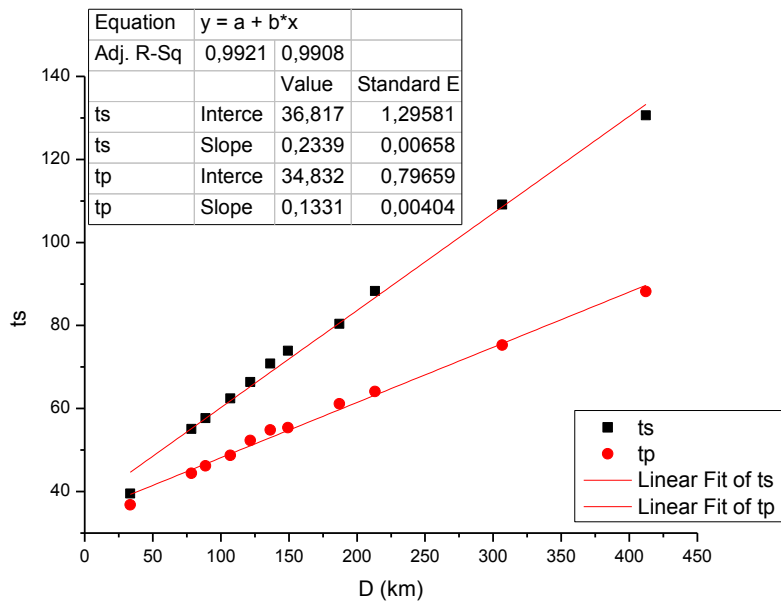
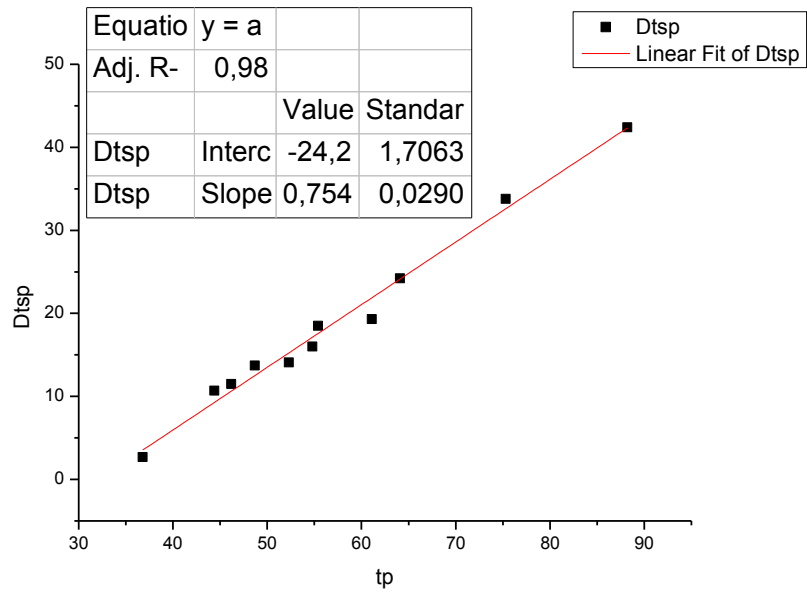


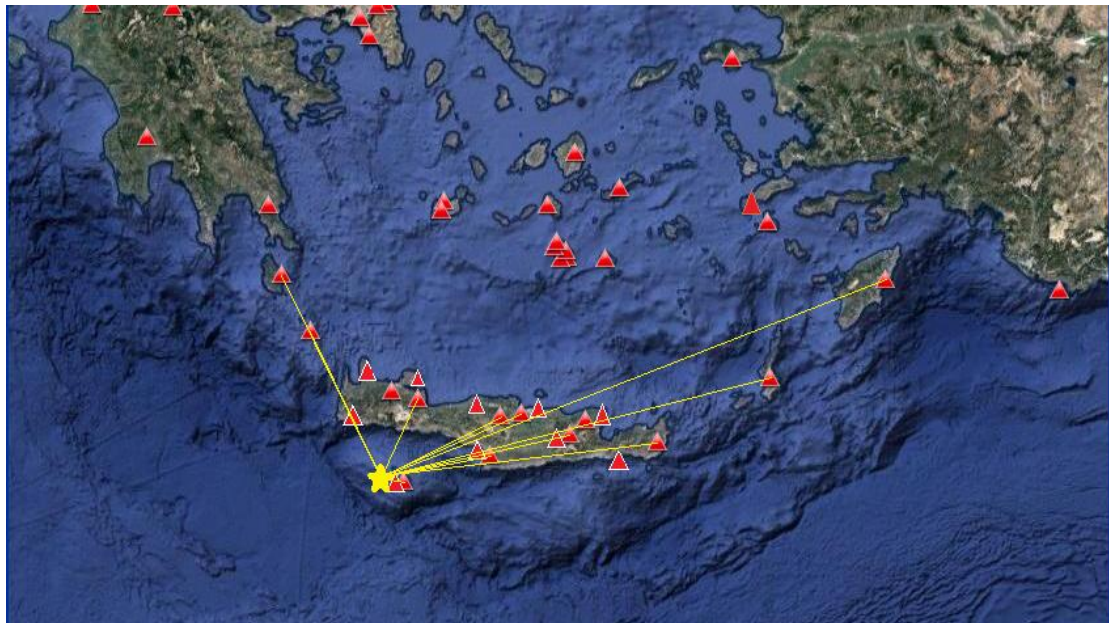


8 MARCH 2012 (4.2 ML 4.2 Mw, depth 30.3 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	39,5	36,8	2,7	14,4	33,54773
VAM	55,1	44,4	10,7	72,4	78,48471
SIVA	57,7	46,2	11,5	83,5	88,82759
IDI	62,4	48,7	13,7	102,7	107,0765
IACM	66,4	52,3	14,1	117,9	121,7313
ANKY	70,8	54,8	16	132,9	136,3103
LAST	73,9	55,4	18,5	146,2	149,3068
KTHR	80,4	61,1	19,3	184,6	187,0702
ZKR	88,3	64,1	24,2	211	213,1645

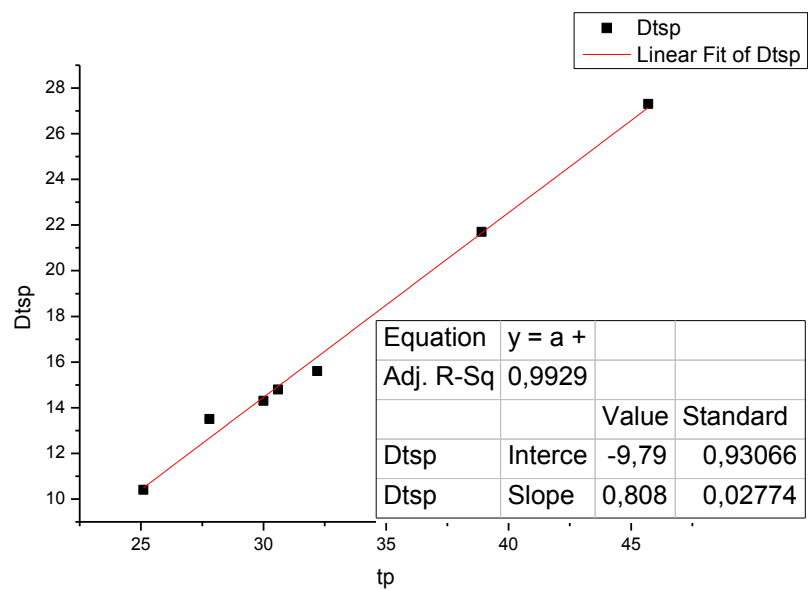
KARP	109,1	75,3	33,8	305,2	306,7004
ARG	130,6	88,2	42,4	411	412,1154

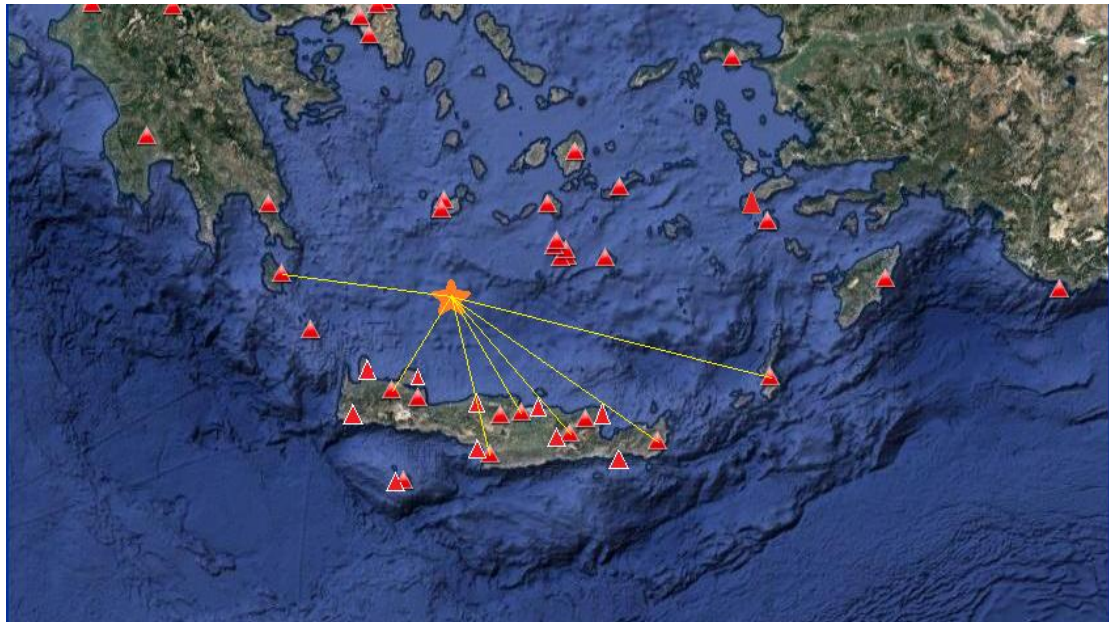
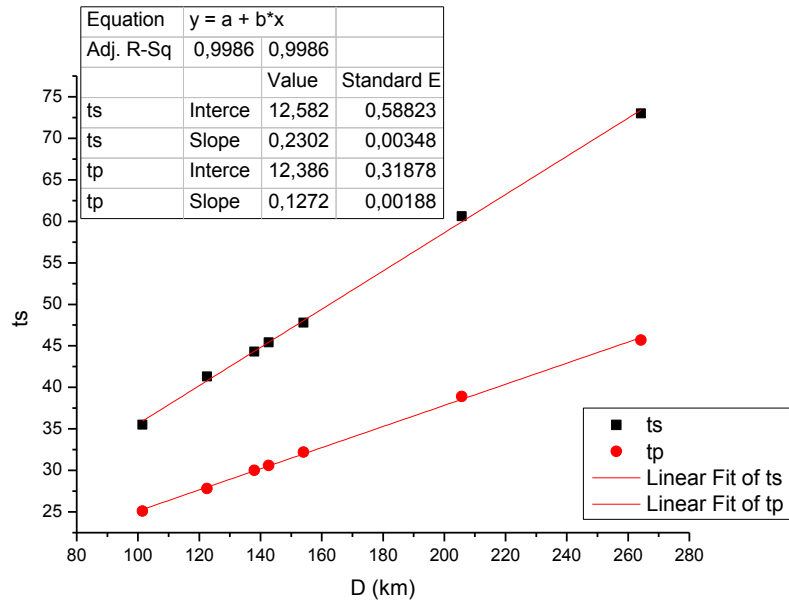




20MARCH 2012 (4.6 ML 4.5 Mw, depth 67.5 km)

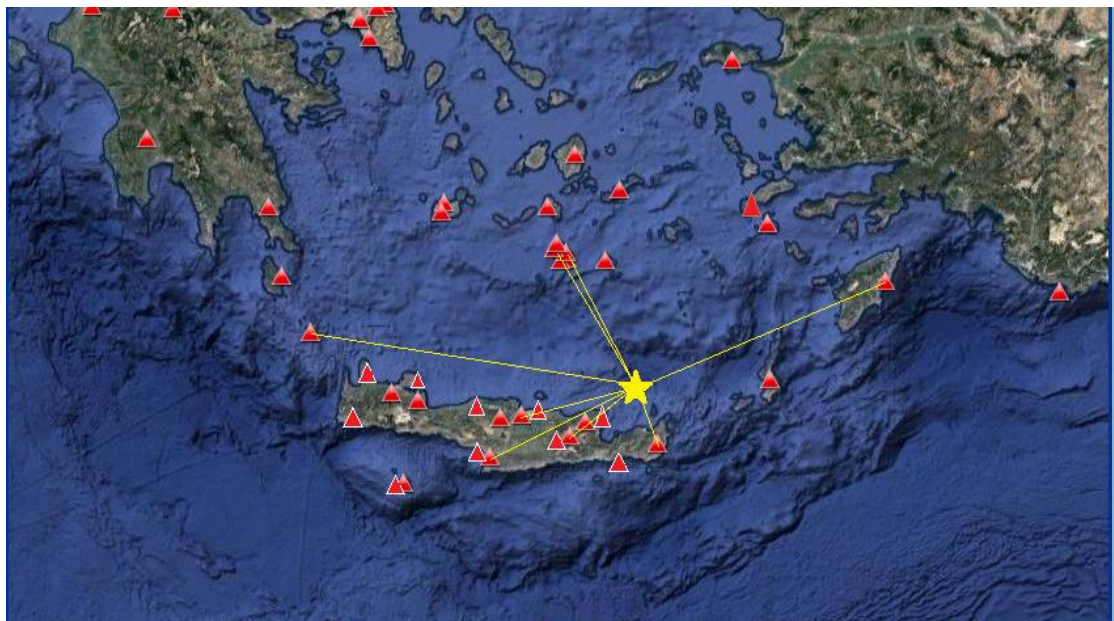
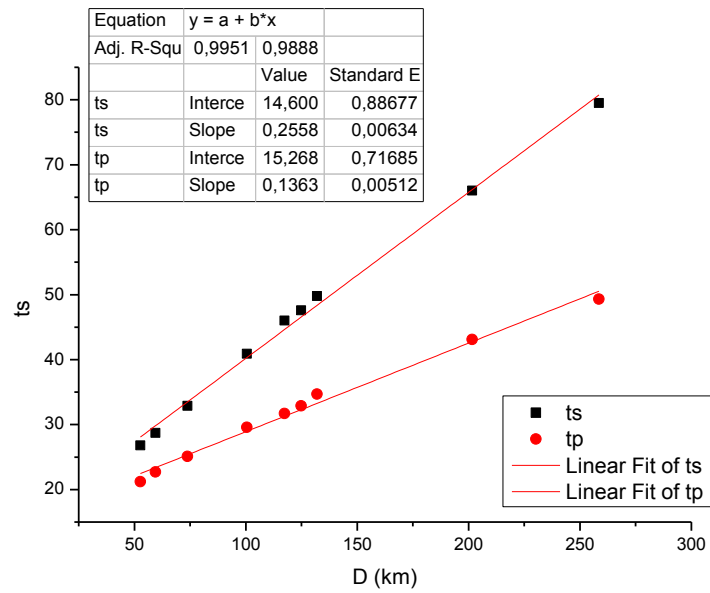
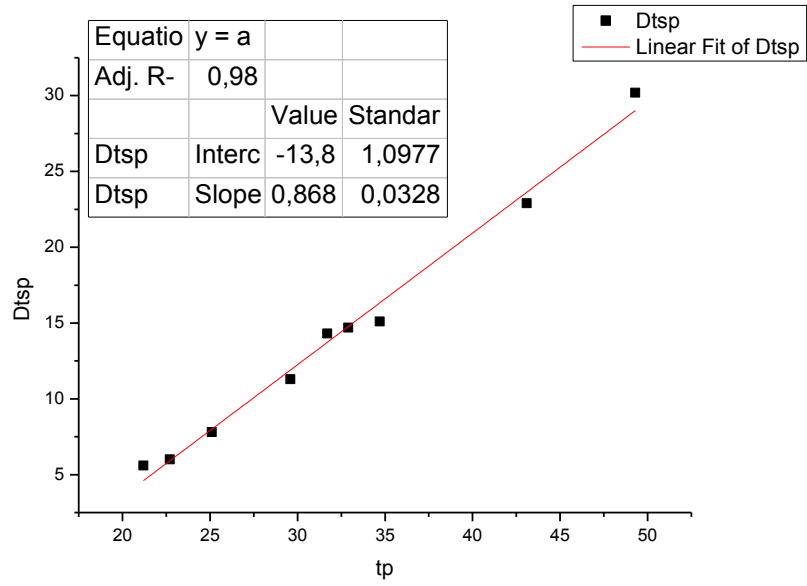
station	ts	tp	Dtsp	Dop(km)	D(km)
IMMV	35,5	25,1	10,4	75,8	101,4982
IACM	41,3	27,8	13,5	102,3	122,5624
SIVA	44,3	30	14,3	120,4	138,0305
KTHR	45,4	30,6	14,8	125,7	142,677
LAST	47,8	32,2	15,6	138,5	154,073
ZKR	60,6	38,9	21,7	194,3	205,6909
KARP	73	45,7	27,3	255,4	264,1693





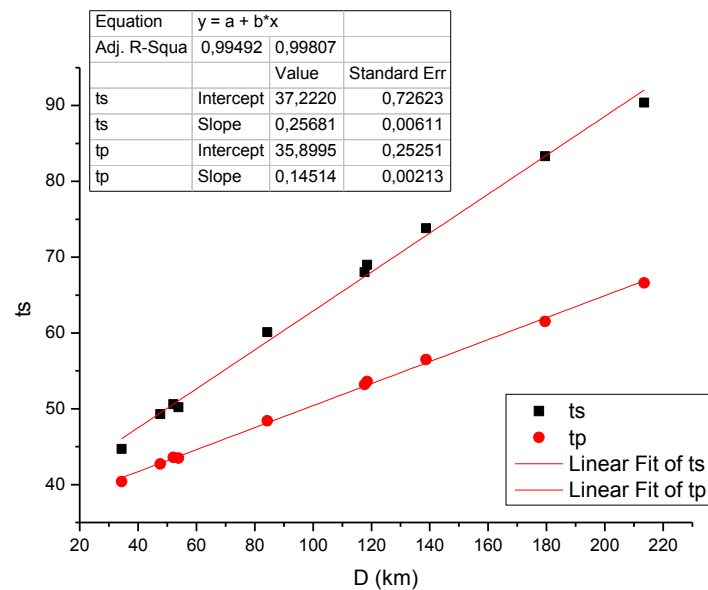
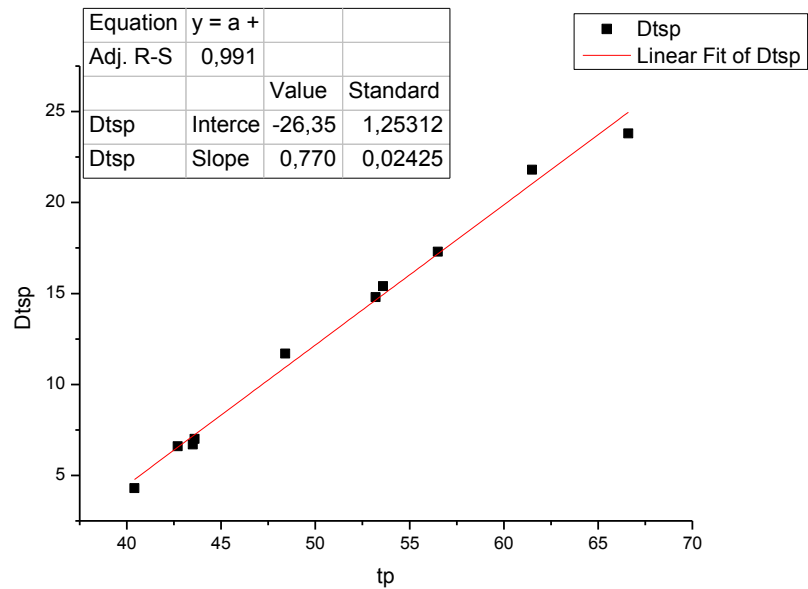
22 MARCH 2012 (4,1 ML 4.4 Mw, depth30.2km)

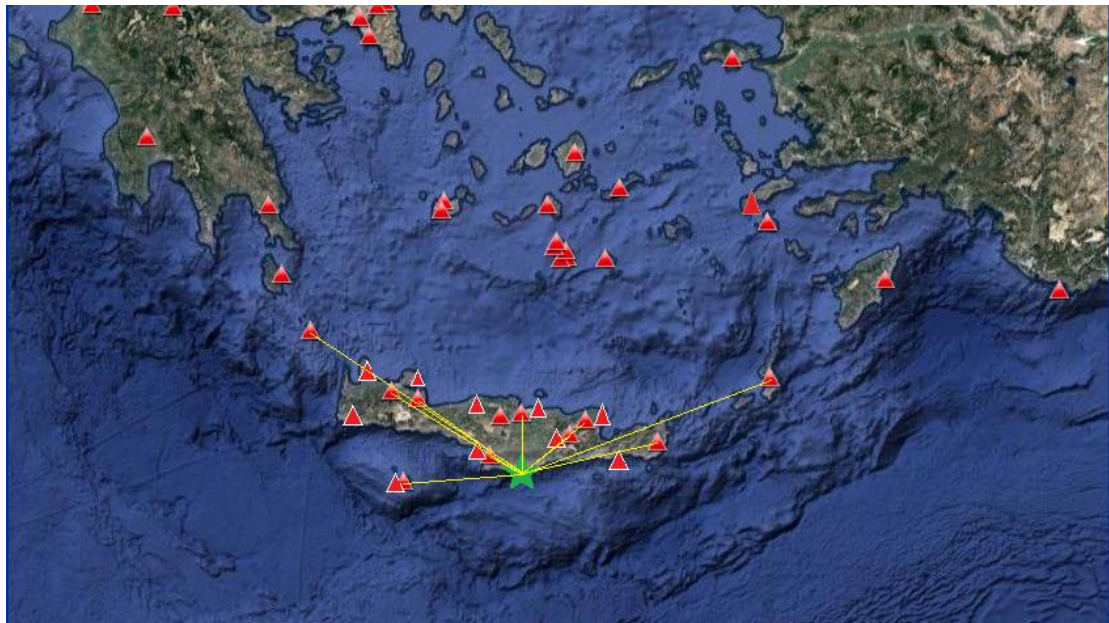
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	26,8	21,2	5,6	43,2	52,70939
NPS	28,7	22,7	6	51,3	59,52924
LAST	32,9	25,1	7,8	67,4	73,85662
IACM	40,9	29,6	11,3	95,8	100,4474
SANT	46	31,7	14,3	113,4	117,3525
THT2	47,6	32,9	14,7	121,2	124,9059
SIVA	49,8	34,7	15,1	128,5	132,0011
ARG	66	43,1	22,9	199,4	201,674
ANKY	79,5	49,3	30,2	256,8	258,5697



23 APRIL 2012 (4.5 ML 4.7 Mw , depth20.8km)

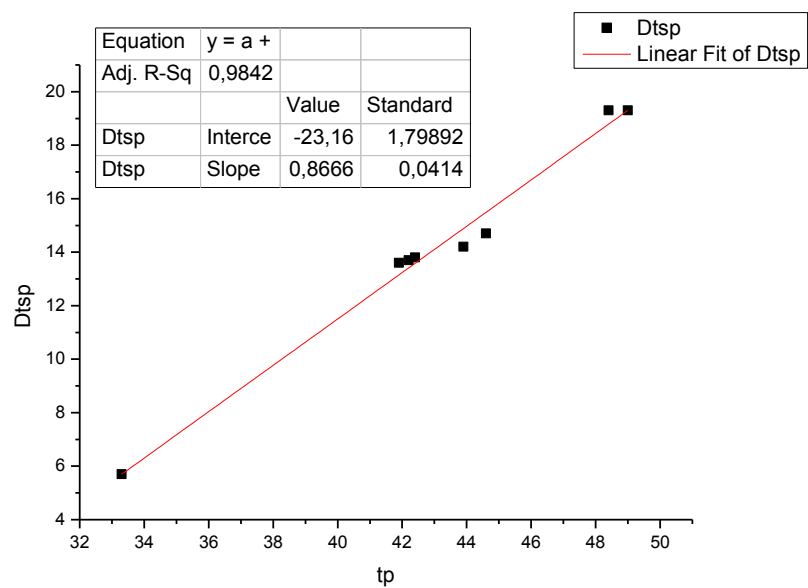
station	ts	tp	Dtsp	Dop(km)	D(km)
LAST	44,7	40,4	4,3	27,4	34,40058
NPS	49,3	42,7	6,6	42,9	47,67651
SIVA	50,2	43,5	6,7	49,7	53,87699
IACM	50,6	43,6	7	47,8	52,12945
ZKR	60,1	48,4	11,7	81,7	84,30617
GVD	68	53,2	14,8	115,8	117,6532
VAM	69	53,6	15,4	116,7	118,5391
IMMV	73,8	56,5	17,3	137,2	138,7677
KARP	83,3	61,5	21,8	178,3	179,5091
AMKY	90,4	66,6	23,8	212,5	213,5155

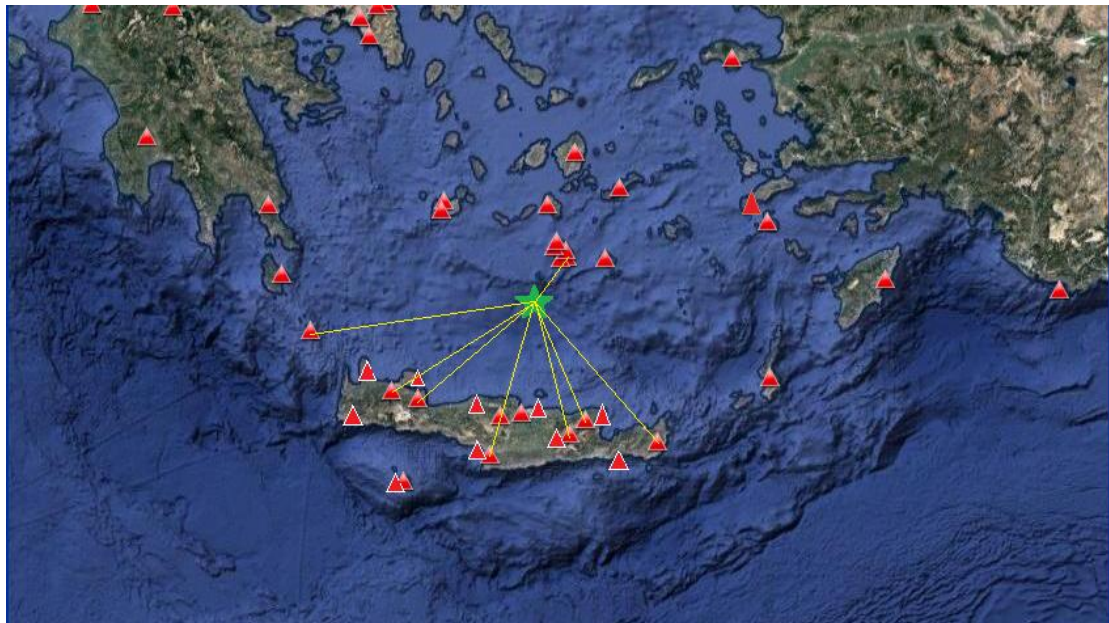
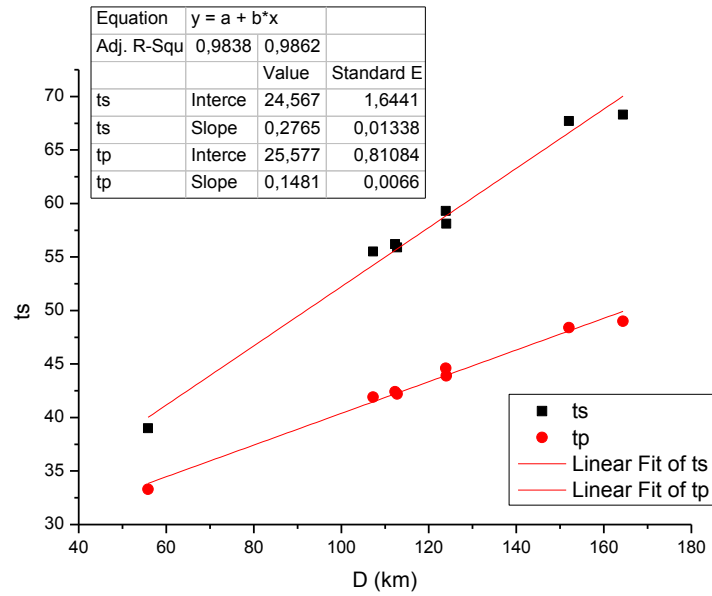




30 APRIL 2012 (4 ML 4.1 Mw , depth 29.7)

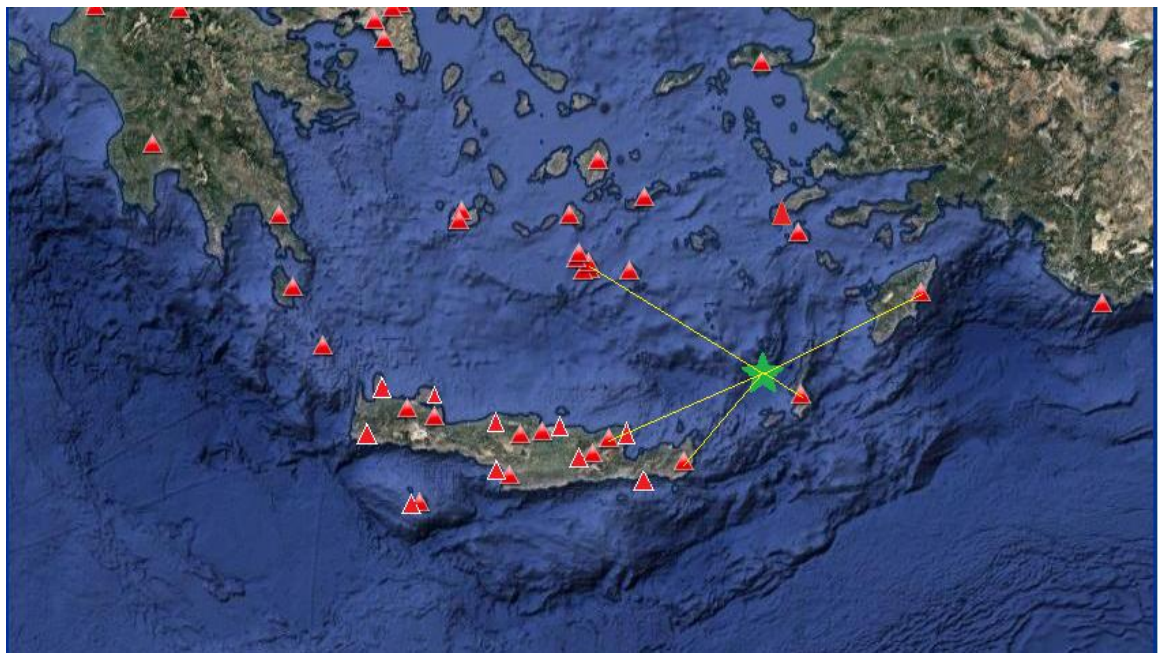
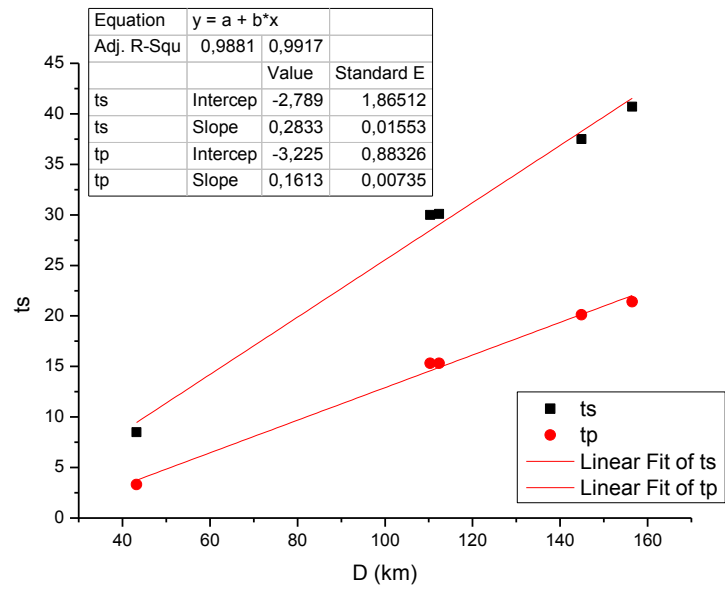
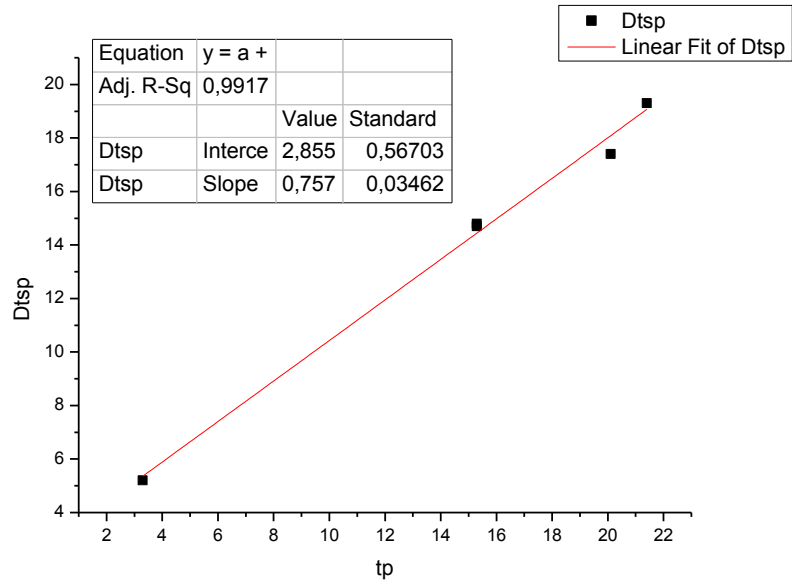
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	39	33,3	5,7	47,3	55,85141
NPS	55,5	41,9	13,6	103,1	107,2926
VAM	55,9	42,2	13,7	108,8	112,7809
LAST	56,2	42,4	13,8	108,3	112,2986
IMMV	58,1	43,9	14,2	120,4	124,0091
SIVA	59,3	44,6	14,7	120,3	123,912
ZKR	67,7	48,4	19,3	149,1	152,0293
ANKY	68,3	49	19,3	161,7	164,4049





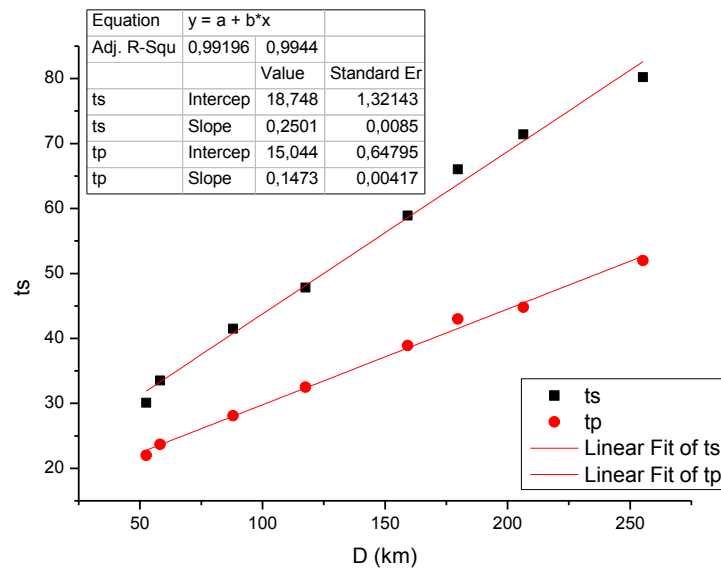
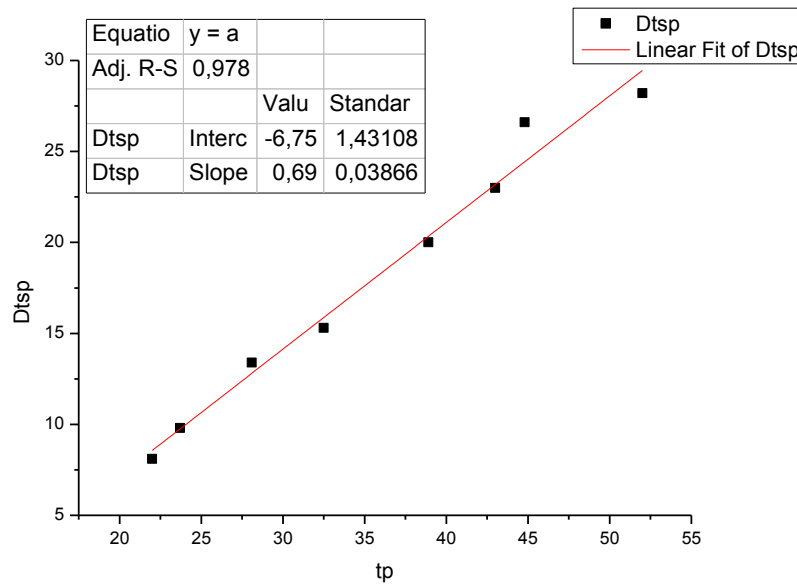
17 MAY 2012 (4 ML 3.7 Mw , depth28.9km)

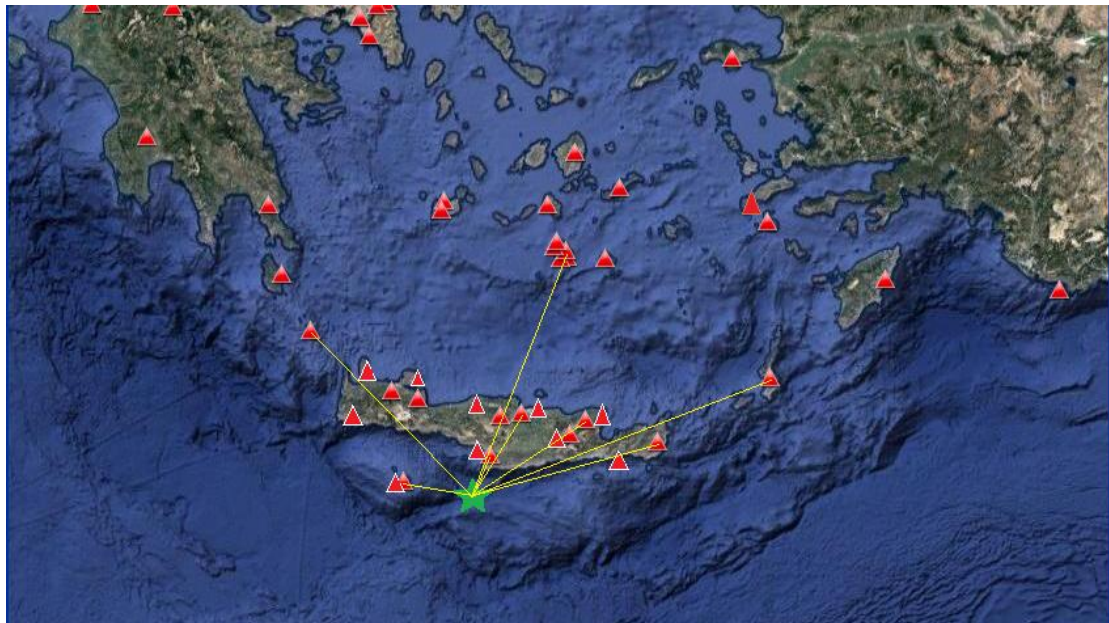
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	8,5	3,3	5,2	32,1	43,19282
ZKR	30	15,3	14,7	106,5	110,3515
ARG	30,1	15,3	14,8	108,6	112,3796
NPS	37,5	20,1	17,4	142	144,911
SANT	40,7	21,4	19,3	153,8	156,4917



26 MAY 2012 (4.1 ML 4.1 Mw ,depth29.9km)

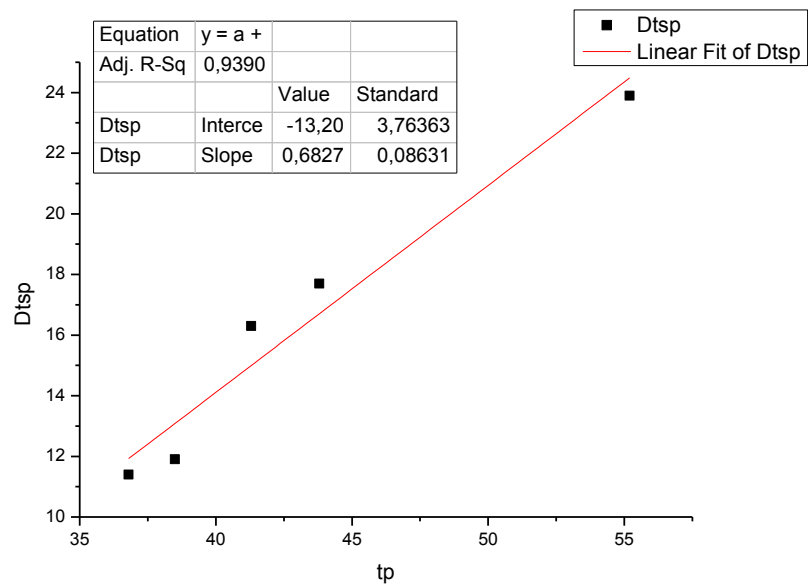
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	30,1	22	8,1	43,3	52,62034
GVD	33,5	23,7	9,8	49,9	58,17233
IACM	41,5	28,1	13,4	82,8	88,03323
NPS	47,8	32,5	15,3	113,7	117,5657
ZKR	58,9	38,9	20	156,4	159,2324
ANKY	66	43	23	177,2	179,7049
SANT	71,4	44,8	26,6	204,3	206,4764
KARP	80,2	52	28,2	253,5	255,2572

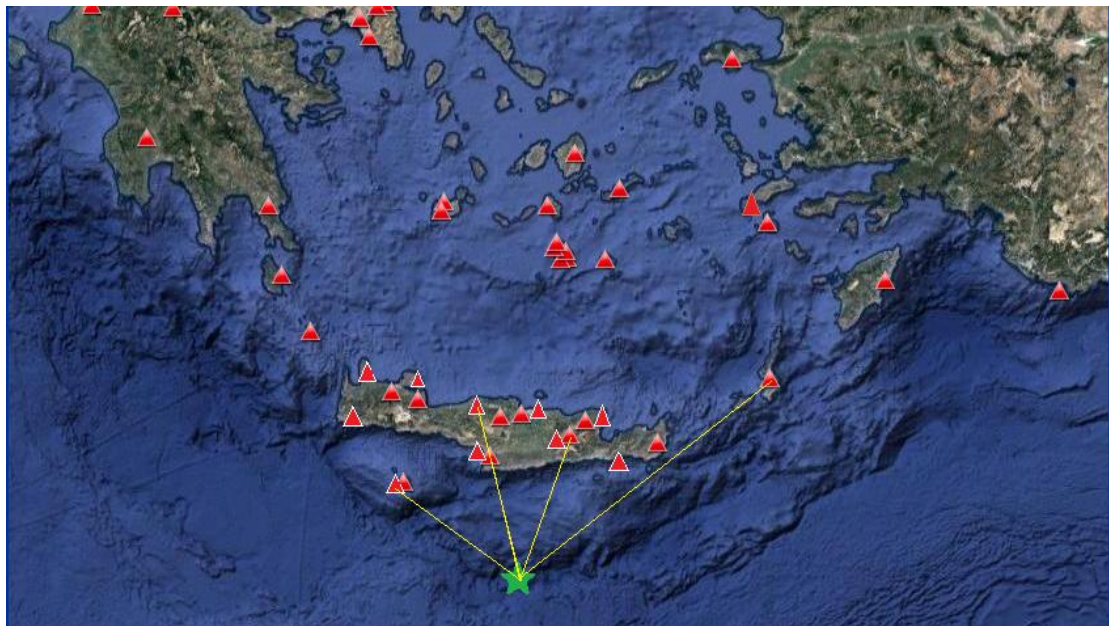
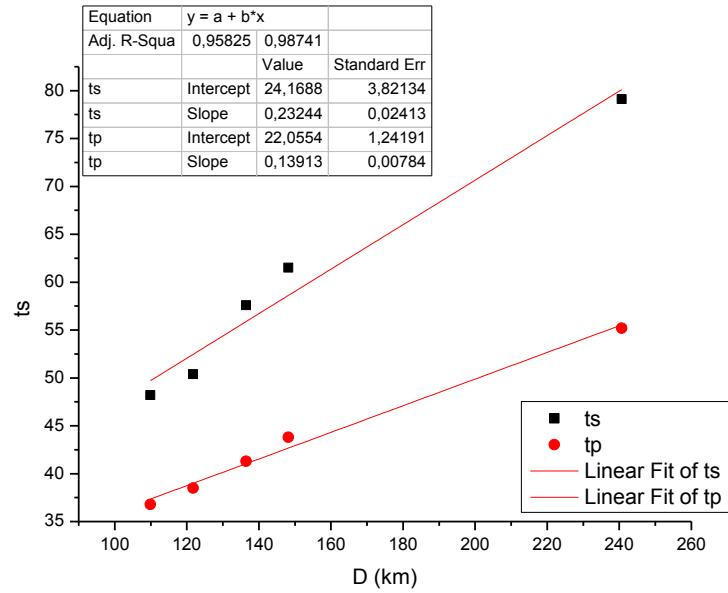




18 JULY 2012 (4.4 ML 4.4 Mw , depth 27.2km)

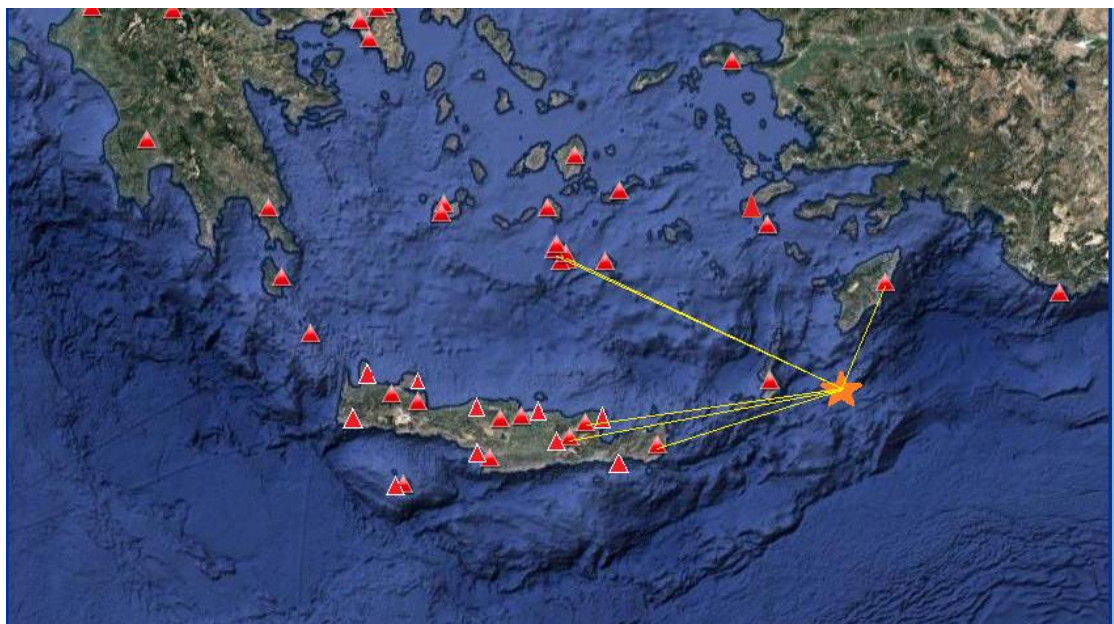
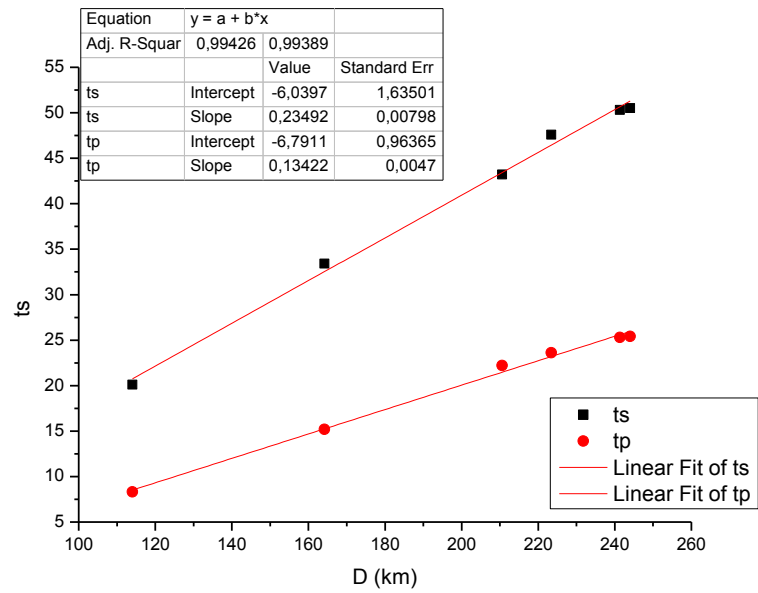
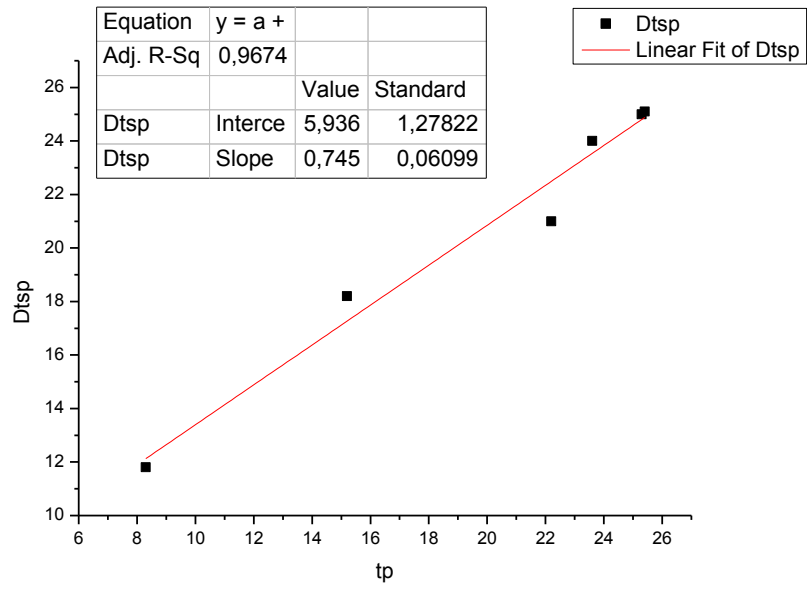
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	48,2	36,8	11,4	106,5	109,9186
LAST	50,4	38,5	11,9	118,7	121,7766
GVDS	57,6	41,3	16,3	133,7	136,4387
PRNS	61,5	43,8	17,7	145,7	148,2172
KARP	79,1	55,2	23,9	239,1	240,6422





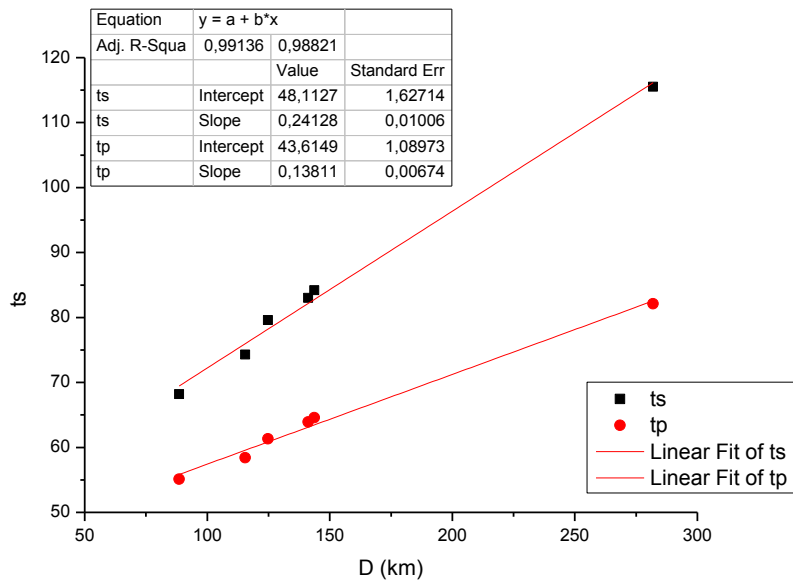
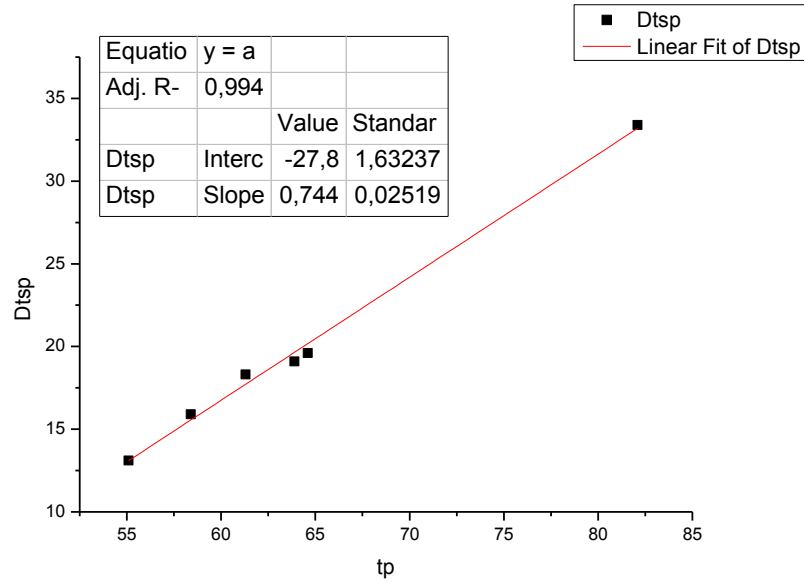
4 SEPTEMBER 2012 (4 ML 3.8 Mw, depth74.1km)

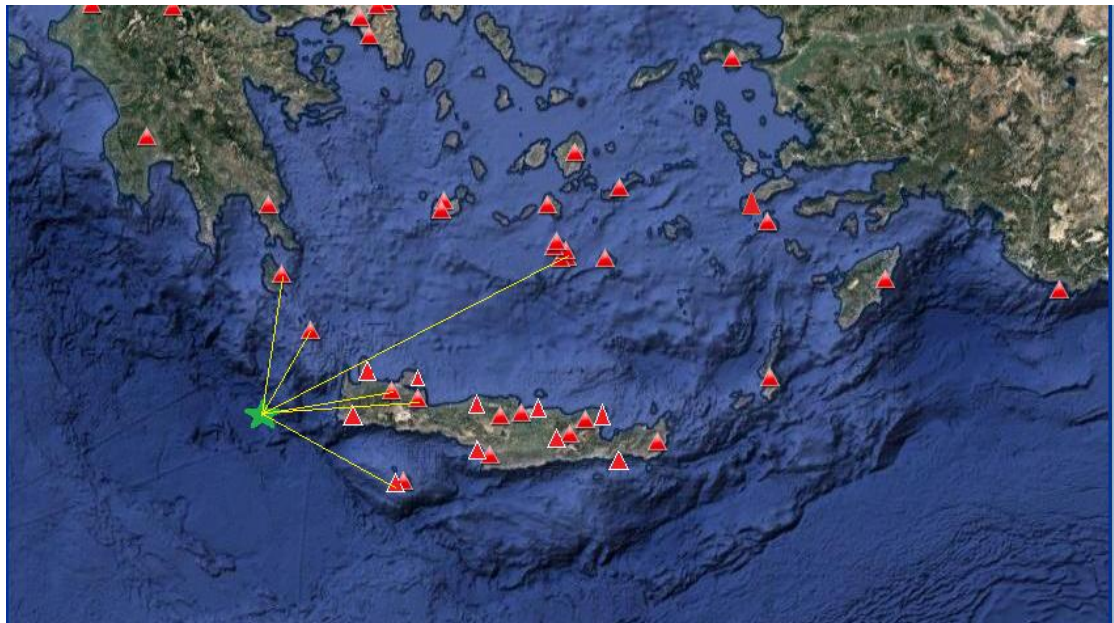
station	ts	tp	Dtsp	Dop(km)	D(km)
ARG	20,1	8,3	11,8	86,7	114,0513
ZKR	33,4	15,2	18,2	146,5	164,1739
NPS	43,2	22,2	21	197,1	210,5688
LAST	47,6	23,6	24	210,8	223,4445
SANT	50,3	25,3	25	229,7	241,3564
THT2	50,5	25,4	25,1	232,5	244,0227



21 SEPTEMBER 2012 (4.8 ML 5.1 Mw , depth 16.4km)

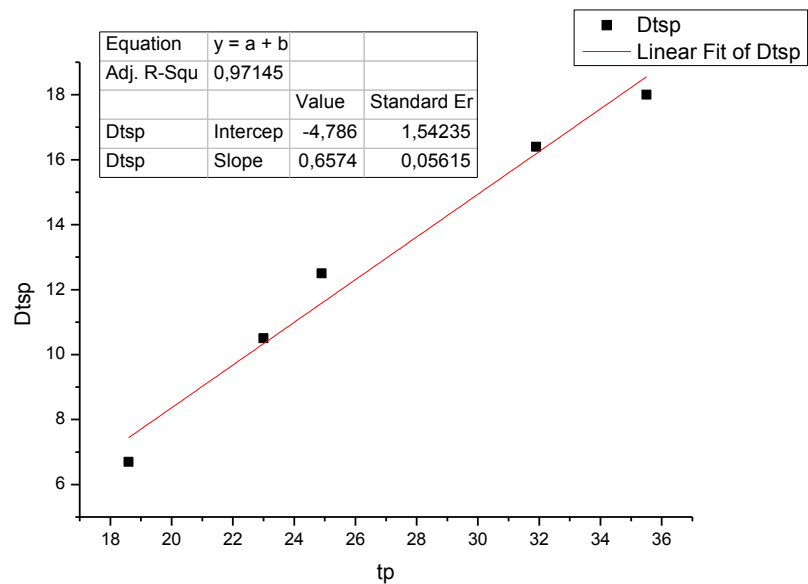
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	68,2	55,1	13,1	35,7	39,28677
KTHR	74,3	58,4	15,9	68,7	70,63038
IMMV	79,6	61,3	18,3	109,5	110,7213
GVDS	83	63,9	19,1	121,4	122,5027
VAM	84,2	64,6	19,6	148,7	149,6016
SANT	115,5	82,1	33,4	229,4	229,9855

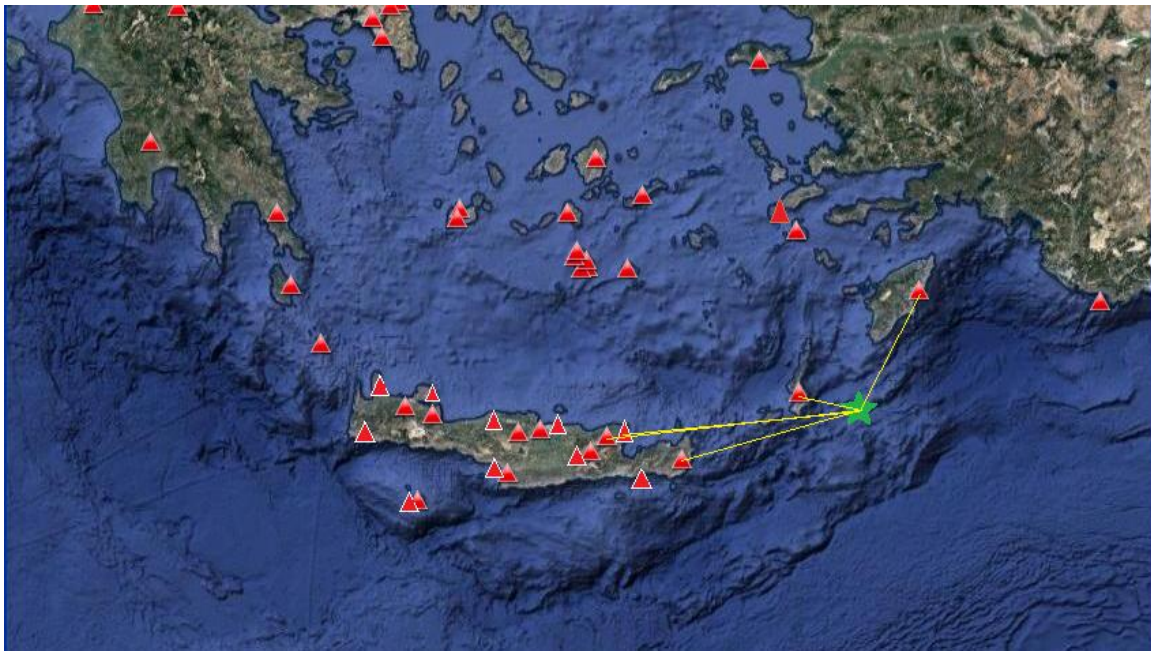
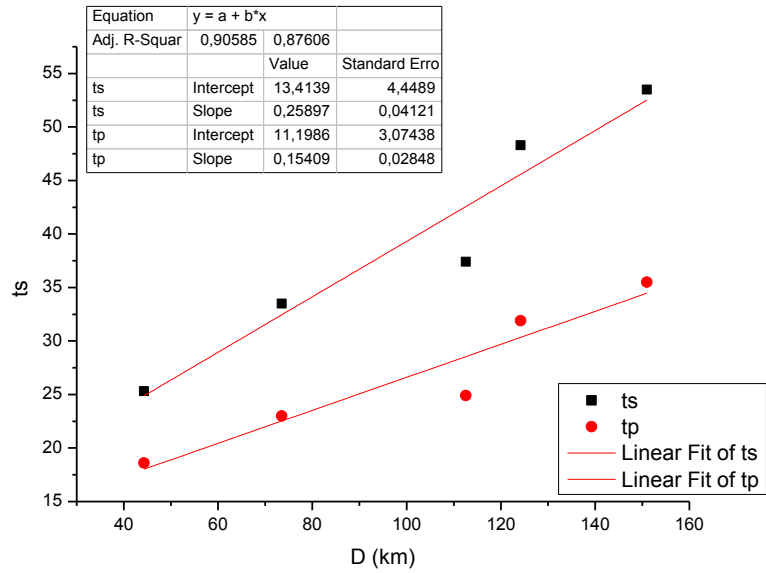




22 SEPTEMBER 2012 (4 ML 4.2 Mw ,depth 26.2km)

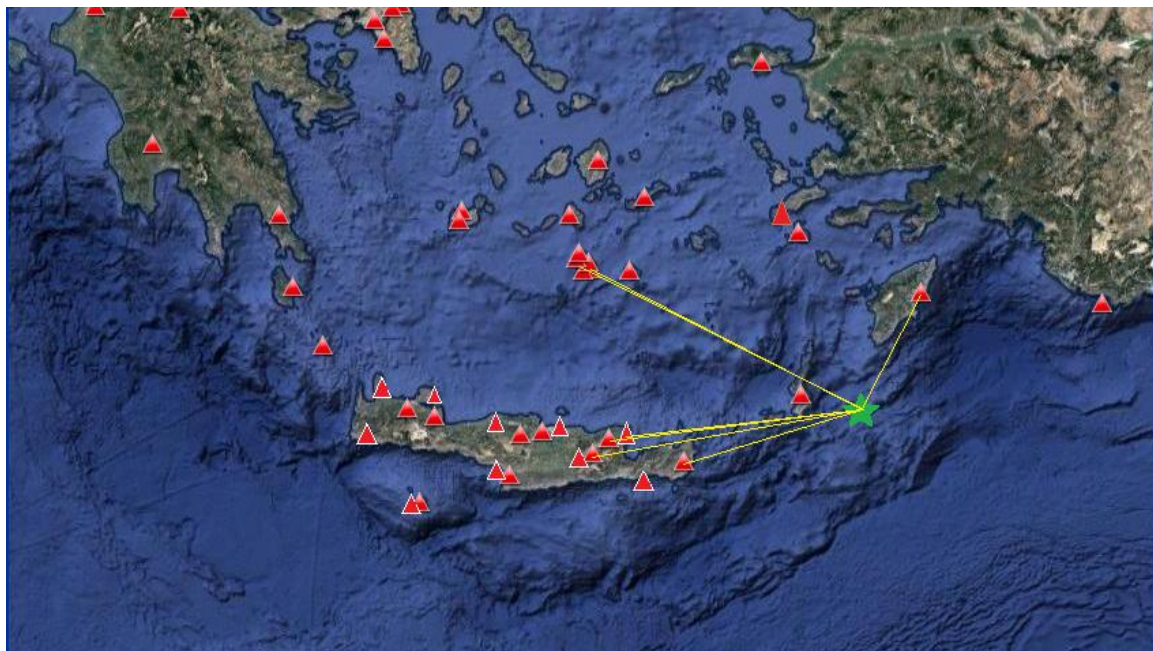
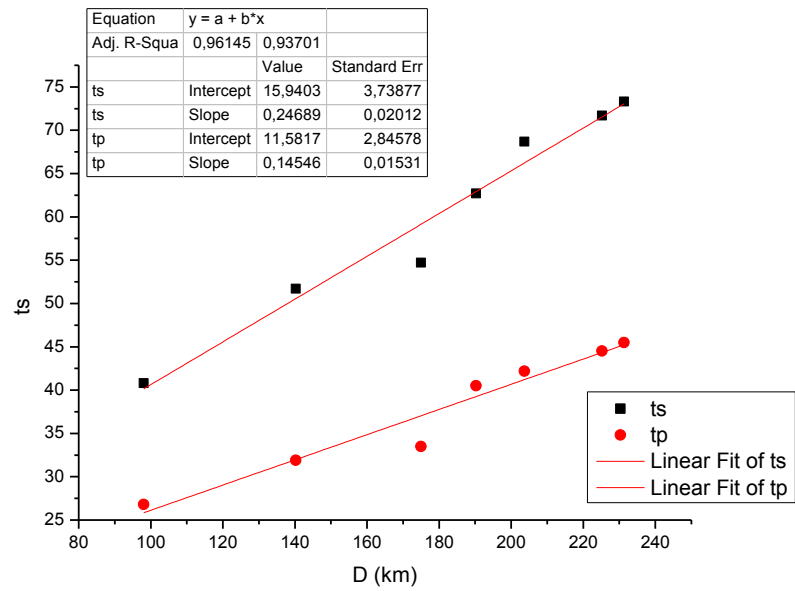
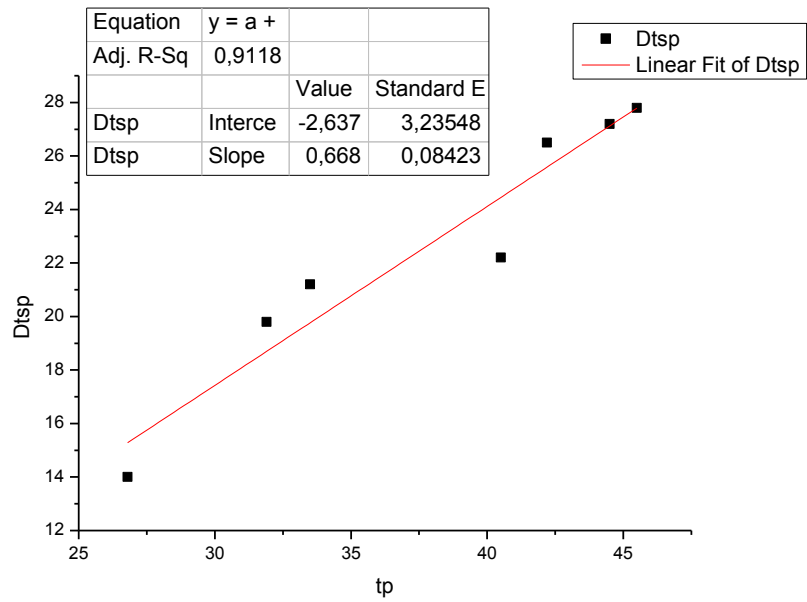
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	25,3	18,6	6,7	35,7	44,28239
ZKR	33,5	23	10,5	68,7	73,52639
STIA	37,4	24,9	12,5	109,5	112,5908
NPS	48,3	31,9	16,4	121,4	124,195
ARG	53,5	35,5	18	148,7	150,9905





16 DECEMBER 2012 (4.1 ML 4.2 Mw , depth 29.9km)

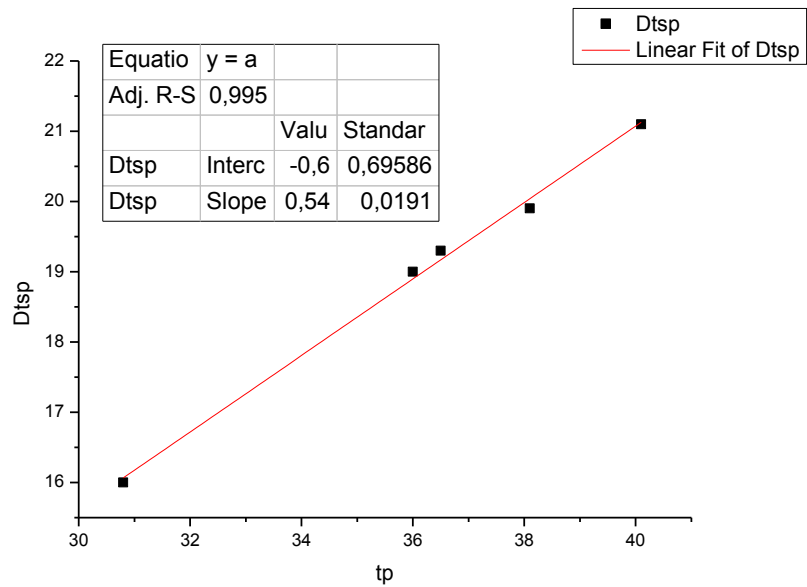
station	ts	tp	Dtsp	Dop(km)	D(km)
ARG	40,8	26,8	14	93,4	98,06921
ZKR	51,7	31,9	19,8	137	140,2249
STIA	54,7	33,5	21,2	172,4	174,9736
NPS	62,7	40,5	22,2	187,9	190,2641
LAST	68,7	42,2	26,5	201,5	203,7063
SANT	71,7	44,5	27,2	223,2	225,1938
THT2	73,3	45,5	27,8	229,4	231,3404

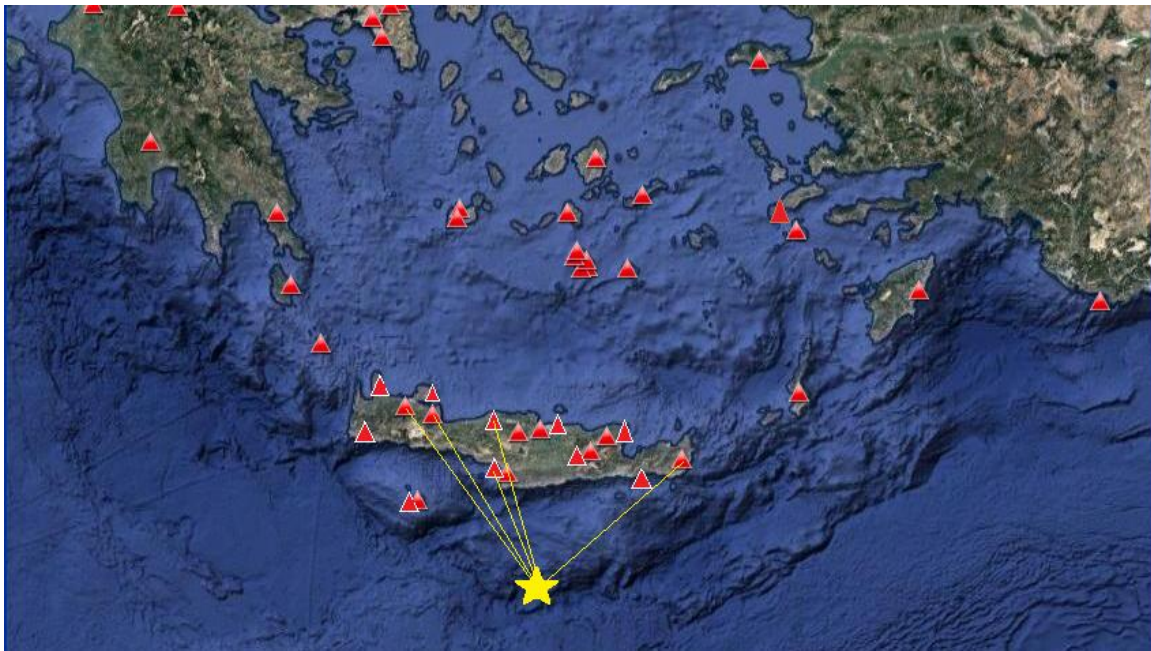
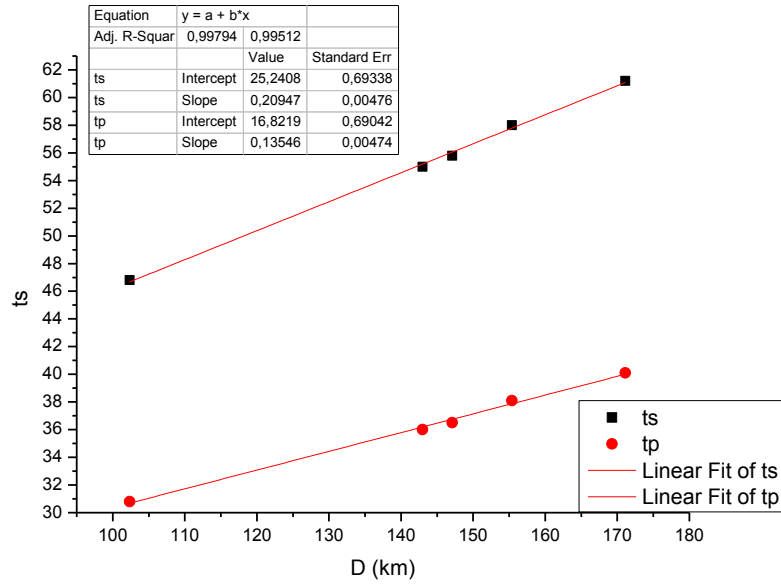


EARTHQUAKES DURING 2013

3 JANUARY 2013 (4.1 ML 4.3 Mw ,depth 42.3km)

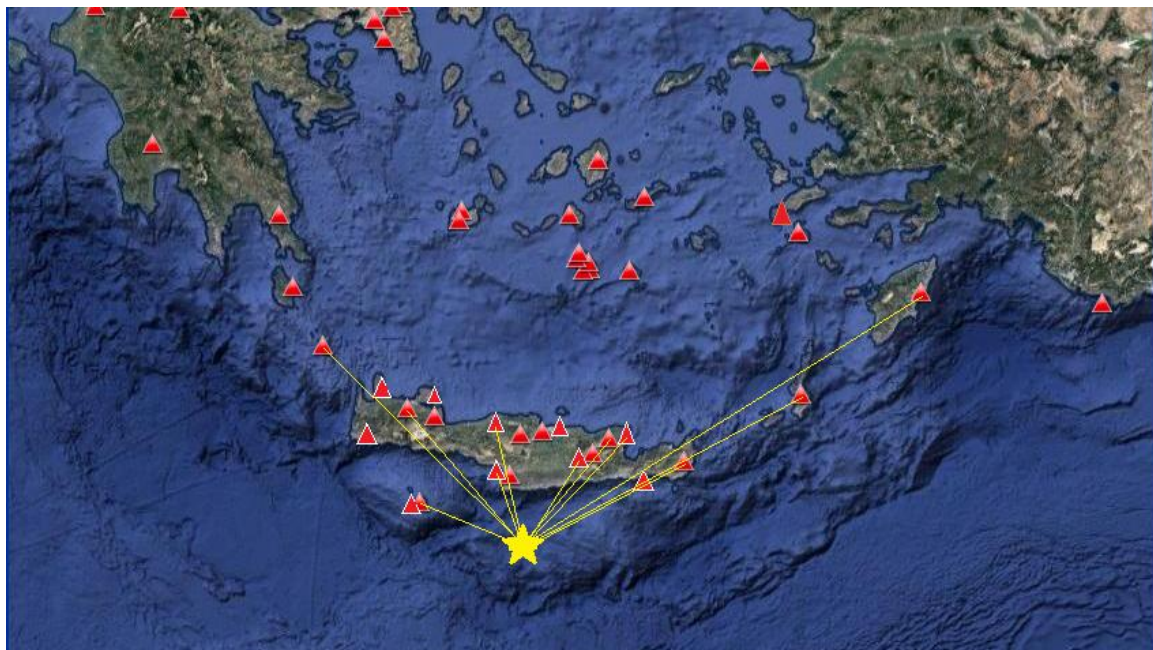
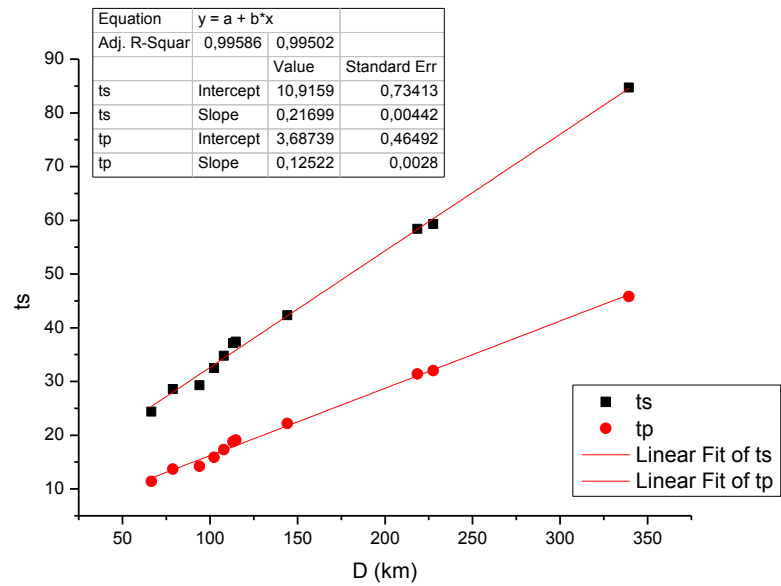
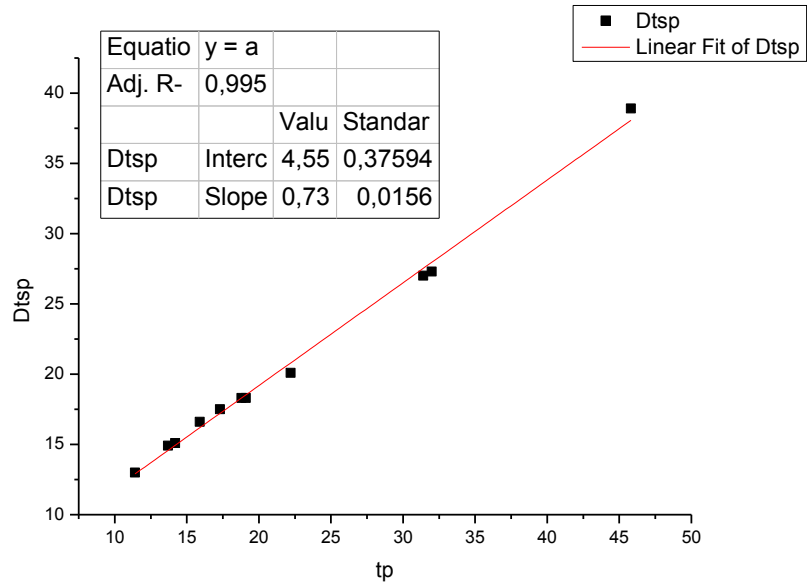
station	ts	tp	Dtsp	Dop(km)	D(km)
TMBK	46,8	30,8	16	93,2	102,35
PRNS	55	36	19	136,6	142,9995
ZKR	55,8	36,5	19,3	140,9	147,1125
VAM	58	38,1	19,9	149,5	155,369
IMMV	61,2	40,1	21,1	165,8	171,1109





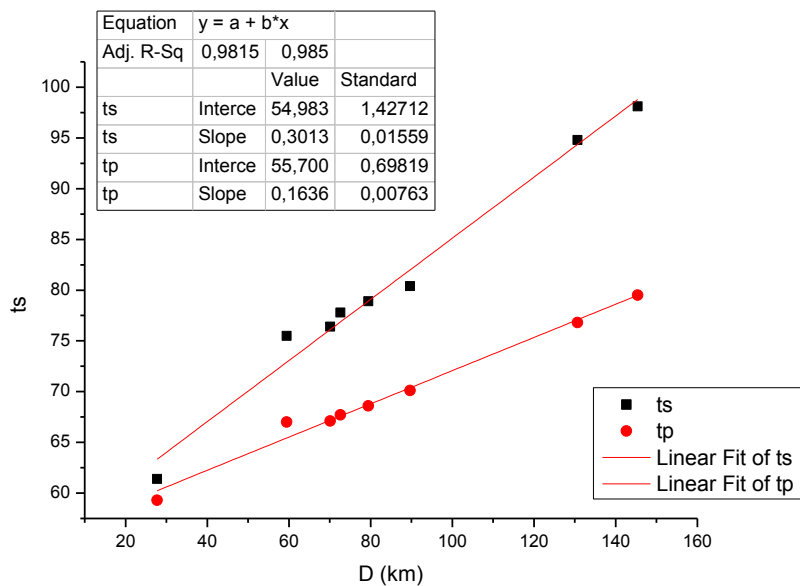
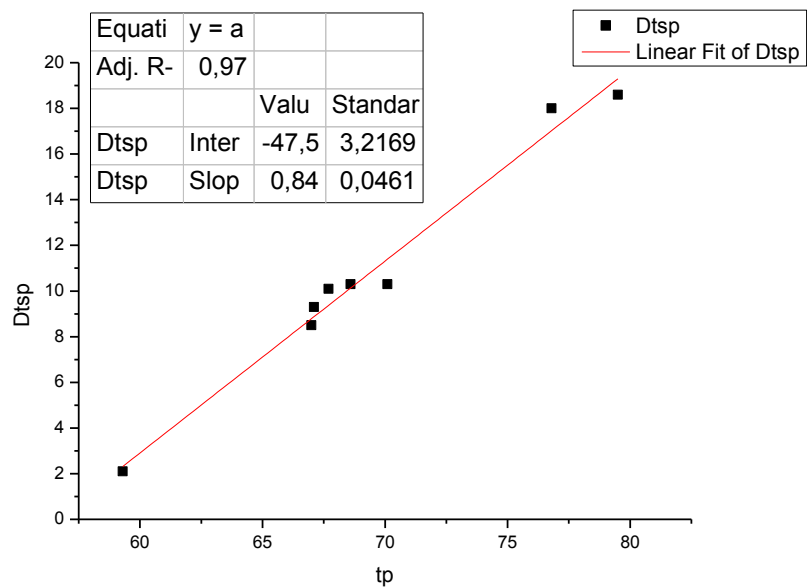
2 FEBRUARY 2013 (4.1 ML 4.5 Mw ,depth 31.4km)

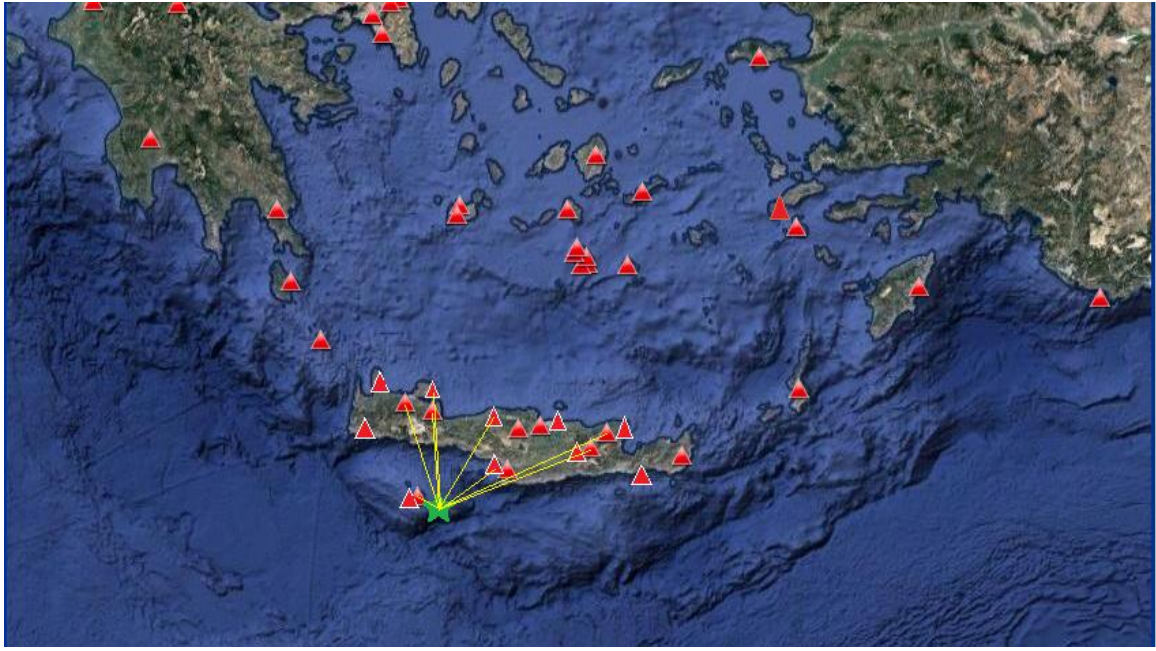
station	ts	tp	Dtsp	Dop(km)	D(km)
TMBK	24,4	11,4	13	58,6	66,48248
KSTL	28,6	13,7	14,9	72,3	78,82417
GVD	29,3	14,2	15,1	88,6	93,99957
NPS	32,5	15,9	16,6	97,4	102,3363
PRNS	34,8	17,3	17,5	103,2	107,8712
STIA	37,1	18,8	18,3	108,7	113,1444
ZKR	37,4	19,1	18,3	110,5	114,8748
IMMV	42,3	22,2	20,1	140,7	144,1612
ANKY	58,4	31,4	27	216,2	218,4683
KARP	59,3	32	27,3	225,4	227,5766
ARG	84,7	45,8	38,9	337,9	339,3558



4 FEBRUARY 2013 (4.4 ML 4.3 Mw, depth 26.8km)

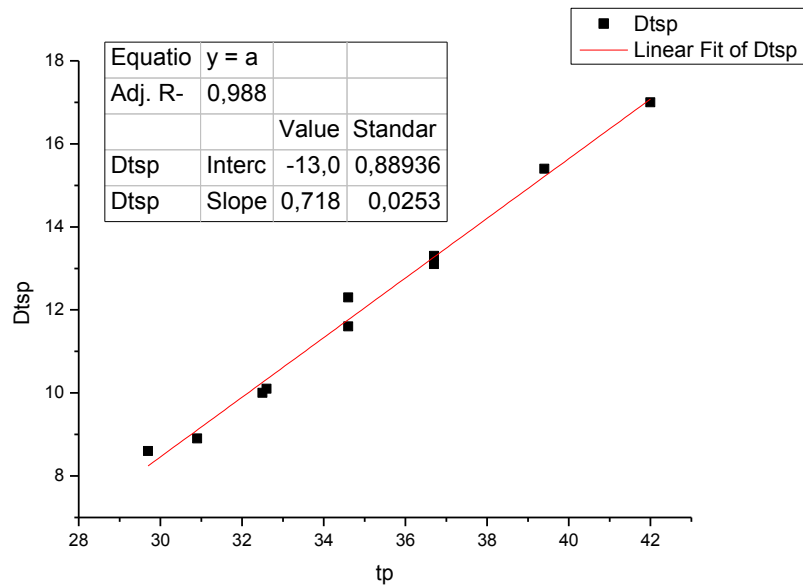
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	61,4	59,3	2,1	7,1	27,72454
TMBK	75,5	67	8,5	53,1	59,47983
PRNS	76,4	67,1	9,3	64,8	70,12332
VAM	77,8	67,7	10,1	67,5	72,62568
IMMV	78,9	68,6	10,3	74,8	79,45615
CHAN	80,4	70,1	10,3	85,6	89,69727
LAST	94,8	76,8	18	127,9	130,6777
NPS	98,1	79,5	18,6	142,9	145,3914

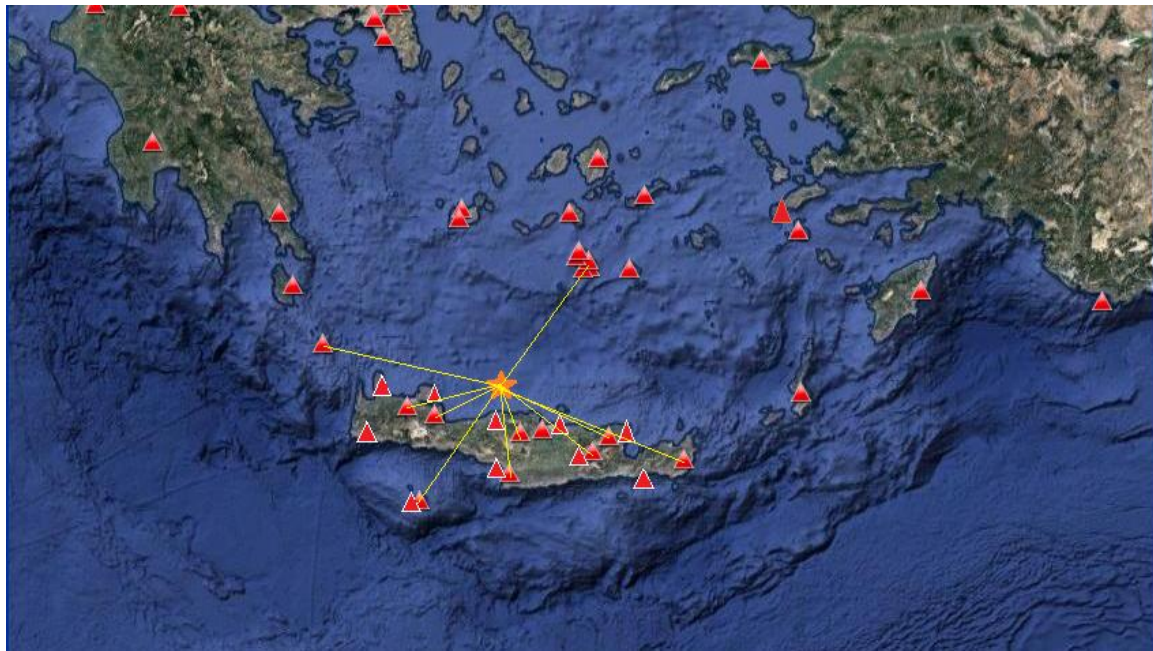
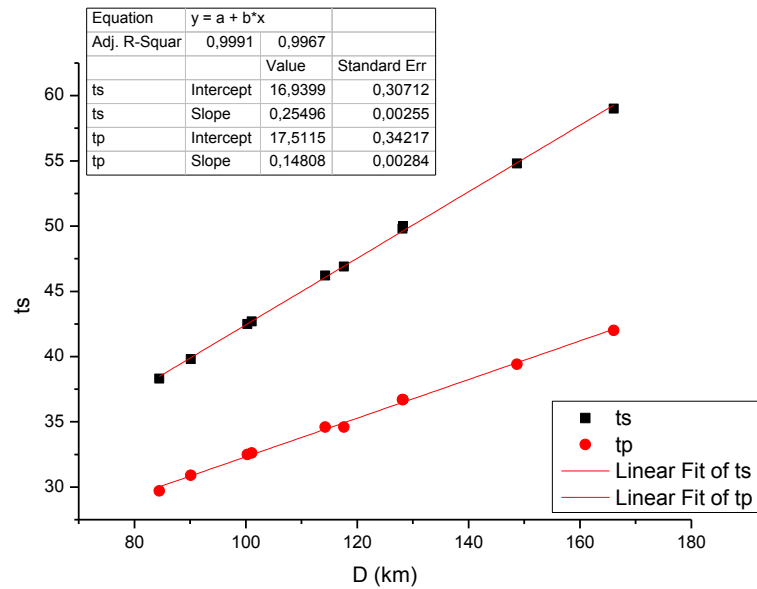




25 MARCH 2013 (4.4 ML 4.2 Mw, depth 72.9km)

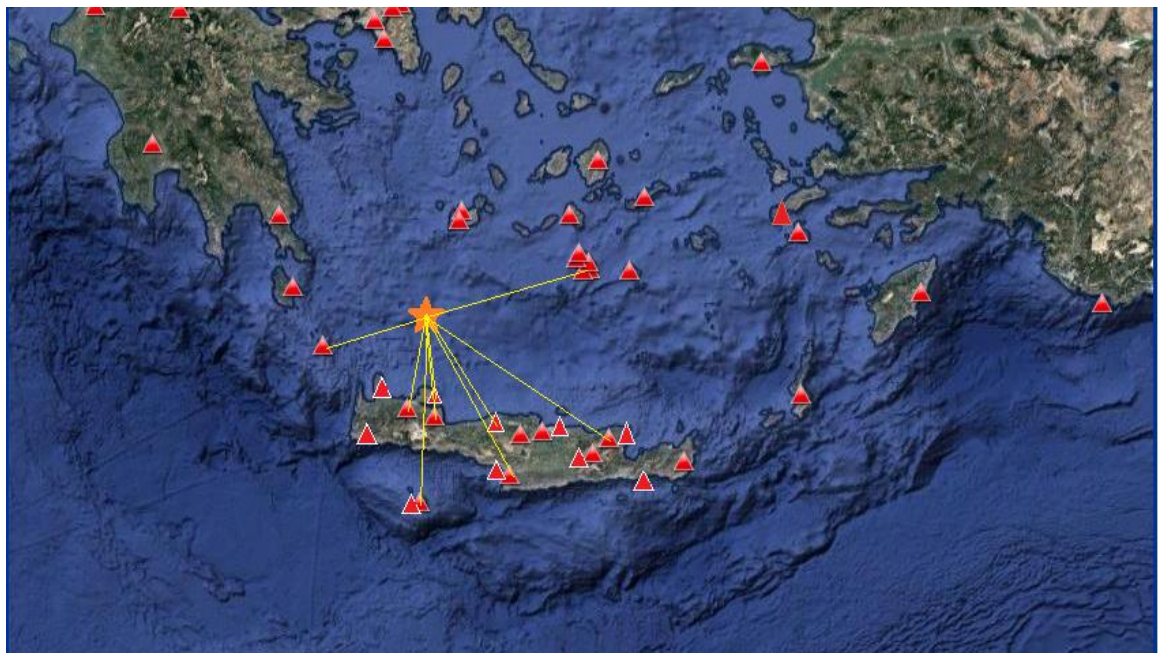
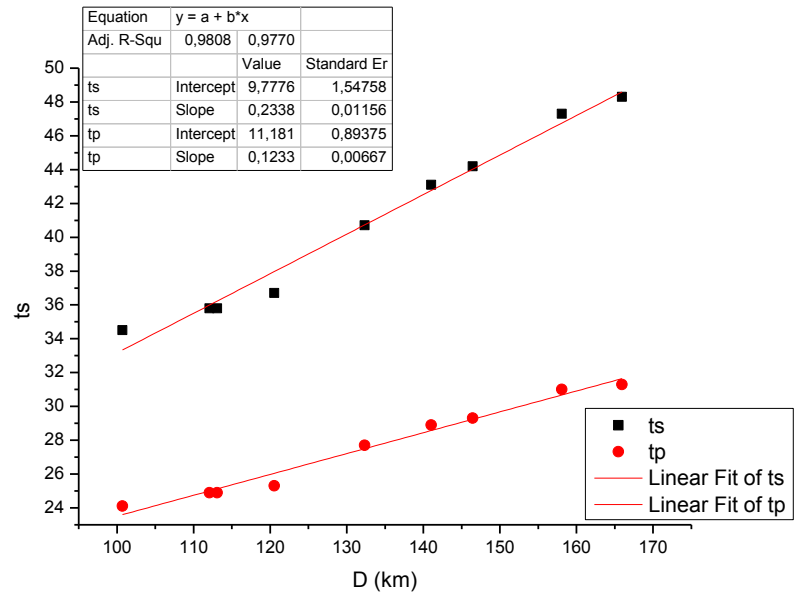
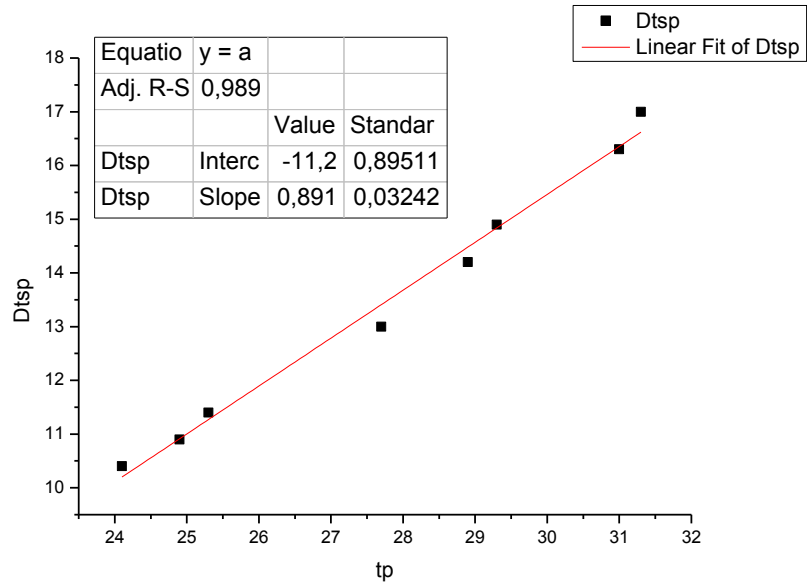
station	ts	tp	Dtsp	Dop(km)	D(km)
IDI	38,3	29,7	8,6	42,7	84,48491
VAM	39,8	30,9	8,9	53	90,12996
IMMV	42,5	32,5	10	68,9	100,3076
SIVA	42,7	32,6	10,1	70	101,0664
LAST	46,2	34,6	11,6	88	114,2734
NPS	46,9	34,6	12,3	92,3	117,6168
SANT	49,8	36,7	13,1	105,4	128,1545
GVD	50	36,7	13,3	105,5	128,2367
ANKY	54,8	39,4	15,4	129,6	148,6962
ZKR	59	42	17	149,2	166,0574





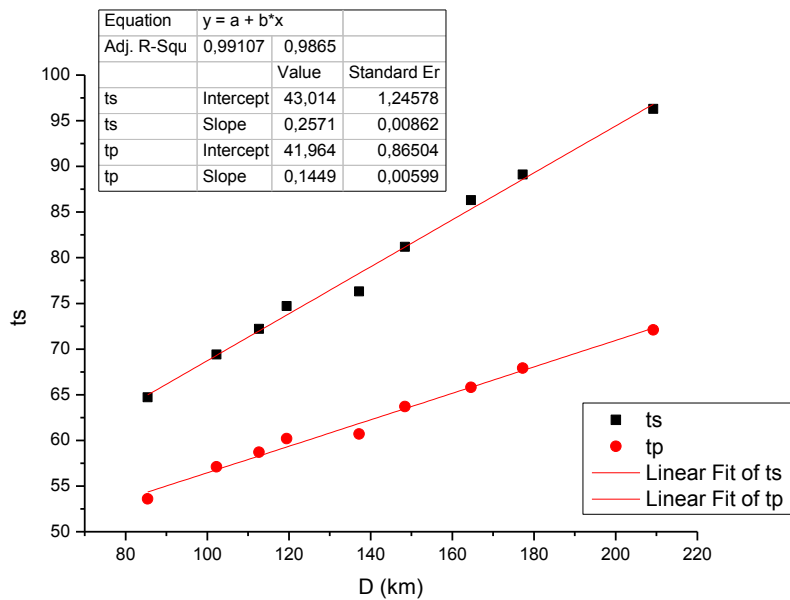
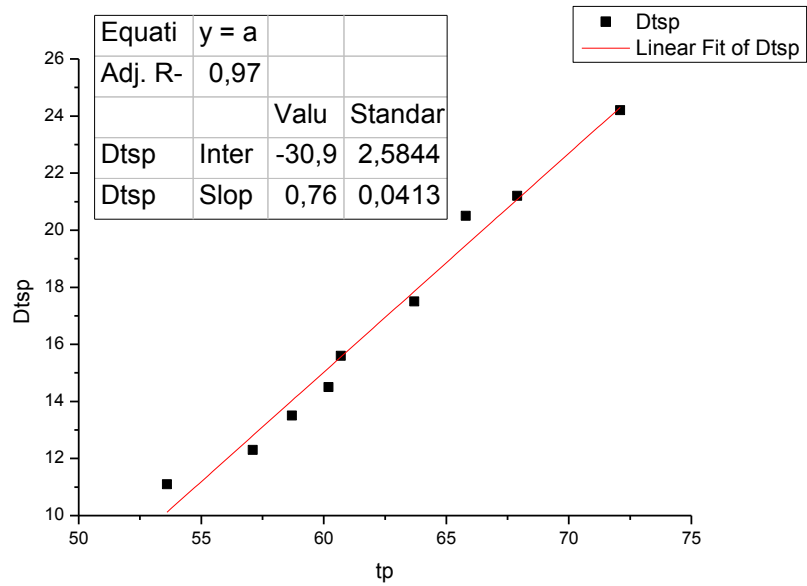
31 MARCH 2013(4.3ML, depth 90.8km)

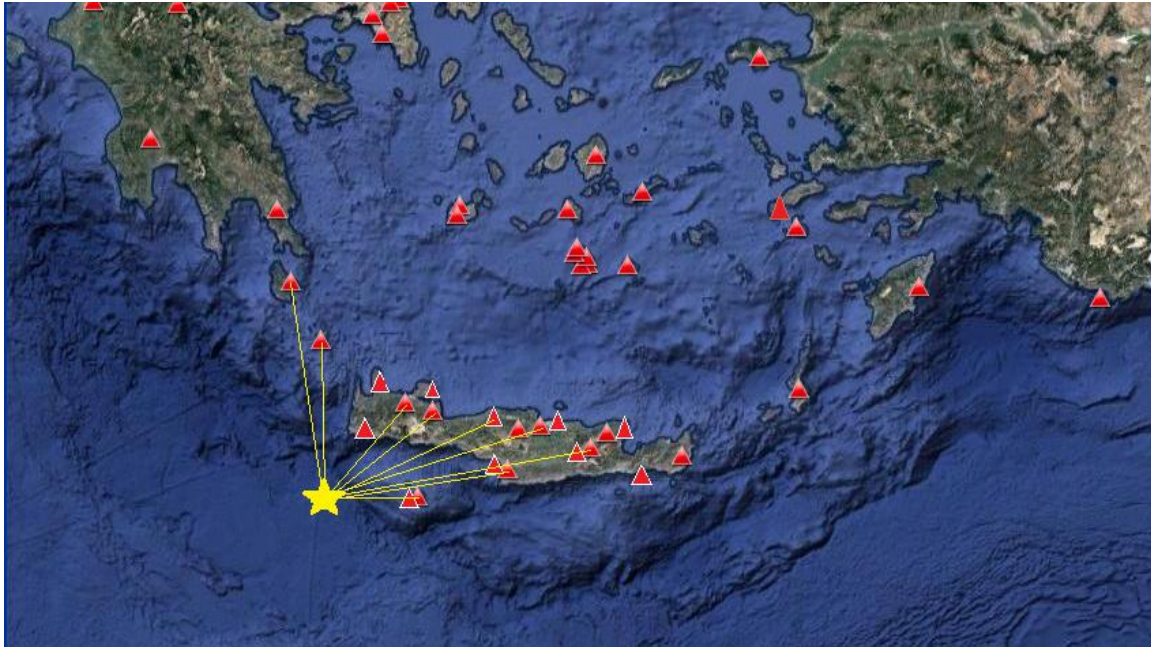
station	ts	tp	Dtsp	Dop(km)	D(km)
CHAN	34,5	24,1	10,4	43,6	100,7254
VAM	35,8	24,9	10,9	65,7	112,0764
IMMV	35,8	24,9	10,9	67,4	113,0814
PRNS	36,7	25,3	11,4	79,3	120,5534
ANKY	40,7	27,7	13	96,3	132,3568
SANT	43,1	28,9	14,2	107,9	141,0215
SIVA	44,2	29,3	14,9	114,9	146,4467
GVD	47,3	31	16,3	129,4	158,0791
NPS	48,3	31,3	17	138,9	165,9453



3 APRIL 2013(4.2 ML 4.6 Mw, depth 39.4km)

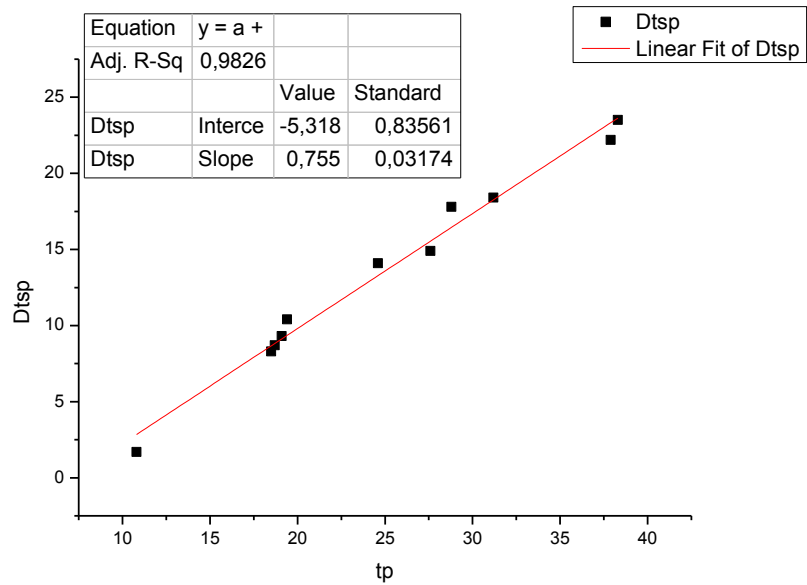
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	64,7	53,6	11,1	75,8	85,42833
IMMV	69,4	57,1	12,3	94,4	102,2923
VAM	72,2	58,7	13,5	105,6	112,7108
ANKY	74,7	60,2	14,5	112,8	119,4831
PRNS	76,3	60,7	15,6	131,4	137,1799
SIVA	81,2	63,7	17,5	143,1	148,425
KTHR	86,3	65,8	20,5	159,8	164,5855
IACM	89,1	67,9	21,2	172,8	177,2349
LAST	96,3	72,1	24,2	205,5	209,2429

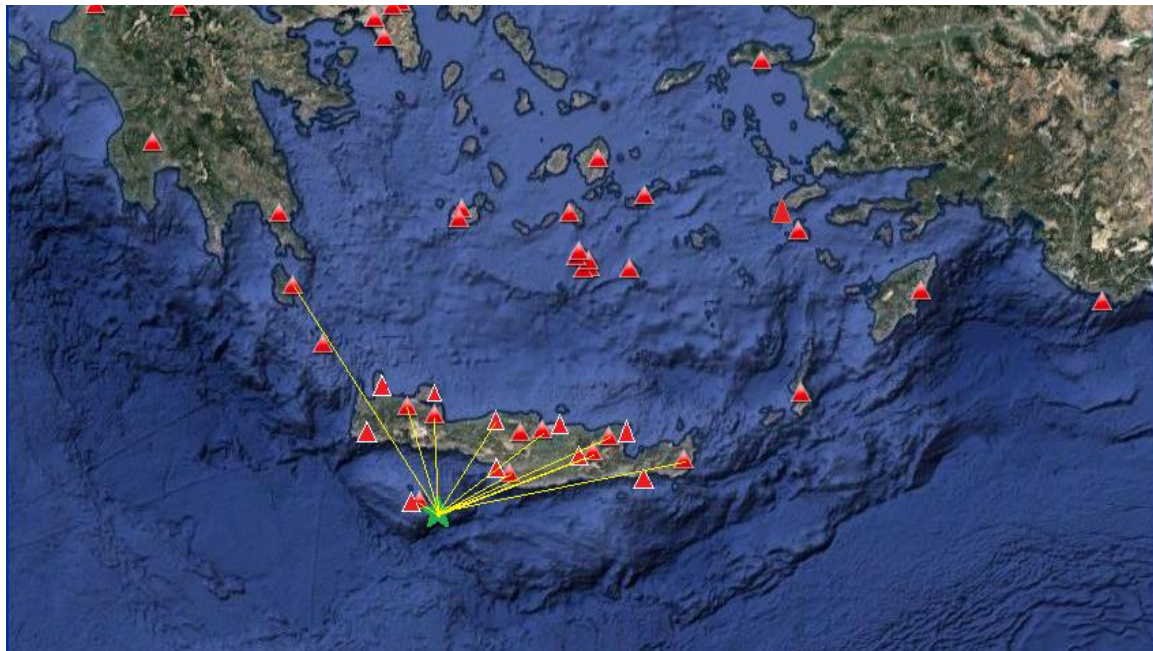
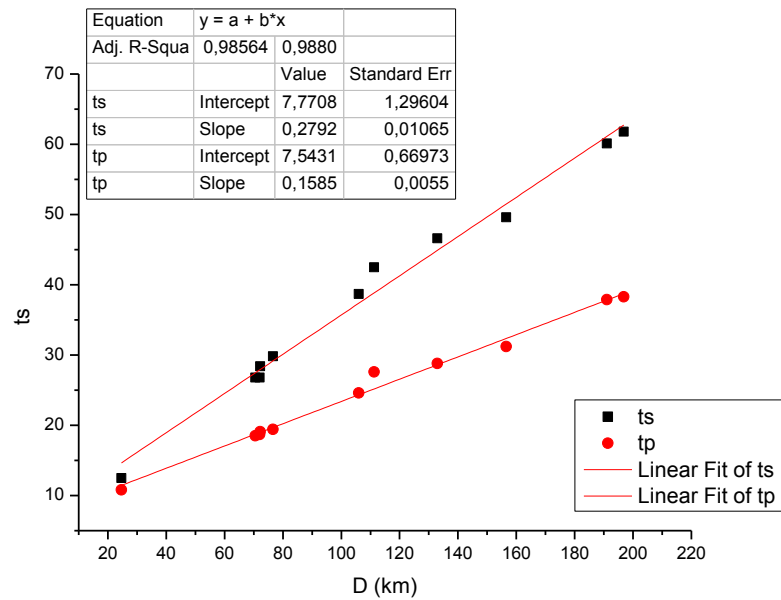




6 APRIL 2013 (5.1 ML 4.9 Mw, depth 24.4km)

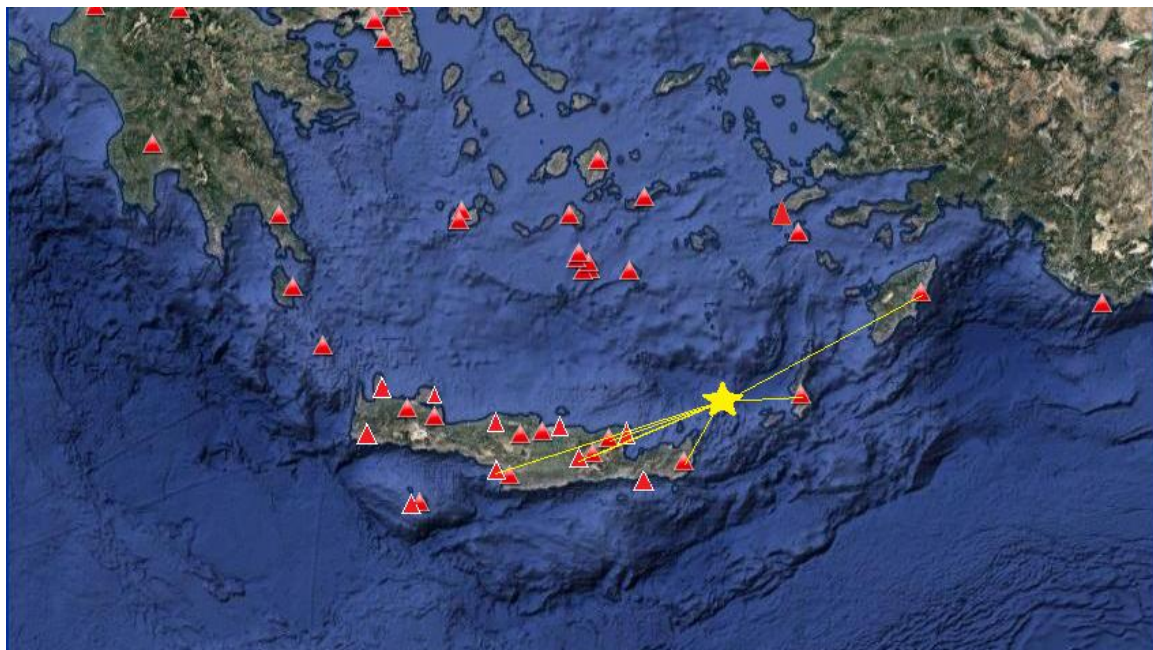
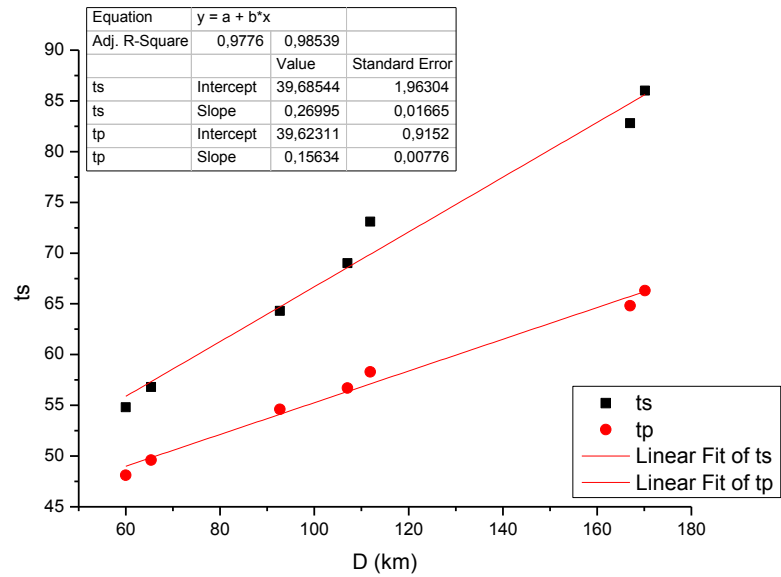
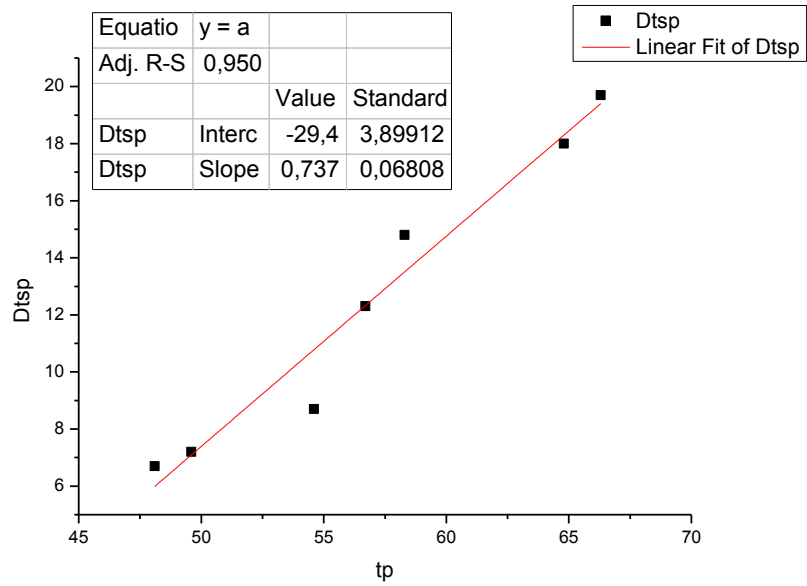
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	12,5	10,8	1,7	3,4	24,63575
VAM	26,8	18,5	8,3	66,2	70,55353
PRNS	26,8	18,7	8,7	67,8	72,05692
SIVA	28,4	19,1	9,3	68	72,24514
IMMV	29,8	19,4	10,4	72,6	76,5906
IACM	38,7	24,6	14,1	103,2	106,0453
KSTL	42,5	27,6	14,9	108,6	111,3073
LAST	46,6	28,8	17,8	130,7	132,9581
NPS	49,6	31,2	18,4	154,6	156,5136
KTHR	60,1	37,9	22,2	189,5	191,0644
ZKR	61,8	38,3	23,5	195,3	196,8183





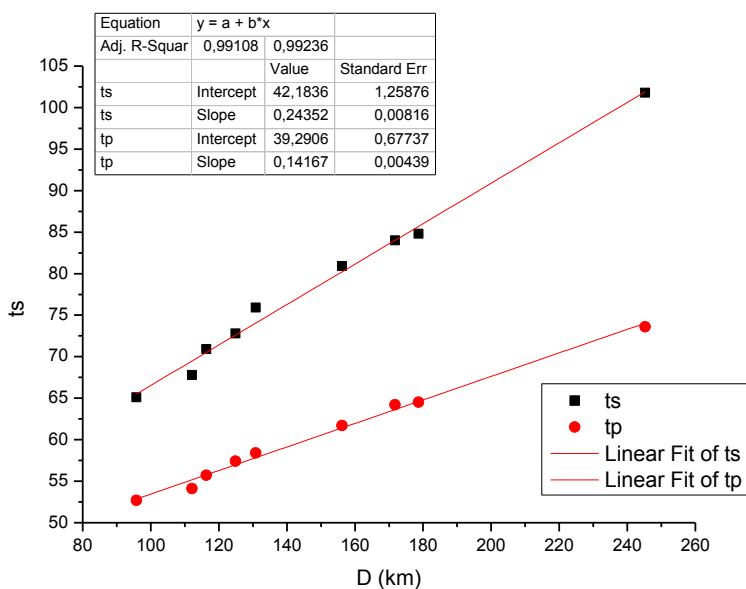
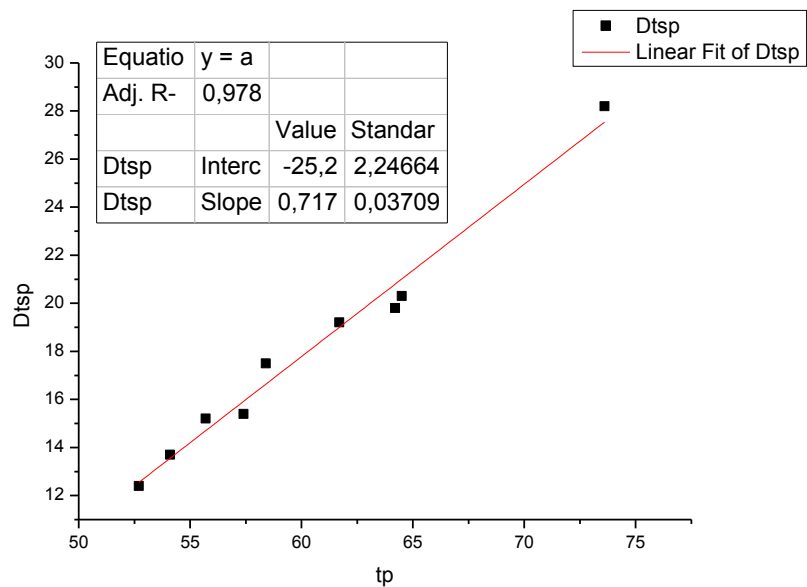
20 MAY 2013 (4.2 ML 3.8 Mw, depth 30.6km)

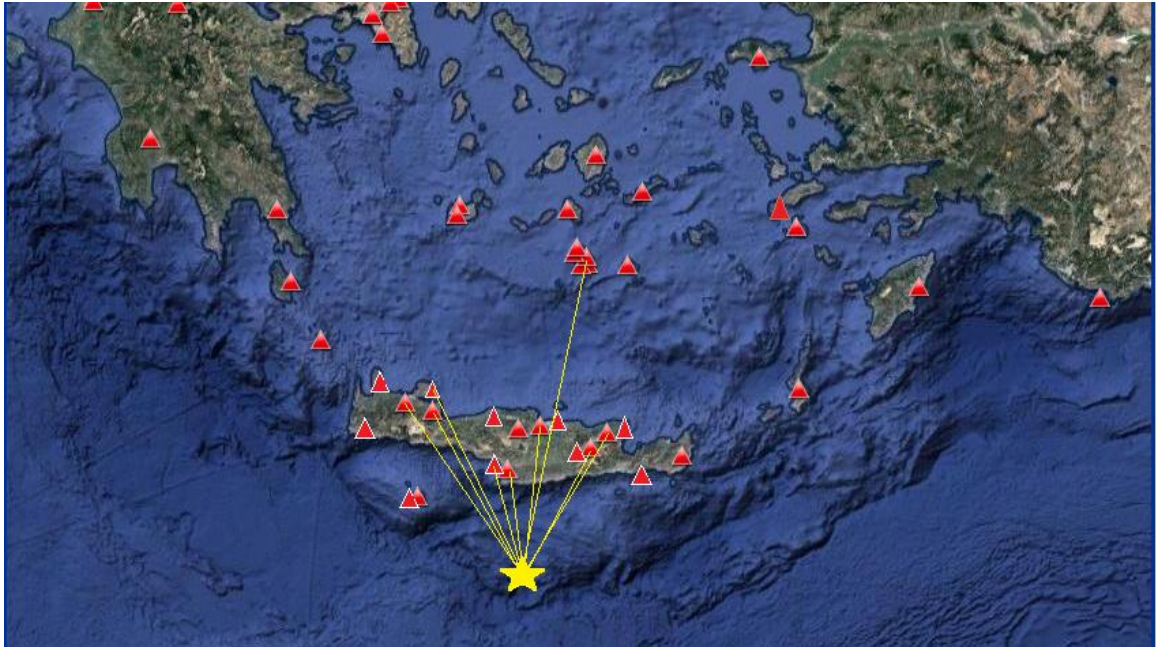
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	54,8	48,1	6,7	51,6	59,991
KARP	56,8	49,6	7,2	57,8	65,40031
NPS	64,3	54,6	8,7	87,5	92,69633
LAST	69	56,7	12,3	102,6	107,066
KSTL	73,1	58,3	14,8	107,6	111,8665
ARG	82,8	64,8	18	164,2	167,0269
TMBK	86	66,3	19,7	167,4	170,1738



23 MAY 2013 (4.3 ML 4.4 Mw, depth 19.4km)

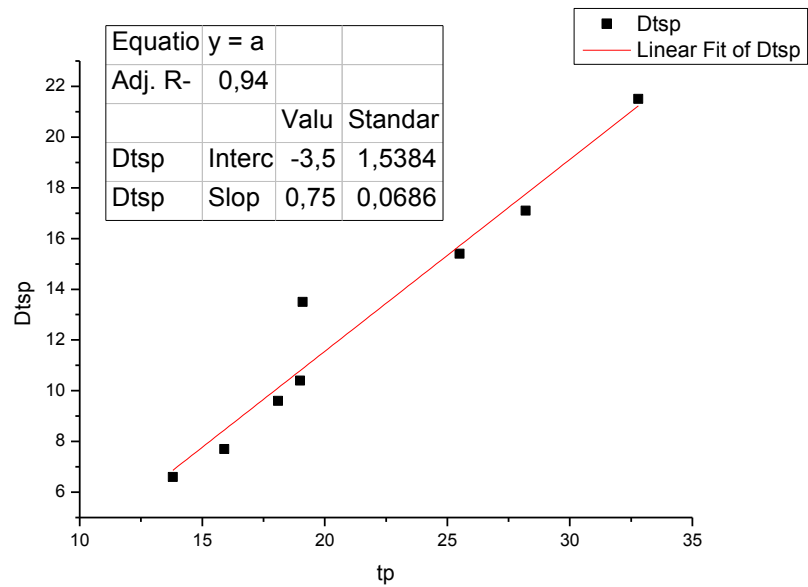
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	65,1	52,7	12,4	93,8	95,78518
TMBK	67,8	54,1	13,7	110,4	112,0916
LAST	70,9	55,7	15,2	114,7	116,3291
IACM	72,8	57,4	15,4	123,4	124,9157
NPS	75,9	58,4	17,5	129,4	130,8462
VAM	80,9	61,7	19,2	155	156,2093
IMMV	84	64,2	19,8	170,7	171,7989
CHAN	84,8	64,5	20,3	177,6	178,6564
SANT	101,8	73,6	28,2	244,5	245,2684

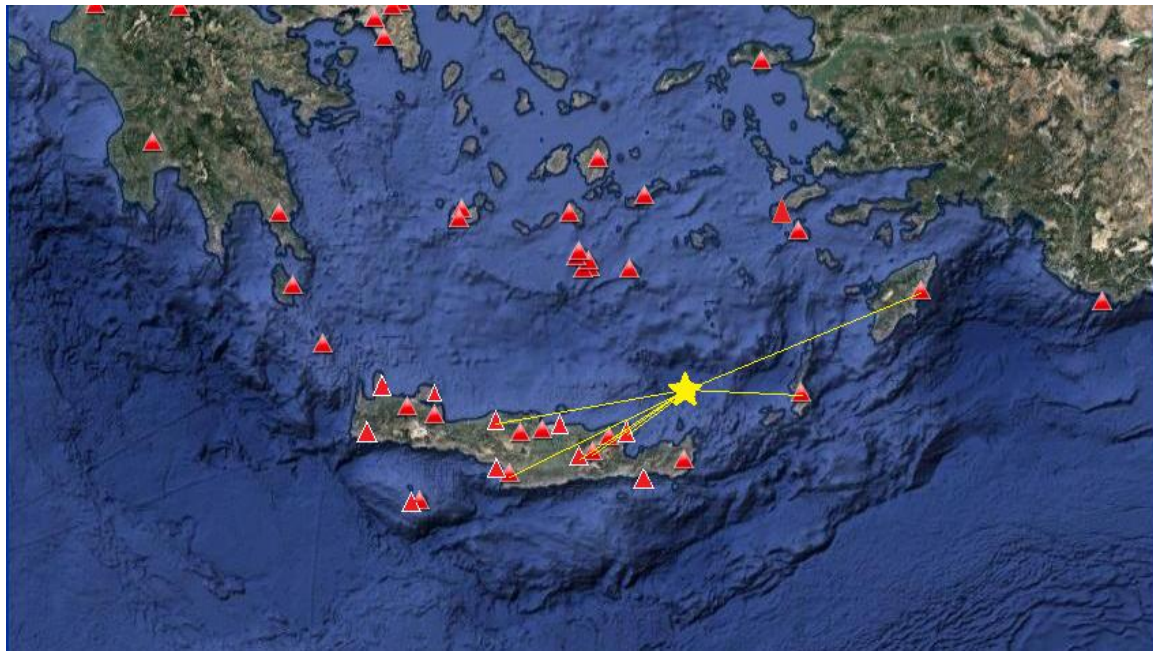
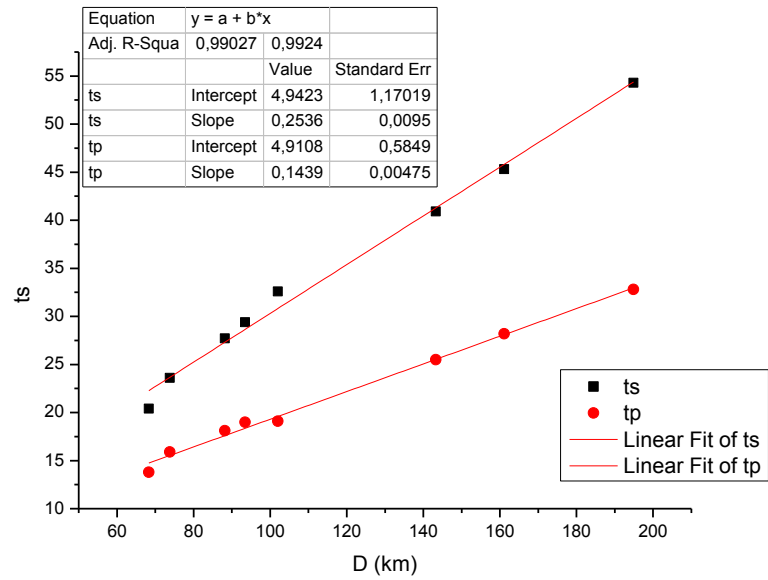




6 JUNE 2013 (4.1ML, depth 38.6km)

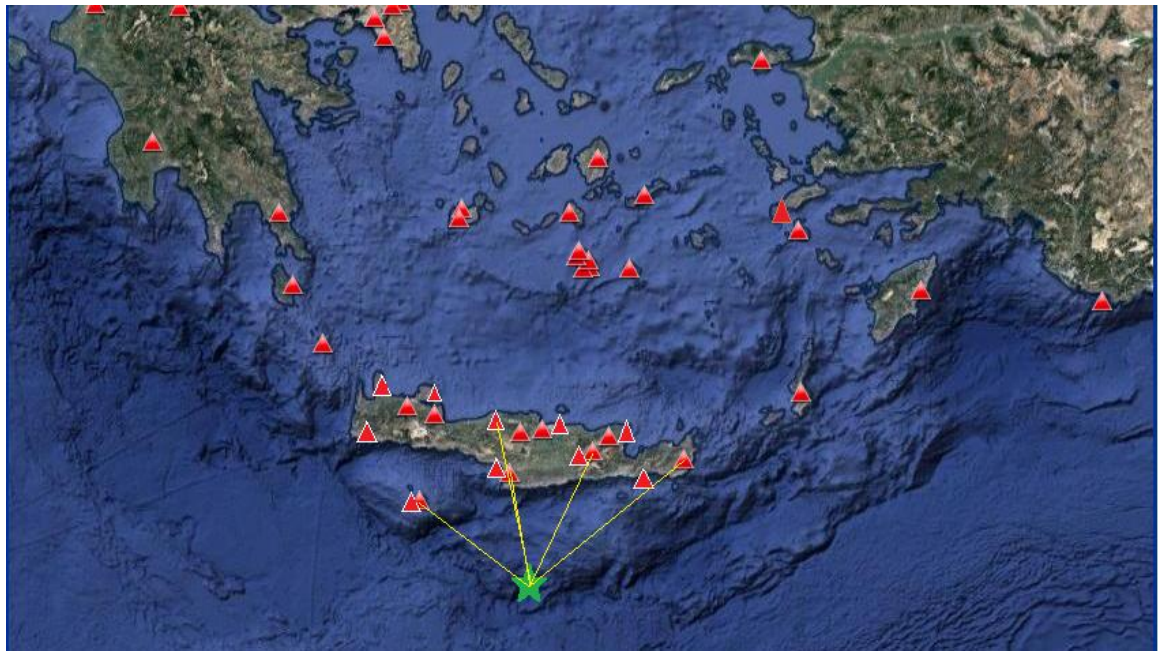
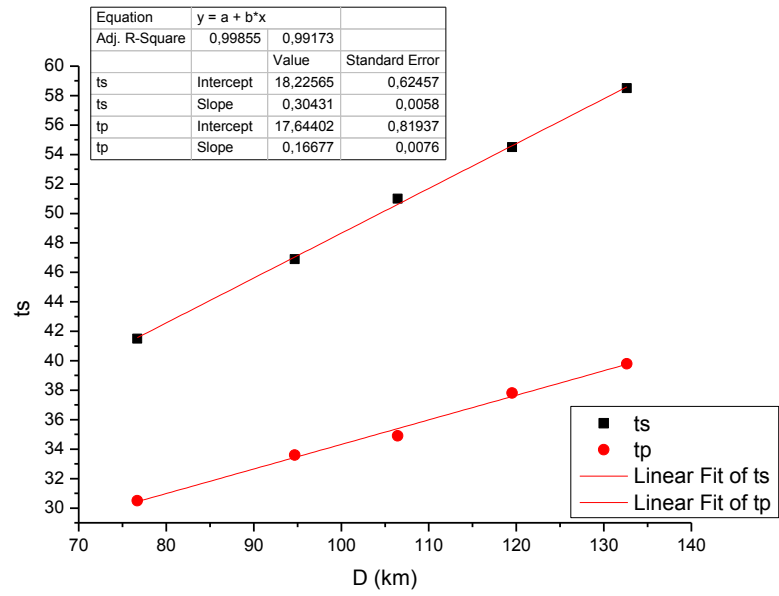
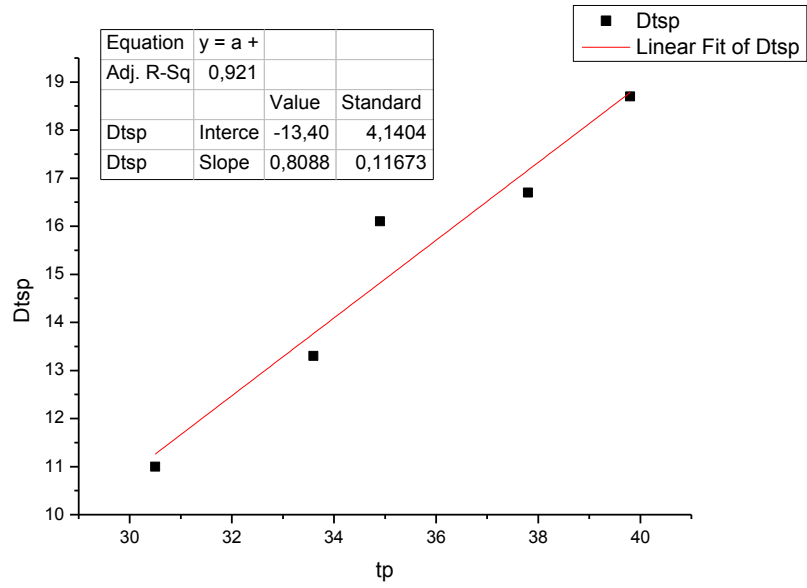
station	ts	tp	Dtsp	Dop(km)	D(km)
STIA	20,4	13,8	6,6	56,4	68,34413
NPS	23,6	15,9	7,7	62,9	73,79953
LAST	27,7	18,1	9,6	79,3	88,19552
KSTL	29,4	19	10,4	85,1	93,44501
KARP	32,6	19,1	13,5	94,4	101,9869
SIVA	40,9	25,5	15,4	138	143,2968
PRNS	45,3	28,2	17,1	156,4	161,0929
ARG	54,3	32,8	21,5	191	194,8614





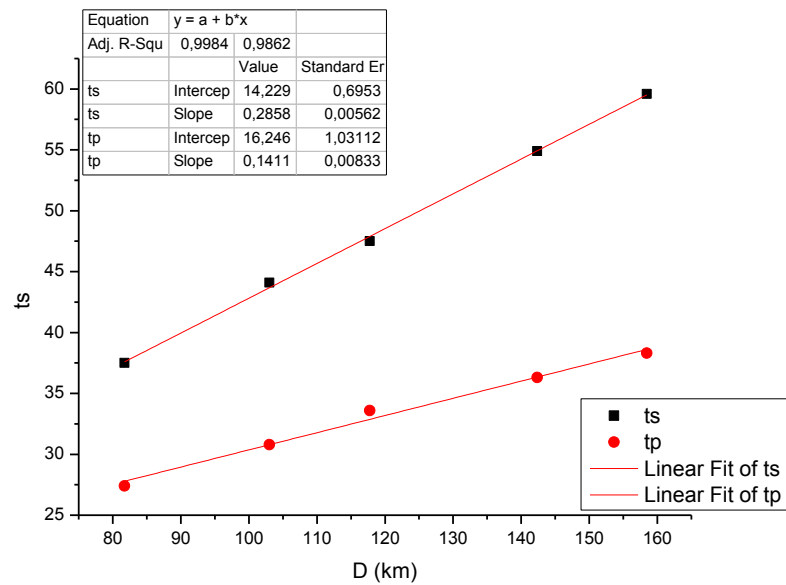
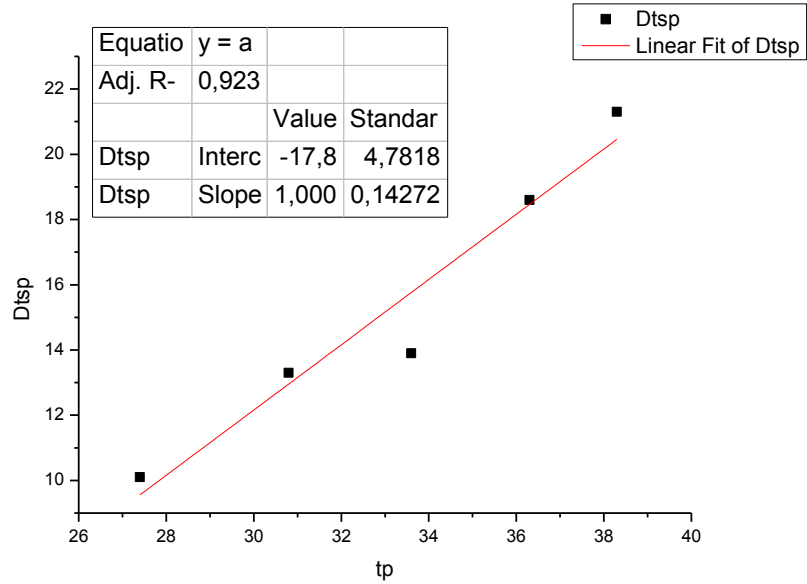
15 JUNE 2013 (4.3 ML, depth 27.2km)

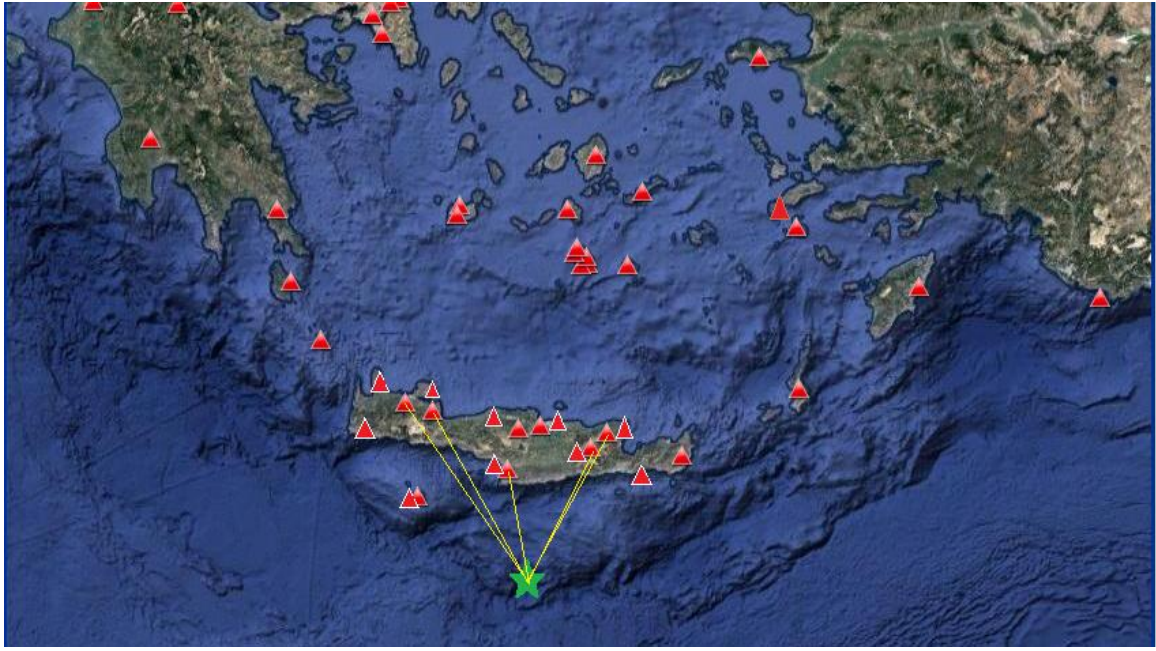
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	41,5	30,5	11	71,7	76,68592
LAST	46,9	33,6	13,3	90,7	94,69071
GVD	51	34,9	16,1	102,9	106,4343
PRNS	54,5	37,8	16,7	116,4	119,5358
ZKR	58,5	39,8	18,7	129,8	132,6193



15 JUNE 2013 (4 ML ,depth 28.8km)

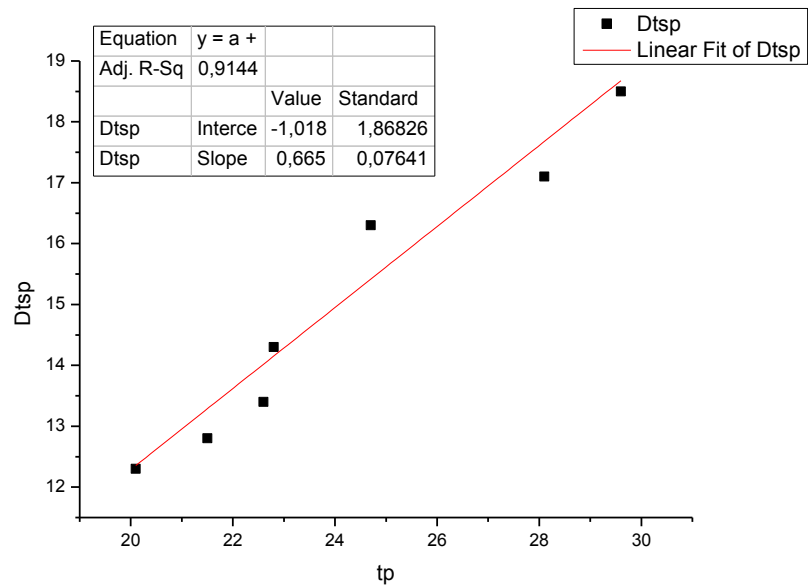
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	37,5	27,4	10,1	76,5	81,74161
LAST	44,1	30,8	13,3	98,9	103,008
NPS	47,5	33,6	13,9	114,2	117,7755
VAM	54,9	36,3	18,6	139,4	142,3439
IMMV	59,6	38,3	21,3	155,8	158,4395

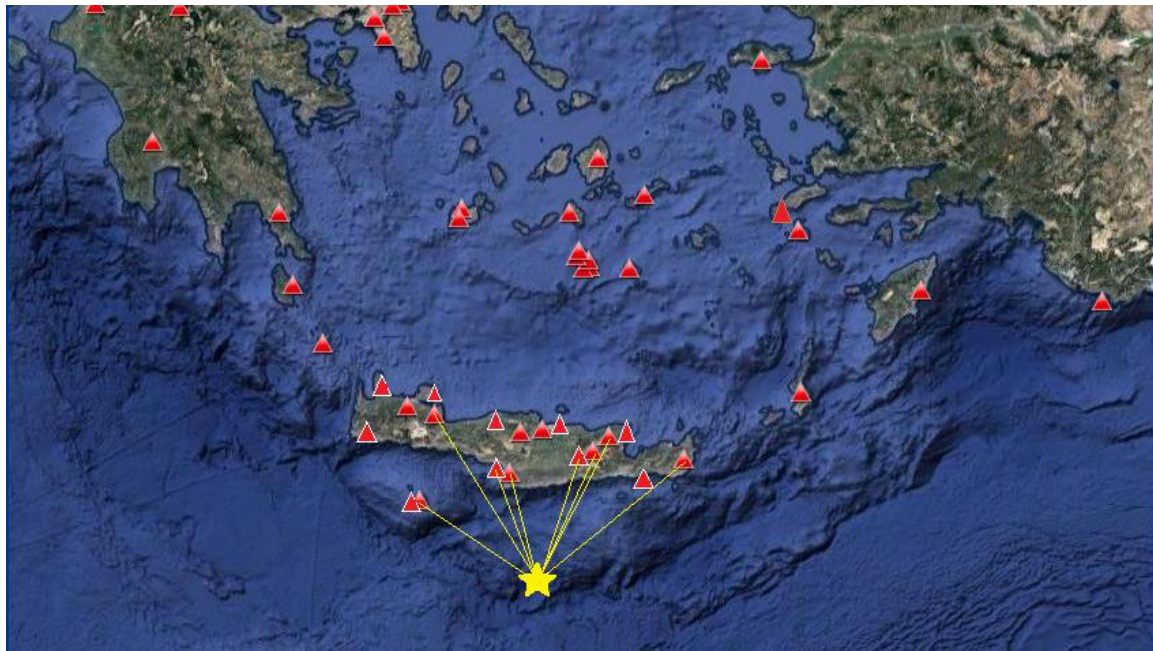
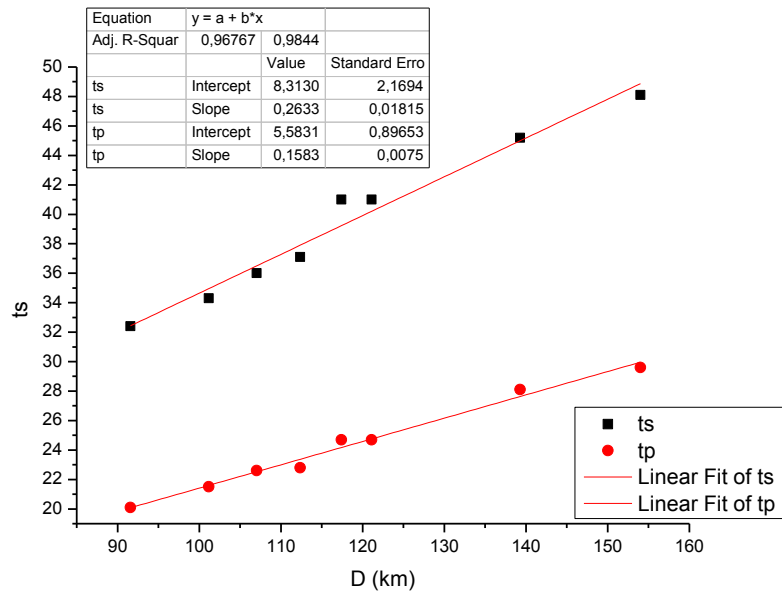




16 JUNE 2013 (5.6 ML , depth 27.7km)

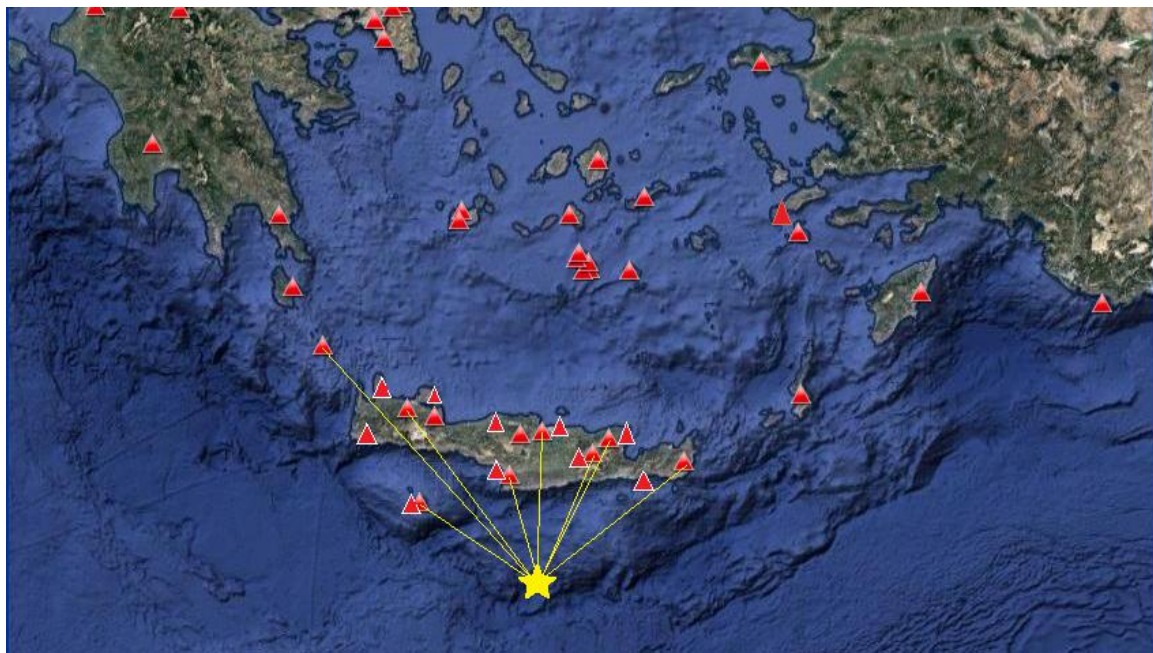
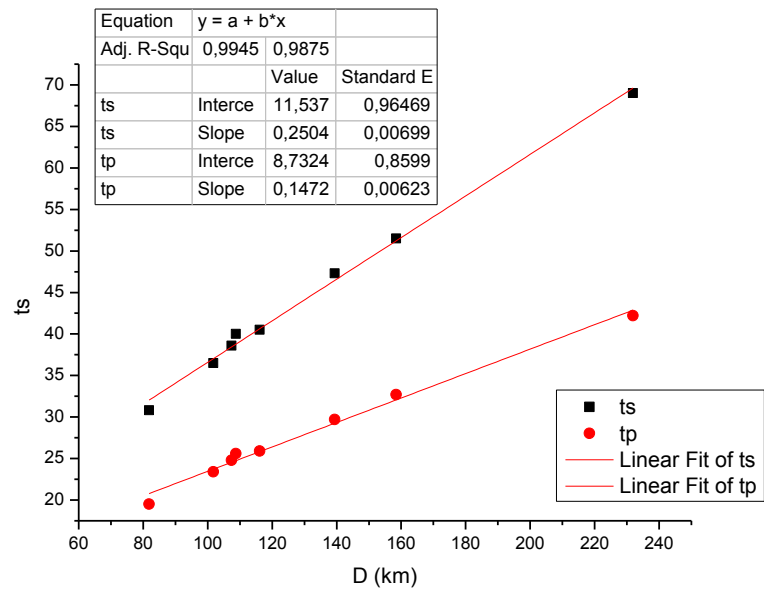
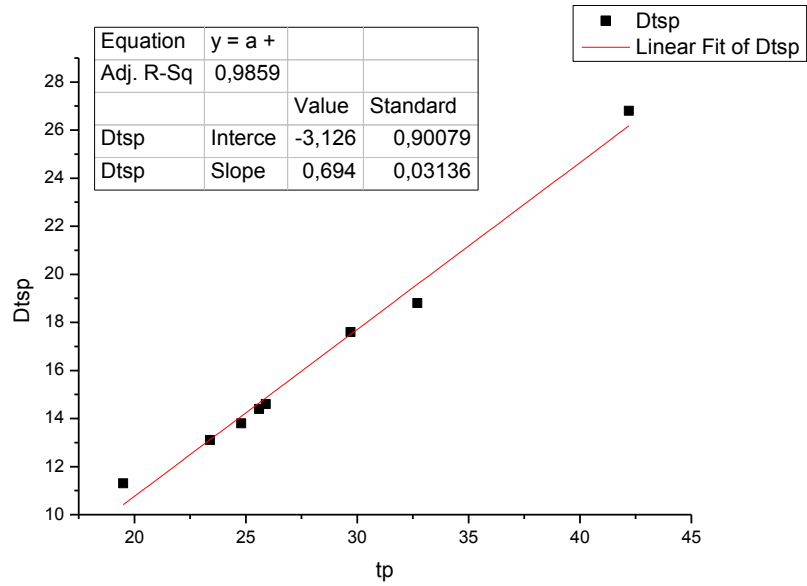
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	32,4	20,1	12,3	87,3	91,58919
TMBK	34,3	21,5	12,8	97,3	101,1661
LAST	36	22,6	13,4	103,4	107,046
KSTL	37,1	22,8	14,3	108,9	112,3677
GVD	41	24,7	16,3	114,1	117,4142
NPS	41	24,7	16,3	117,9	121,1103
ZKR	45,2	28,1	17,1	136,5	139,2822
VAM	48,1	29,6	18,5	151,5	154,0115





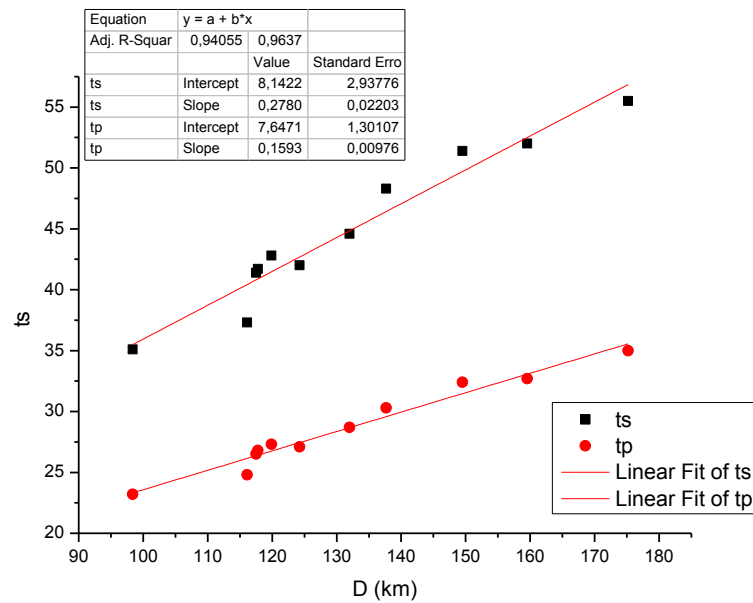
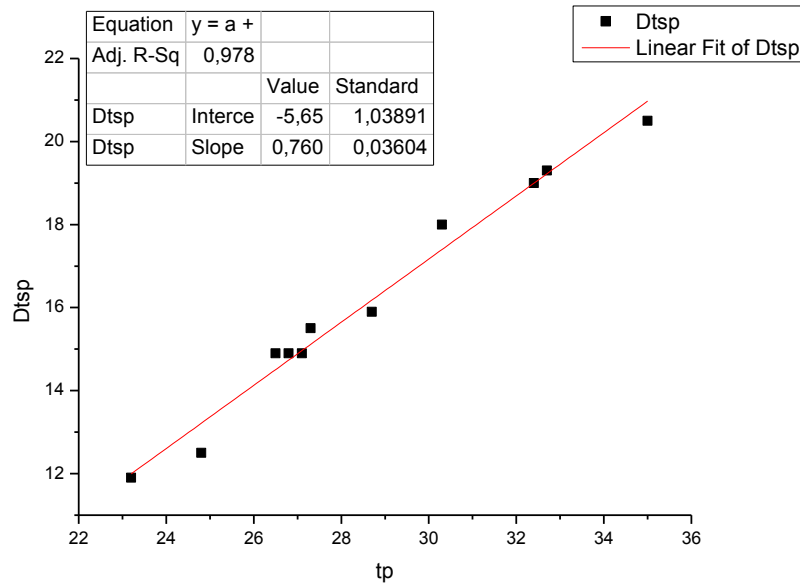
18 JUNE 2013 (4.3 ML 4.5 Mw , depth 34.6km)

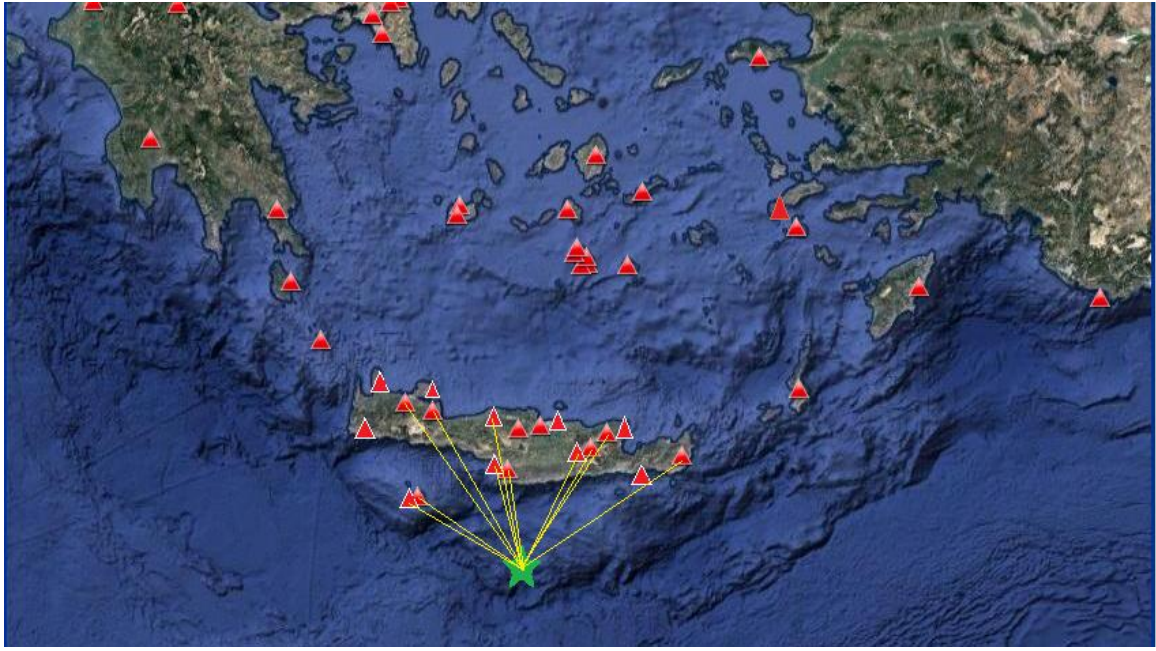
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	30,8	19,5	11,3	74,2	81,87063
LAST	36,5	23,4	13,1	95,7	101,7627
GVD	38,6	24,8	13,8	101,7	107,4246
IACM	40	25,6	14,4	103,1	108,751
NPS	40,5	25,9	14,6	110,9	116,1722
ZKR	47,3	29,7	17,6	135	139,3634
IMMV	51,5	32,7	18,8	154,6	158,4245
ANKY	69	42,2	26,8	229,3	231,8958



19 JUNE 2013 (4.5 ML 4.7 Mw , depth 14.5km)

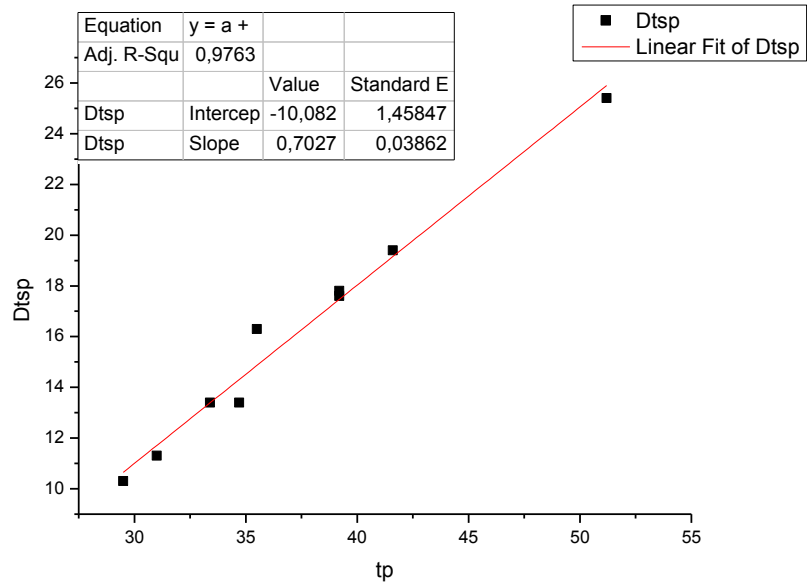
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	35,1	23,2	11,9	97,3	98,37449
TMBK	37,3	24,8	12,5	115,2	116,109
LAST	41,4	26,5	14,9	116,6	117,4981
GVD	41,7	26,8	14,9	116,9	117,7958
KSTL	42	27,1	14,9	123,4	124,249
GVDS	42,8	27,3	15,5	119	119,8801
NPS	44,6	28,7	15,9	131,2	131,9988
PRNS	48,3	30,3	18	136,9	137,6658
ZKR	51,4	32,4	19	148,8	149,5048
VAM	52	32,7	19,3	158,9	159,5602
IMMV	55,5	35	20,5	174,6	175,2011

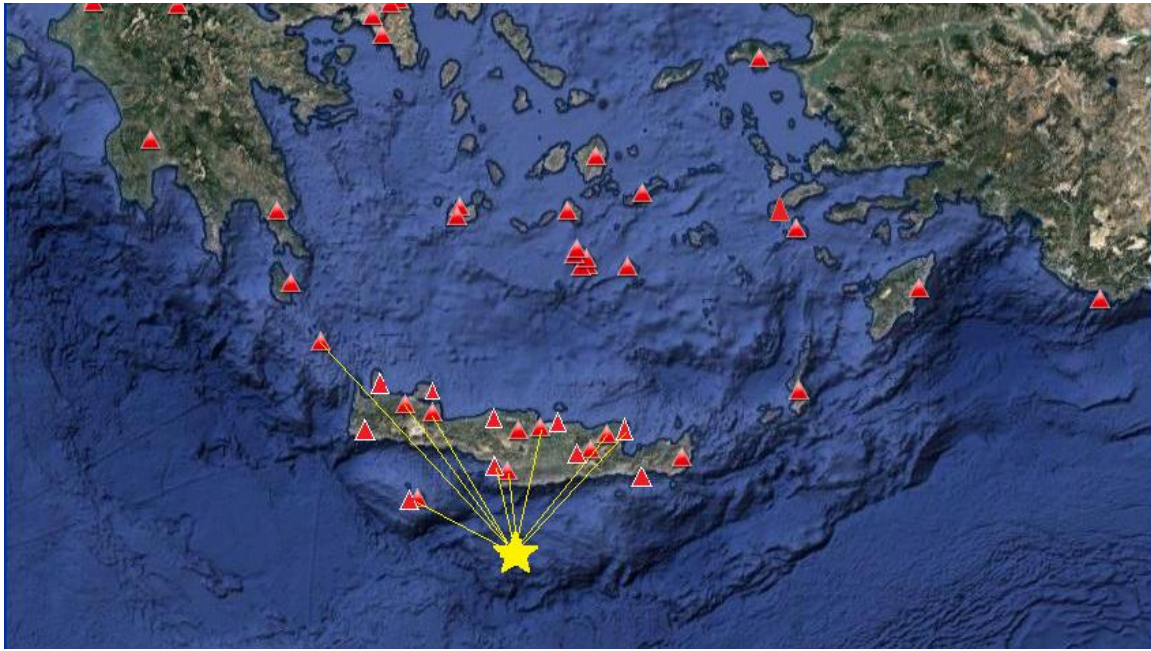
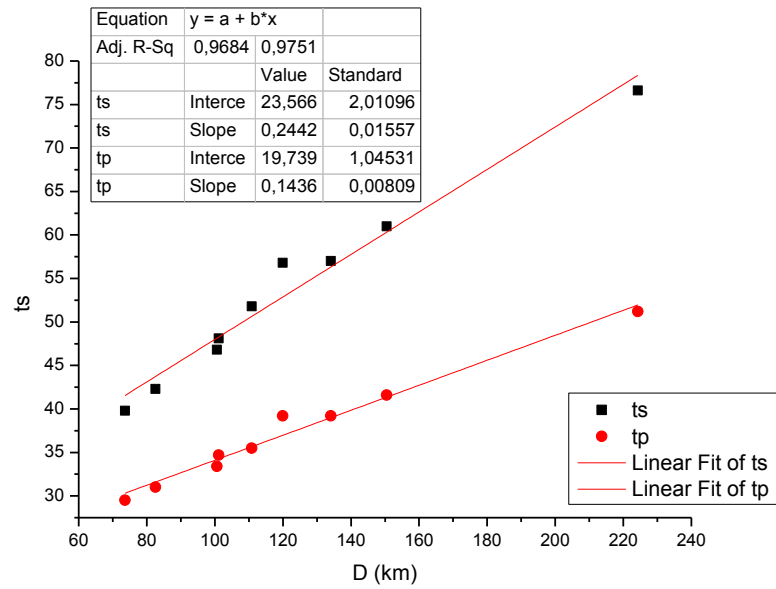




22 JUNE 2013 (4 ML, depth 31.3km)

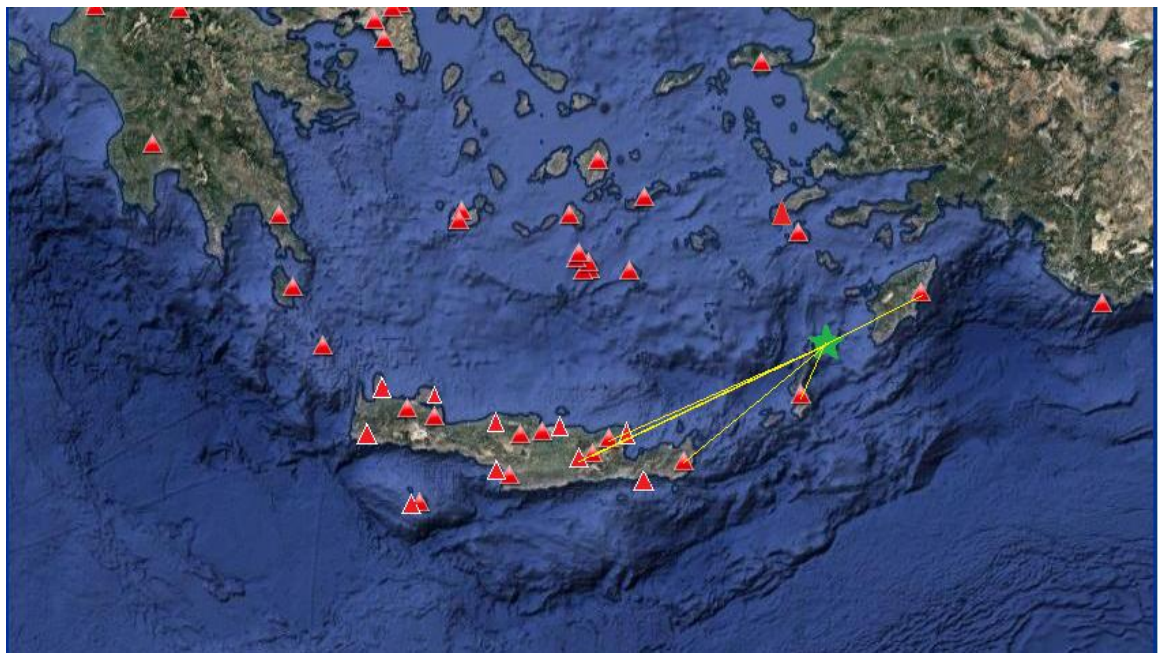
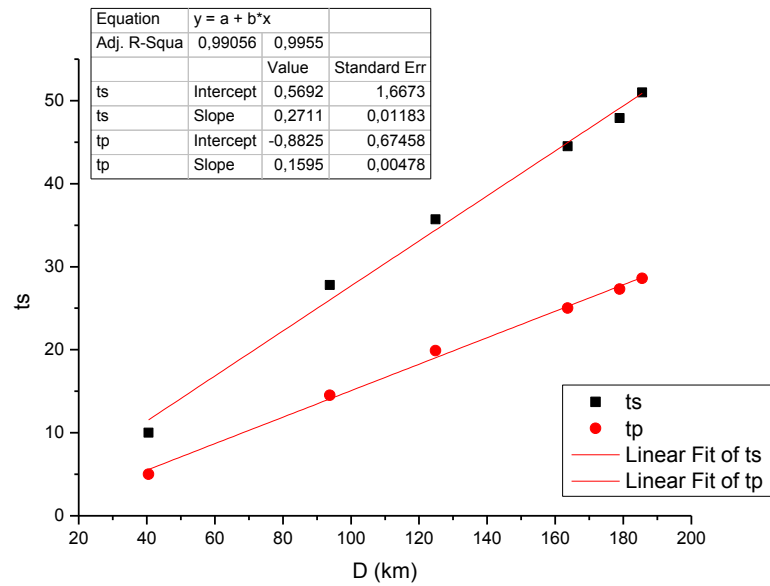
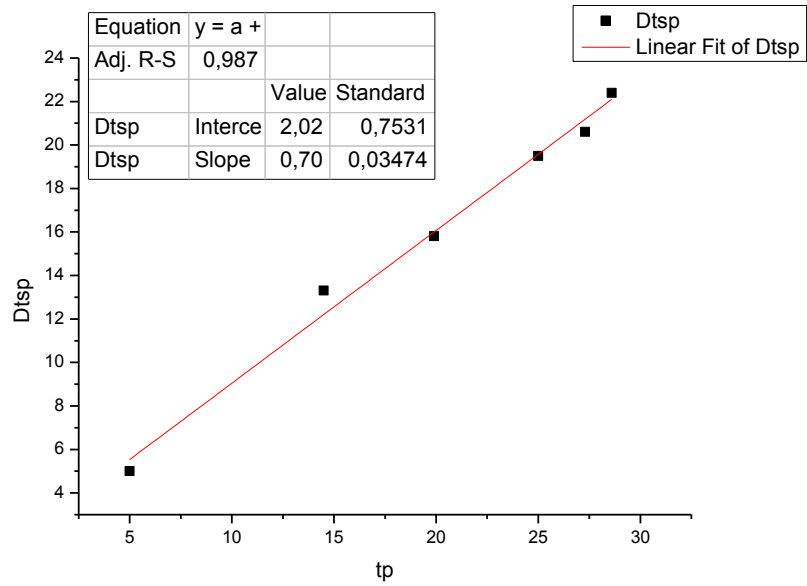
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	39,8	29,5	10,3	66,6	73,58838
TMBK	42,3	31	11,3	76,4	82,56301
GVD	46,8	33,4	13,4	95,6	100,5935
IACM	48,1	34,7	13,4	96,2	101,1639
NPS	51,8	35,5	16,3	106,3	110,8124
STIA	56,8	39,2	17,6	115,8	119,9555
VAM	57	39,2	17,8	130,4	134,1039
IMMV	61	41,6	19,4	147,2	150,491
ANKY	76,6	51,2	25,4	222,1	224,2947





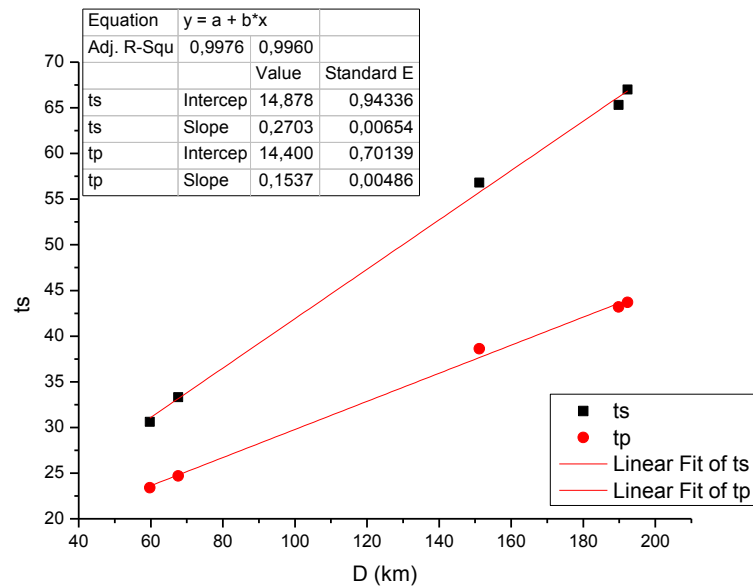
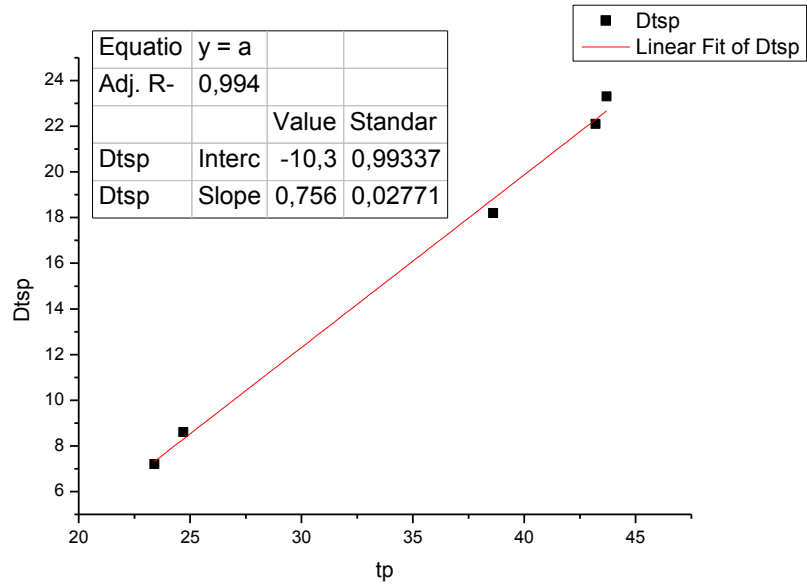
26 JUNE 2013 (4 ML 3.9 Mw , depth 27km)

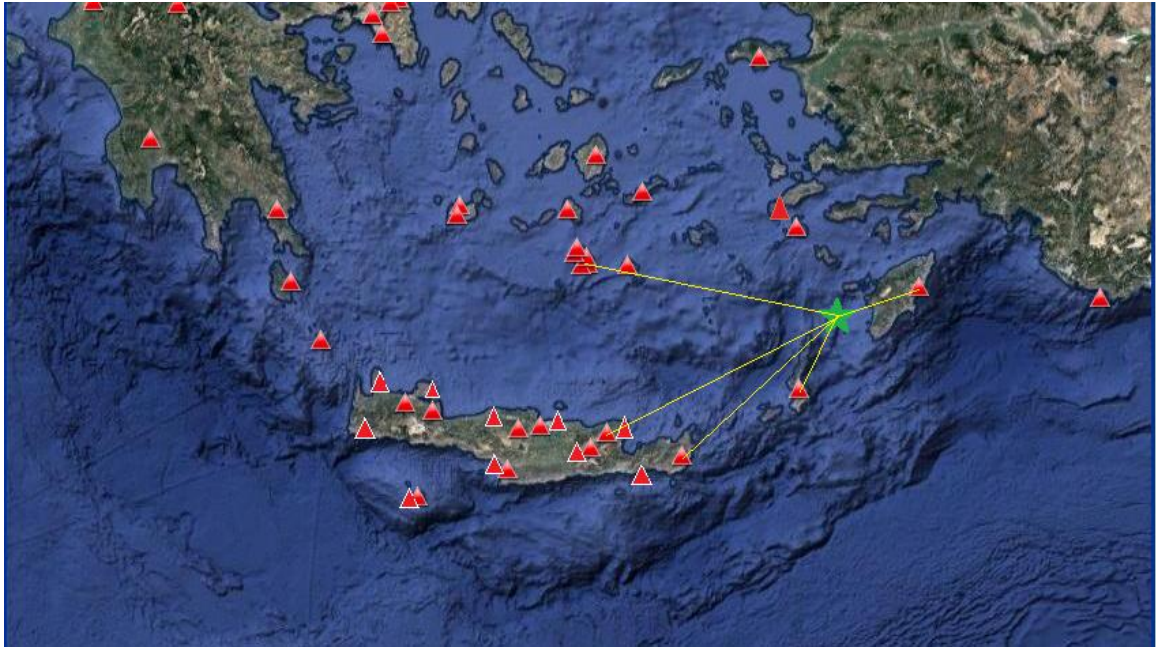
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	10	5	5	30,2	40,50975
ARG	27,8	14,5	13,3	89,8	93,77121
ZKR	35,7	19,9	15,8	121,9	124,8544
NPS	44,5	25	19,5	161,4	163,6428
LAST	47,9	27,3	20,6	176,9	178,9486
KSTL	51	28,6	22,4	183,6	185,5747



30 JUNE 2013 (4 ML 3.8 Mw , depth 25.4km)

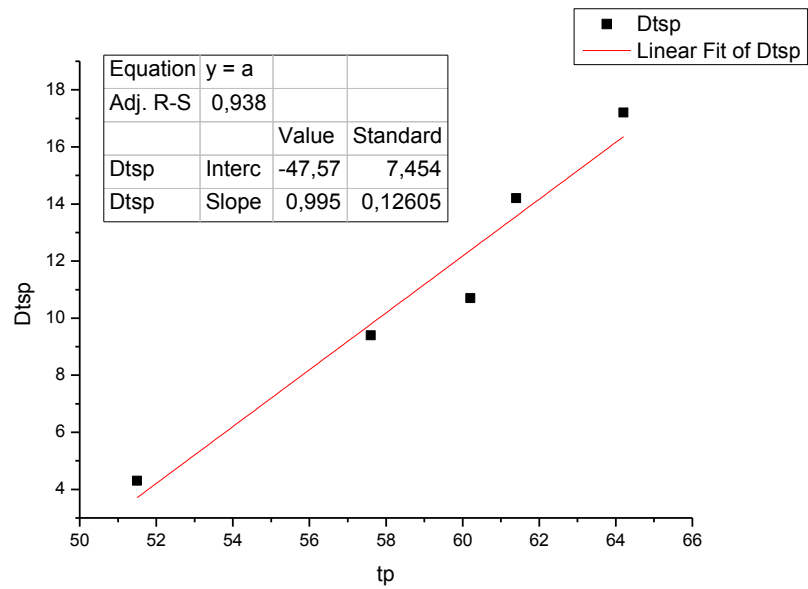
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	30,6	23,4	7,2	54,1	59,76596
ARG	33,3	24,7	8,6	62,7	67,64946
ZKR	56,8	38,6	18,2	149	151,1495
NPS	65,3	43,2	22,1	188,1	189,8072
SANT	67	43,7	23,3	190,6	192,285

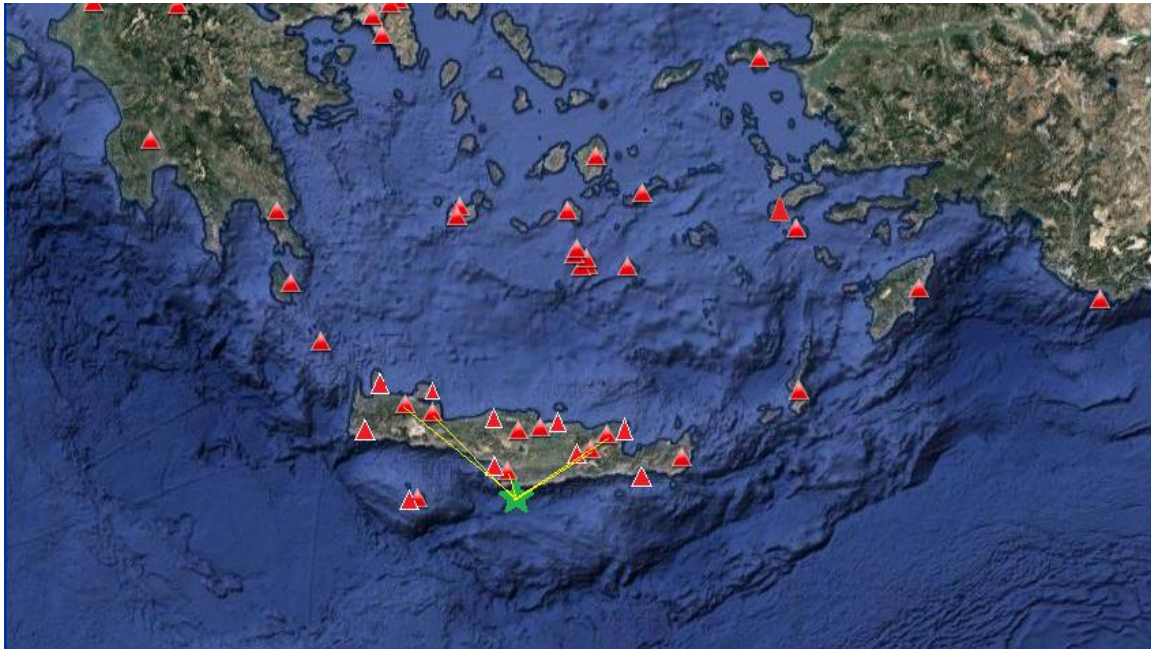
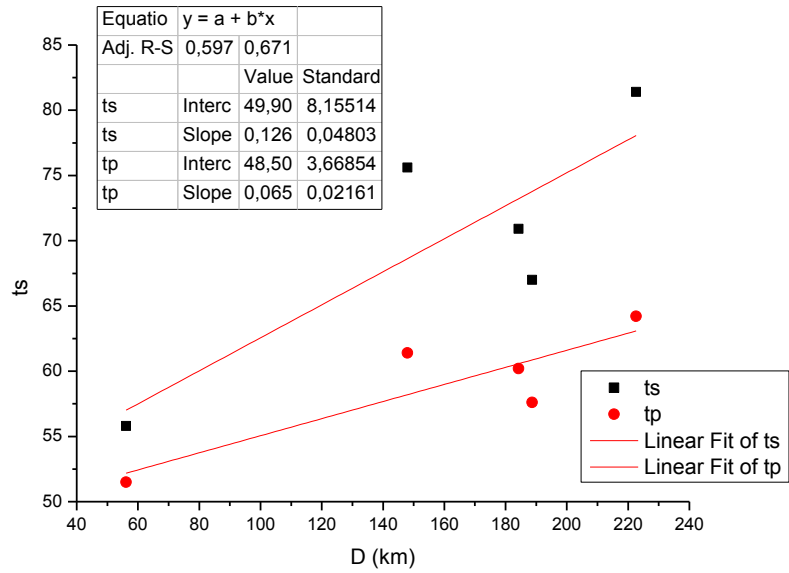




6 SEPTEMBER 2013 (4.2 ML 4.1 Mw , depth 15.1km)

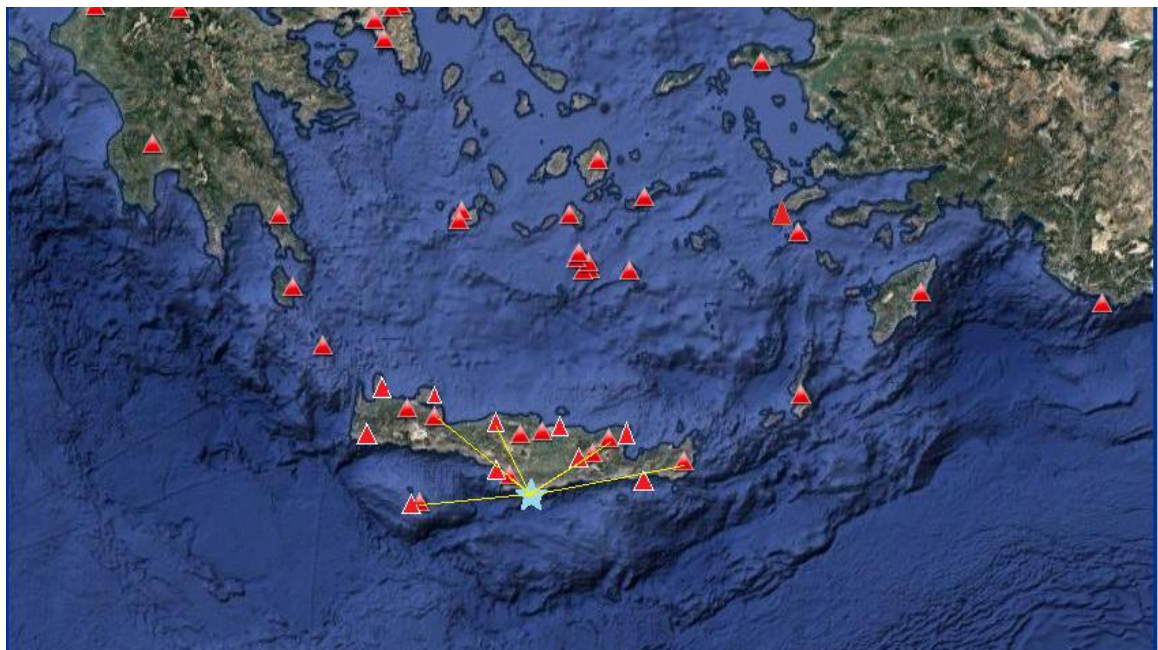
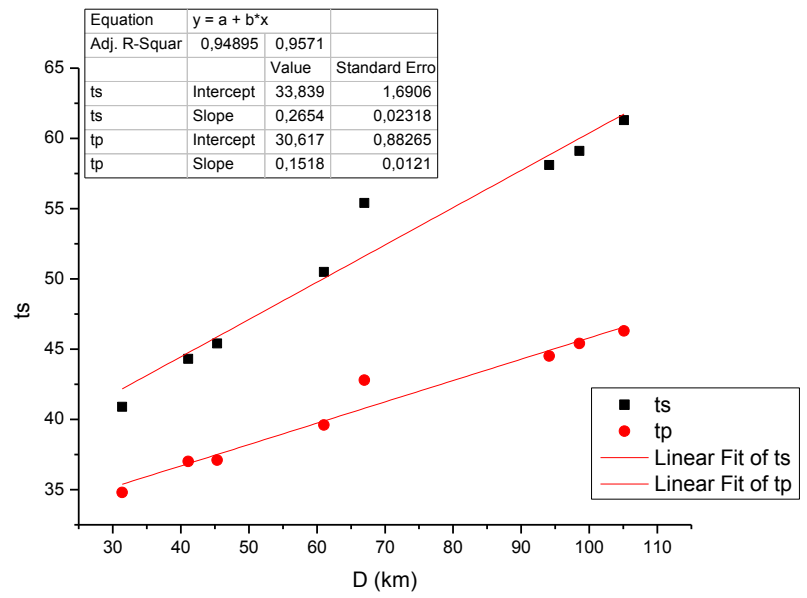
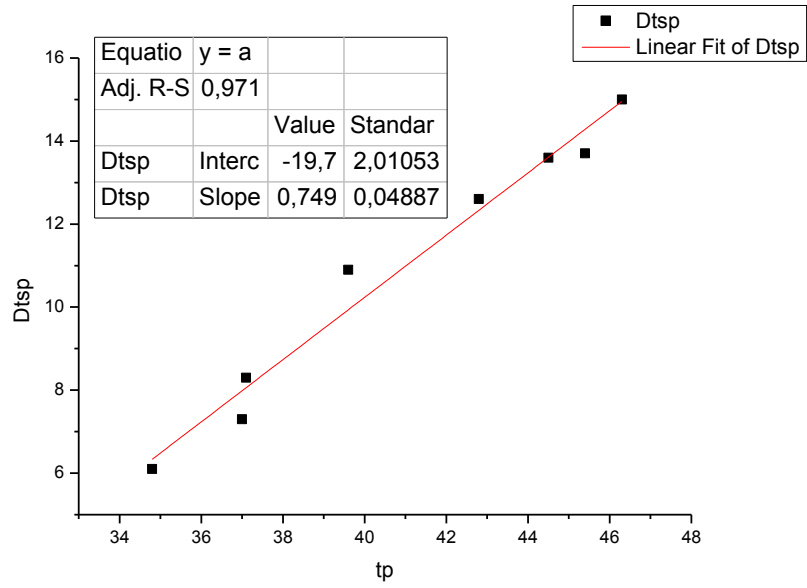
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	55,8	51,5	4,3	54,1	56,16778
LAST	67	57,6	9,4	188,1	188,7051
NPS	70,9	60,2	10,7	183,6	184,2199
VAM	75,6	61,4	14,2	147,2	147,9725
IMMV	81,4	64,2	17,2	222,1	222,6127





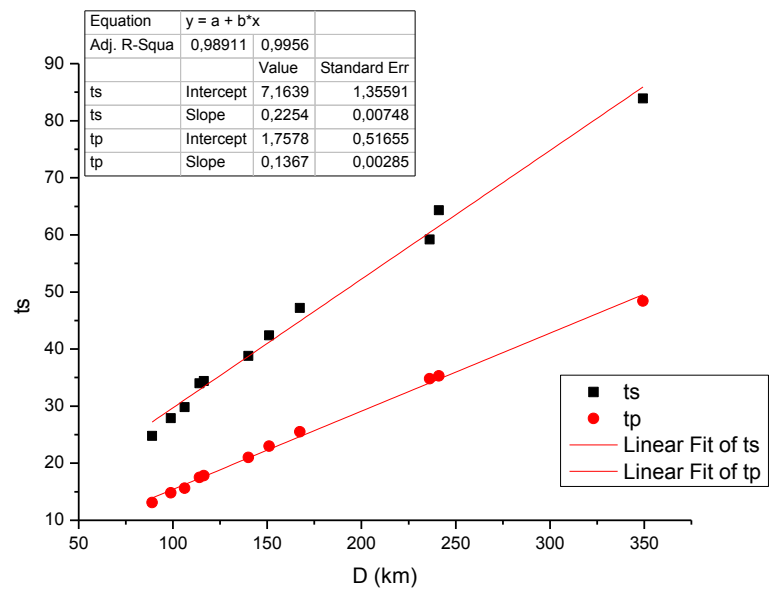
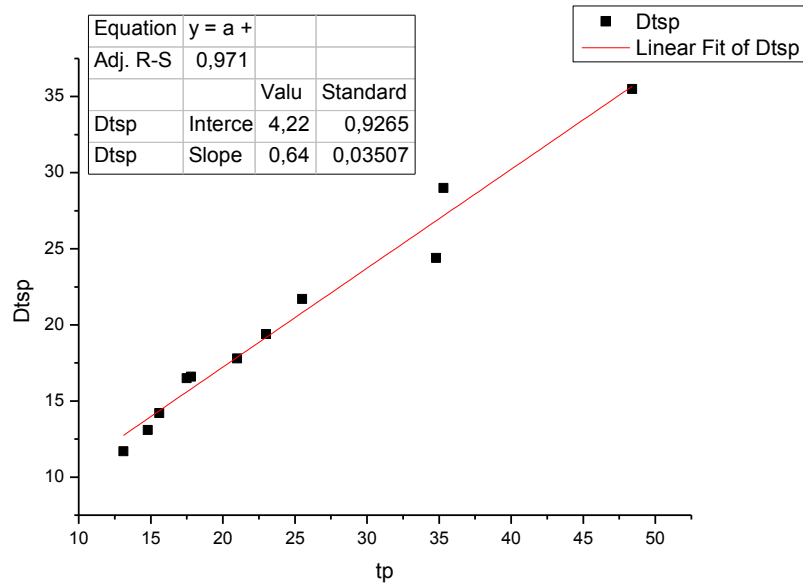
8 SEPTEMBER 2013 (4,7ML 4.6 Mw , depth 14.4km)

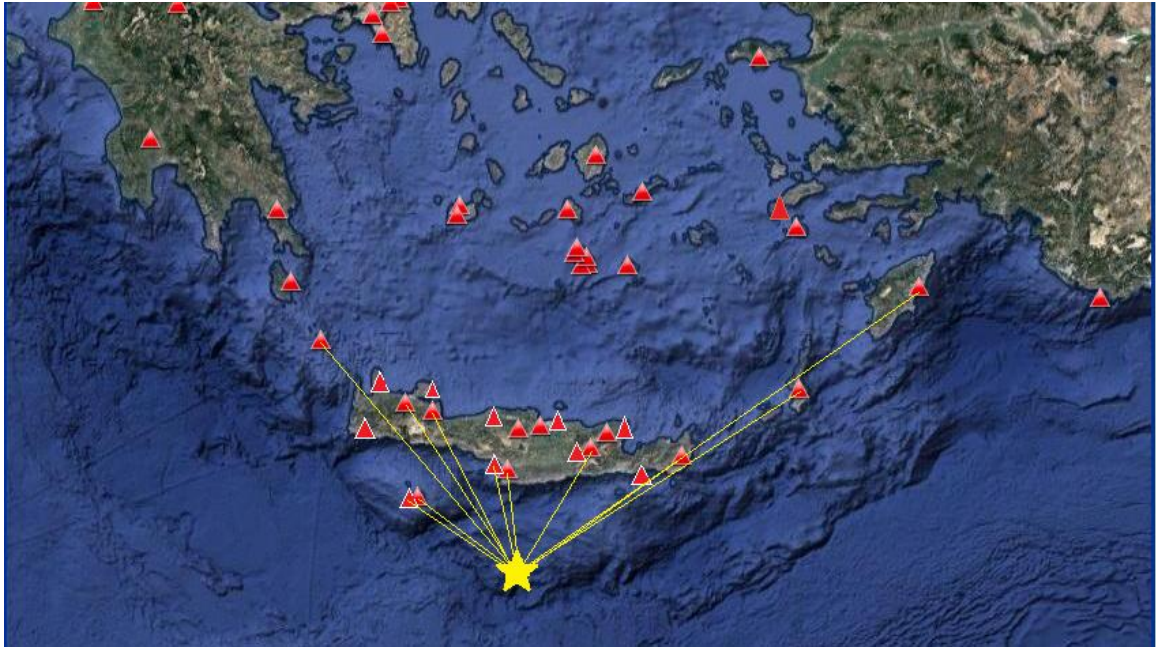
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	40,9	34,8	6,1	27,9	31,39697
KSTL	44,3	37	7,3	38,5	41,10487
LAST	45,4	37,1	8,3	43	45,34711
NPS	50,5	39,6	10,9	59,3	61,02336
PRNS	55,4	42,8	12,6	65,4	66,96656
GVD	58,1	44,5	13,6	93	94,10824
VAM	59,1	45,4	13,7	97,5	98,55765
ZKR	61,3	46,3	15	104,1	105,0912



18 SEPTEMBER 2013 (4.3 ML ,depth 26.9km)

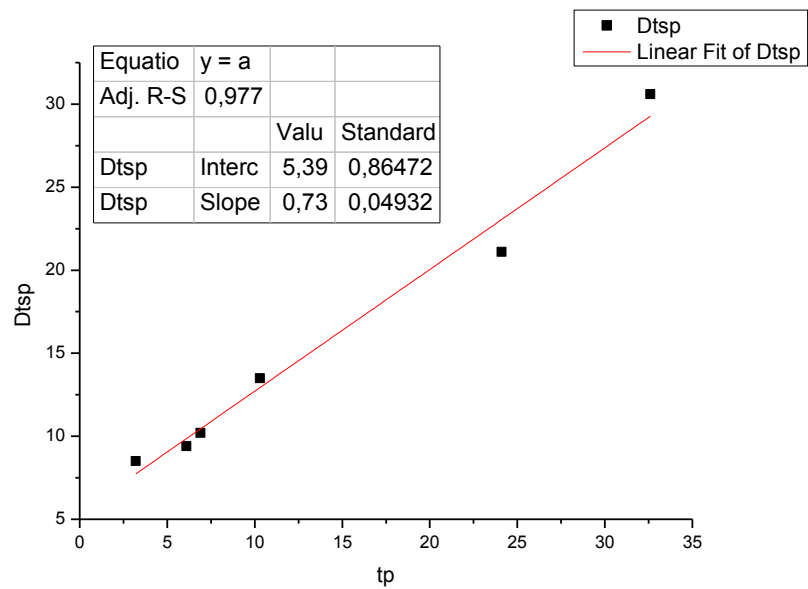
stathmoi	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	24,8	13,1	11,7	84,8	88,96432
TMBK	27,9	14,8	13,1	95,1	98,83127
LAST	29,8	15,6	14,2	102,8	106,2612
GVD	34	17,5	16,5	110,9	114,1158
GVDS	34,4	17,8	16,6	113,2	116,3523
ZKR	38,8	21	17,8	137,4	140,0085
VAM	42,4	23	19,4	148,6	151,0151
IMMV	47,2	25,5	21,7	165,1	167,2771
KARP	59,2	34,8	24,4	234,6	236,1372
ANKY	64,3	35,3	29	239,6	241,1053
ARG	83,9	48,4	35,5	348,3	349,3372

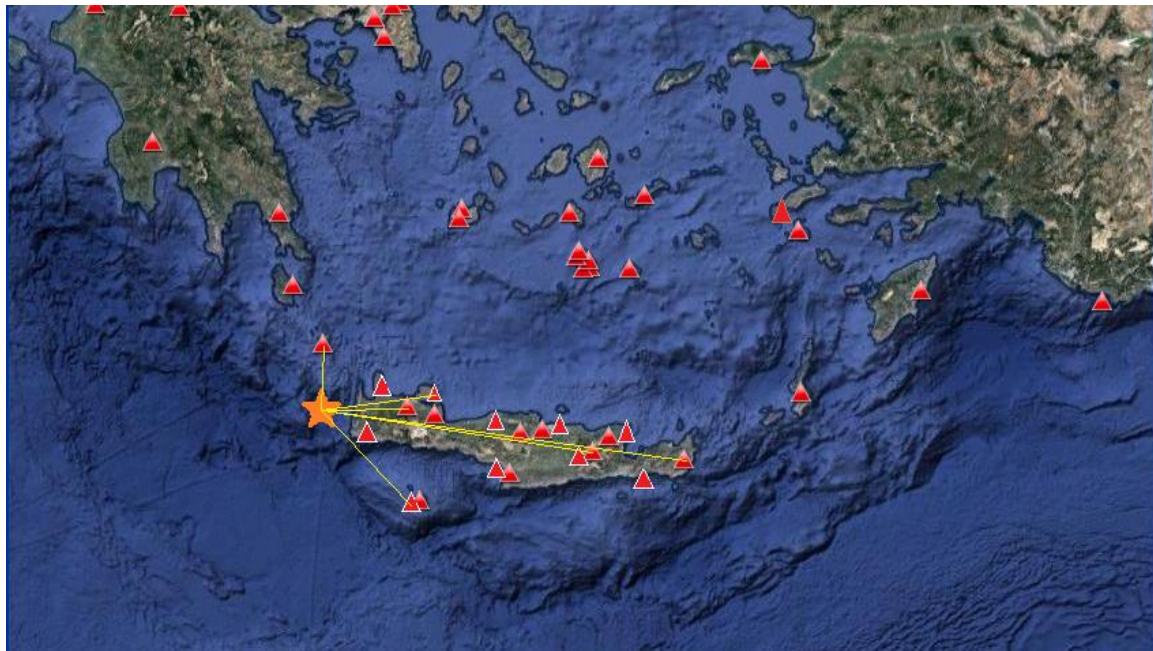
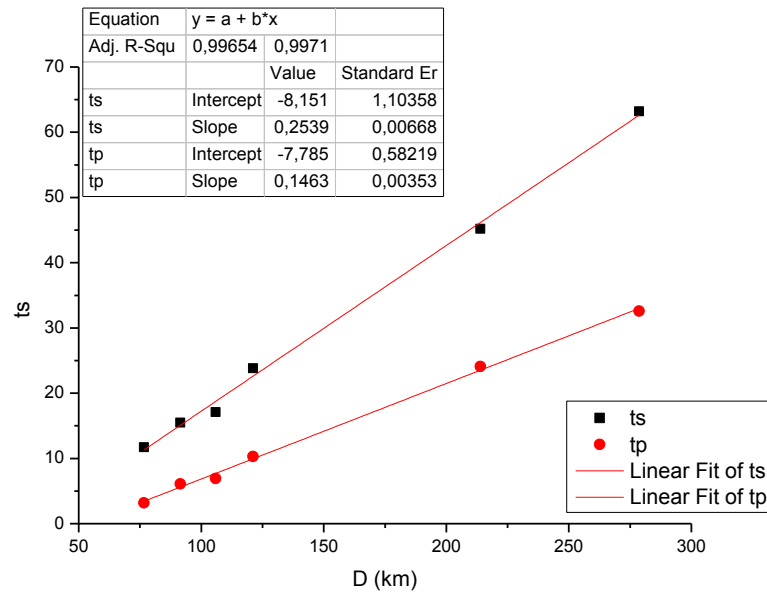




12 OCTOBER 2013 (6.2 ML 6.4 Mw , depth 65.2km)

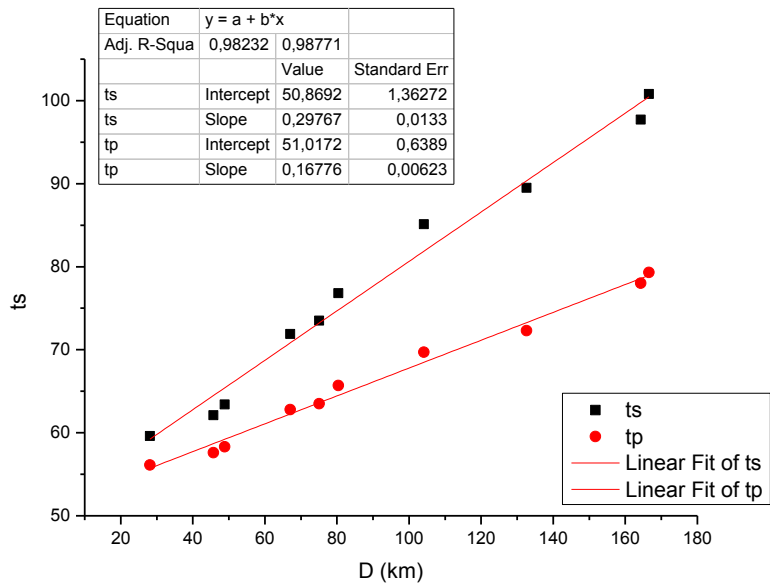
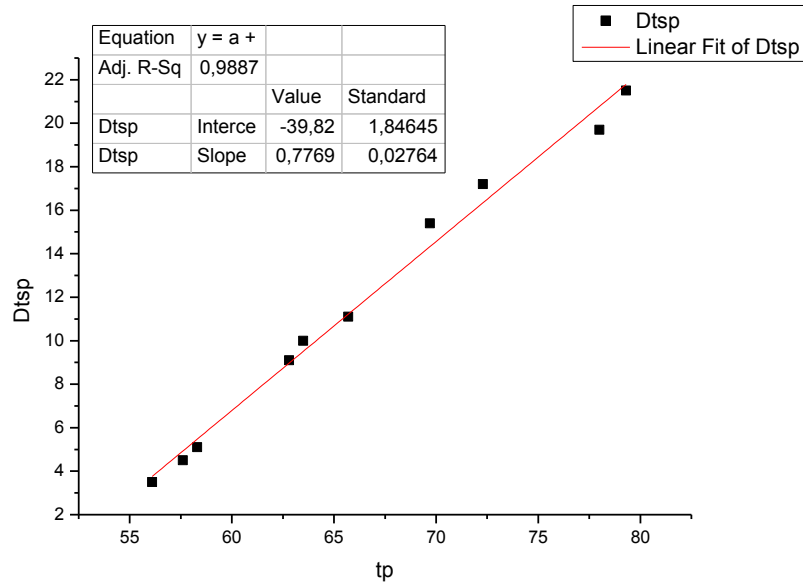
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	11,7	3,2	8,5	40,3	76,6494
IMMV	15,5	6,1	9,4	64,1	91,43222
CHAN	17,1	6,9	10,2	83,5	105,94
GVDS	23,8	10,3	13,5	102,1	121,1423
LAST	45,2	24,1	21,1	203,7	213,8802
ZKR	63,2	32,6	30,6	270,9	278,6357

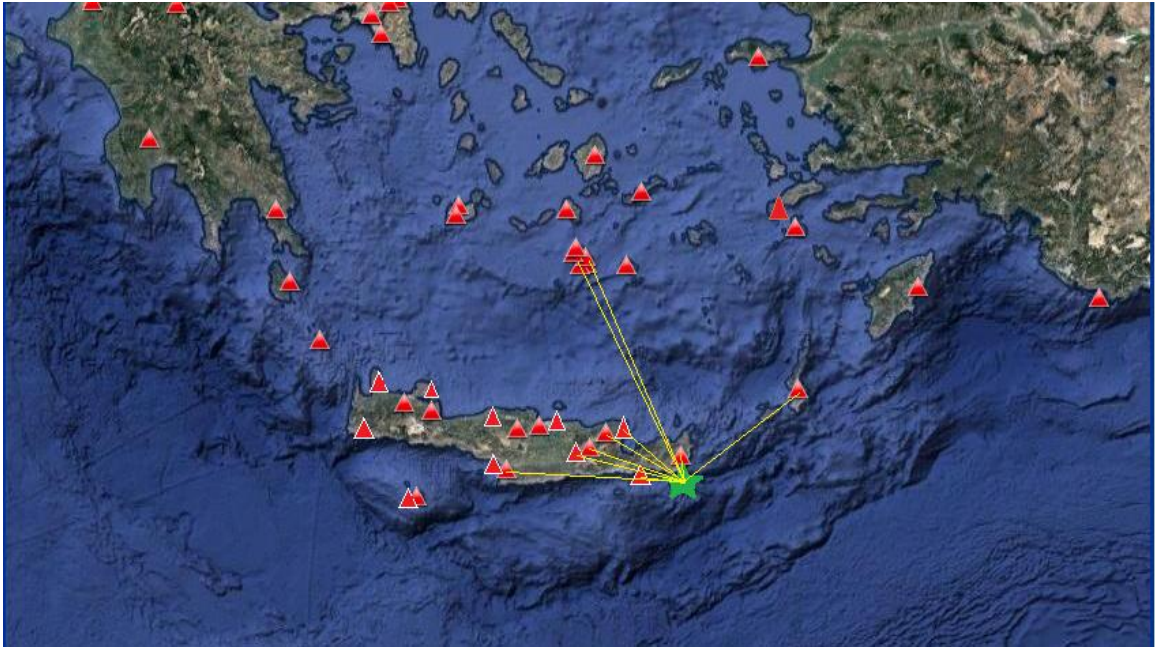




24 DECEMBER 2013 (4.2 ML 4.3 Mw , depth 27.3km)

station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	59,6	56,1	3,5	6,8	28,13414
STIA	62,1	57,6	4,5	36,7	45,74035
FRMA	63,4	58,3	5,1	40,5	48,84199
NPS	71,9	62,8	9,1	61,2	67,01291
LAST	73,5	63,5	10	69,9	75,04199
KSTL	76,8	65,7	11,1	75,6	80,37817
KARP	85,1	69,7	15,4	100,5	104,1419
SIVA	89,5	72,3	17,2	129,8	132,6399
SANT	97,7	78	19,7	162	164,2842
THT2	100,8	79,3	21,5	164,3	166,5526

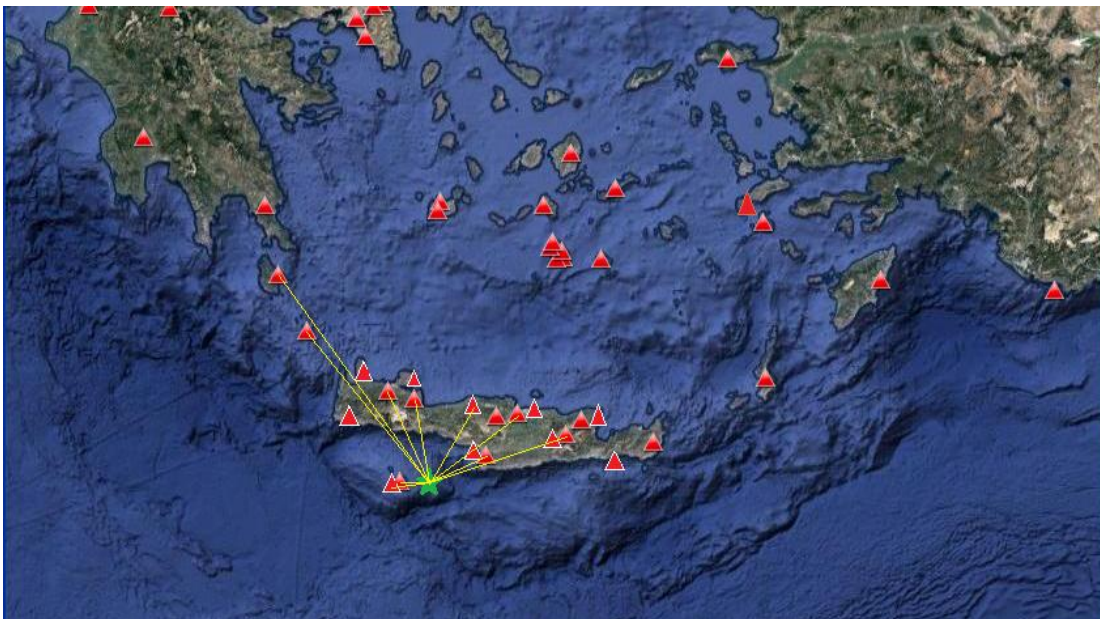
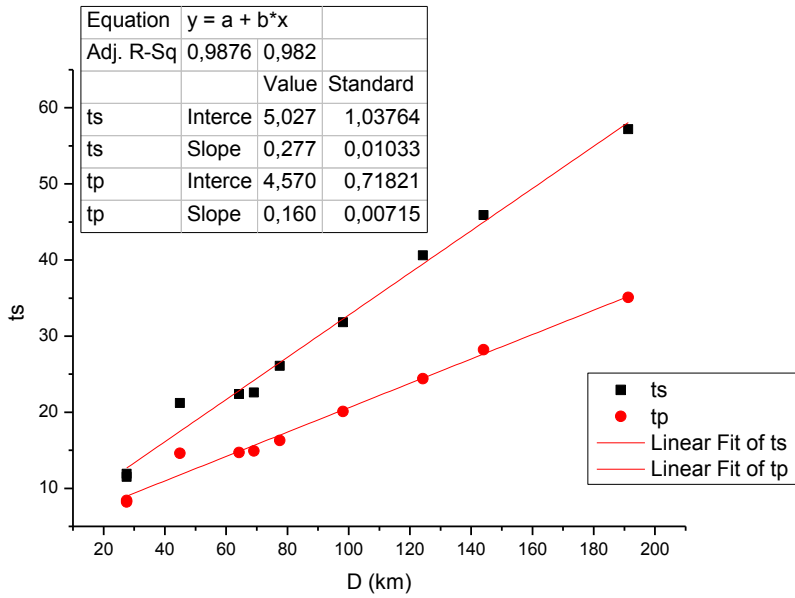
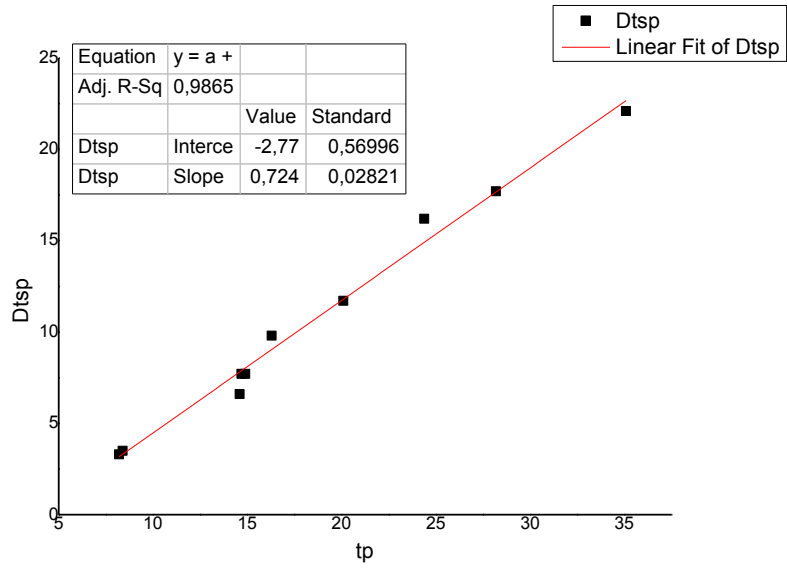




EARTHQUAKES DURING 2014

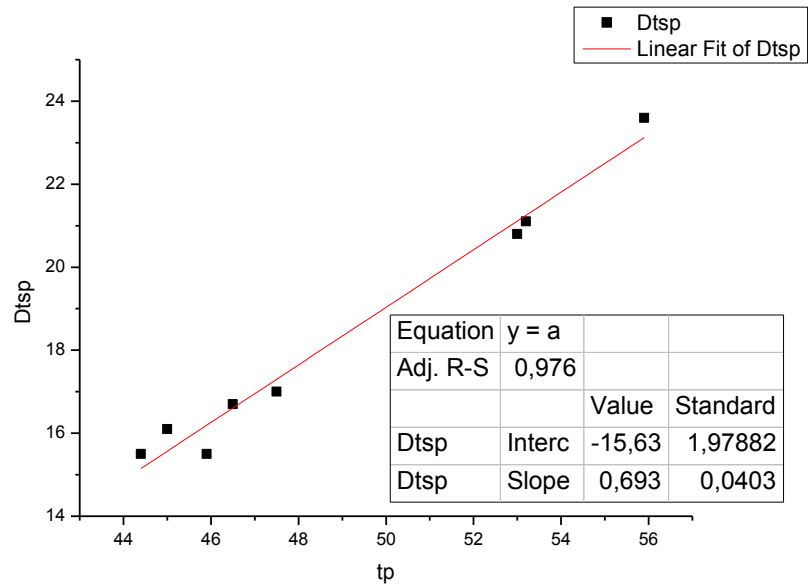
24 FEBRUARY 2014 (4 ML, depth 25.2 km)

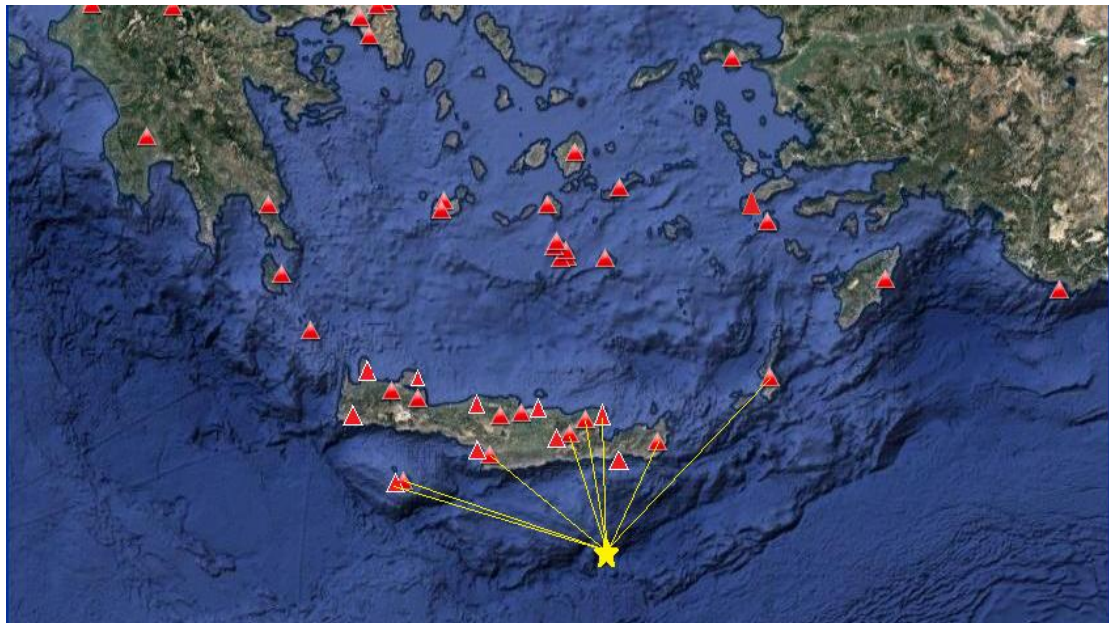
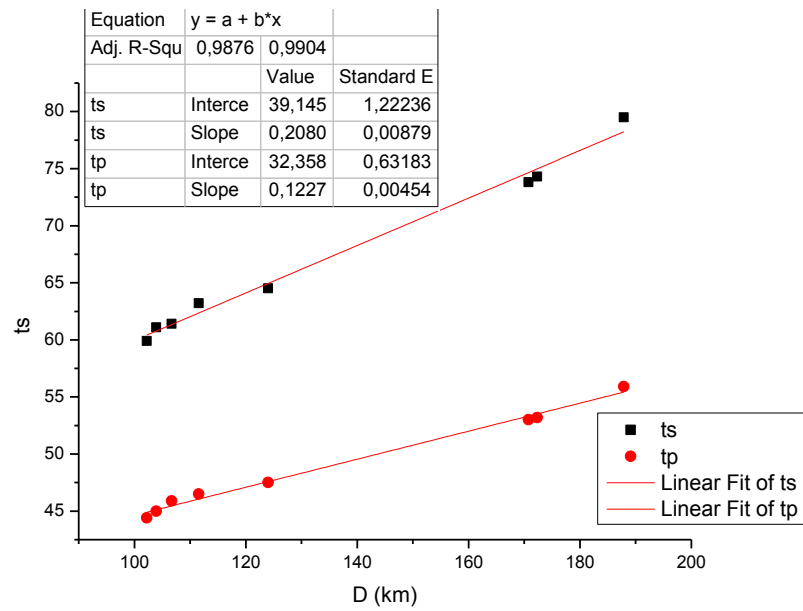
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	11,5	8,2	3,3	11,2	27,5768
GVDS	11,9	8,4	3,5	11,2	27,5768
PRNS	21,2	14,6	6,6	37,2	44,93195
SIVA	22,4	14,7	7,7	59,1	64,24835
VAM	22,6	14,9	7,7	64,3	69,06178
IMMV	26,1	16,3	9,8	73,3	77,51084
IACM	31,8	20,1	11,7	94,9	98,18885
LAST	40,6	24,4	16,2	121,7	124,2817
ANKY	45,9	28,2	17,7	141,8	144,0218
KTHR	57,2	35,1	22,1	189,6	191,2674



14 APRIL 2014 (4.6 ML, depth 33.8 km)

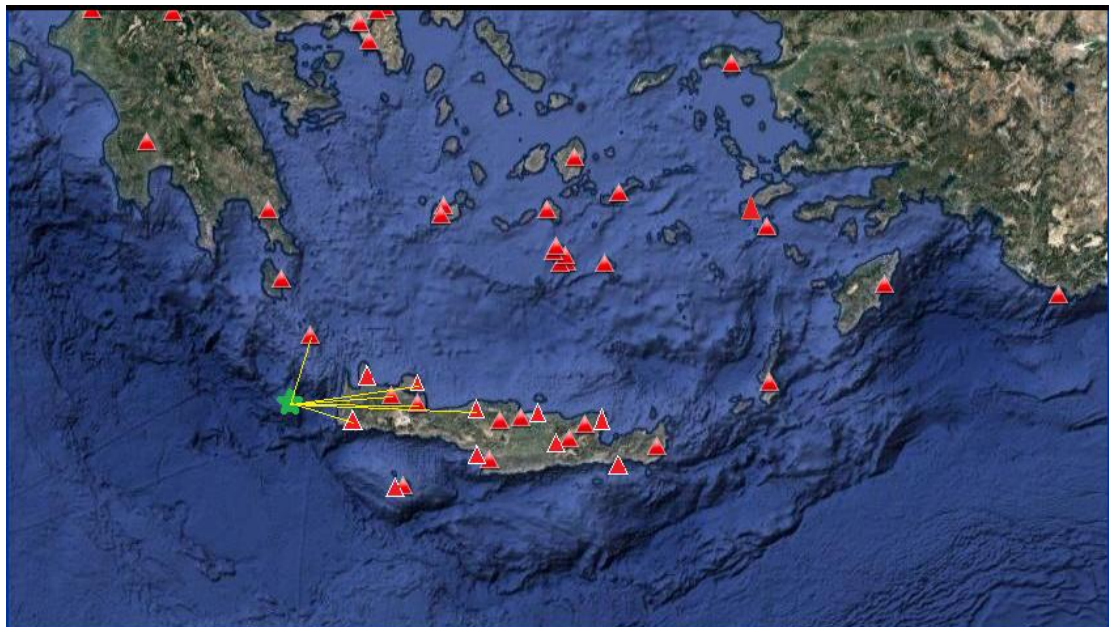
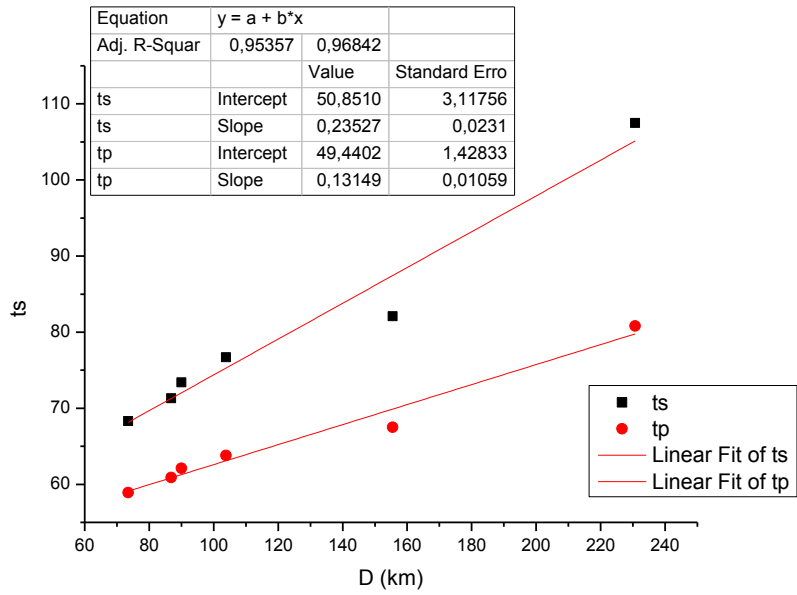
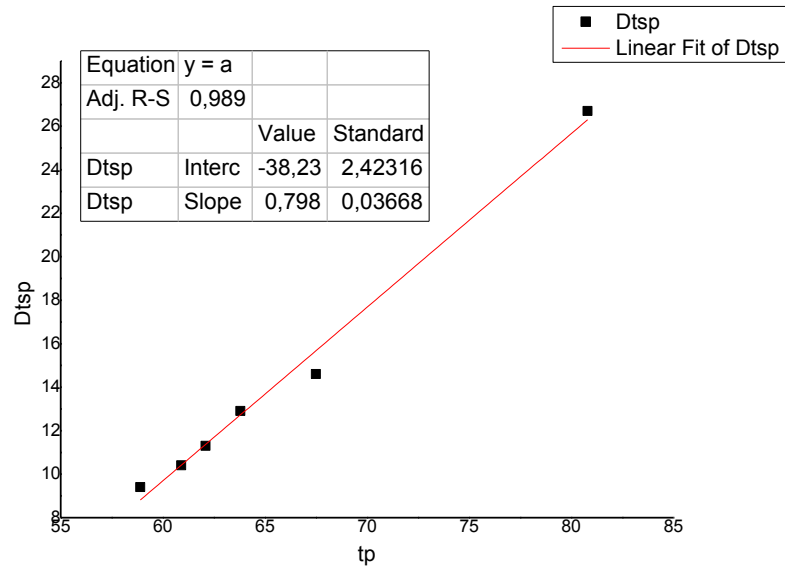
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	59,9	44,4	15,5	96,5	102,2482
LAST	61,1	45	16,1	98,3	103,9487
STIA	61,4	45,9	15,5	101,2	106,6953
NPS	63,2	46,5	16,7	106,3	111,5443
SIVA	64,5	47,5	17	119,3	123,9957
GVD	73,8	53	20,8	167,4	170,7782
GVDS	74,3	53,2	21,1	169	172,3469
KARP	79,5	55,9	23,6	184,8	187,8656





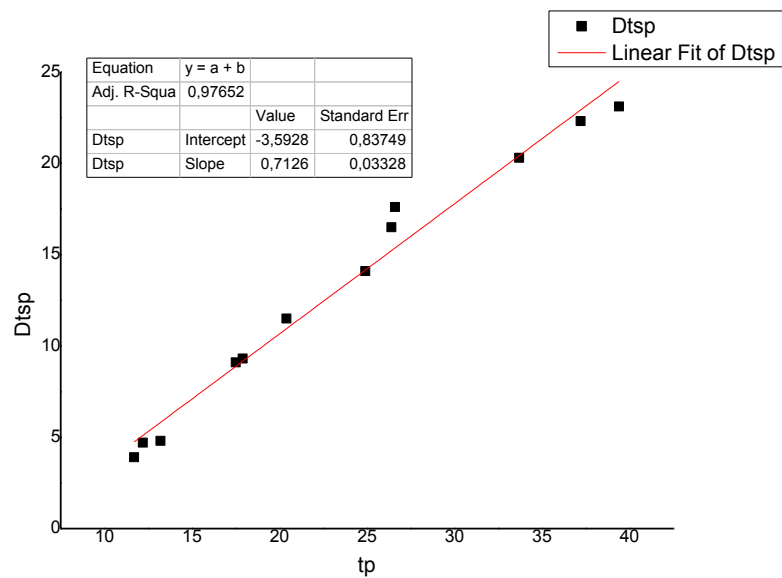
29 APRIL 2014 (4.1 ML 4 Mw, depth 41.2 km)

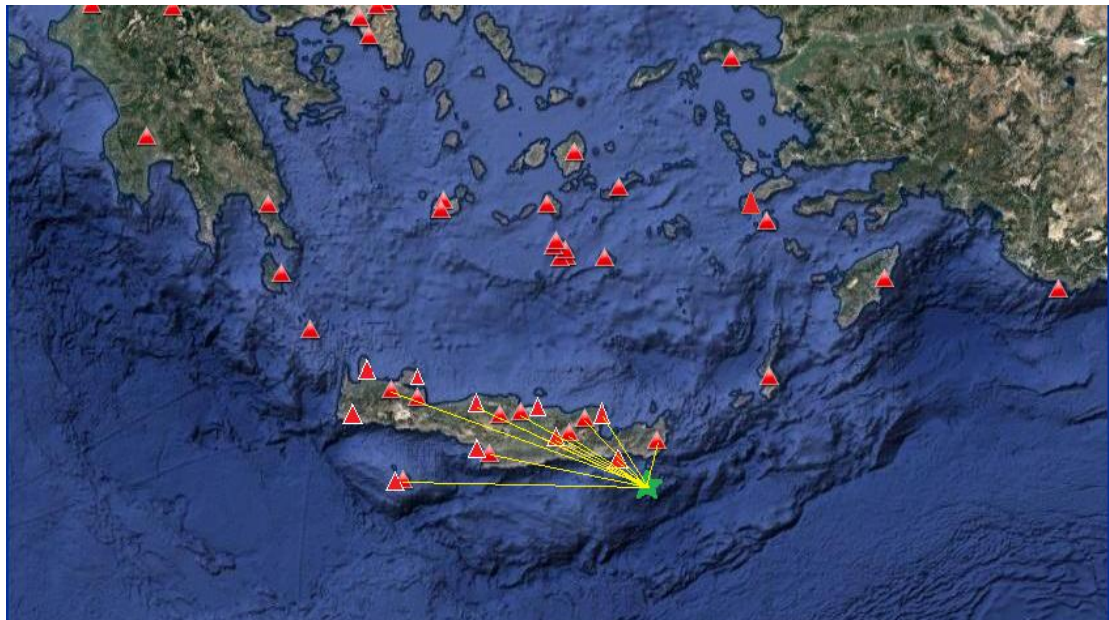
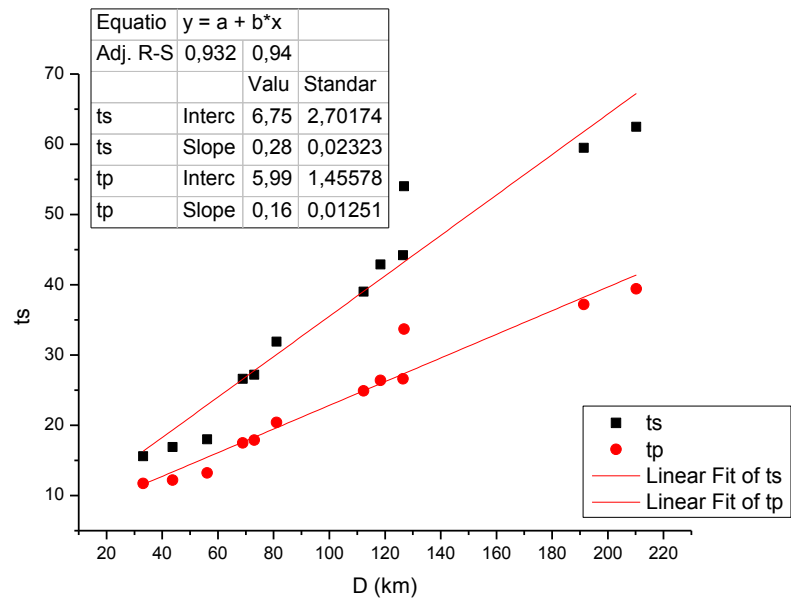
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	68,3	58,9	9,4	60,9	73,52721
IMMV	71,3	60,9	10,4	76,4	86,80092
CHAN	73,4	62,1	11,3	80	89,98578
VAM	76,7	63,8	12,9	95,3	103,8245
PRNS	82,1	67,5	14,6	150	155,5553
KRND	107,5	80,8	26,7	227	230,7086



18 MAY 2014 (4.2 ML, depth 20.6 km)

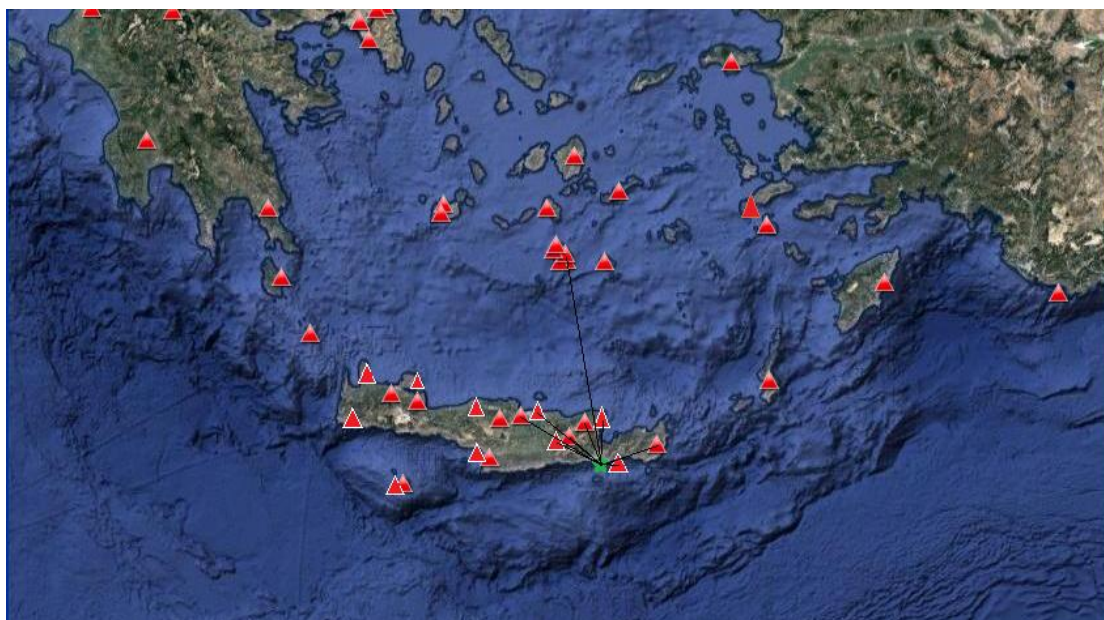
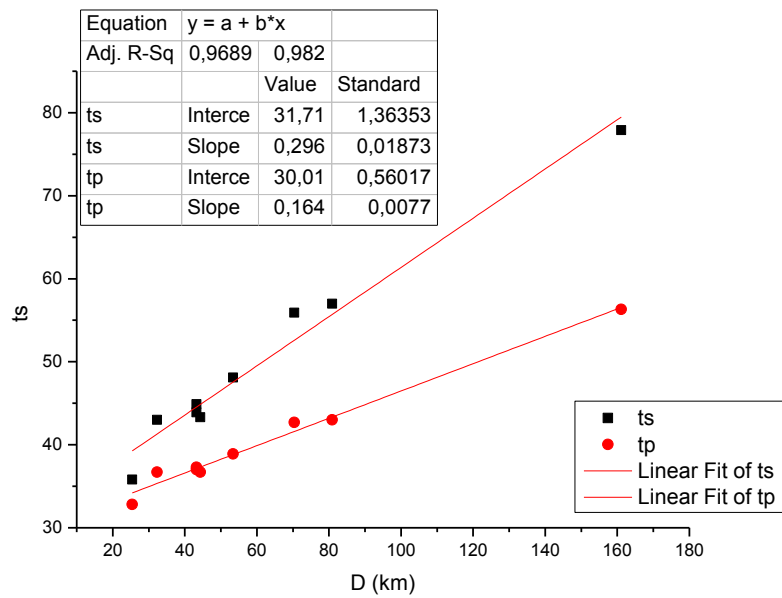
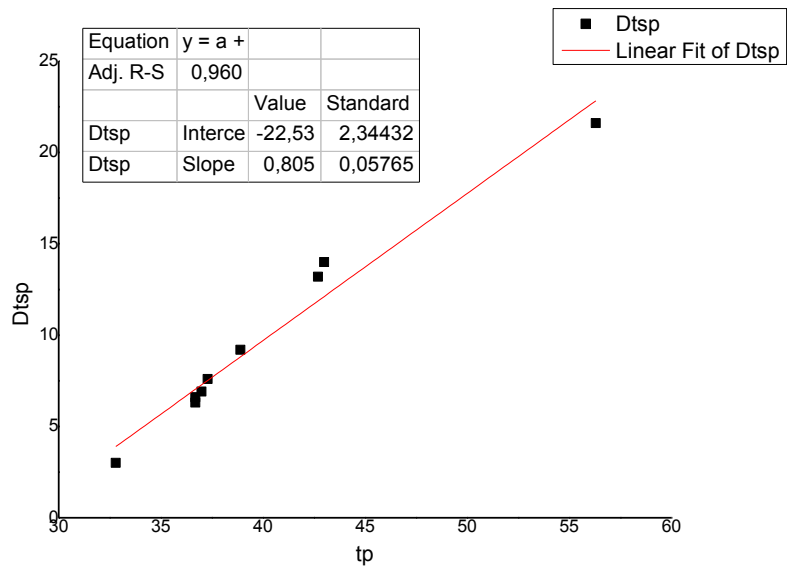
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	15,6	11,7	3,9	26	33,17167
FRMA	16,9	12,2	4,7	38,6	43,75294
STIA	18	13,2	4,8	52,2	56,11773
NPS	26,6	17,5	9,1	65,8	68,94926
LAST	27,2	17,9	9,3	70,1	73,06415
KSTL	31,9	20,4	11,5	78,4	81,06121
IACM	39	24,9	14,1	110,4	112,3055
IDI	42,9	26,4	16,5	116,6	118,4057
SIVA	44,2	26,6	17,6	124,8	126,4887
PRNS	54	33,7	20,3	125,2	126,8834
GVD	59,5	37,2	22,3	190,3	191,4117
IMMV	62,5	39,4	23,1	209,2	210,2118





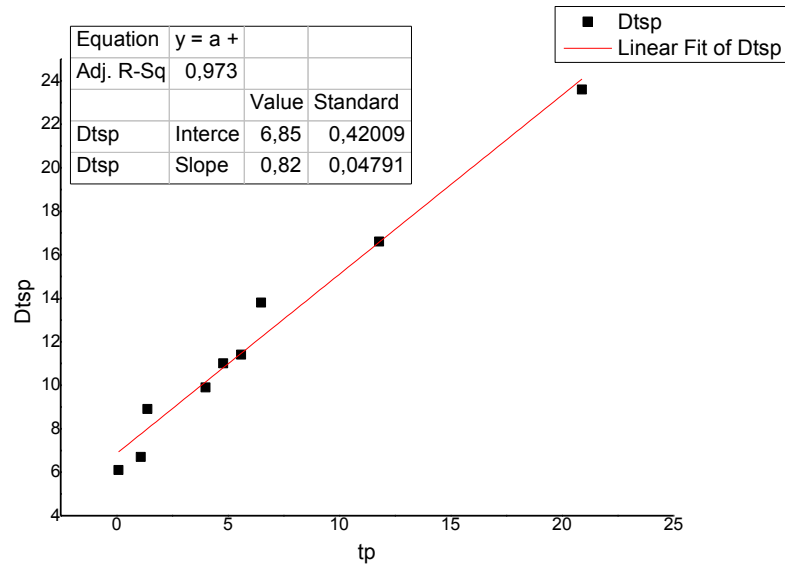
31 MAY 2014 (4.2 ML 4 Mw, depth 19.5 km)

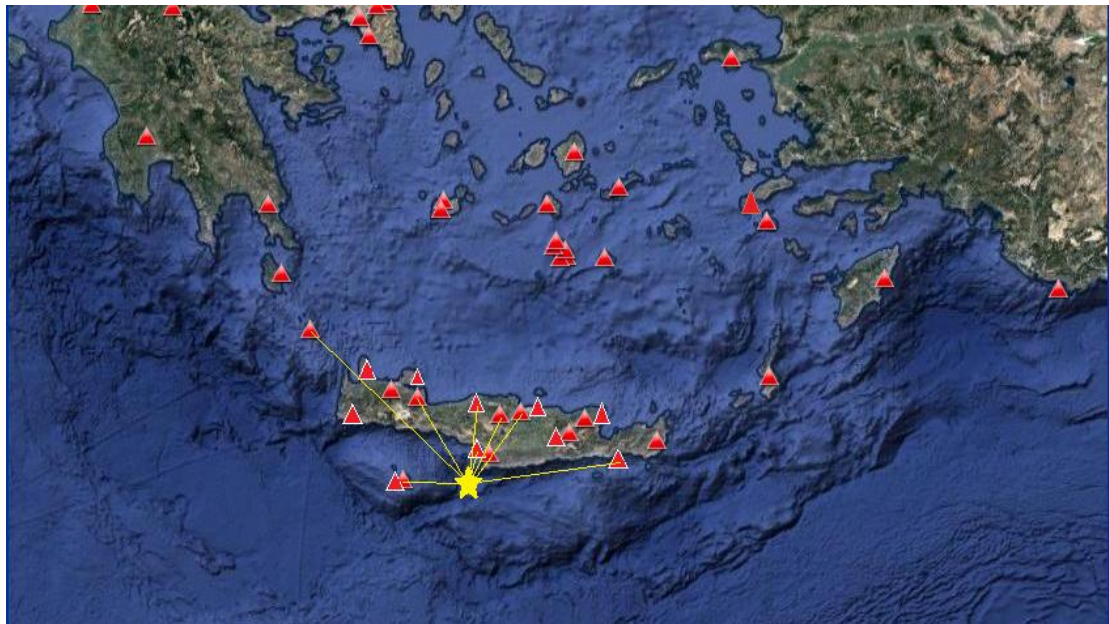
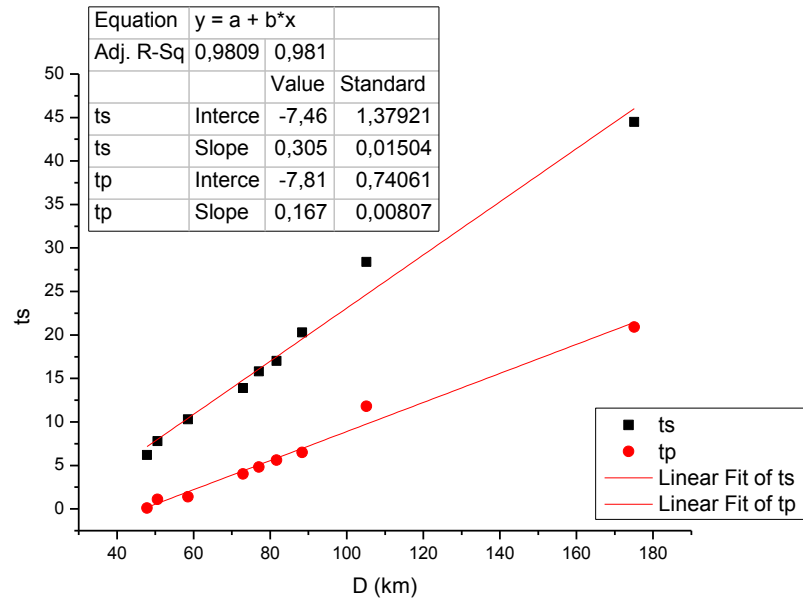
station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	35,8	32,8	3	16,3	25,41535
STIA	43	36,7	6,3	25,8	32,34022
ZKR	43,3	36,7	6,6	39,8	44,32031
LAST	43,9	37	6,9	38,6	43,24592
NPS	44,9	37,3	7,6	38,6	43,24592
KSTL	48,1	38,9	9,2	49,7	53,38858
HRKL	55,9	42,7	13,2	67,6	70,35631
IACM	57	43	14	78,5	80,88572
SANT	77,9	56,3	21,6	159,9	161,0846



1 JUNE 2014 (4.8 ML 4.6Mw, depth 32.2 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	6,2	0,1	6,1	35,4	40,41547
TMBK	7,8	1,1	6,7	39	43,60333
GVD	10,3	1,4	8,9	48,9	52,64466
IDI	13,9	4	9,9	65,4	68,24522
PRNS	15,8	4,8	11	70	72,66533
IACM	17	5,6	11,4	75,1	77,59033
VAM	20,3	6,5	13,8	82,3	84,5786
FRMA	28,4	11,8	16,6	100,1	101,9817
ANKY	44,5	20,9	23,6	172,1	173,2012

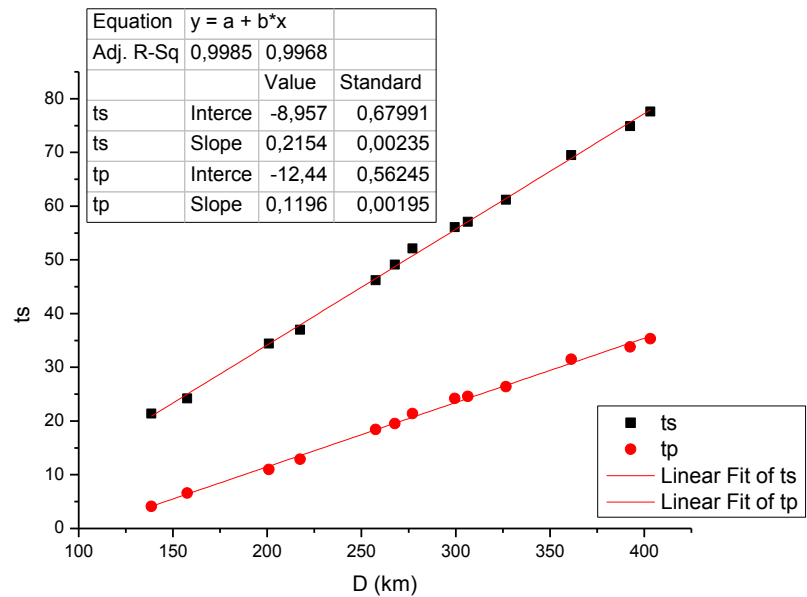
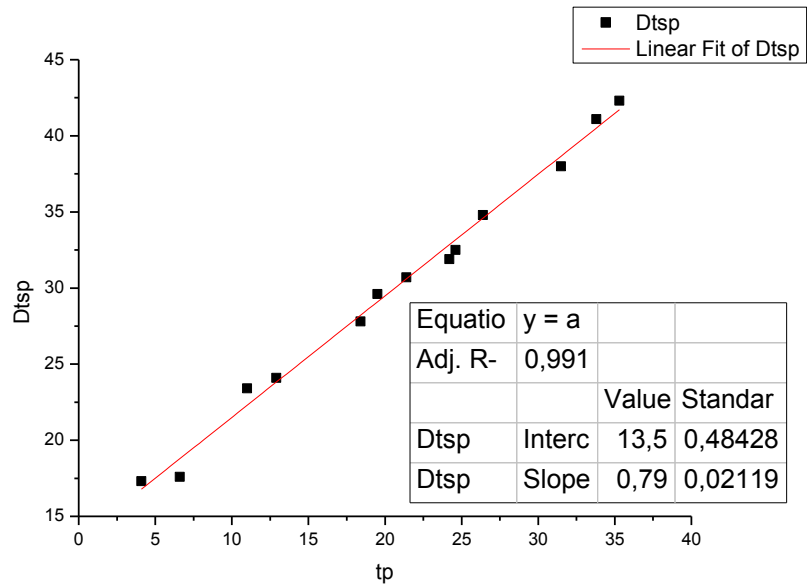


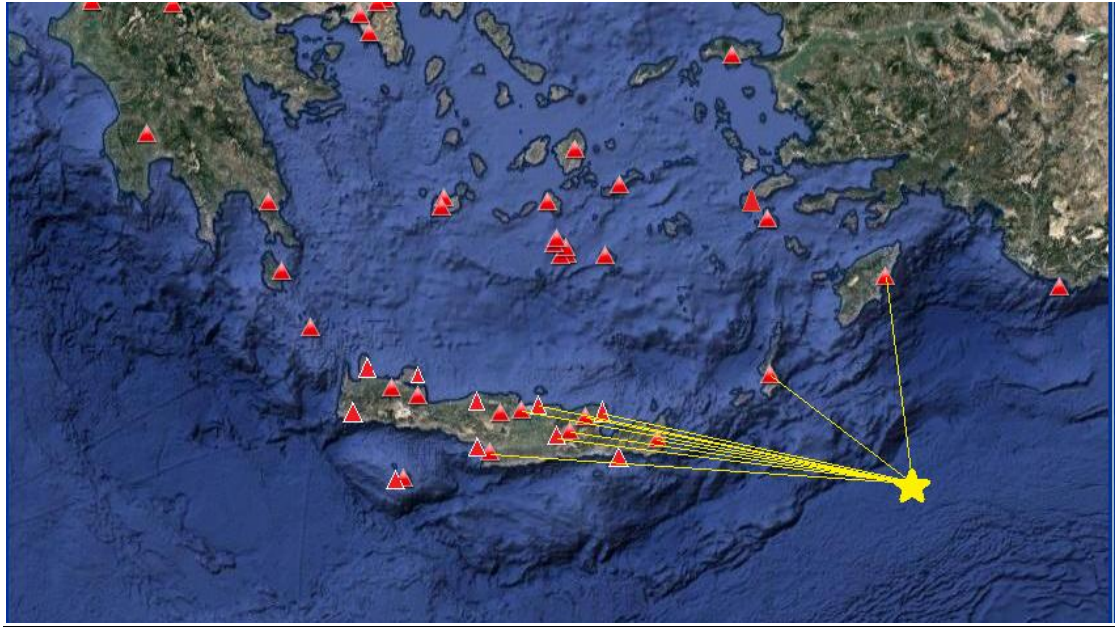


11 JUNE 2014 (5.1 ML, depth 32.5 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	21,4	4,1	17,3	134,7	138,5653
ARG	24,2	6,6	17,6	154,2	157,5877
ZKR	34,4	11	23,4	198,3	200,9456
STIA	37	12,9	24,1	215	217,4425
NPS	46,2	18,4	27,8	255,5	257,5587
LAST	49,1	19,5	29,6	265,8	267,7796

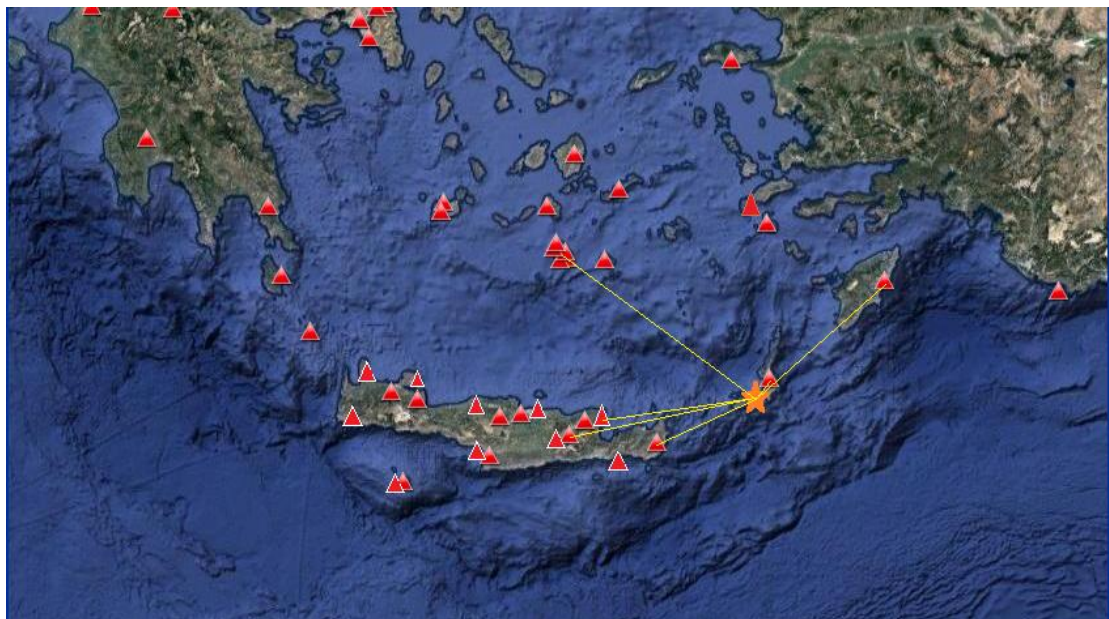
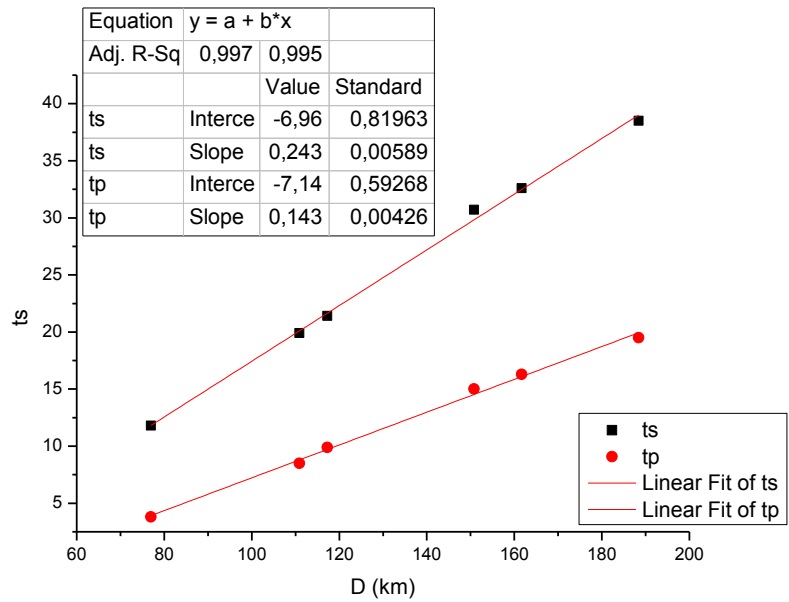
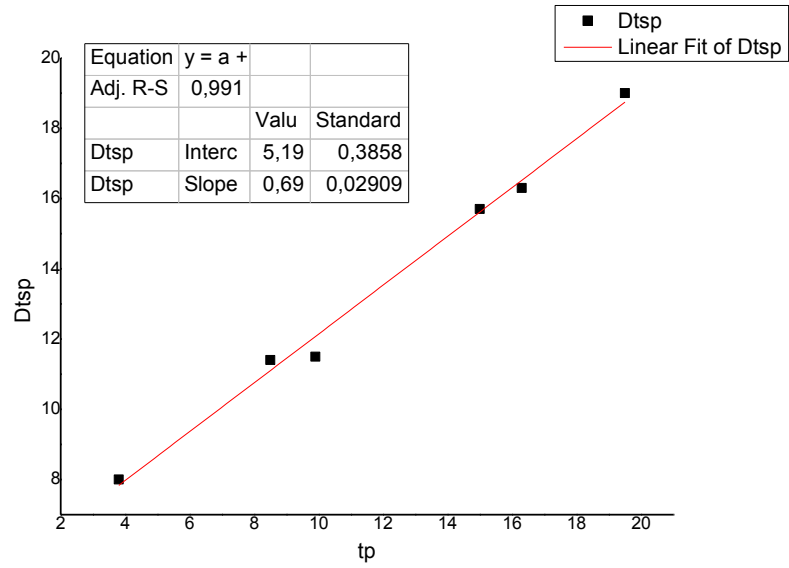
KSTL	52,1	21,4	30,7	275,2	277,1124
HRKL	56,1	24,2	31,9	297,7	299,4688
IACM	57,1	24,6	32,5	304,7	306,4284
SIVA	61,2	26,4	34,8	325,1	326,7205
PRNS	69,5	31,5	38	359,9	361,3644
GVD	74,9	33,8	41,1	391,2	392,5477
CHAN	77,6	35,3	42,3	402	403,3116





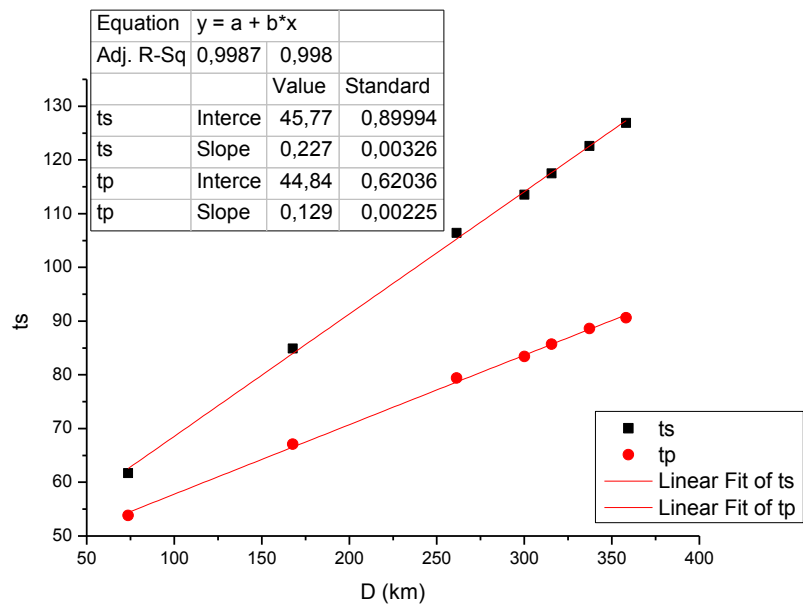
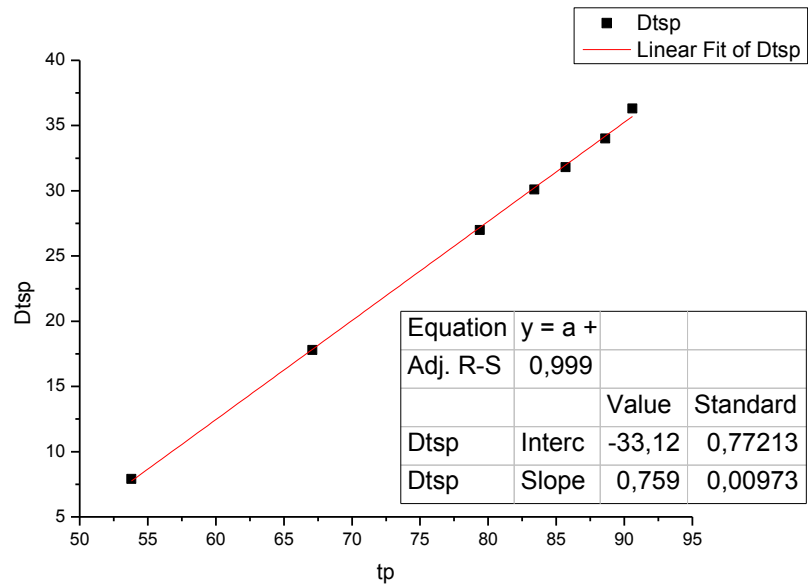
13 JUNE 2014 (4.9 ML 4.6Mw, depth 75.1 km)

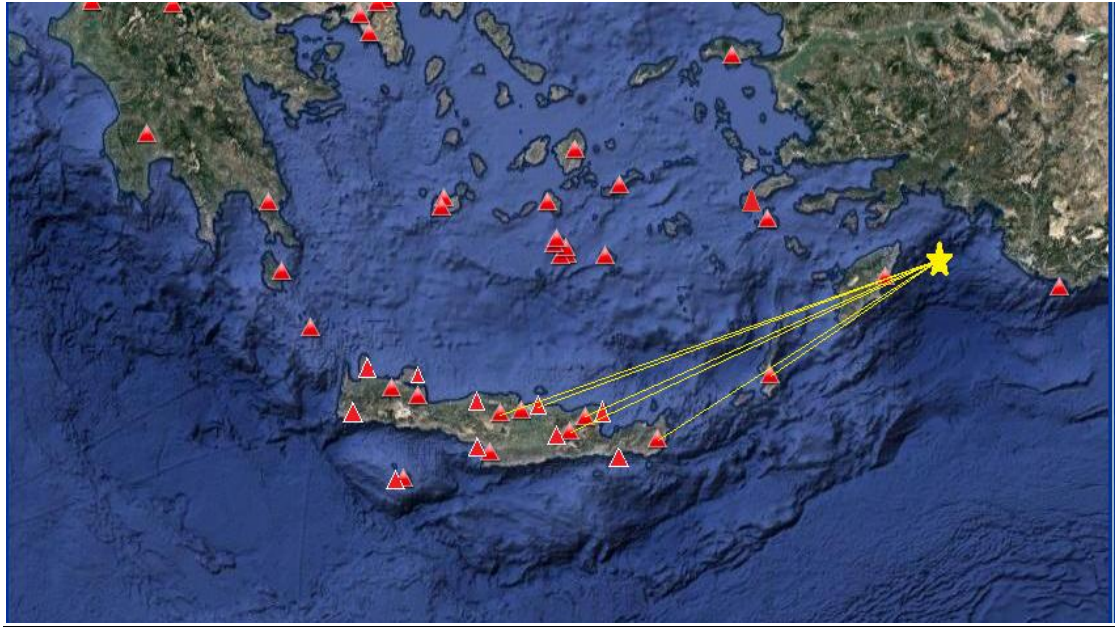
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	11,8	3,8	8	16,9	76,97805
ZKR	19,9	8,5	11,4	81,6	110,8989
STIA	21,4	9,9	11,5	90,1	117,2946
ARG	30,7	15	15,7	130,8	150,8266
LAST	32,6	16,3	16,3	143,2	161,698
SANT	38,5	19,5	19	172,8	188,414



20 JUNE 2014 (4.3 ML, depth 59.3 km)

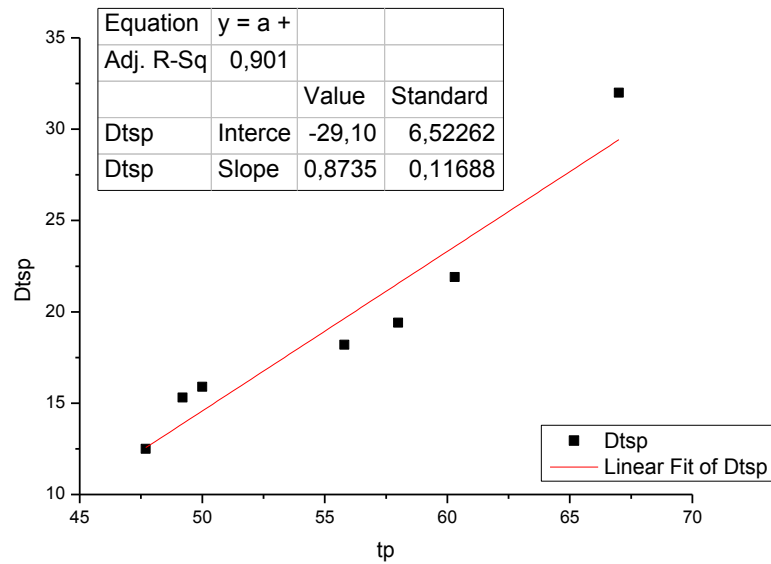
station	ts	tp	Dtsp	Dop(km)	D(km)
ARG	61,7	53,8	7,9	43,7	73,66261
KARP	84,9	67,1	17,8	156,9	167,7322
ZKR	106,4	79,4	27	254,6	261,4147
NPS	113,5	83,4	30,1	294,2	300,1169
LAST	117,5	85,7	31,8	310	315,6208
HRKL	122,6	88,6	34	332	337,2543
IDI	126,9	90,6	36,3	353,2	358,1434

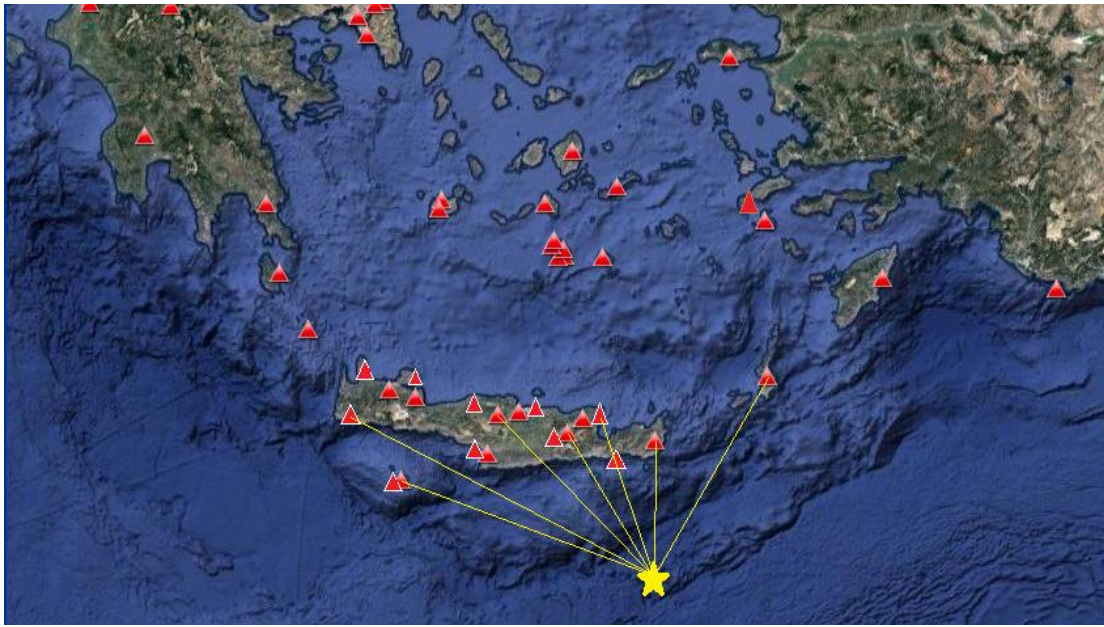
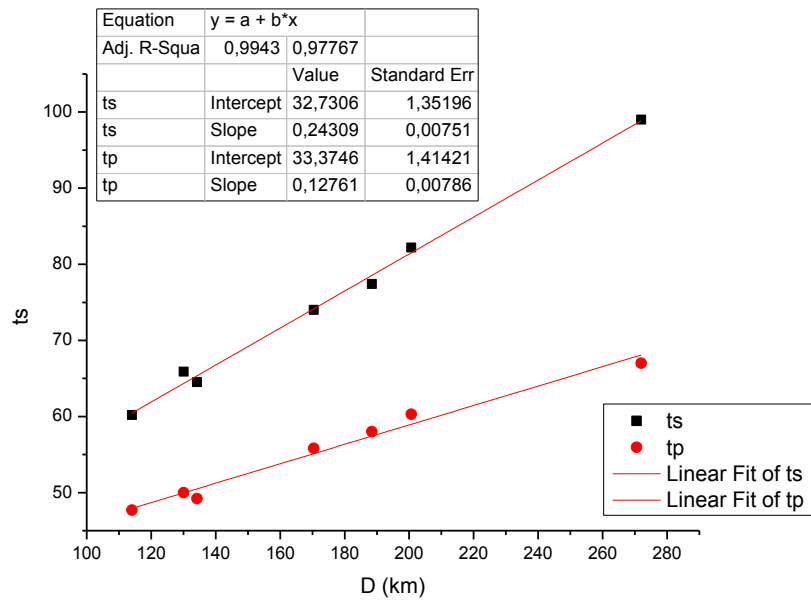




6 JULY 2014 (4.2 ML 4.2 Mw, depth 32.5 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	60,2	47,7	12,5	109,3	114,0296
STIA	64,5	49,2	15,3	130,2	134,195
LAST	65,9	50	15,9	126	130,124
IDI	74	55,8	18,2	167,3	170,4275
KARP	77,4	58	19,4	185,6	188,424
GVD	82,2	60,3	21,9	198	200,6496
KNDR	99	67	32	270	271,949

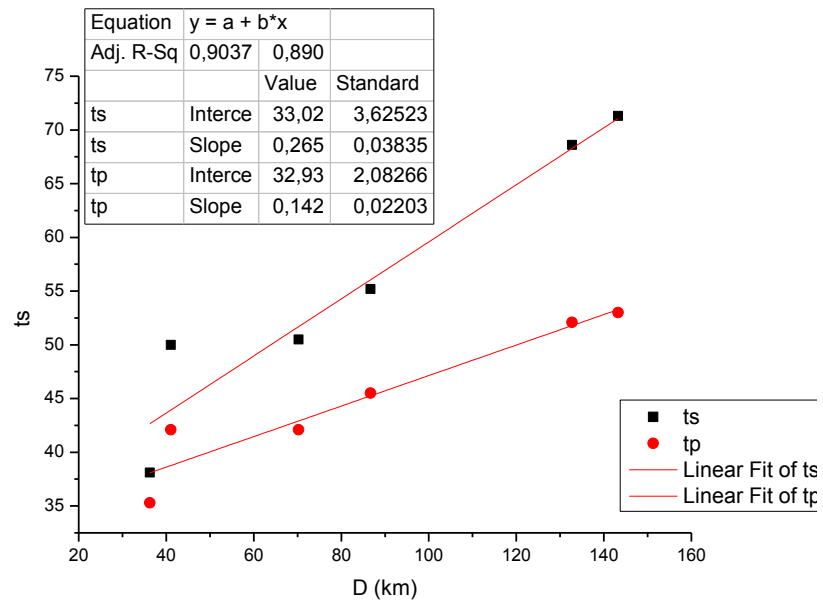
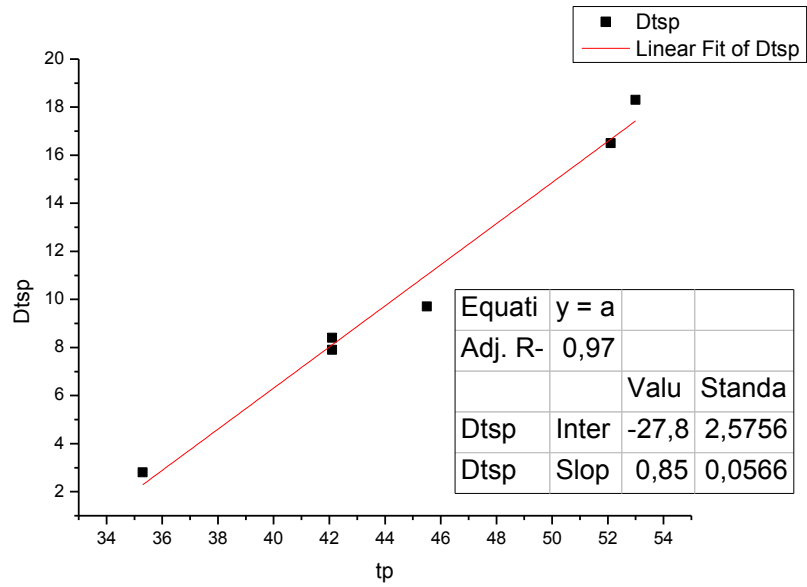


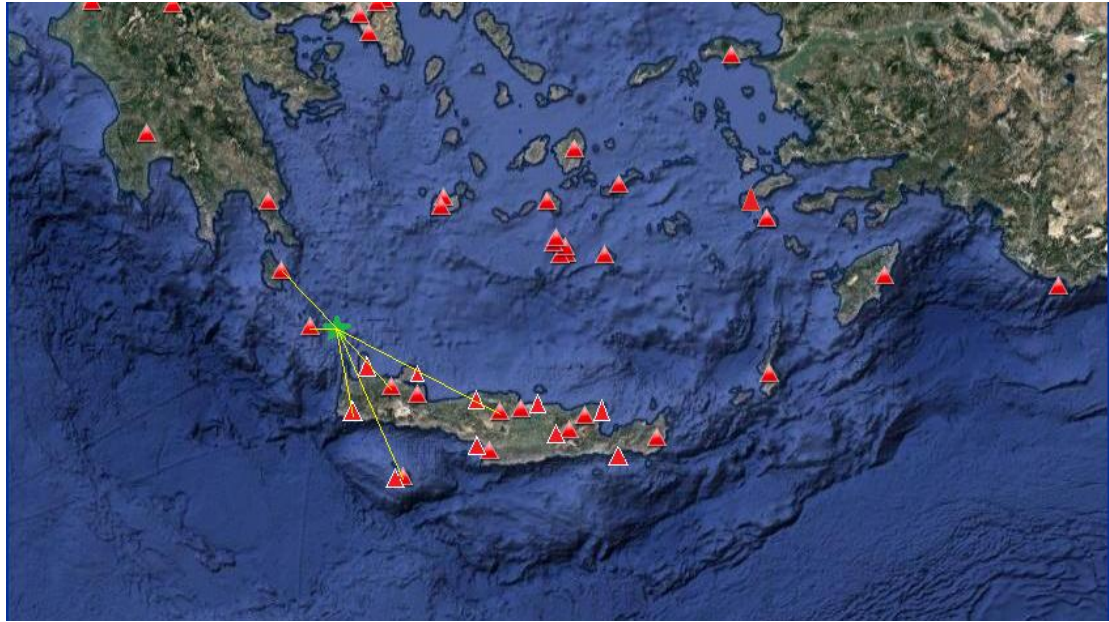


8JULY 2014 (4 ML, depth 27.9 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	38,1	35,3	2,8	23,2	36,28567
CHAN	50	42,1	7,9	30,1	41,04169
IMMV	50,5	42,1	8,4	64,5	70,2756
VAM	55,2	45,5	9,7	82,1	86,71113

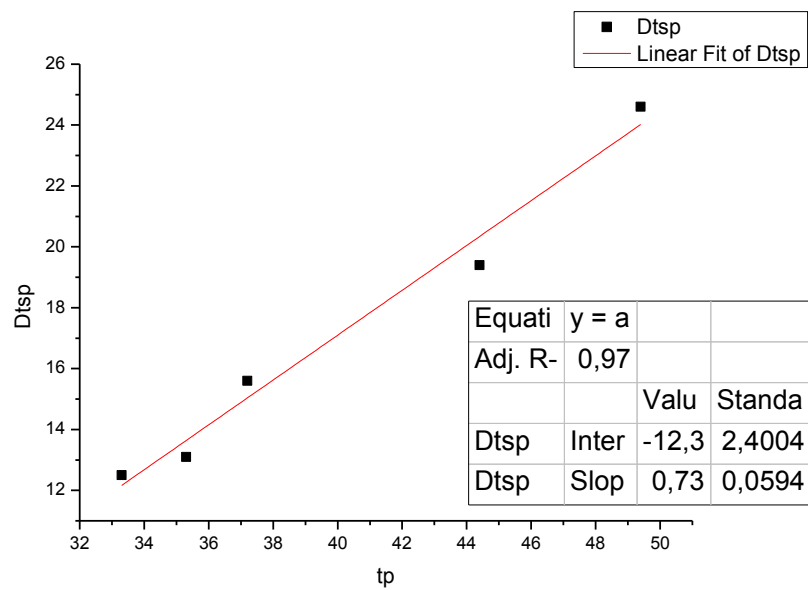
GVDS	68,6	52,1	16,5	129,8	132,7646
IDI	71,3	53	18,3	140,5	143,2434

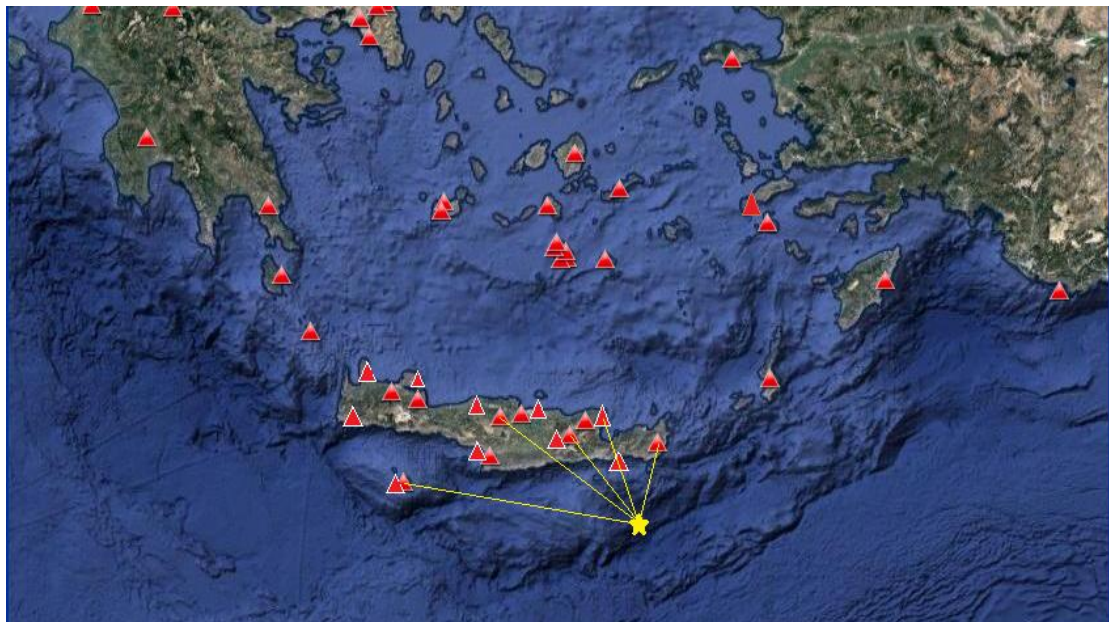
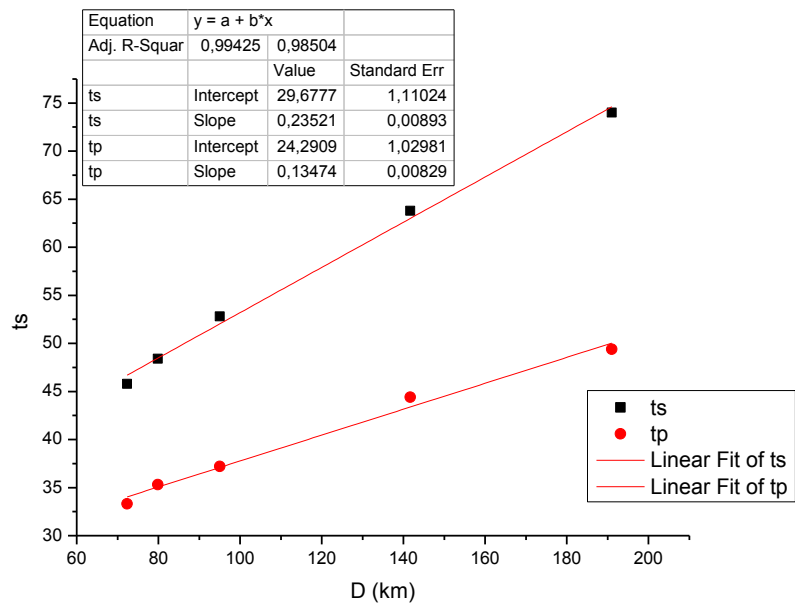




22 JULY 2014 (4.1 ML, depth 39 km)

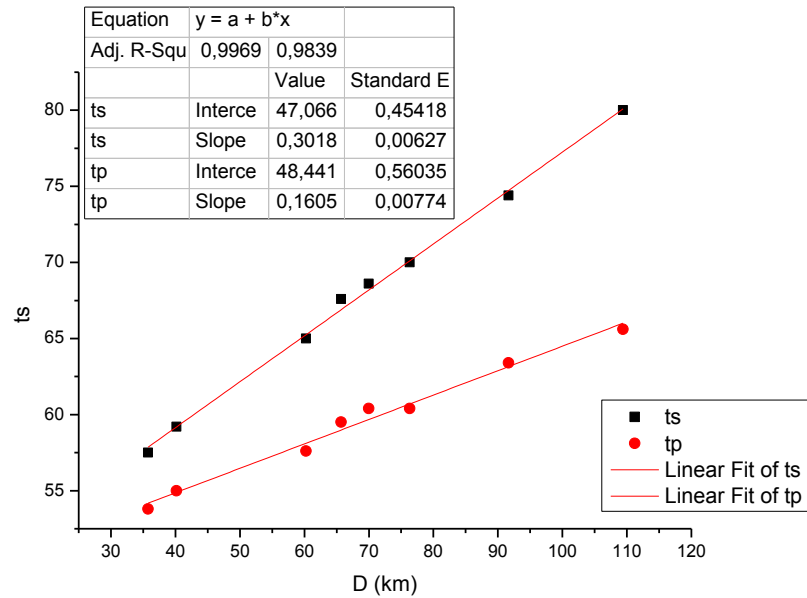
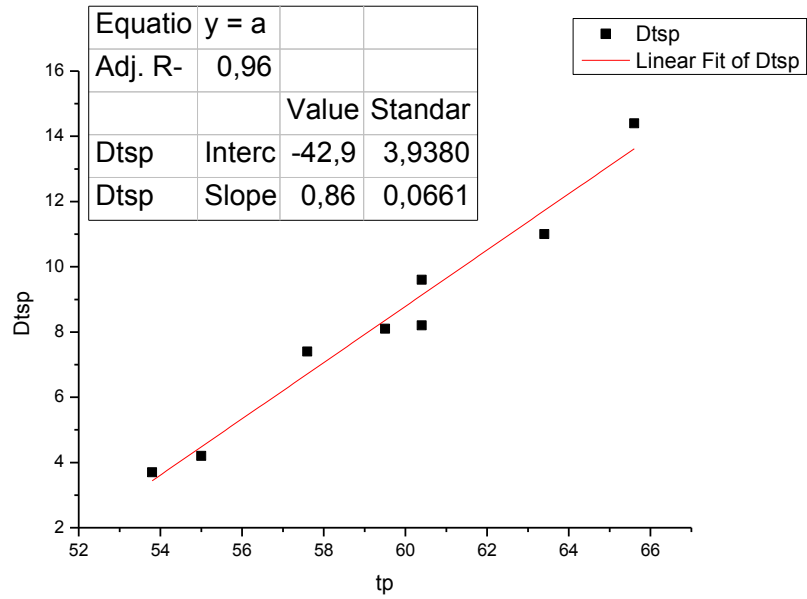
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	45,8	33,3	12,5	60,9	72,31743
STIA	48,4	35,3	13,1	69,7	79,86921
LAST	52,8	37,2	15,6	86,7	95,06782
IDI	63,8	44,4	19,4	136,2	141,6737
GVD	74	49,4	24,6	187	191,0236

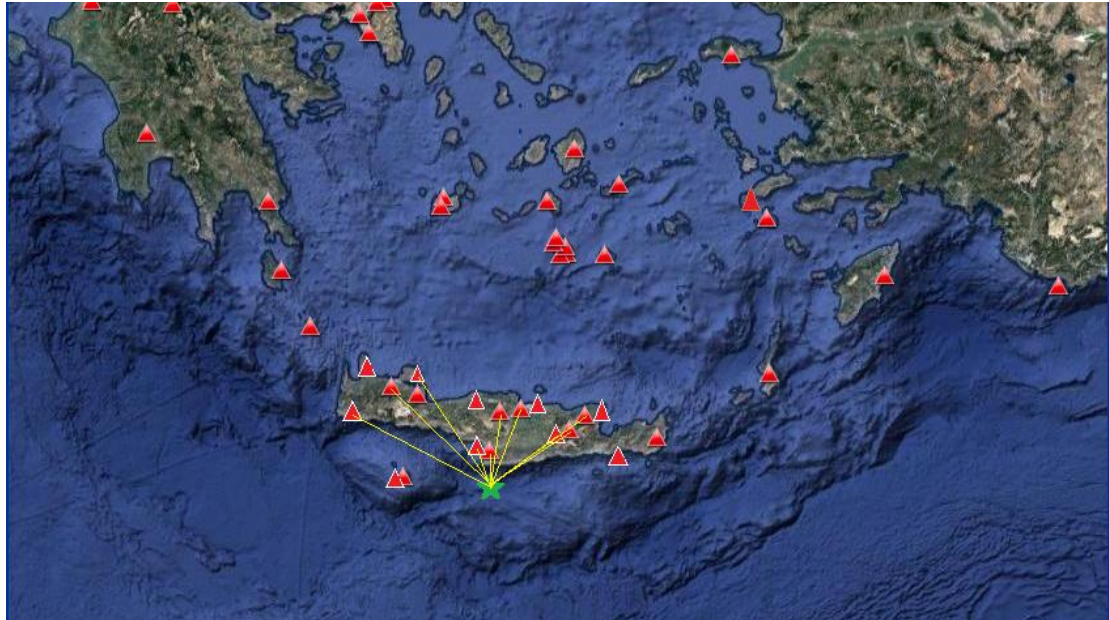




8 AUGUST 2014 (4.8 ML 4.5Mw , depth 26.7 km)

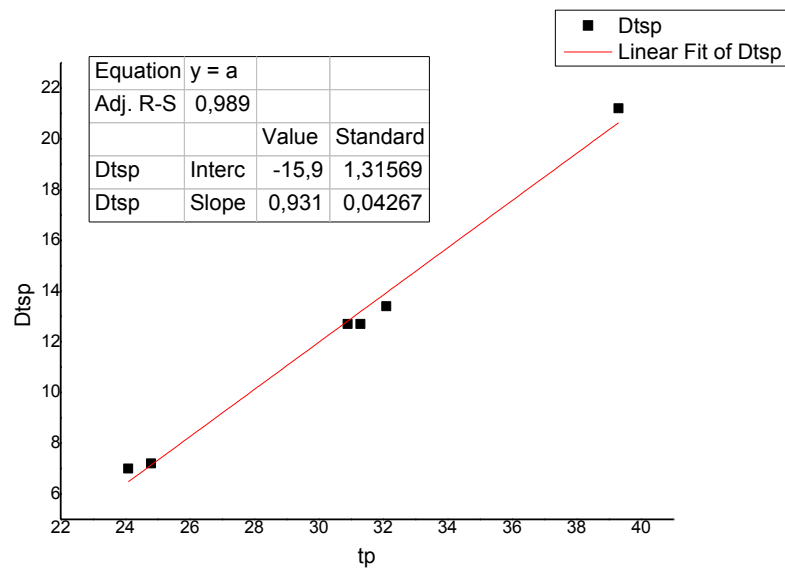
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	57,5	53,8	3,7	23,8	35,76772
TMBK	59,2	55	4,2	30	40,1608
IDI	65	57,6	7,4	54	60,24027
IACM	67,6	59,5	8,1	60	65,6726
KSTL	68,6	60,4	8,2	64,7	69,99271
LAST	70	60,4	9,6	71,5	76,3226
NPS	74,4	63,4	11	87,7	91,67431
IMMV	80	65,6	14,4	106,1	109,408

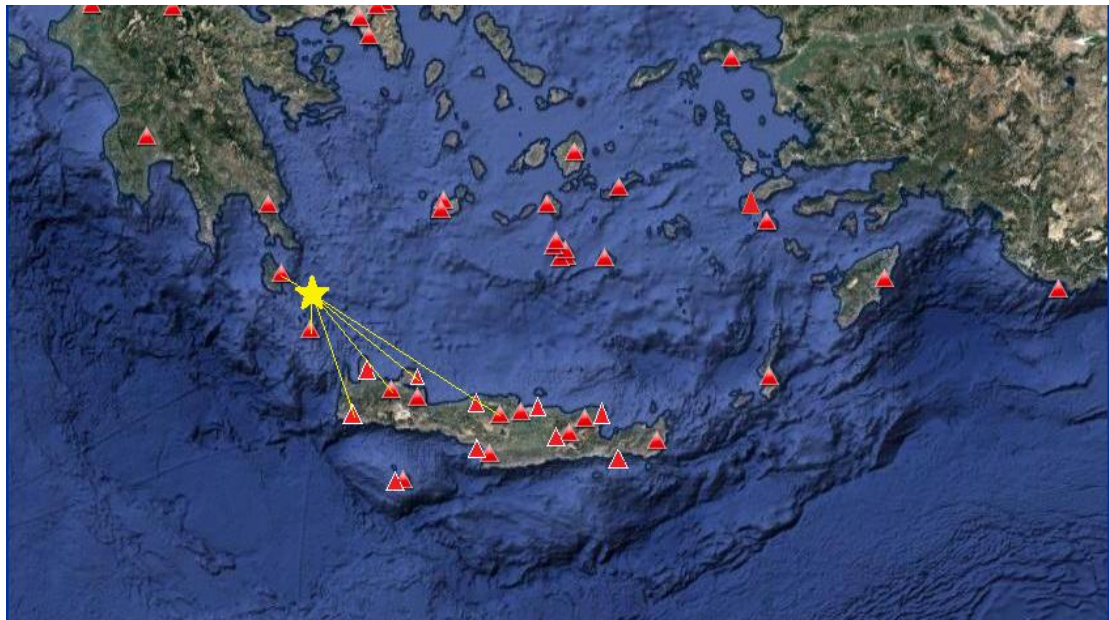
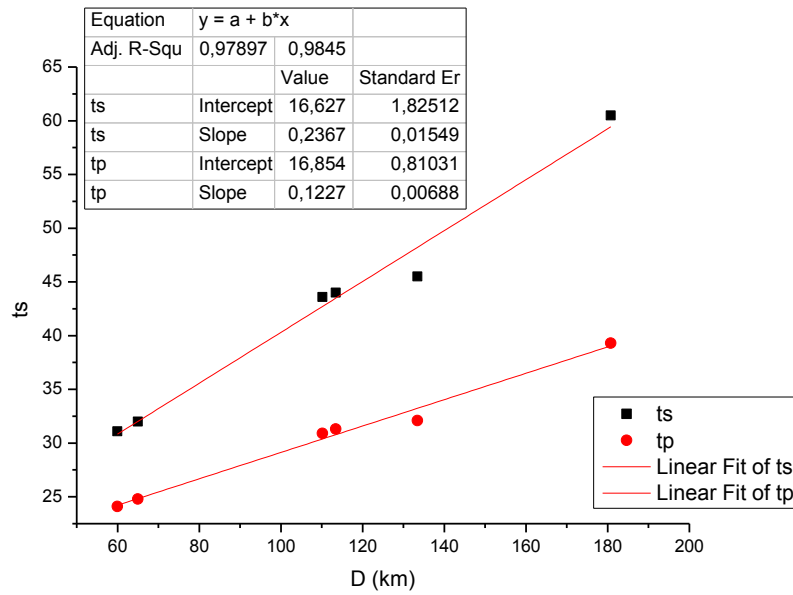




11 AUGUST 2014 (4.1 ML 4 Mw , 54.1 km)

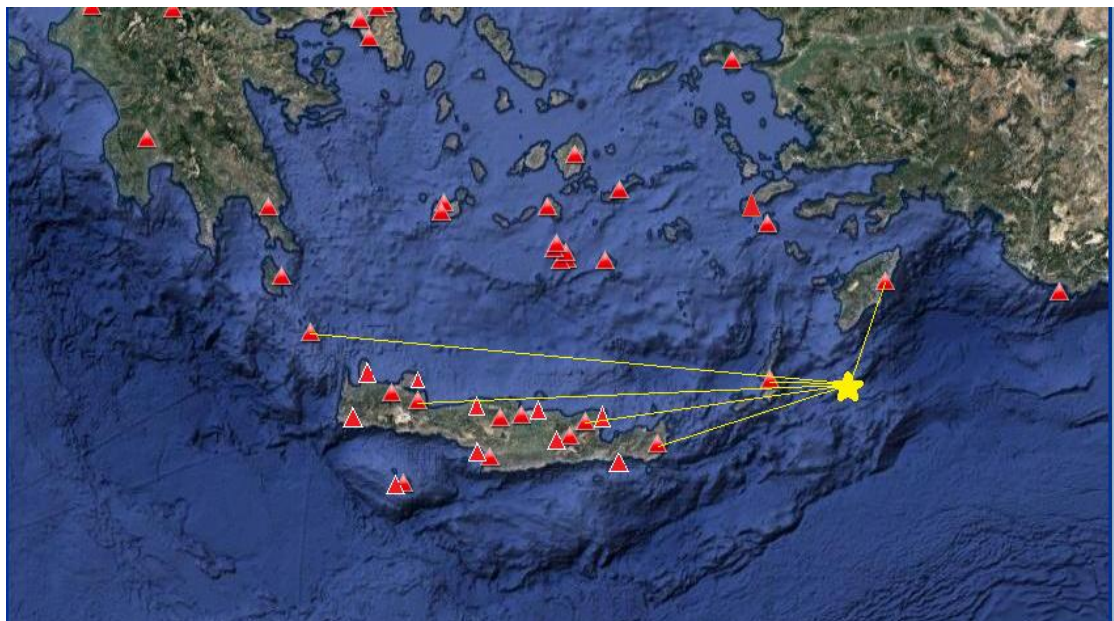
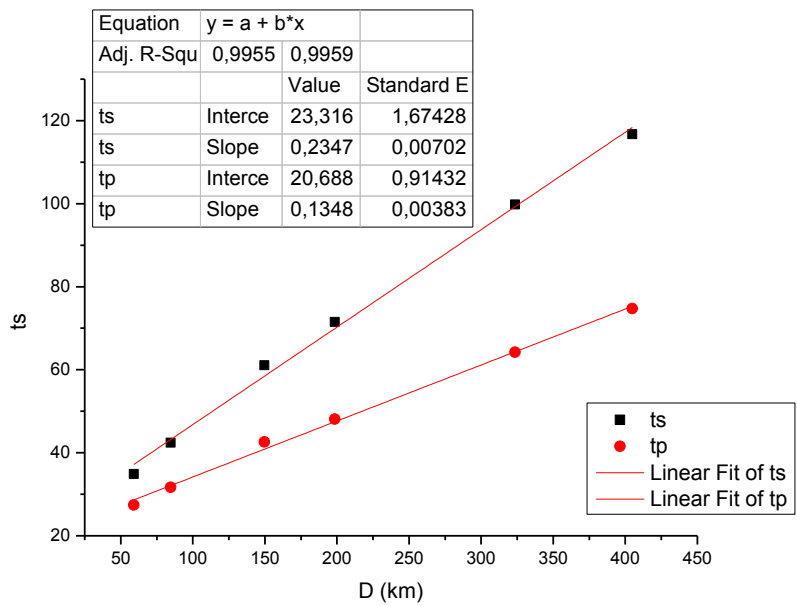
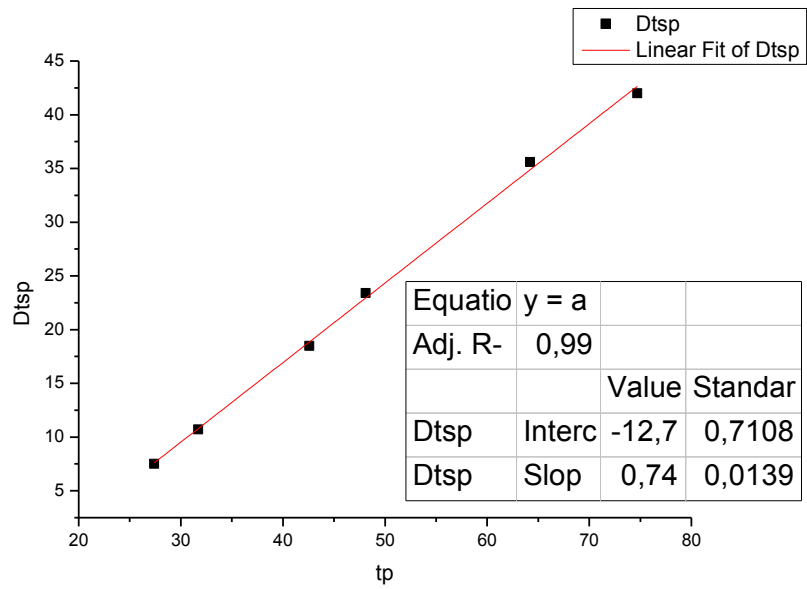
station	ts	tp	Dtsp	Dop(km)	D(km)
KTHR	31,1	24,1	7	25,8	59,93705
ANKY	32	24,8	7,2	36	64,98315
CHAN	43,6	30,9	12,7	96	110,1944
IMMV	44	31,3	12,7	99,7	113,4324
KNDR	45,5	32,1	13,4	122	133,4571
IDI	60,5	39,3	21,2	172,5	180,7846





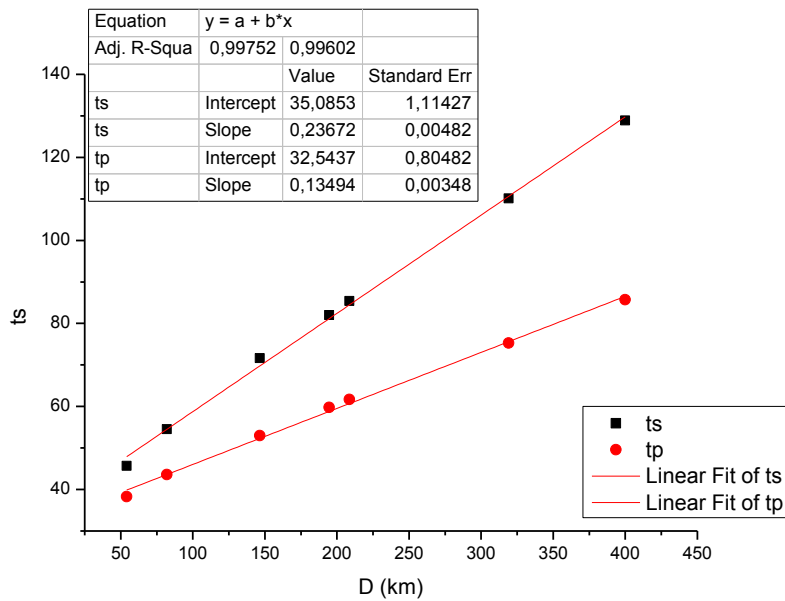
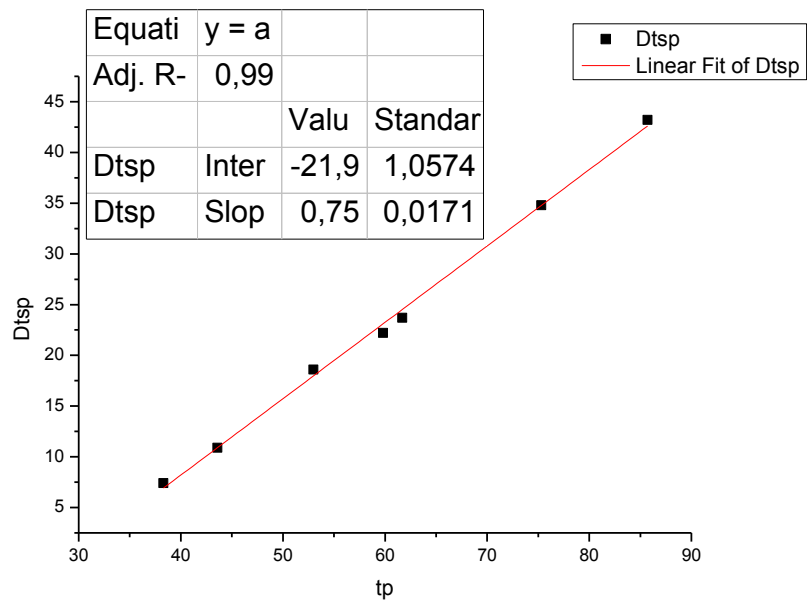
21 AUGUST 2014 (4.3 ML, depth 25.7 km)

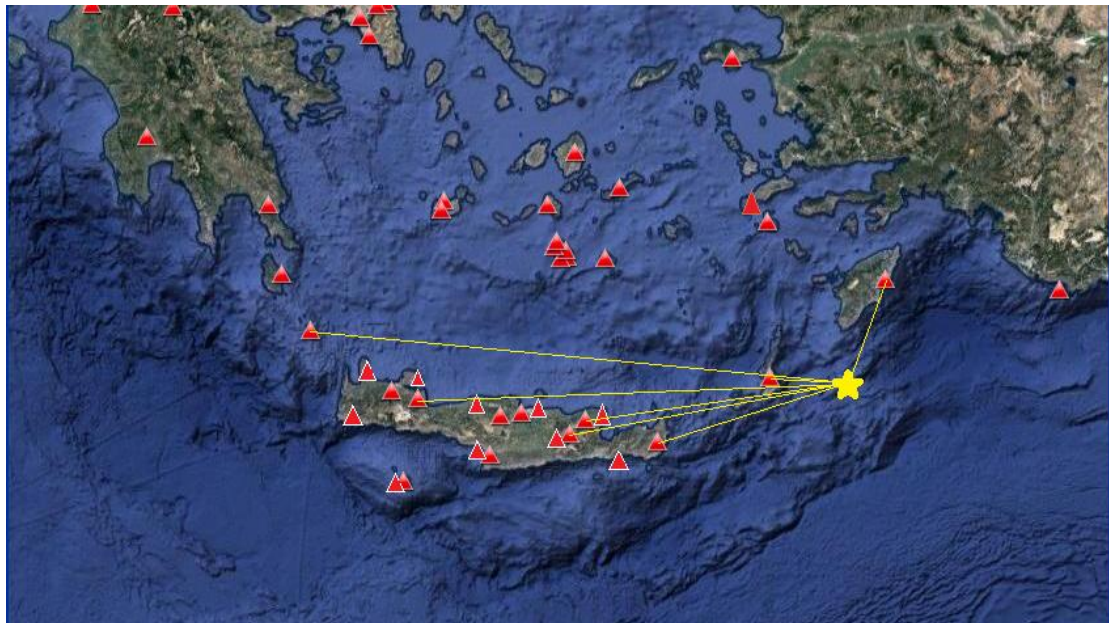
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	34,9	27,4	7,5	53,2	59,0824
ARG	42,4	31,7	10,7	80,6	84,59817
ZKR	61,1	42,6	18,5	147,5	149,7222
NPS	71,5	48,1	23,4	196,9	198,5701
VAM	99,8	64,2	35,6	322,5	323,5224
ANKY	116,7	74,7	42	404,1	404,9164



22 AUGUST 2014 (4 ML, depth 23.3 km)

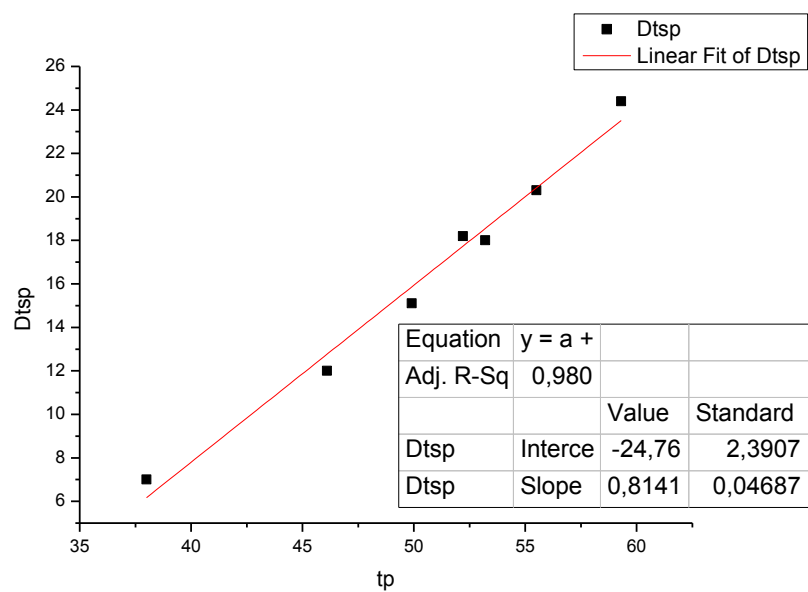
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	45,7	38,3	7,4	48,9	54,16733
ARG	54,5	43,6	10,9	78,7	82,07667
ZKR	71,6	53	18,6	144,7	146,5639
NPS	82	59,8	22,2	193,2	194,5999
LAST	85,4	61,7	23,7	207,4	208,7047
VAM	110,1	75,3	34,8	318,2	319,0519
ANKY	128,9	85,7	43,2	399,2	399,8794

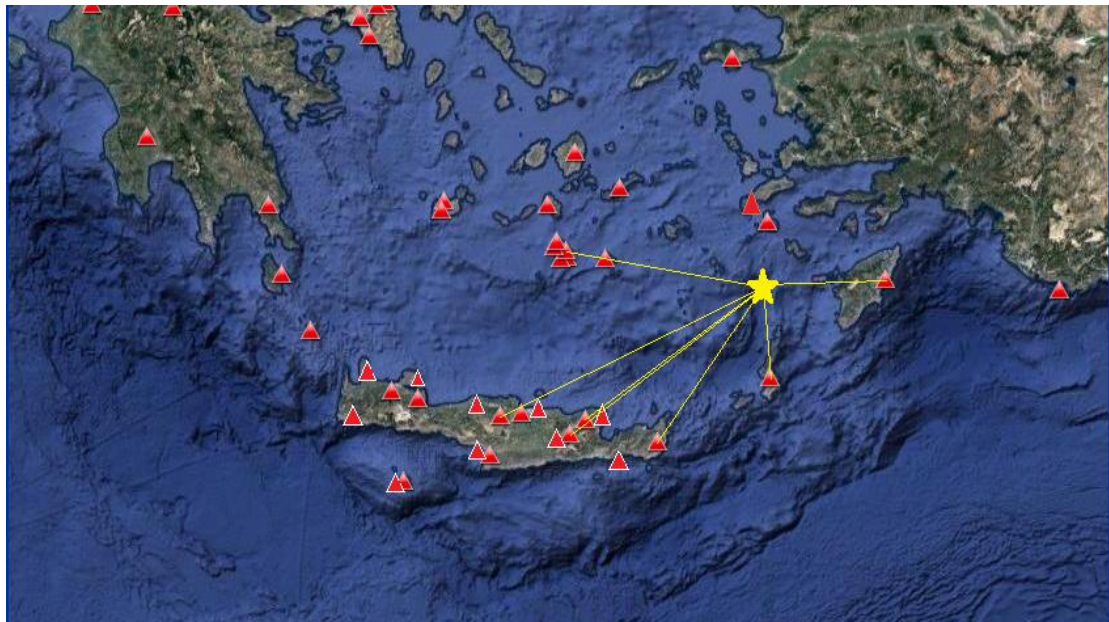
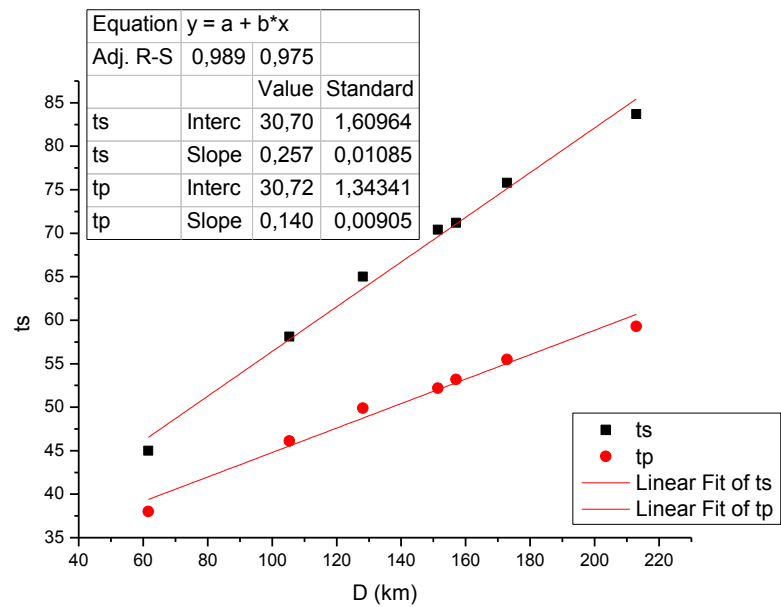




2 OCTOBER 2014 (4.2 ML, depth 32.7 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	45	38	7	52,2	61,59651
ARG	58,1	46,1	12	100,1	105,3057
ZKR	65	49,9	15,1	123,9	128,1425
SANT	70,4	52,2	18,2	147,8	151,3741
NPS	71,2	53,2	18	153,6	157,0422
LAST	75,8	55,5	20,3	169,7	172,8218
IDI	83,7	59,3	24,4	210,4	212,9259

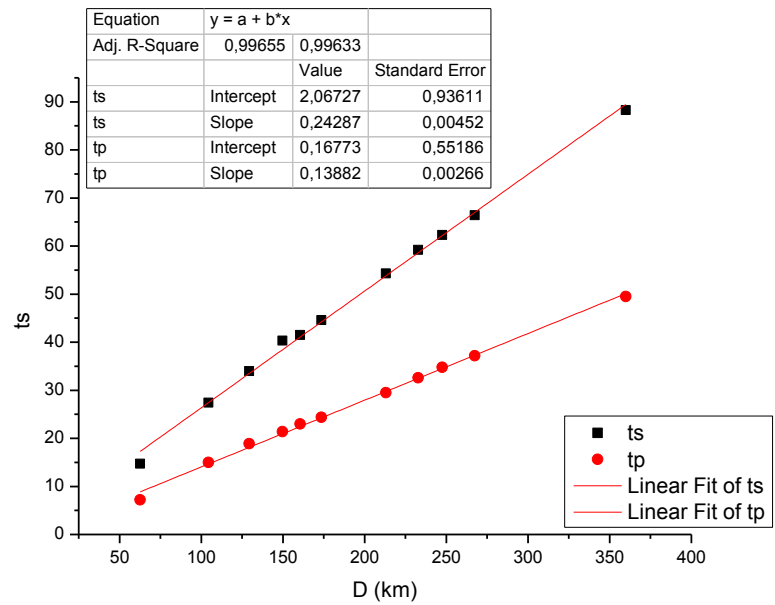
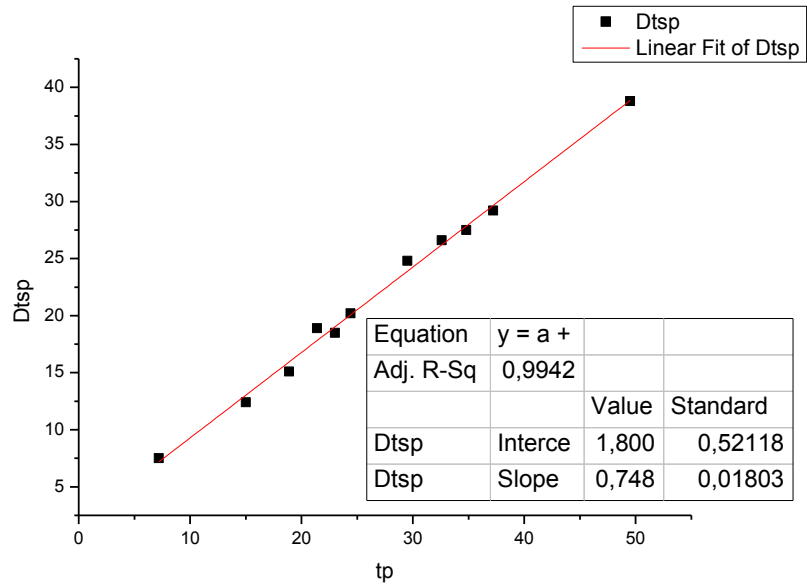


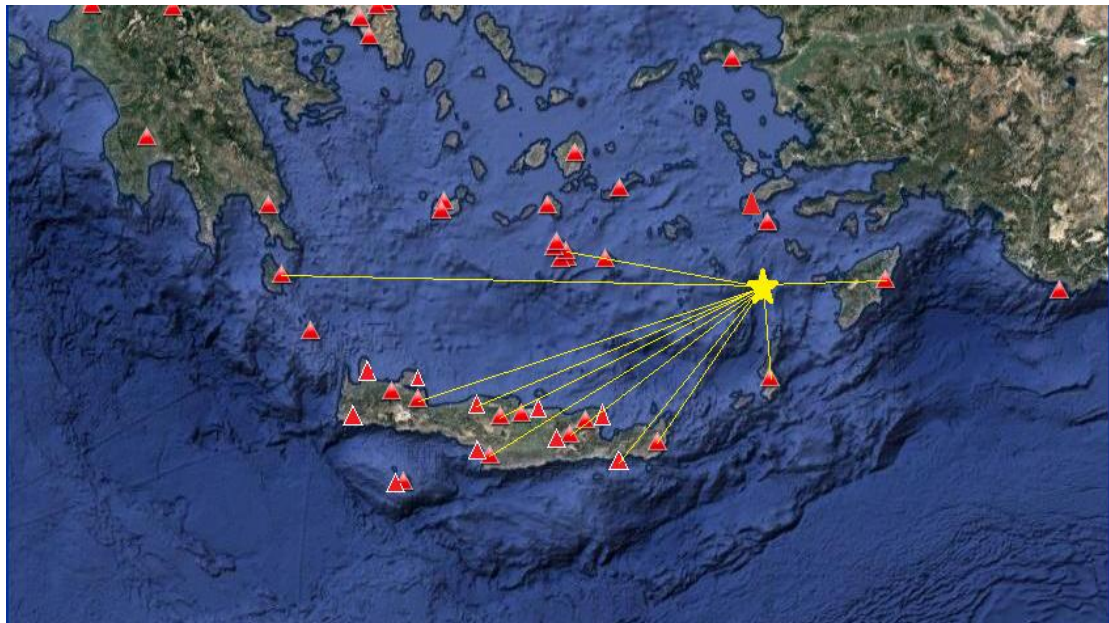


2 OCTOBER 2014 (4.1 ML,depth 30.4 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	14,7	7,2	7,5	54,7	62,57995
ARG	27,4	15	12,4	99,9	104,423
ZKR	34	18,9	15,1	125,7	129,3238
SANT	40,3	21,4	18,9	146,7	149,8167
FRMA	41,5	23	18,5	157,7	160,6034
LAST	44,6	24,4	20,2	170,8	173,4843
IDI	54,3	29,5	24,8	210,9	213,0797
SIVA	59,2	32,6	26,6	230,8	232,7935

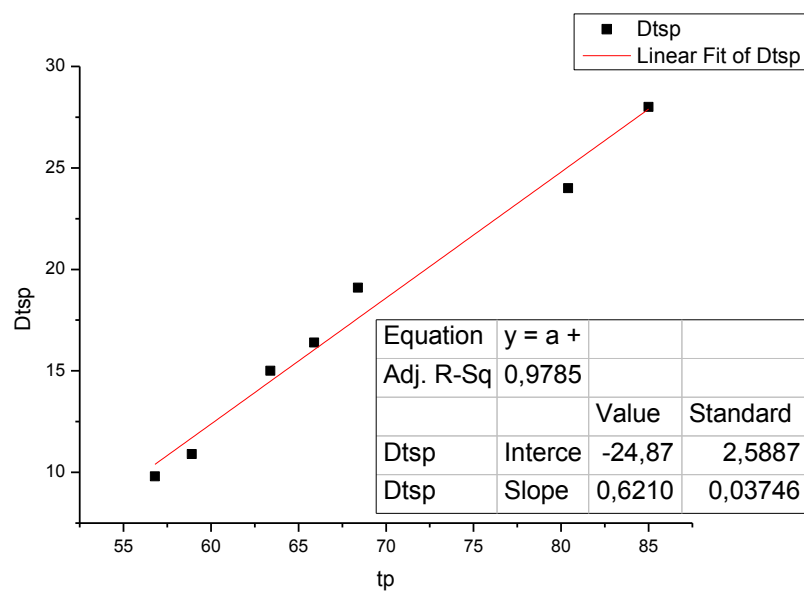
PRNS	62,3	34,8	27,5	245,7	247,5735
VAM	66,4	37,2	29,2	265,7	267,4334
KTHR	88,3	49,5	38,8	358,6	359,8863

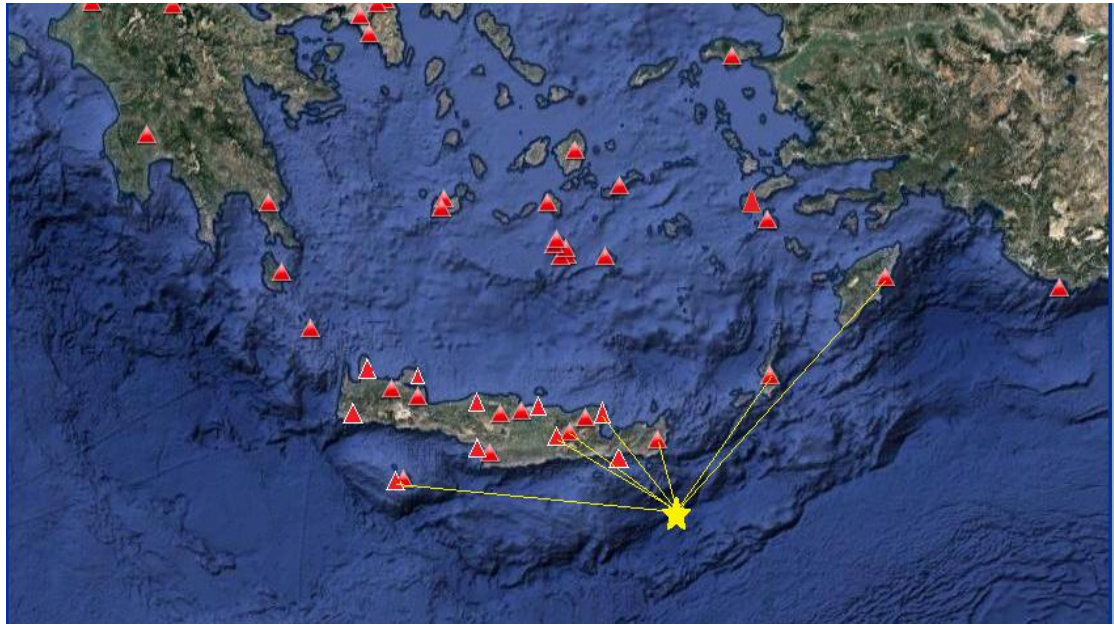
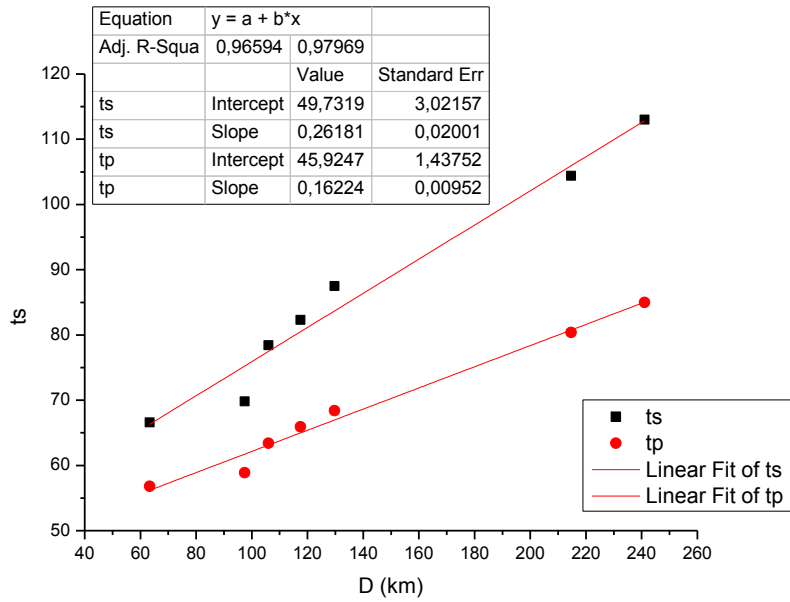




3 OCTOBER 2014 (4.8 ML,depth 16.6 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	66,6	56,8	9,8	61,1	63,31485
STIA	69,8	58,9	10,9	96	97,42464
LAST	78,4	63,4	15	104,7	106,0078
KSTL	82,3	65,9	16,4	116,3	117,4787
KARP	87,5	68,4	19,1	128,7	129,7661
GVDS	104,4	80,4	24	214	214,6429
ARG	113	85	28	240,5	241,0722

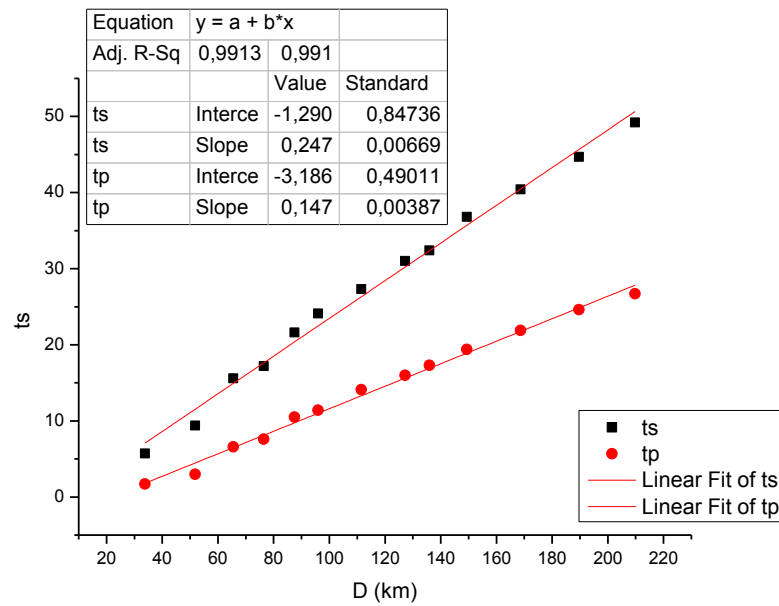
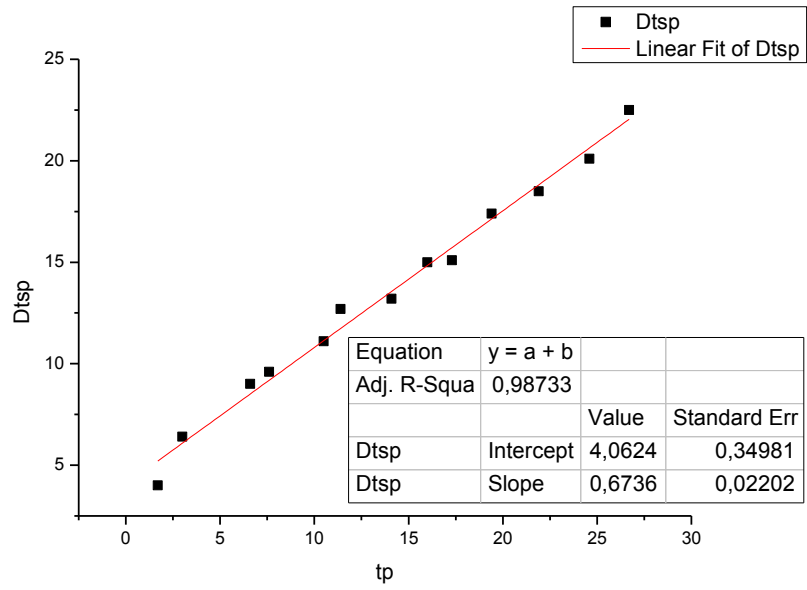


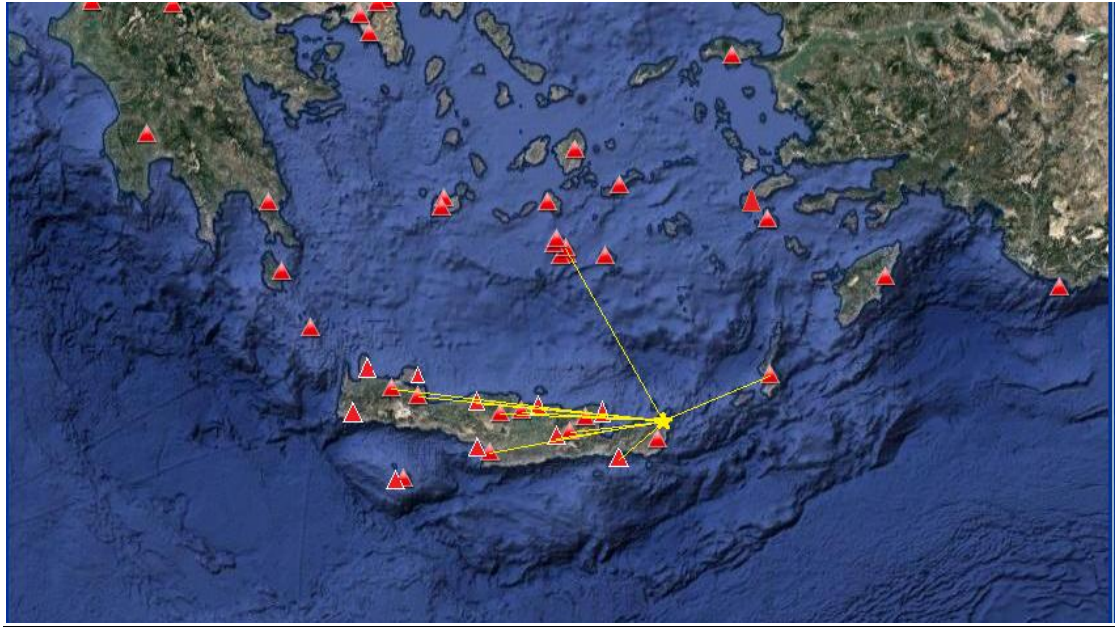


4 OCTOBER 2014 (4.5 ML,depth 30.8 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
STIA	5,7	1,7	4	14	33,83253
FRMA	9,4	3	6,4	41,7	51,84139
NPS	15,6	6,6	9	57,8	65,49412
LAST	17,2	7,6	9,6	70	76,4764
KSTL	21,6	10,5	11,1	81,9	87,5
KARP	24,1	11,4	12,7	90,9	95,9763
IACM	27,3	14,1	13,2	107,2	111,5369
IDI	31	16	15	123,4	127,1857
SIVA	32,4	17,3	15,1	132,4	135,9353
SANT	36,8	19,4	17,4	146,2	149,4091
PRNS	40,4	21,9	18,5	165,8	168,6365

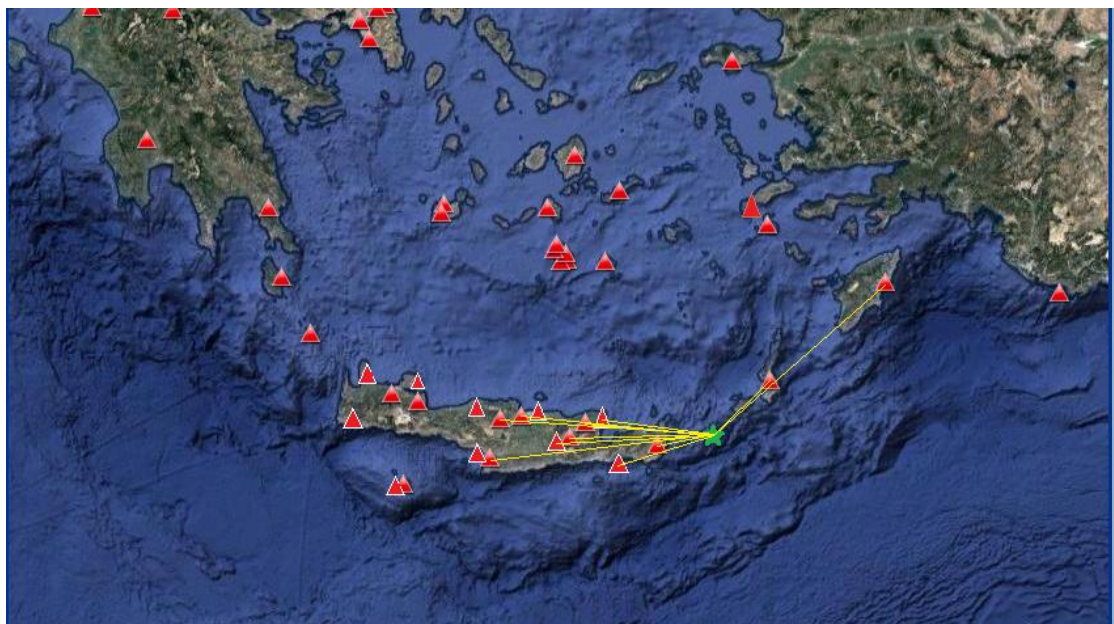
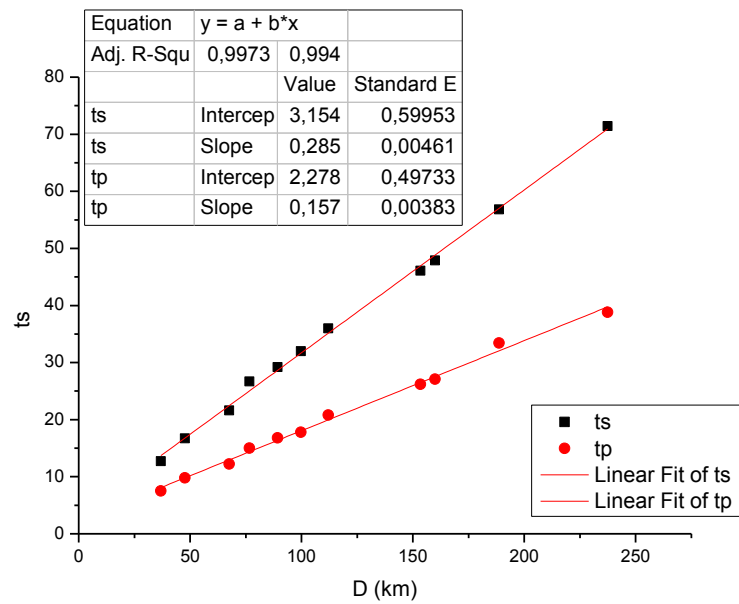
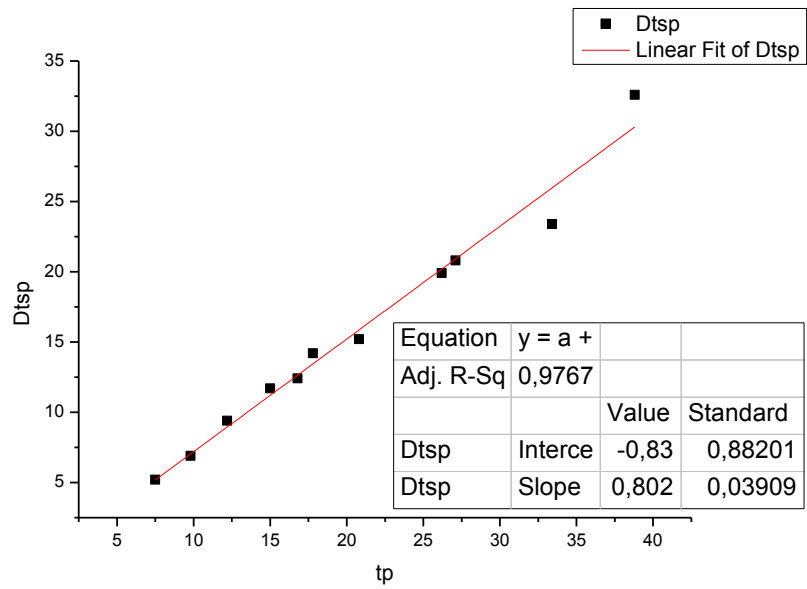
VAM	44,7	24,6	20,1	187,1	189,6182
IMMV	49,2	26,7	22,5	207,5	209,7734





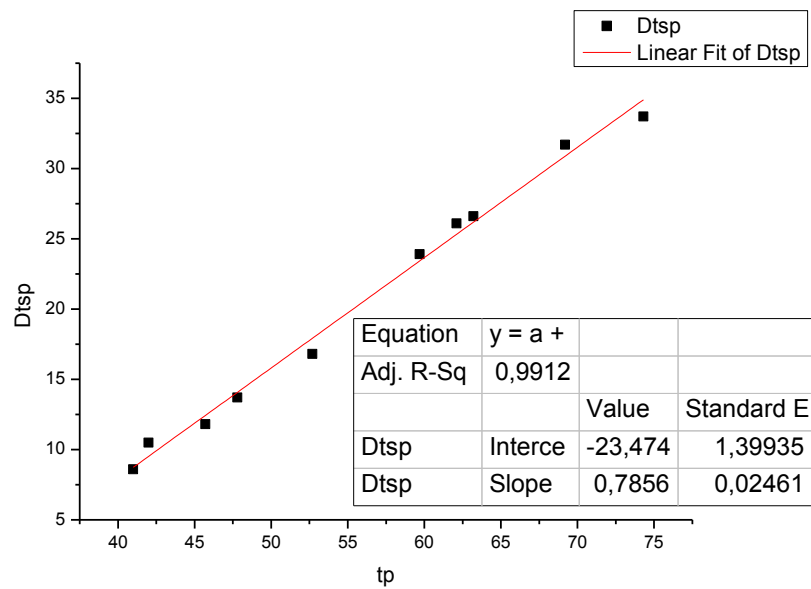
6 OCTOBER 2014 (4.4 ML, depth 21.6 km)

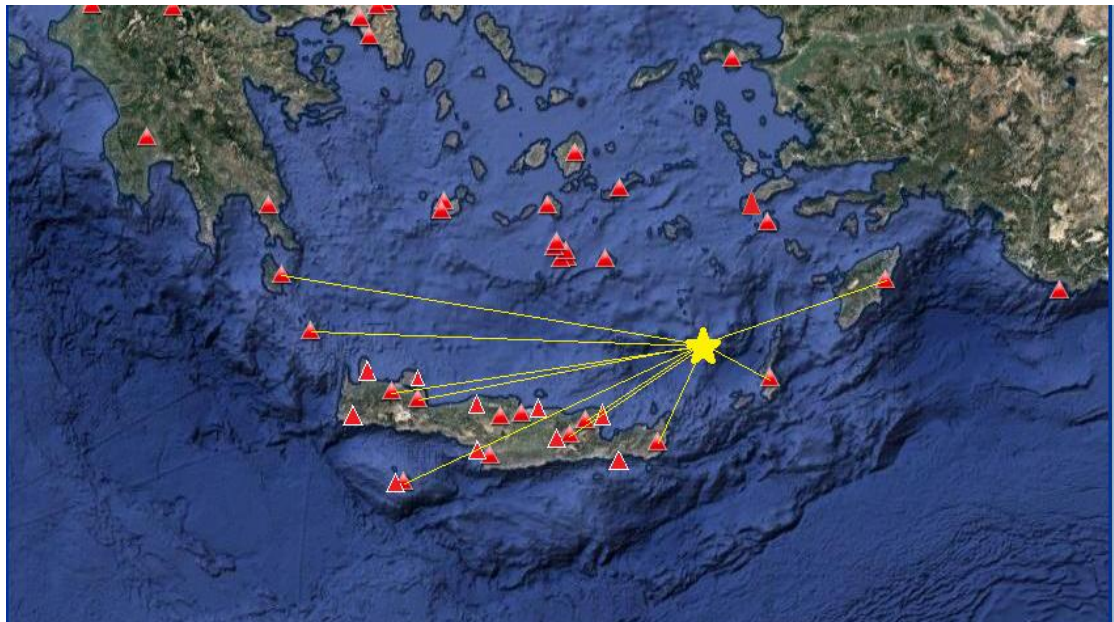
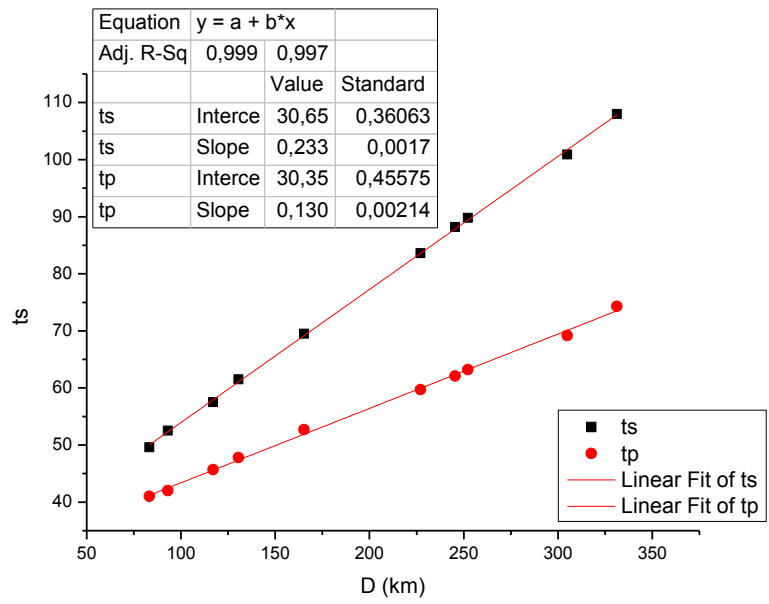
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	12,7	7,5	5,2	29,9	36,88591
STIA	16,7	9,8	6,9	42,5	47,674
FRMA	21,6	12,2	9,4	64	67,54672
KARP	26,7	15	11,7	73,5	76,60816
NPS	29,2	16,8	12,4	86,6	89,25312
LAST	32	17,8	14,2	97,4	99,76633
KSTL	36	20,8	15,2	110	112,1007
IDI	46,1	26,2	19,9	151,9	153,4281
SIVA	47,9	27,1	20,8	158,5	159,965
ARG	56,8	33,4	23,4	187,5	188,7401
IMMV	71,4	38,8	32,6	236,4	237,3848



16 OCTOBER 2014 (4.5 ML, depth 64 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	49,6	41	8,6	53,3	83,28799
ZKR	52,5	42	10,5	67,5	93,01747
NPS	57,5	45,7	11,8	98,1	117,1307
LAST	61,5	47,8	13,7	113,8	130,562
ARG	69,5	52,7	16,8	152,4	165,293
VAM	83,6	59,7	23,9	217,9	227,1044
IMMV	88,2	62,1	26,1	237	245,4893
GVD	89,8	63,2	26,6	244	252,2538
ANKY	100,9	69,2	31,7	298,1	304,8928
KTHR	108	74,3	33,7	325	331,2416

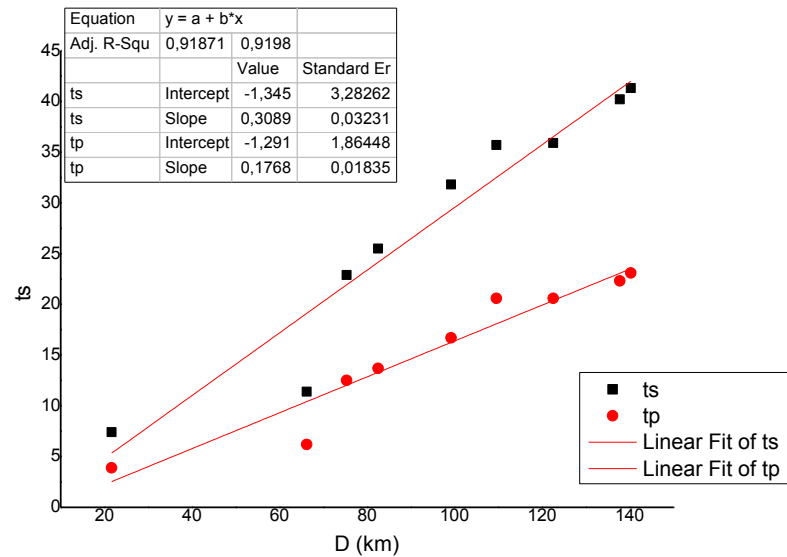
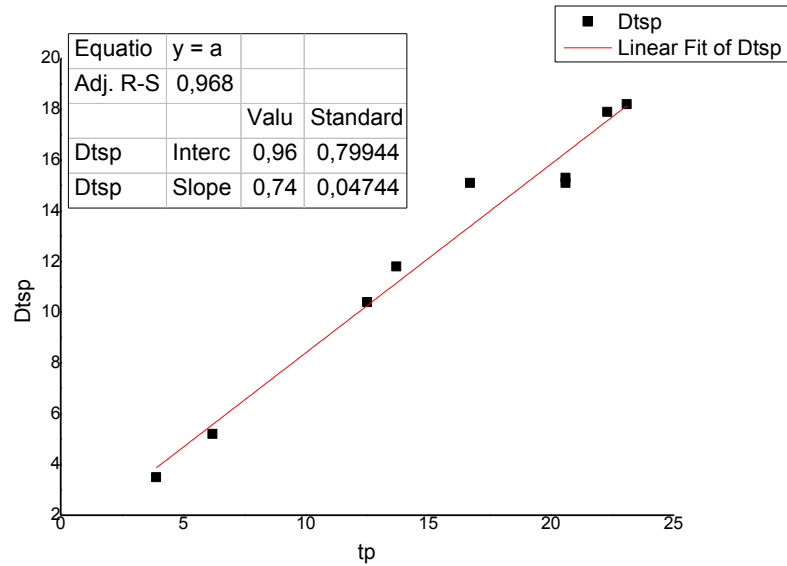


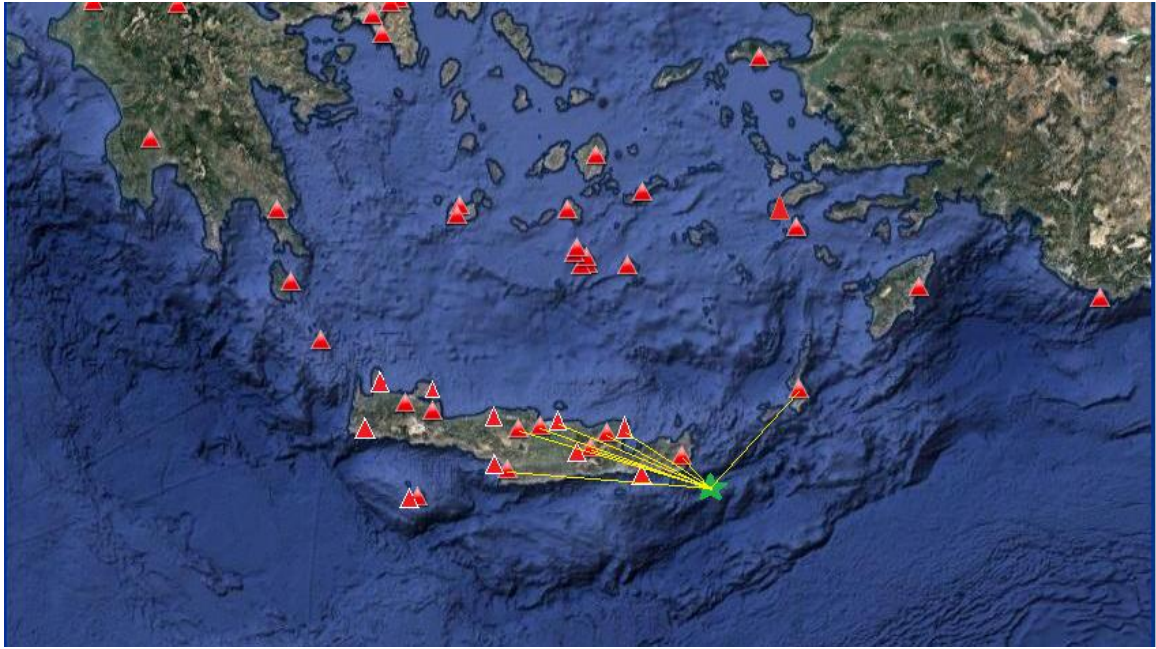


EARTHQUAKES DURING 2015

5 JANUARY 2015 (4.2 ML , depth 4.4km)

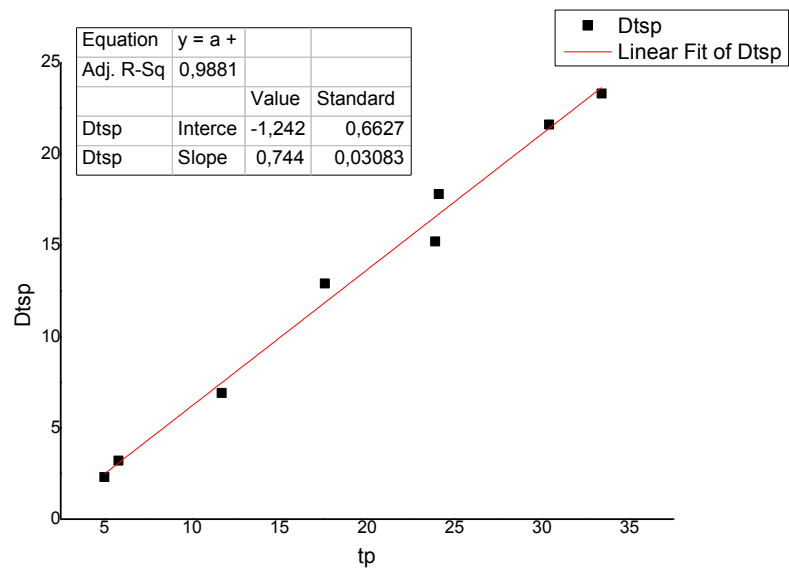
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	7,4	3,9	3,5	21,2	21,65179
STIA	11,4	6,2	5,2	66,1	66,24628
NPS	22,9	12,5	10,4	75,2	75,32861
LAST	25,5	13,7	11,8	82,4	82,51739
KARP	31,8	16,7	15,1	99,1	99,19763
HRKL	35,7	20,6	15,1	109,5	109,5884
IACM	35,9	20,6	15,3	122,5	122,579
IDI	40,2	22,3	17,9	137,7	137,7703
SIVA	41,3	23,1	18,2	140,2	140,269

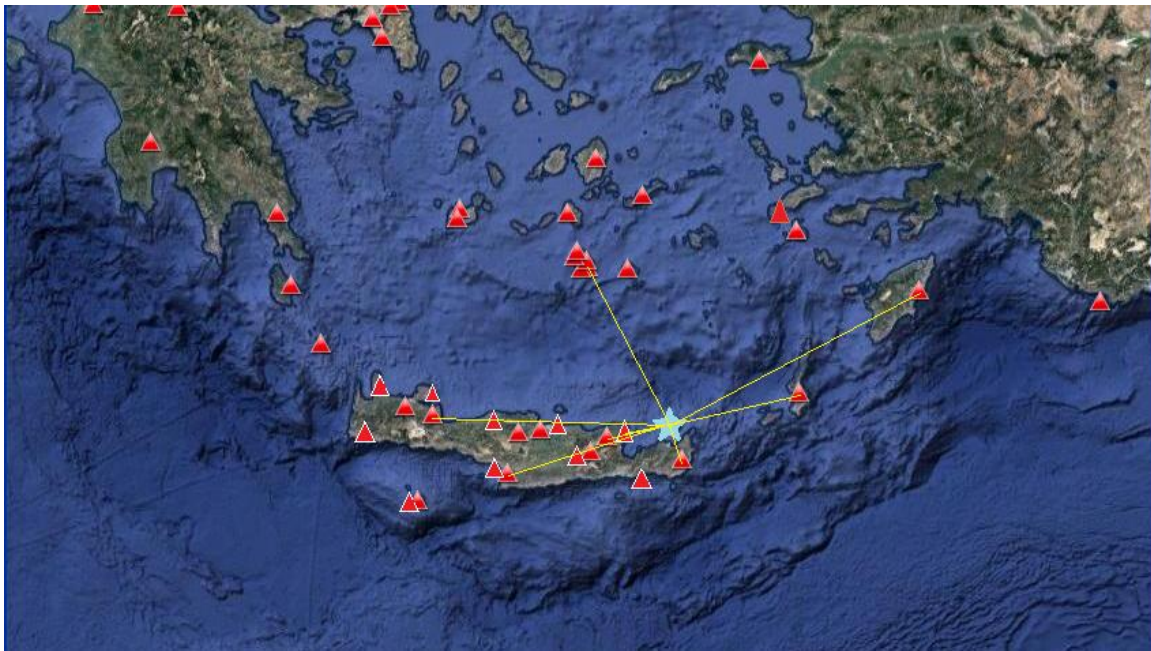
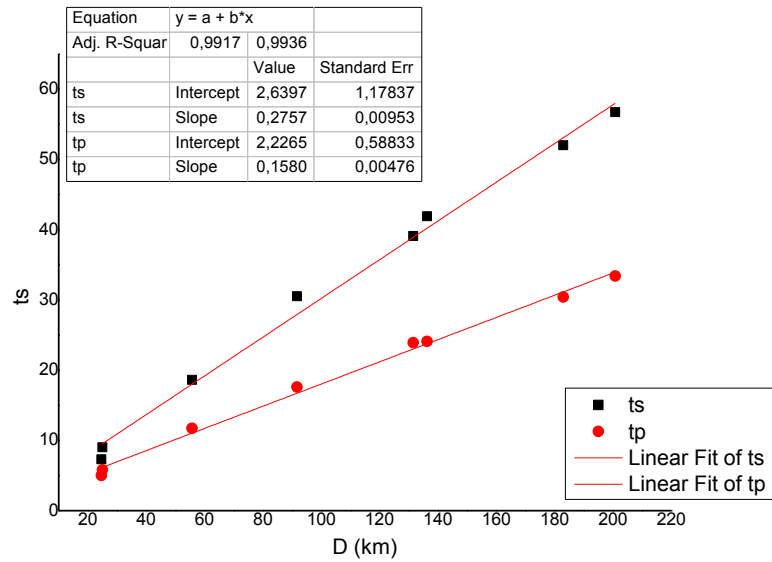




10 JANUARY 2015 (4.2 ML 4 Mw , depth 12.6 km)

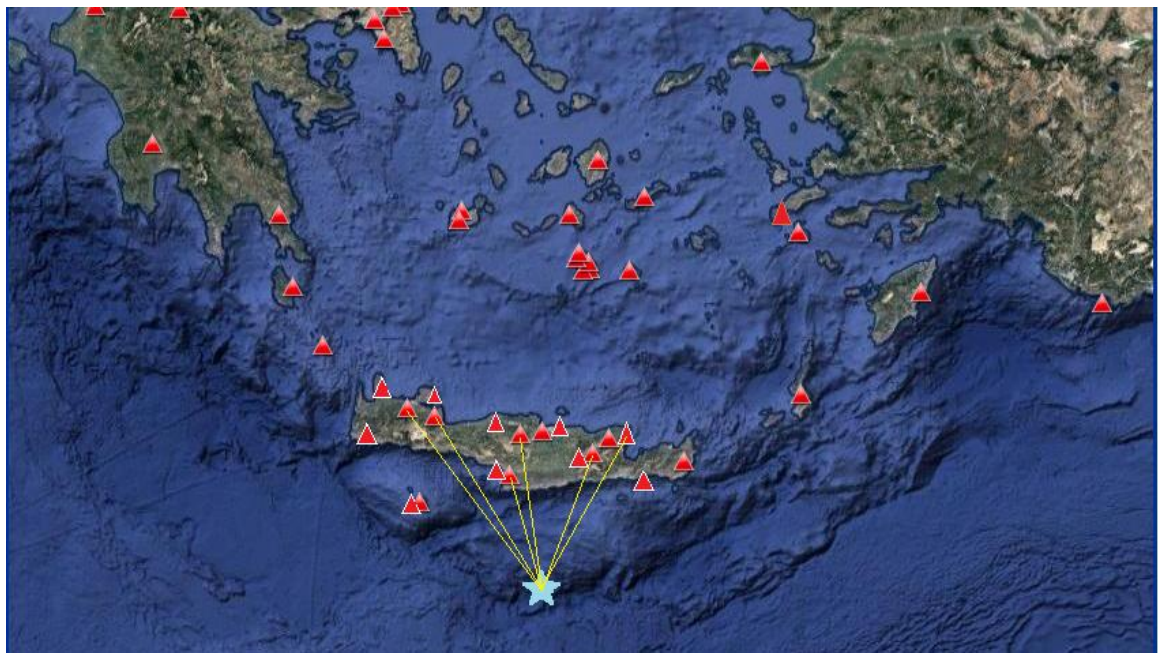
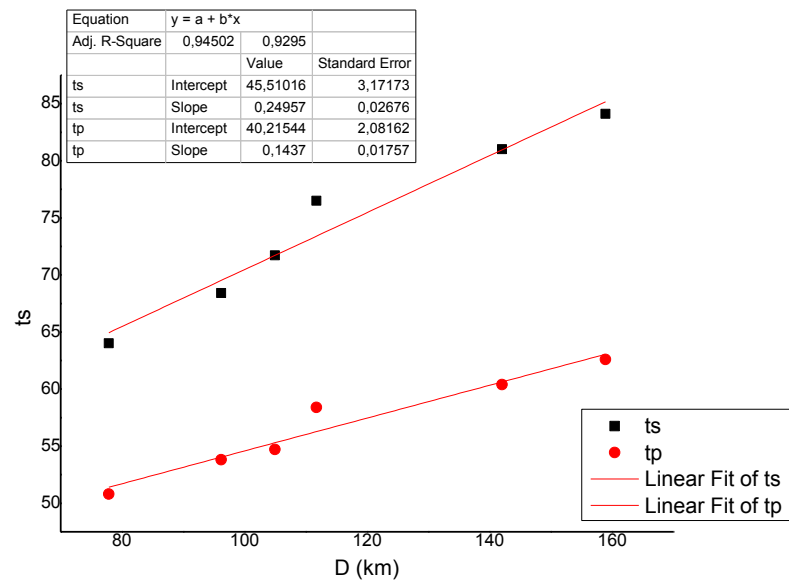
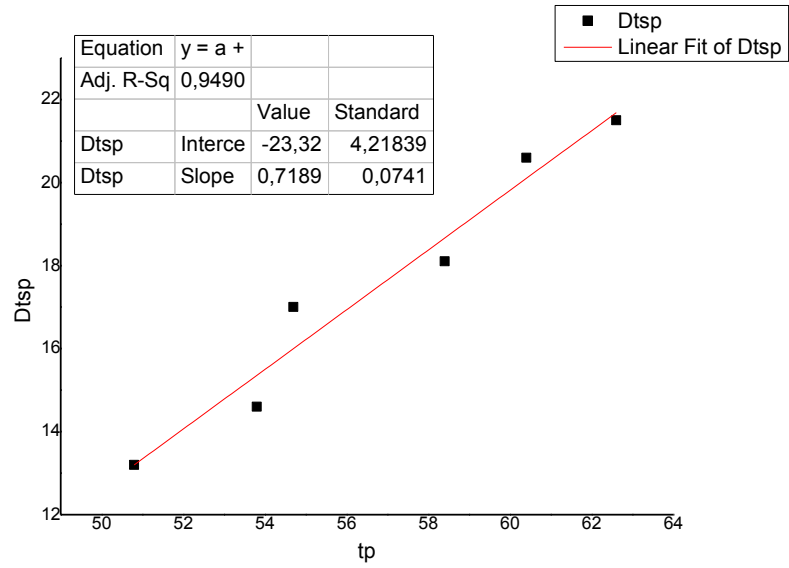
station	ts	tp	Dtsp	Dop(km)	D(km)
STIA	7,3	5	2,3	21,2	24,66171
ZKR	9	5,8	3,2	21,6	25,0064
NPS	18,6	11,7	6,9	54,3	55,74271
KARP	30,5	17,6	12,9	90,8	91,67006
SIVA	39,1	23,9	15,2	130,9	131,505
SANT	41,9	24,1	17,8	135,7	136,2837
VAM	52	30,4	21,6	182,5	182,9344
ARG	56,7	33,4	23,3	200,4	200,7957





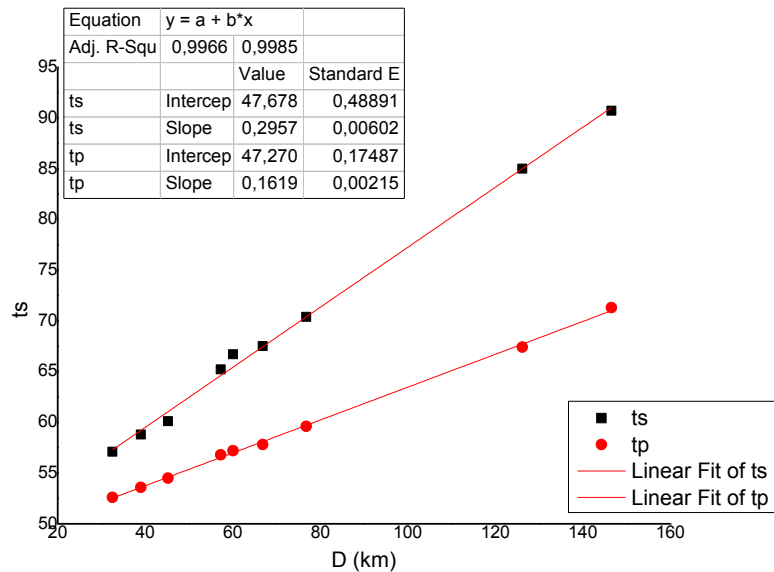
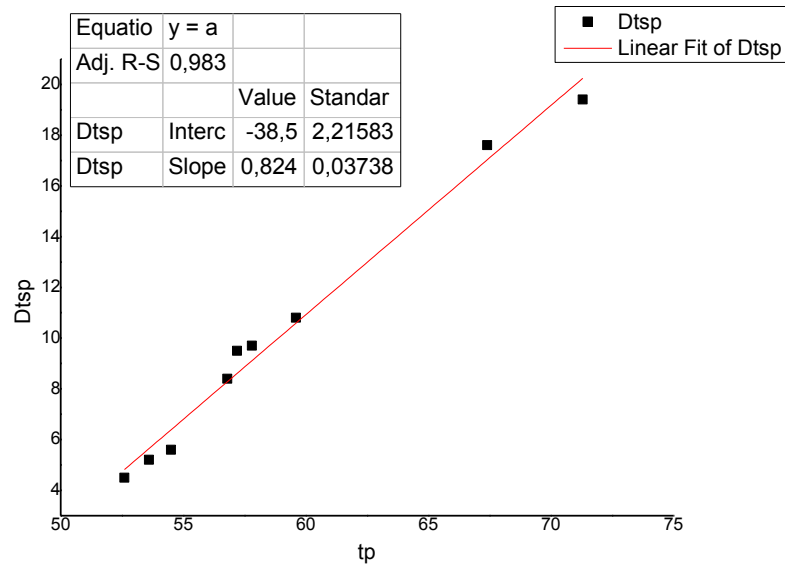
28 JANUARY 2015 (4.9 ML 4.9 Mw , depth 10km)

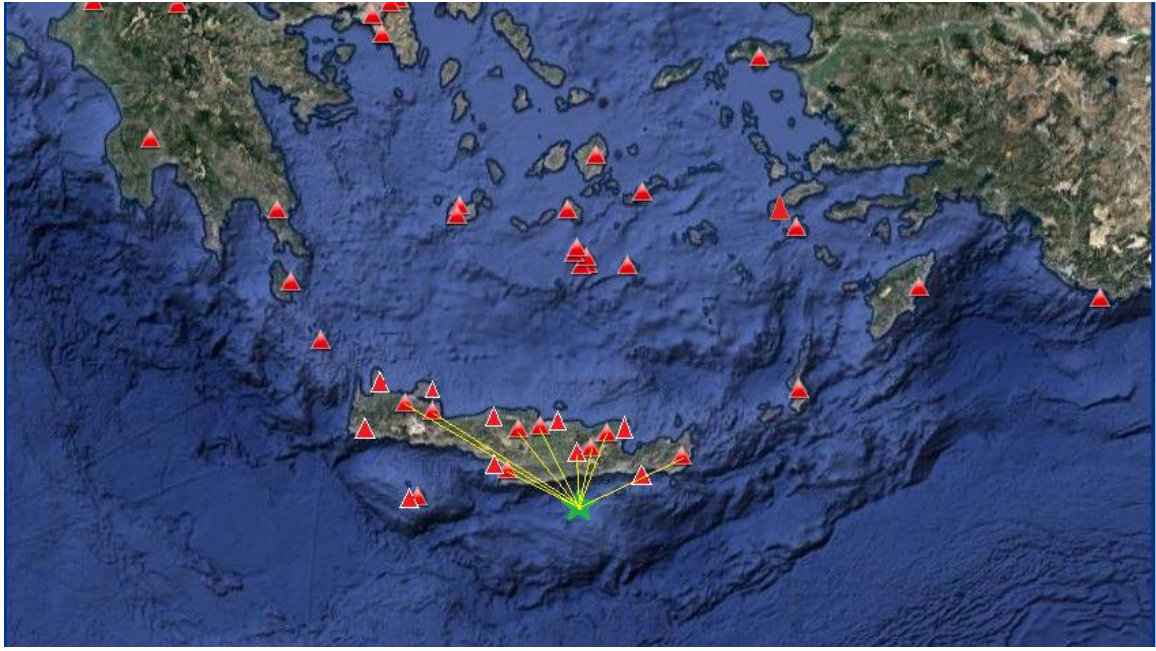
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	64	50,8	13,2	77,2	77,84497
LAST	68,4	53,8	14,6	95,7	96,22105
IDI	71,7	54,7	17	104,5	104,9774
STIA	76,5	58,4	18,1	111,3	111,7483
VAM	81	60,4	20,6	141,7	142,0524
IMMV	84,1	62,6	21,5	158,6	158,9149



5 FEBRUARY 2015 (4.4 ML 4.2 Mw , depth 15.7km)

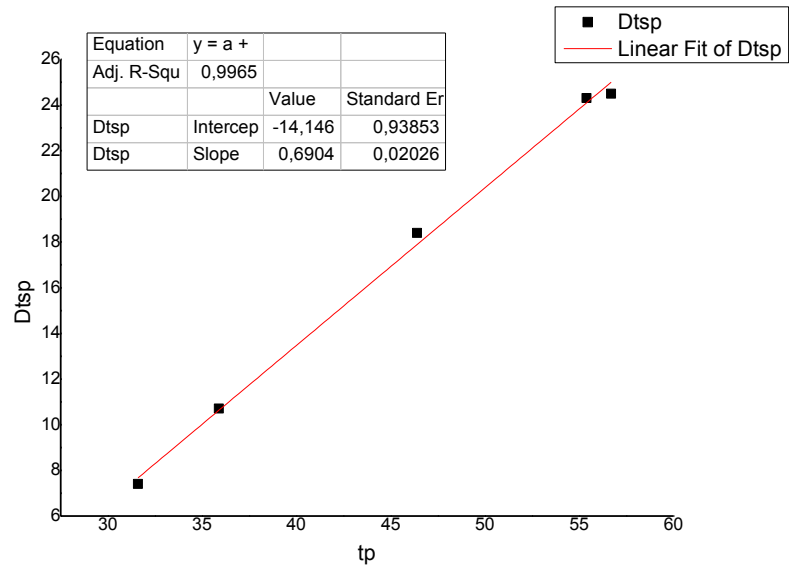
station	ts	tp	Dtsp	Dop(km)	D(km)
LAST	57,1	52,6	4,5	28,5	32,53829
KSTL	58,8	53,6	5,2	35,7	38,99974
NPS	60,1	54,5	5,6	42,4	45,21338
IACM	65,2	56,8	8,4	55,1	57,29311
SIVA	66,7	57,2	9,5	58	60,08735
IDI	67,5	57,8	9,7	65	66,8692
ZKR	70,4	59,6	10,8	75,2	76,82142
VAM	85	67,4	17,6	125,2	126,1805
IMMV	90,7	71,3	19,4	145,7	146,5434

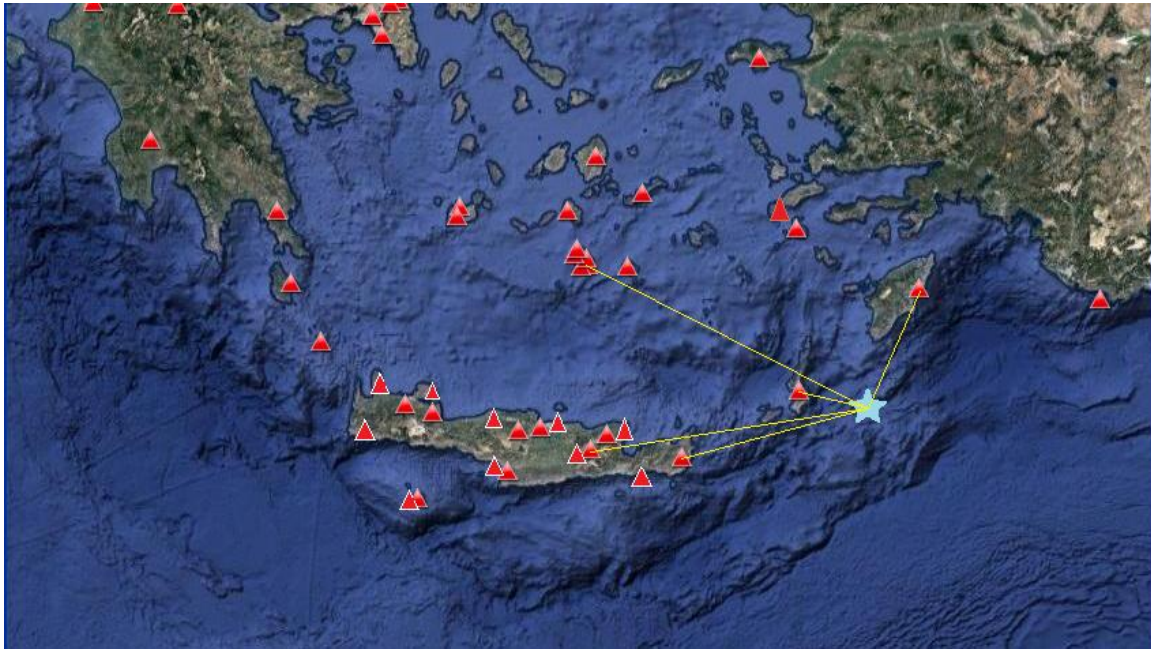
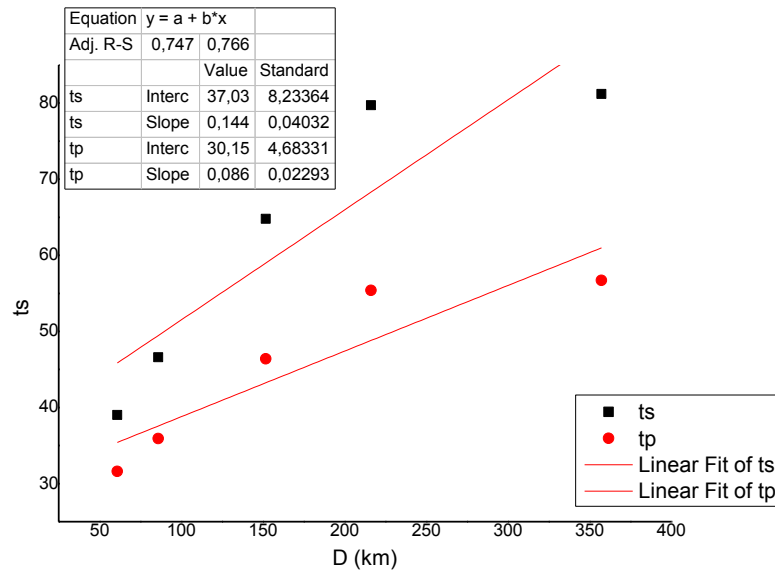




12 MARCH 2015 (4.2 ML 4.4 Mw, depth 8.3km)

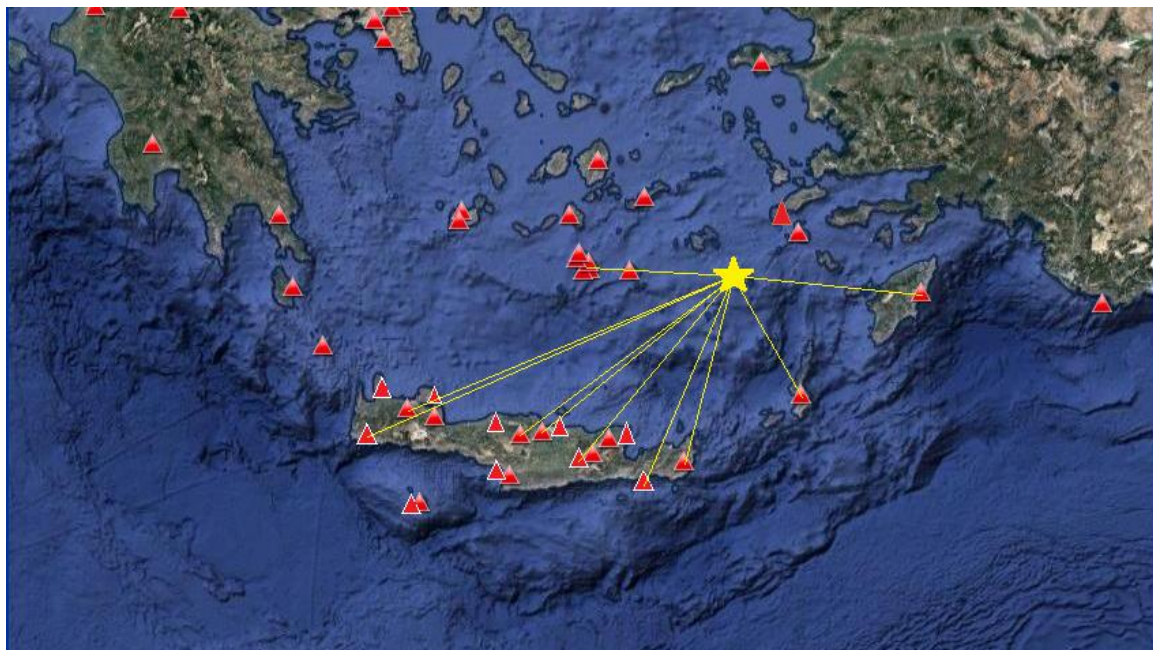
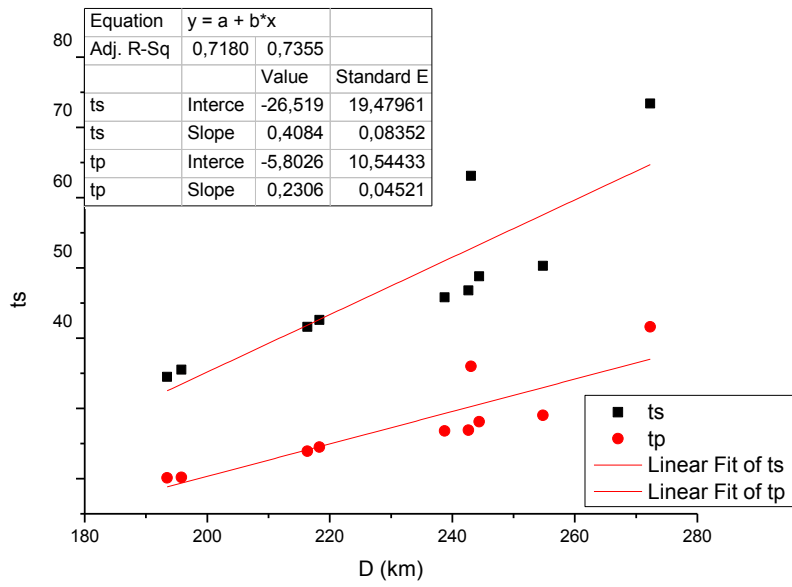
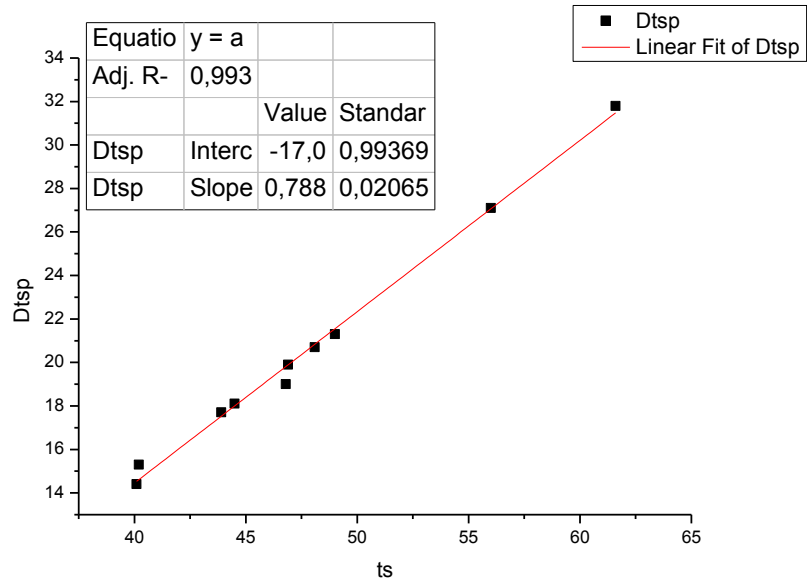
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	39	31,6	7,4	60,3	60,86855
ARG	46,6	35,9	10,7	85,5	85,90192
ZKR	64,8	46,4	18,4	151,5	151,7272
LAST	79,7	55,4	24,3	216	216,1594
SANT	81,2	56,7	24,5	357,2	357,2964





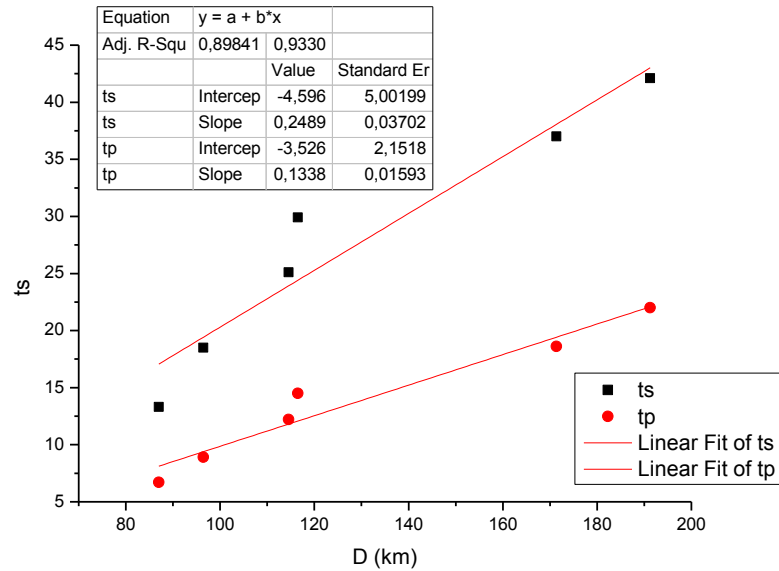
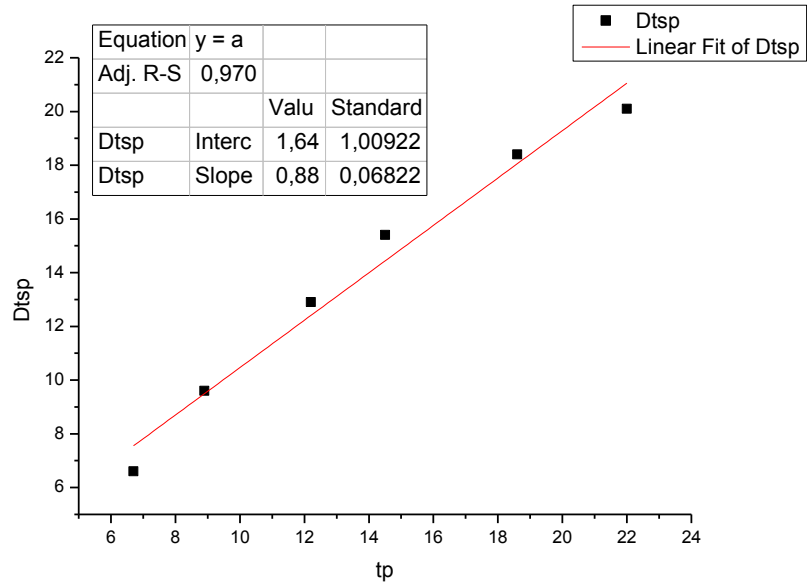
17 MARCH 2015 (4.5 ML, depth 165.3km)

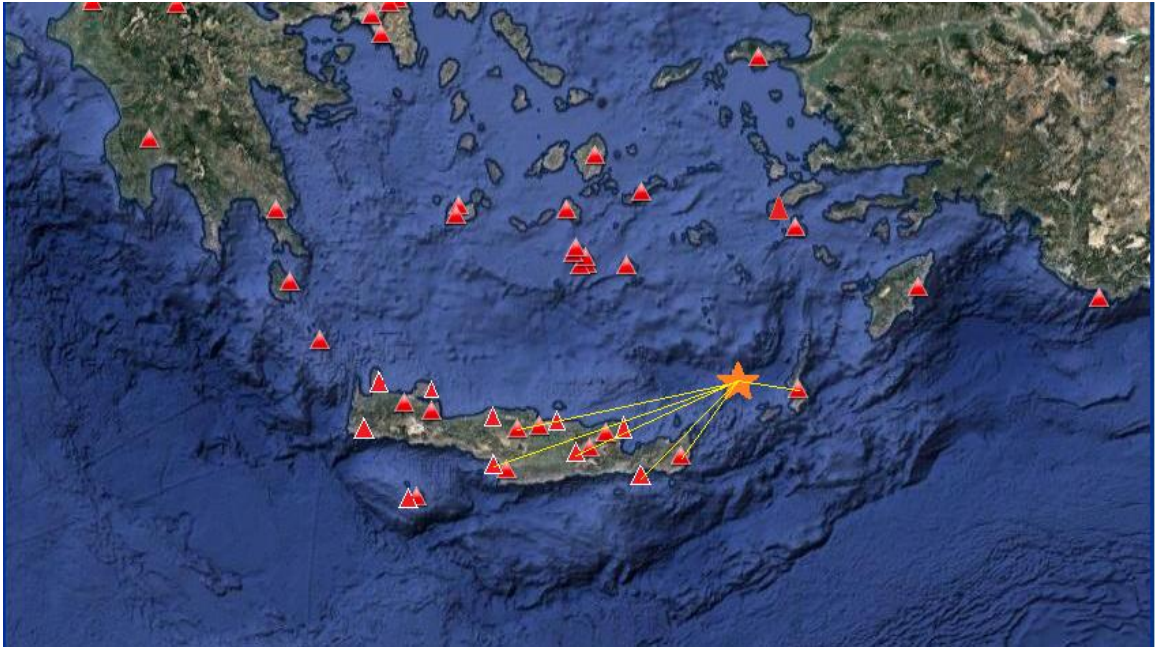
station	ts	tp	Dtsp	Dop(km)	D(km)
SANT	54,5	40,1	14,4	100,5	193,4537
KARP	55,5	40,2	15,3	104,9	195,7756
ARG	61,6	43,9	17,7	139,6	216,3614
ZKR	62,6	44,5	18,1	142,6	218,3091
FRMA	65,8	46,8	19	172,3	238,7706
KSTL	66,8	46,9	19,9	177,6	242,6229
IACM	68,8	48,1	20,7	180	244,3851
IDI	70,3	49	21,3	193,9	254,7966
IMMV	83,1	56	27,1	178,2	243,0624
KNDR	93,4	61,6	31,8	216,4	272,3106



27 MARCH 2015 (5.3 ML ,depth 66,6m)

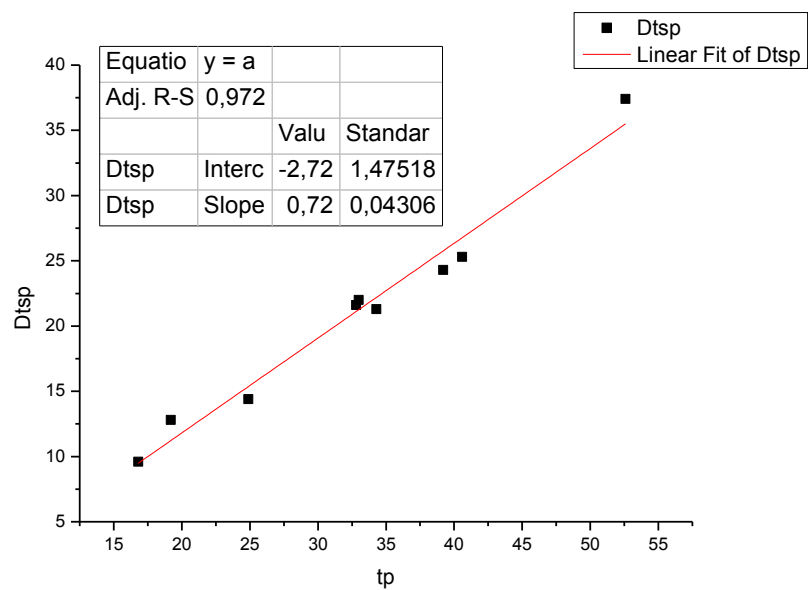
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	13,3	6,7	6,6	56	87,01471
ZKR	18,5	8,9	9,6	69,8	96,4759
FRMA	25,1	12,2	12,9	93,2	114,5504
KSTL	29,9	14,5	15,4	95,6	116,5115
IDI	37	18,6	18,4	157,9	171,3709
TMBK	42,1	22	20,1	179,3	191,2696

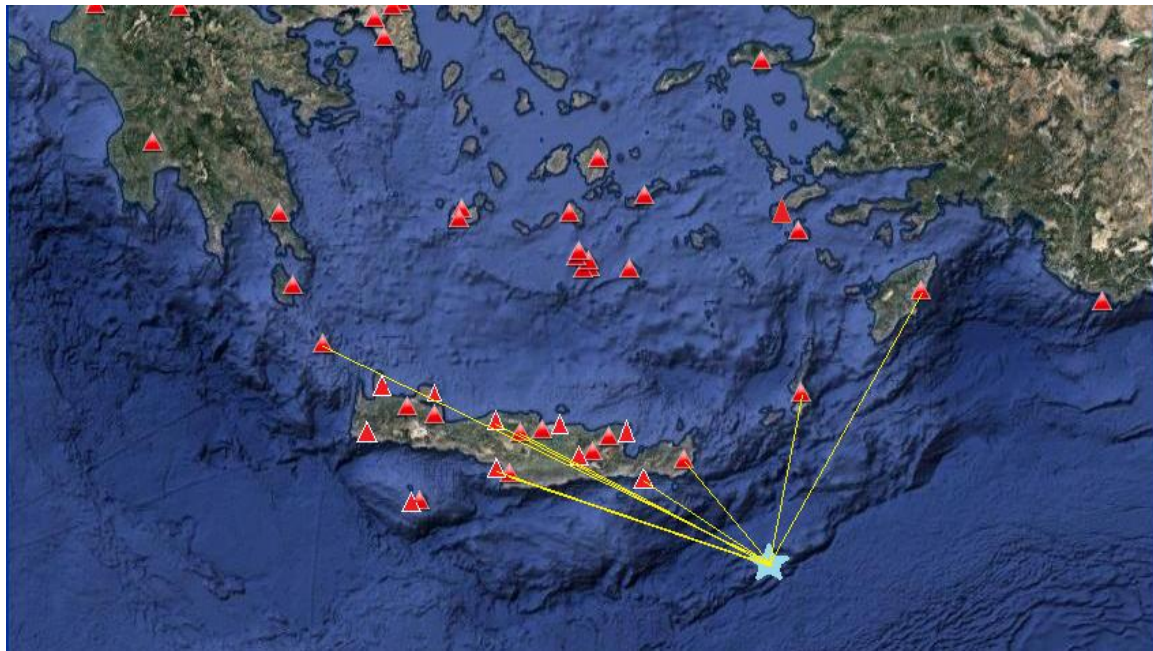
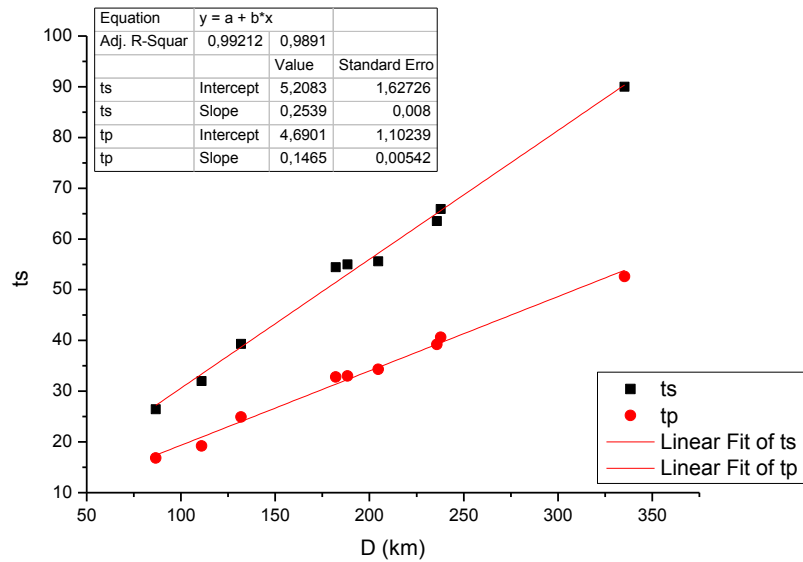




14 APRIL 2015 (4.1ML ,depth 9.3km)

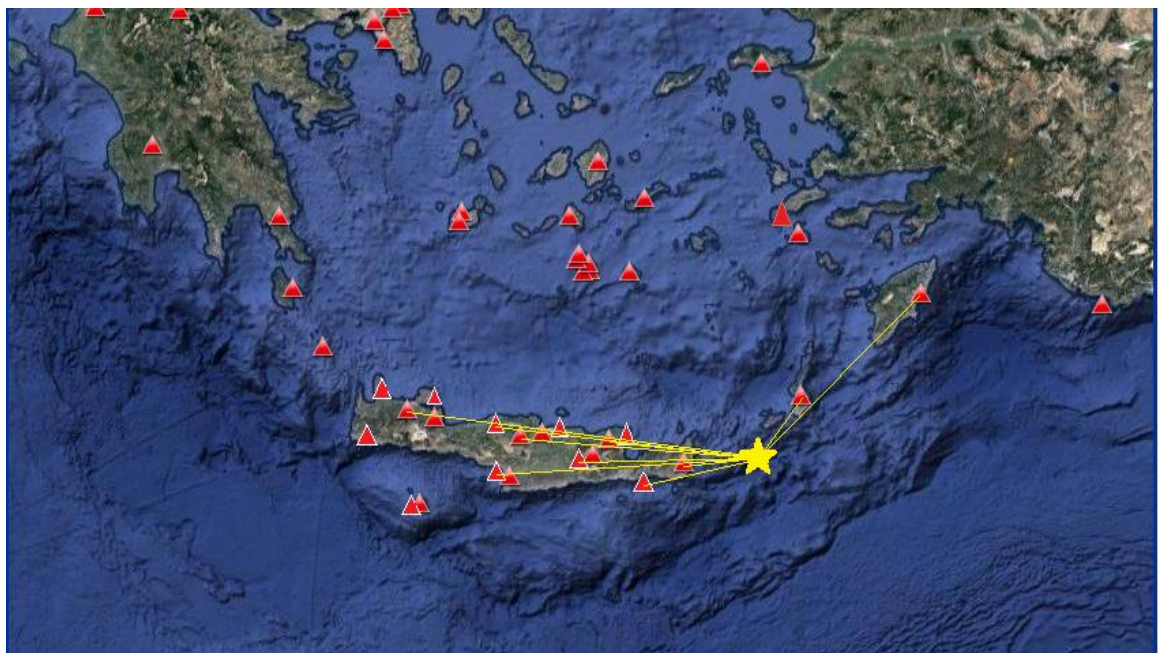
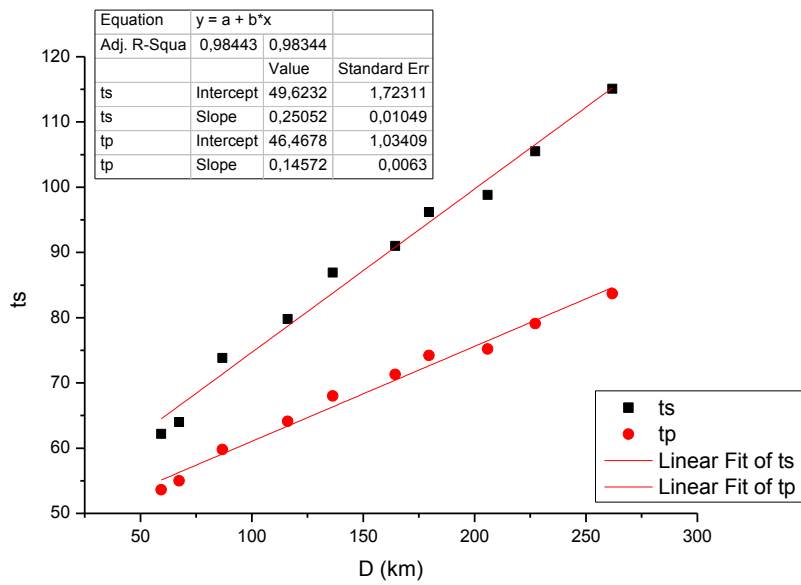
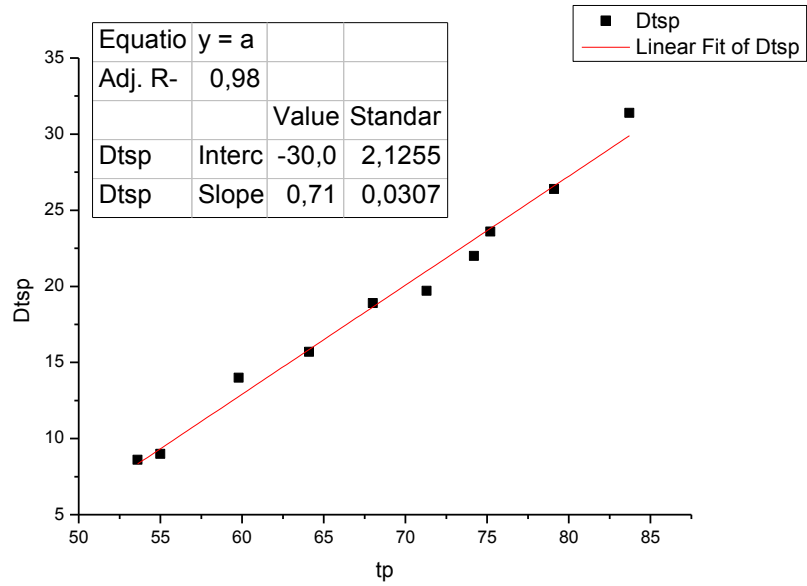
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	26,4	16,8	9,6	86,2	86,70023
FRMA	32	19,2	12,8	110,6	110,9903
KARP	39,3	24,9	14,4	131,6	131,9282
SIVA	54,4	32,8	21,6	181,9	182,1376
IDI	55	33	22	188,2	188,4296
TMBK	55,6	34,3	21,3	204,5	204,7114
PRNS	63,5	39,2	24,3	235,6	235,7835
ARG	65,9	40,6	25,3	237,7	237,8819
ANKY	90	52,6	37,4	335,2	335,329





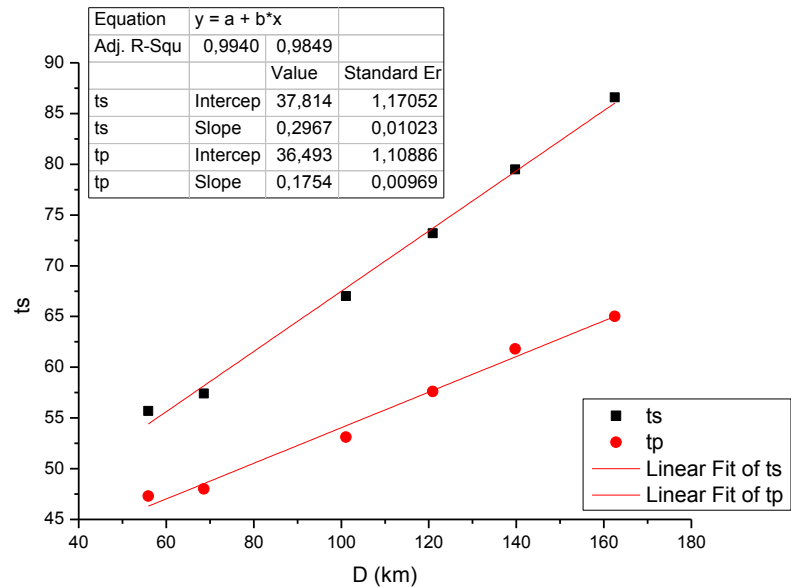
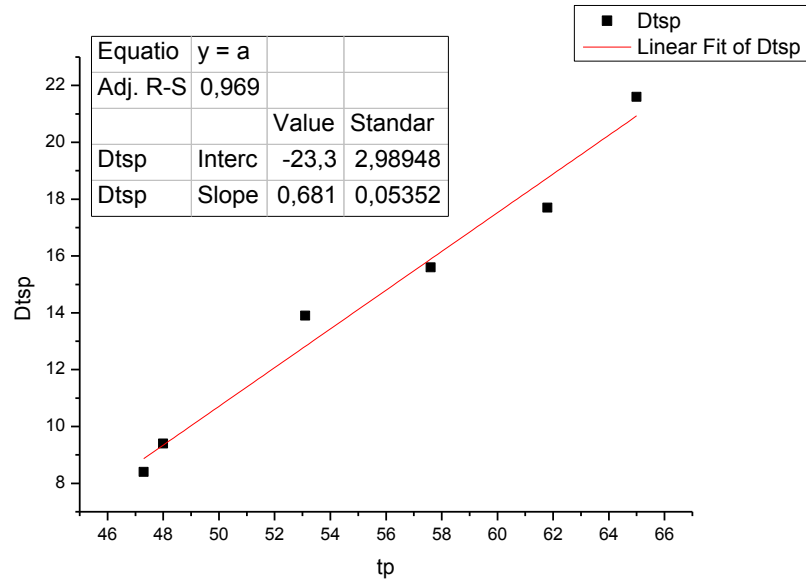
16 APRIL 2015 (6.1 ML 6 Mw , depth 36.8km)

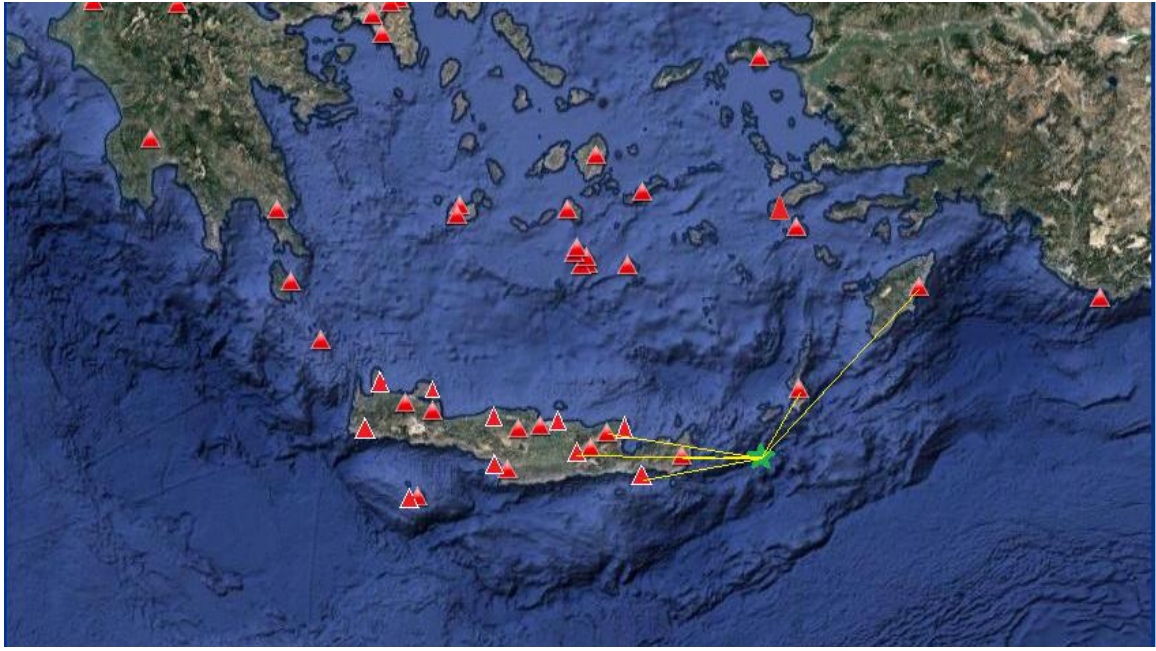
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	62,2	53,6	8,6	46,6	59,37845
ZKR	64	55	9	56,5	67,42766
FRMA	73,8	59,8	14	78,6	86,78825
NPS	79,8	64,1	15,7	110,1	116,0873
KSTL	86,9	68	18,9	131,3	136,3596
ARG	91	71,3	19,7	160,2	164,3724
IDI	96,2	74,2	22	175,8	179,6104
TMBK	98,8	75,2	23,6	202,6	205,915
PRNS	105,5	79,1	26,4	224,3	227,2988
IMMV	115,1	83,7	31,4	259,3	261,8983



16 APRIL 2015 (4.6 ML 4.8 Mw , depth 29km)

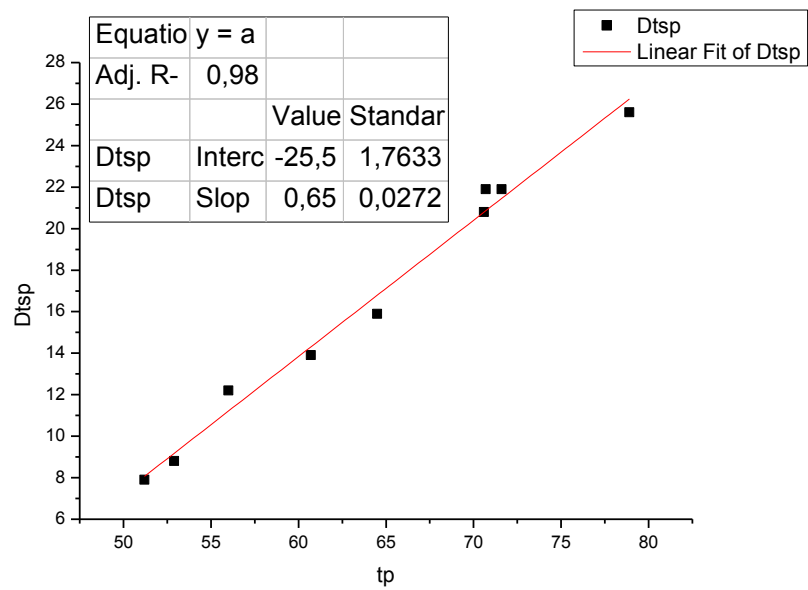
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	55,7	47,3	8,4	47,8	55,90921
ZKR	57,4	48	9,4	62,2	68,62827
FRMA	67	53,1	13,9	96,8	101,0507
NPS	73,2	57,6	15,6	117,4	120,9287
KSTL	79,5	61,8	17,7	136,7	139,7422
ARG	86,6	65	21,6	159,9	162,5085

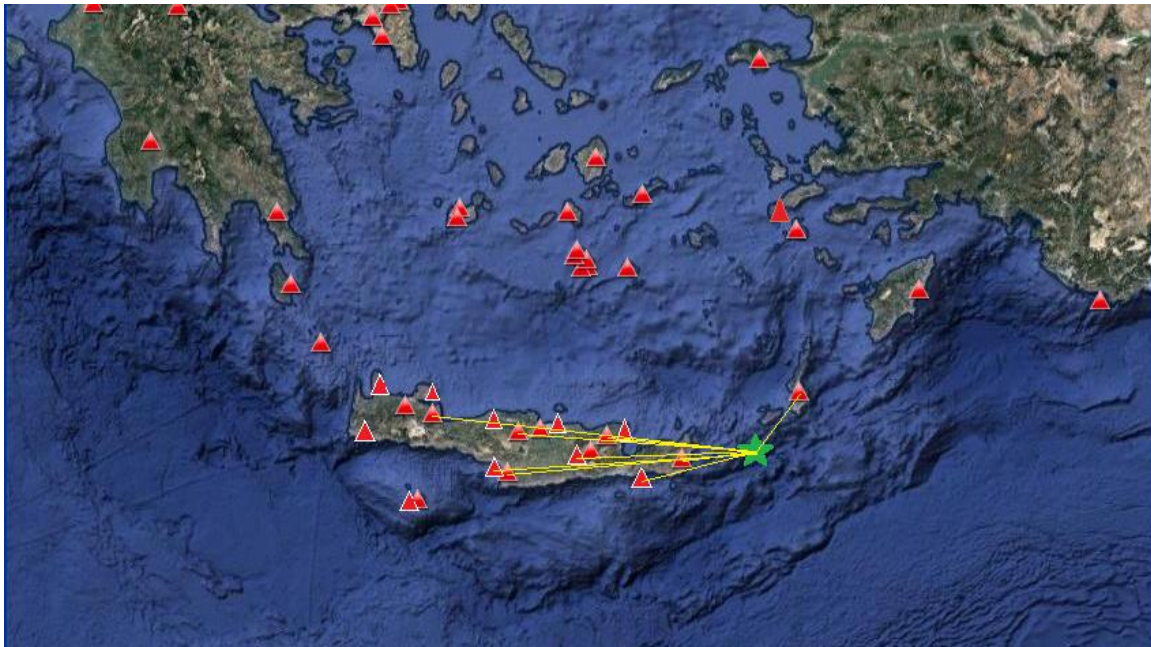
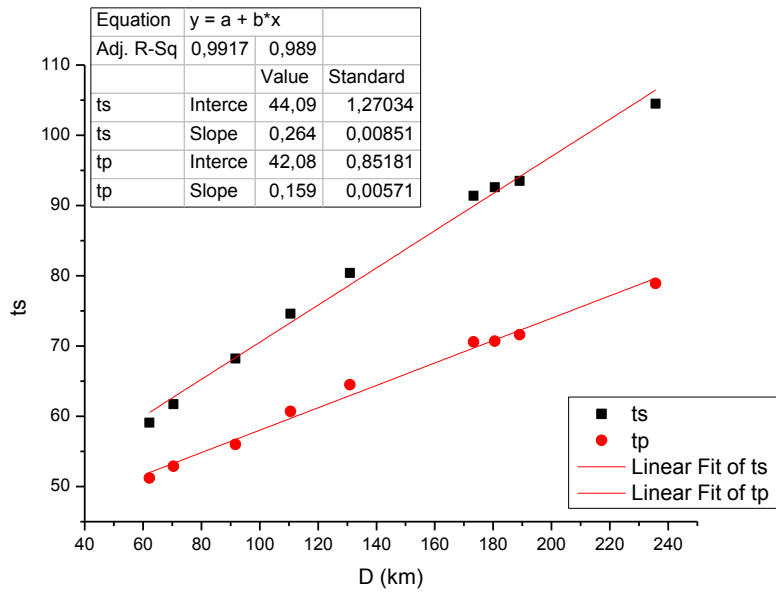




17 APRIL 2015 (5.4 ML 5.4 Mw , depth 40.1km)

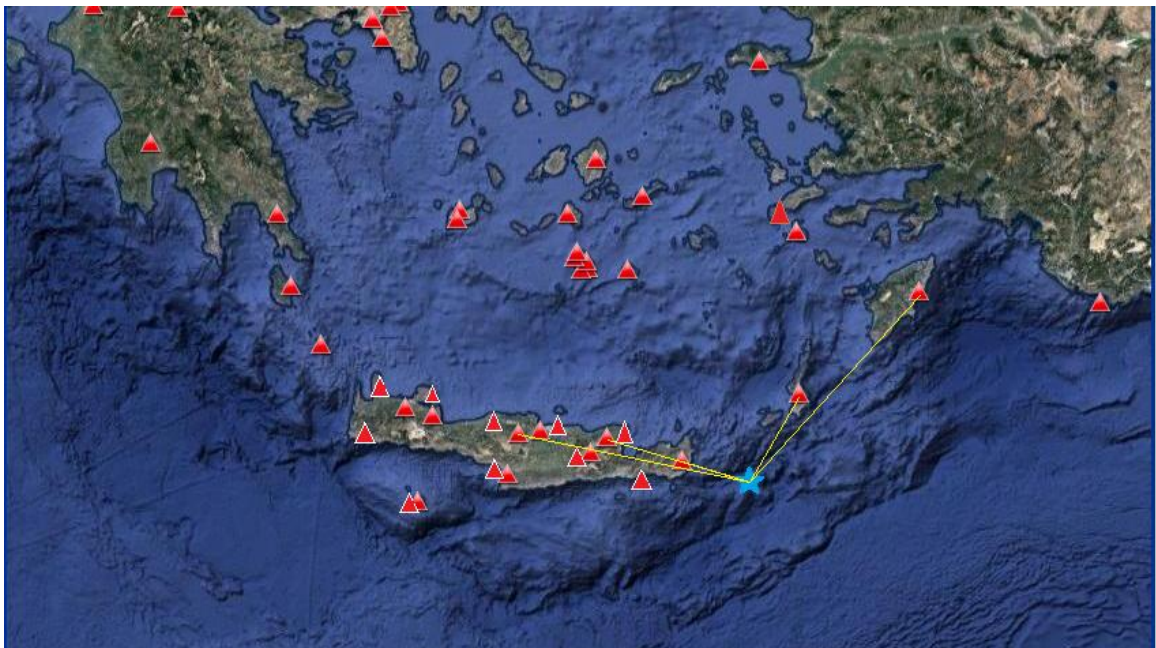
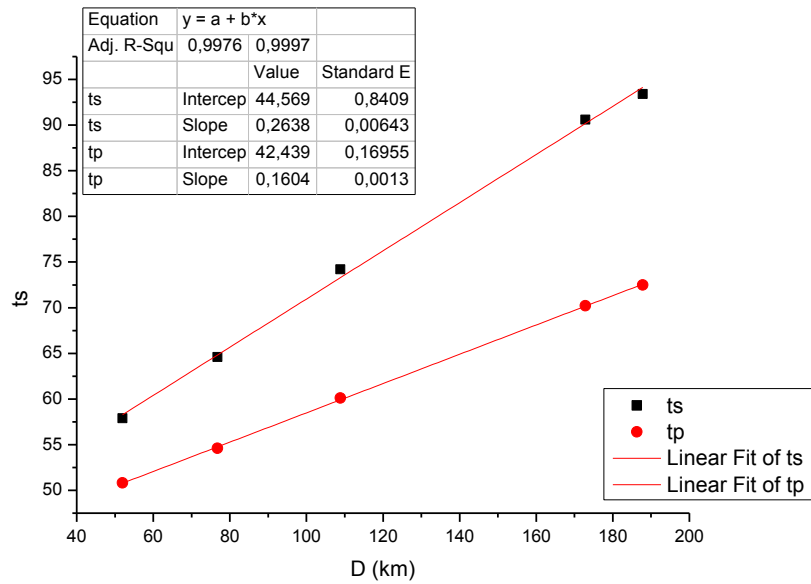
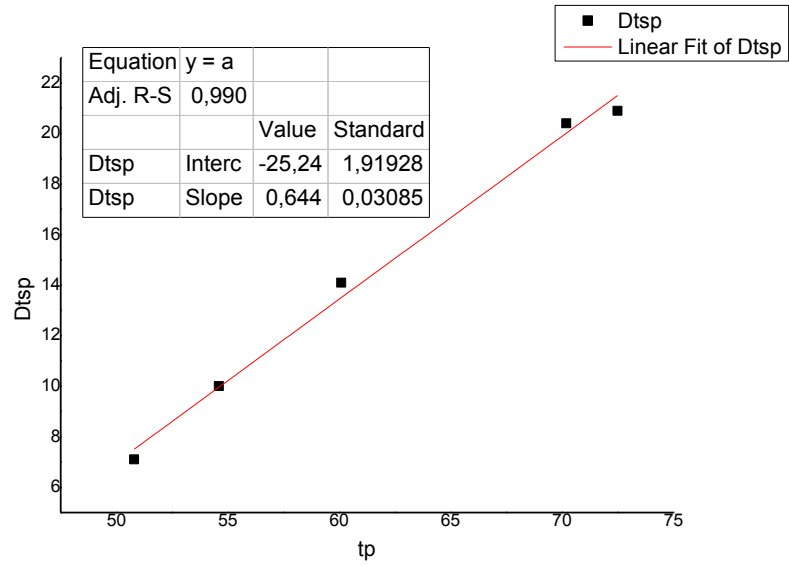
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	59,1	51,2	7,9	47,5	62,16317
KARP	61,7	52,9	8,8	57,9	70,43025
FRMA	68,2	56	12,2	82,5	91,72928
NPS	74,6	60,7	13,9	103	110,5306
KSTL	80,4	64,5	15,9	124,6	130,8937
IDI	91,4	70,6	20,8	168,6	173,3031
SIVA	92,6	70,7	21,9	176,1	180,6079
TMBK	93,5	71,6	21,9	184,8	189,1006
VAM	104,5	78,9	25,6	232,3	235,7357





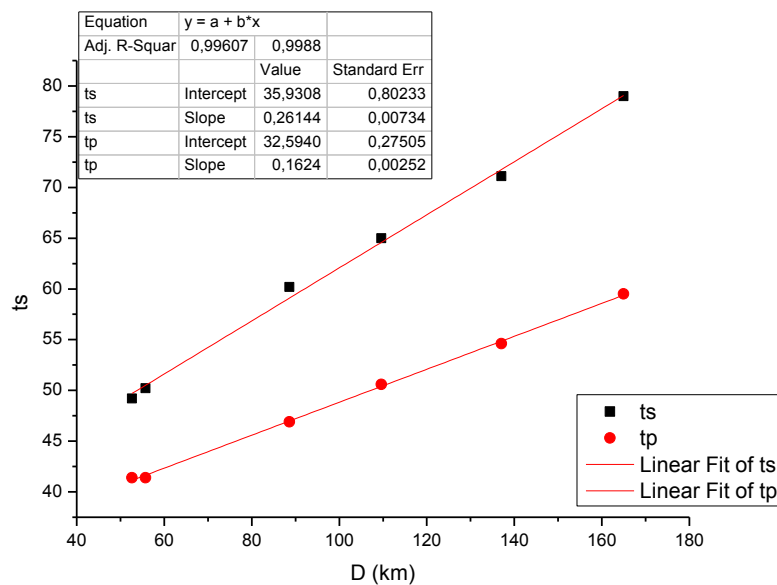
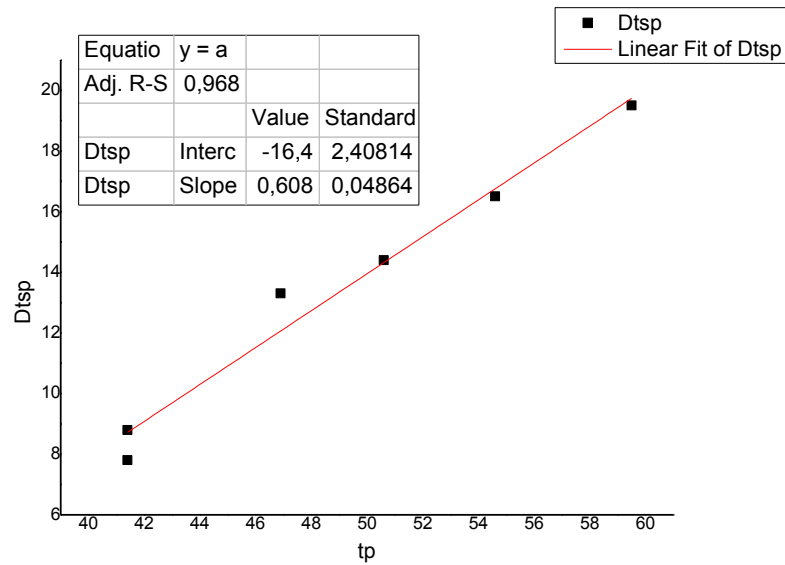
17 APRIL 2015 (4.6 ML 4.5 Mw , depth 11.1km)

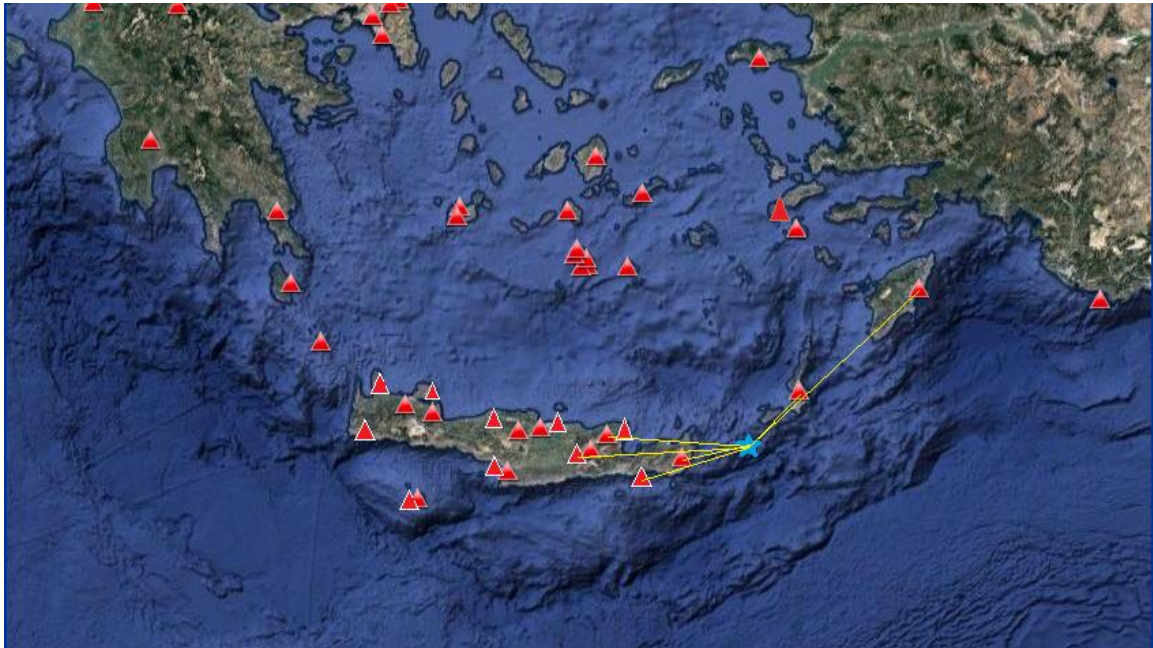
station	ts	tp	Dtsp	D(km)
ZKR	57,9	50,8	7,1	50,8
KARP	64,6	54,6	10	76
NPS	74,2	60,1	14,1	108,3
IDI	90,6	70,2	20,4	172,5
ARG	93,4	72,5	20,9	187,5



21 APRIL 2015 (4.2 ML 4.1 Mw , depth 13.4km)

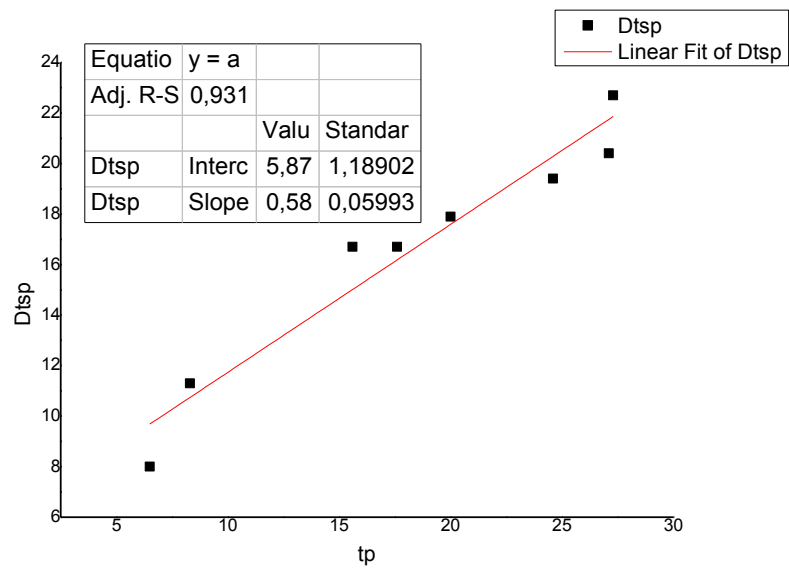
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	49,2	41,4	7,8	50,9	52,6343
ZKR	50,2	41,4	8,8	54,1	55,73482
FRMA	60,2	46,9	13,3	87,6	88,61896
NPS	65	50,6	14,4	108,8	109,6221
KSTL	71,1	54,6	16,5	136,4	137,0566
ARG	79	59,5	19,5	164,4	164,9452

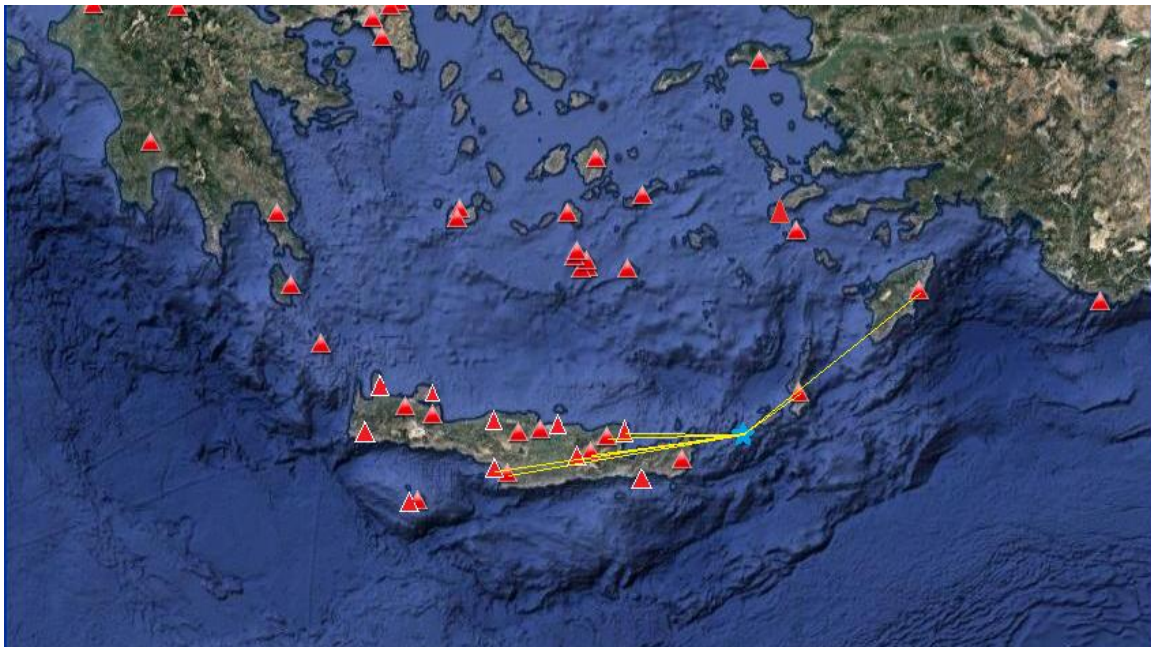
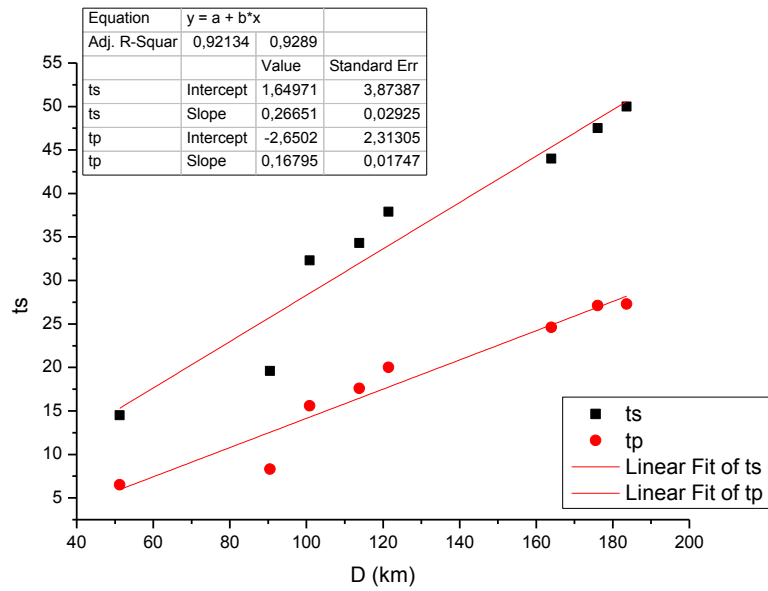




22APRIL 2015 (4.1 ML 4.2 Mw , depth 12.5)

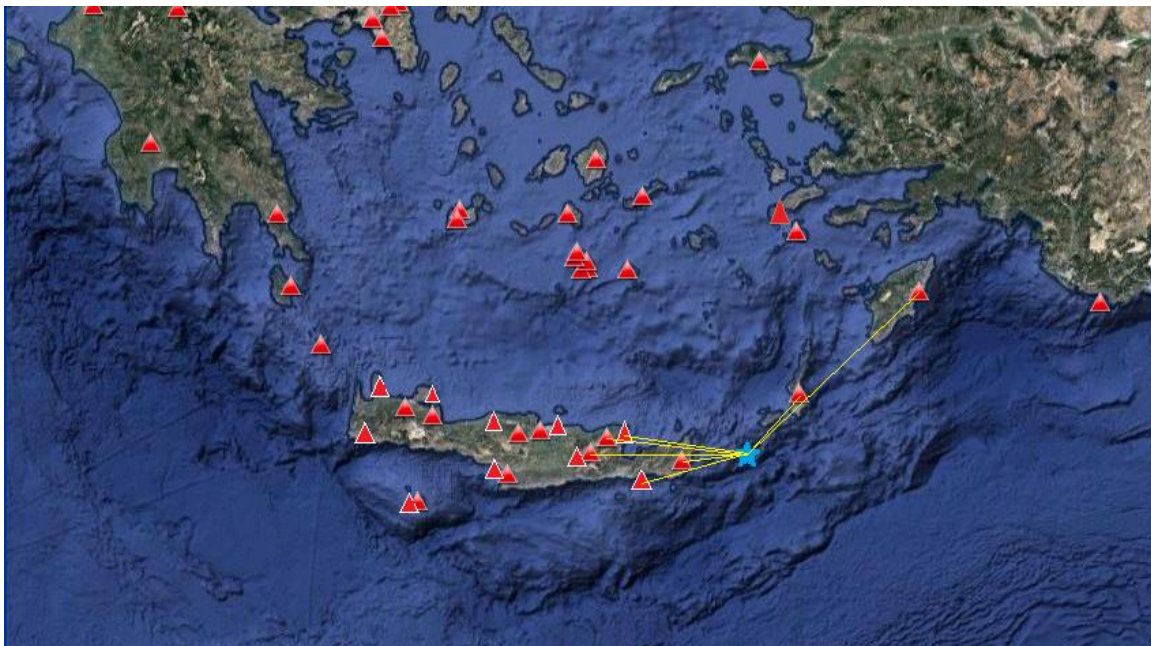
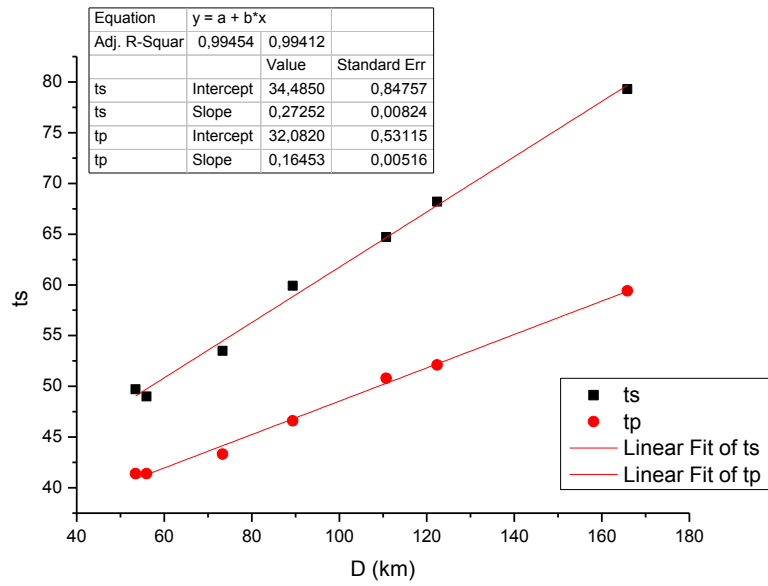
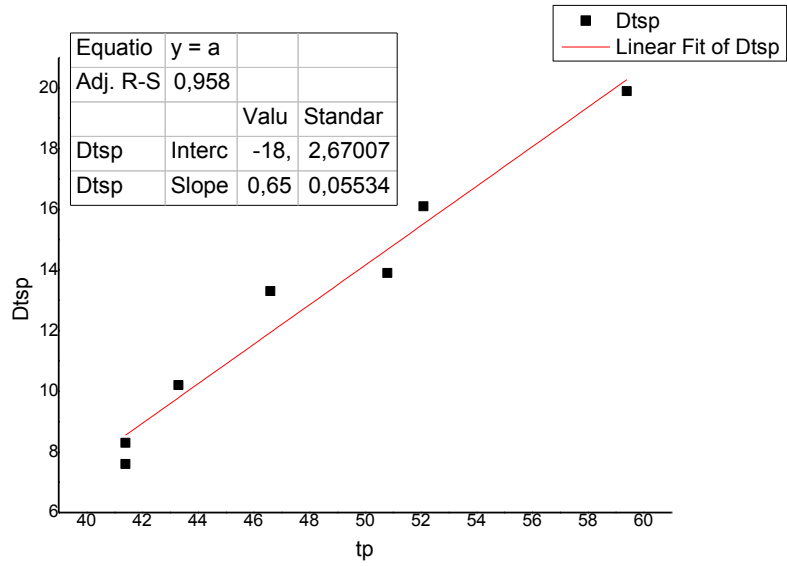
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	14,5	6,5	8	49,7	51,24783
STIA	19,6	8,3	11,3	89,6	90,46773
NPS	32,3	15,6	16,7	100,1	100,8775
LAST	34,3	17,6	16,7	113,1	113,7887
KSTL	37,9	20	17,9	120,8	121,445
ARG	44	24,6	19,4	163,5	163,9771
SIVA	47,5	27,1	20,4	175,6	176,0443
TMBK	50	27,3	22,7	183,2	183,626





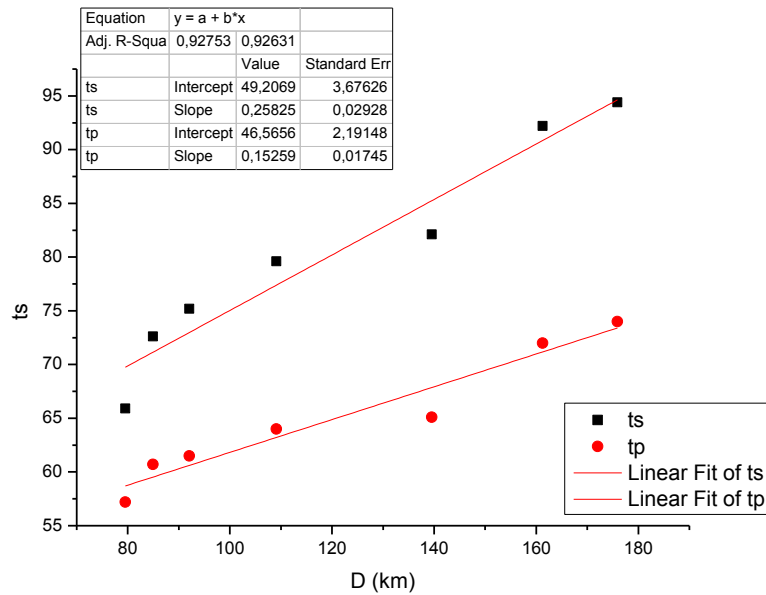
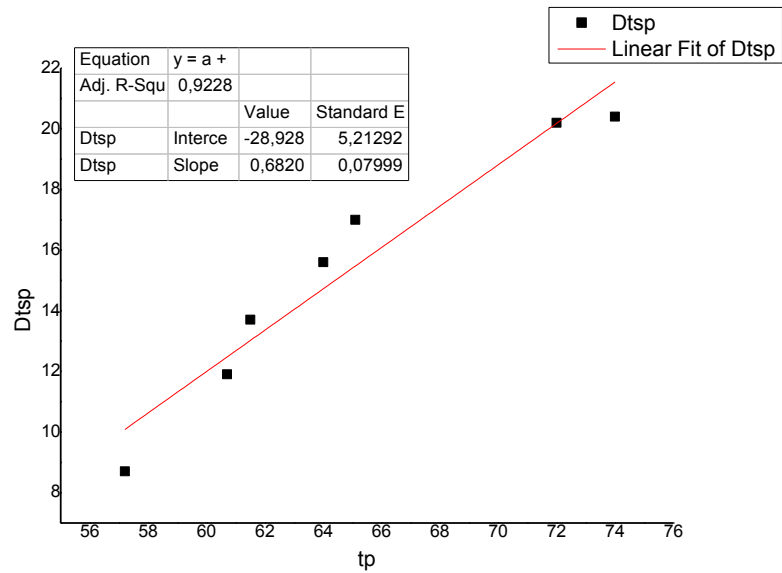
27 APRIL 2015 (4 ML 4 Mw , depth 11km)

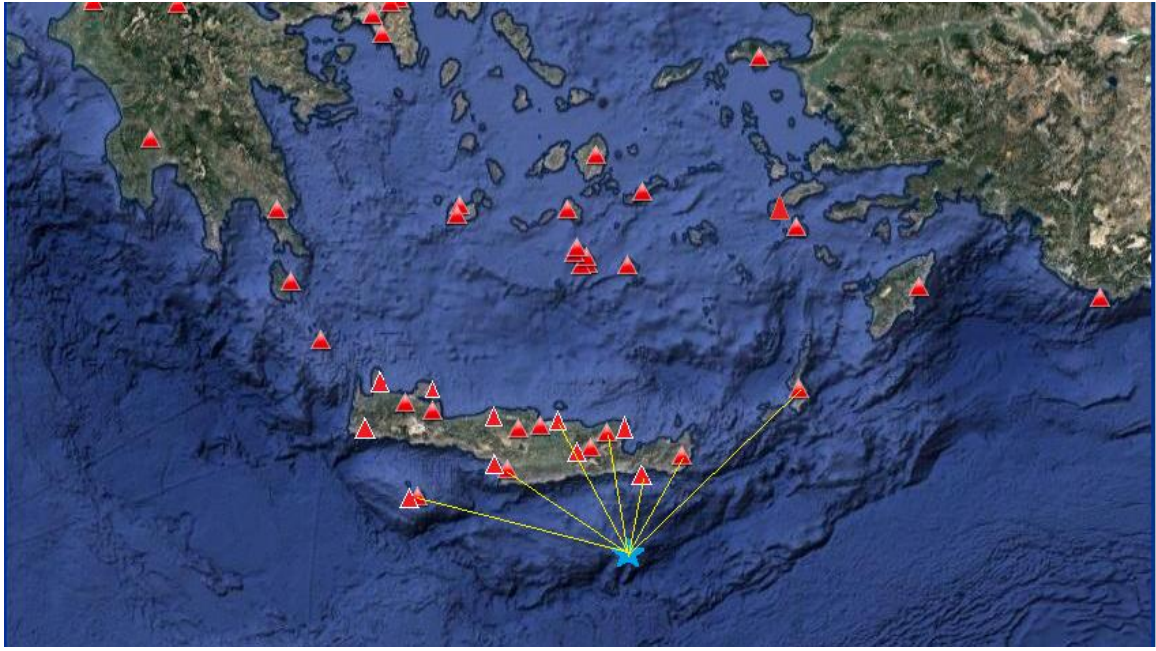
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	49	41,4	7,6	54,9	55,99116
KARP	49,7	41,4	8,3	52,3	53,44427
STIA	53,5	43,3	10,2	72,5	73,32973
FRMA	59,9	46,6	13,3	88,7	89,37947
NPS	64,7	50,8	13,9	110,2	110,7476
LAST	68,2	52,1	16,1	121,9	122,3953
ARG	79,3	59,4	19,9	165,5	165,8652



2 MAY 2015 (4.7 ML 4.7 Mw , depth 13.4km)

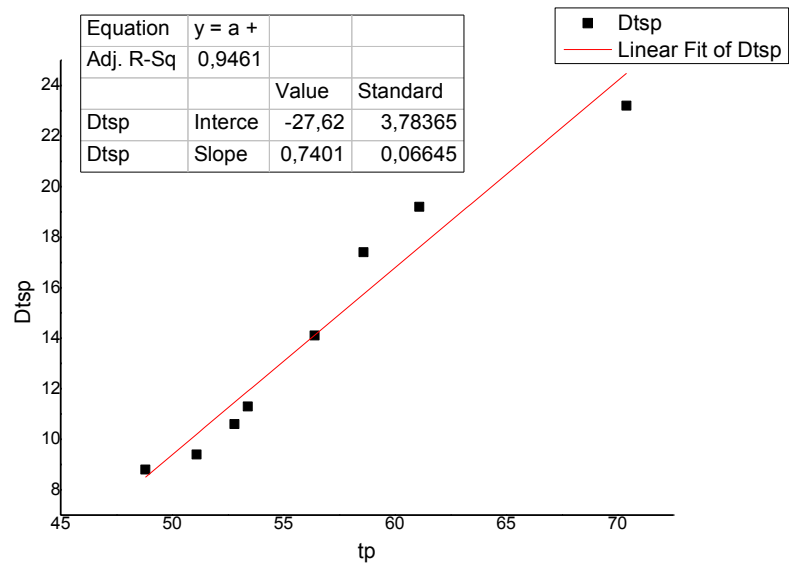
station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	65,9	57,2	8,7	78,4	79,53691
ZKR	72,6	60,7	11,9	83,9	84,96335
NPS	75,2	61,5	13,7	91,1	92,08024
SIVA	79,6	64	15,6	108,3	109,1258
HRKL	82,1	65,1	17	138,9	139,5449
GVD	92,2	72	20,2	160,7	161,2577
KARP	94,4	74	20,4	175,4	175,9111

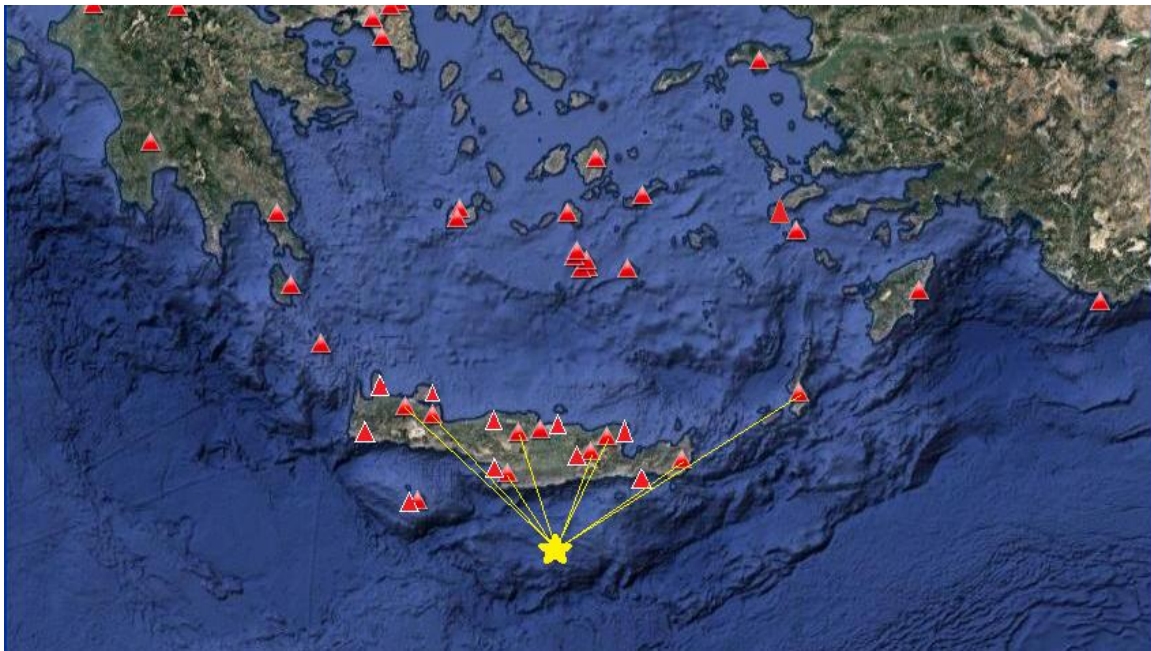
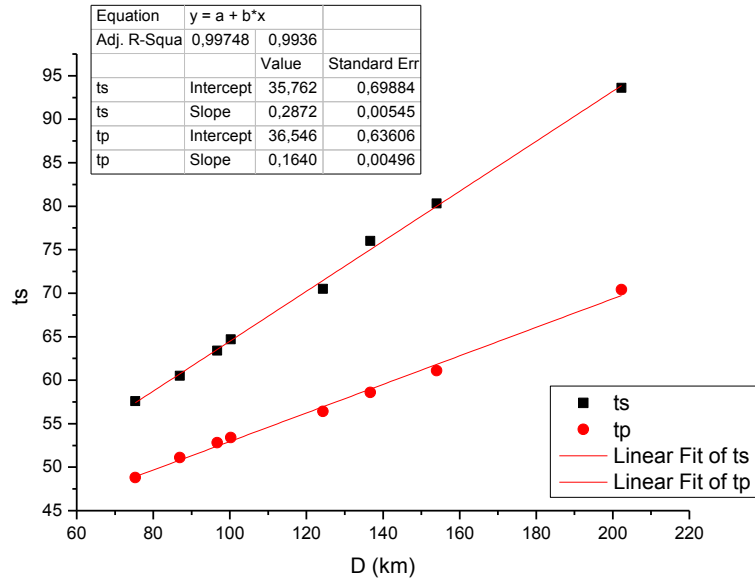




4 MAY 2015 (4.3 ML 4.4 Mw , depth 45km)

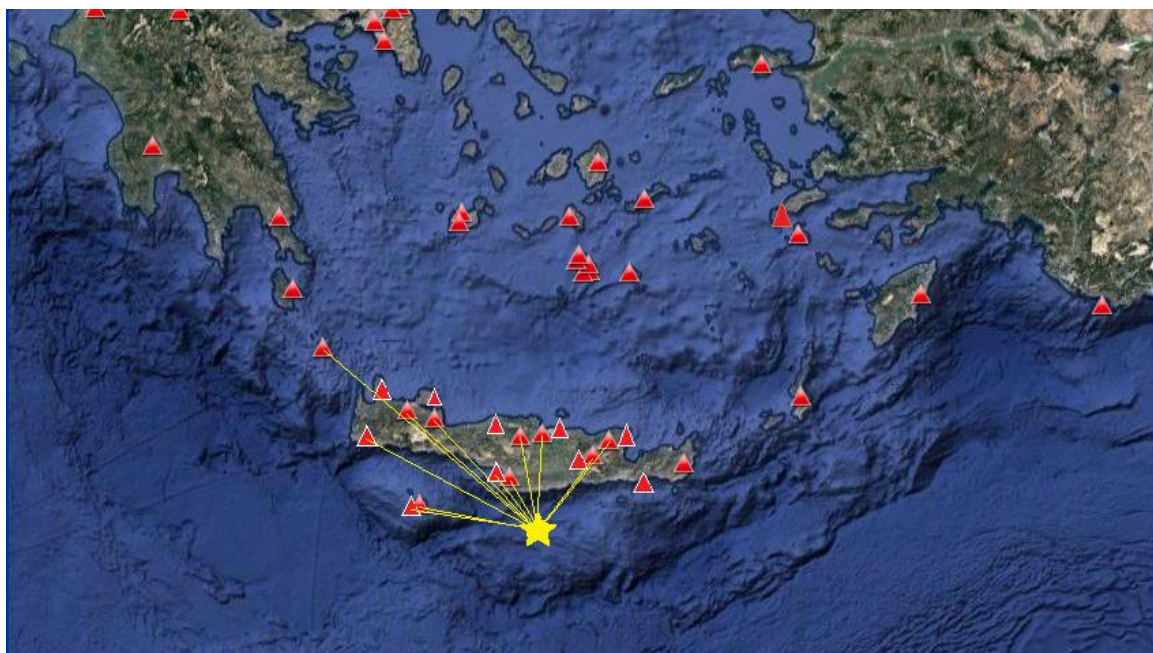
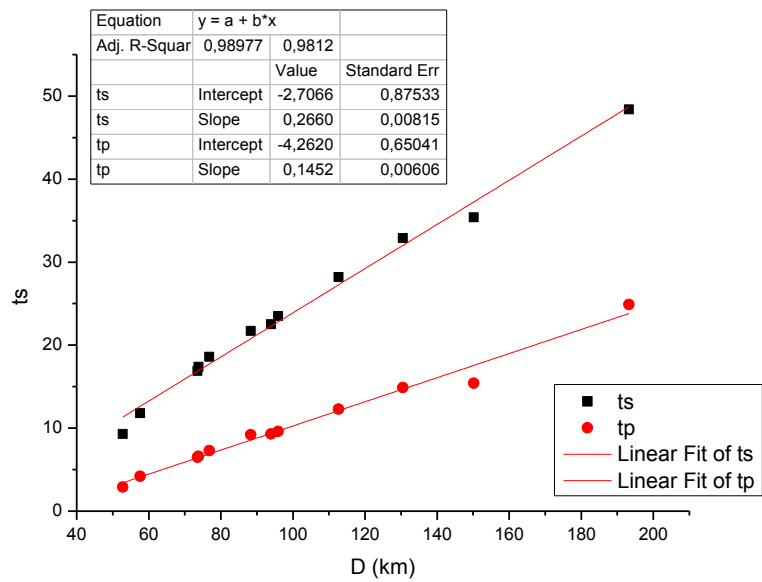
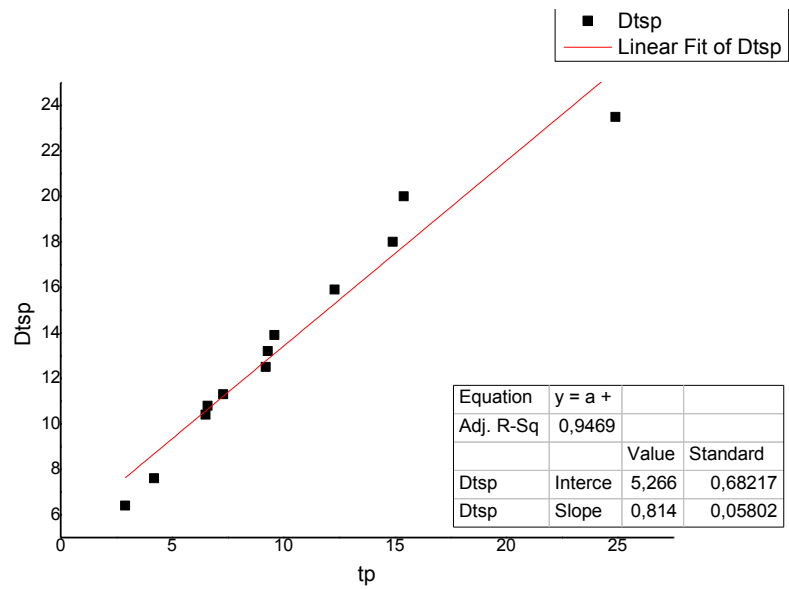
Station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	57,6	48,8	8,8	60,4	75,32038
LAST	60,5	51,1	9,4	74,4	86,95033
IDI	63,4	52,8	10,6	85,6	96,7076
NPS	64,7	53,4	11,3	89,6	100,2654
ZKR	70,5	56,4	14,1	115,9	124,3294
VAM	76	58,6	17,4	129,1	136,718
IMMV	80,3	61,1	19,2	147,3	154,0204
KARP	93,6	70,4	23,2	197,2	202,2692





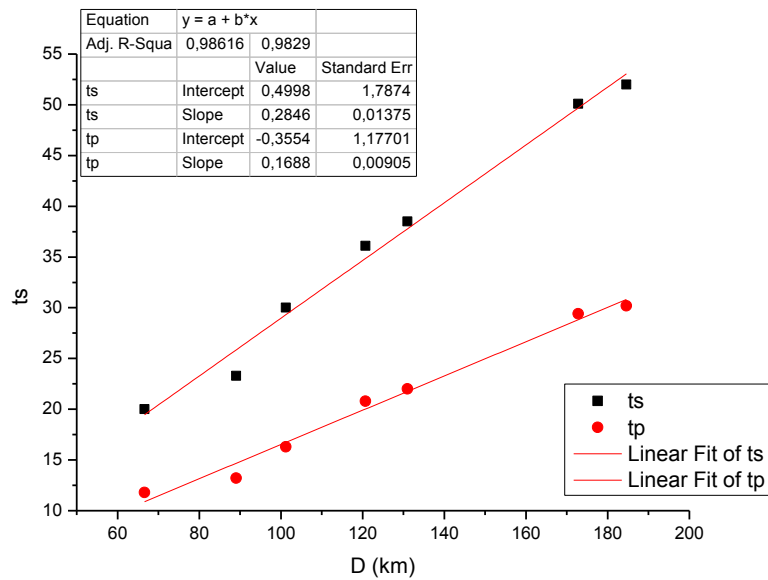
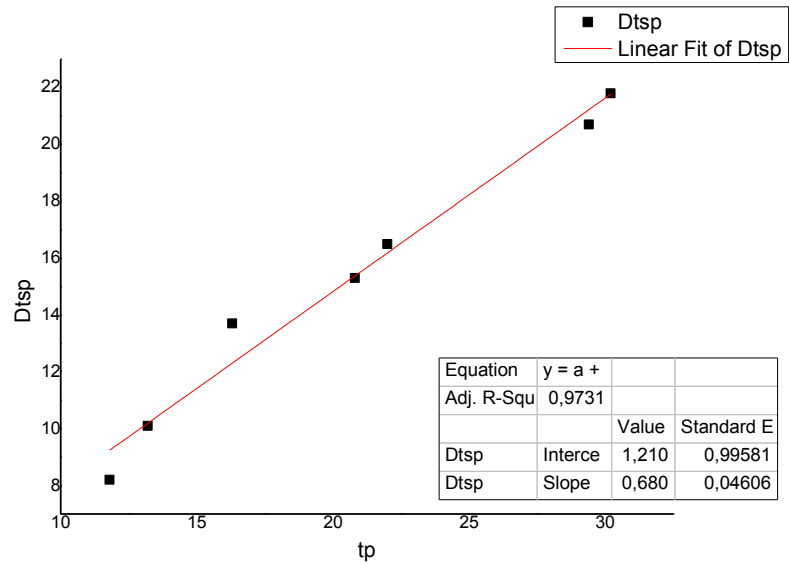
6 MAY 2015 (4.5 ML 4.4 Mw , depth 36.8)

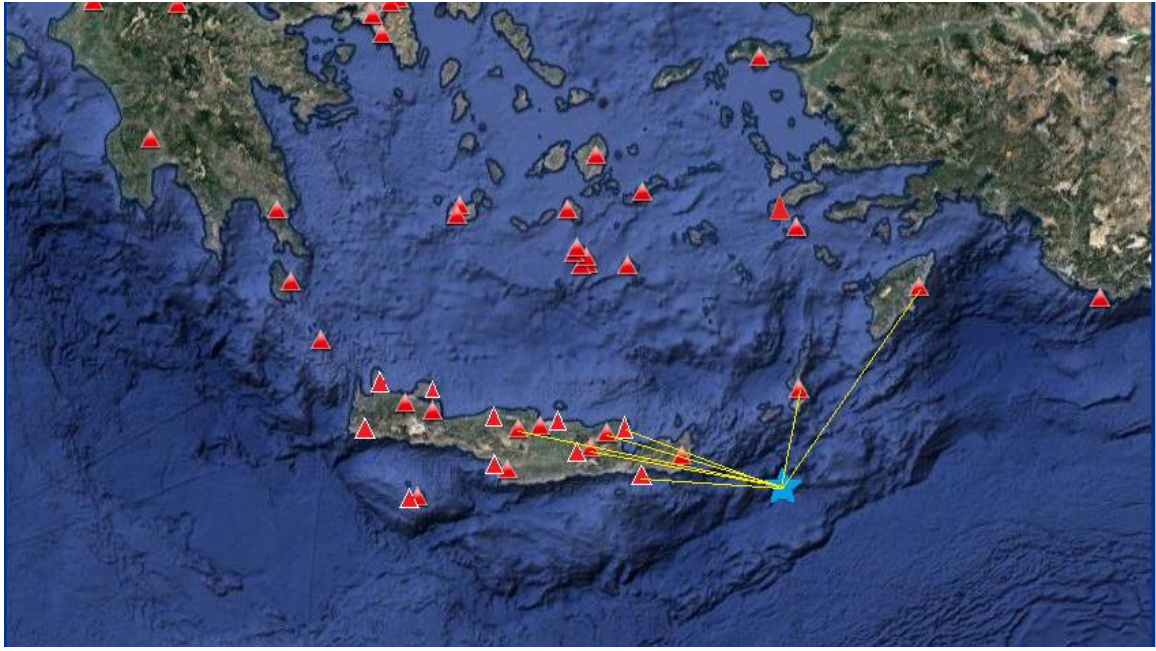
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	9,3	2,9	6,4	37,8	52,7549
TMBK	11,8	4,2	7,6	44,3	57,59106
IDI	16,9	6,5	10,4	63,7	73,56582
LAST	17,4	6,6	10,8	64	73,82574
IACM	18,6	7,3	11,3	67,4	76,79193
NPS	21,7	9,2	12,5	80,3	88,3308
GVD	22,5	9,3	13,2	86,4	93,9106
GVDS	23,5	9,6	13,9	88,6	95,93852
VAM	28,2	12,3	15,9	106,5	112,6787
IMMV	32,9	14,9	18	125,2	130,4963
KNDR	35,4	15,4	20	145,6	150,1786
AMKY	48,4	24,9	23,5	189,7	193,2365



11 MAY 2015 (4.3 ML, depth 30.9)

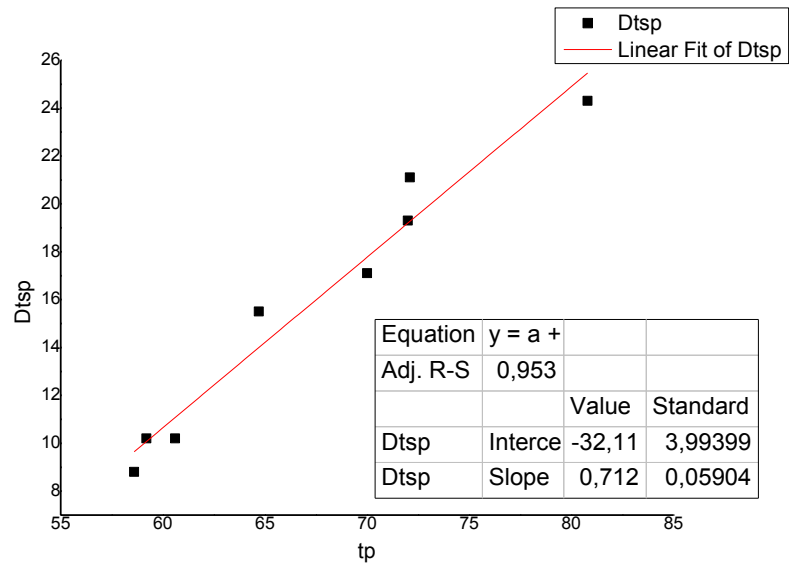
station	ts	tp	Dtsp	Dop(km)	D(km)
KARP	20	11,8	8,2	59	66,60188
STIA	23,3	13,2	10,1	83,5	89,03404
FRMA	30	16,3	13,7	96,4	101,2313
NPS	36,1	20,8	15,3	116,7	120,7216
LAST	38,5	22	16,5	127,3	130,9966
ARG	50,1	29,4	20,7	170	172,7854
IDI	52	30,2	21,8	182	184,6045

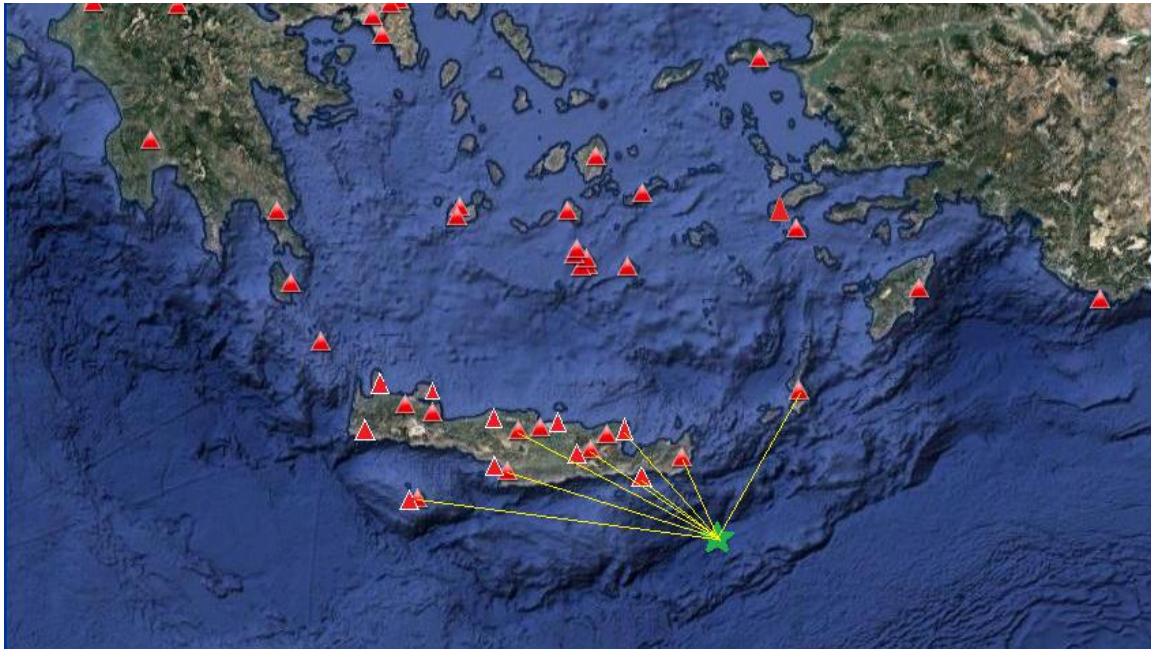
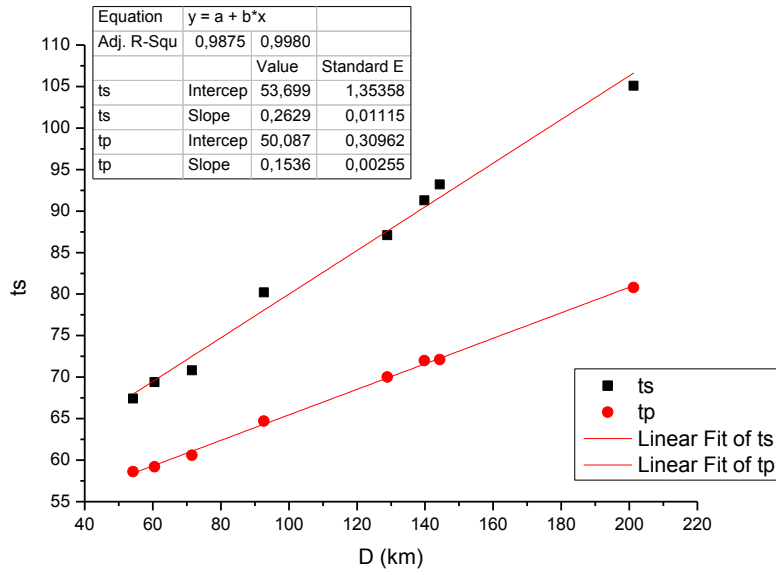




17 MAY 2015 (4.1 ML 4.2 Mw ,depth 23.7km)

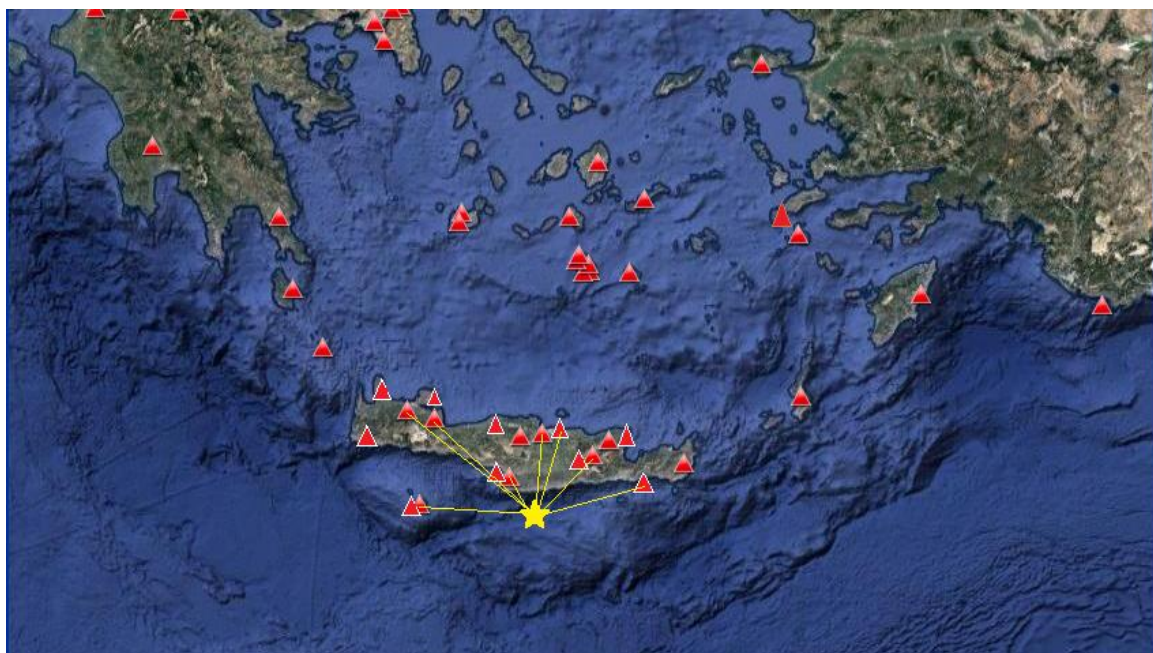
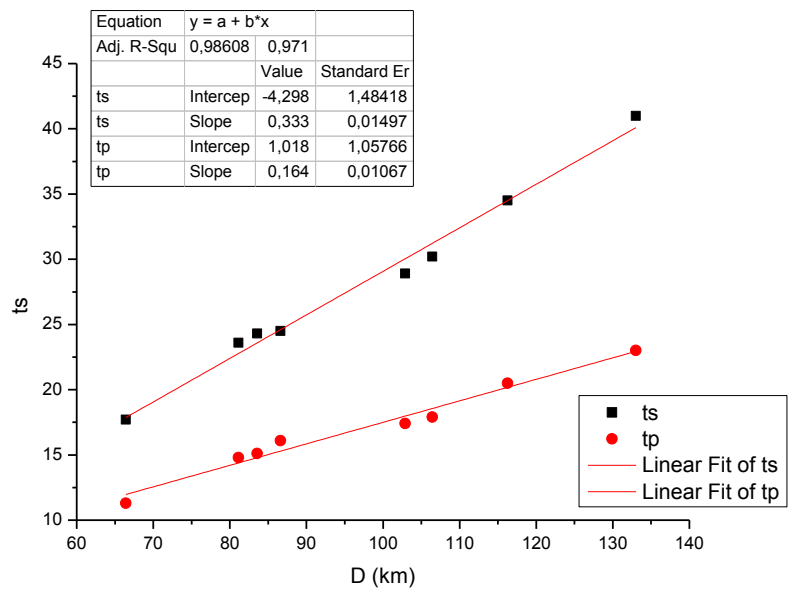
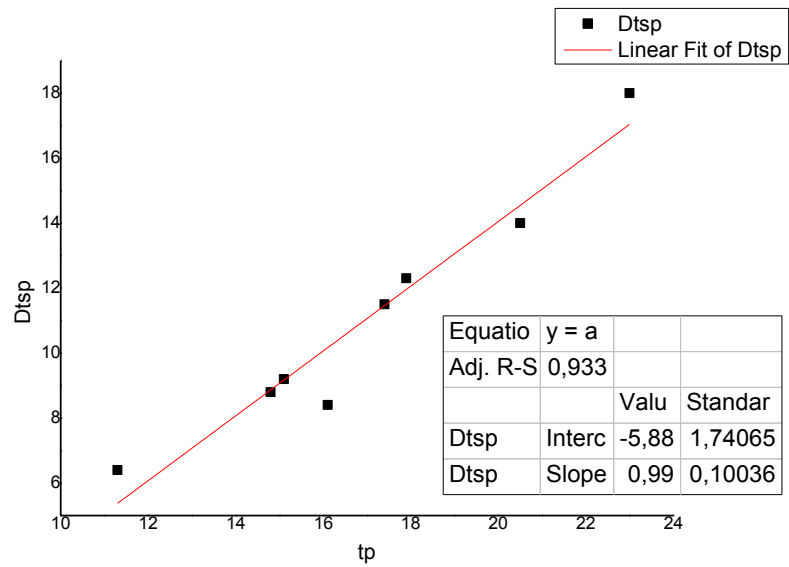
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	67,4	58,6	8,8	48,8	54,25062
FRMA	69,4	59,2	10,2	55,7	60,53247
STIA	70,8	60,6	10,2	67,5	71,53978
LAST	80,2	64,7	15,5	89,6	92,68144
KARP	87,1	70	17,1	126,7	128,8976
SIVA	91,3	72	19,3	137,8	139,8232
IDI	93,2	72,1	21,1	142,4	144,3588
GVD	105,1	80,8	24,3	199,9	201,3





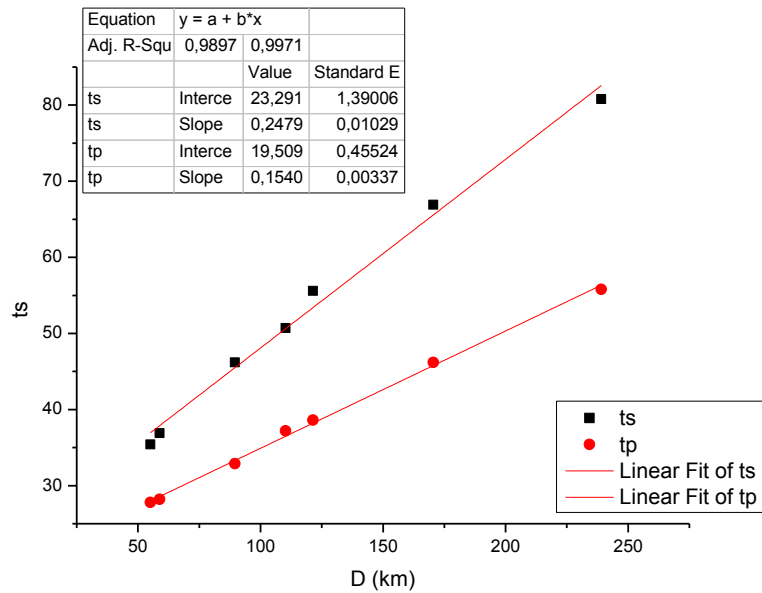
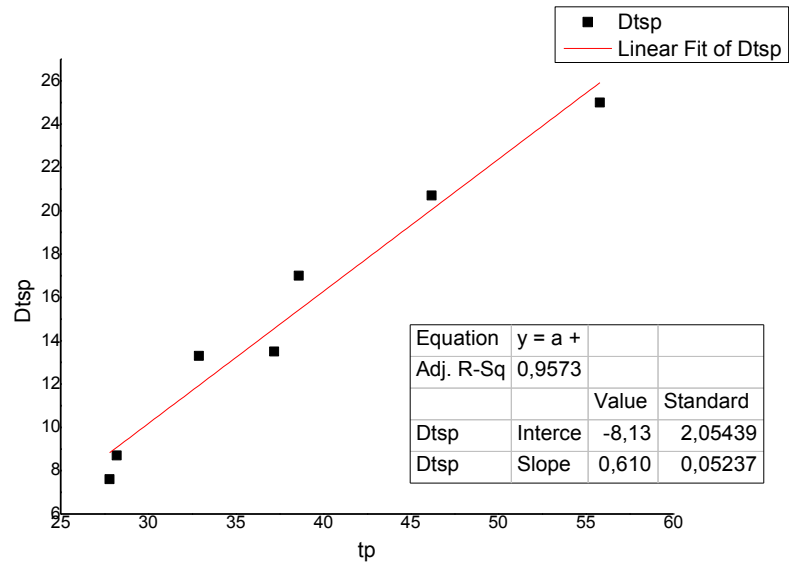
18 MAY 2015 (4.4 ML 4.4 Mw ,depth 59km)

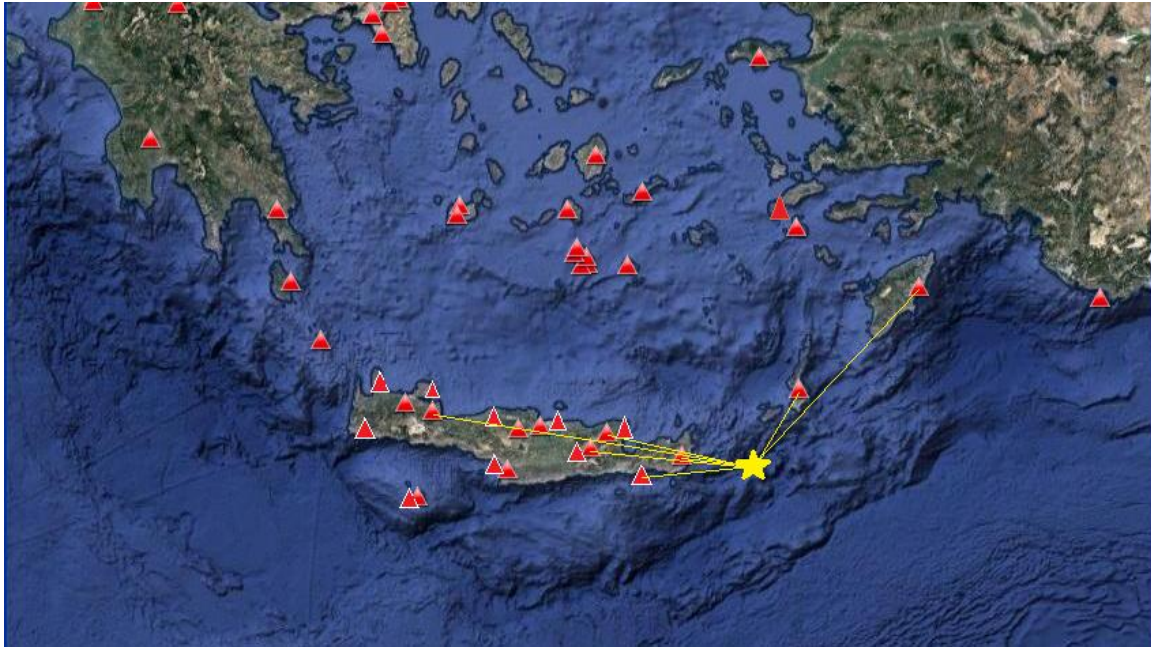
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	17,7	11,3	6,4	30,5	66,41724
IDI	23,6	14,8	8,8	55,7	81,13871
LAST	24,3	15,1	9,2	59,2	83,58014
HRKL	24,5	16,1	8,4	63,4	86,60577
GVD	28,9	17,4	11,5	84,3	102,8955
FRMA	30,2	17,9	12,3	88,6	106,447
VAM	34,5	20,5	14	100,2	116,28
IMMV	41	23	18	119,2	133,0024



22 MAY 2015 (4.1 ML, depth 14.7km)

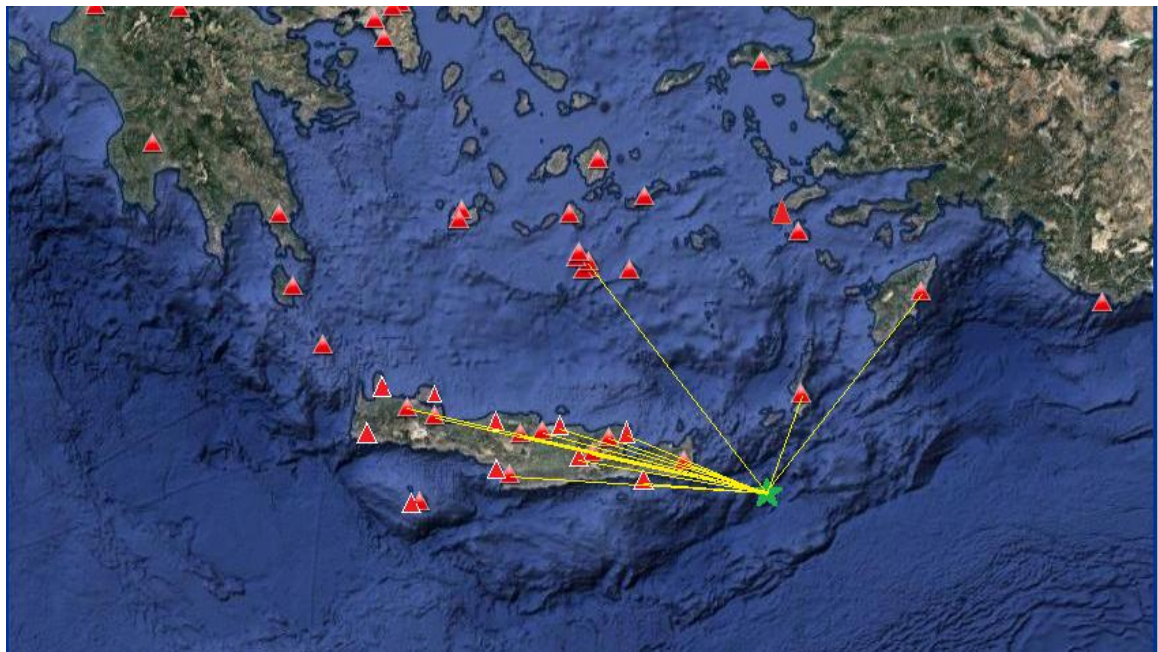
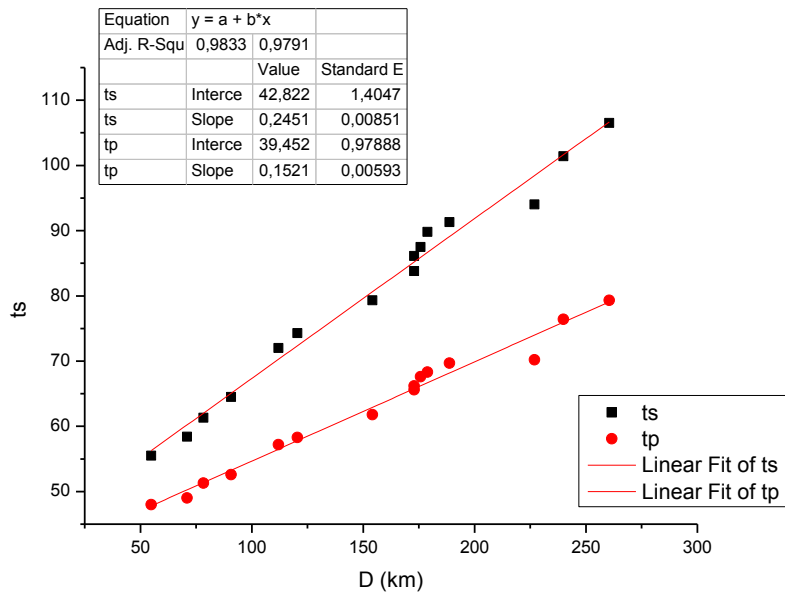
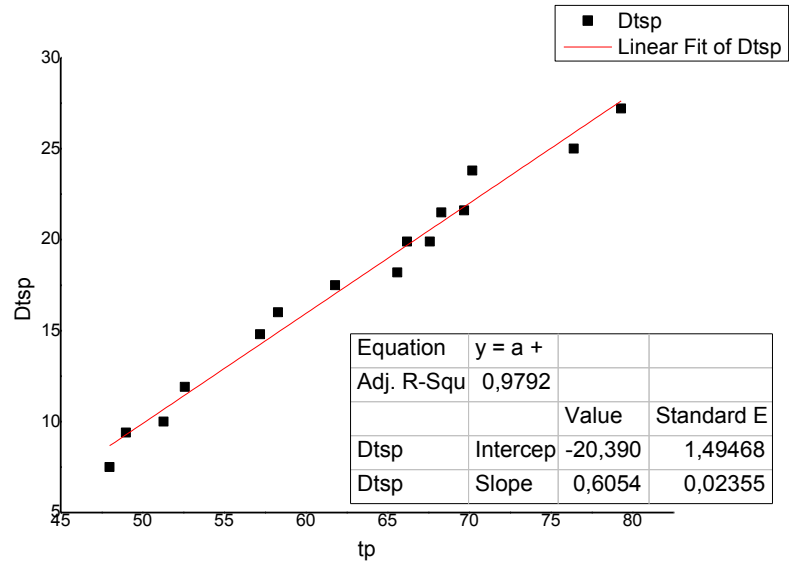
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	35,4	27,8	7,6	53,1	55,09719
KARP	36,9	28,2	8,7	57	58,86502
FRMA	46,2	32,9	13,3	88,4	89,61389
NPS	50,7	37,2	13,5	109,3	110,2841
LAST	55,6	38,6	17	120,5	121,3933
ARG	66,9	46,2	20,7	169,9	170,5347
VAM	80,8	55,8	25	238,6	239,0524





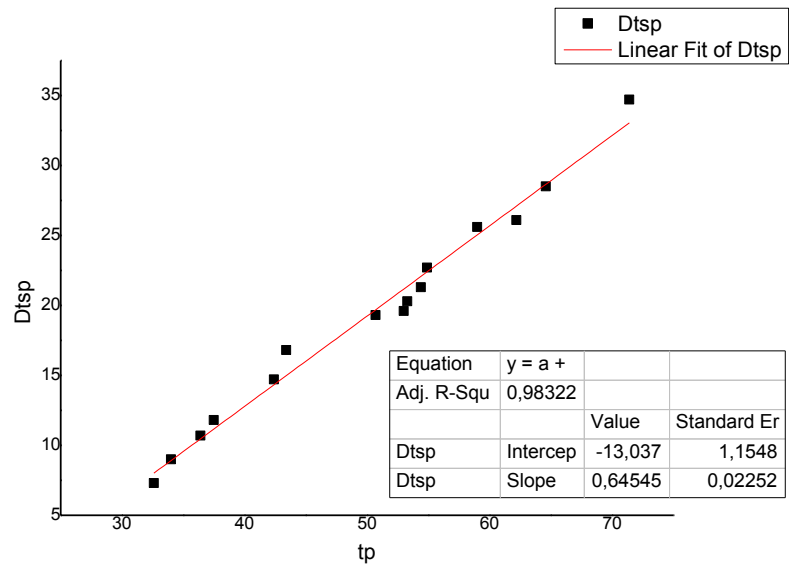
28 MAY 2015 (4.2 ML 4 Mw , depth 9.2km)

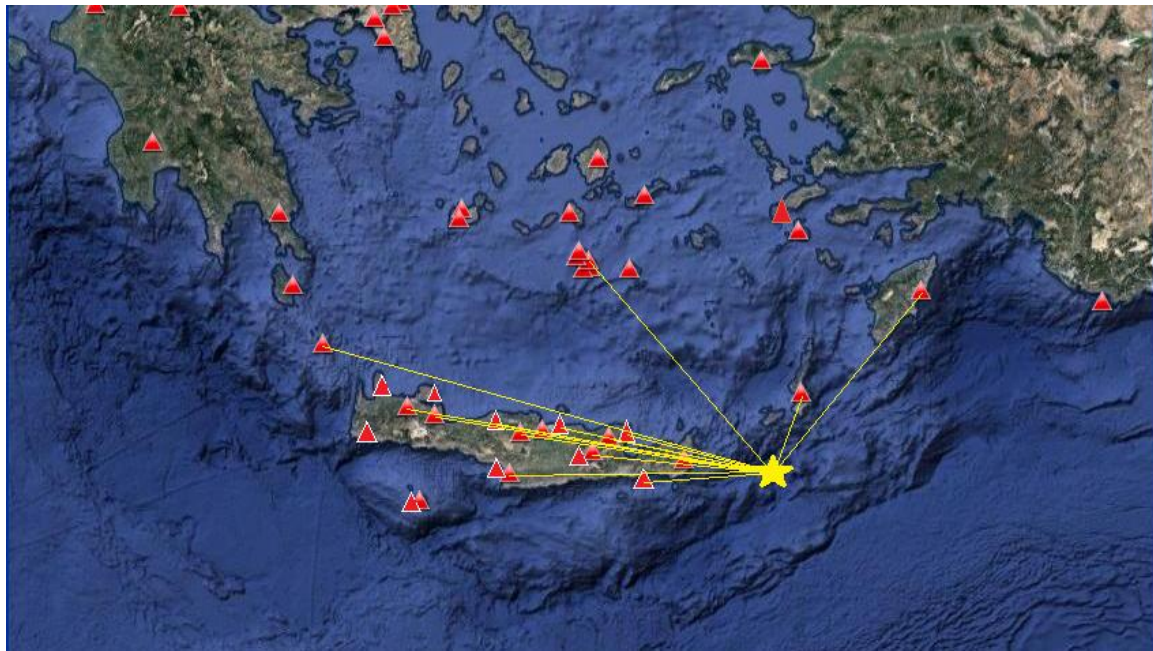
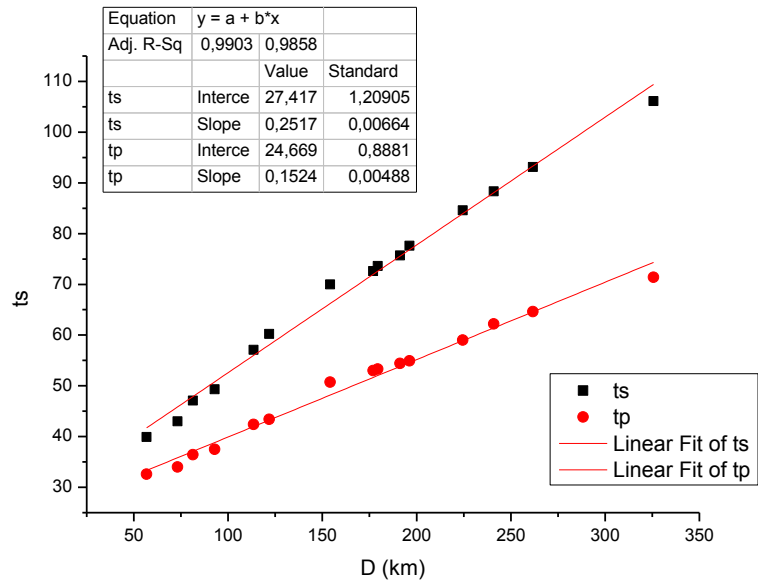
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	55,5	48	7,5	54,1	54,87668
STIA	58,4	49	9,4	70,4	70,99859
KARP	61,3	51,3	10	77,8	78,34207
FRMA	64,5	52,6	11,9	90,3	90,76745
NPS	72	57,2	14,8	111,6	111,9786
LAST	74,3	58,3	16	120,2	120,5516
KSTL	79,3	61,8	17,5	153,9	154,1747
HRKL	83,8	65,6	18,2	172,6	172,845
IACM	86,1	66,2	19,9	172,6	172,845
IDI	87,5	67,6	19,9	175,5	175,741
SIVA	89,8	68,3	21,5	178,6	178,8368
ARG	91,3	69,7	21,6	188,5	188,7244
THT2	94	70,2	23,8	226,7	226,8866
VAM	101,4	76,4	25	239,7	239,8765
IMMV	106,5	79,3	27,2	260,3	260,4625



28 MAY 2015 (4.4 ML 4.2 Mw ,depth 9.8km)

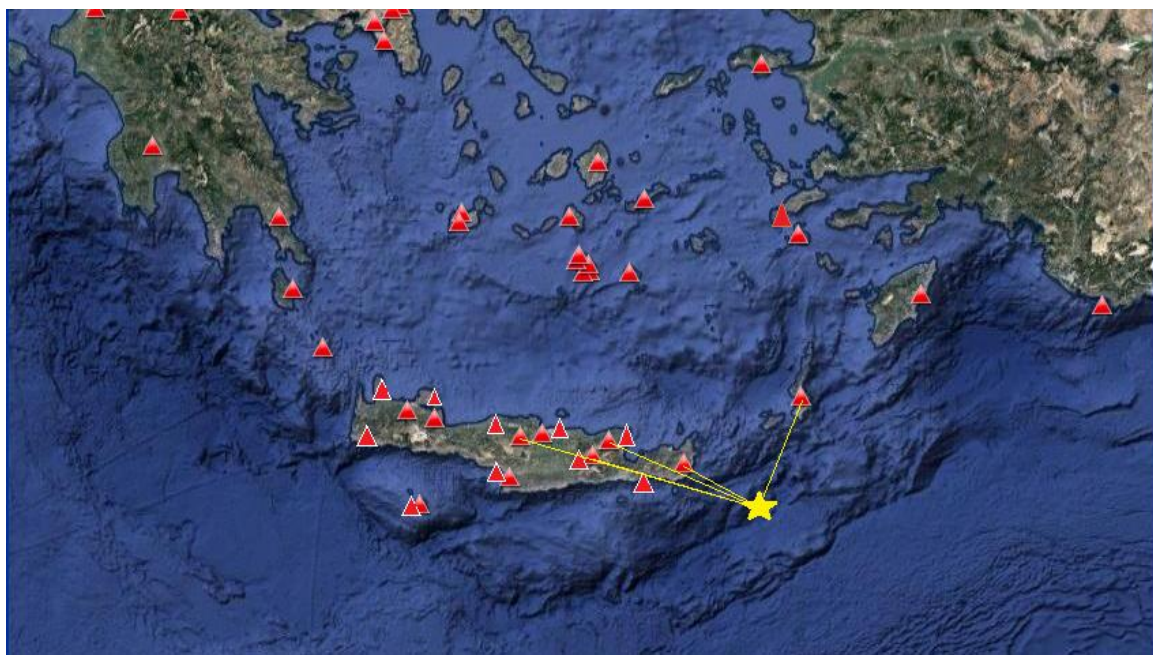
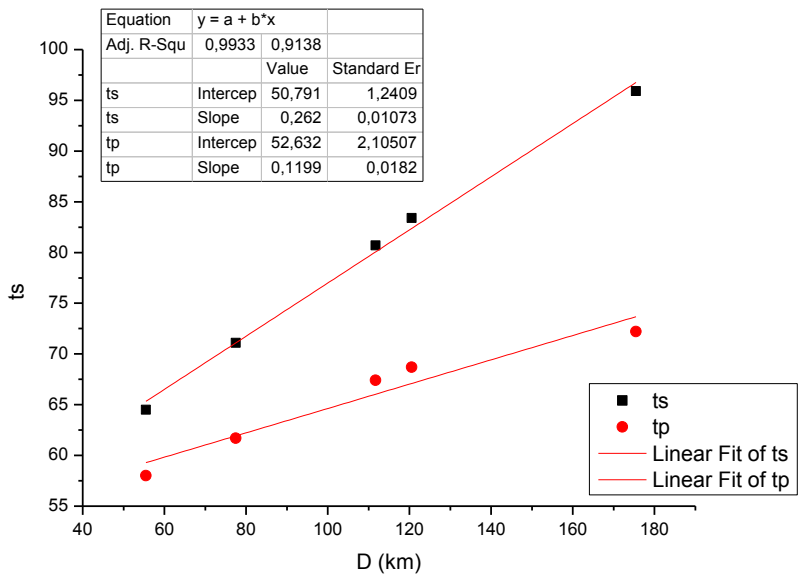
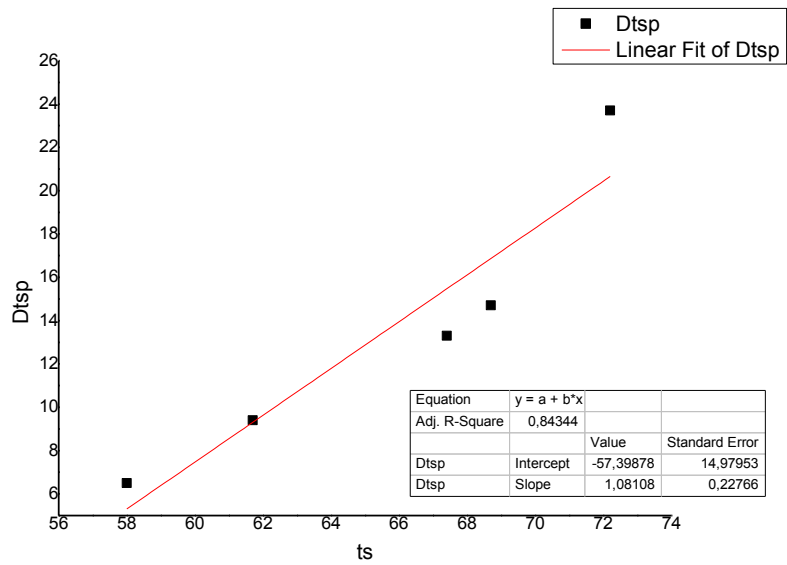
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	39,9	32,6	7,3	55,9	56,75253
STIA	43	34	9	72,6	73,25845
KARP	47,1	36,4	10,7	80,8	81,39214
FRMA	49,3	37,5	11,8	92,4	92,91824
NPS	57,1	42,4	14,7	113,1	113,5238
LAST	60,2	43,4	16,8	121,4	121,7949
HRKL	70	50,7	19,3	153,9	154,2117
IDI	72,6	53	19,6	176,7	176,9716
SIVA	73,6	53,3	20,3	179,1	179,3679
ARG	75,7	54,4	21,3	191	191,2512
THT2	77,6	54,9	22,7	196	196,2448
PRNS	84,6	59	25,6	224,3	224,514
VAM	88,3	62,2	26,1	240,8	240,9993
IMMV	93,1	64,6	28,5	261,5	261,6836
ANKY	106,1	71,4	34,7	325,6	325,7474





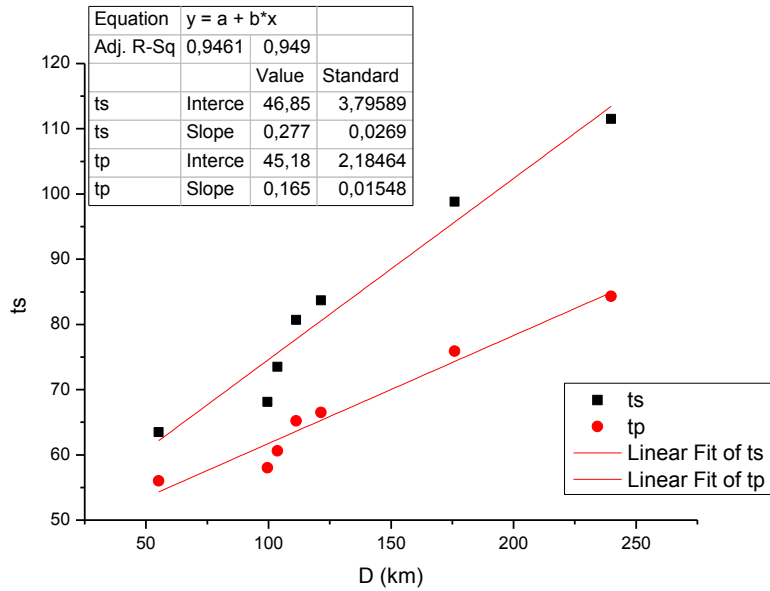
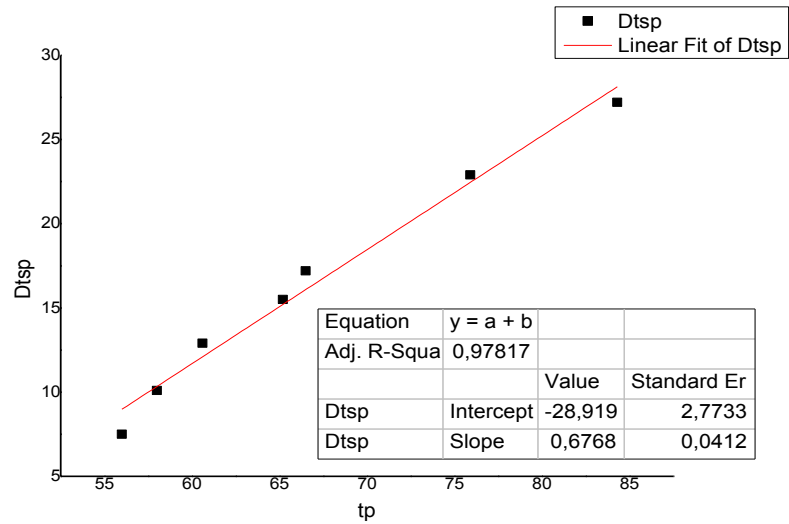
29 MAY 2015 (4.2 ML 4.1 Mw , depth 16.4km)

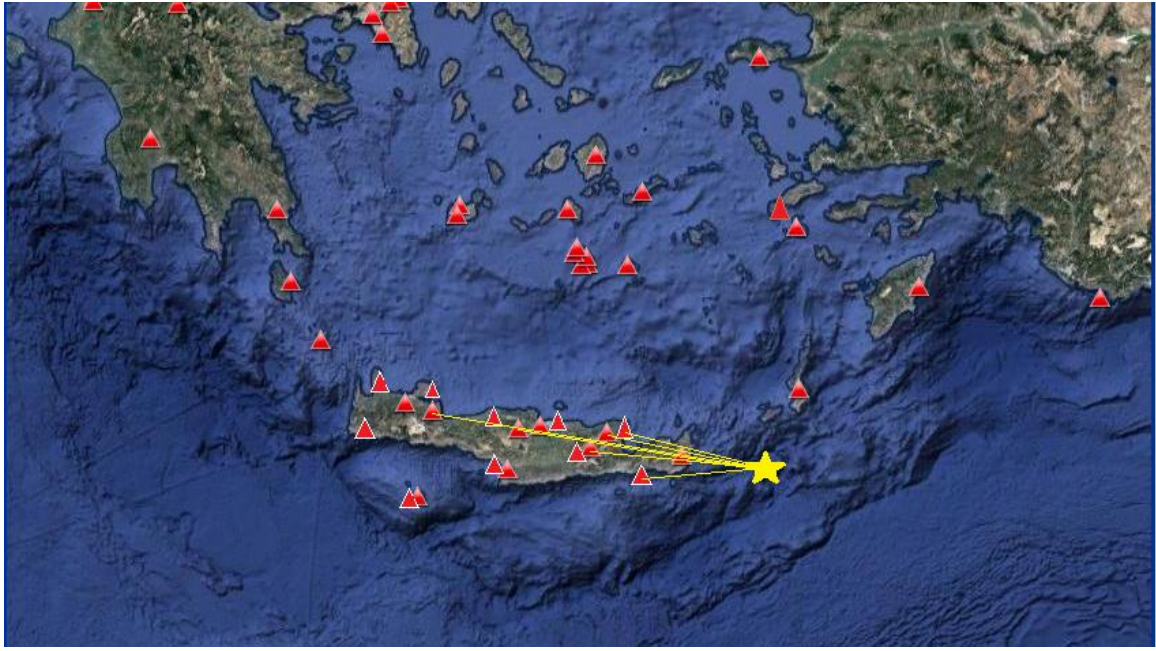
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	64,5	58	6,5	53	55,47937
KARP	71,1	61,7	9,4	75,7	77,45612
NPS	80,7	67,4	13,3	110,5	111,7104
LAST	83,4	68,7	14,7	119,4	120,521
IDI	95,9	72,2	23,7	174,7	175,4681



9 JUNE 2015(5.4 ML 5.4 Mw , depth 15.8)

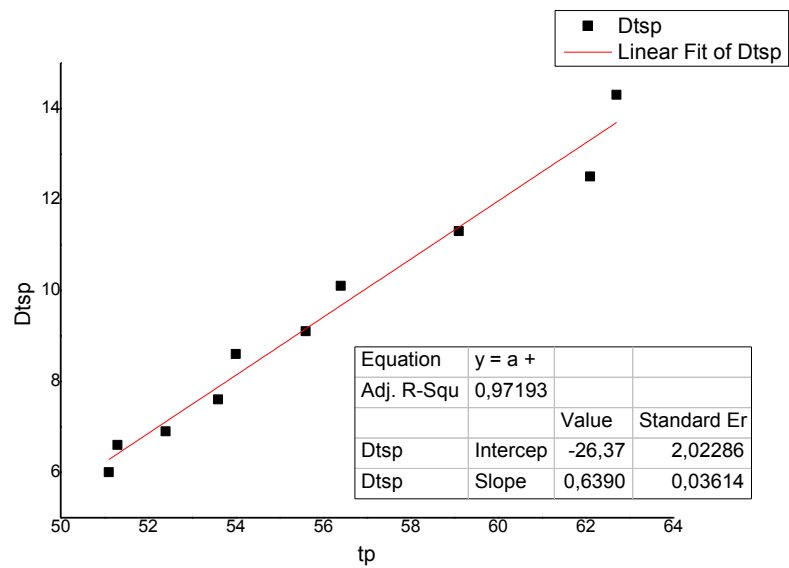
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	63,5	56	7,5	52,9	55,20915
STIA	68,1	58	10,1	98,3	99,56169
FRMA	73,5	60,6	12,9	102,5	103,7106
NPS	80,7	65,2	15,5	110,2	111,3269
LAST	83,7	66,5	17,2	120,4	121,4323
IDI	98,8	75,9	22,9	175,3	176,0106
VAM	111,5	84,3	27,2	239,3	239,821

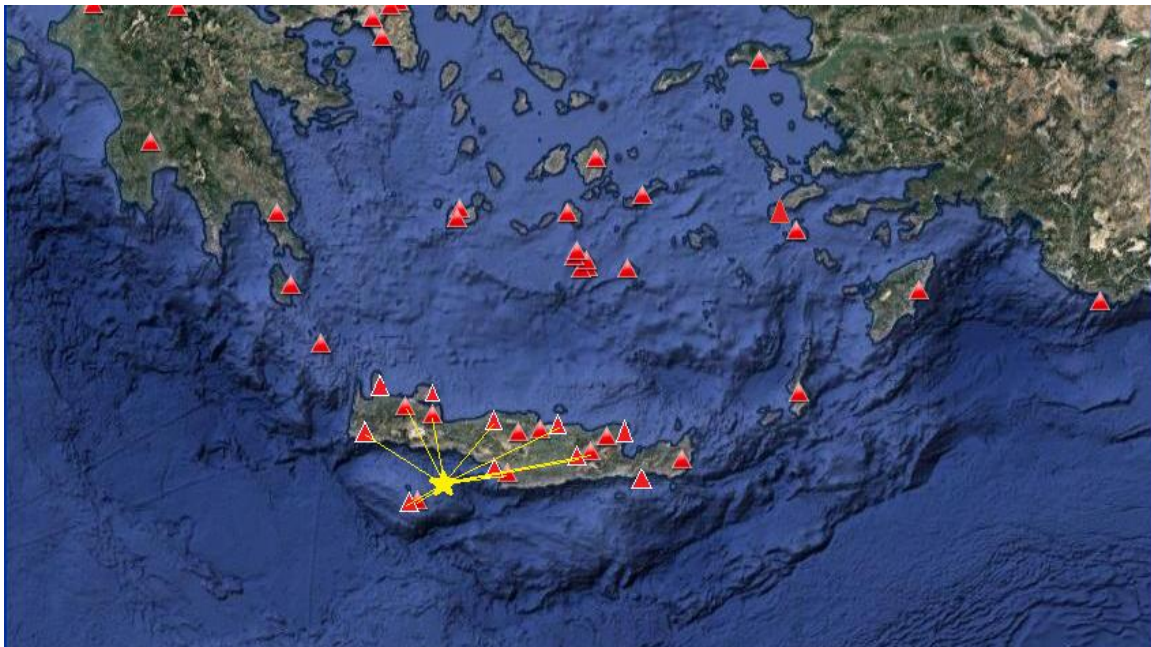
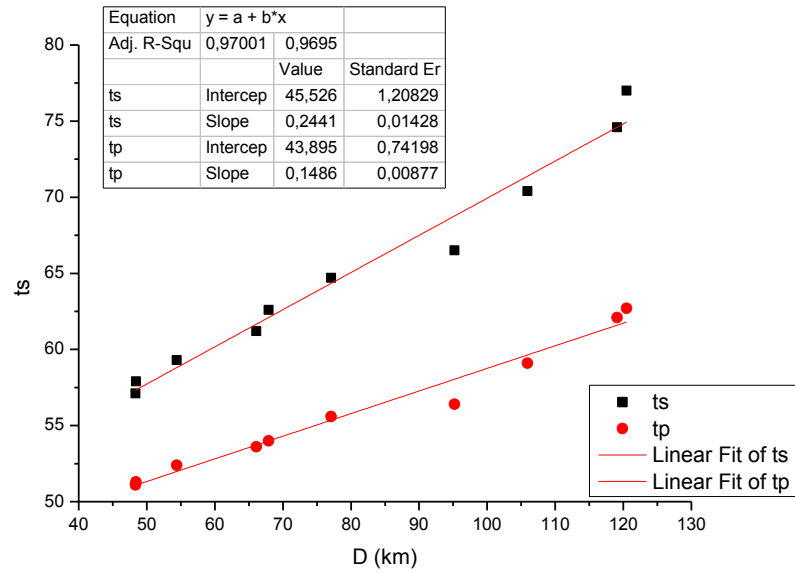




31 JULY 2015 (4.2 ML, depth 43.7km)

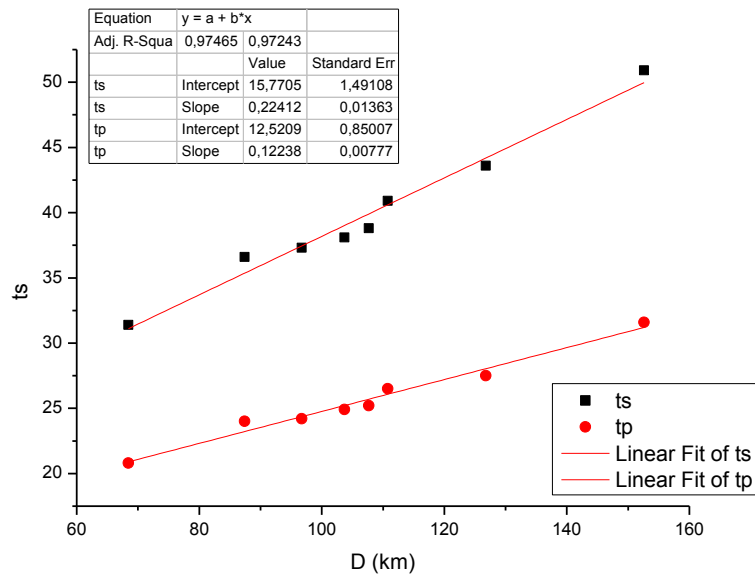
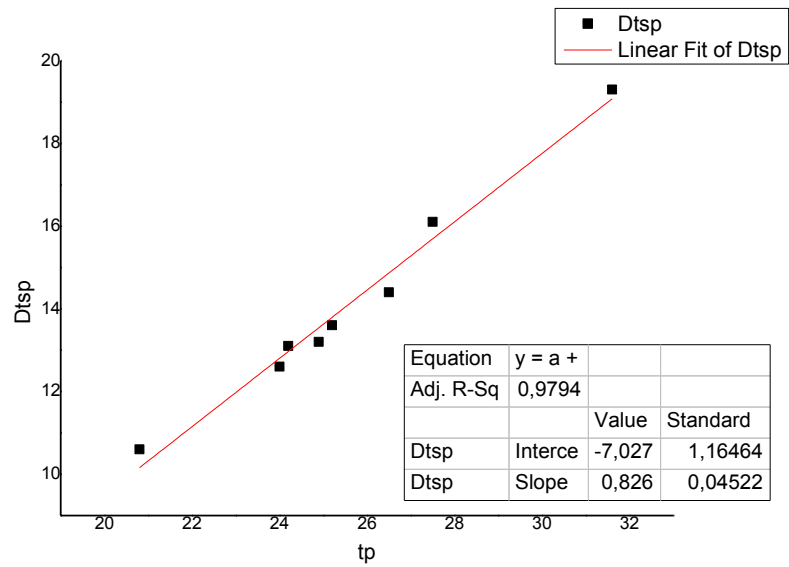
station	ts	tp	Dtsp	Dop(km)	D(km)
GVD	57,1	51,1	6	20,7	48,35473
GVDS	57,9	51,3	6,6	20,9	48,44069
PRNS	59,3	52,4	6,9	32,4	54,40083
SIVA	61,2	53,6	7,6	49,6	66,10484
VAM	62,6	54	8,6	52	67,92415
IMMV	64,7	55,6	9,1	63,5	77,08398
KNDR	66,5	56,4	10,1	84,6	95,22001
HRKL	70,4	59,1	11,3	96,5	105,9337
KSTL	74,6	62,1	12,5	110,8	119,1064
LAST	77	62,7	14,3	112,3	120,503





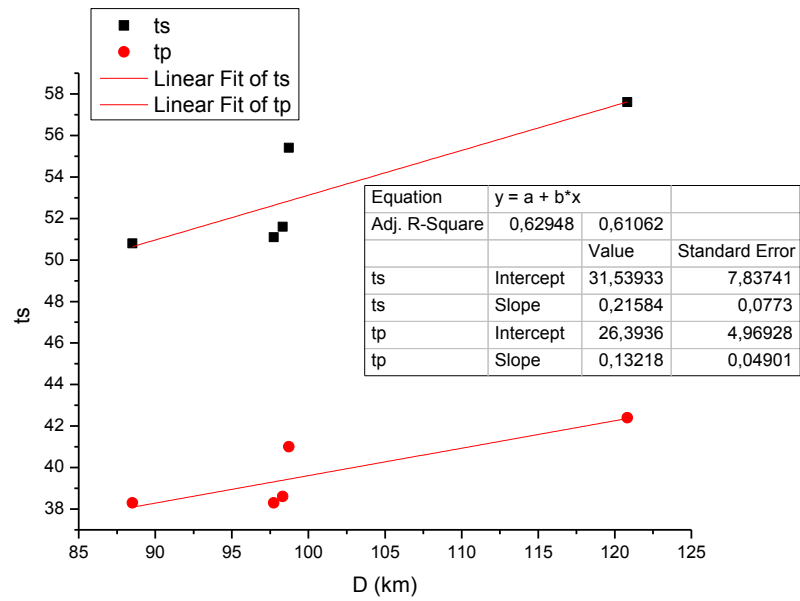
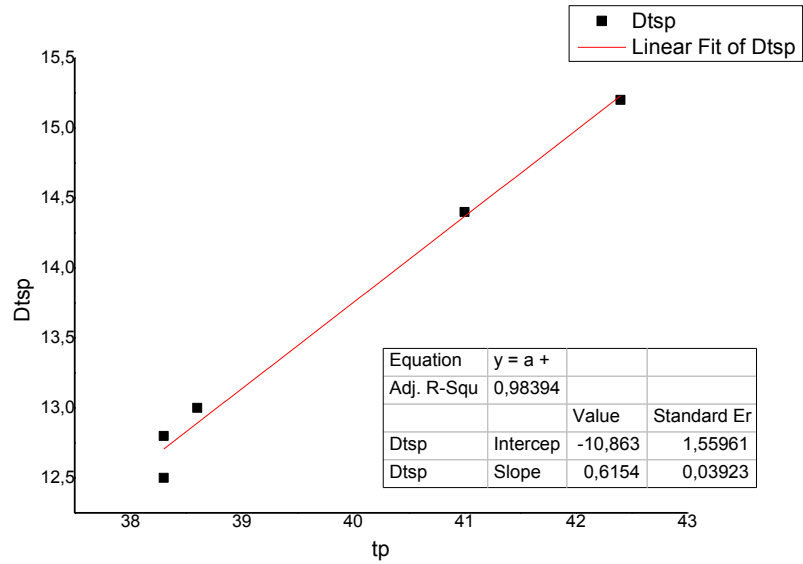
27 AUGUST 2015 (4.6 ML 4.5 Mw ,depth 11.2km)

station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	31,4	20,8	10,6	67,5	68,42288
KSTL	36,6	24	12,6	86,7	87,42042
NPS	37,3	24,2	13,1	96,1	96,75045
ZKR	38,1	24,9	13,2	103,1	103,7066
SIVA	38,8	25,2	13,6	107,1	107,684
TMBK	40,9	26,5	14,4	110,2	110,7677
IDI	43,6	27,5	16,1	126,3	126,7956
GVD	50,9	31,6	19,3	152,2	152,6115



27 AUGUST 2015 (4.2 ML, depth 17.8km)

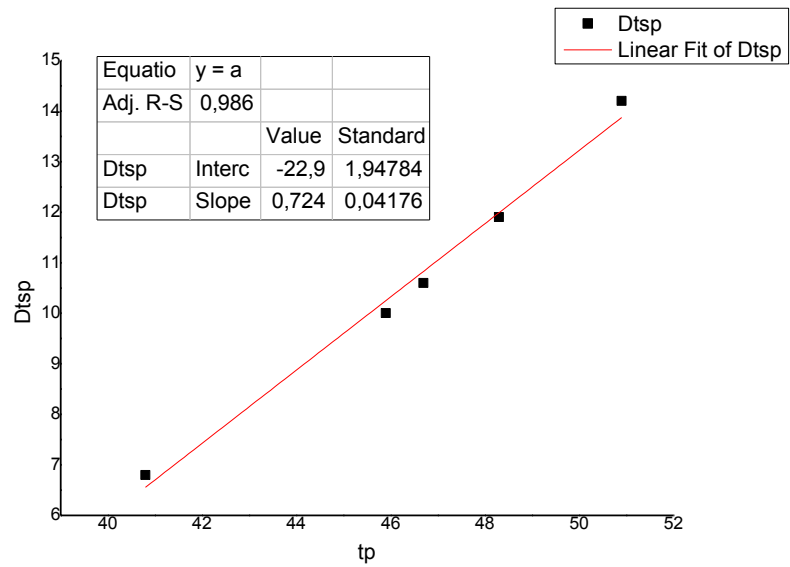
station	ts	tp	Dtsp	Dop(km)	D(km)
KSTL	50,8	38,3	12,5	867	867,1827
NPS	51,1	38,3	12,8	96,1	97,73459
ZKR	51,6	38,6	13	96,7	98,32462
TMBK	55,4	41	14,4	97,1	98,71803
IDI	57,6	42,4	15,2	119,5	120,8184

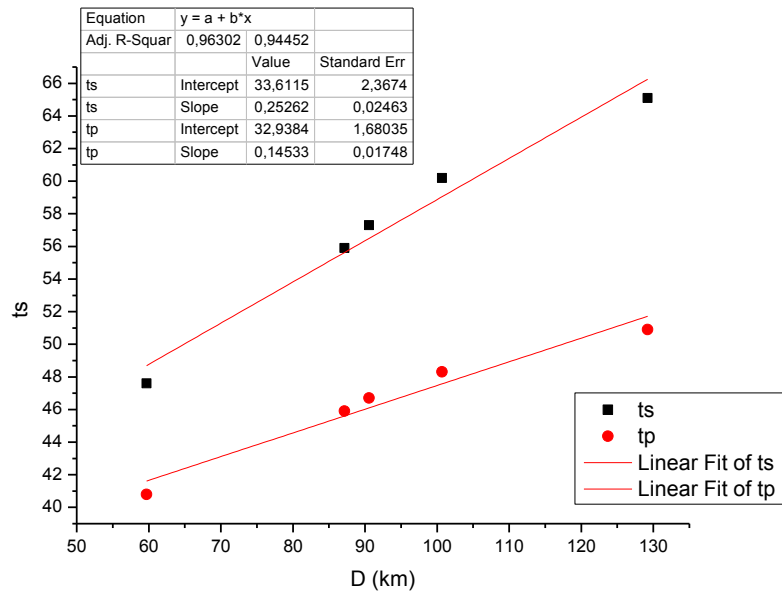




7 SEPTEMBER 2015 (4.1 ML, depth 57.7)

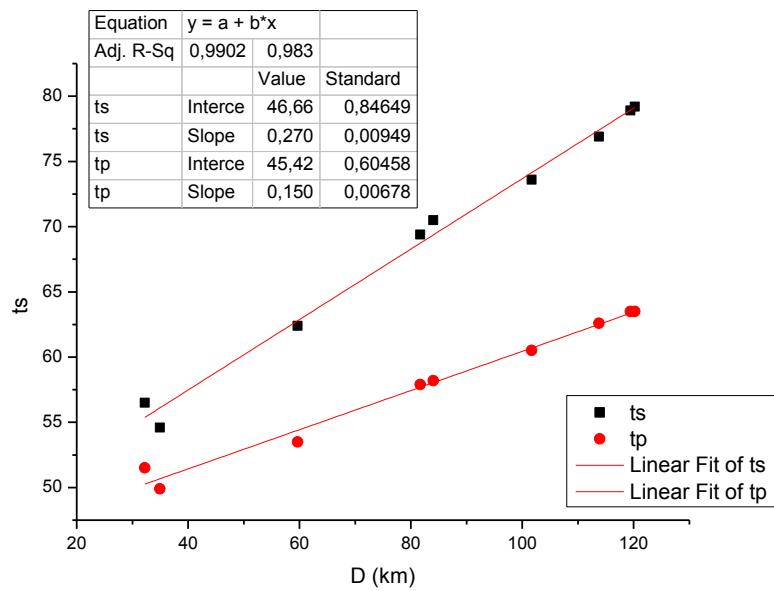
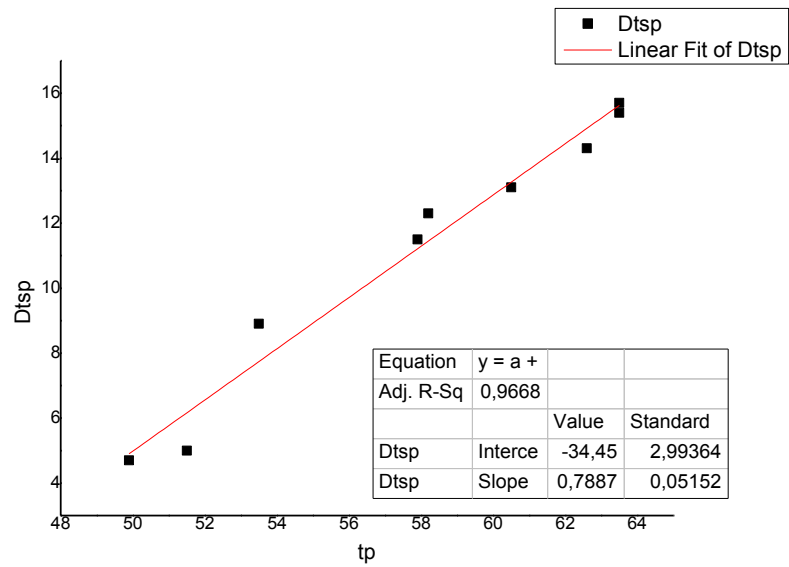
station	ts	tp	Dtsp	Dop(km)	D(km)
KNDR	47,6	40,8	6,8	15,3	59,69405
IMMV	55,9	45,9	10	65,3	87,14
ANKY	57,3	46,7	10,6	69,8	90,56119
VAM	60,2	48,3	11,9	82,5	100,6754
PRNS	65,1	50,9	14,2	115,6	129,2





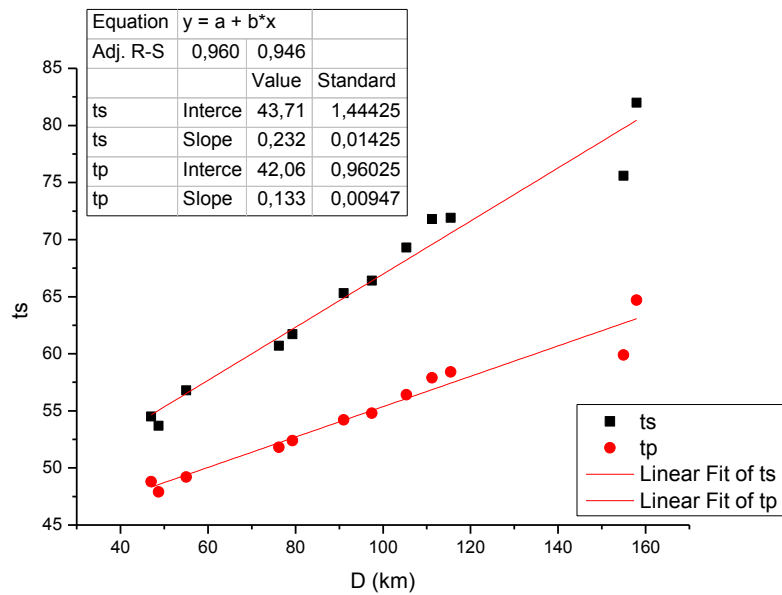
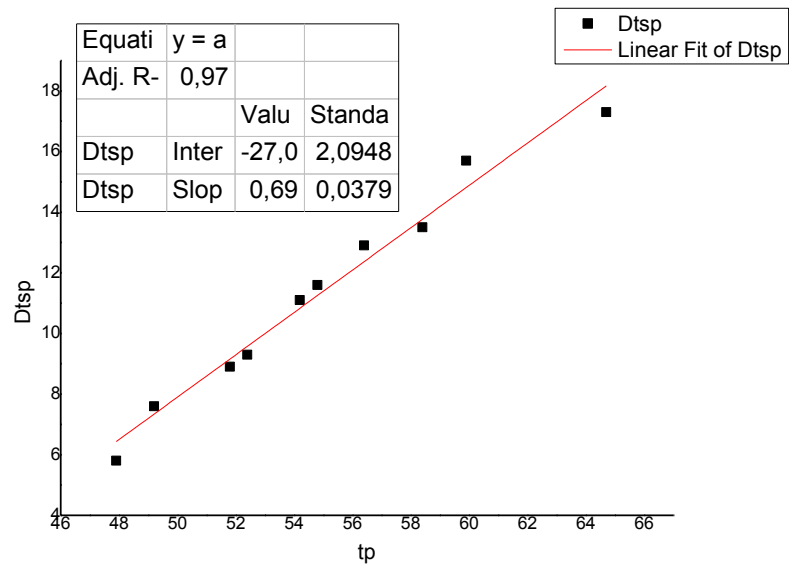
15 SEPTEMBER 2015 (4.2 ML 4.2 Mw , depth 14.9km)

station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	54,6	49,9	4,7	31,6	34,93666
TMBK	56,5	51,5	5	28,6	32,24857
IDI	62,4	53,5	8,9	57,8	59,68961
FRMA	69,4	57,9	11,5	80,3	81,67068
GVD	70,5	58,2	12,3	82,7	84,03154
VAM	73,6	60,5	13,1	100,6	101,6974
STIA	76,9	62,6	14,3	112,8	113,7798
ZKR	78,9	63,5	15,4	118,5	119,4331
IMMV	79,2	63,5	15,7	119,3	120,2269



29 SEPTEMBER 2015 (4.6 ML 4.4 Mw , depth 24.7km)

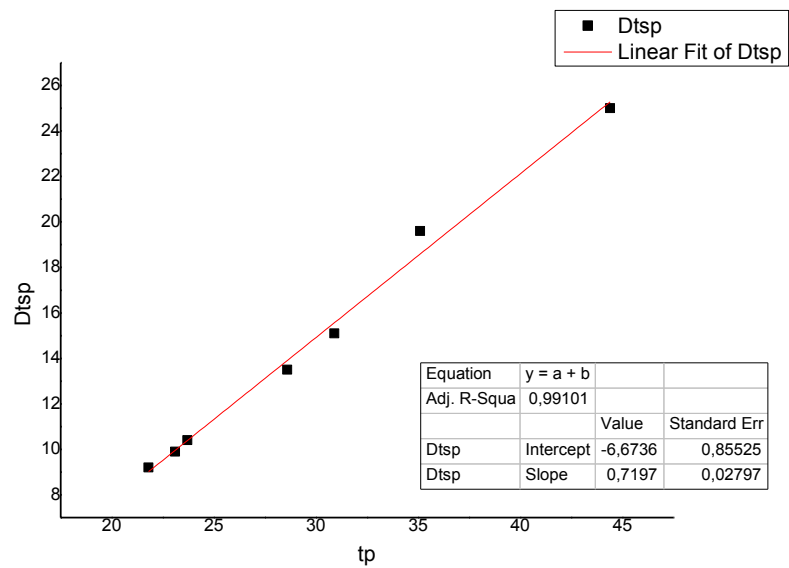
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	53,7	47,9	5,8	42	48,72463
TMBK	54,5	48,8	5,7	40	47,01159
GVD	56,8	49,2	7,6	49,2	55,05207
IDI	60,7	51,8	8,9	72,1	76,21352
PRNS	61,7	52,4	9,3	75,4	79,34261
VAM	65,3	54,2	11,1	87,6	91,01566
KSTL	66,4	54,8	11,6	94,3	97,48118
IMMV	69,3	56,4	12,9	102,4	105,3368
KNDR	71,8	57,9	13,9	108,4	111,1785
NPS	71,9	58,4	13,5	112,8	115,4726
FRMA	75,6	59,9	15,7	153	154,9809
ZKR	82	64,7	17,3	156	157,9433

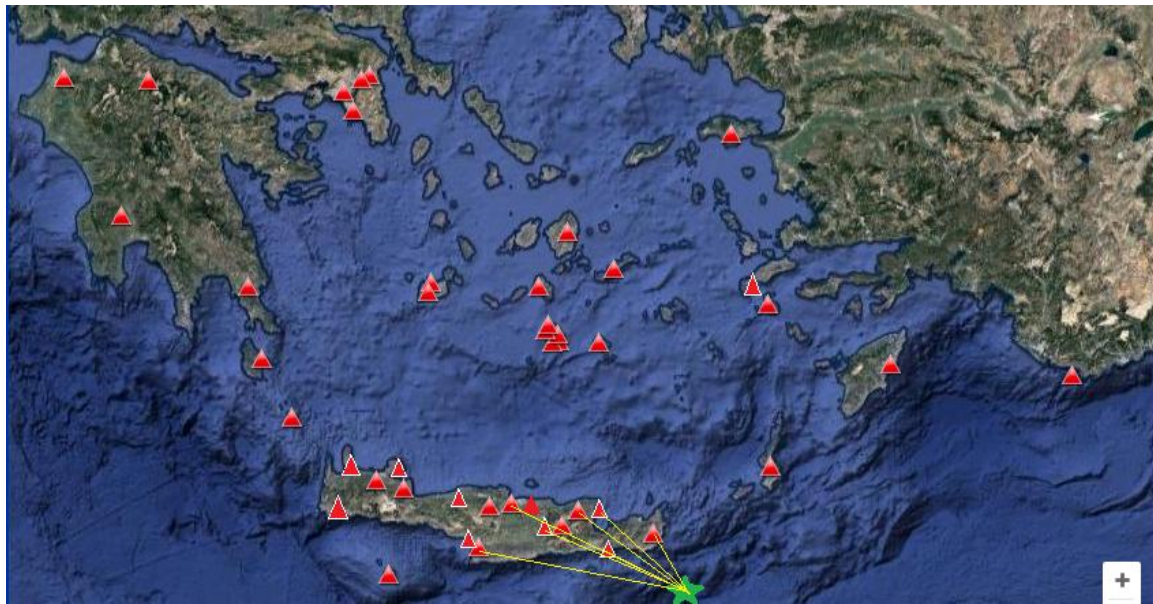
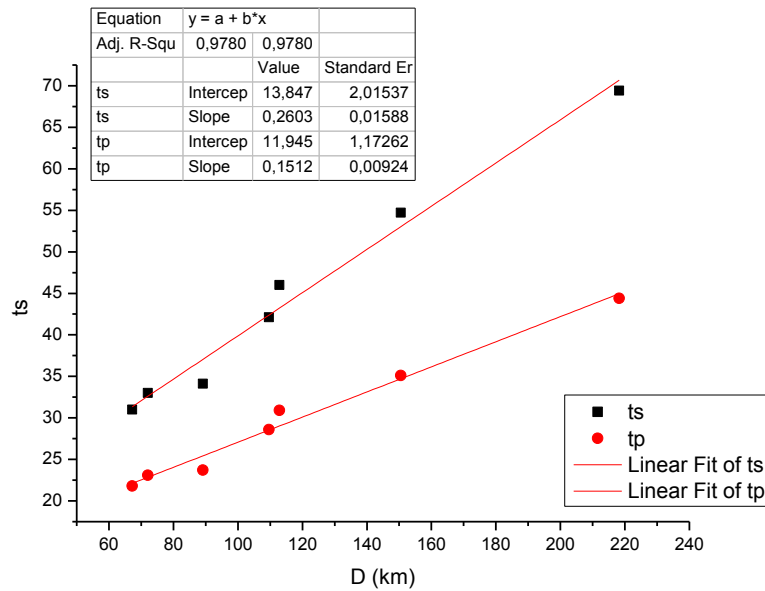




12 OCTOBER 2015 (4.5 ML 4.9 Mw , depth 22.6km)

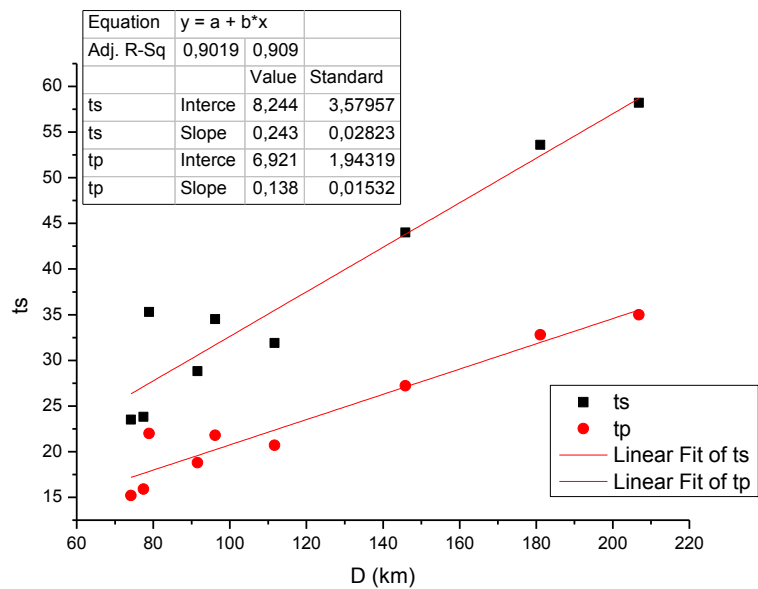
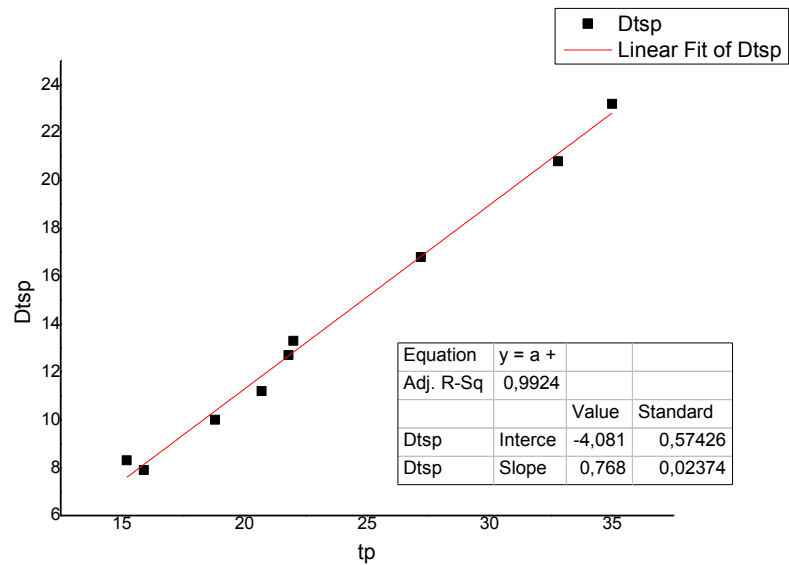
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	31	21,8	9,2	63,3	67,21347
FRMA	33	23,1	9,9	68,4	72,03693
STIA	34,1	23,7	10,4	86,2	89,11341
NPS	42,1	28,6	13,5	107,3	109,6542
KSTL	46	30,9	15,1	110,6	112,8854
IACM	54,7	35,1	19,6	148,8	150,5065
GVD	69,4	44,4	25	217,1	218,2732





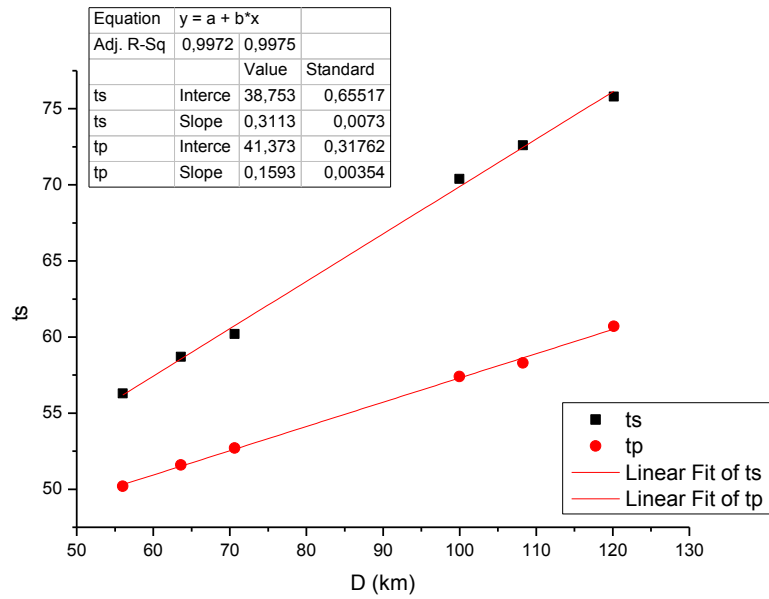
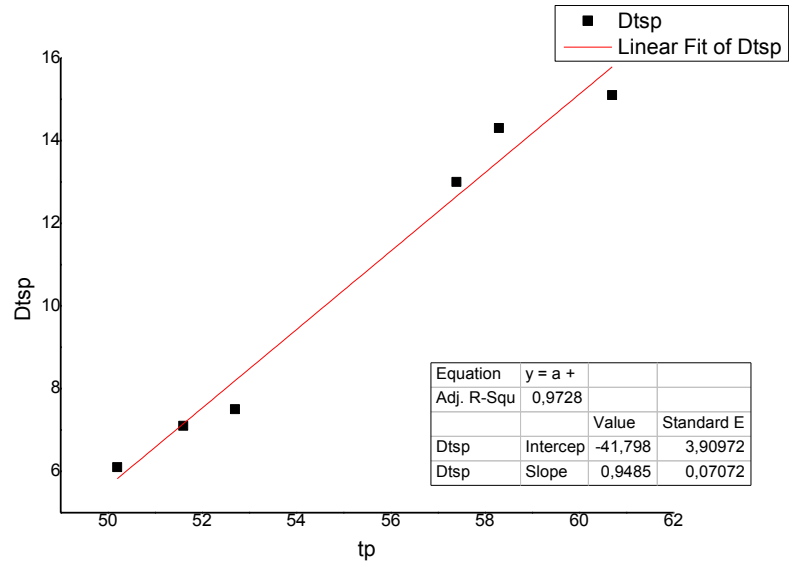
24 OCTOBER 2015 (4 ML 4.1 Mw , depth 60.8km)

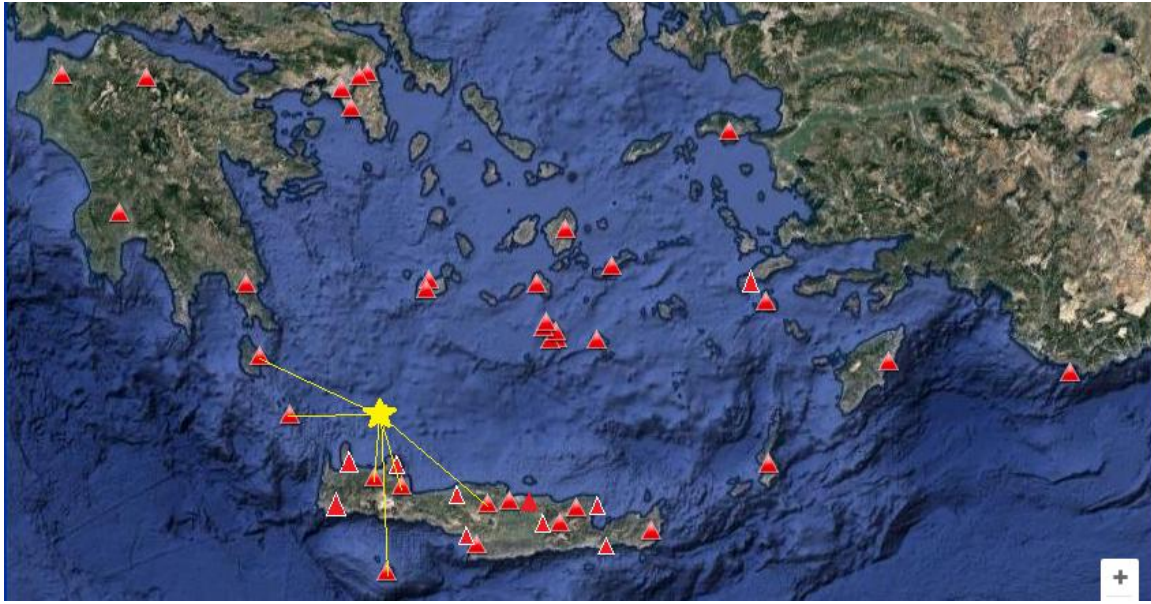
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	23,5	15,2	8,3	42,5	74,18147
IMMV	23,8	15,9	7,9	48	77,4638
VAM	28,8	18,8	10	68,5	91,59088
GVD	31,9	20,7	11,2	93,7	111,6975
PRNS	34,5	21,8	12,7	74,5	96,16075
KTHR	35,3	22	13,3	50,3	78,90963
IDI	44	27,2	16,8	132,6	145,8746
KSTL	53,6	32,8	20,8	170,6	181,1105
NPS	58,2	35	23,2	197,7	206,8379



27 OCTOBER 2015 (4.2 ML 4.1 Mw , depth 30.5km)

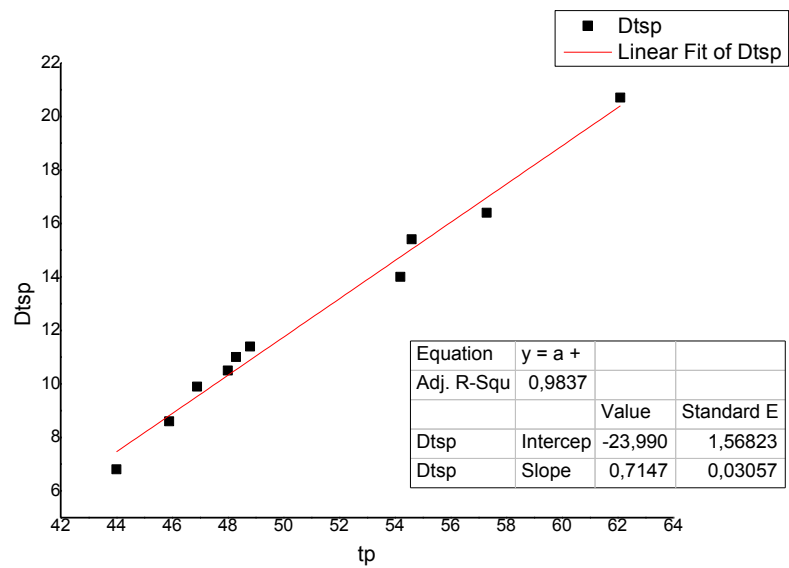
station	ts	tp	Dtsp	Dop(km)	D(km)
IMMV	56,3	50,2	6,1	47	56,02901
VAM	58,7	51,6	7,1	55,8	63,59159
ANKY	60,2	52,7	7,5	63,7	70,62535
KTHR	70,4	57,4	13	95,2	99,96644
IDI	72,6	58,3	14,3	103,9	108,2842
GVD	75,8	60,7	15,1	116,2	120,1361

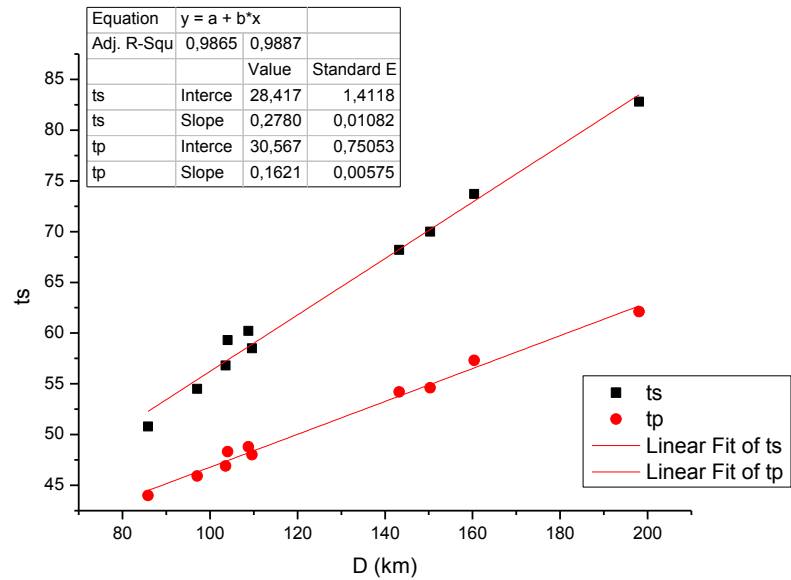




25 DECEMBER 2015 (4.4 ML 4.2 Mw , depth 74.6km)

station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	50,8	44	6,8	42,5	85,85692
NPS	54,5	45,9	8,6	62,1	97,06477
SIVA	56,8	46,9	9,9	71,9	103,6087
TMBK	58,5	48	10,5	80,3	109,605
STIA	59,3	48,3	11	72,5	104,026
ZKR	60,2	48,8	11,4	79,2	108,8017
PRNS	68,2	54,2	14	122,3	143,2566
GVD	70	54,6	15,4	130,5	150,3177
VAM	73,7	57,3	16,4	142	160,4031
KNDR	82,8	62,1	20,7	183,5	198,0844



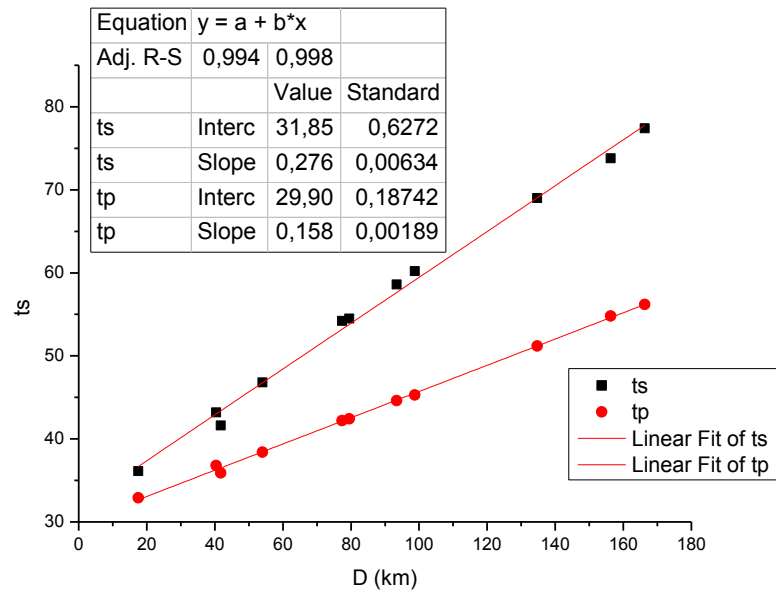
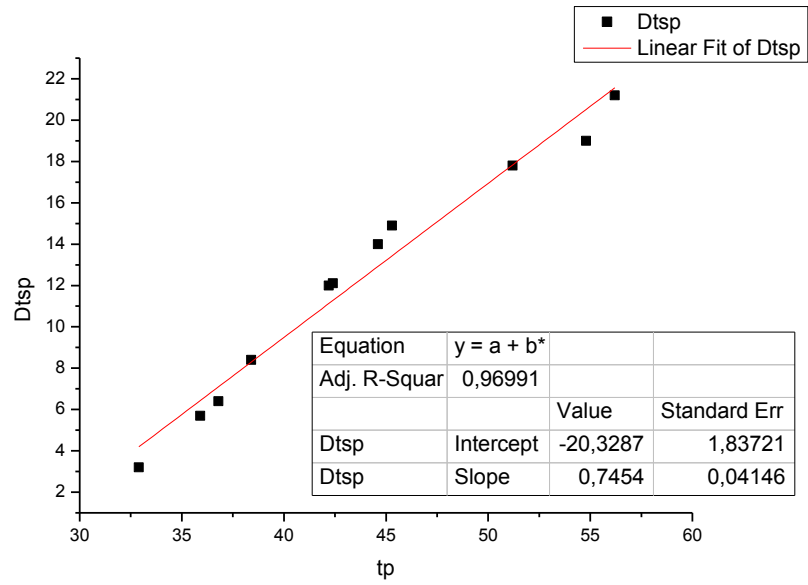


EARTHQUAKES DURING 2016

5 FEBRUARY 2016 (4.5 ML 4.3 Mw, depth 16.9 km)

station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	36,1	32,9	3,2	4,51	17,49143
ZKR	41,6	35,9	5,7	38,14	41,71654
NPS	43,2	36,8	6,4	36,69	40,39512
KSTL	46,8	38,4	8,4	51,27	53,98354
HRKL	54,2	42,2	12	75,53	77,39762
IACM	54,5	42,4	12,1	77,69	79,50689

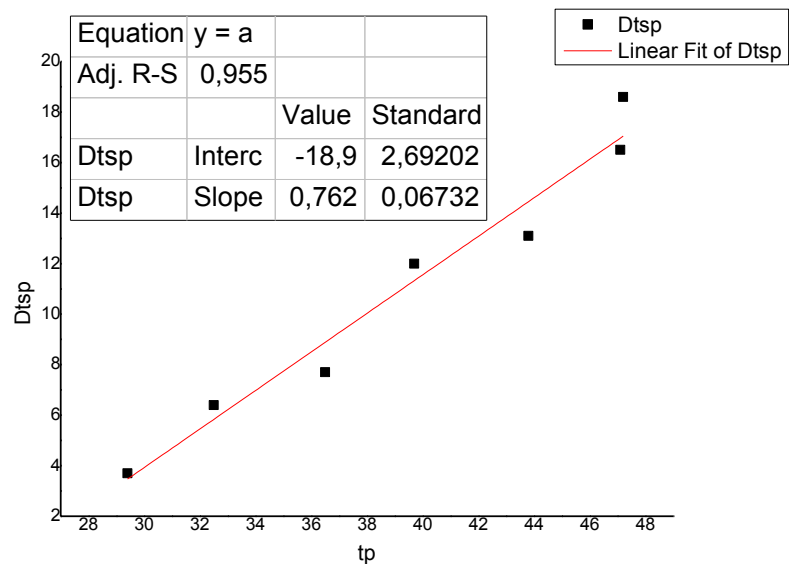
IDI	58,6	44,6	14	91,86	93,40166
TMBK	60,2	45,3	14,9	97,31	98,76662
PRNS	69	51,2	17,8	133,69	134,7539
VAM	73,8	54,8	19	155,37	156,2864
THT2	77,4	56,2	21,2	165,47	166,3308

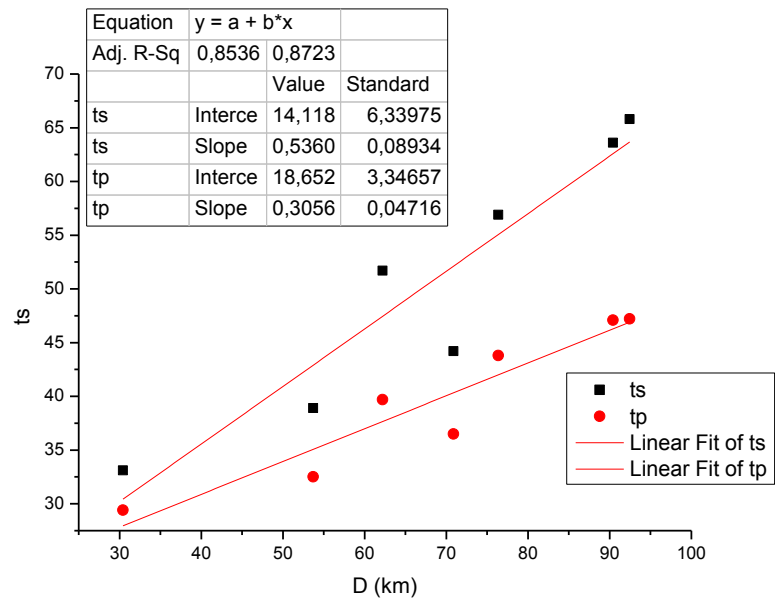




18 FEBRUARY 2016 (4.7 ML 4.5 Mw , depth 28.1 km)

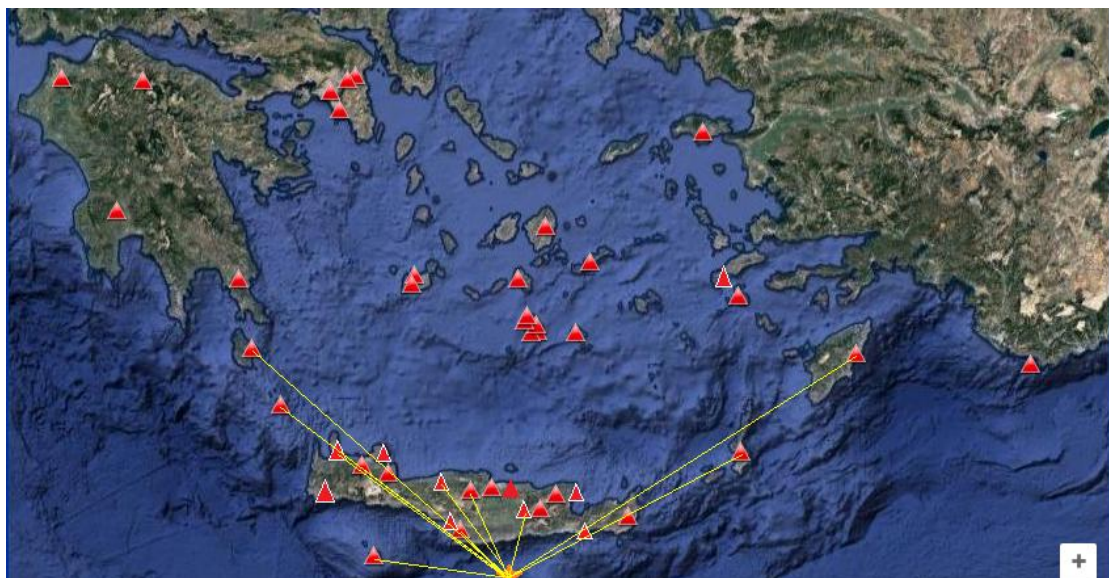
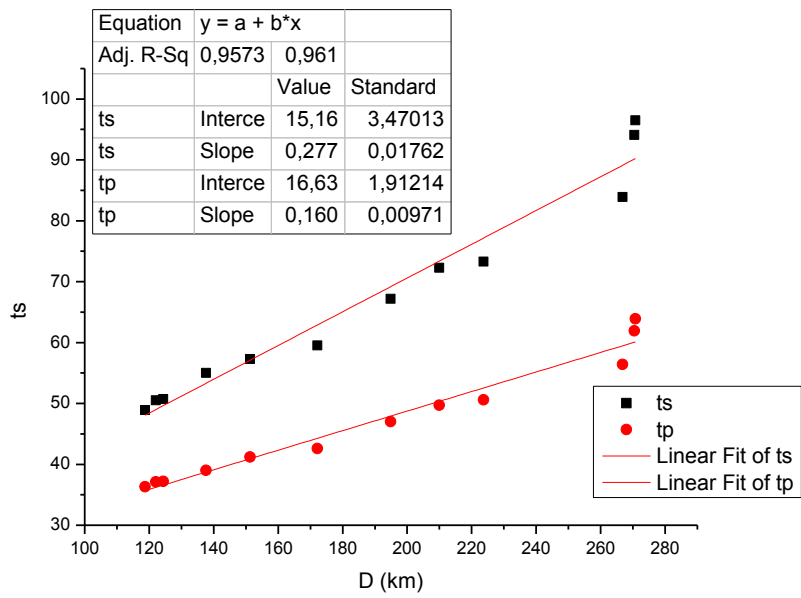
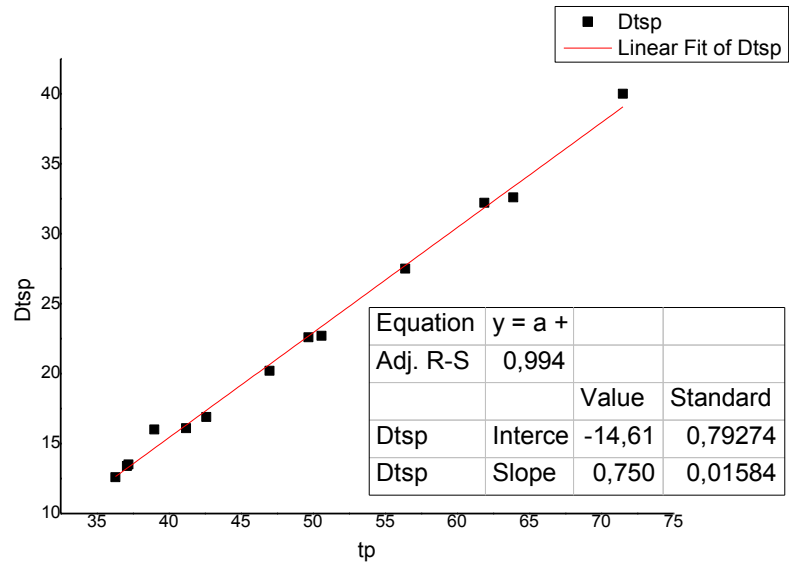
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	33,1	29,4	3,7	11,68	30,43078
FRMA	38,9	32,5	6,4	45,77	53,70757
NPS	44,2	36,5	7,7	65,07	70,87817
KSTL	51,7	39,7	12	55,48	62,19036
IACM	56,9	43,8	13,1	71	76,35843
SIVA	63,6	47,1	16,5	85,92	90,39832
TMBK	65,8	47,2	18,6	88,07	92,44423





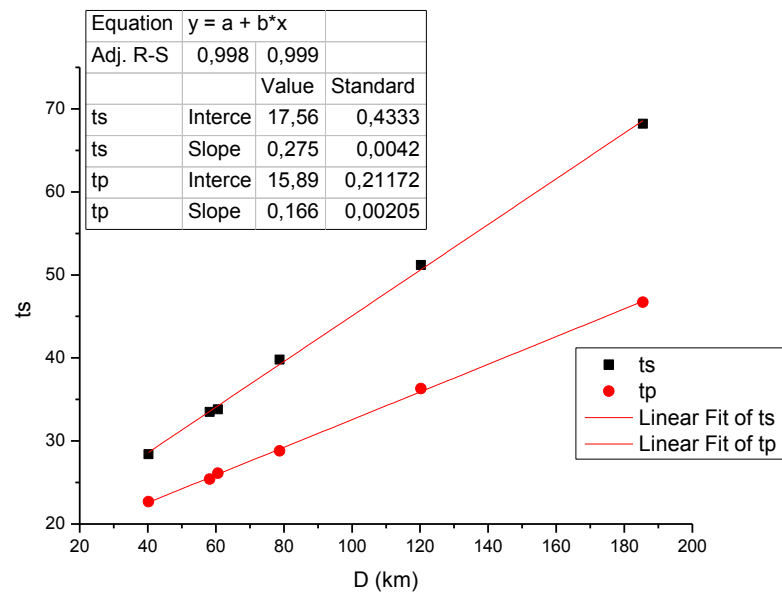
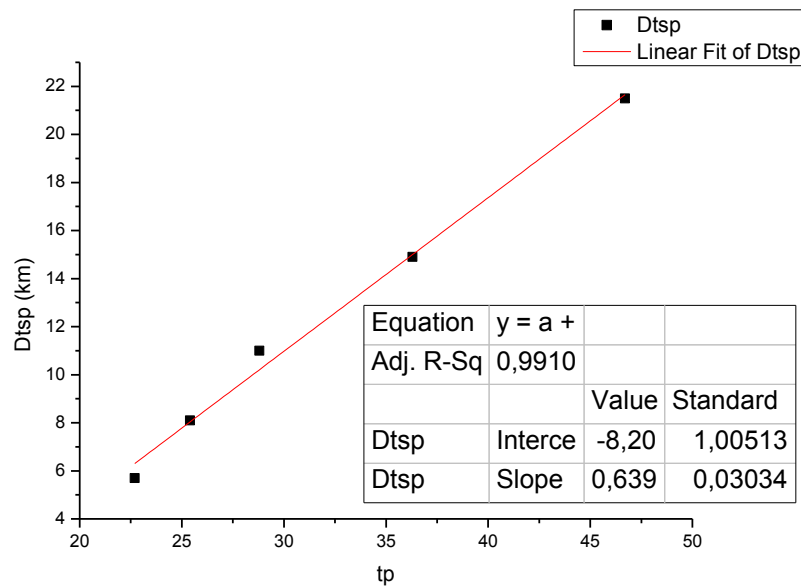
1 MARCH 2016 (4.1 ML, depth 72 km)

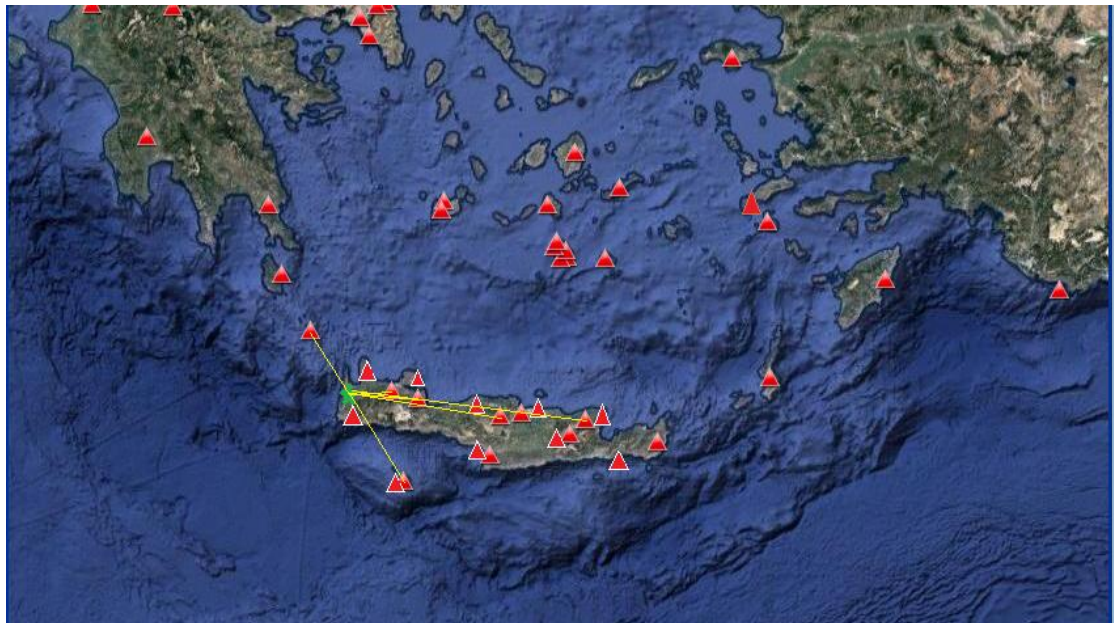
station	ts	tp	Dtsp	Dop(km)	D(km)
SIVA	48,9	36,3	12,6	94,4	118,7239
KSTL	50,5	37,1	13,4	98,6	122,09
TMBK	50,7	37,2	13,5	101,4	124,3622
IDI	55	39	16	117,3	137,6346
GVD	57,3	41,2	16,1	133,1	151,3262
PRNS	59,5	42,6	16,9	156,4	172,1771
IMMV	67,2	47	20,2	181,1	194,8877
RODP	72,3	49,7	22,6	197,2	209,9329
KARP	73,3	50,6	22,7	211,8	223,7035
ANKY	83,9	56,4	27,5	256,9	266,7988
KTHR	94,1	61,9	32,2	260,7	270,4598
ARG	96,5	63,9	32,6	261	270,749



6 MARCH 2016 (4 ML 3.9 Mw , depth 16.9 km)

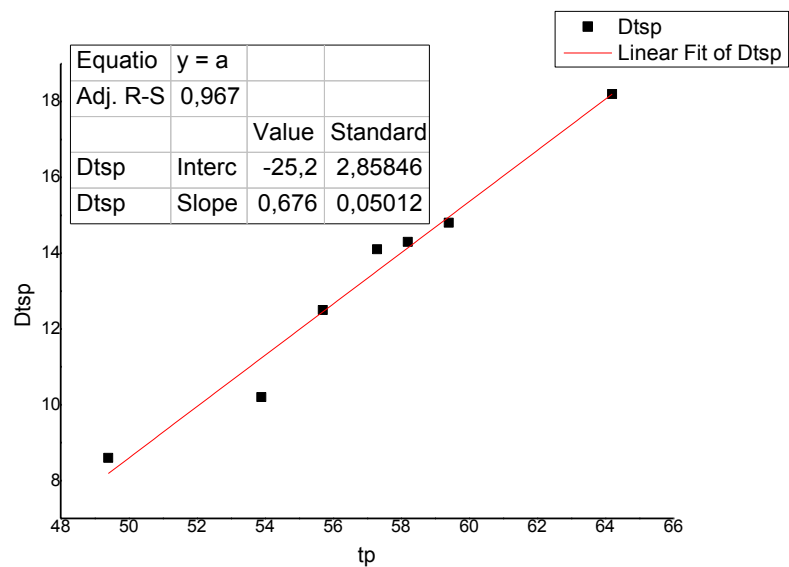
station	ts	tp	Dtsp	Dop(km)	D(km)
IMMV	28,4	22,7	5,7	36,5	40,22263
VAM	33,5	25,4	8,1	55,7	58,20739
ANKY	33,8	26,1	7,7	58,2	60,60404
GVD	39,8	28,8	11	76,9	78,73513
IDI	51,2	36,3	14,9	119,1	120,2931
NPS	68,2	46,7	21,5	184,7	185,4716

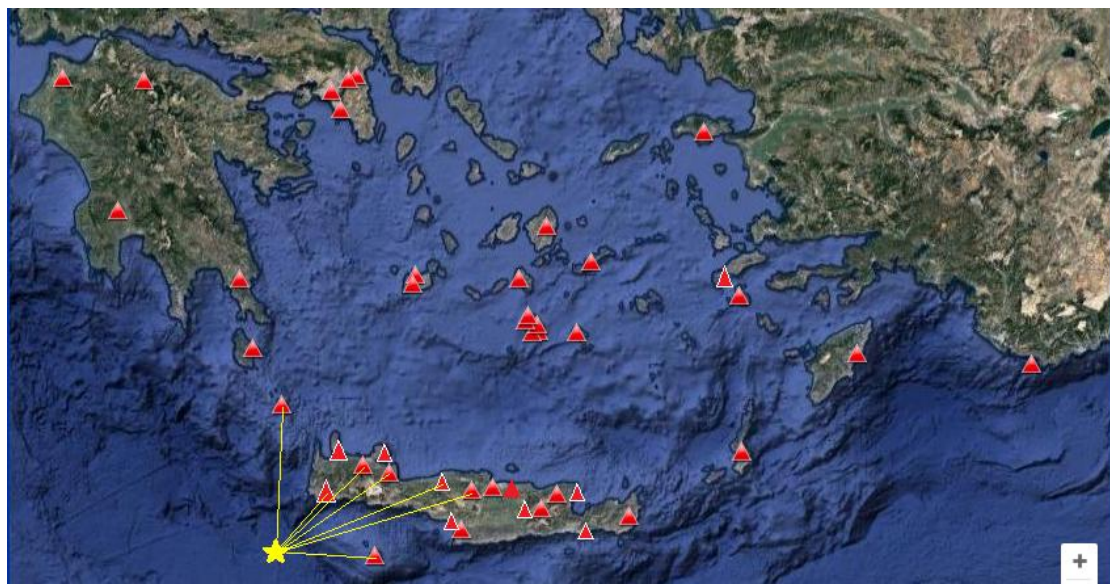
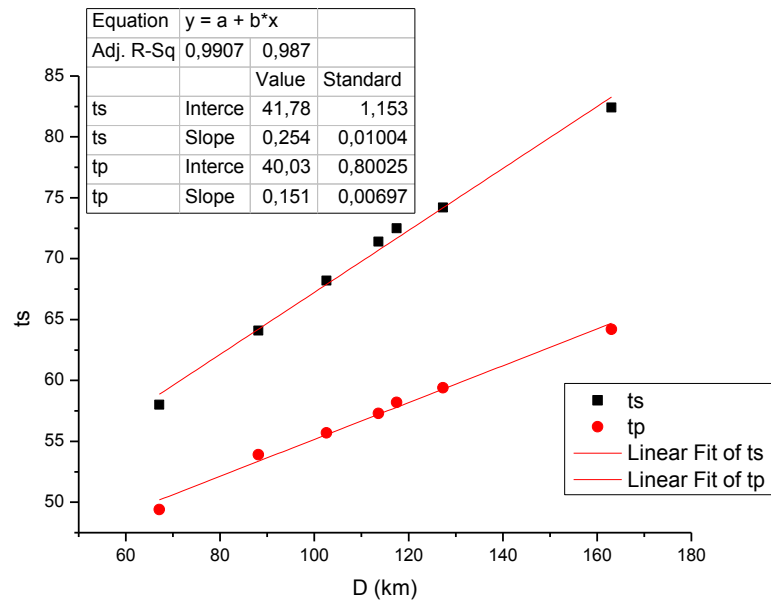




10 MARCH 2016 (4.1 ML 4.4 Mw, depth 40km)

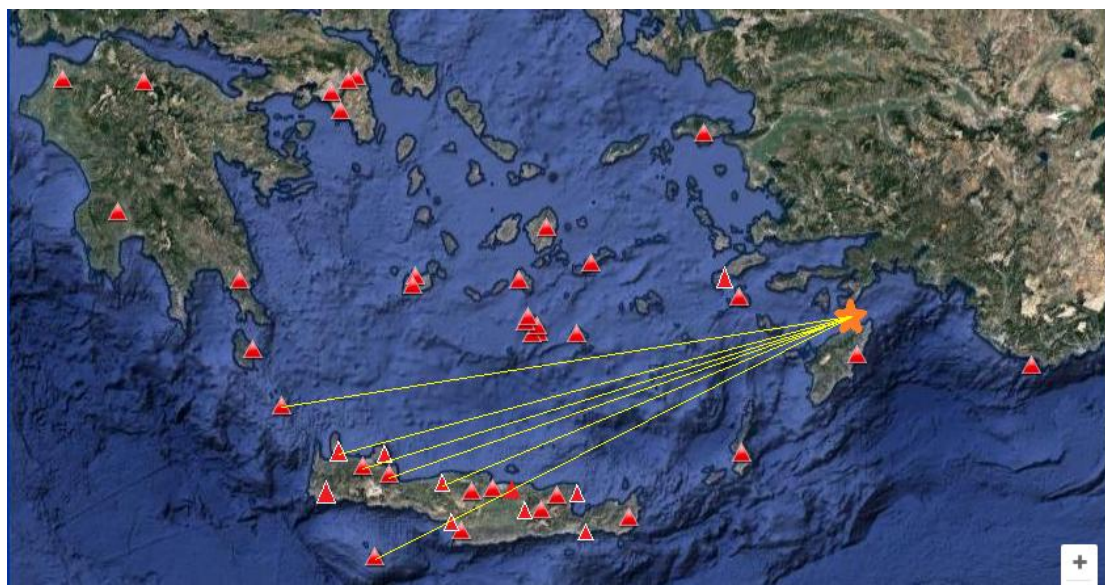
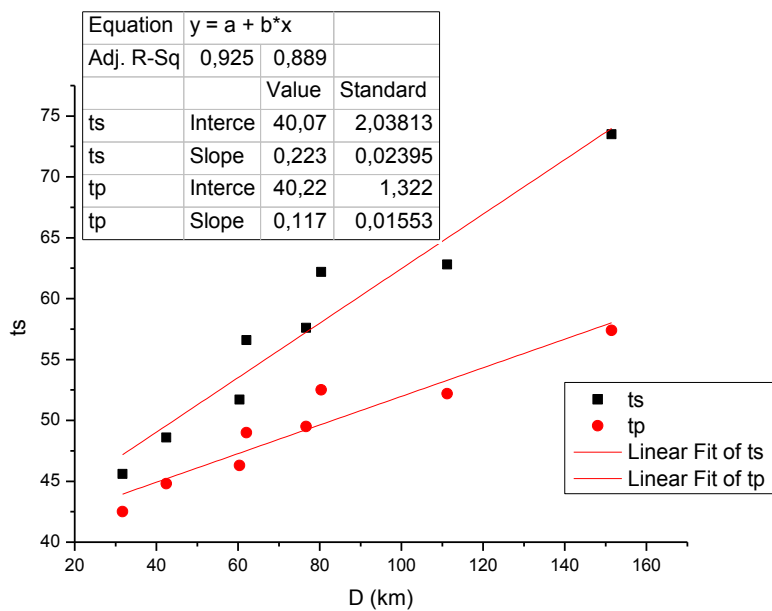
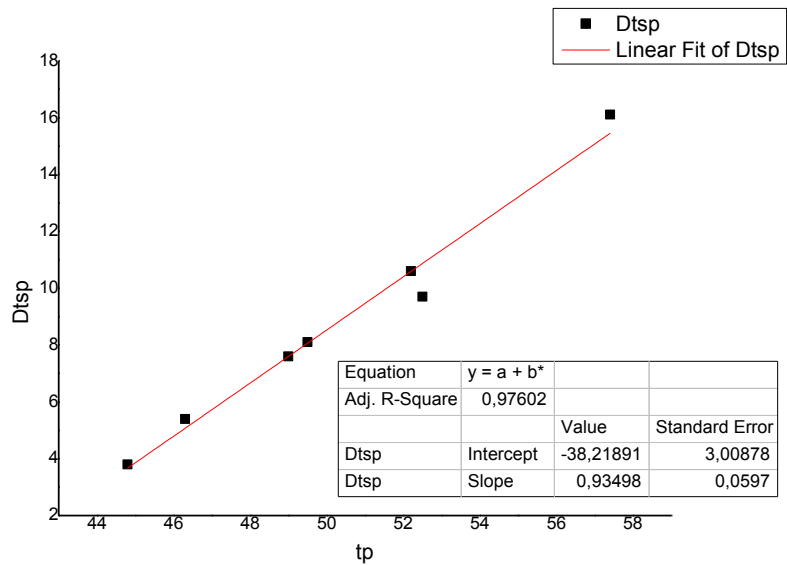
station	ts	tp	Dtsp	Dop(km)	D(km)
KNDR	58	49,4	8,6	53,9	67,12086
GVD	64,1	53,9	10,2	78,55	88,14818
IMMV	68,2	55,7	12,5	94,47	102,5894
VAM	71,4	57,3	14,1	106,33	113,6049
ANKY	72,5	58,2	14,3	110,47	117,4888
PRNS	74,2	59,4	14,8	120,88	127,3263
IDI	82,4	64,2	18,2	158,07	163,0525





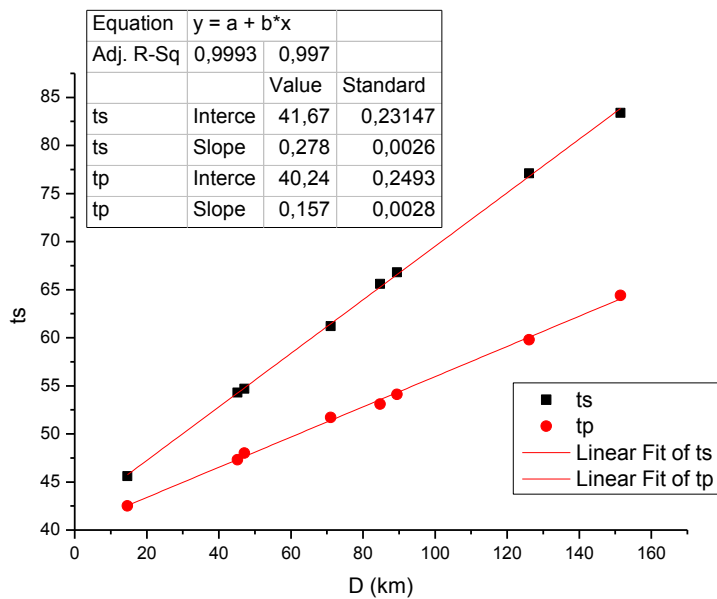
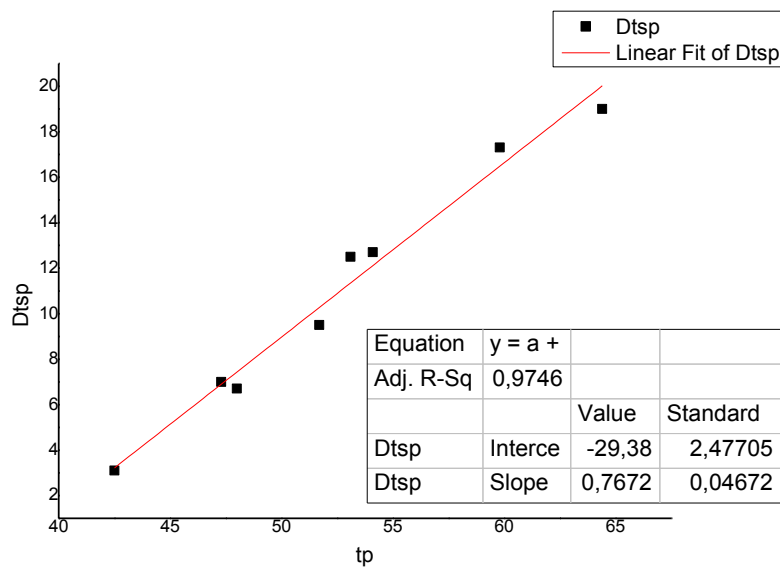
12 MARCH 2016 (4.9 ML 4.5 Mw , depth 12.4)

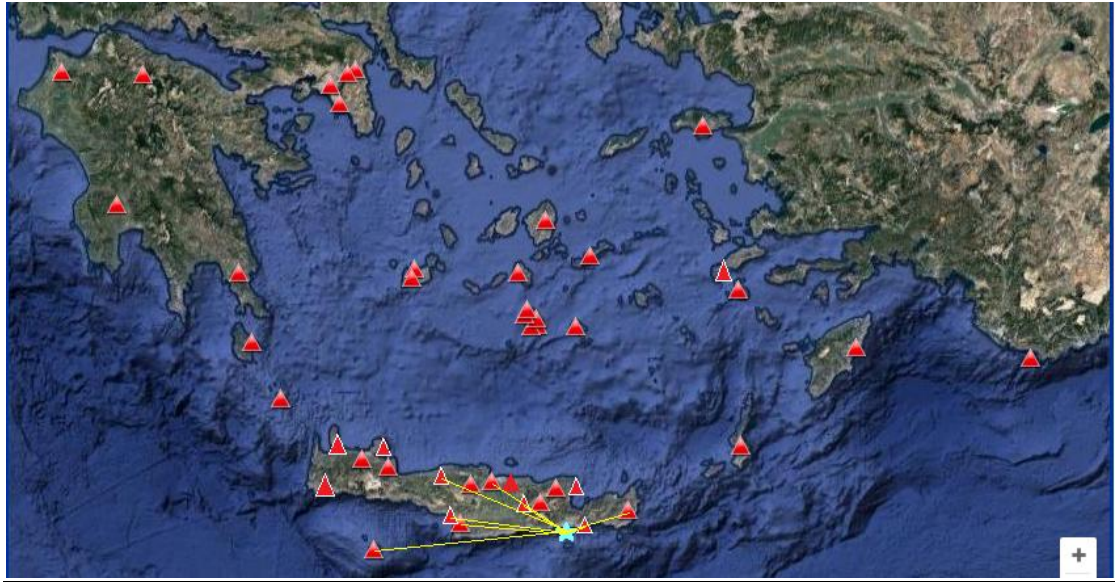
station	ts	tp	Dtsp	Dop(km)	D(km)
RODP	48,6	44,8	3,8	29,17	31,6962
IMMV	51,7	46,3	5,4	40,57	42,42269
VAM	56,6	49	7,6	59,05	60,3379
ANKY	57,6	49,5	8,1	60,8	62,05159
GVD	62,2	52,5	9,7	75,68	76,68913
PRNS	62,8	52,2	10,6	79,41	80,37231
KTHR	73,5	57,4	16,1	110,52	111,2134



16 APRIL 2016 (4.7 ML 4.7 Mw, depth 8.9 km)

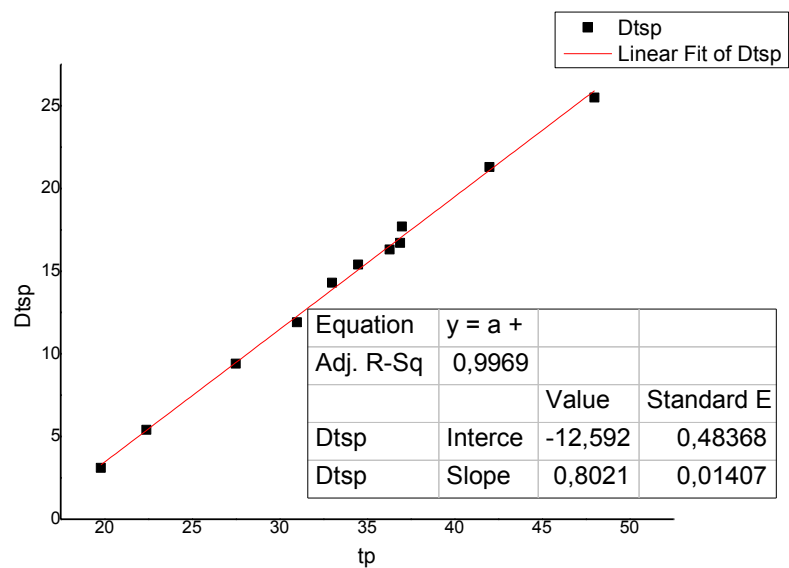
station	ts	tp	Dtsp	Dop(km)	D(km)
FRMA	45,6	42,5	3,1	11,64	14,65263
KSTL	54,3	47,3	7	44,3	45,18517
ZKR	54,7	48	6,7	46,23	47,0789
IACM	61,2	51,7	9,5	70,49	71,04963
SIVA	65,6	53,1	12,5	84,25	84,71878
TMBK	66,8	54,1	12,7	88,97	89,41404
PRNS	77,1	59,8	17,3	125,76	126,0745
GVD	83,4	64,4	19	151,19	151,4517

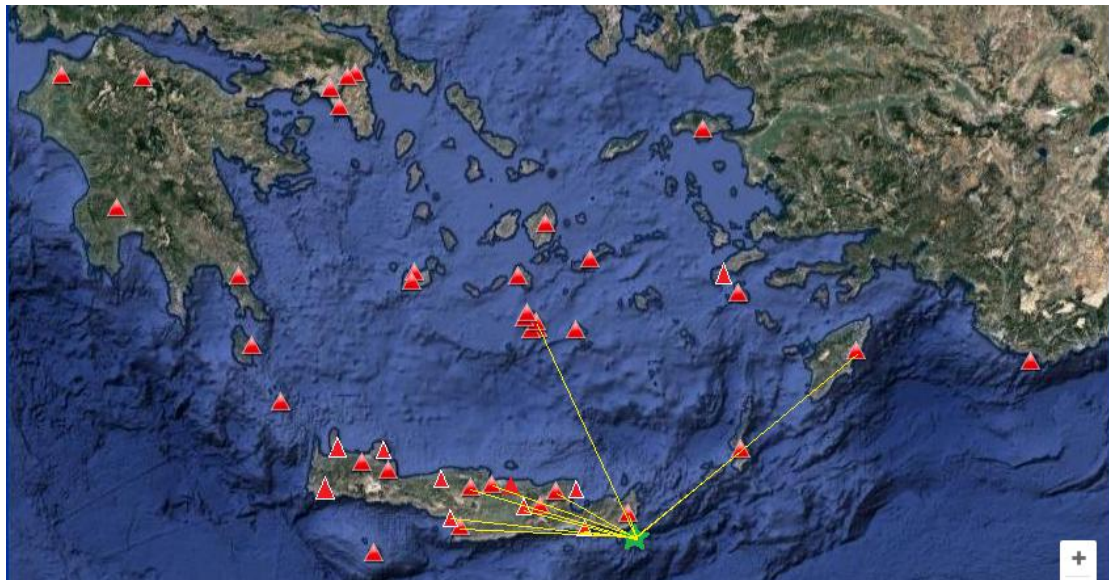
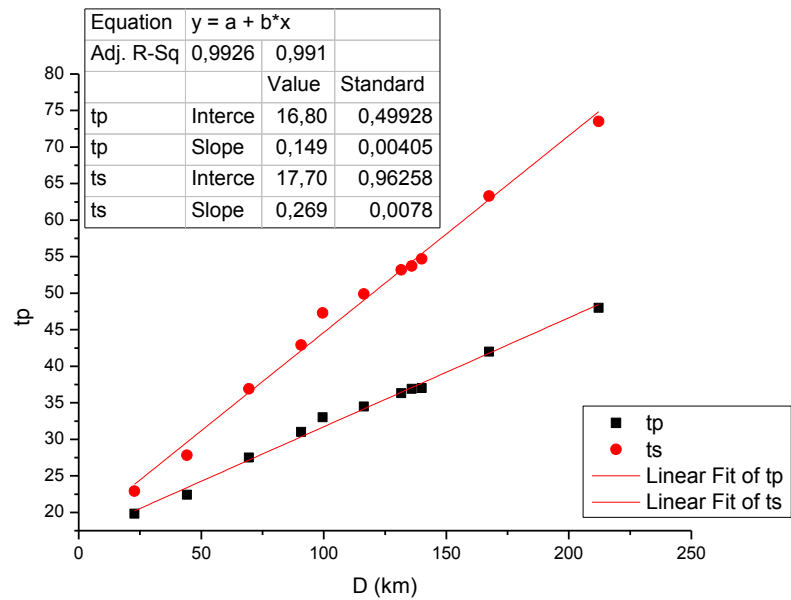




25 MAY 2016 (5.5 ML 5.5 Mw , depth 20 km)

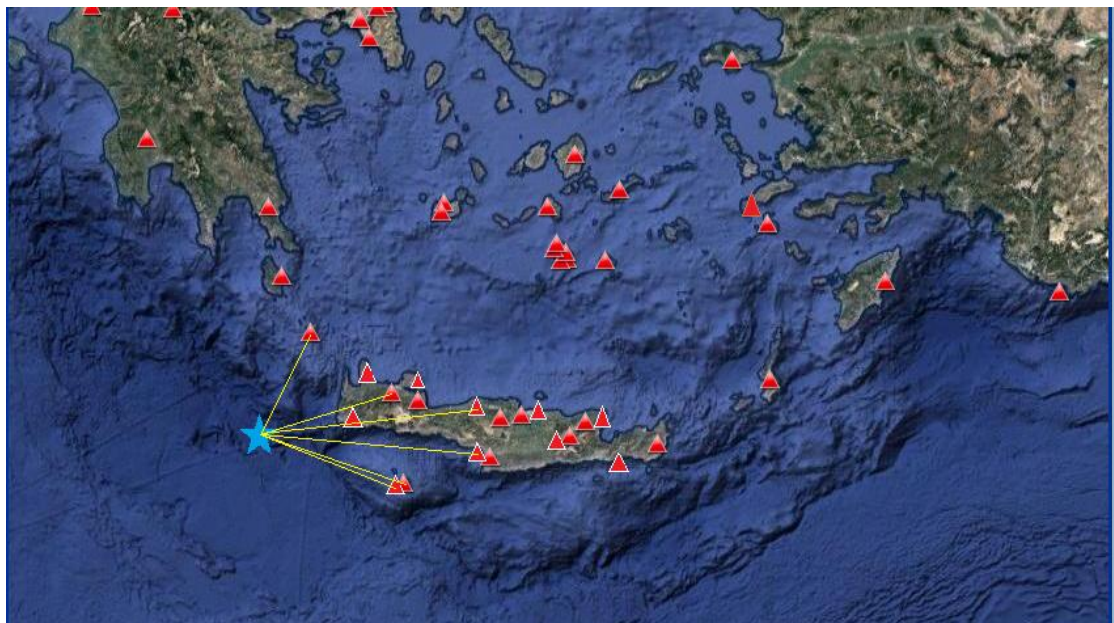
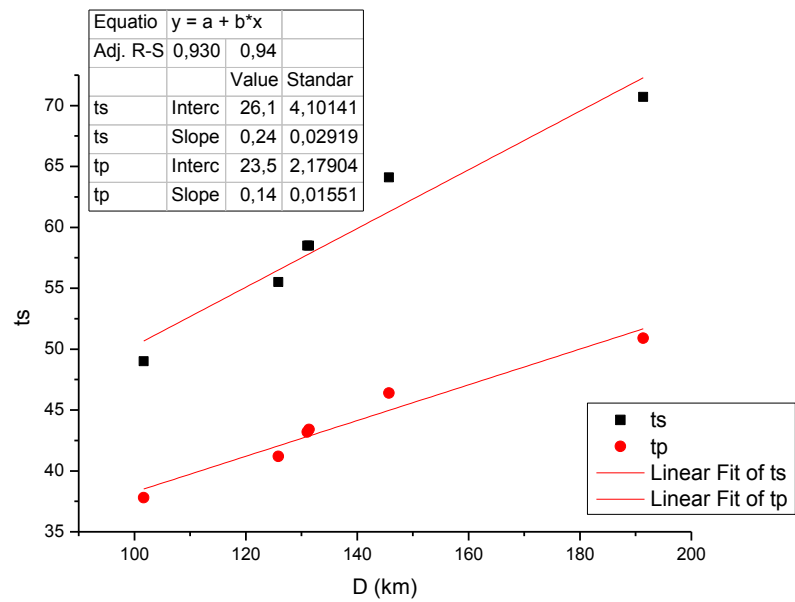
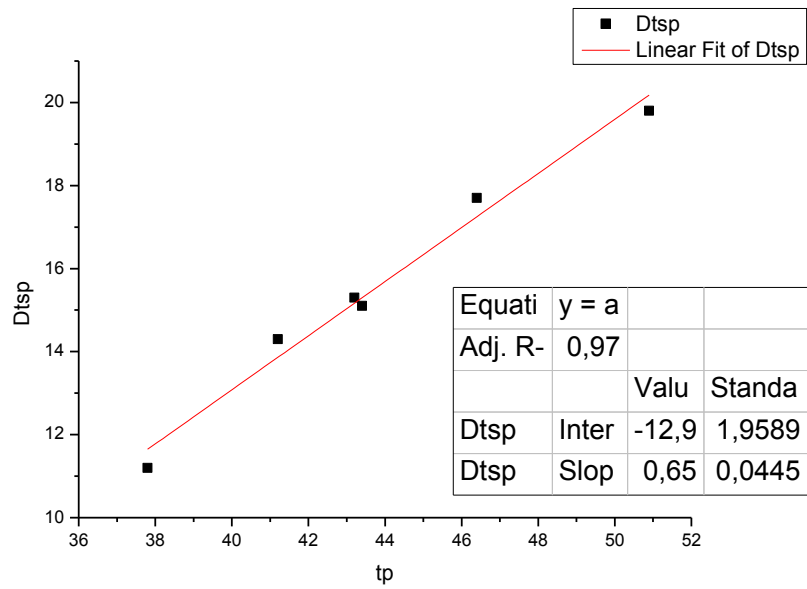
station	ts	tp	Dtsp	Dop(km)	D(km)
ZKR	19,8	22,9	3,1	10,9	22,98739
FRMA	22,4	27,8	5,4	39,43	44,54082
NPS	27,5	36,9	9,4	66,52	70,09472
KSTL	31	42,9	11,9	88,57	91,5765
KARP	33	47,3	14,3	97,52	100,5716
IACM	34,5	49,9	15,4	114,63	117,3763
IDI	36,3	53,2	16,3	130,14	132,6729
SIVA	36,9	53,7	16,7	134,41	136,9122
TMBK	37	54,7	17,7	138,58	141,1301
SANT	42	63,3	21,3	166,27	168,8177
ARG	48	73,5	25,5	211,19	213,662





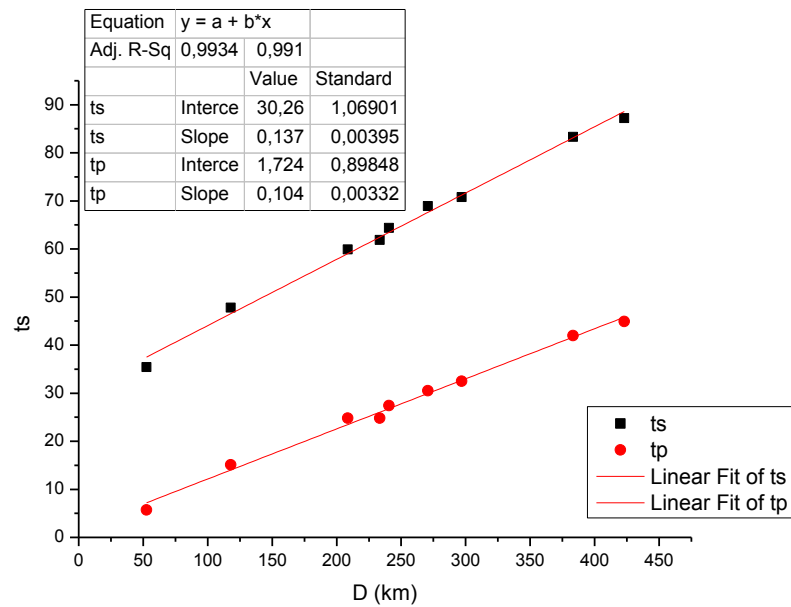
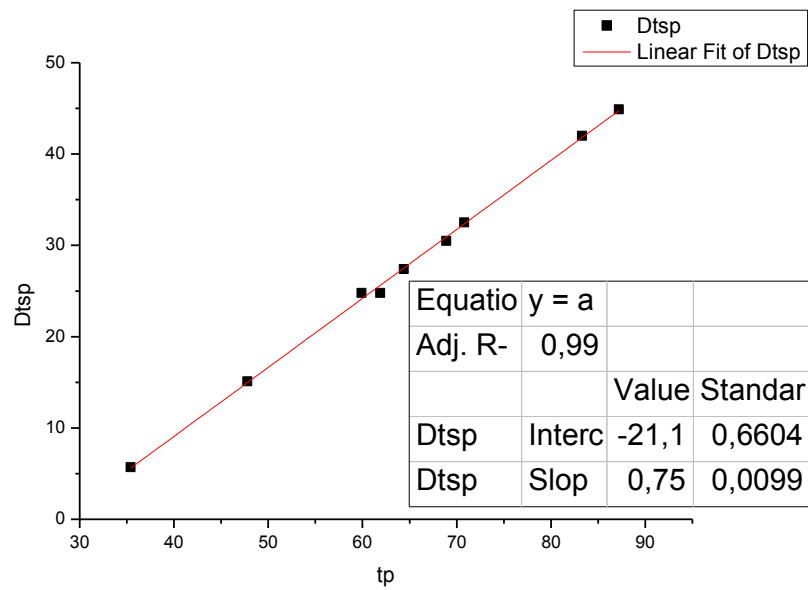
30 JULY 2016(5.1ML , depth 9.6 km)

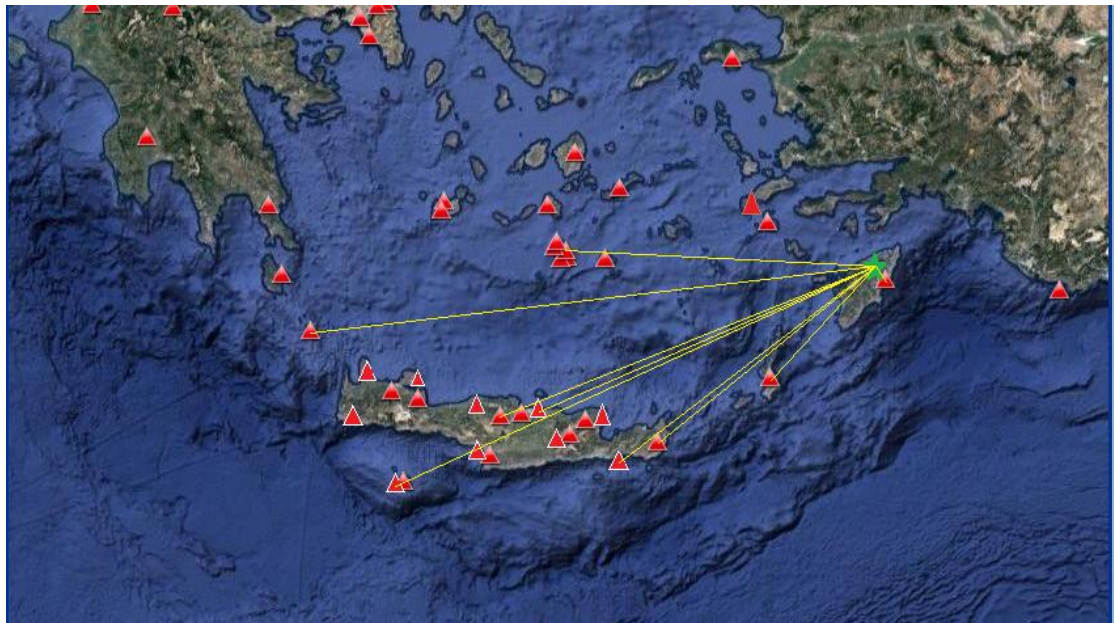
station	ts	tp	Dtsp	Dop(km)	D(km)
ANKY	49	37,8	11,2	101,2	101,6543
IMMV	55,5	41,2	14,3	125,5	125,8666
GVD	58,5	43,2	15,3	130,7	131,0521
GVDS	58,5	43,4	15,1	131	131,3513
PRNS	64,1	46,4	17,7	145,4	145,7166
TMBK	70,7	50,9	19,8	191,1	191,341



6 SEPTEMBER 2016 (4.3 ML, depth 50.8 km)

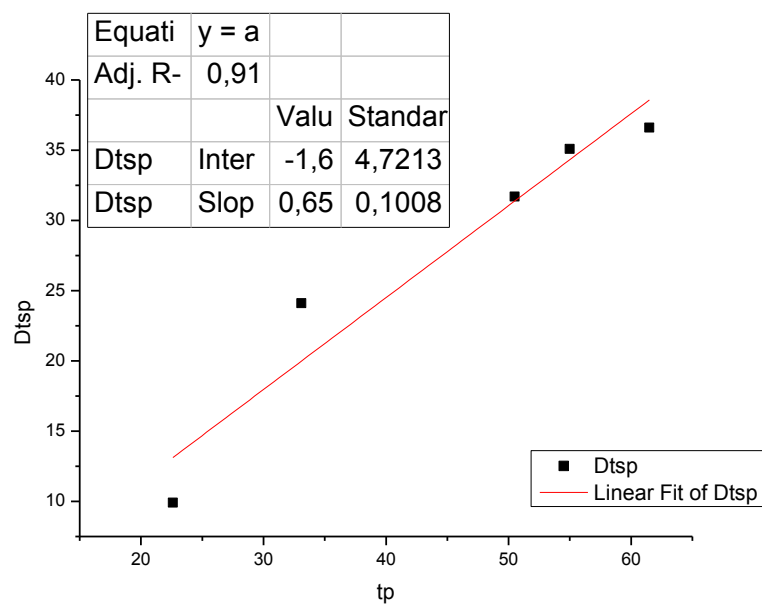
station	ts	tp	Dtsp	Dop(km)	D(km)
ARG	41,1	35,4	5,7	13,5	52,5632
KARP	62,9	47,8	15,1	106,5	117,9953
ZKR	84,7	59,9	24,8	202,4	208,6777
SANT	86,7	61,9	24,8	227,8	233,3955
FRMA	91,8	64,4	27,4	235,1	240,5258
HRKL	99,4	68,9	30,5	266	270,8074
IDI	103,3	70,8	32,5	292,5	296,8786
GVDS	125,3	83,3	42	380	383,3805
ANKY	132,1	87,2	44,9	420	423,061

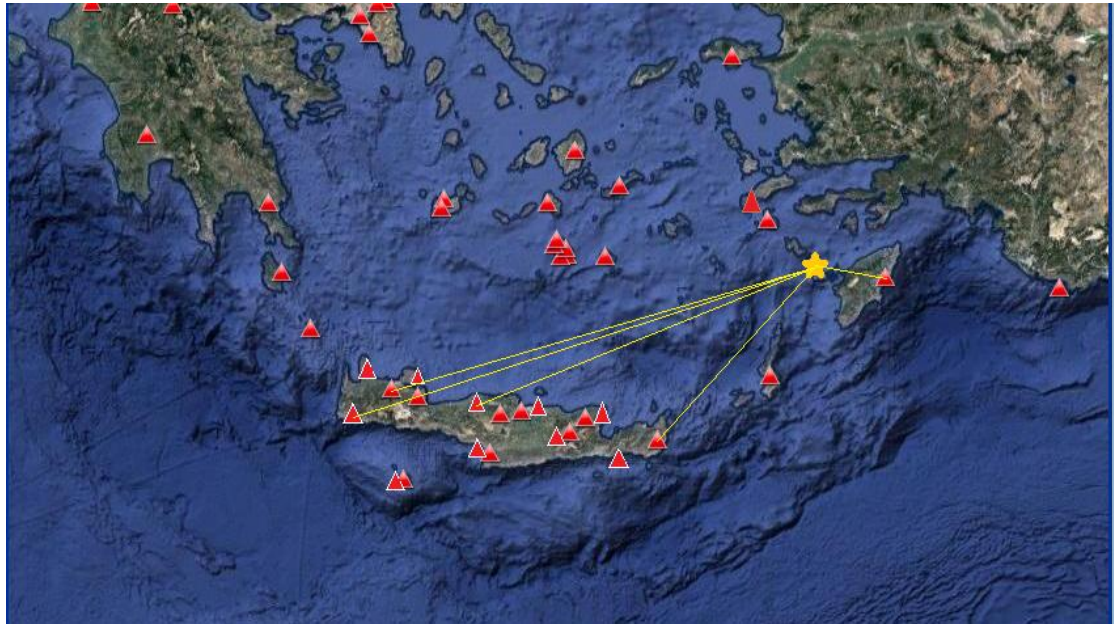
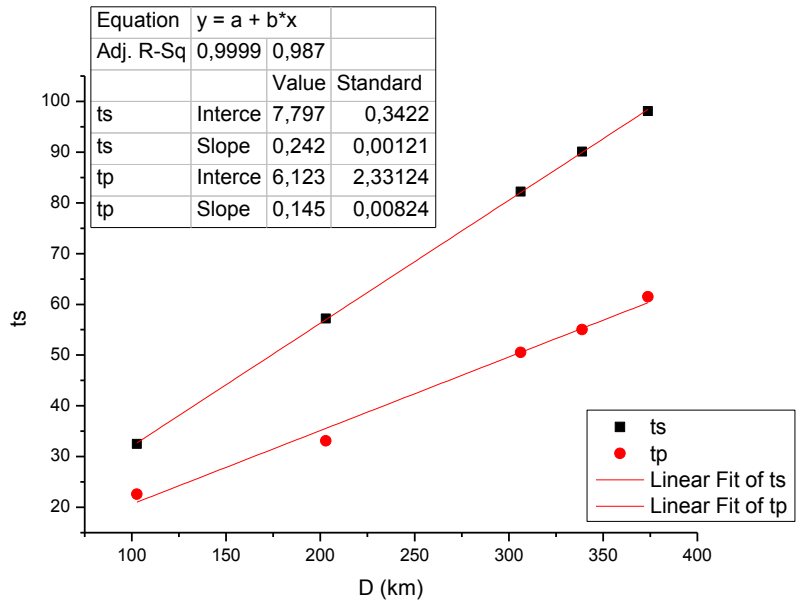




27 SEPTEMBER 2016 (5.4 ML 5.1Mw , depth 89.3 km)

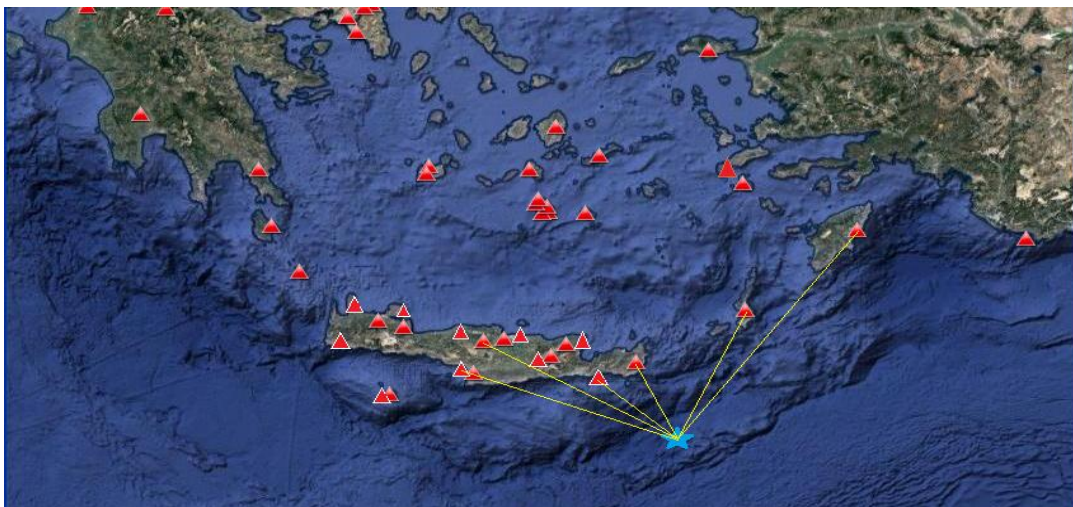
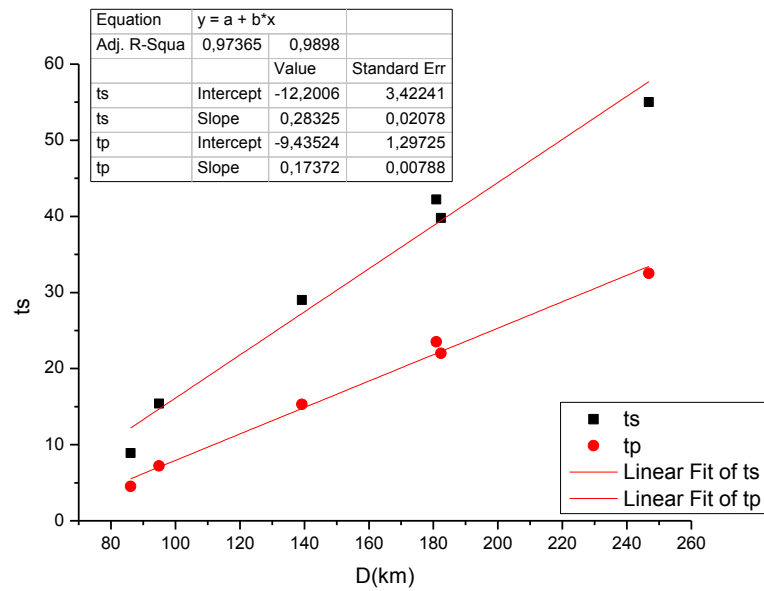
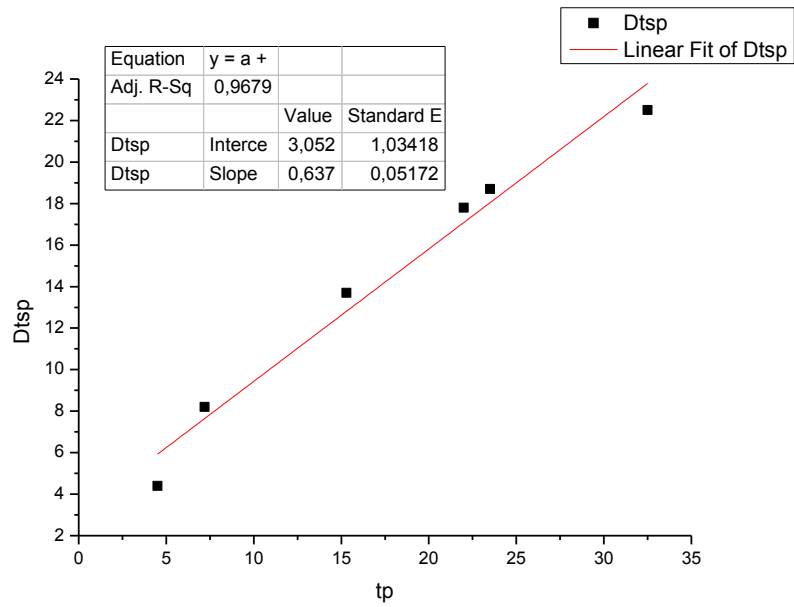
station	ts	tp	Dtsp	Dop(km)	D(km)
ARG	32,5	22,6	9,9	50,6	102,6394
ZKR	57,2	33,1	24,1	182,3	202,997
PRNS	82,2	50,5	31,7	293	306,3062
IMMV	90,1	55	35,1	326,9	338,8777
KNDR	98,1	61,5	36,6	363	373,8228





15 OCTOBER 2016(4.2ML , depth 6.3km)

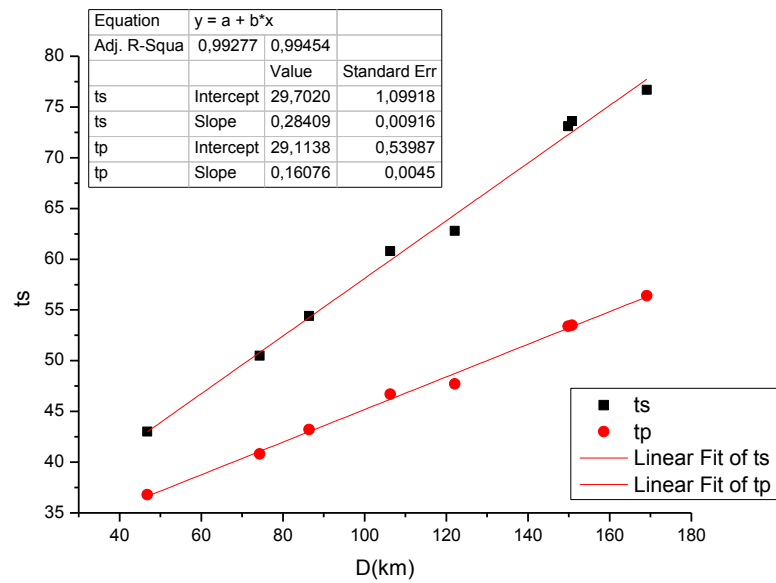
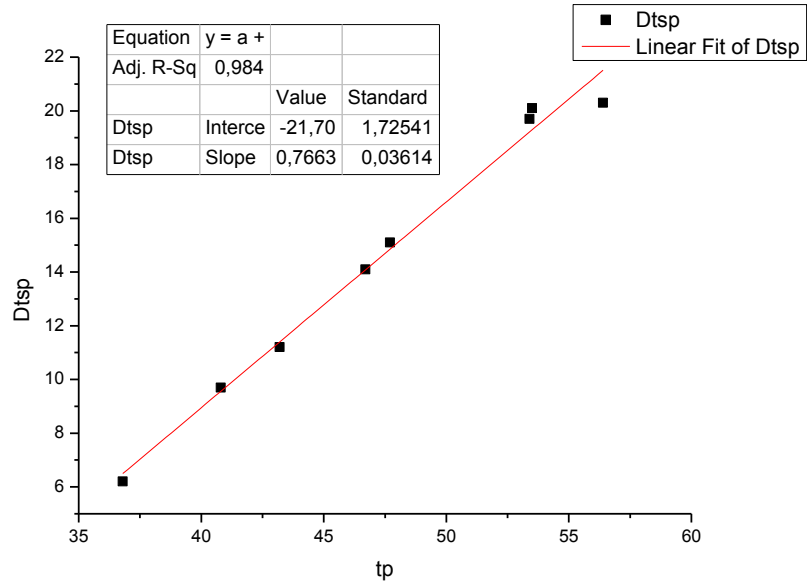
stathmoi	ts	tp	Dtsp	Dor(km)	D(km)
ZKR	8,9	4,5	4,4	85,9	86,13071
FRMA	15,4	7,2	8,2	94,7	94,90933
KARP	29	15,3	13,7	139,1	139,2426
IDI	39,8	22	17,8	182,2	182,3089
TMBK	42,2	23,5	18,7	180,8	180,9097
ARG	55	32,5	22,5	246,7	246,7804

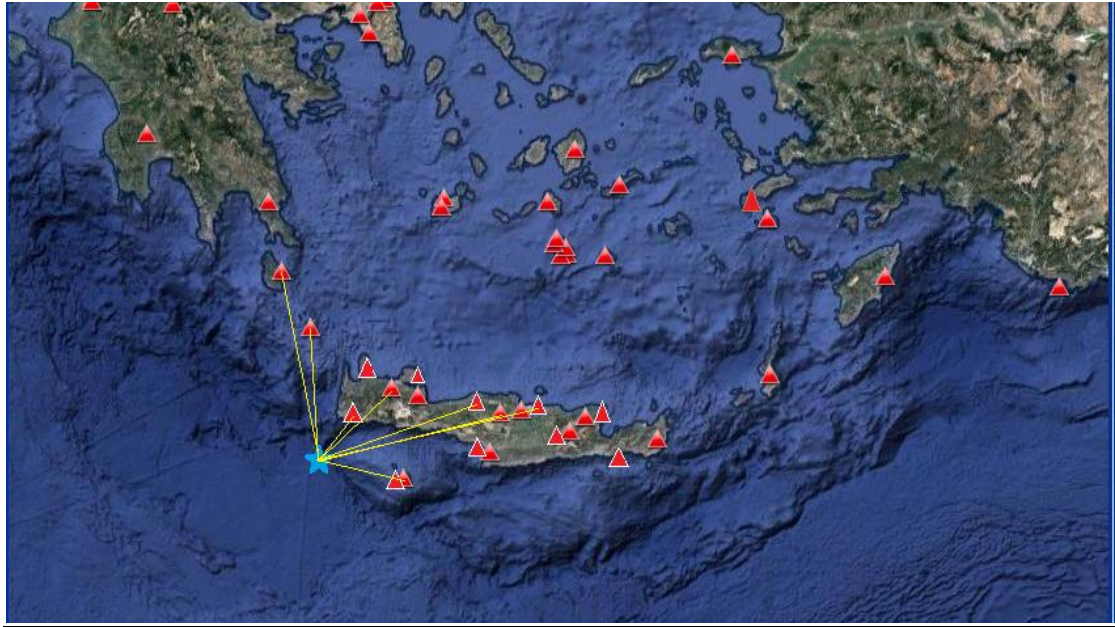


29 NOVEMBER 2016(4.3ML, depth 11.8km)

stathmoi	ts	tp	Dtsp	Dor(km)	D(km)
KNDR	43	36,8	6,2	45,3	46,81164

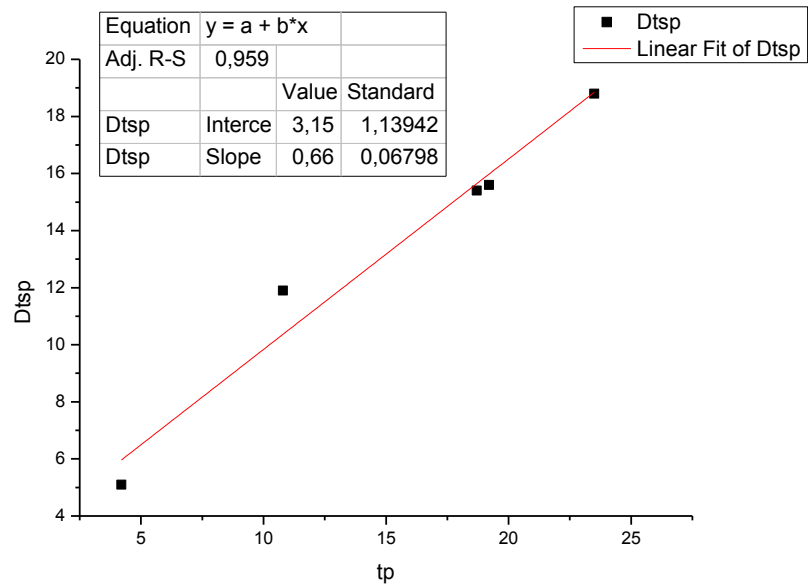
GVDS	50,5	40,8	9,7	73,4	74,34245
IMMV	54,4	43,2	11,2	85,6	86,40949
ANKY	60,8	46,7	14,1	105,6	106,2572
PRNS	62,8	47,7	15,1	121,5	122,0717
IDI	73,1	53,4	19,7	149,4	149,8653
KTHR	73,6	53,5	20,1	150,3	150,7625
HRKL	76,7	56,4	20,3	168,7	169,1122

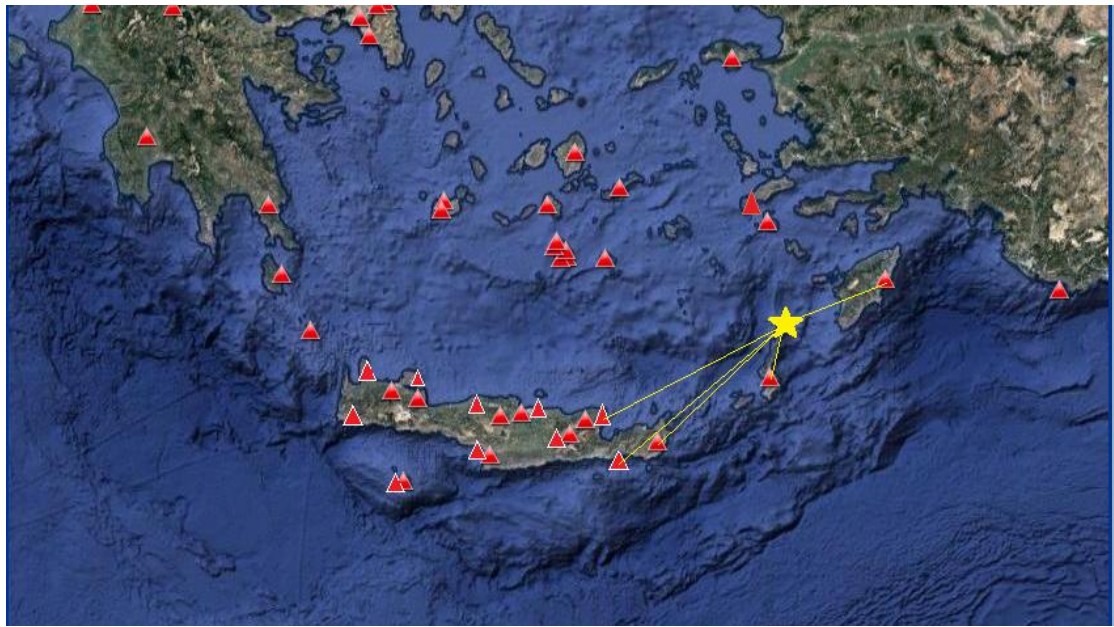
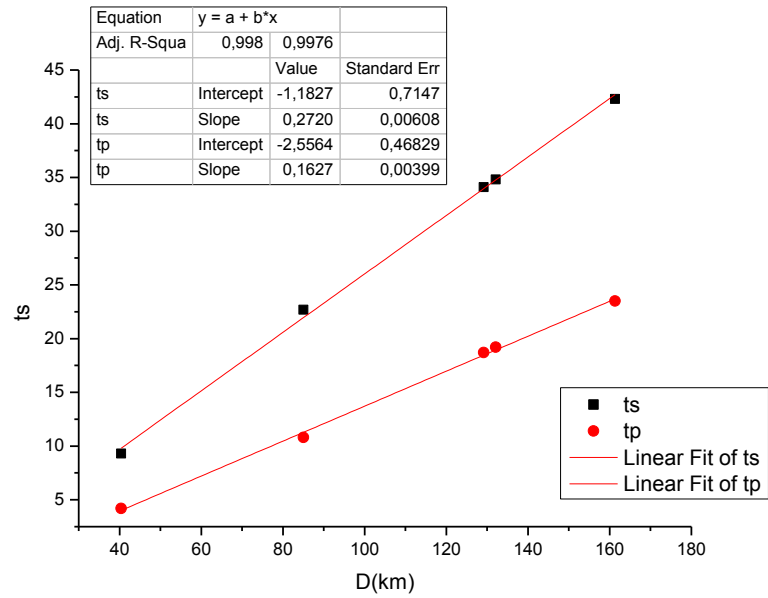




3 DECEMBER 2016 (4.1 ML, 3,9Mw, depth 11.3)

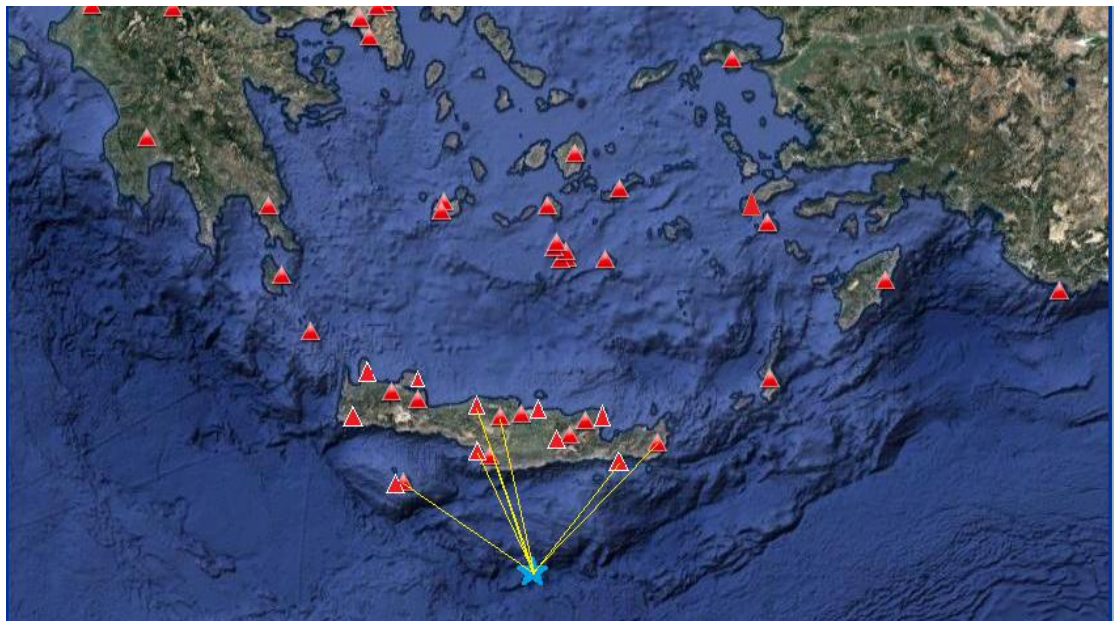
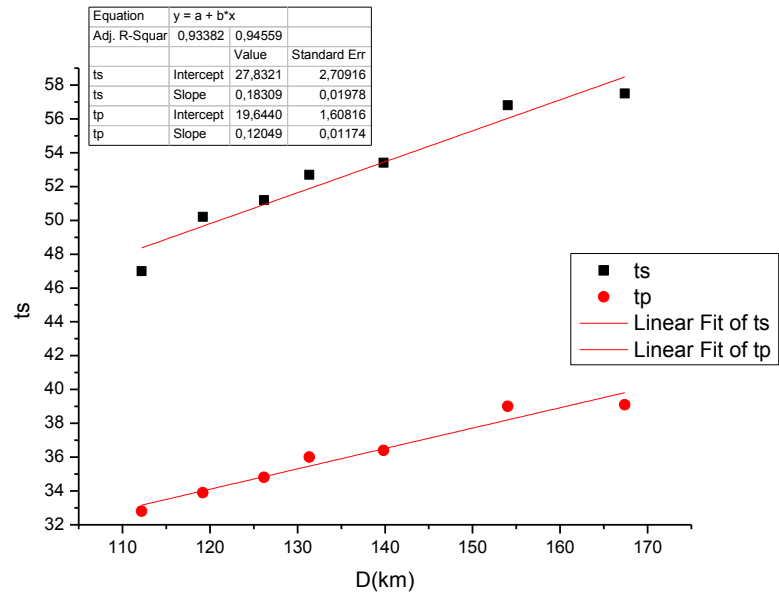
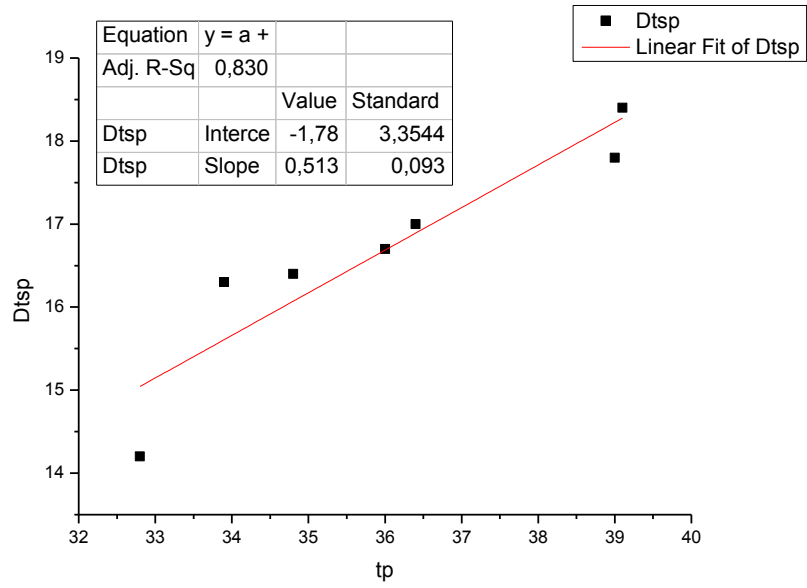
stathmoi	ts	tp	Dtsp	Dor(km)	D(km)
KARP	9,3	4,2	5,1	38,8	40,412
ARG	22,7	10,8	11,9	84,3	85,05398
ZKR	34,1	18,7	15,4	128,7	129,1951
STIA	34,8	19,2	15,6	131,6	132,0843
FRMA	42,3	23,5	18,8	160,9	161,2963





3 DECEMBER 2016(4.2ML, depth 8,3km)

stathmoi	ts	tp	Dtsp	Dor(km)	D(km)
SIVA	47	32,8	14,2	111,9	112,2074
TMBK	50,2	33,9	16,3	118,9	119,1893
FRMA	51,2	34,8	16,4	125,9	126,1733
GVD	52,7	36	16,7	131,1	131,3625
IDI	53,4	36,4	17	139,6	139,8465
ZKR	56,8	39	17,8	153,8	154,0238
PRNS	57,5	39,1	18,4	167,2	167,4059



CONCLUSIONS:

Using the origin times, along with the arrival times of P and S waves in a number of stations in different epicentral distances, we created the Wadati diagrams that presented in the present thesis, for about 134 earthquakes that are distributed on the front of the Hellenic Arc and especially around the island of Crete. Afterwards, we calculated the V_p/V_s ratio with values ranged between 1.51 to 2.08 with an average value of 1.73 very close to the theoretical value expected when $\mu=\lambda$. In addition, using the velocity ratio V_p/V_s the Poisson's ratio calculated with values in the range 0.11 to 0.34 and an average value 0.25.

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