

# Isola Presentation

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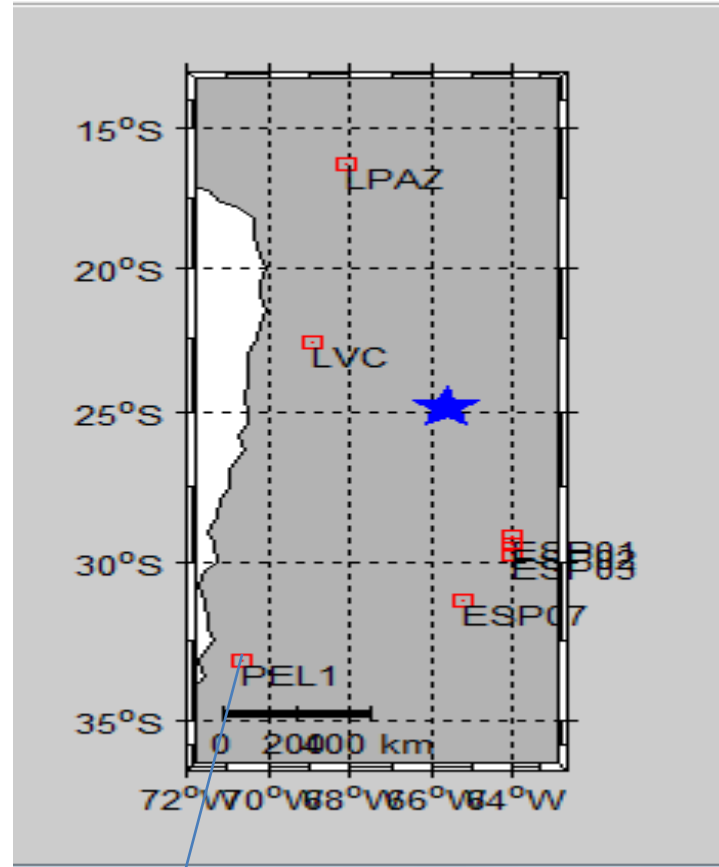
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# Event Info

The screenshot shows a software window titled 'eventinfo' with a standard Windows-style title bar (minimize, maximize, close buttons). The interface is organized into several sections:

- Date:** A text box containing '20100227'.
- Origin Time:** Three text boxes for 'Hour' (15), 'Min' (45), and 'Seconds' (37.00).
- Location:** A section with two columns. The left column has 'Lat (Deg,Min)' (38.00, 50.00) and 'Lon (Deg,Min)' (21.00, 50.00). The right column has 'Lat (N) (Dec.Degrees)' (-24.872) and 'Lon (E) (Dec.Degrees)' (-65.602). A 'DDMM->DDEG' button is between the columns. A 'Depth (km)' text box contains '8'.
- Comments:** Two text boxes for 'Maqnitude' (6) and 'Location agency' (INPRES).
- Time Window Length (sec):** A list box with values: 16.384, 40.96, 81.92, 163.84, 245.76, 327.68, 409.6, 819.2 (highlighted), 1638.4.
- Automatic form fill:** A text box with the example string 'e.g. 20100118 1556 8.38 38 25.19 21E55.44 8.29 5.23' and a 'Read' button.
- Buttons:** 'Save' and 'Exit' buttons are located on the right side of the window.

# Stations



Bad Data in PEL 1

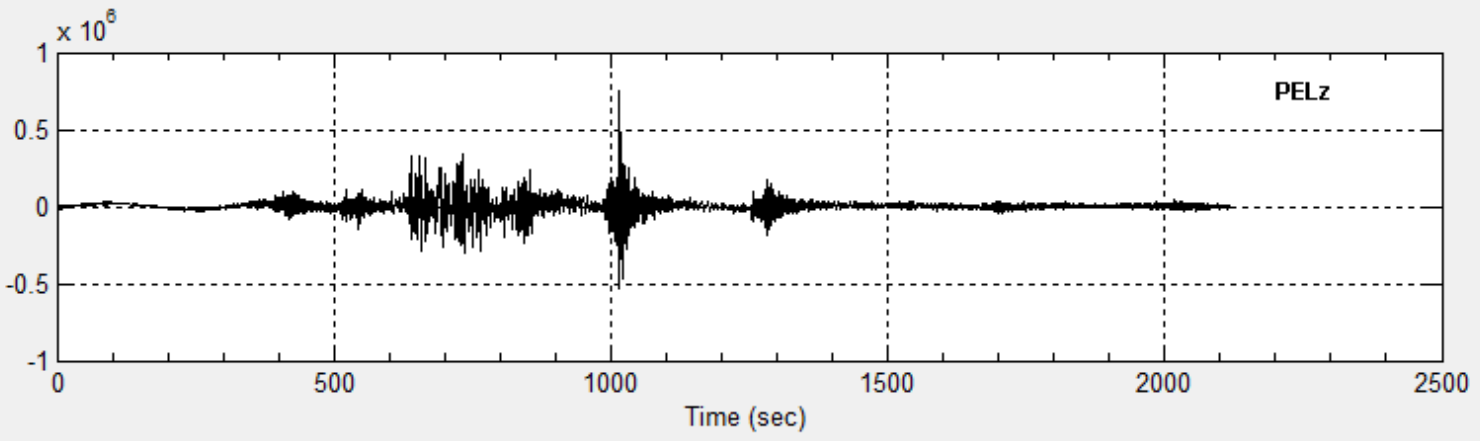
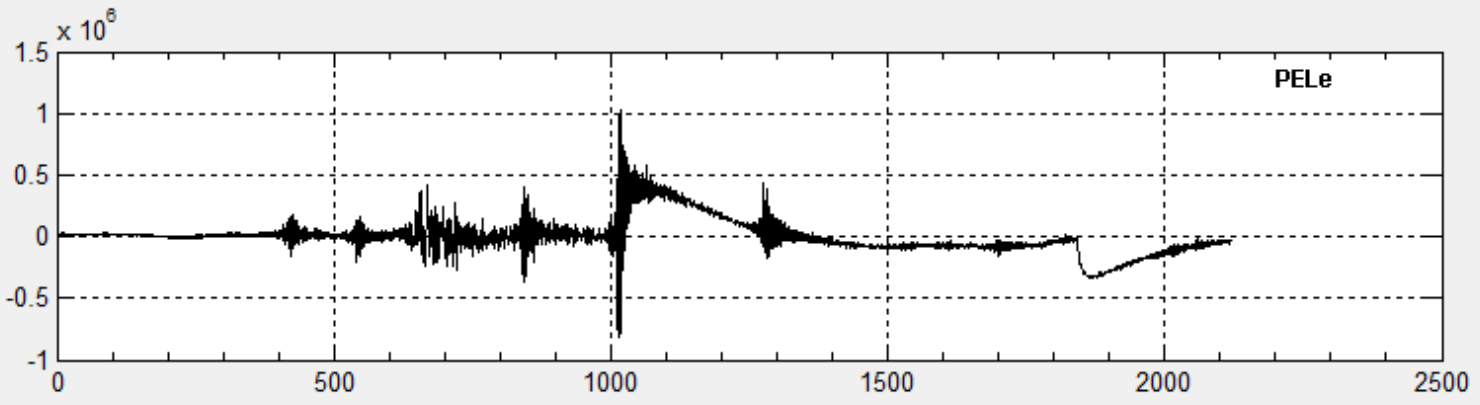
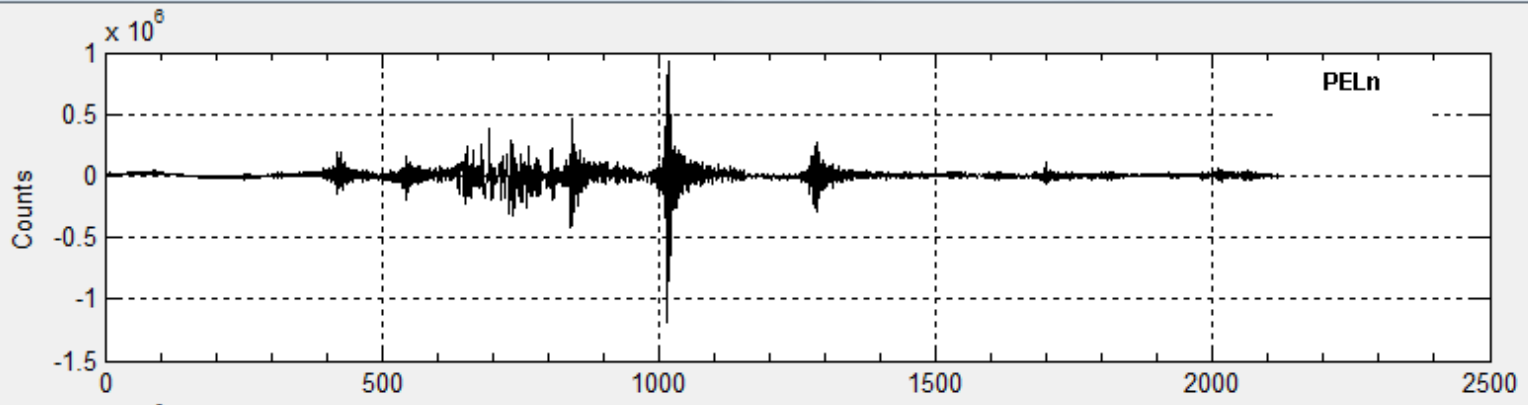
Load Ascii file

Integrate

Sampling Frequency

50

Exit



Load Ascii file    Exit

Integrate    Restart

Pre-defined filters

Frequency (Hz)    Period (sec)

- 1-5    1.0-0.2
- 0.2-1.0    5.0-1.0
- 0.08-0.2    12.5-5.0
- 0.06-0.08    16.5-12.5
- 0.05-0.07    20.0-14.3
- 0.03-0.06    33.3-16.5
- 0.01-0.03    100-33.3

My filter

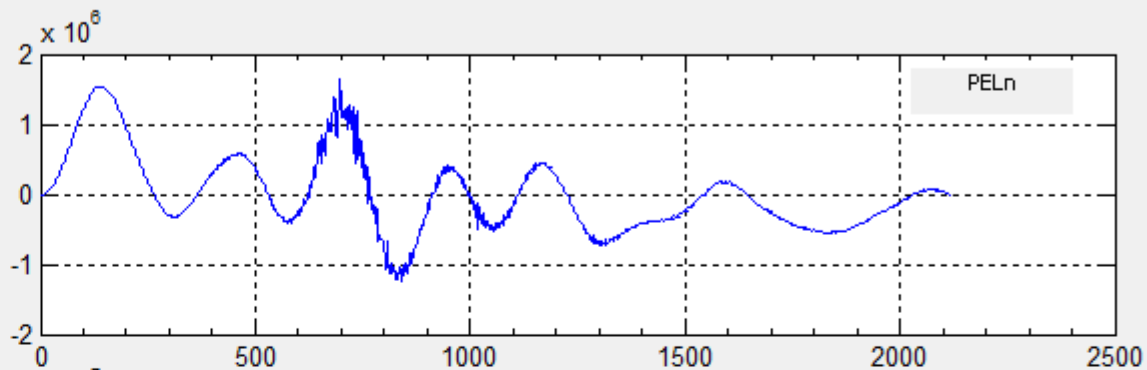
0.01 (Hz)    0.04  
Low    High

100 (sec)    25

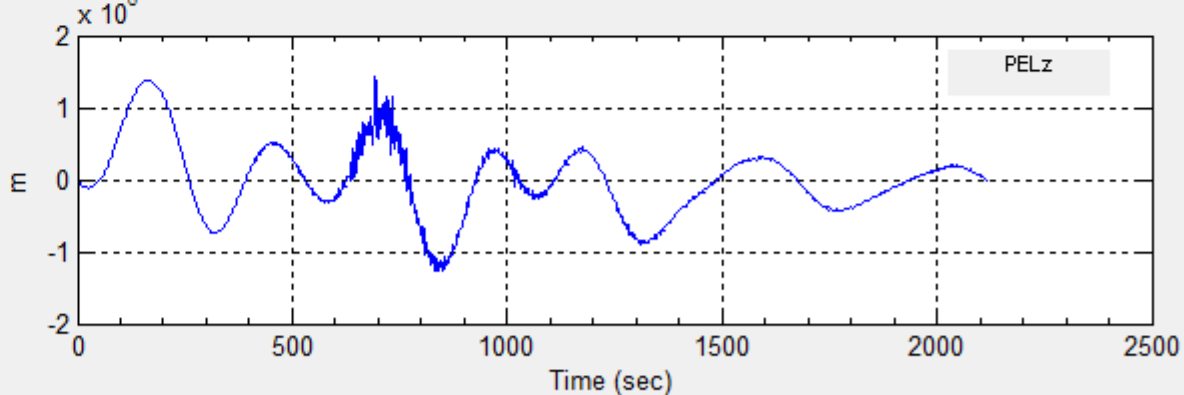
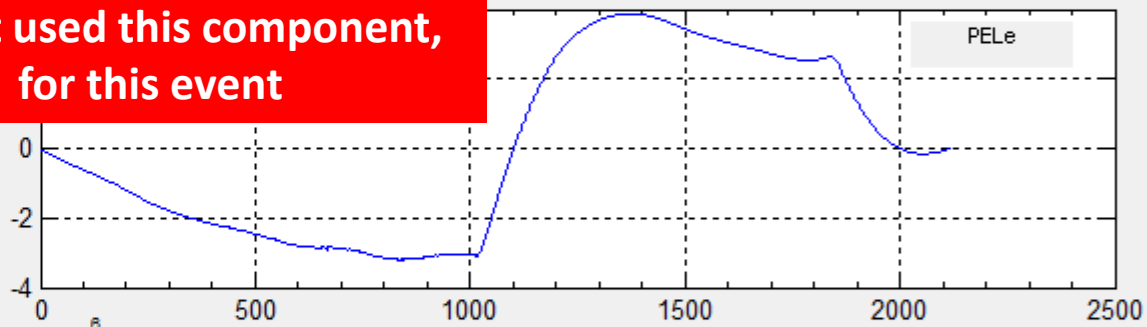
Displacement

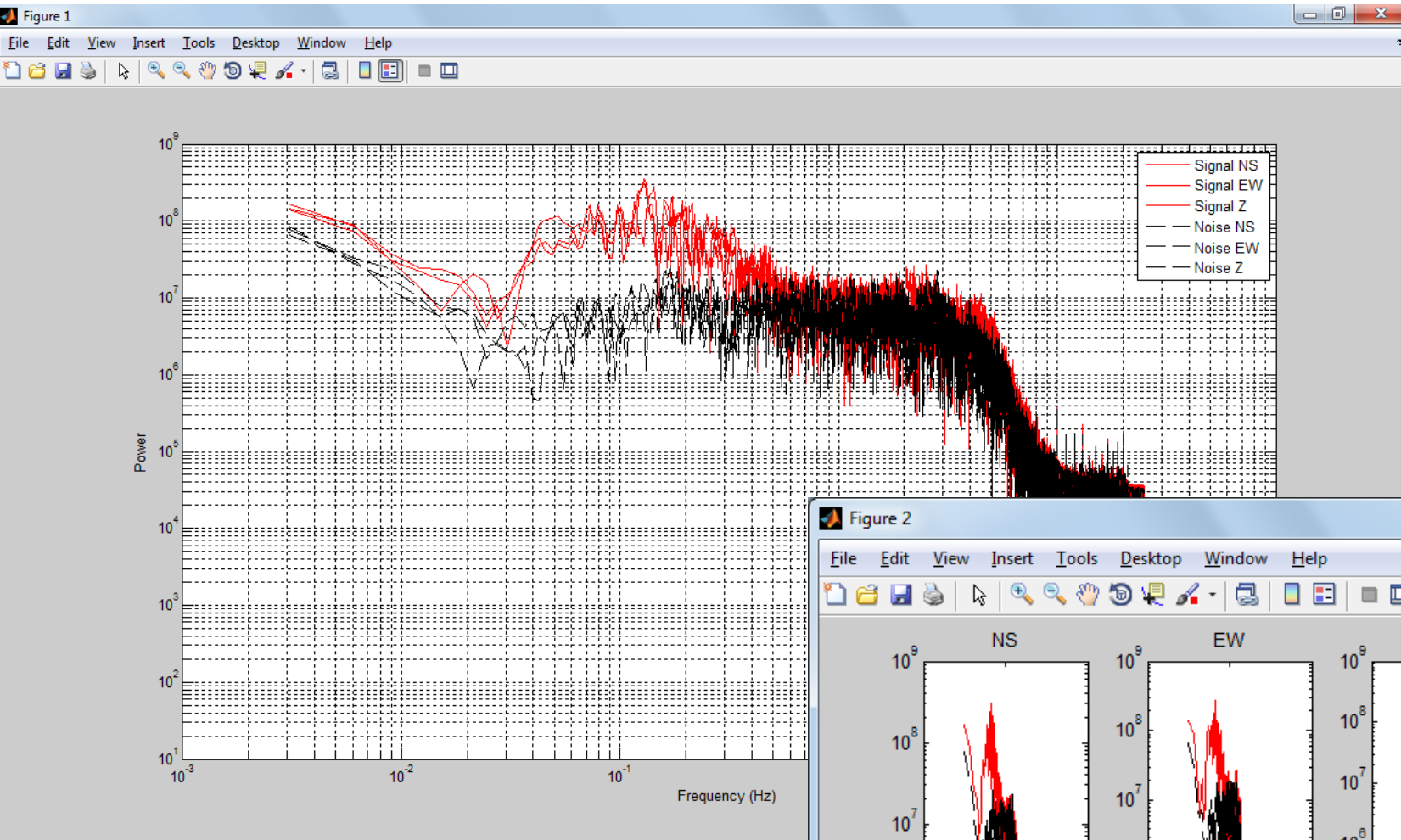
Sampling Frequency

50

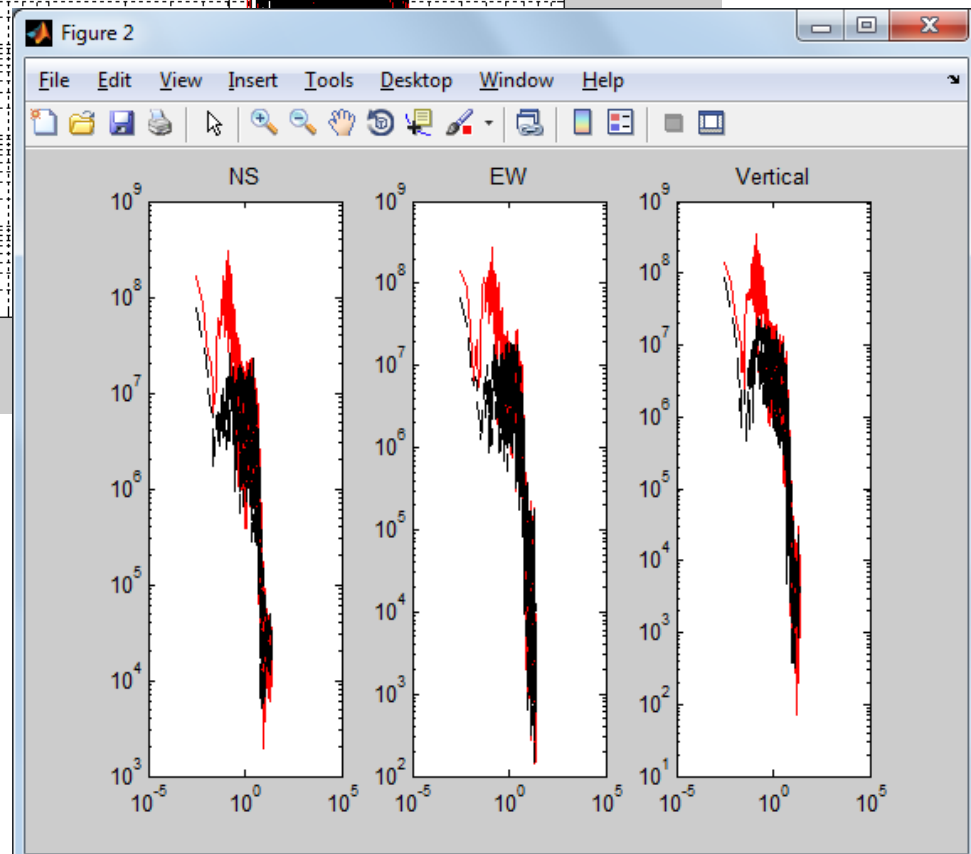


I didn't use this component, for this event





Ok between 0.02-0.03 to  
0.1-0.2



Load Ascii file    Exit

Integrate    Restart

Pre-defined filters

Frequency (Hz)    Period (sec)

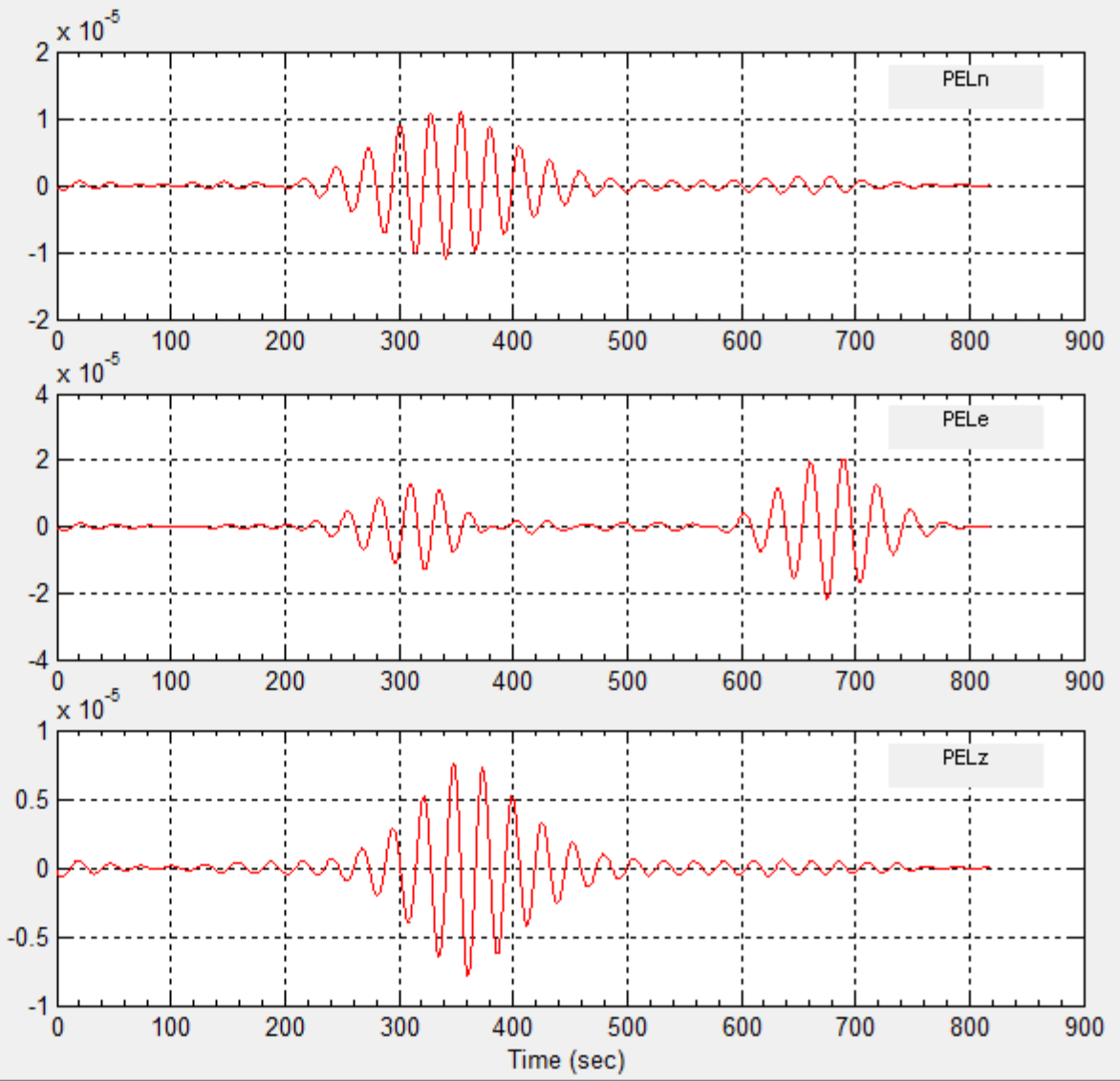
- 1-5    1.0-0.2
- 0.2-1.0    5.0-1.0
- 0.08-0.2    12.5-5.0
- 0.06-0.08    16.5-12.5
- 0.05-0.07    20.0-14.3
- 0.03-0.06    33.3-16.5
- 0.01-0.03    100-33.3

My filter

0.03 (Hz)    0.04  
Low    High

33.3333 (sec)    25

Velocity    Sampling Frequency 10



```
Seismogram Info - C:PEL1:(counts):BHE.;;
# Processing history:
[read];

# Seismogram info:
network = C
staName = PEL1
latitude = -33.14360046386719
longitude = -70.67469787597656
elevation = 0.713
depth = 0.0
instName = (counts)
chanName = BHE
locName =
compName = X
azimuth = 90.0
inclination = 90.0
iyear = 2010
ijday = 58
ihour = 15
imin = 39
sec = 58.1
timeMin = 0.0
sample.length = 105934
sampleInt = 0.019999999552965164
lagTime = 0.0
ampUnits = counts
timeUnits = sec
ampMin = -808397.0
ampMax = 1027922.0
```

```
Seismogram Info - C:PEL1:(counts):BHN
# Processing history:
[read];

# Seismogram info:
network = C
staName = PEL1
latitude = -33.14360046386719
longitude = -70.67469787597656
elevation = 0.713
depth = 0.0
instName = (counts)
chanName = BHN
locName =
compName = Y
azimuth = 0.0
inclination = 90.0
iyear = 2010
ijday = 58
ihour = 15
imin = 39
sec = 25.22
timeMin = 0.0
sample.length = 107951
sampleInt = 0.019999999552965164
lagTime = 0.0
ampUnits = counts
timeUnits = sec
ampMin = -1183478.0
ampMax = 923321.0
```

```
Seismogram Info - C:PEL1:(counts):BHZ.;;
# Processing history:
[read];

# Seismogram info:
network = C
staName = PEL1
latitude = -33.14360046386719
longitude = -70.67469787597656
elevation = 0.713
depth = 0.0
instName = (counts)
chanName = BHZ
locName =
compName = Y
azimuth = 0.0
inclination = 90.0
iyear = 2010
ijday = 58
ihour = 15
imin = 39
sec = 36.52
timeMin = 0.0
sample.length = 107661
sampleInt = 0.019999999552965164
lagTime = 0.0
ampUnits = counts
timeUnits = sec
ampMin = -529012.0
ampMax = 747011.0
```

```
Seismogram Info - C:PEL1:(counts):BHZ.;;
USER3 = -12345.0
USER4 = -12345.0
USER5 = -12345.0
USER6 = -12345.0
USER7 = -12345.0
USER8 = -12345.0
USER9 = -12345.0
DIST = -12345.0
AZ = -12345.0
BAZ = -12345.0
GCARC = -12345.0
DEPMEN = -12345.0
CMPAZ = 0.0
CMPINC = 90.0
XMINIMUM = -12345.0
XMAXIMUM = -12345.0
YMINIMUM = -12345.0
YMAXIMUM = -12345.0
ADJTM = -12345.0
FUNUSED = -12345.0
NZYEAR = 2010
NZJDAY = 58
NZHOUR = 15
NZMIN = 39
NZSEC = 36
NZMSEC = 520
NVHDR = 6
IINTERNAL = -12345
NPTS = 107661
IUNUSED = -12345
```

Strange inclination of 90°



# One problem more: *Sensitivity* $\neq$ *Sensor Gain* \* *Digitizer Gain*

```
RESP.C.PEL1..BHE - WordPad
Ver
Inicio Ver
Portapapeles
Cortar Copiar
Pegar
Courier New 11
N K S abc x x
Imagen Pintar Fecha Insertar
dibuj y hora objeto
Edición
Buscar
Reemplazar
Seleccionar todo
3 2 1 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
B054F08-09 317 4.023100E-09 0.000000E+00
B054F08-09 318 7.727620E-09 0.000000E+00
#
# + +-----+ +
# + | Decimation, PEL1 ch BHE | +
# + +-----+ +
#
B057F03 Stage sequence number: 7
B057F04 Input sample rate: 2.500000E+02
B057F05 Decimation factor: 5
B057F06 Decimation offset: 0
B057F07 Estimated delay (seconds): 6.360000E-01
B057F08 Correction applied (seconds): 6.360000E-01
#
# + +-----+ +
# + | Channel Gain, PEL1 ch BHE | +
# + +-----+ +
#
B058F03 Stage sequence number: 7
B058F04 Gain: 1.000000E+00
B058F05 Frequency of gain: 5.000000E-02 HZ
B058F06 Number of calibrations: 0
#
# + +-----+ +
# + | Channel Sensitivity, PEL1 ch BHE | +
# + +-----+ +
#
B058F03 Stage sequence number: 0
B058F04 Sensitivity: 2.400450E+09
B058F05 Frequency of sensitivity: 5.000000E-02 HZ
B058F06 Number of calibrations: 0
#
ISOLA
1 Acceso a Internet
10:44 a.m.
09/12/2013
```

makepz

No of Zeroes

No of Poles

Station Name

New Zero (rad/sec)

2

New Pole (rad/sec)

4

PEL1

0.0

0.0

-1.234000E-02

+1.234000E-02

AD normalization constant

0.0

0.0

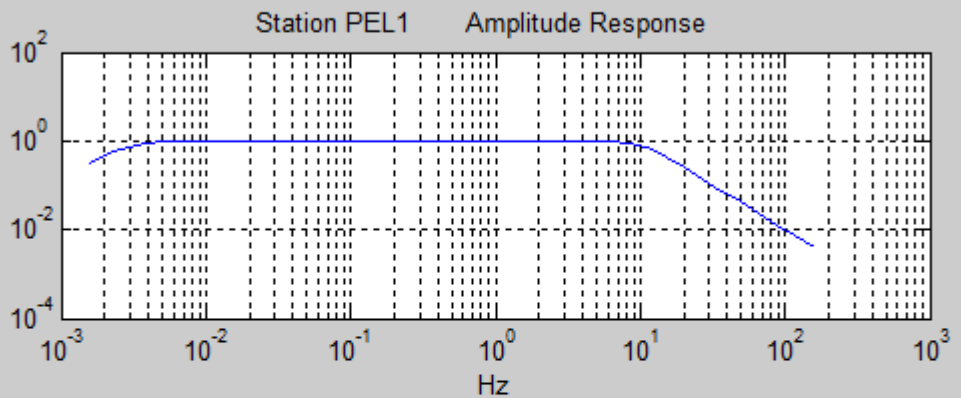
-1

-3

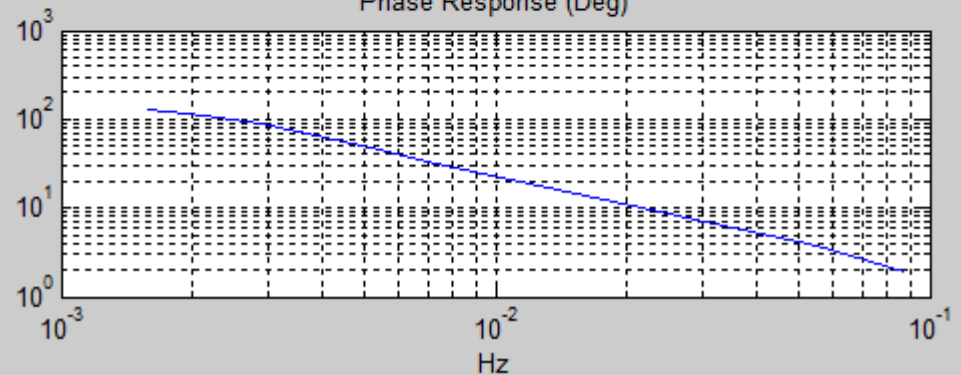
-3

Figure 1

File Edit View Insert Tools Desktop Window Help



Phase Response (Deg)

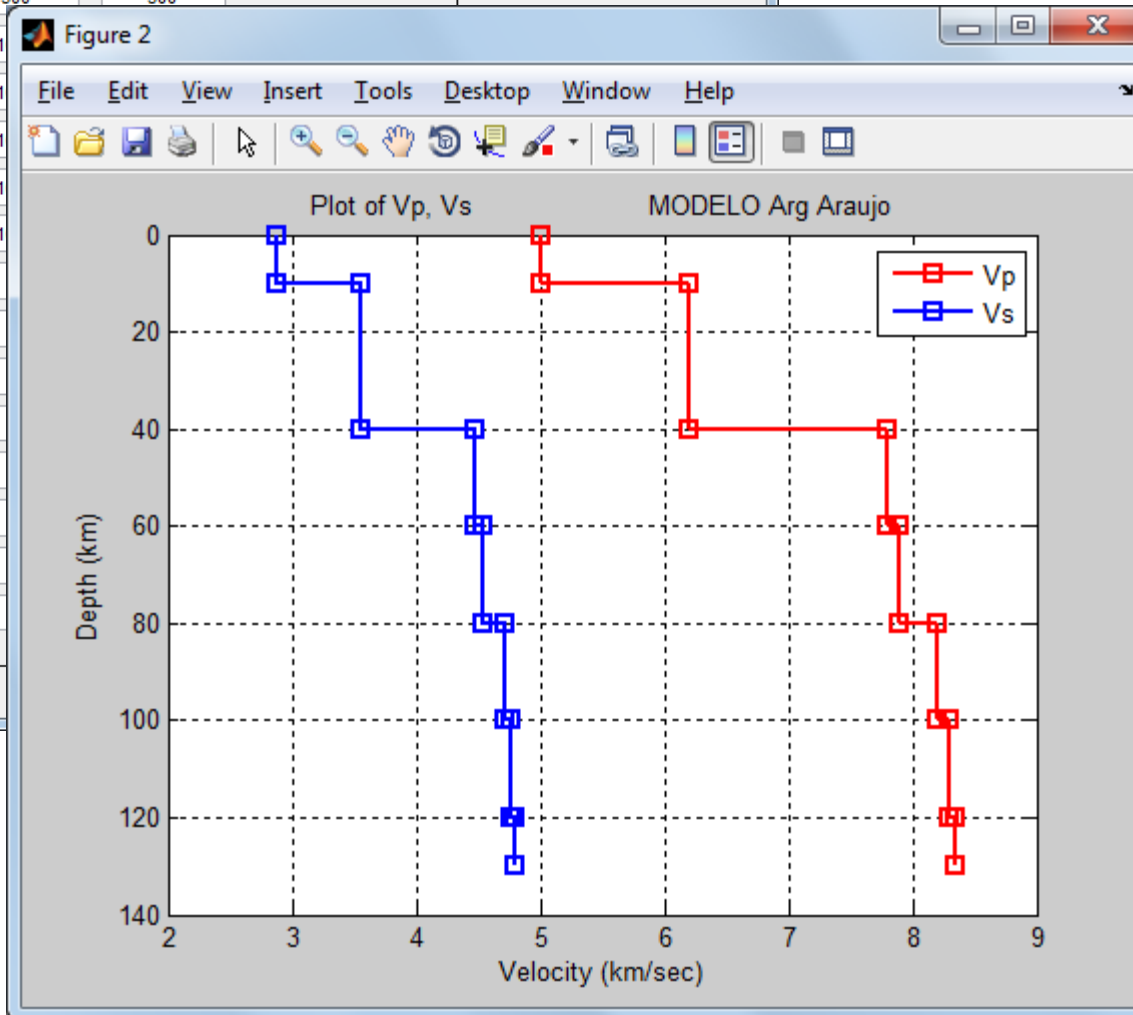
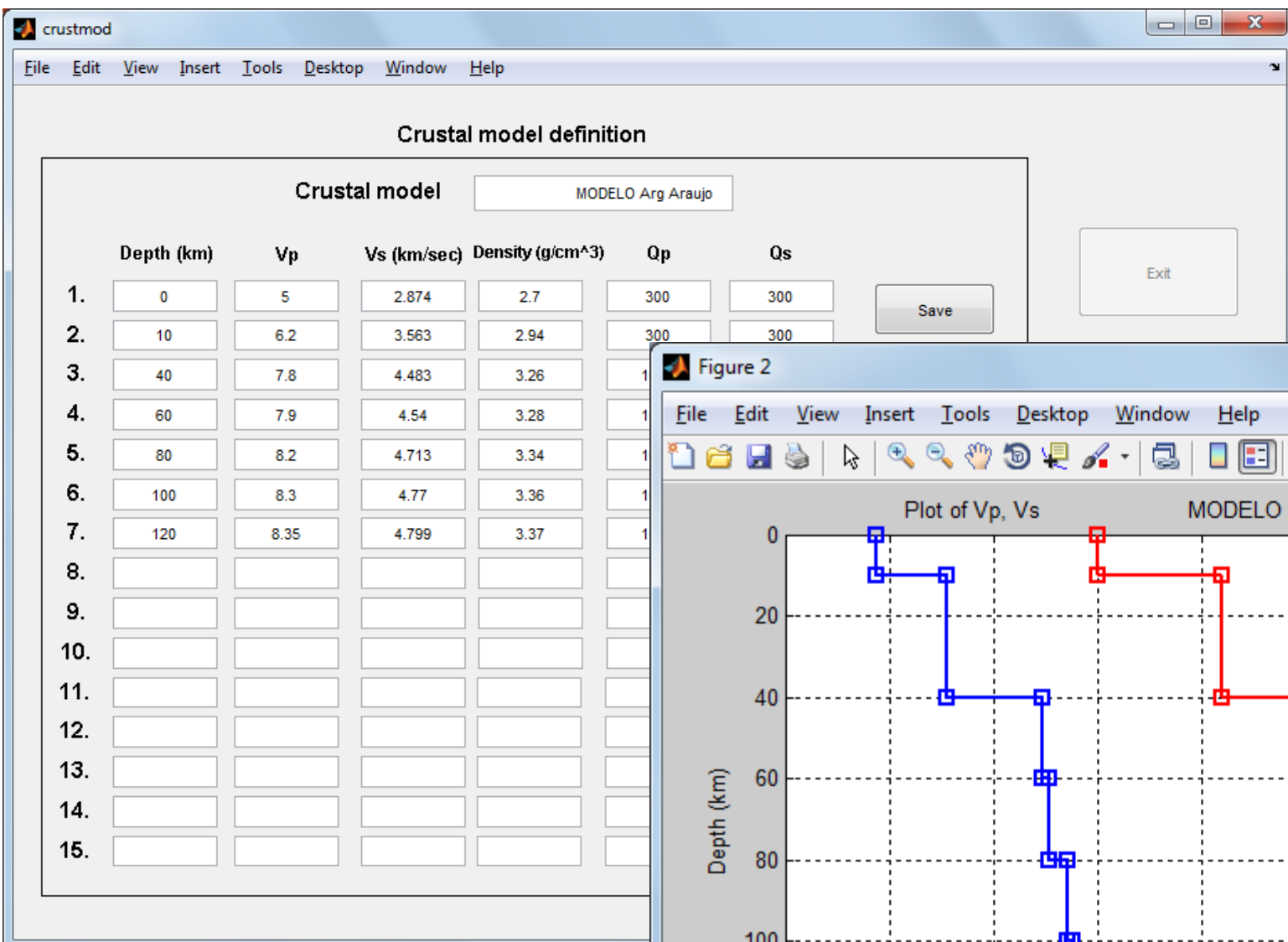


Equipment  
STS-1, 360 s  
mode, 2400  
V/m/s-EDR-209

FDSN Network

# For all this reason

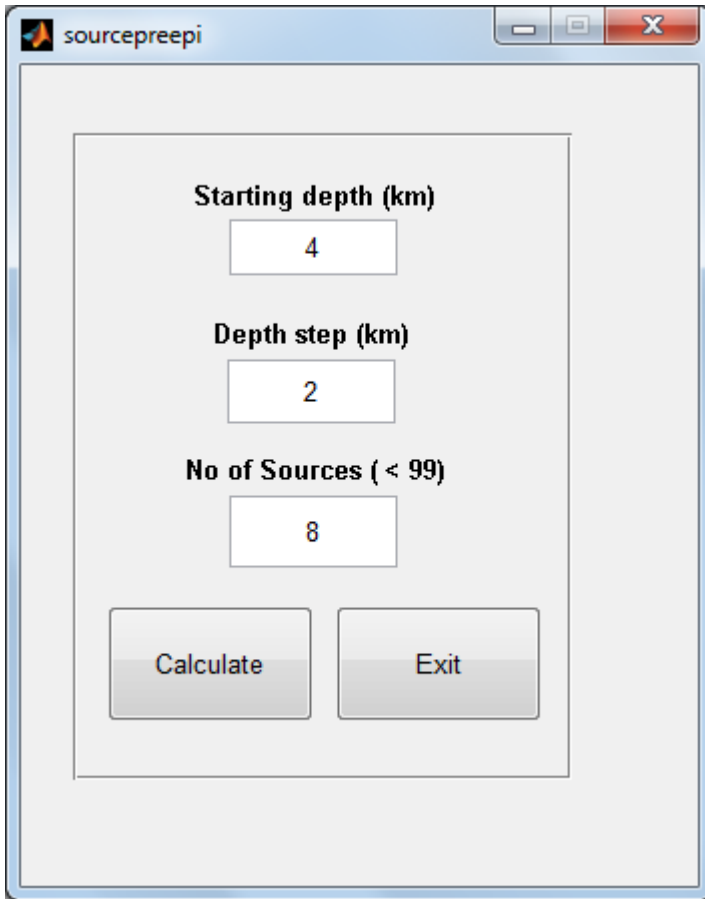
- Sensitivity, inclination, distance too far (more than 1000 km)
- We didn't use PEL1 in the inversion.



Crustal model, Araujo et al 1989, for Argentina



# Plot trial sources



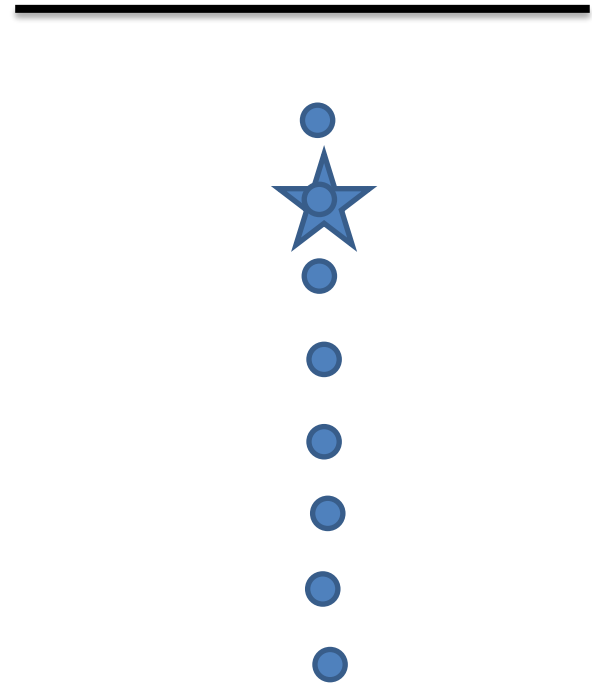
sourcepreepi

Starting depth (km)  
4

Depth step (km)  
2

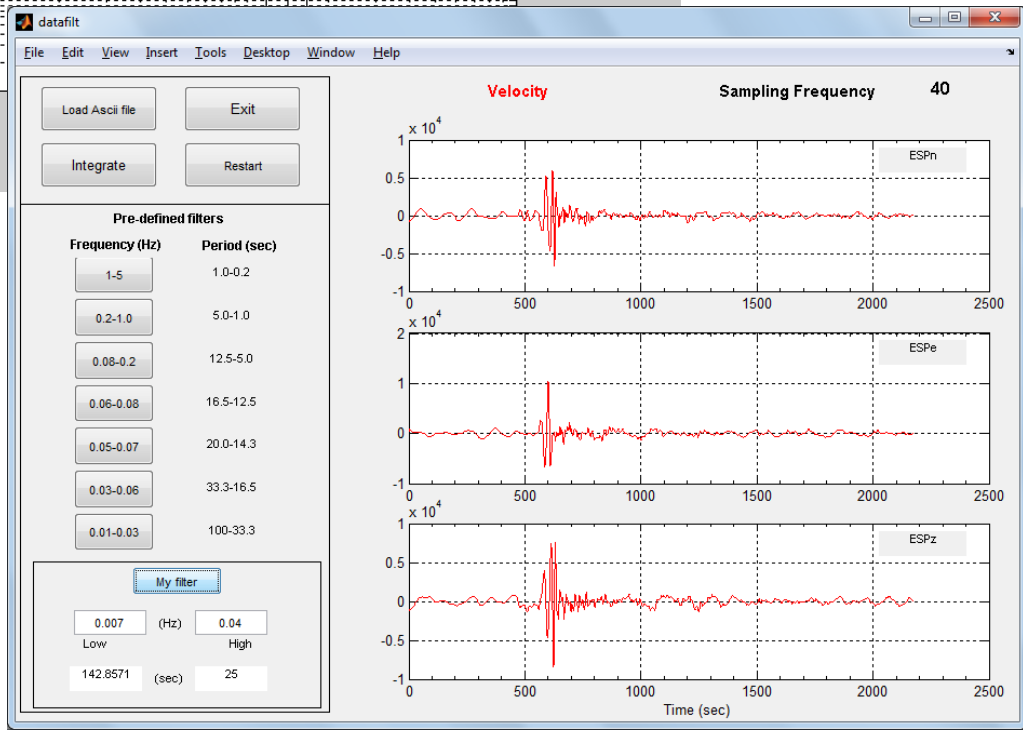
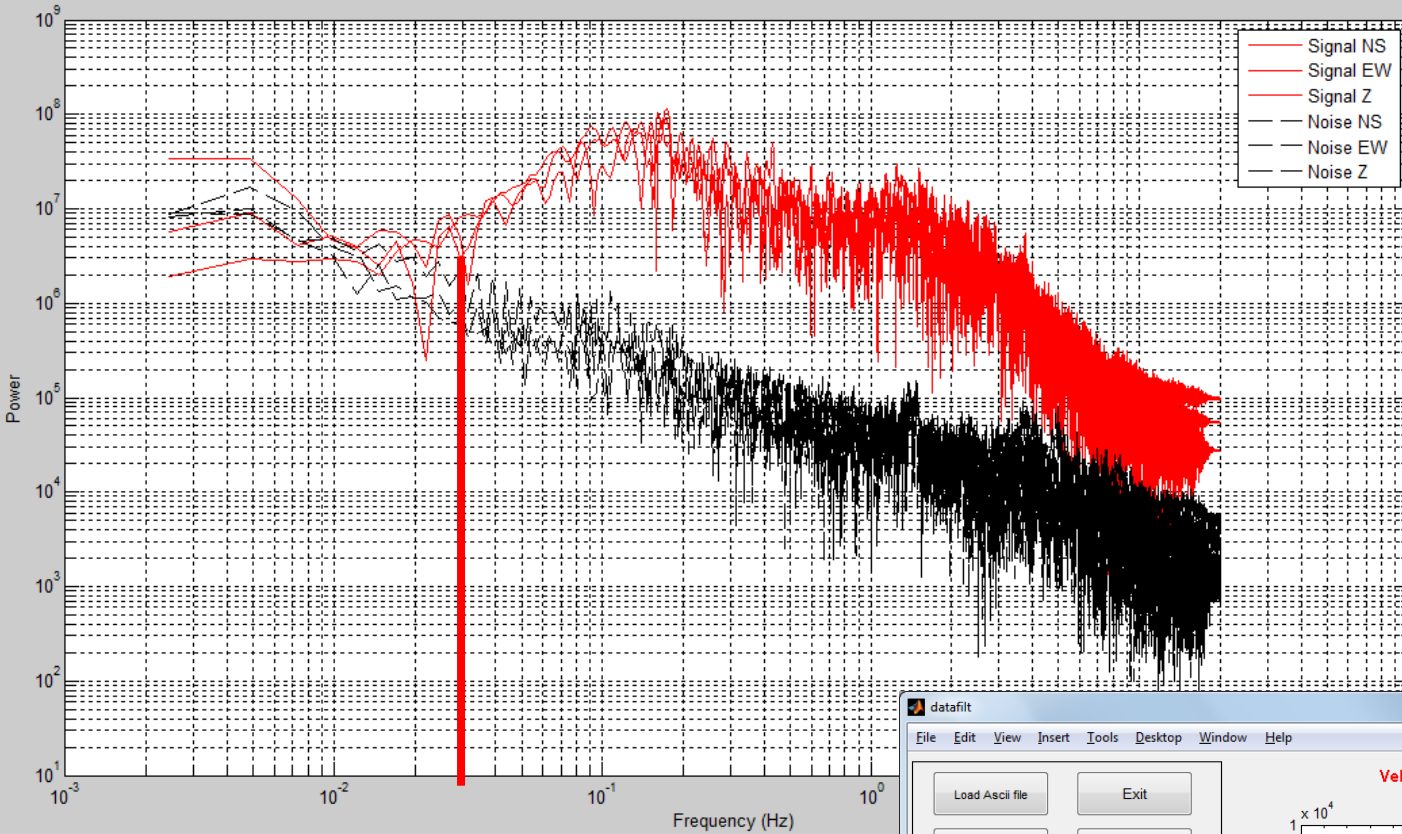
No of Sources (< 99)  
8

Calculate Exit



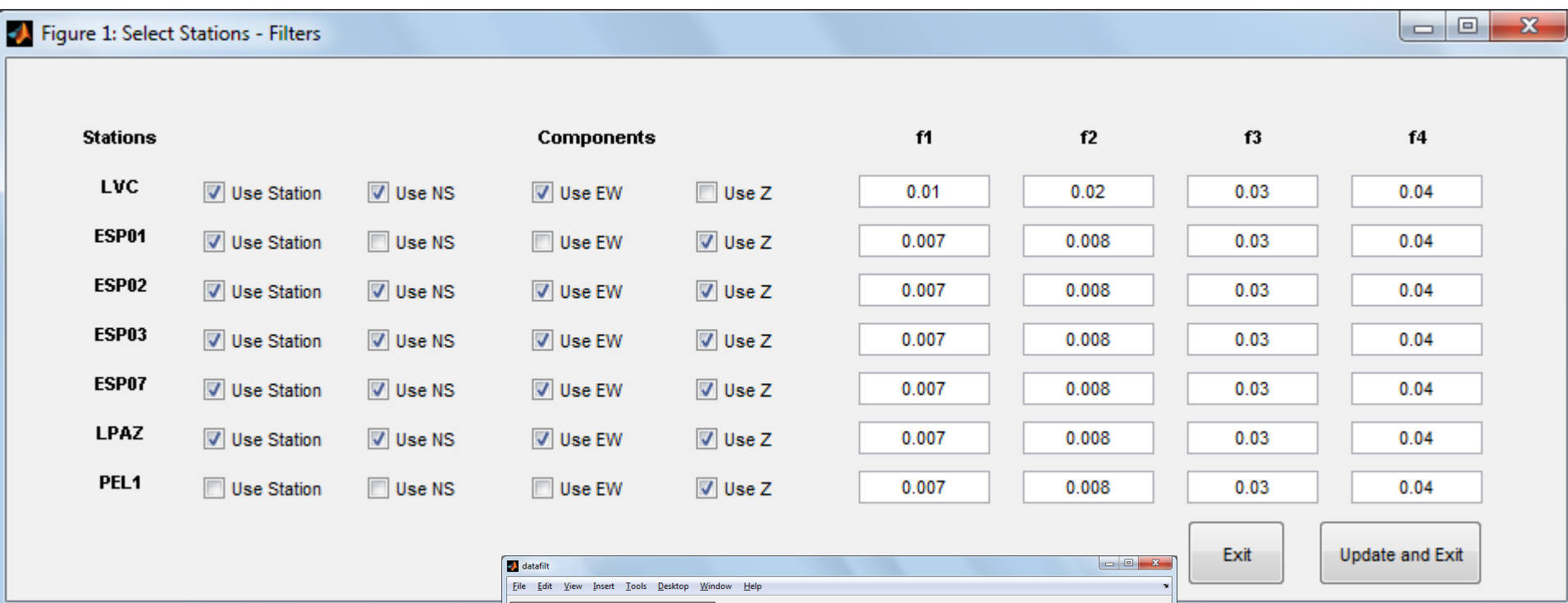
# Guess f3 and f4

- $M_w = 6$
- Distance stations between 300 – 900 km
- F3 and f4 expected: large (M6-7) events at regional distances (up to 1000km):  $\sim 0.004$ - $0.010$  Hz...
- F3, f4 0.03-0.04 work in this case. In LVC station, range f1, f2, f3, f4 is narrow.

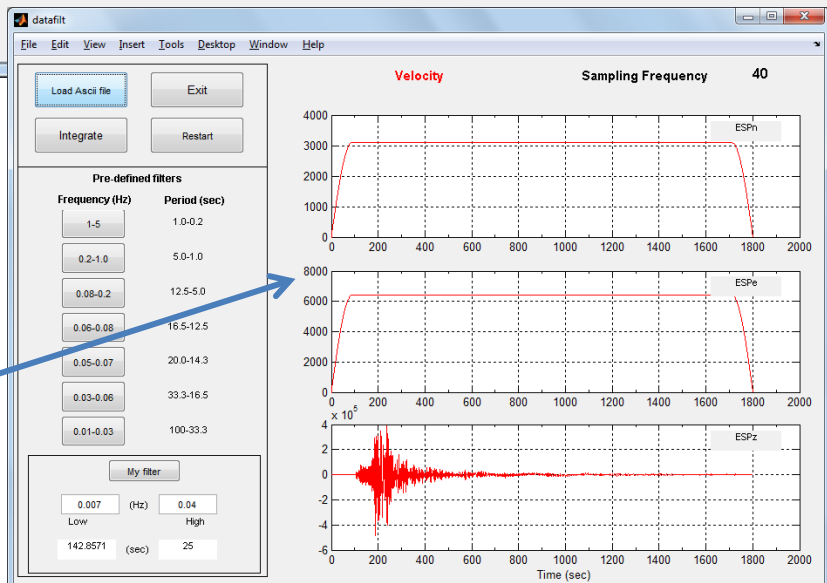




# Select useable stations/components

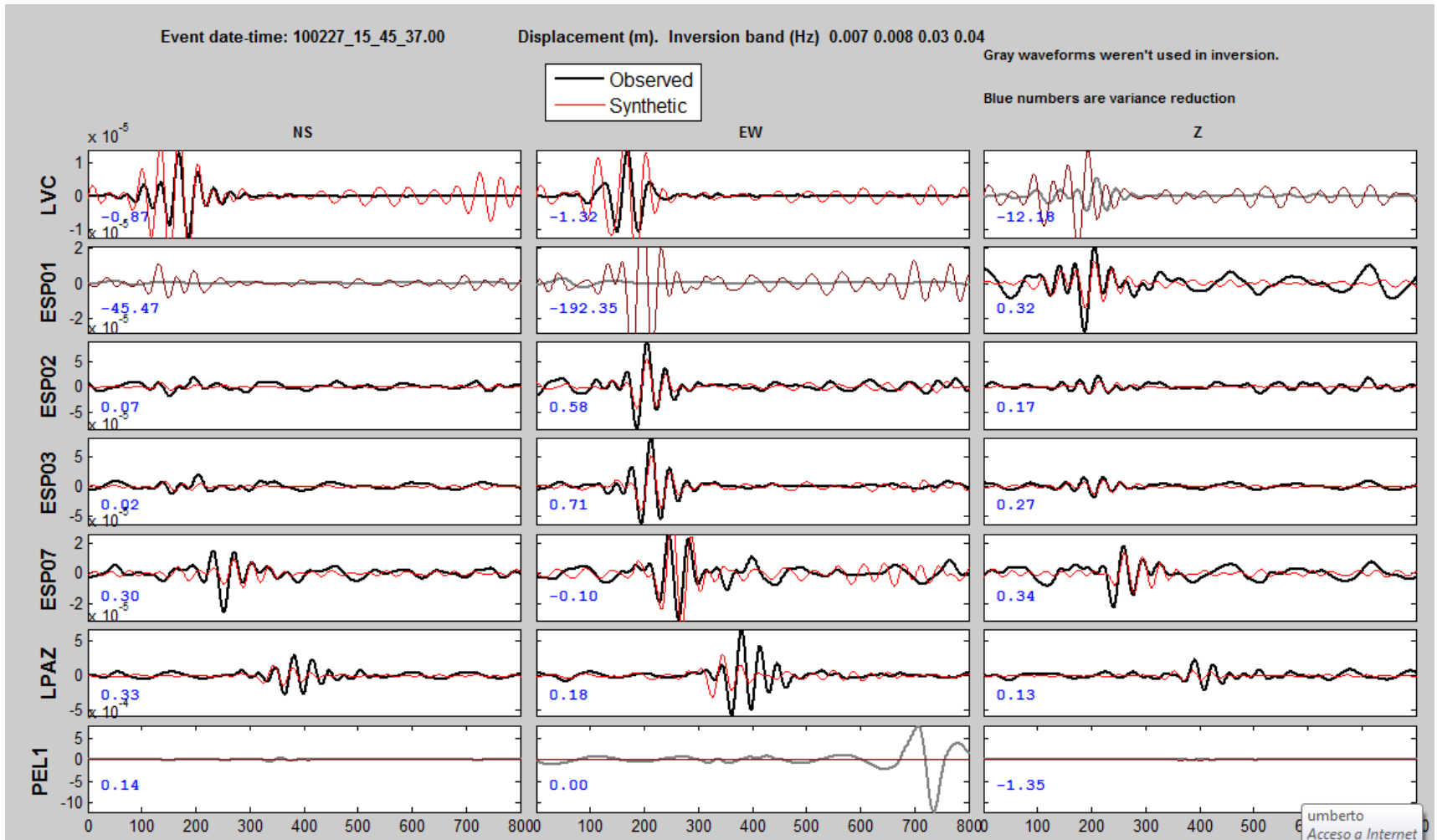


ESP01 has broken horizontal components and LVC has Z .

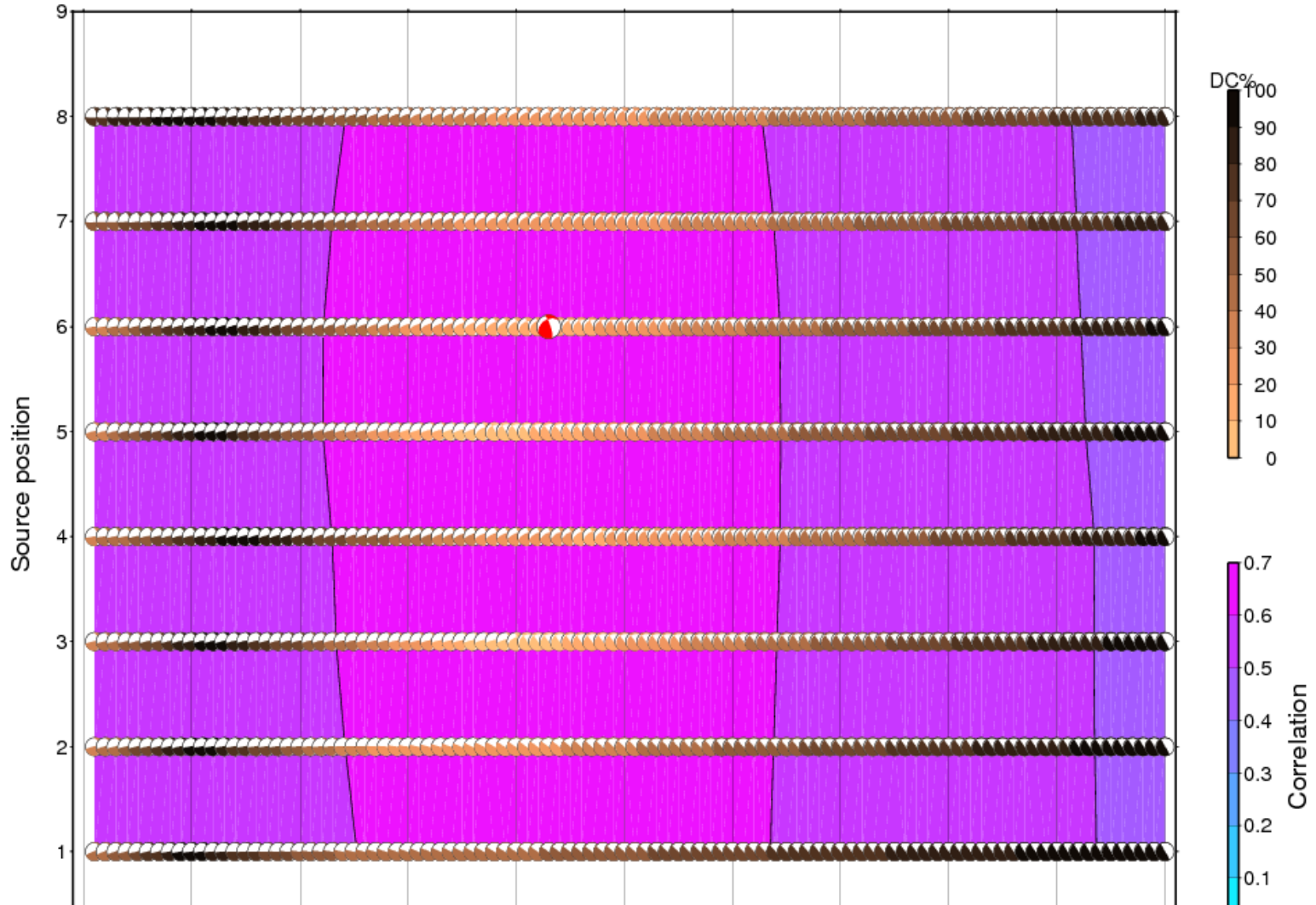


PEL1: 1041 km to epicenter

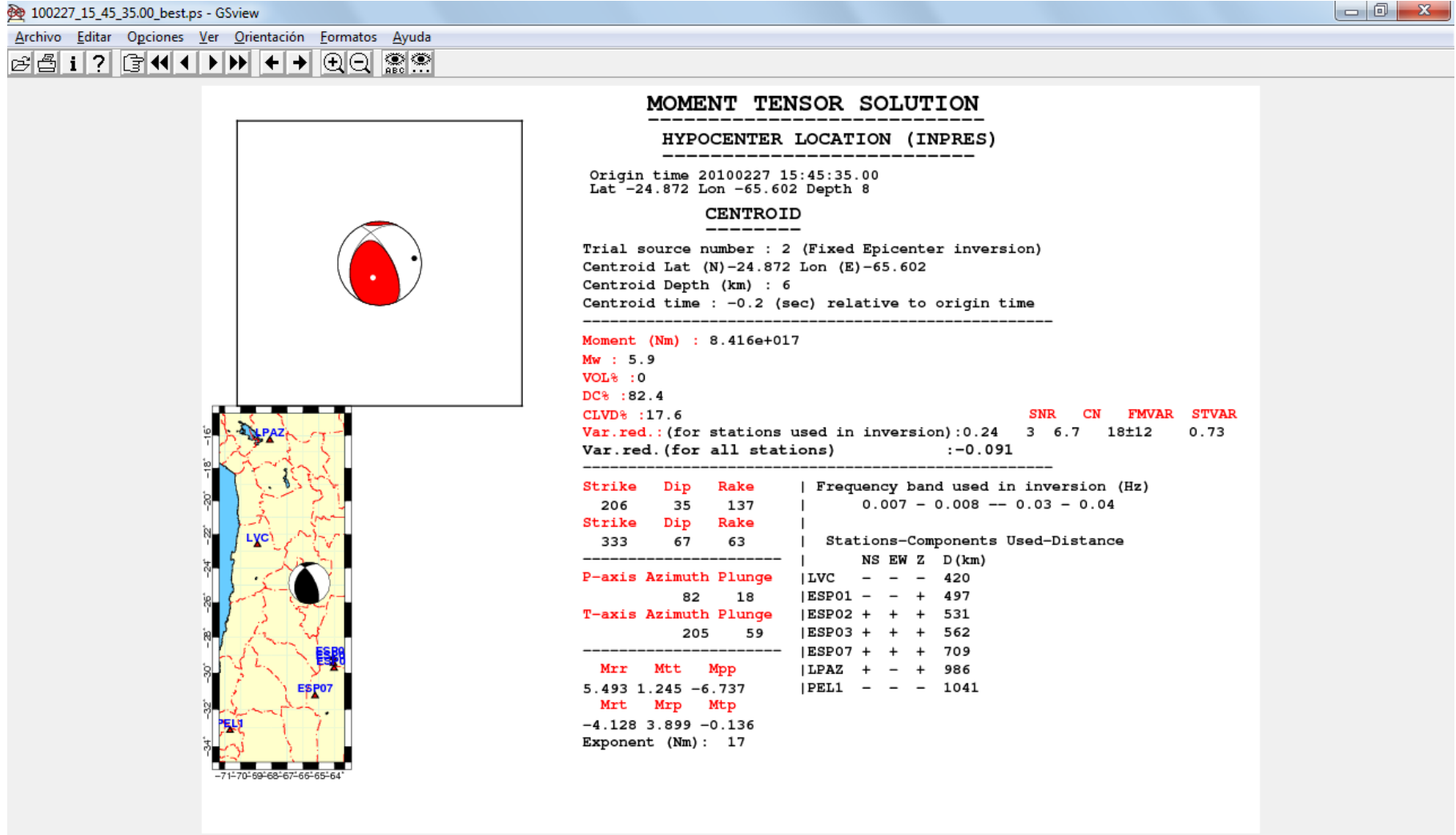
# Waveforms



# Plot space – time correlation



# Plot moment tensor summary



# mtsoltxt

=====  
===== Moment Tensor Solution =====  
=====

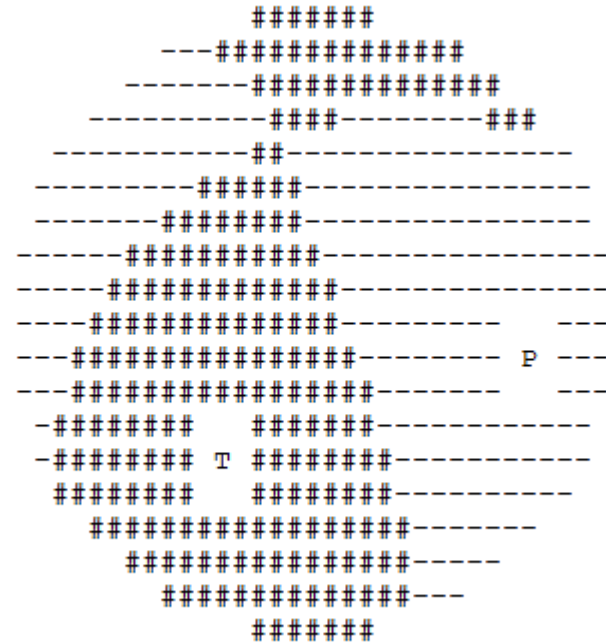
Hypocenter Solution (INPRES)  
Origin Time : 20100227 15:45:35.00  
Lat: -24.872 Lon: -65.602  
Depth (km) : 8  
Mw : 5.9

=====  
Centroid Solution  
Centroid Time : -0.2 (sec) relative to origin time  
Centroid Lat: -24.872 Lon: -65.602  
Centroid Depth : 6

=====  
No of Stations: 7 (LVC-ESP01-ESP02-ESP03-ESP07-LPAZ-PEL1)  
Freq band (Hz)  
0.008-0.03 tapered 0.007-0.008 and 0.03-0.04  
Variance Reduction (%): 24

Moment Tensor (Nm): Exponent 10\*\*17  
Mrr Mtt Mpp  
5.493 1.245 -6.737  
Mrt Mrp Mtp  
-4.128 3.899 -0.136  
VOL (%) : 0  
DC (%) : 82.4  
CLVD (%) : 17.6

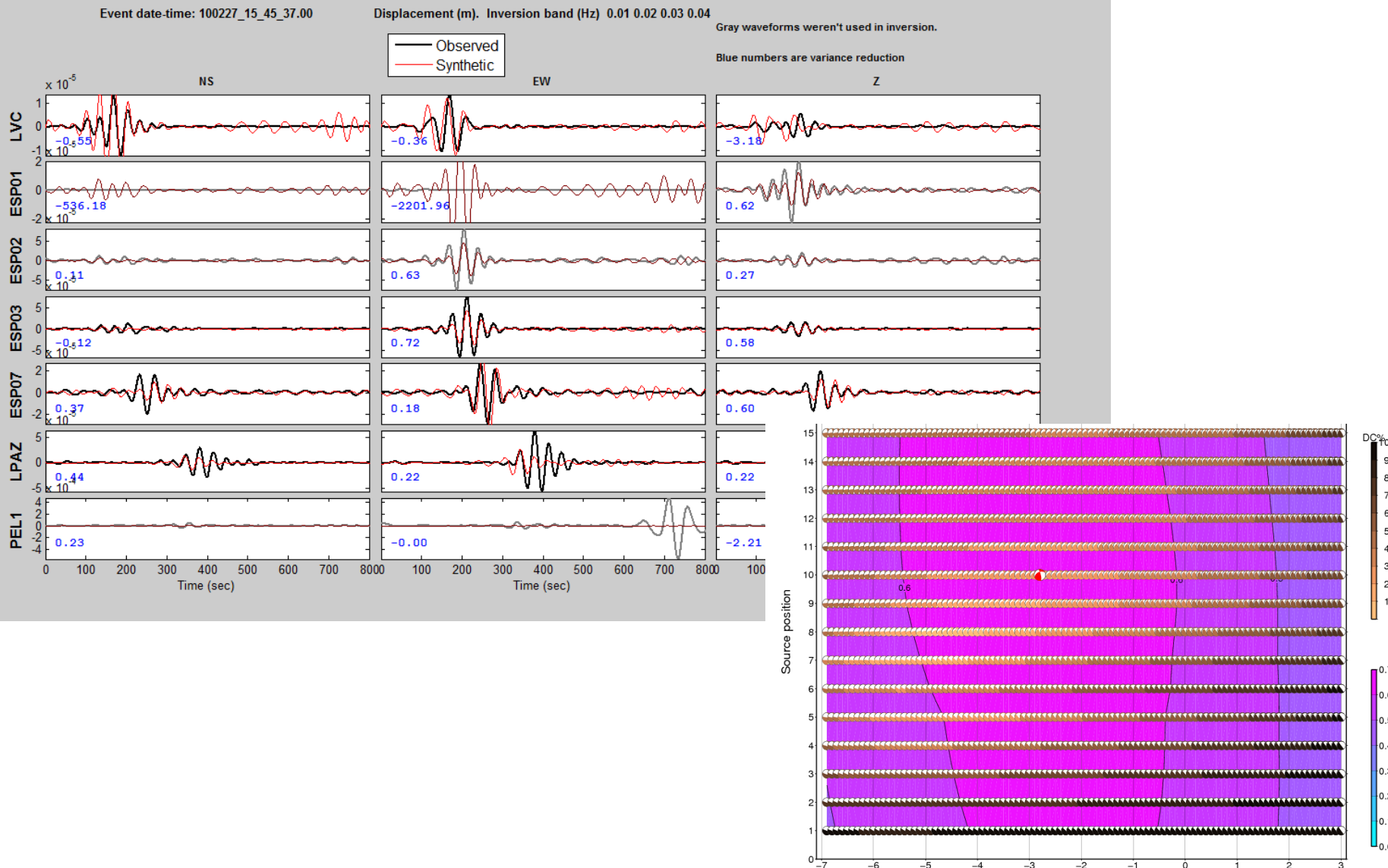
Best Double Couple: Mo= 8.416e+017 Nm  
NP1: Strike Dip Rake  
206 35 137  
NP2: Strike Dip Rake  
333 67 63



Moment Tensor Solution computed using ISOLA  
<http://seismo.geology.upatras.gr/isola/>

Universidad Nacional de San Luis  
<http://unsl.edu.ar>

# ESP01,02,03 are close to each other, I probe only whit ESP03



# Try two subsources – check sub1/sub2 (fix position and sdr)

sourcepre

Event parameters			
Magnitude	Date	Lat	Lon
6	20100227	-24.872	-65.602

New Reference point position		
Depth (km)	Shift to North (km)	Shift to East (km)
8	0	0

No of Sources (along strike)	6
Spacing along Strike (km)	8
Length (km)	<b>40</b>

No of Sources (along dip)	6
Spacing along Dip (km)	8
Width (km)	<b>40</b>

Reference point at Strike source number:	3
Reference point at Dip source number:	3

**Trial Sources Plane Orientation**

Strike

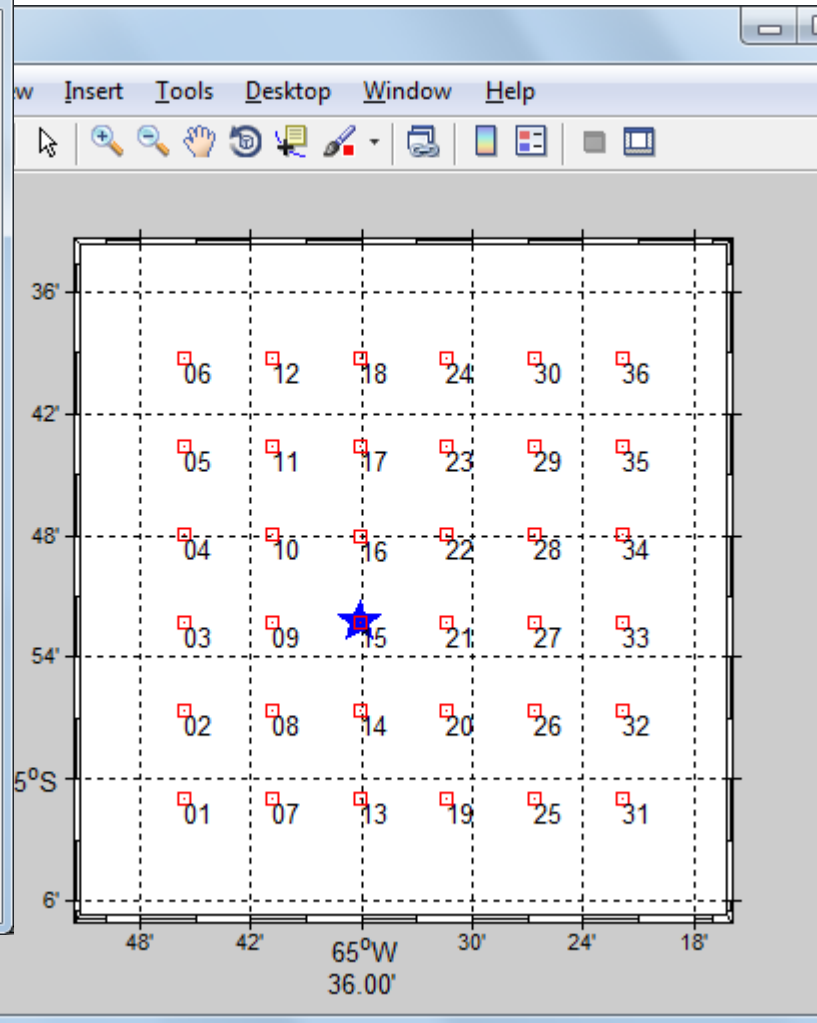
Dip

Hint: Specify the Strike and Dip of the trial sources Plane. For a horizontal plane choose Strike=0 and Dip=0.

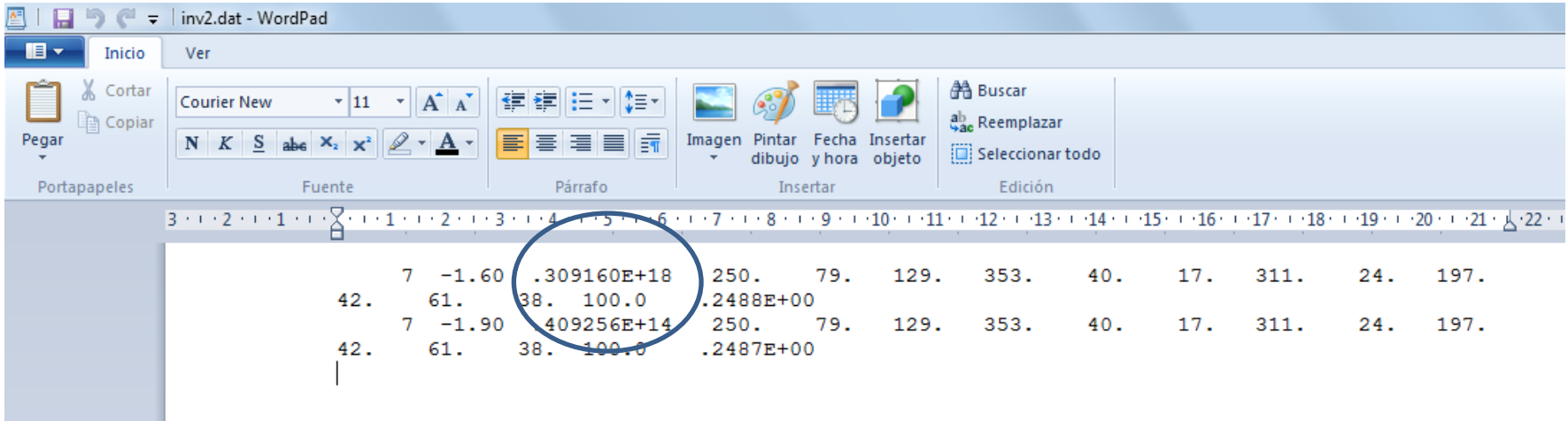
**Total number of trial sources**  
**36**

Calculate

Exit



# Try two subsources – check sub1/sub2 (fix position and sdr)



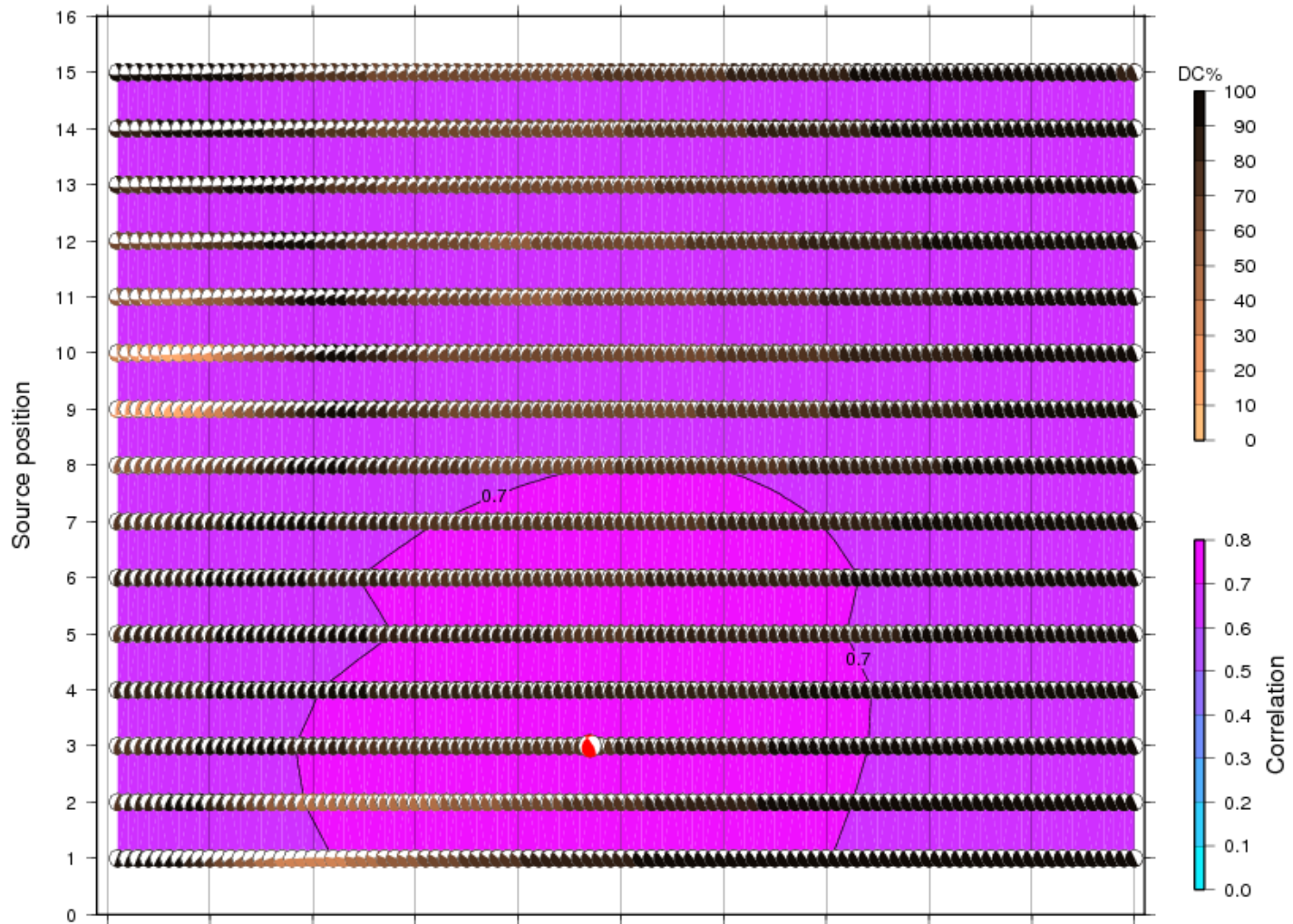
- Event 1: 7555 times bigger



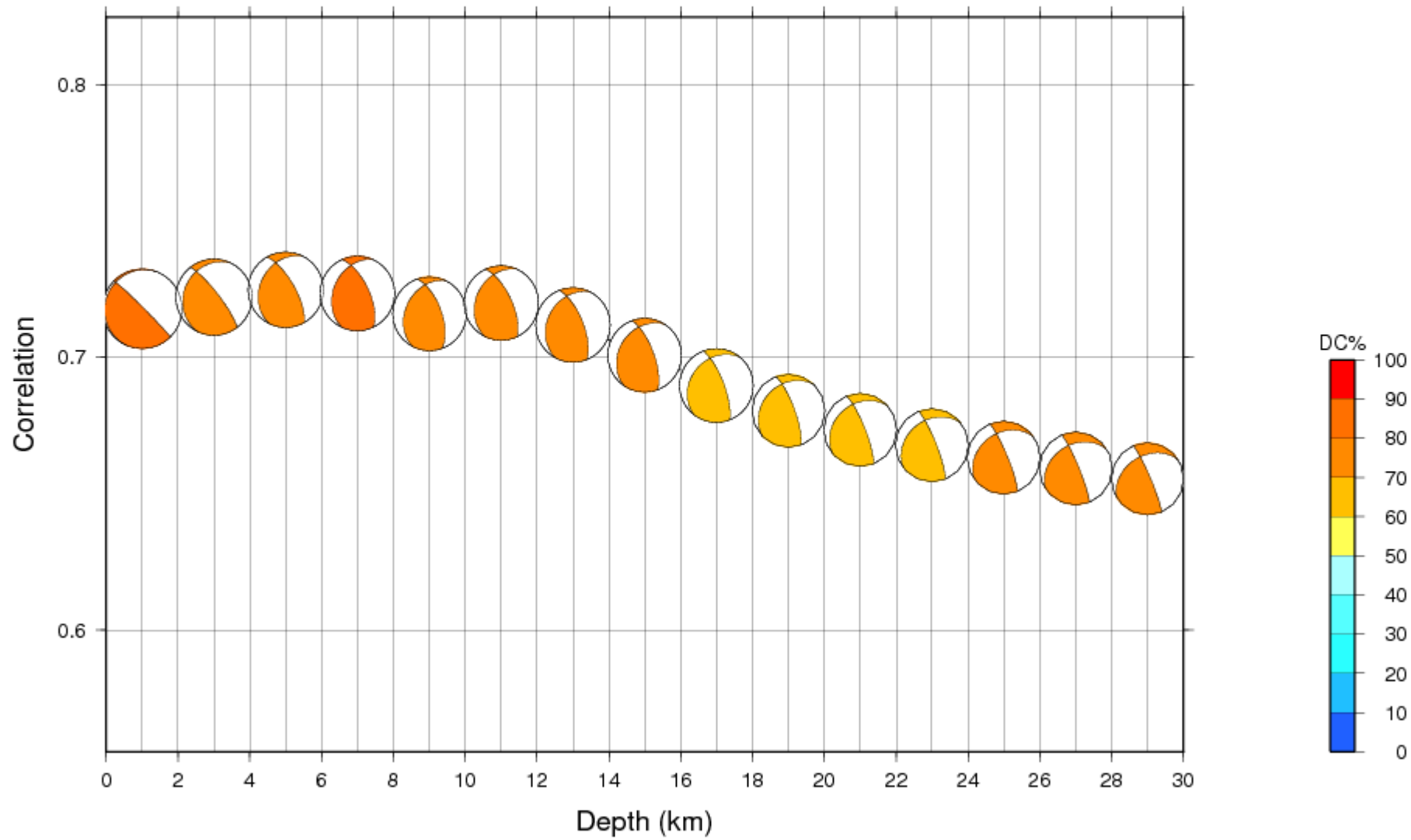
# For 1 event, function temporal 3 seg

r01.ps - GSview

o Editar Opciones Ver Orientación Formatos Ayuda

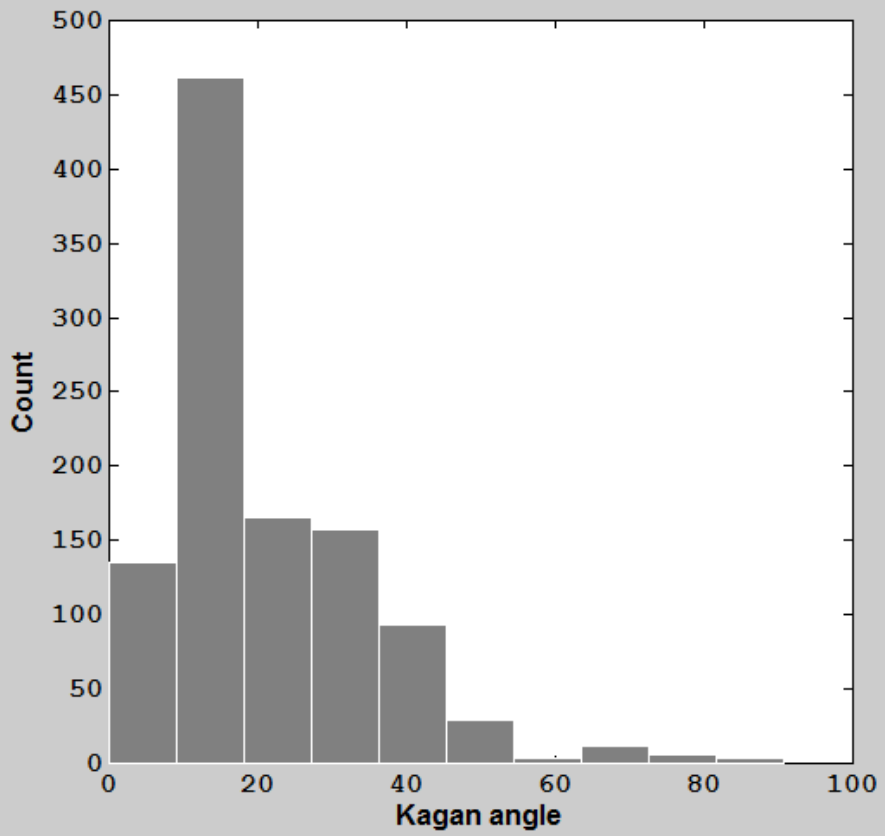


### Correlation vs Depth Plot

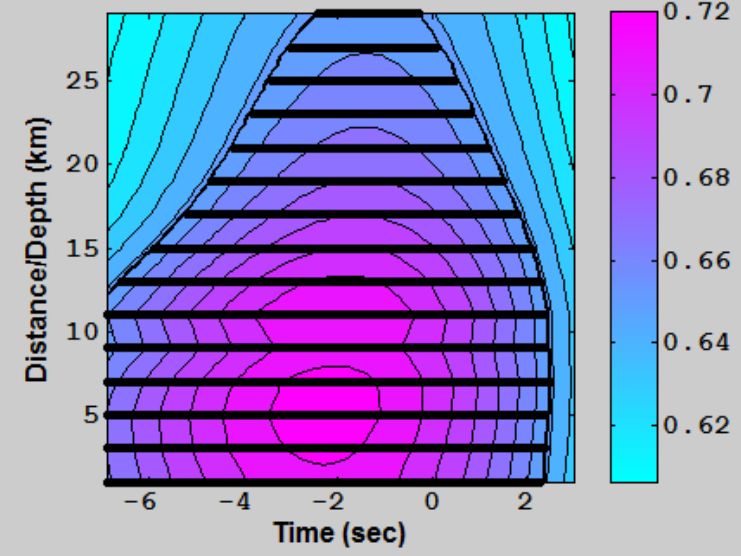




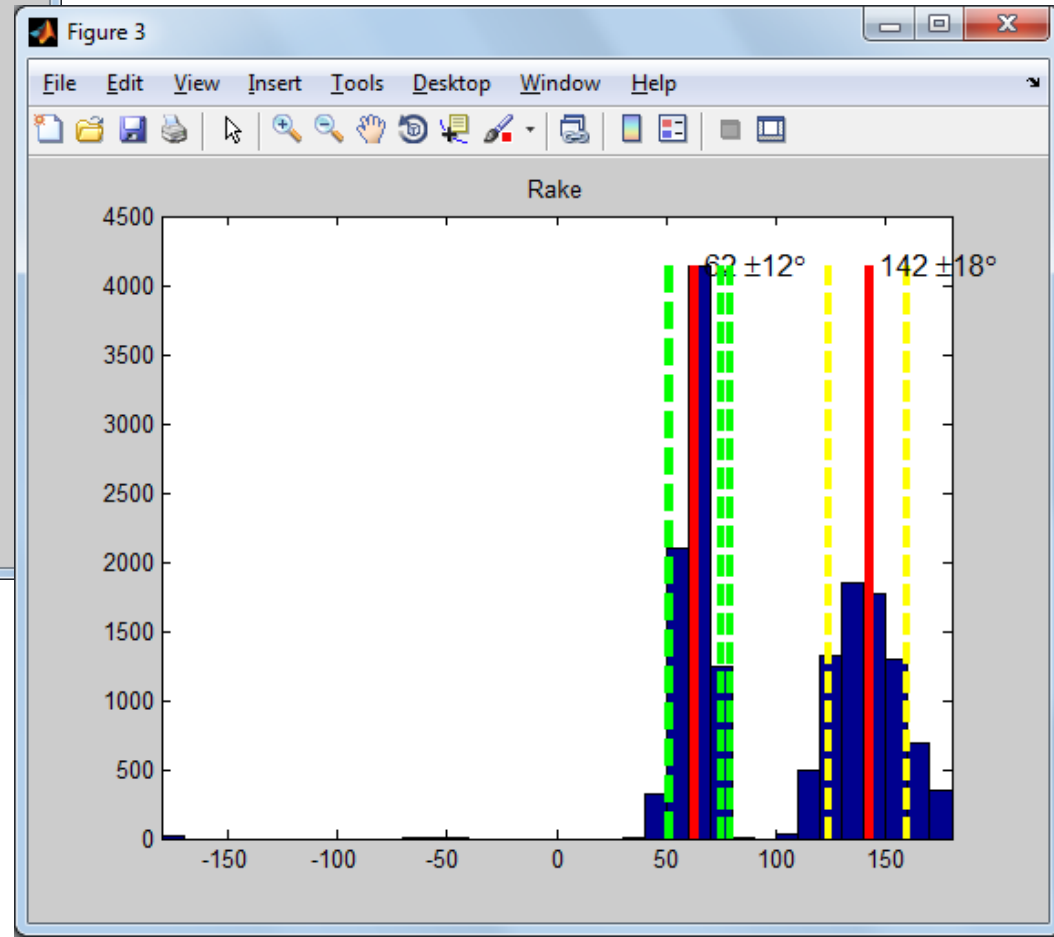
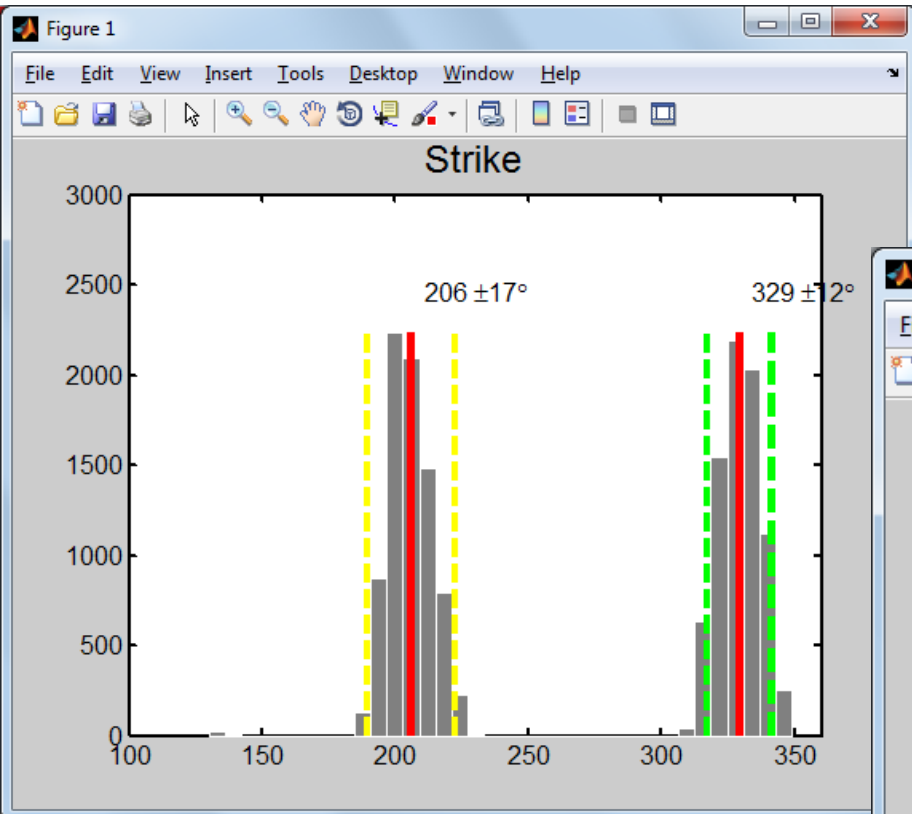
Kagan angle for reference solution STR = 206 DIP = 33 RAKE = 142  
Mean = 21.28 STD = 13.58 Median = 16.45 Var = 184.33  
**FMVAR = 21 ± 14**



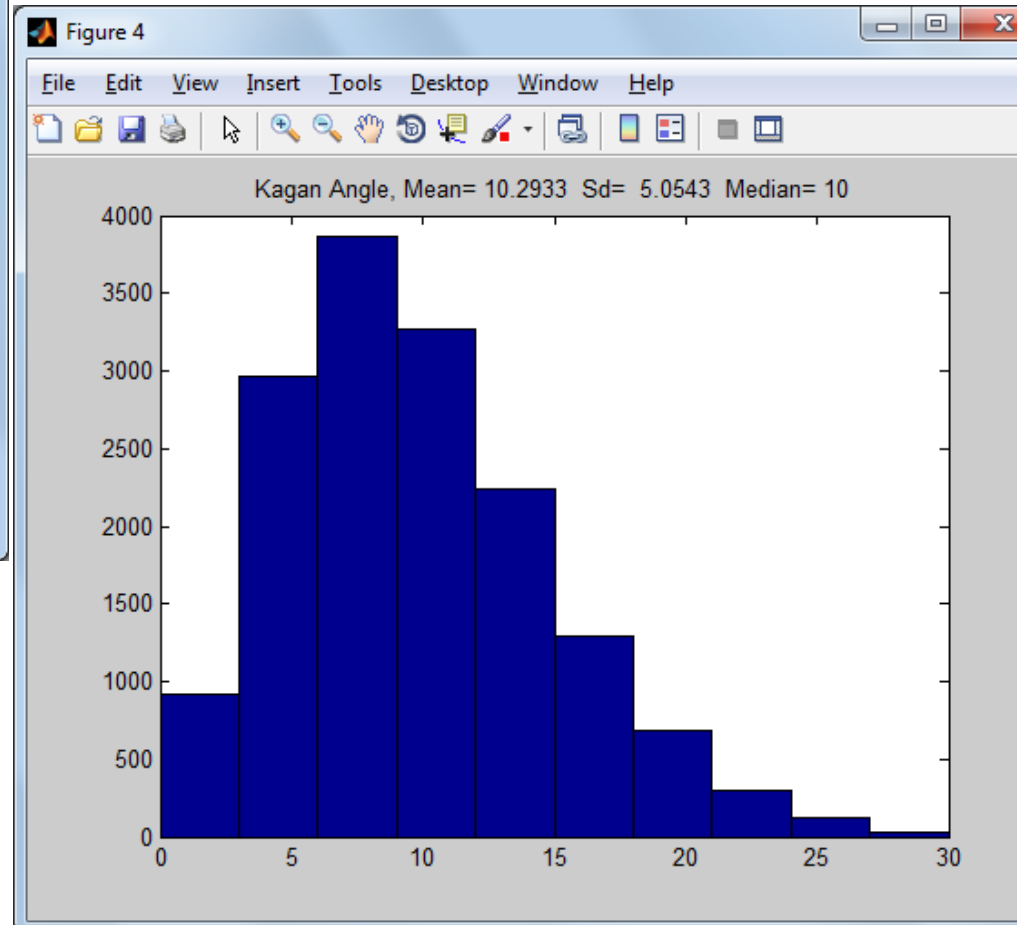
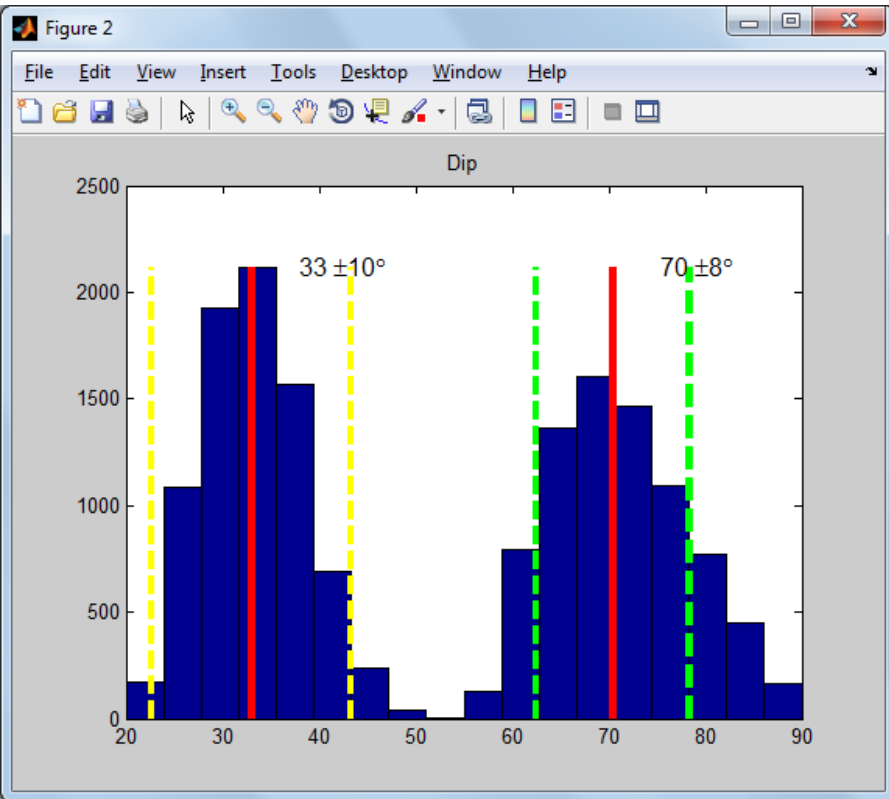
Maximum Correlation = 0.72 Correlation Threshold = 0.65  
**STVAR = 0.71**



# Uncertainty estimate



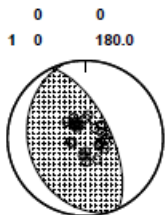
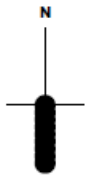
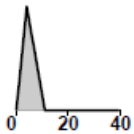
# Uncertainty estimate



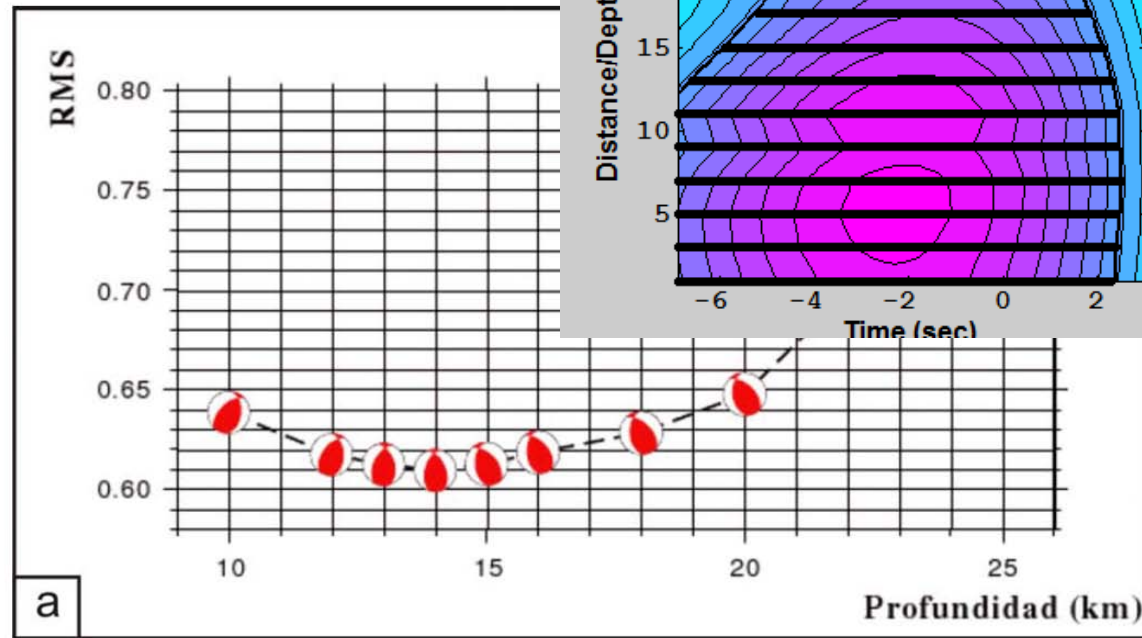
# Discussion

- Tectonic, Insar distribution, CMT catalog, and Kikuchi kanamori inversion.

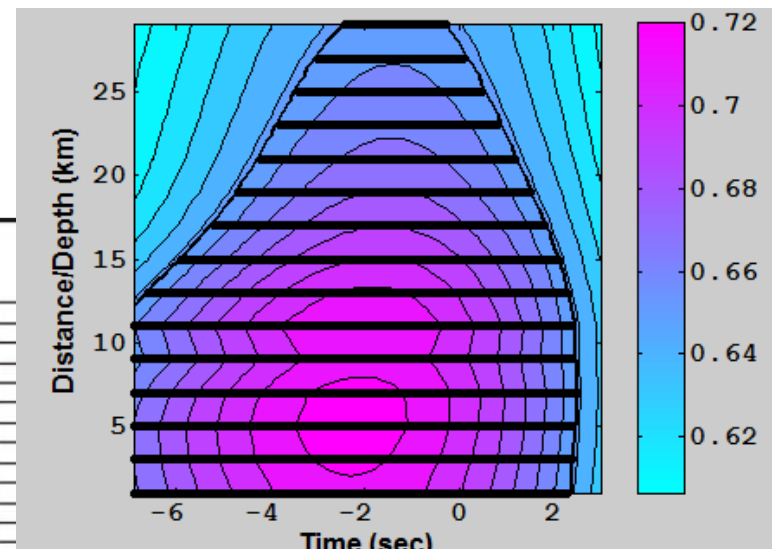
Temporal function  
more large

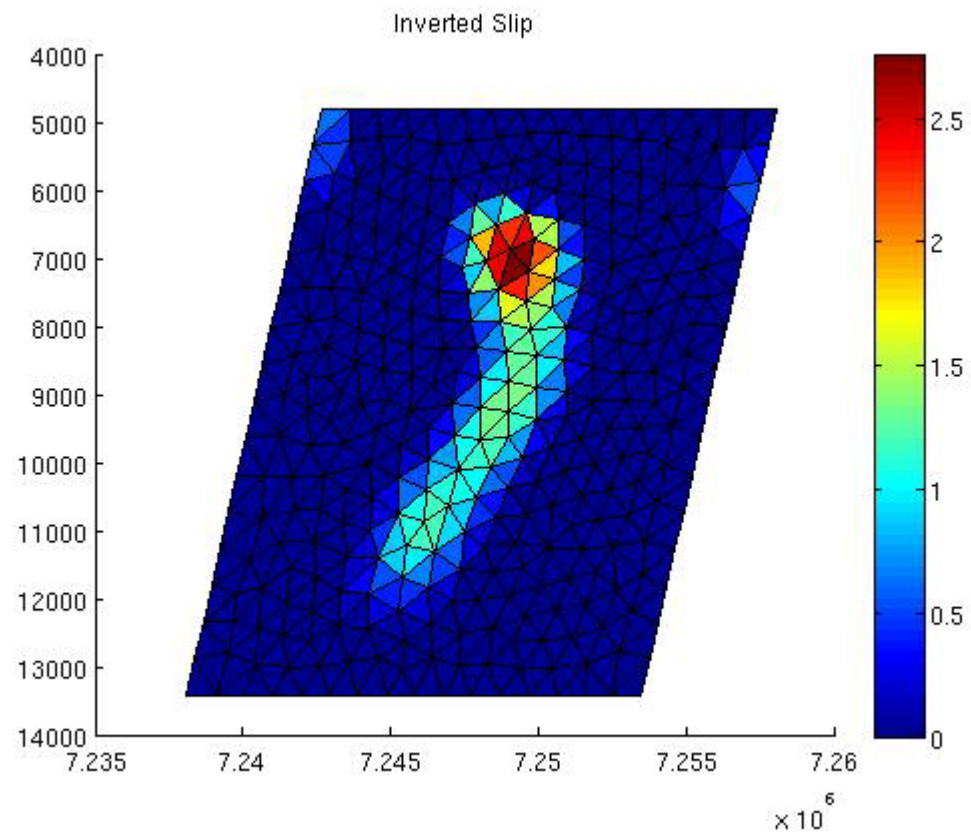


CMT depth 27 km



Inpres localization  
depth 8 km





INSAR depth 6 km

Tectonic depth 2 options

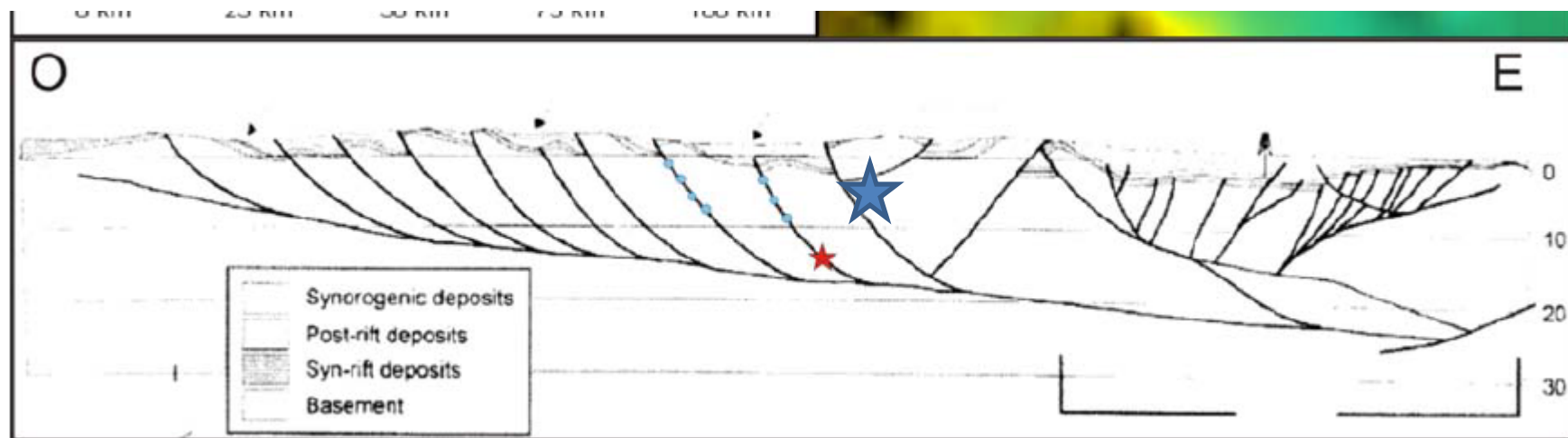
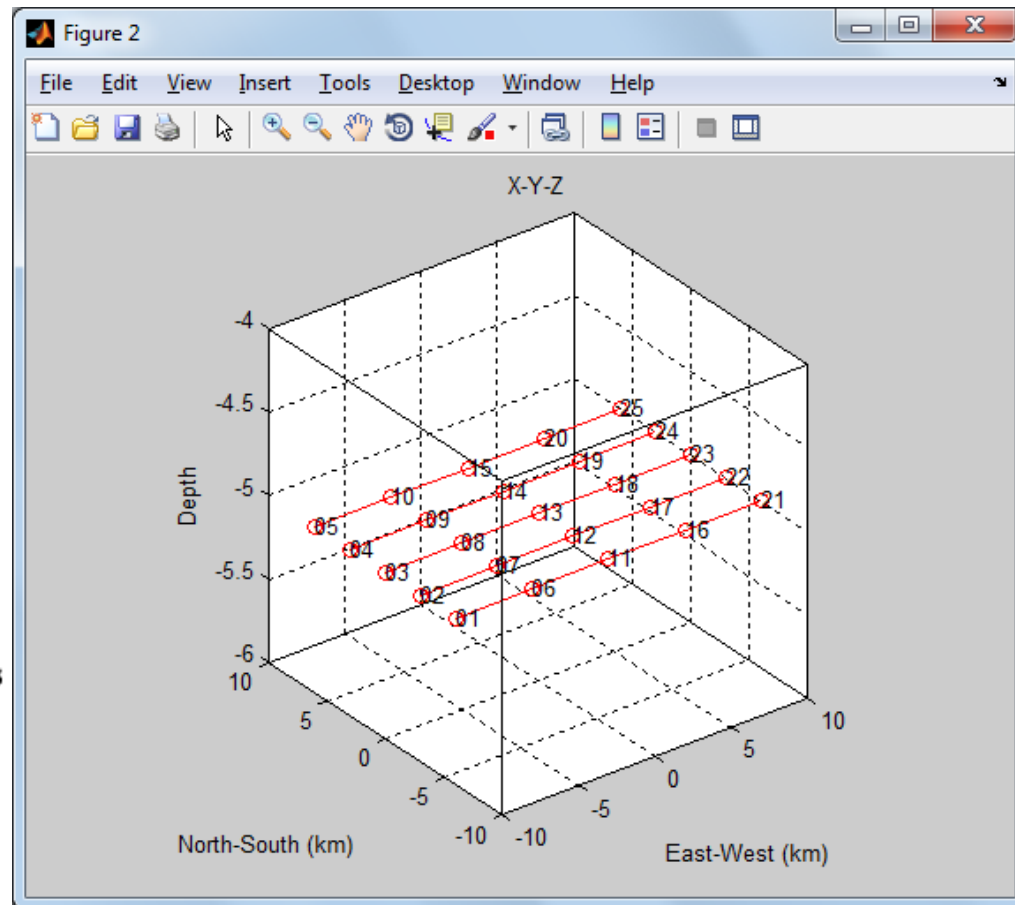
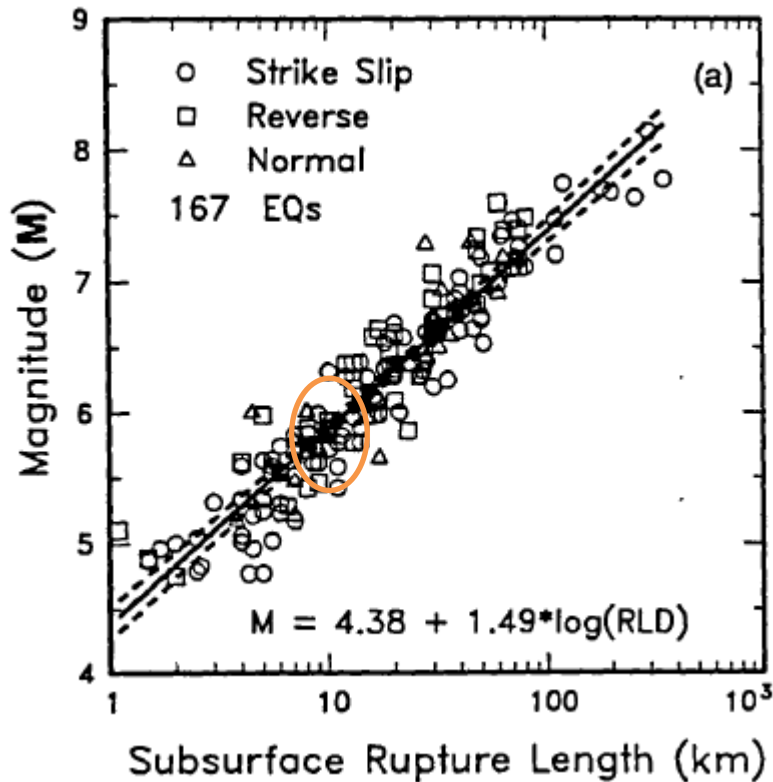


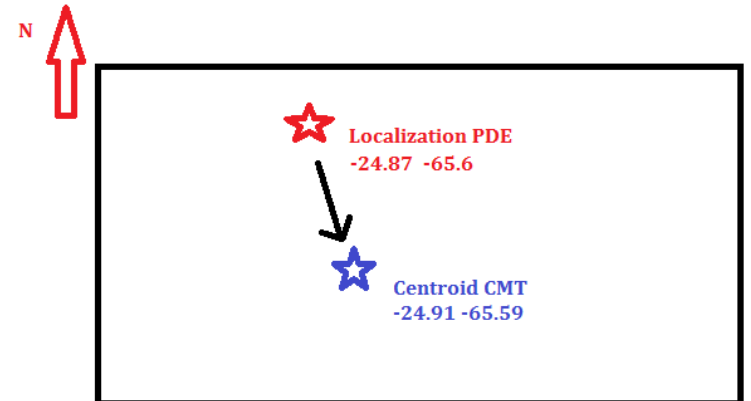
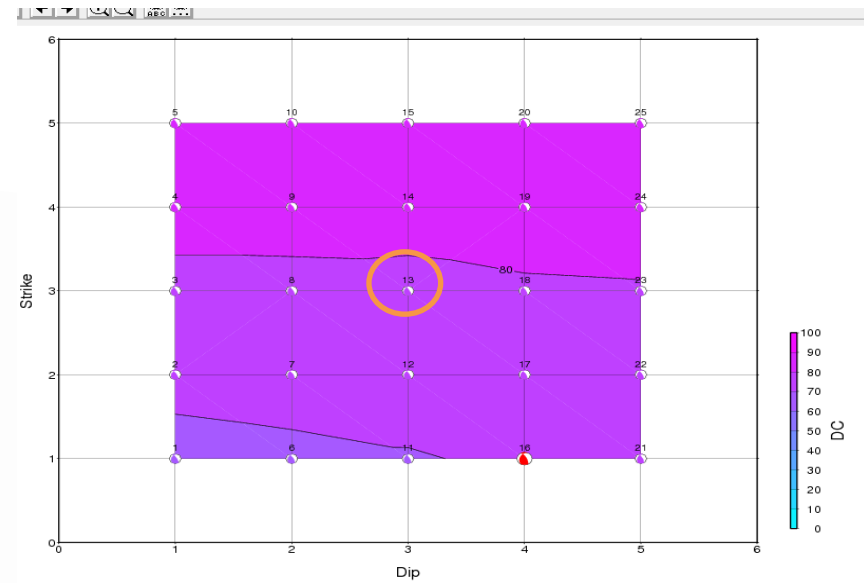
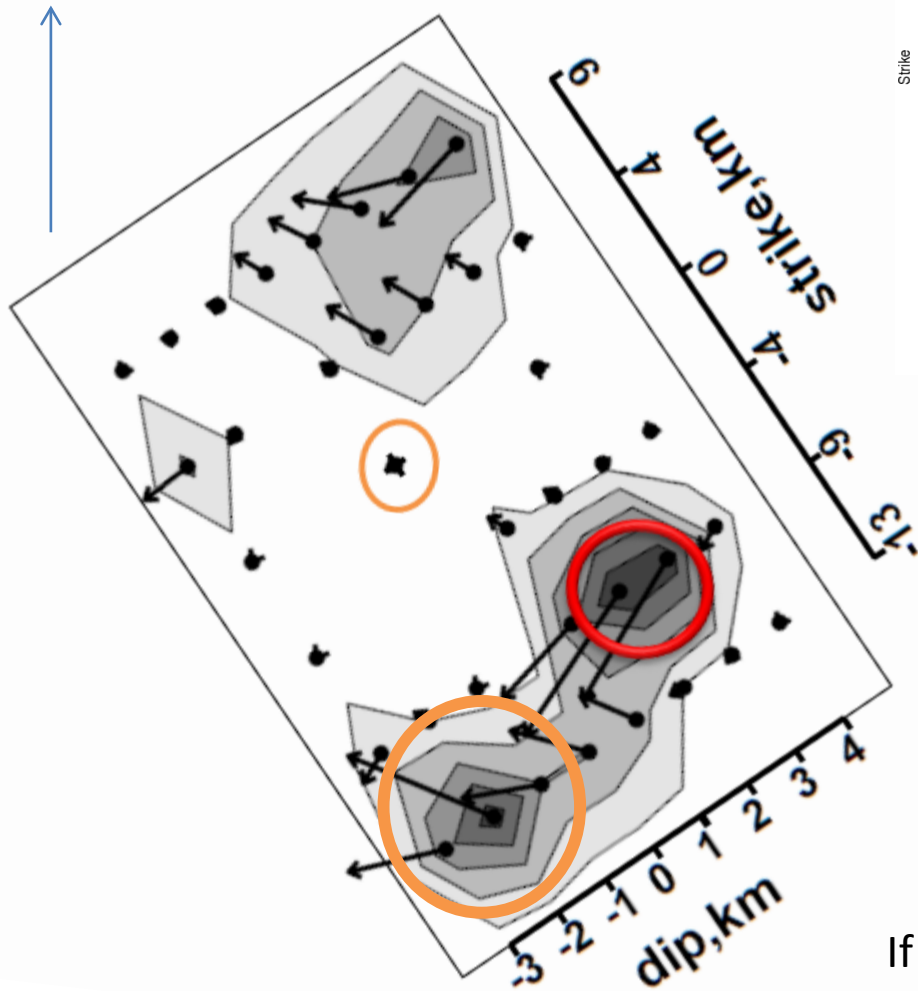
Figure 6. (a) Model of subsurface structure of the rift valley of the Taurus region.

# Single point source inversion

## Design horizontal grid search



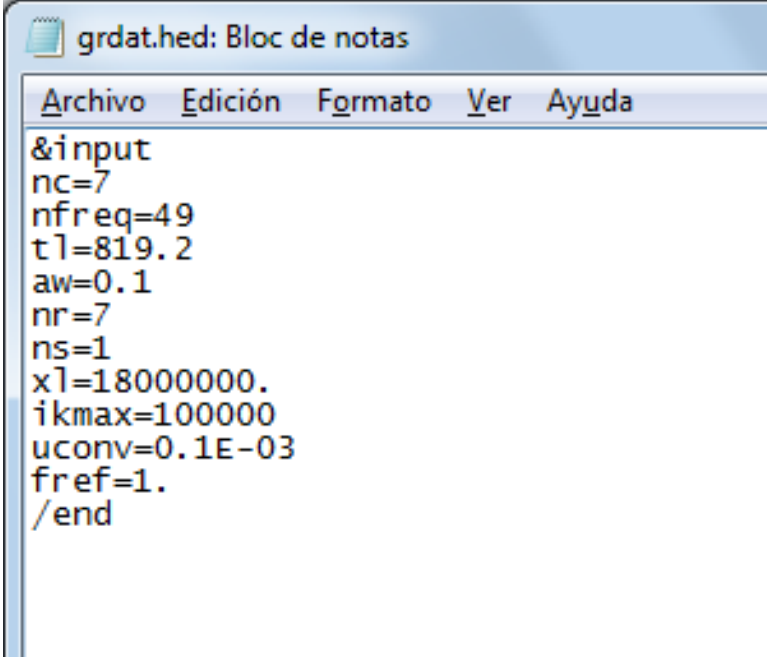




If we had more stations ...  
 It would be very important for comparison  
 with GCMT position and slip distribution.

# Change XL=18000 km

- Para D aproximadamente 900 km..
- En green
- $900 \text{ km} * 20 = 18000 \text{ km}$



```
grdat.hed: Bloc de notas
Archivo Edición Formato Ver Ayuda
&input
nc=7
nfreq=49
tl=819.2
aw=0.1
nr=7
ns=1
xl=18000000.
ikmax=100000
uconv=0.1E-03
fref=1.
/end
```

.... I need work more....

Con alguna estación más, tal vez

Planos con dip en el plano

Hacer nuevamente slip distribución con nueva profundidad, y comparar..

