NEAREST PROJET

Integrated observations from NEAR shore sources of Tsunamis: towards an early warning system

WP.5 Data Integration/ Integrated Tsunami Detection Network:

LEADER: UGR

PARTNERS INVOLVED: FCCUL, IM, CNRST, UGR

Lisbon Meeting 17 and 18 May, 2007

Task 5.1 Establishment of 3 data collectors for real-time automatic processing of data (one in Portugal, the other in Spain and a 3rd one in Morocco). This will involve:

- **i) Waveform sharing between data collectors, integration of seismic data including OBS's;**
- **ii) Integration of tide gauge data;**
- **iii) Integration of multiparameter data from seafloor observatory. Task**

Task 5.2 Development of automatic procedures for rapid determination of seismic parameters and definition of thresholds for triggering the tsunami detection procedures

Activities related with Task 5.1 and 5.2

- **CNRST:**
- Affectation of IP physical address for a workstation to be used as a data collector for exchanging broad band seismic data (in a first step) in real time with the similar data collectors in Portugal and Spain.

- CNRST is working now on preparing one of its broad band stations to be linked and available by the Morroquian data centre.

- CNRST has started two moths ago the study of the possibilities for purchasing and installing, in the framework of NEAREST, a new broad band station, also it will available by Morroquian data collector. Some quotations are now in a study phase. The search of potential sites, for the installation of this broad band station, is already programmed on the second Week of April 2007.

Activities related with Task 5.1 and 5.2

- **UGR:**

In this first semester the UGR group has recruited a person dedicated to the development of fast algorithms of seismic source, and the analysis of the seismicity and seismotectonic of the Gulf of Cádiz.

For the personnel recruitment, it has been required a seismologist with experience in seismic data analysis, in regional seismic source studies and in development of early detection algorithms for early warning procedures.

Activities related with Task 5.1 and 5.2

- Also, the UGR group has begun with the recovery of the available broad band waveforms in the Iberian Peninsula and Europe for earthquakes with magnitude M>4.0 in the Gulf of Cádiz area for the period 2005-2007.

- The waveforms collection has been carry out by the data exchange between partners of NEAREST as IM (Portuguese seismic network) and FFCUL (Lisbon University seismic network) and by using fast transfer tools of seismic waveforms from IRIS and ORFEUS which provide data from MEDNET and GEOFON stations in the area.

Activities related with Task 5.1 and 5.2

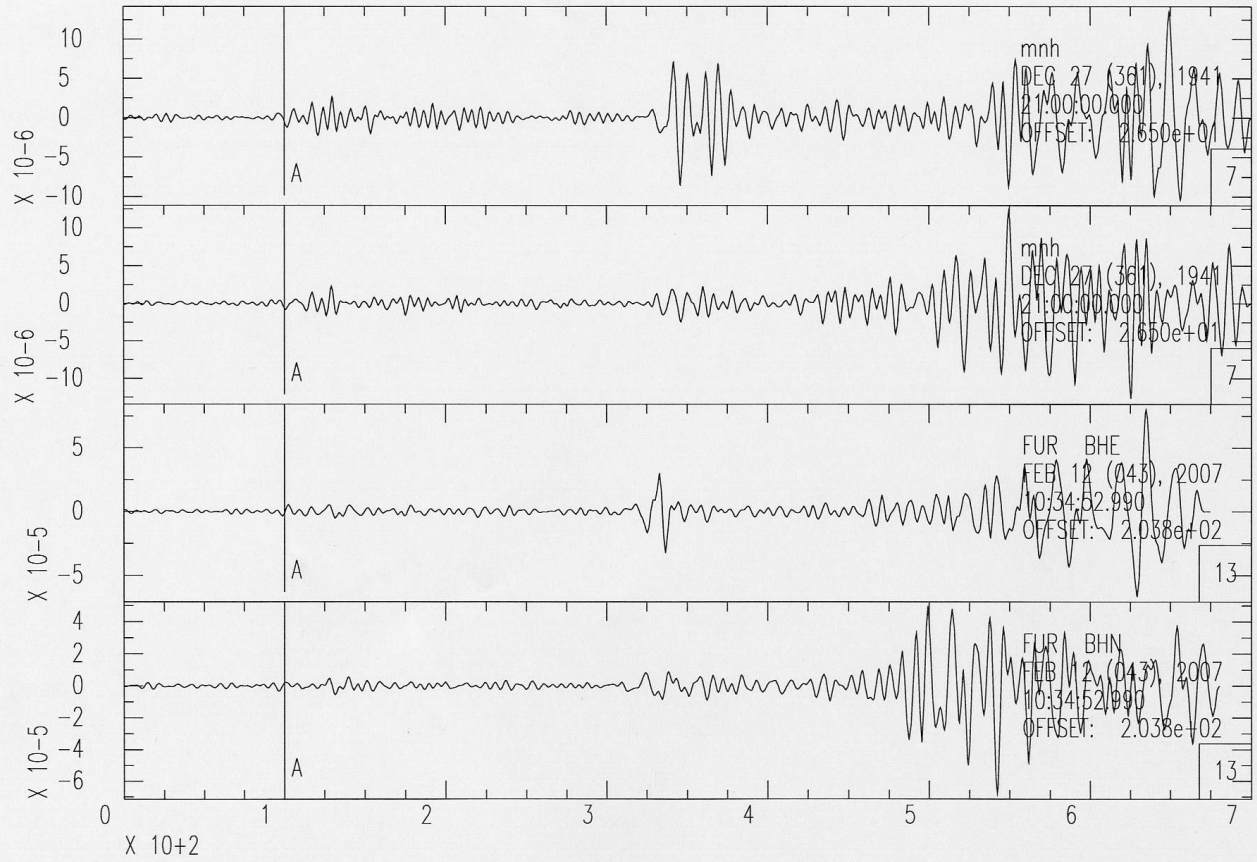
- UGR group have, already, worked with seismograms of the last large earthquake Mw=6.0 happened in the region, February 12, 2007. This earthquake was the largest earthquake occurring in the study area after the large earthquake of February 1969, Mw=7.8.
- This earthquake has provided an excellent and successful opportunity to test the fast interchange of data between groups involved in the project.

- The results of the sources analysis of this earthquake was submitted to Geophysical Research Letters journal “Source analysis of the February 12th 2007, Mw 6.0 Horseshoe earthquake: implications for the 1755 Lisbon earthquake” by Daniel Stich, Flor de Lis Mancilla, Silvia Pondrelli and Jose Morales which has been accepted for publications. A detailed description of the work will be make by Flor de Lis.

Activities related with Task 5.1 and 5.2

- We have made a prelimary investigations of some historical earthquakes in the area of 2007 Mw=6.0 earthquake like December 1941 M=6.5?. We have compared the seismogramas of both earthquake at Munich to know if the focal mechanism is similar or not.

- Also we have to try to collect seismograms at teleseismic distancies of the 1969 Mw=7.8 earthquake to procedure to invert mechanism and if it is possible dislocation. However it is very hard work!!!!

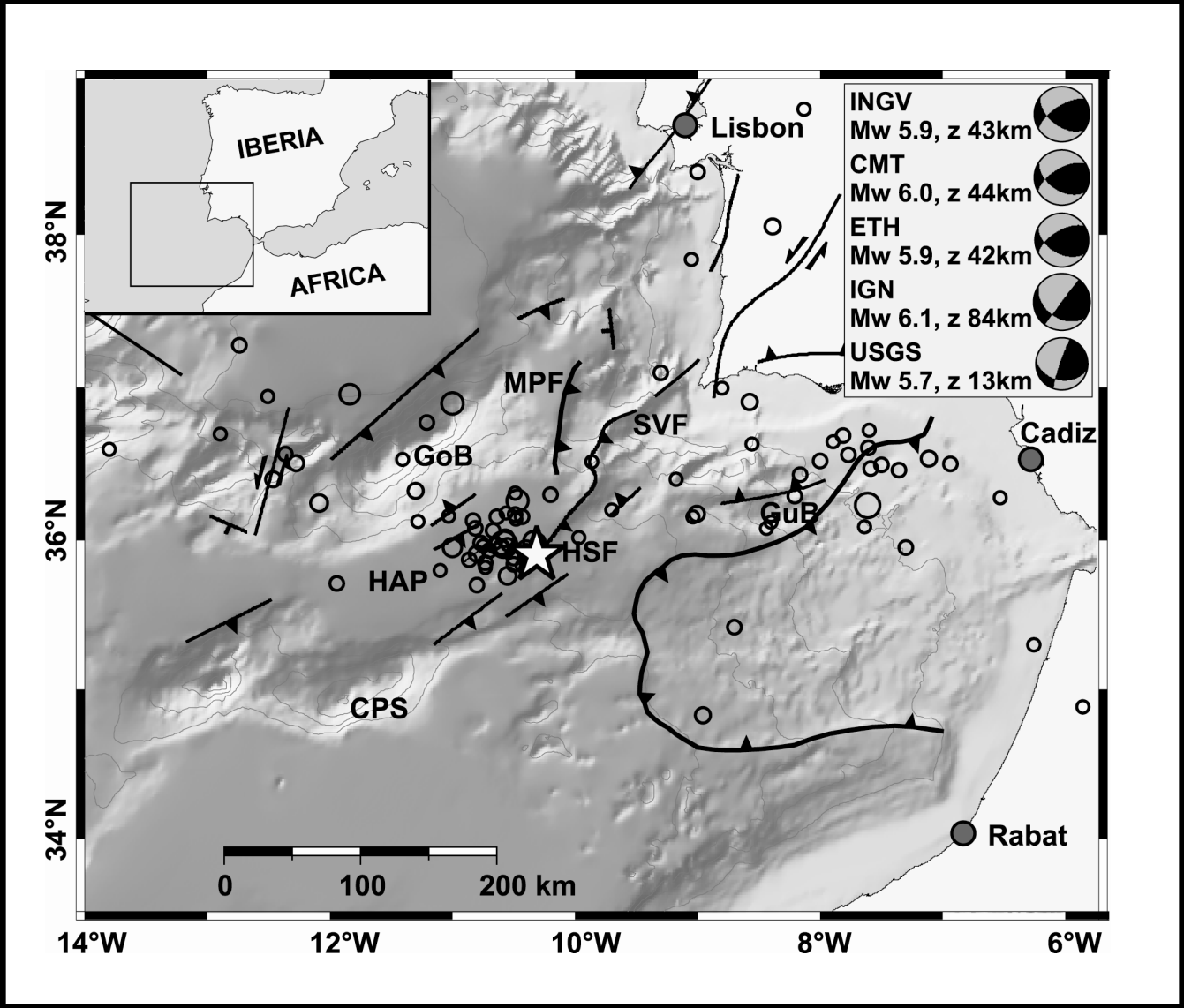

mnh
DEC 27 (361), 1941
21:00:00.000
OFFSET: 2.650e+01
A
7
mnh
DEC 27 (361), 1941
21:00:00.000
OFFSET: 2.650e+01
A
7
FUR BHE
FEB 12 (043), 2007
10:34:52.990
OFFSET: 2.038e+02
A
13
FUR BHN
FEB 12 (043), 2007
10:34:52.990
OFFSET: 2.038e+02
A
13
X 10-6
X 10-6
X 10-5
X 10-5
X 10+2
10
5
0
-5
-10
4
2
-2
-4
-6
0
1
2
3
4
5
6
7

Source Analysis of the February 12th 2007, Mw 6.0 Horseshoe Earthquake

D. Stich, F. Mancilla, S. Pondrelli & J. Morales

Nearest: 17-18 May 2007, Lisbon

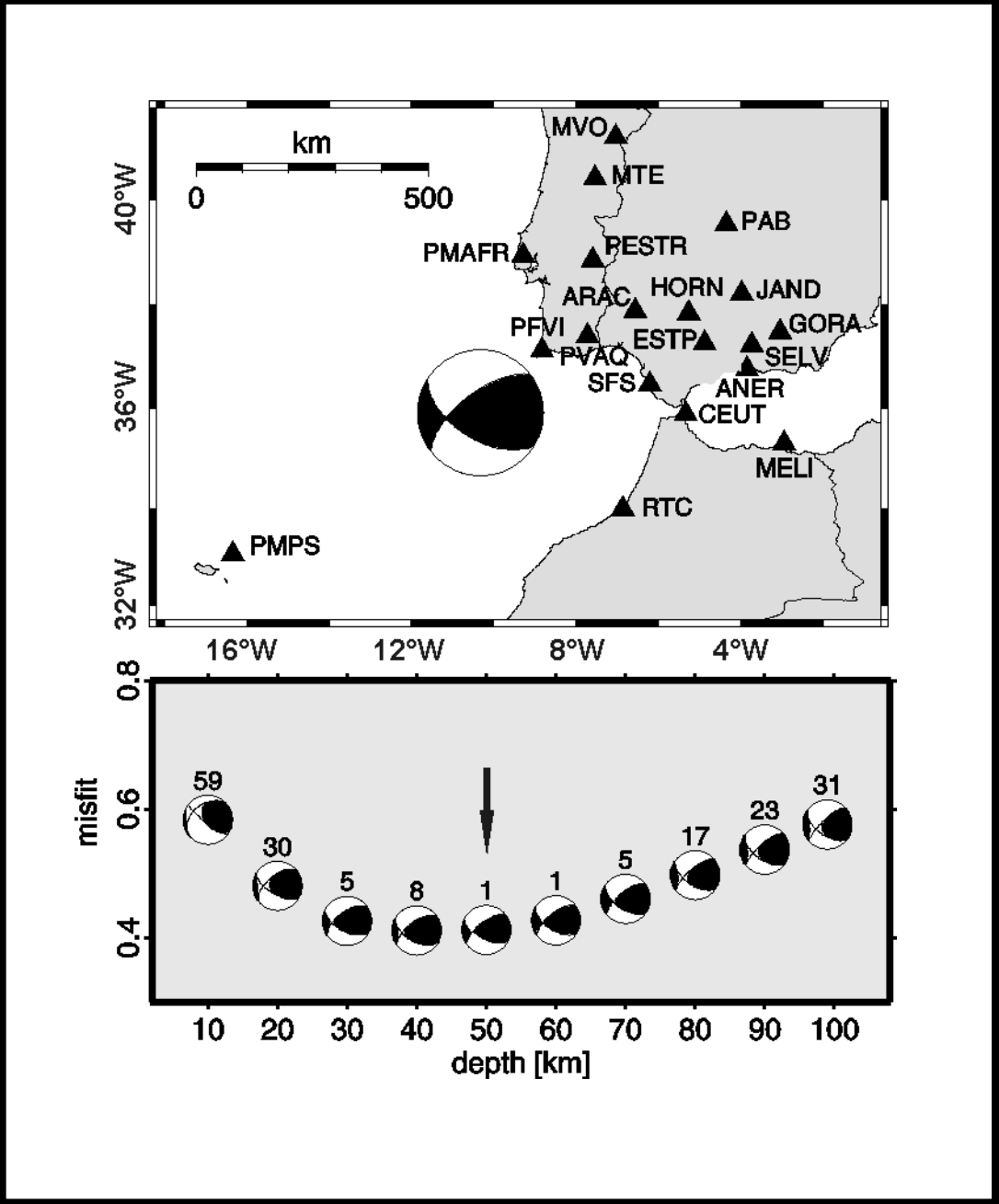
Regional Setting

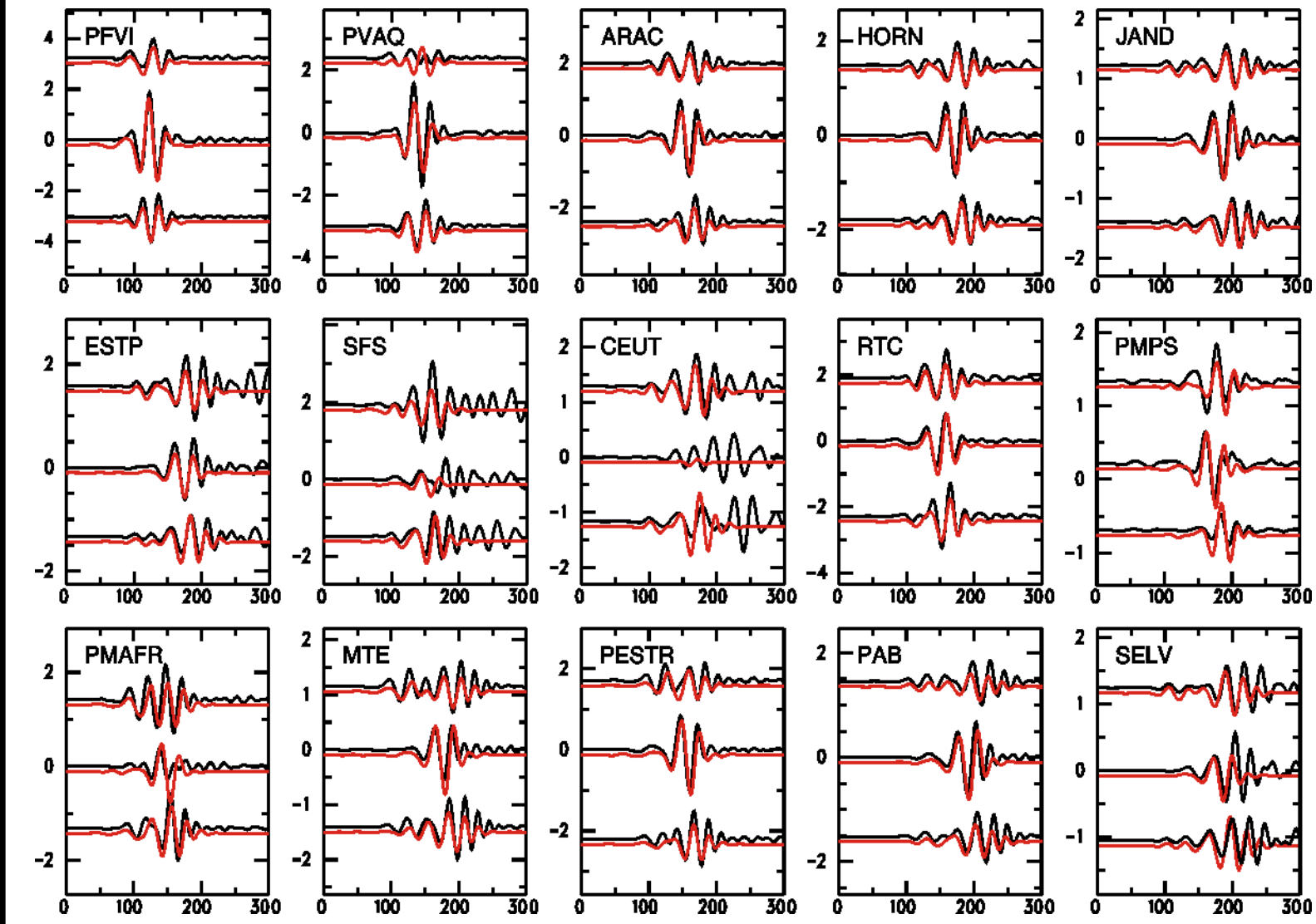


Regional Moment Tensor Inversion

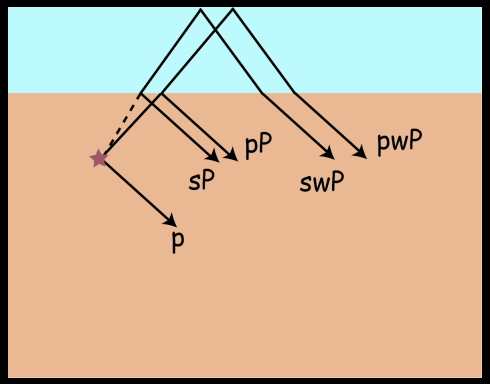
N122°E/55°/147°

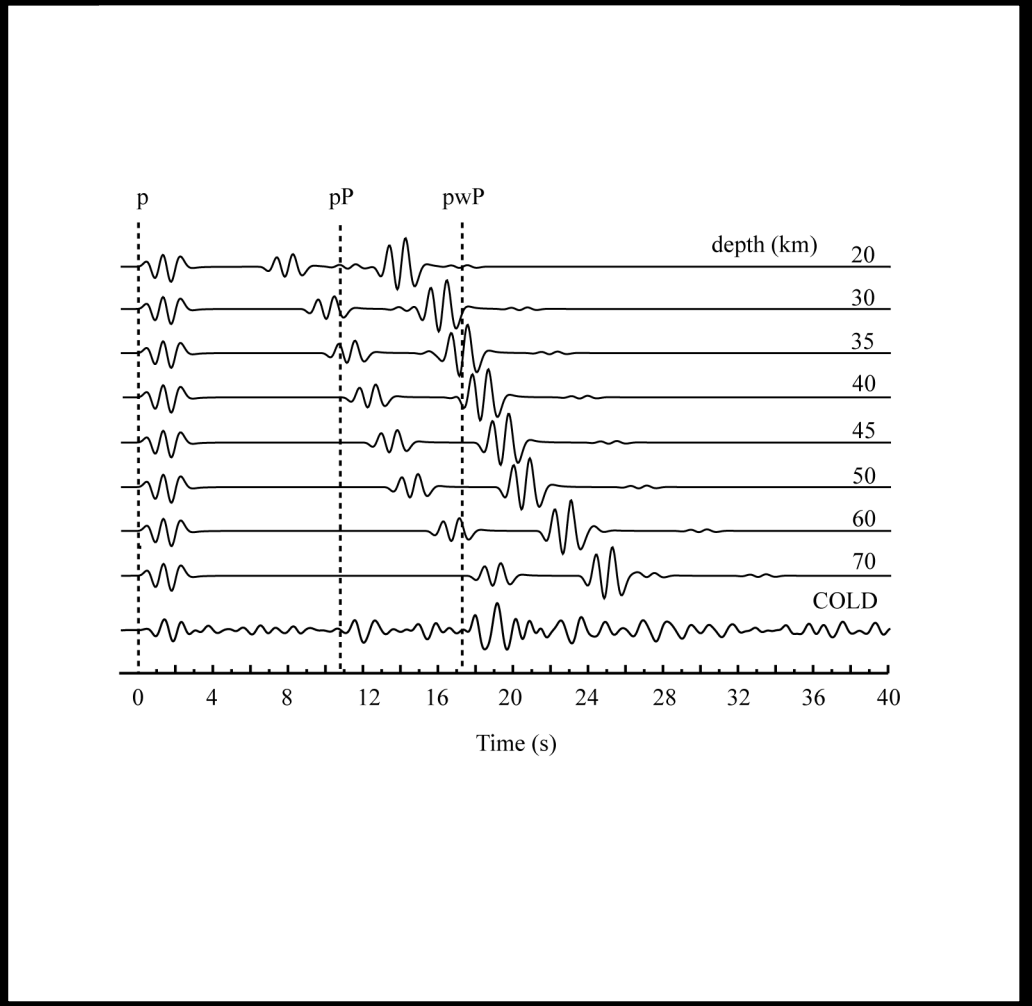
N232°E/63°/40°



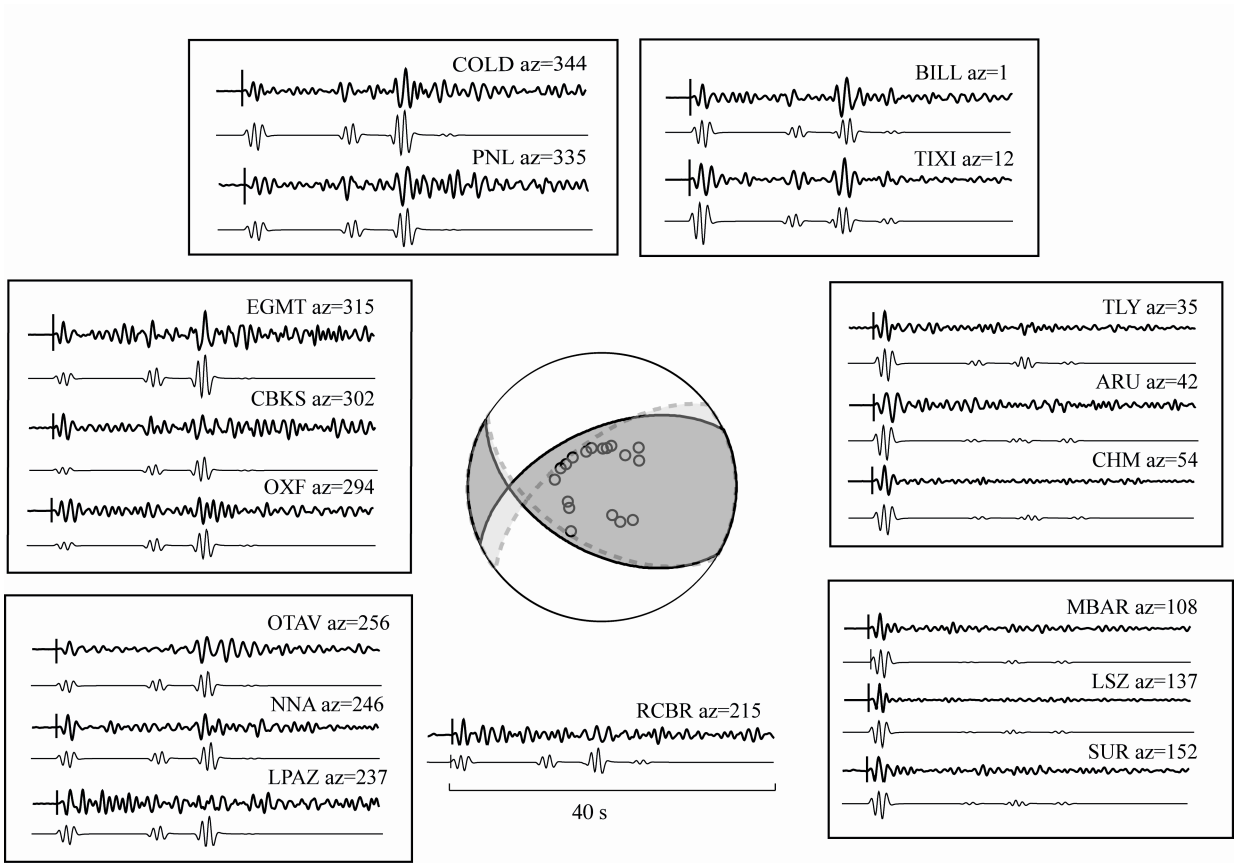

PFVI
PVAQ
ARAC
HORN
JAND
ESTP
SFS
CEUT
RTC
PMPS
PMAFR
MTE
PESTR
PAB
SELV

Telesismic depth phases: pP,sP, pwP & swP

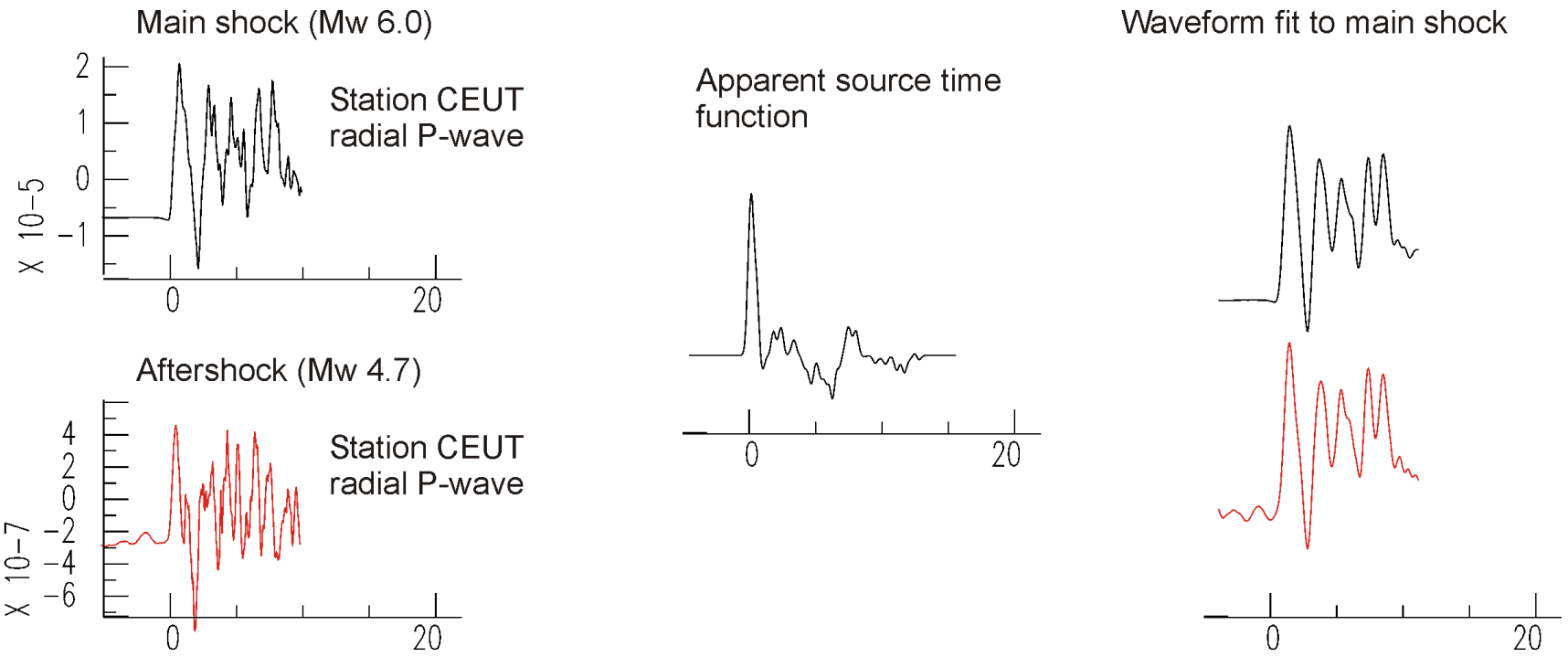




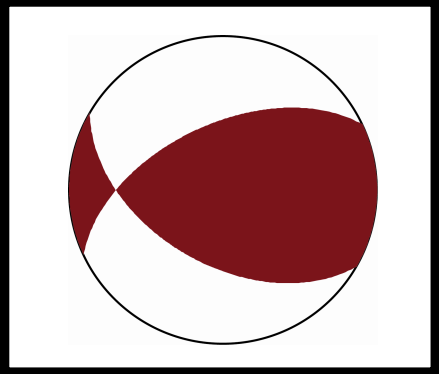
N245°E/55°/50°


COLD az=344
PNL az=335
BILL az=1
TIXI az=12
EGMT az=315
CBKS az=302
OXF az=294
TLY az=35
ARU az=42
CHM az=54
OTAV az=256
NNA az=246
LPAZ az=237
RCBR az=215
40 s
MBAR az=108
LSZ az=137
SUR az=152

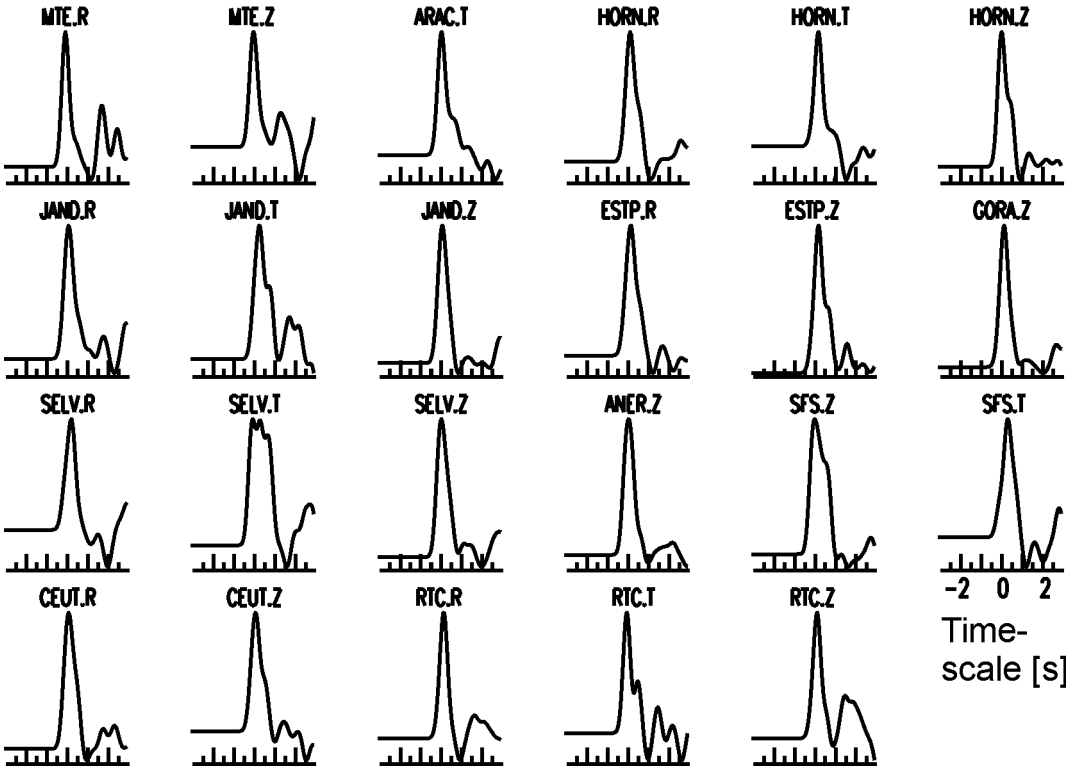
Apparent Source Time Function



N245°E/55°/50°

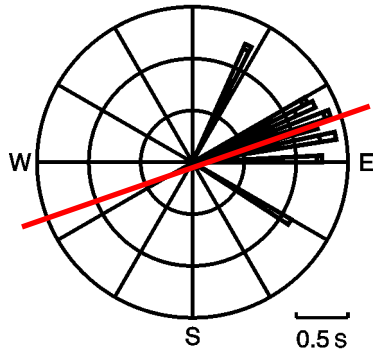


Apparent source time functions (ASTF)

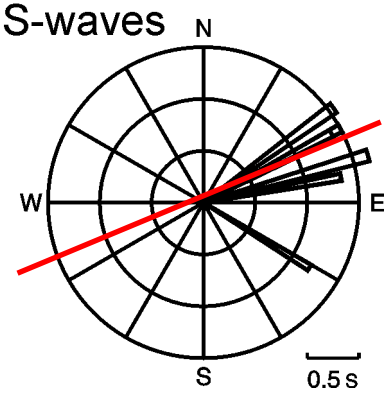


Duration

P-waves



S-waves



Rupture duration 1.1 s

Rupture velocity 0.8 Vs = 3.7

Circular crack

Radius 4.1 km

Area 53 km

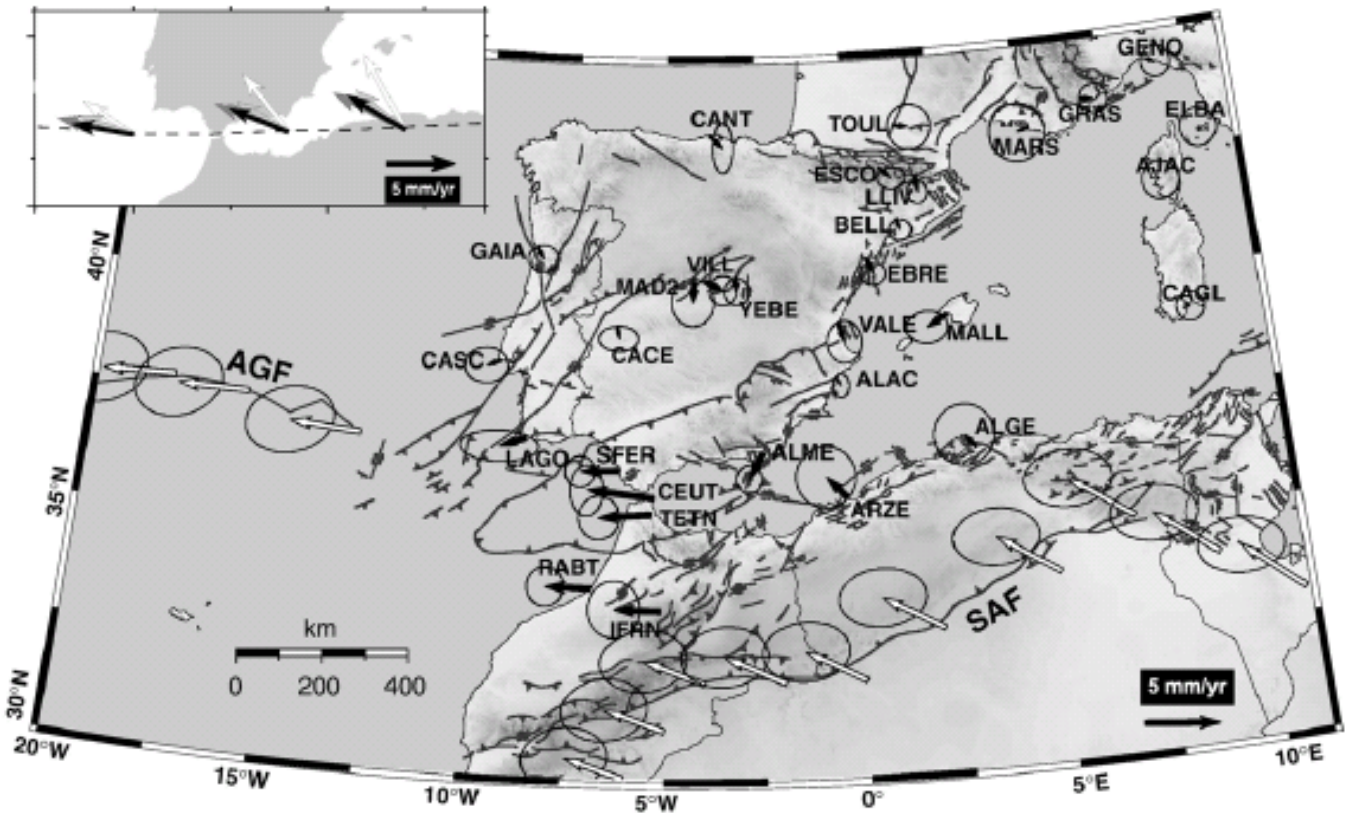
Dynamic stress drop 6MPa

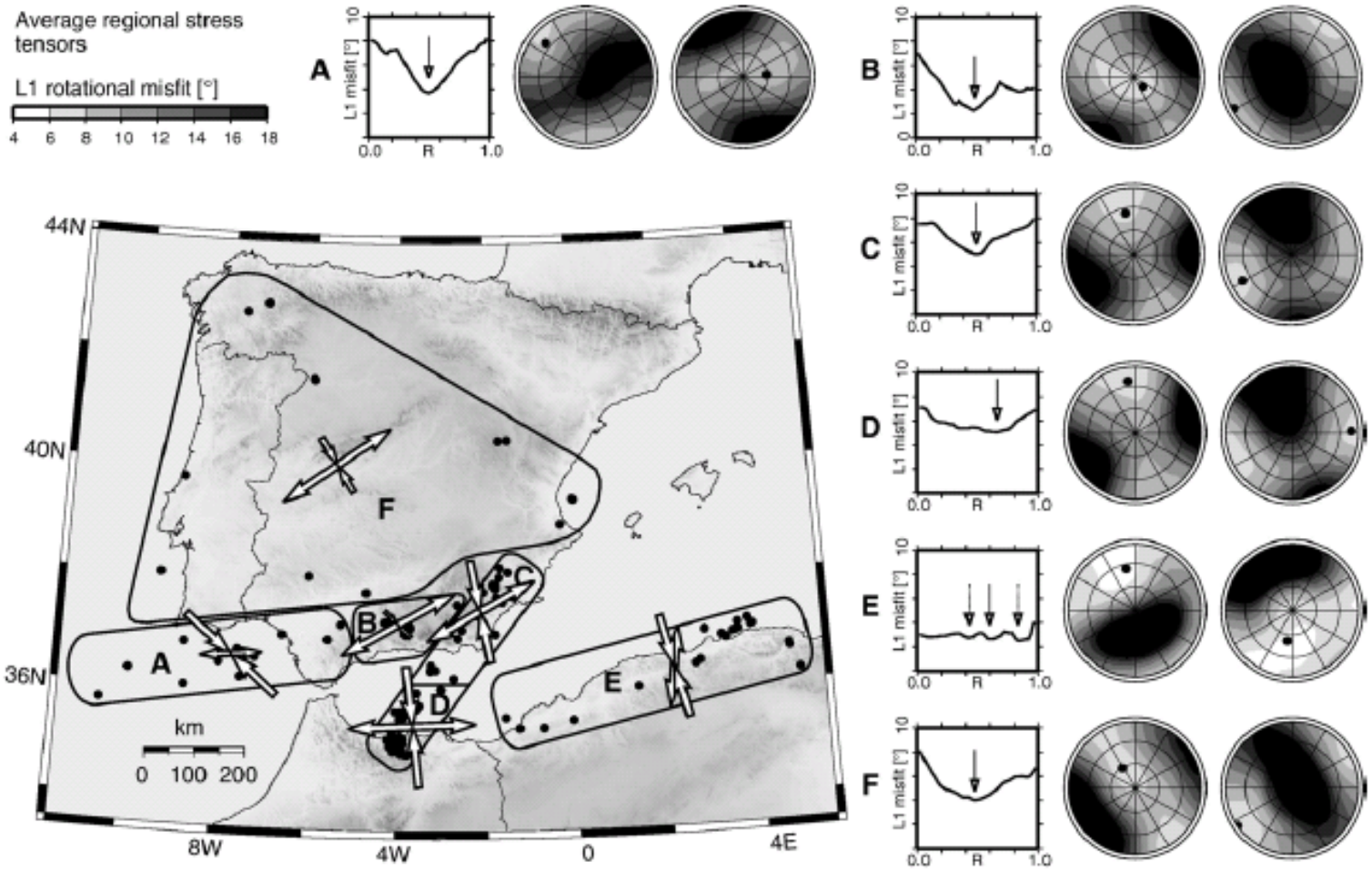
Average slip 0.27 m

Length/slip 3.7e-5

Mw 8.5 → 230 km

Mw 8.7 → 310 km


5 mm/yr
GENO
CANT
TOUL
GRAS
ELBA
MARS
AJAC
ESCO
LLIV
BELL
GAIA
VILL
EBRE
MAD2
YEBE
CAGL
VALE
MALL
CASC
CACE
AGF
ALAC
ALGE
LAGO
SFER
ALME
CEUT
TETN
ARZE
RABT
JERN
SAF
km
0
200
400
5 mm/yr
40°N
35°N
30°N
20°W
15°W
10°W
5°W
0°
5°E
10°E


Average regional stress tensors
L1 rotational misfit [°]
4 6 8 10 12 14 16 18
A
B
C
D
E
F
L1 misfit [°]
0.0 R 1.0
44N
40N
36N
8W
4W
0
4E
km
0 100 200