Université Mohammed V – Agdal
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Catalogue of focal mechanisms of Moroccan earthquakes for the period 1959-2007

Fida MEDINA

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Abstract. This document presents an exhaustive inventory of the focal mechanisms of the strongest earthquakes that occurred from 1959 to 2007 in Morocco and surroundings between 29°–36°N; 1.5°–9°W (northern Morocco) extending to 11°W in Agadir area. A total of 166 mechanisms were inventoried for 100 events. Most mechanisms were determined for earthquakes in the Central Rif area (Al Hoceima) and its Mediterranean continuation. Solutions are based on *P* wave first motion before 1992, and on moment tensor inversion since that time.

Catalogue des mécanismes au foyer des séismes du Maroc pour la période 1959-2007

Résumé. Ce document présente un inventaire exhaustif des mécanismes au foyer determines pour les séismes les plus importants ayant eu lieu de 1959 à 2007 au Maroc et régions voisines entre les coordonnées 29°–36°N; 1.5°–9°W (nord du Maroc) s'étendant à 11°W dans la région d'Agadir. Un total de 166 mécanismes ont été inventoriés pour 100 événements. La plupart des mécanismes ont été déterminés pour des séismes dans le Rif central (Al Hoceima) et son prolongement en Méditerranée. Les solutions sont basées sur le premiers sens des ondes *P* avant 1992, et sur l'inversion du tenseur moment après cette date.

فداء مدينة

فهرس للألويات عند البؤرة للهزات الأرضية بالمغرب خلال المدة 1959-2007

مكن الجرد المدقق للوثائق المنشورة أو المدرجة بمواقع الإنترنيت للعديد من الباحثين و مراكز الرصد الزلزالي من جمع 166 ألوية عند البؤرة ل 100 هزة أرضية قوية أو متوسطة وقعت بالمغرب و جواره خلال المدة الممتدة من 1959 إلى 2007. أغلب الألويات تم تحديدها لهزات بمنطقة الريف الأوسط (الحسيمة) و امتدادها المتوسطي. و تعتمد الألويات التي تم تحديدها قبل 1992 على الحركة الأولى للموجات الأولية، أما بعد ذلك استعملت طريقة تحليل الموجات.

INTRODUCTION

In the setting of the study of lithospheric deformations, the determination of focal mechanisms of earthquakes is a necessary tool for understanding the displacement type on seismogenic faults and for determining the state of stress related to plate motions, in particular at their boundaries. Since a large increase in the number of data was recorded in the last decades, it has become necessary to gather up the available focal mechanisms in regional catalogues. Examples of such catalogues have been published by Shirokova (1972), McKenzie (1972), Udias *et al.* (1989) for the Mediterranean area, or are available from the websites of the National Earthquake Information Center (US Geological Survey), Harvard University, the European Mediterranean Seismological Centre, Instituto Geografico Nacional (IGN) and Instituto Andaluz de Geofisica (IAG). However, the printed catalogues have been elaborated for large areas (e.g. the Mediterranean area), and only include strong earthquakes (M≥5), so they are not adapted to small areas such as countries.

The present catalogue includes a list of all focal mechanisms determined for the Moroccan earthquakes located within the geographic coordinates 29°–36°N; 1.5°–9°W (northern Morocco) extending to 11°W in Agadir area. The Saharan aseismic region is not included.

This document should rather be regarded as a working sheet than an analytical research work. Therefore, no seismotectonic interpretation will be developed. In parallel to this publication, a computer files in Excel® format has been prepared in order to make possible processing data and adding or modifying parameters.

BRIEF INSIGHT ON THE SEISMICITY OF MOROCCO

Seismicity of Morocco is related to the convergent plate motion of the African plate with respect to the Eurasian plate, which occurs along a N320 trend with a velocity of 0.5 cm/y according to models NUVEL-1 et NUVEL-1A (DeMets *et al.* 1994). Recent GPS data indicate that the direction of convergence is rather WNW-ESE (N116E) with a rate of 4 mm/y (McClusky *et al.* 2003), and is accommodated within the mobile zone north of the southern boundary of the Atlas chain, including a probable SSW-verging escape zone in the Al Hoceima area (Fadil *et al.* 2005, Stich *et al*. 2006).

At the Moroccan scale, seismicity is relatively important but, as shown in Figure 1, appears as diffuse on all the seismicity maps of the western Mediterranean area (e.g. Udias *et al.* 1976, Cherkaoui 1988, El Alami *et al.* 2004). At a regional scale, some epicentres appear to be aligned along NNE-SSW, NNW-SSE and WNW-ESE trends, especially in the Al Hoceima area and in western Alboran (Cherkaoui *et al*. 1990, Calvert *et al.* 1997, El Alami *et al.* 1998, Buforn *et al.* 2004, Dorbath *et al.* 2005).

These earthquakes are of low to moderate magnitude (maximum Mw = 6,2 at Al Hoceima on February, 24, 2004) and generally shallow foci, although some events have focal depths of 100 km (Hatzfeld & Frogneux 1981, Buforn *et al.* 2004).

FOCAL MECANISMS

Determination of focal mechanisms started at the beginning of the 1960's and rapidly expanded during the decade 1990-2000, in parallel with the quantitative and qualitative improvement of the worldwide seismic survey networks. Progressively, the manual and automatized determination of the fault planes from P-waves first motions were replaced by waveform analysis and moment tensor determination, which provide faster solutions.

The first determinations of focal mechanisms of Moroccan earthquakes were carried out after the deadly Agadir earthquake (February, 29th, 1960; M=6; 12 000 killed). The first solutions for this event were published by Constantinescu (1966), Wickens & Hodgson (1967) and Shirokova (1972). However, solutions were not systematically determined before the 1970's in parallel with the improvement of the seismic

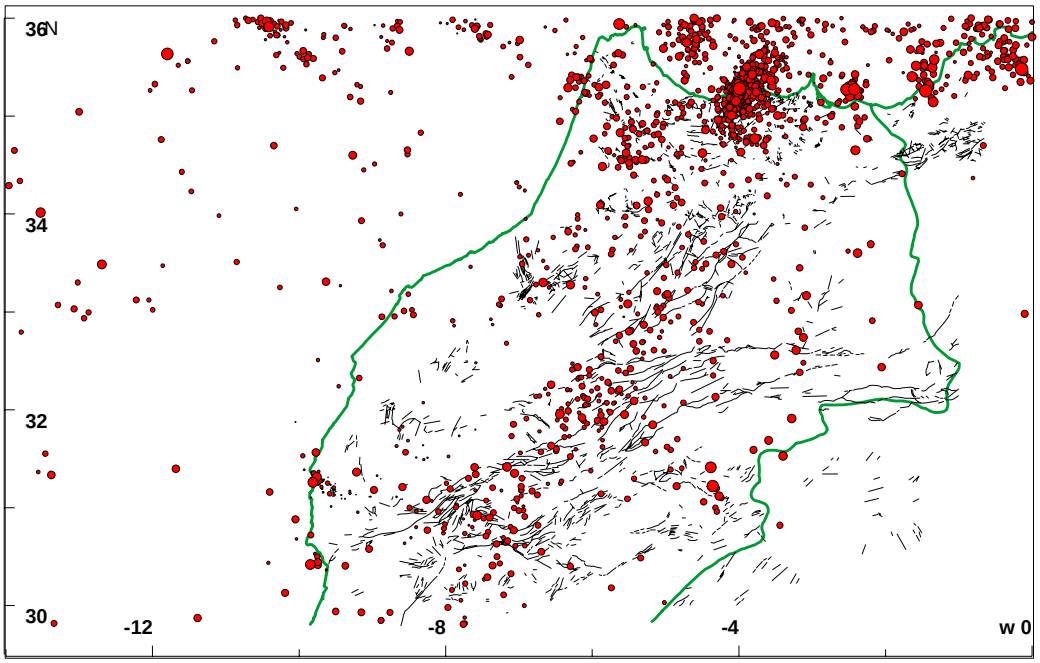


Figure 1. Seismicity of Morocco (northern provinces) for the period 1987-2000 and main fault structures. Source: files El Alami.

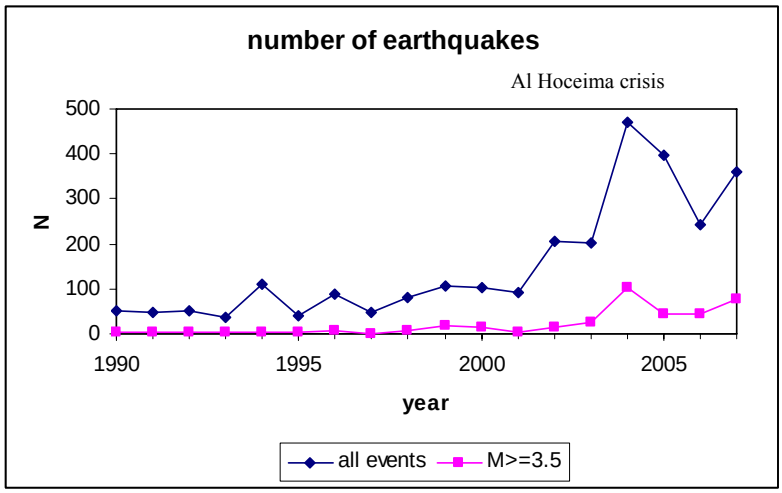


Figure 2. Number of total and M≥3.5 events recorded by CNR from 1990 to 2007. Source: CNR files (http://sismo-lag.cnrst.ma)

network of the *Service de Physique du Globe* (SPGM) of the *Institut Scientifique* (Rabat), which comprised as much as 15 operating stations (Frogneux 1980).

Beside the study of major single events (Udias *et al.* 1976 and following papers), regional-scale studies were published by Hatzfeld (1978) for the earthquakes previous to 1978, relayed by Medina & Cherkaoui (1992) for the events recorded from 1959 to 1986.

From 1998 on, the development of the Spanish networks of IAG and IGN enabled the numerical determination of focal mechanisms of moderate earthquakes (M ≈ 4) using moment tensor inversion, thus leading to a larger number of data.

As the database has increased, it was difficult to gather the data from various sources where they are scattered in catalogues, journal articles, reports and bulletins. Furthermore, the references are not always correctly quoted, thus making difficult assigning a given event to the original author(s) especially after changing or adapting plane attitude notations to present-day current conventions.

In Table I (from Medina & El Alami 2006) are summarized the main authors and agencies and the method used.

Table I

Method	Authors	Events
Polarity of P-wave arrivals	Hatzfeld (1978)	teleseisms previous to 1980
	Medina & Cherkaoui (1992)	teleseisms 1959-1986
	Hatzfeld *et al.* (1993)	microseims of 1989
	Medina (1995)	microseisms of 1989, teleseisms
	El Alami *et al.* (1998)	major events of the 1994 seismic crisis
	Instituto Geografico Nacional (IGN, Spain)	teleseismic events
	Bezzeghoud & Buforn (1999)	teleseismic events
Waveform analysis	Bezzeghoud & Buforn (1999) and Buforn *et al.* (2005)	major shocks of 1994 and 2004
	Biggs *et al.* (2006)	
Moment tensor	IGN and IAG centres ZUR (Switzerland) and MED (France), Stich *et al*. (2003) and Rueda & Mezcua (2004)	moderate teleseisms (4<M<5)
	Stich *et al*. (2005)	major shock of 2004

CHARACTERISTICS OF THE CATALOGUE

Database

The database used for this catalogue comprises all mechanisms published in widely-distributed and less known journals, theses, reports and available online catalogues (NEIC, IGN, IAG, ZUR, MED…). Composite and microseismicity survey solutions were not included because of their large number and local character (see discussion *in* Medina 1995).

A total of 166 mechanisms were inventoried (Fig. 3). Most events were initially determined in the latest 1970's to the early 1990's by the *Institut Scientifique* researchers using P-wave first motions, before failure of most network stations. Recent widespread use of moment tensor inversion within international programs led by European agencies (IGN, IAG, MED, ZUR) permitted determining a large set of moment tensors for strong and moderate events. For clarity, all available solutions are shown without preferences. However, numerous aftershocks taken from IGN site by Stich *et al.* (2006) are no more available, as they seem to have been removed from the updated IGN catalogue of 2008. In addition, the remaining ones have

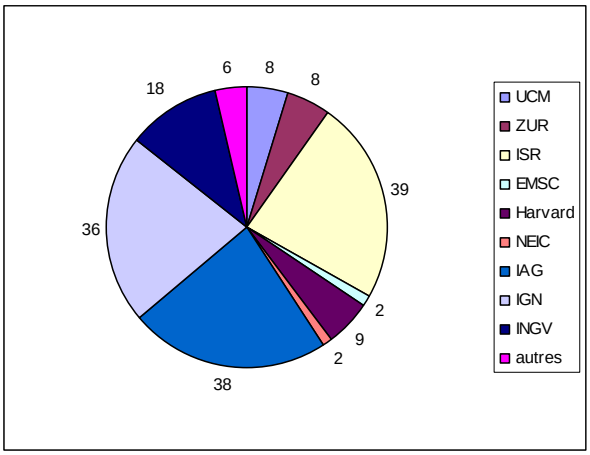


Figure 3. Number of focal mechanisms determined by different institutions: UCM: Universidad Complutense, Madrid; ISR, Institut Scientifique, Rabat. For other institutions, see the abbreviation list.

different parameters than those listed in Table 2 of Stich *et al.*, so these events were finally not taken into account.

Geographically, most focal mechanisms (116 mechanisms for 70 events) were determined for Al Hoceima area (Central Rif), and a few are located in the Atlas chain (18 for 10 events), the Atlantic (5 for 3 events).

Revision of some parameters

As the nodal planes determined before 1987 were traced graphically on paper, an imperfect orthogonality between the nodal planes was observed during revision. In order to correct the parameters of planes, the attitude of the complementary plane was recalculated after determining the strike and dip of the best constrained plane on the basis of the stations' distribution on the stereogram. Recalculation of parameters of the complementary planes and the *P* and *T* axes was accomplished with the help of the free software FaultKin, version 1.2.2. for Windows™ by Richard Allmendinger (Cornell University), available at the website: ftp://www.geo.cornell.edu/pub/rwa/Windows/FaultKinWinFull122.zip

Solutions were automatically illustrated with the help of the online software available from the Bristol University (U.K.) site: http://www1.gly.bris.ac.uk/~george/focmec.html

Anyway, in most cases, the differences between the graphical and numerical values of plane and axis orientations were generally of only 1° in the case of well-constrained planes.

Remarks on the discrepancies observed between Centres

For moment tensor determinations, some discrepancy was observed between solutions determined by different centres for the same events. In order to find out the amount of discrepancy between solutions, the focal mechanisms determined by IGN, IAG and MED for the same events of the Al Hoceima seismic crises were compared in Frohlisch & Apperson diagrams (Fig. 4). These plots readily show that IGN solutions follow a path close to the *B*–*T* line (*P* axis plunge close to 0°), whereas those of IAG are offset towards the *P* axis pole. The dashed lines in figure 4 are traced to show the differences between two solutions of the same event, and may be regarded as a "discrepancy index". MED solutions plotted against IAG ones are further offset towards the *P* and *T* axes. The tectonic implications of such discrepancies are important, since the use of different data sources may lead to different interpretations of the prevailing tectonic regime: transpression using IGN data, trantension using IAG or MED data.

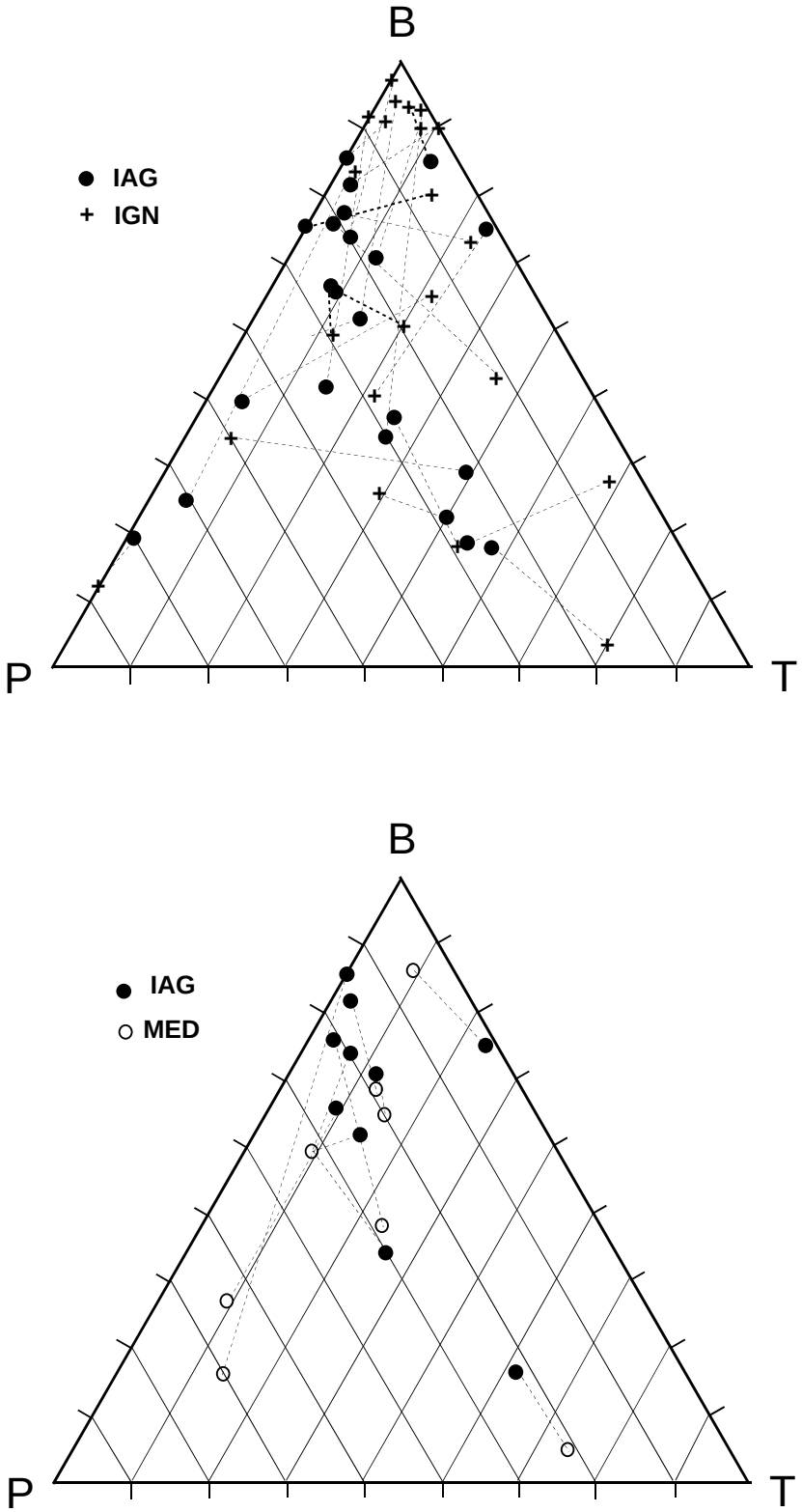


Figure 4. Frohlich and Apperson diagrams for focal mechanisms determined by IGN, IAG and MED. The dashed lines connect points corresponding to the same events.

Data presentation

The format of data is exposed in table 2. Values **in bold characters** have been revised with the FaultKin software, especially for mechanisms published by Hatzfeld *et al.* (1977), Hatzfeld (1978), Medina & Cherkaoui (1992), Medina (1995), El Alami *et al.* (1992).

Table 2: data presentation

year/month/day

T = origin time
Lat. N = Latitude North
Long. W = Longitude West (taken here as positive)
Area: epicentral area (structural domain)
Z = depth of focus in km
M = magnitude
Ref. = reference of the person or institution who determined the earthquake parameters

simplified graphical solution
(Schmidt net, lower hemisphere)

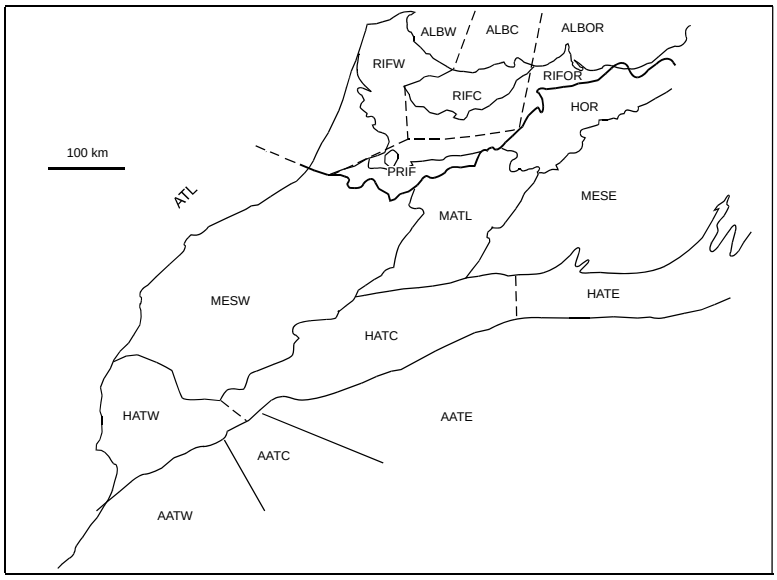
Reference of the investigator(s) or institution who determined the focal mechanism

Plane A			Plane B			Pressure axis *P*		Tension axis *T*		**NS**	**Ref.**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
strike[1]	dip	rake[2]	strike	dip	rake	trend	plunge	trend	plunge	$N(n)$[3]	references

[1] According to the right hand rule: dip always to the right (from 0° to 359° clockwise)
[2] According to the convention of seismologists: 0 to 180° counterclockwise for faults with a thrust component, and 0° to –180° clockwise for faults with a normal component.
[3] *N* number of readings for P-wave first motions when available (*n*, number of inconsistent readings).

Abbreviations of structural domains (Northern Provinces of Morocco)

AATE: Eastern Anti Atlas
ALBC: Central Alboran
ALBOR: Eastern Alboran
ALBW: Western Alboran
ATL: Atlantic
HATC: Central High Atlas
HATW: Western High Atlas
HOR: Horsts Country
MATL: Middle Atlas
MESE: Eastern Meseta
MESW: Western Meseta
PRIF: Pre-Rif and Gharb
RIFC: Central Rif
RIFW: Western Rif
RIFOR: Eastern Rif



Abbreviations and references of authors and institutions

[BB99] Bezzeghoud M. & Buforn E. 1999. Source parameters of the 1992 Melilla (Spain, Mw=4.8), 1994 Alhoceima (Morocco, Mw=5.8) and 1994 Mascara (Algeria, Mw=5.7) earthquakes and seismotectonic implications. *Bull. Seismol. Soc. Am.*,89, 359-372.

[B88] Buforn E., Udias A. & Colombas M.A. 1988. Seismicity, source mechanisms and tectonics of the Azores-Gibraltar plate boundary. *Tectonophysics*, 152, 89-118.

[B90] Buforn E., Udias A. & Mezcua, J. 1990. Sismicidad y sismotectonica de la region Ibero-Mogrebi. *Rev. Geofis,* 46, 171-180.

[B95] Buforn E., Sanz de Galdeano C. & Udias A. 1995. Seismotectonicsof the Ibero-Maghrebian region. *Tectonophysics*, 152, 89-118.

[B97] Buforn E., Coca P., Udias A. & Lasa C. 1997. Source mechanism of intermediate and deep earthquakes in southern Spain. *J. Seismol*. 1, 113-130.

[B04] Buforn E., Bezzeghoud M., Udias A. & Pro C. 2004. Seismic sources on the Iberia-African plate boundary and their tectonic implications. *Pure appl. Geophys.,* 161, 623-646.

[BIG06] Biggs J., Bergman E., Emmerson B., Funning J.G., Jackson J. Parsons B. & Wright T.J. 2006. Fault identification for buried strike-slip earthquakes using InSAR: The 1994 and 2004 Al Hoceima, Morocco earthquakes. *Geophys. J. Inter*., 166, 1347-1362.

[CH88] Cherkaoui T.-E. 1988. Fichier des séismes du Maroc et des régions limitrophes 1901-1984. *Trav. Inst. Sci.,* Rabat, sér. Géol. & Géogr. phys., 17, 158 p.

[C66] Constantinescu L. Ruprechtova L. & Enescu D. 1966. Mediterranean-Alpine earthquake mechanisms and their seismo-tectonic implications. *Geophys. J. R. Astronom. Soc.,* 10, 347-368.

[DPG] Département de Physique du Globe (formerly *Service*), Institut Scientifique, Rabat. Monthly and yearly bulletins.

[EA89] El Alami S.O., Ramdani F., Medina F. & Jebli H. 1989. Le séisme d'Essaouira du 21 novembre 1988 : carte des isoséistes, étude des répliques et mécanisme au foyer. *Bull. Inst. Sci.,* 13, 43-50.

[EA92] El Alami S.O., Medina F. & Jebli H. 1992. Etude du séisme d'Agadir du 5 avril 1992. *Gaia*, Lisboa, 5, 1-5.

[EA98] El Alami S.O., Tadili B., Cherkaoui T.-E., Medina F., Ramdani M., Aït Brahim L. & Harnafi M. 1998. The Al Hoceima earthquake of May, 26, 1994 and its aftershocks : a seismotectonic study. *Ann. Geofis.,* 41, 519-537.

[EMSC-CSEM] European-Mediterranean Seismological Centre.
http://www.emsc-csem.org/index.php?page=current&sub=qmt

[FR] Frogneux, M. (1980): *La sismicité marocaine de 1972 à 1978. Etude des paramètres à la source des séismes proches*.Troisième Cycle Thesis, Univ. Grenoble ; 131 p.

[H77] Hatzfeld D., Frogneux M. & Girardin N. 1977. Etude de la sismicité dans la région de l'arc de Gibraltar et l'Algérie du Nord. *Bull. Soc. Géol. Fr*., (7), XIX, n°4, 741-747.

[H78] Hatzfeld D. 1978. *Etude sismotectonique de la zone de collision ibéro-maghrébine*. Thèse d'Etat, Univ. Grenoble, 281 p.

[HRV] Harvard University
http://www.globalcmt.org/CMTsearch.html

[IAG] Instituto Andaluz de Geofisica, Universidad de Granada.
http://www.ugr.es/~iag/tensor/

[IGN] Instituto Geografico Nacional, Madrid.
http://www.ign.es/ign/home/geofisica/sismologia/formularioTensor.jsp

[ISC] International Seismological Center, Kew, Monthly bulletins.

[M95] Medina F. 1995. Present-day state of stress in northern Morocco from focal mechanism analysis. *J. Struct. Geol*., 17, 1035-1046.

[MC92] Medina F. & Cherkaoui T.-E. 1992. Mécanismes au foyer des séismes du Maroc et des régions voisines (1901-1986). Implications tectoniques. *Eclogae Geol. Helv*., 85, 2, 433-457.

[MED] European-Mediterranean Regional Centroid-Moment Tensors. Istituto Nazionale di Geofisica e Vulcanologia.
http://www.bo.ingv.it/RCMT/

[NEIC] National Earthquake Information Center of the United States Geological Survey
http://neic.usgs.gov/neis/FM/previous_mom.html

[O64] Ocal N. 1964. Fault plane solutions for Agadir, Morocco, earthquake of February 29, 1960 and Skopje, Yougoslavia, earthquake of July 26, 1963. *Bull. Intern. Inst. Seismol. Earthq. Eng*., 5, 1-7.

[TR86] Tadili B. & Ramdani M. (1986). La sismicité du Moyen Atlas. *Gerlands Beitr. Geophysik,* Leipzig, 95, 6, 469-476.

[SPGM] Service de Physique du Globe du Maroc (now *Département*), Institut Scientifique, Rabat (monthly and yearly bulletins).

[SSIS] Servicio de Sismologia e Ingenieria Sismica, Madrid.

[STI05] Stich D., Mancilla F., Baumont D. & Morales J. 2005. Source analysis of the Mw 6.3 2004 Al Hoceima earthquake (Morocco) using regional apparent source time functions. *J. Geophys. Res.,* 110, B06306, doi:10.1029/2004JB003366, 205

[STI06] Stich D., Serpelloni E. Mancilla F. & Morales J. 2006. Kinematics of the Iberia–Maghreb plate contact from seismic moment tensors and GPS observations. *Tectonophysics*, 426, 295-317.

[U76] Udias A., Lopez-Arroyo A. & Mezcua J. 1976. Seismotectonic of the Azores-Gibraltar region. *Tectonophysics* 31, 259-289.

[U89] Udias A., Buforn E. & Ruiz de Gauna J. 1989. Catalogue of focal mechanisms of European earthquakes. Department of Geophysics, Universidad Complutense, Madrid, 274 p.

[VSM86] Moreira V.S. 1986 - Seismicity and seismotectonics of mainland Portugal. *8ème Conf. Génie Sismique*, Lisboa, 2.1, pp. 7-14.

[WH67] Wickens J.W. & Hodgson J.H. 1967. Computer re-evaluation of earthquake mechanism solutions. Department of Energy, Mines and Resources, Ottawa. (*in* Udias *et al.* 1988).

Other references cited

Calvert A., Gomez F., Seber D., Barazangi M., Jabour N., Ibenbrahim A.& Demnati A. 1997. An integrated geophysical investigation of recent seismicity in the Al-Hoceima region of north Morocco. *Bull. Seismol. Soc. Amer*., 87, 3, 637-651.

DeMets C., Gordon R.G., Argus D.F. & Stein S. 1994. Effect of the recent revisions to the geomagnetic reversal time scale on the estimate of current plate motions. *Geophys. Res. Lett.*, 21, 2191-2194.

Dorbath L., Hahou Y., Delouis B., Dorbath C., Van Der Woerde J., Badrane S., Frogneux M., Haessler H., Jacques E. Menzhi M. & Tapponnier P. 2005. Etudes sismologiques sur le séisme d'Al Hoceima : localisation et mécanisme du choc principal et des répliques, contraintes et structure de la zone épicentrale. *Coll. Intern. « Séisme d'Al Hoceima : bilan et perspectives »,* Al Hoceima, 24-26 février 2005, p. 22.

El Alami S.O., Tadili B., Aït Brahim L. & Mouayn I. 2004. Seismicity of Morocco for the period 1987-1994. *Pure appl. Geophys.*, 161, 969-982.

Fadil A., Vernant P., McClusky S., Reilinger R., Gomez F., Ben Sari D., Mourabit T., Feigl K. & Barazangi M. 2006. Active tectonics of the western Mediterranean: geodetic evidence for rollback of a delaminated subcontinental lithospheric slab beneath the Rif Mountains, Morocco. *Geology,* 34, 7, 529-532.

Frogneux, M. 1980. *La sismicité marocaine de 1972 à 1978. Etude des paramètres à la source des séismes proches*. 3ème cycle Thesis, Grenoble, 131 p.

Frohlich C. & Apperson K.D. 1992. Earthquake focal mechanisms, moment tensors, and the consistency of seismic activity near plate boundaries. *Tectonics,* 11, 2, 279-296.

Hatzfeld D. & Frogneux M. 1981. Intermediate depth seismicity in the western Mediterranean unrelated to subduction of oceanic lithosphere. *Nature*, 292, 443-445.

Hatzfeld D., Caillot V., Cherkaoui T.-E., Jebli H. & Medina F. 1993. Microearthquake seismicity and fault plane solutions study around the Nékor strike-slip fault, Morocco. *Earth & Planet. Sci. Letters,* 120, 31-41.

McClusky S., Reilinger R., Mahmoud S., Ben Sari D. & Tealeb A. 2003. GPS constraints on Africa (Nubia) and Arabia plate motions. *Geophys. J. Int.,* 155, 126-138.

McKenzie D. 1978. Active tectonics in the Mediterranean region.. Geophys. J. R. Astronom. Soc., 30, 109-185.

Medina F. & El Alami S.O. 2006. Focal mechanisms and state of stress in the Al Hoceima area (Central Rif, Morocco). *Bull. Inst. Sci*., Rabat, sect. Sci. Terre, 28, 19-30.

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1959/08/23

T = 22-21-30
Lat. N = 35.51
Long. W = 3.23
Area: 20 km WNW Cap des Trois fourches (ALBC)
Z = 20
M = 5.5
Ref. = SSIS

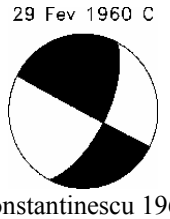
Medina & Cherkaoui (1992), n°12

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
276	**70**	**153**	**24**	**50**	**43**	**334**	**12**	**232**	**44**	**25(6)**	**MC92**

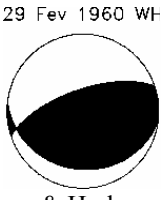
1960/02/29

h	Lat. N	Long W	Area	z	M	Ref
23-40-14	30.45	9.62	Agadir (HATW)	-	5.9	SPGM

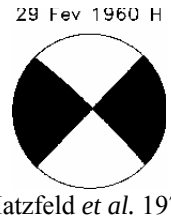
A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
224	87		315	61		N	N			44	O64
27	65	1	297	90	156	251	17	346	17		C66
251	67	79	084	24	95	345	22	152	68		WH67
44	90	10	314	80	0	176	8	90	8	44	H77
214	66	152*	316	73	26	85	4	178	30	65	VSM86
229	**68**	**169**	**323**	**80**	**22**	**94**	**8**	**188**	**23**	**75**	**MC88**



Constantinescu 1966

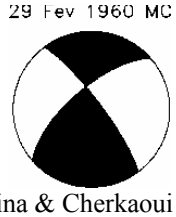


Wickens & Hodgson 1967



Hatzfeld *et al.* 1977

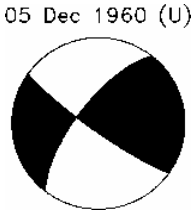
Moreira 1986



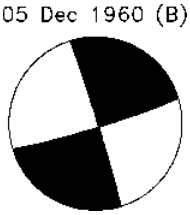
Medina & Cherkaoui 1988

1960/12/05

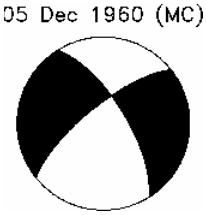
T = 21-21-47
Lat. N = 35.69
Long. W = 6.62
Area : Atlantic, 6 km W Tangier (ATL)
Z = 5
ERZ = 33
M = 4.9
Ref. = SSIS



Udias *et al.* (1976)



Buforn *et al.* (1988)

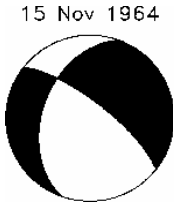


Medina & Cherkaoui (1992), n°1

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
218	70	8	126	83	160	174	10	80	17	13	U76
73	86	–2	343	88	–04	289	04	28	01	14	B88
328	**69**	**–162**	**232**	**74**	**–21**	**189**	**27**	**281**	**03**	**28(8)**	**MC92**

1964/11/15

T = 20-03-54
Lat. N = 34.9
Long. W = 5.42
Area =: Mokressat, 25 km NE Ouezzane (RIFW)
Z = 8 ± (10)
M = 5
Ref. = CH88



Medina & Cherkaoui (1992), n°2

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
308	**74**	**–130**	**202**	**42**	**–23**	**177**	**46**	**67**	**19**	**20(2)**	**MC92**

1967/08/28

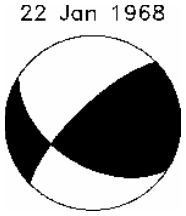
T = 21-15-36
Lat. N = 31.49
Long. W = 6.06
Area: 10 km NW Boumalne Dadès (HATC)
Z = 33
M = 4.7
Ref. = ISC

Medina & Cherkaoui (1992) n°15

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
E-W, dip N, Thr.RL comp.			NNE-SSW, dip E, Thr LL comp.			ND	ND	ND	ND	ND	VSM86
246	**68**	**165**	**342**	**76**	**23**	**114**	**5**	**206**	**27**	**19(4)**	**MC92**

1968/01/22

T = 07-19-07
Lat. N = 35.08
Long. W = 5.66
Area: 25 km NE Ksar El Kébir (RIFW)
Z = 36 ± 5
M = 4.4
Ref. = ISC



Medina & Cherkaoui (1992), n°3a

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
226	**74**	**(45)**	**(120)**	**(47)**	**(158)**	**347**	**16**	**93**	**42**	**16(3)**	**MC92**

1968/04/17

T = 09-12-04
Lat. N = 35.24
Long. W = 3.73
Area = Ras Tarf, 5 km N Trougout E of Al Hoceima (RIFC)
Z = 13 ± 4.8
M = 5
Ref. = ISC

Hatzfeld (1978)

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
350	**82**	**–10**	**81**	**80**	**–172**	**305**	**12**	**36**	**1**	**40(10)**	**H78**

1968/05/22

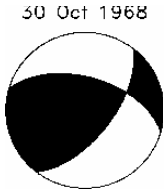
T = 14-01-57
Lat. N = 34.87
Long. W = 4.34
Area: Targuist (RIFC)
Z = 71 ± 3.4
M = 4.0
Ref. = ISC

Medina & Cherkaoui (1992) n°8
(error on value of trend in figure)

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
232	**28**	**137**	**001**	**72**	**68**	**107**	**24**	**241**	**58**	**11(1)**	**MC92**

1968/10/30

T = 11-41-57
Lat. N = 35.19
Long. W = 3.76
Area: Al Hoceima, 10 km S Trougout (RIFC)
Z = 34 ± 0
M = 4.6
Ref. = ISC



Buforn *et al.* (1988)

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
286	55	145	38	62	40	160	4	254	46	NC	B88

1970/04/07

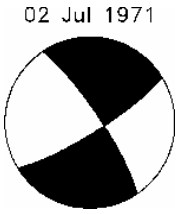
T = 09-16-14
Lat. N = 34.87
Long. W = 3.90
Area : Al Hoceima 10 km W El Arba de Taourirt (RIFC)
Z = 27 ± 10
M = 4,9
Ref. = ISC

Hatzfeld (1978)

A			**B**			***P***		***T***		**NS**	**Ref.**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
244	**64**	**155**	**346**	**70**	**19**	**114**	**3**	**205**	**35**	**17(2)**	**H78**

1971/07/02

T = 21-11-10
Lat. N = 34.05
Long. W = 5.23
Z = 11 ± 4.6
Area : 25 km W Fès (PRIF)
M = 4,6
Ref. = CH88

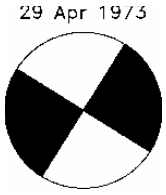


Medina & Cherkaoui (1992), n°6

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
58	**80**	**–170**	**326**	**80**	**–10**	**282**	**14**	**11**	**0**	**11(1)**	**MC92**

1973/04/29

T = 14-37-57
Lat. N = 34.55
Long. W = 4.06
Area : Taïneste, 40 km N Taza (RIFC)
Z = 45 ± 16
M = 4.6
Ref. = FR in CH88

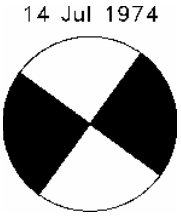


Hatzfeld (1978)

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
32	**90**	**0**	**122**	**90**	**0**	**167**	**0**	**77**	**0**	**27 (4)**	**H78**

1974/07/14

T = 02-55-26
Lat. N = 35.56
Long. W = 3.68
Area: Alboran, 40 km NE Al Hoceima (ALBC)
Z = 5 ± (15)
M = 4.3
Ref. = SSIS

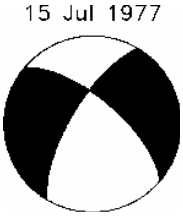


Hatzfeld (1978)

A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
36	**90**	**0**	**126**	**90**	**0**	**351**	**0**	**81**	**0**	**13(3)**	**H78**

1977/07/15

T = 05-41-50
Lat. N = 35.17
Long. W = 3.73
Area: Al Hoceima, 10 km S Trougout (RIFC)
Z = 17 ± 13
M = 3.7
Ref. = ISC

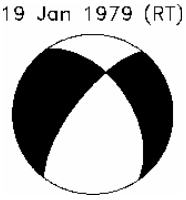


Medina & Cherkaoui (1992) n°11

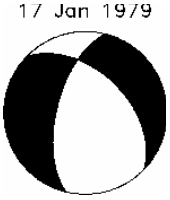
A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
212	**69**	**–25**	**310**	**66**	**–158**	**171**	**29**	**81**	**0**	**11(1)**	**MC92**

1979/01/17

T = 17-43-33
Lat. N = 33.4
Long. W = 5.28
Area: Aïn Leuh (MATL)
Z = 12 ± 2.2
M = 4.5
Ref. = CH88



Tadili & Ramdani (1986)

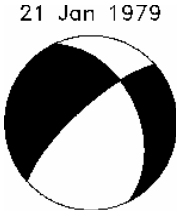


Medina & Cherkaoui (1992), n° 13a

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
218	70	–42	325	50	–154	173	45	275	78	10(0)	TR86
194	**61**	**–50**	**314**	**48**	**–139**	**156**	**55**	**257**	**8**	**20(0)**	**MC92**

1979/01/21

T = 08-06-06
Lat. N = 33.18
Long. W = 5.16
Area : Aïn Leuh (MATL)
Z = 7 ± 2.7
M = n
Ref. = TR86

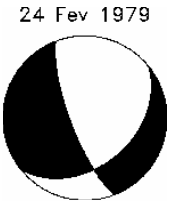


Medina & Cherkaoui (1992), n°13b

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
228	**75**	**-48**	**334**	**44**	**-157**	**180**	**43**	**288**	**19**	**7(0)**	**MC92**

1979/02/24

T = 21-19-23
Lat. N = 34.93
Long. W = 4.28
Area : Targuist (RIFC)
Z = 5 ± 4.1
M = 4.3
Ref. = CH88



Medina & Cherkaoui (1992) n°9

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
51	**40**	**–23**	**159**	**75**	**–129**	**28**	**46**	**276**	**20**	**12(0)**	**MC92**

1979/04/21

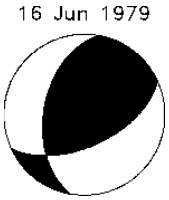
T = 19-52-06
Lat. N = 35.09
Long. W = 4.38
Area: 20 km NW Targuist (RIFC)
Z = 5 ± (10)
M = 3.8
Ref. = SSIS

Medina (1995)

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
171	**70**	**32**	**68**	**60**	**158**	**297**	**06**	**32**	**36**	**9(1)**	**M95**

1979/06/16

T = 13-51-43
Lat. N = 32.89
Long. W = 5.19
Area: 20 km W Itzer (MATL)
Z = 7 ± 3.2
M = 4.0
Ref. = CH88



Medina & Cherkaoui (1992), n°14

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
190	**48**	**44**	**68**	**59**	**139**	**131**	**6**	**32**	**57**	**10(1)**	**MC92**

1979/07/04

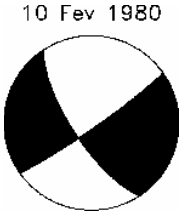
T = 14-24-53
Lat. N = 34.02
Long. W = 6.96
Area = 10 km W Rabat (ATL)
Z = 29 ± 1.6
M = 4.2
Ref. = CH88

Medina & Cherkaoui (1992) n°7

A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
4	**70**	**–106**	**224**	**25**	**–53**	**250**	**62**	**106**	**23**	**8(0)**	**MC92**

1980/02/10

T = 03-39-44
Lat. N = 35.29
Long. W = 4.94
Area: Beni Bouzera, 35 km NE Chaouen (RIFW)
Z = 33± 0.1
M = 4.0
Ref. = CH88

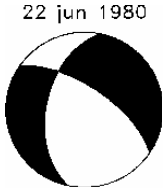


Medina & Cherkaoui (1992) n°4

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
55	**85**	**–18**	**147**	**72**	**–175**	**9**	**16**	**102**	**9**	**12(1)**	**MC92**

1980/06/22

T = 23-18-33
Lat. N = 35.96
Long. W = 5.23
Region: Détroit de Gibraltar, 10 km NE Sebta (ALBW)
Z = 81 ± 28
M = 4.7
Ref. = ISC

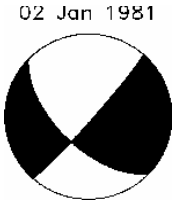


Medina & Cherkaoui (1992), n° 5

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
304	**66**	**–135**	**193**	**50**	**–31**	**166**	**47**	**65**	**10**	**52(6)**	**MC92**

1981/01/02

T = 21-58-39
Lat. N = 34.85
Long. W = 5.80
Area: Arbaoua, 10 km S Ksar El Kebir (RIFW)
Z = 1±4.4
M = 3.8
Ref. = CH88



Medina & Cherkaoui (1992), n° 3b

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
134	**60**	**–175**	**42**	**85**	**–30**	**353**	**24**	**92**	**17**	**7(0)**	**MC92**

1981/03/20

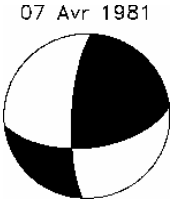
T = 14-08-29
Lat. N = 35.13
Long. W = 3.95
Area: Tamassint, 20 km S Al Hoceima (RIFC)
Z = 5 ± (0)
M = 3.9
Ref. = CH88

Medina (1995)

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
168	**80**	**37**	**70**	**54**	**168**	**294**	**17**	**036**	**33**	**9(1)**	**M95**

1981/04/07

T = 23-37-09
Lat. N = 35.12
Long. W = 3.99
Area: Tamassint, 20 km S Al Hoceima (RIFC)
Z = 5 ± (4.2)
M = **4.3**
Ref. = CH88

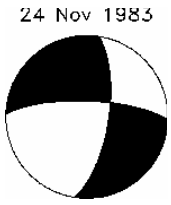


Medina (1995)

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
183	**75**	**33**	**83**	**58**	**163**	**310**	**11**	**047**	**34**	**8(1)**	**M95**

1983/11/24

T = 20-55-32
Lat. N = 34.74
Long. W = 4.49
Area: Taghzout, 25 km NE Taounate (RIFC)
Z = 27 ± 3.5
M = 4.6
Ref. = CH88

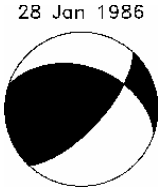


Medina & Cherkaoui (1992), n°10

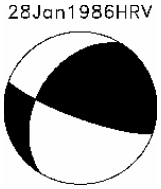
A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
272	**73**	**–23**	**9**	**68**	**–162**	**230**	**29**	**321**	**4**	**44(6)**	**MC92**

1986/01/28

T = 20-01-28
Lat. N = 31.95
Long. W = 5.35
Area: Assoul, 45 km NW Goulmima (HATC)
Z = 5 ± (5.7)
M = 4.9
Ref. = DPG



Medina & Cherkaoui (1992), n°16

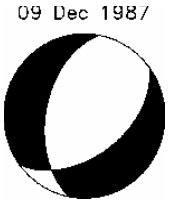


Harvard

A			B			P		T		NS	Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
43	**68**	**129**	**288**	**44**	**33**	**159**	**14**	**267**	**52**	**21(1)**	**MC92**
212	42	16	110	79	131	170	23	58	41	MT	HRV

1987/12/09

T = 15-40-33
Lat. N = 35.40
Long. W = 3.82
Area: Alboran, 25 km NE Al Hoceima (ALBC)
Z = 14
M = 4.2
Ref. = B95 B04

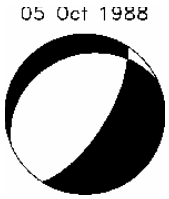


Buforn *et al.* (1990)

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
54	49	–58	190	50	–123	36	68	292	5	nd	B90

1988/10/05

T = 00-42-11
Lat. N = 35°30.1'
Long. W = 3°53.6'
Area: Alboran, 30 km NE Al Hoceima (ALBC)
Z = 11
Mb = 4
Ref. = IGN

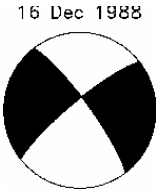


IGN

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
248	26	–58	32	68	–105	279	68	133	26	28	IGN

1988/12/16

T = 22-34-41
Lat. N = 31.35
Long. W = 9.62
Area = 20 km SE Essaouira (HATW)
Z = 24.7 ± 1.74
ERZ = 1.74
Ref. = EA89

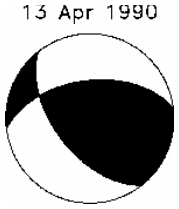


El Alami *et al.* (1989)

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
323	**80**	**–170**	**231**	**80**	**-11**	**187**	**14**	**277**	**00**	**6**	**EA89**

1990/04/13

T =
Lat. N = 35.61
Long. W = 4.82
Area: Alboran, 20 km NE Oued Laou (ALBW)
Z = 89
M = 3.9
Ref. = B97

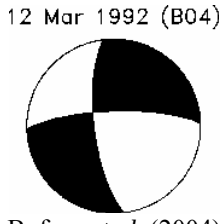


Buforn *et al.* (1997)

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
263	53	45	142	55	133	202	01	111	56	NC	B97

1992/03/12

T = 13-05-56
Lat. N = 35.27
Long. W = 2.53
Area : 15 km NW Chaffarines (ALBOR)
Z = 31 (8)
M = 5.3
Ref. = BB99

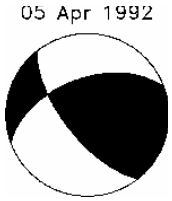


Buforn *et al.* (2004)

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
268	76	–161	173*	72*	–15	131*	23*	40*	02*	-	BB99

1992/04/05

T = 21-16-38
Lat. N = 30.41
Long. W = 9.73
Loc. = Atlantic, 10 km W Agadir (HATW/ATL)
Z = 0.2
M = 4.7
Ref. = EA92



El Alami *et al.* (1992)

A			**B**			***P***		***T***		**NS**	**Ref.**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
250	**53**	**29**	**141**	**67**	**139**	**199**	**9**	**100**	**44**	**10(0)**	**EA92**

1992/10/23

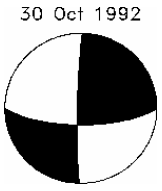
T = 09-11-05
Lat. N = 31.29
Long. W = 4.32
Area = 10 km S Erfoud (AATE)
Z = 5.4
M = 5.2
Ref. = ISC

Harvard (CMT)

A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
187	69	12	92	78	158	141	07	48	24	HRV

1992/10/30

T = 10-43-55
Lat. N = 31.24
Long. W = 4.38
Area = 10 km S Erfoud (AATE)
Z = 8
M = 5.1
Ref. = HRV



Harvard (CMT)

A			**B**			***P***		***T***		**Ref.**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
90	72	176	181	87	18	314	10	47	15	HRV

1993/05/01

T = 00-22-23
Lat. N = 35°17.4’
Long. W = 6°19.9’
Area = Atlantic, 20 km NW Larache (ATL)
Z = 30 ± 1 km
mb = 4.2
Ref. = IGN

IGN (PM)

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
15	25	–60	162	69	–103	50	64	262	23	50	IGN93

1993/05/23

T = 07-40-56
Lat. N = 35° 16.4’
Long. W = 2° 25.5’
Area = Alboran, 10 km NE Chaffarines (ALBOR)
Z = 6
M = 5.4
Ref. = IGN

IGN 1993

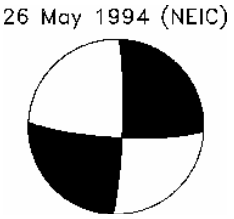
A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
308	84	1	218	89	06	263	04	173	05	59	IGN

1994/05/26 sub-event 1 (08:26:52)

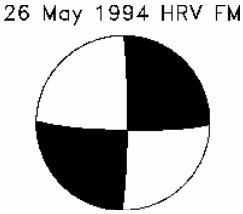
h	Lat. N	Long W	region	z	M	Ref
08-26-52	35.28	4.12	Al Hoceima (RIFC)	10.9	5.7 (Md)	ISC
	35.37	3.91		15	6.0 (Mw)	HRVD
	35.31	4.17		30	5.6 (Md)	DPG
	35.31	4.1		10	5.7 (Mb)	NEIC
	35.28	3.99		13	5.6 (Md)	EA98
				6.8		BB99

A			B			*P*		*T*		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
93	75	–169	00	80	–15	316	18	47	04	FM	NEIC
93	80	–174	02	84	–10	317	11	47	03	MT	NEIC
91	83	–176	00	87	–17	316	14	224	04	FM	HRV
112	48	–173	17	85	–42	326	33	72	24	CMT	HRV
291	86	169	200	79	04	156	11	67	05	FM	EMSC
202	60	23	100	70	148	152	06	58	37	FM	EA98
330	77	–45	72*	74*	–163*	281	40	28	19	WA	BB99 (I)
117	81	–175	26	85	–9	341	10	72	03	WA	BIG06

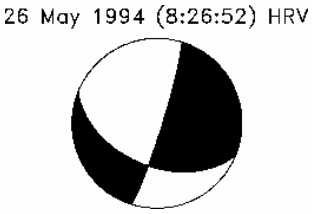
NEIC FM



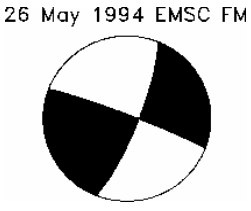
NEIC MT



Harvard FM

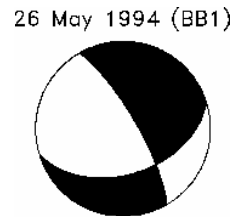


Harvard CMT



EMSC FM

El Alami *et al.* 1998

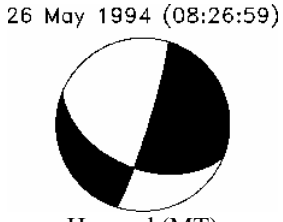


Bezzeghoud & Buforn 1999

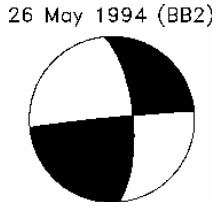
Biggs et al 2006

1994/05/26 (08:26)

T = 08-26-59.4
Lat. N = 35.37
Long. W = 3.9
Area : Imzouren (RIFC)
Z = 15 (BB=8)
Mw = 6
Ref. = HRV



Harvard (MT)



Bezzeghoud & Buforn 1999 (WA)

A			B			*P*		*T*		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
112	48	-173	17	85	–42	326	33	72	24	HRV
355	69	2	264	89	168	311	13	218	16	BB99

1994/05/26

T = 12-27-54
Lat. N = 35°12’
Long. W = 4°01’
Area: 20 km SW Al Hoceima (RIFC)
Z = 20
M = 4.4
Ref. = EA98

El Alami *et al.* (1998) FM

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
185	**70**	**–50**	**297**	**44**	**–150**	**138**	**49**	**247**	**15**	**13(1)**	**EA98**

1994/05/28

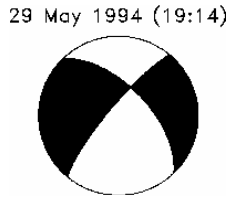
T = 03-32-02
Lat. N = 35°14’
Long. W = 4°03’
Area: 20 km SW Al Hoceima (RIFC)
Z = 10
M = 3.5
Ref. = EA98

El Alami *et al.* (1998) FM

A			B			*P*		*T*		NS
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl	
180	**50**	**–50**	**307**	**54**	**–127**	**157**	**60**	**63**	**03**	**10(1)**

1994/05/29 (19:14)

T = 19-14-05
Lat. N = 35°14’
Long. W = 4°02’
Area: 20 km SW Al Hoceima (RIFC)
Z = 10
M = 3.3
Ref. = EA98

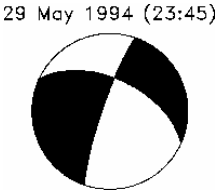


El Alami *et al.* (1998) FM

A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
316	**60**	**–168**	**219**	**80**	**–31**	**174**	**29**	**270**	**19**	**11(3)**	**EA98**

1994/05/29

T = 23-45-06
Lat. N = 35°16’
Long. W = 4°02’
Area: 20 km SW Al Hoceima
Z = 10
M = 4
Ref. = EA98

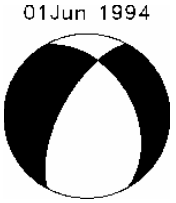


El Alami *et al.* (1998) FM

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
199	**82**	**–35**	**295**	**55**	**–169**	**146**	**37**	**254**	**23**	**11(1)**	**EA98**

1994/06/01

T = 00-53-52
Lat. N = 35°11’
Long. W = 4°01’
Area: S. Al Hoceima (RIFC)
Z = 8.5
M = 4
Ref. = EA98

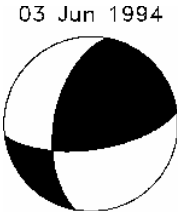


El Alami *et al.* (1998) FM

A			B			*P*		*T*		NS	Ref.
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
208	**64**	**–54**	**330**	**43**	**–140**	**165**	**56**	**273**	**12**	**11(1)**	**EA98**

1994/06/03

T = 08-57-38
Lat. N = 35°11’
Long. W = 4°02’
Area: 20 km SW Al Hoceima (RIFC)
Z = 8
M = 4.6
Ref. = EA98

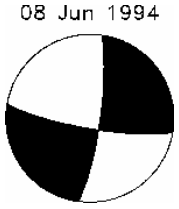


El Alami *et al.* (1998)

A			B			*P*		*T*		NS	Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl		
190	**55**	**30**	**82**	**66**	**141**	**138**	**07**	**40**	**44**	**21(5)**	**EA98**

1994/06/08

T = 03-06-31
Lat. N = 35°11'
Long. W = 4°02'
Area: 20 km SW Al Hoceima (RIFC)
Z = 10
M = 3.6
Ref. = EA98* * erreur sur le mois (03-05-94)



El Alami *et al.* (1998) n° 7

A			**B**			***P***		***T***		**NS**	**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
008	**80**	**–10**	**100**	**80**	**–170**	**324**	**14**	**234**	**00**	**11(1)**	**EA98**

1998/10/20

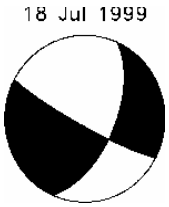
T = 23-47-03
Lat. N = 34.83
Long. W = 3.81
Area: 20 km N Aknoul (RIFC)
Z = 10.6
Mw = 4.7
Ref. = IAG

IAG (MT)

A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
116	54	–118	338	44	–56	328	67	225	05	IAG

1999/07/18

T = 17-26-47
Lat. N = 35.24
Long. W = 4.09
Area: 10 km SW Al Hoceima (RIFC)
Z = 10 km
Mw = 3.9
Ref. = IAG

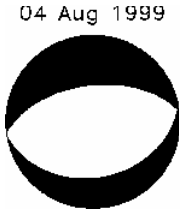


IAG (MT)

A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
118	83	–149	24	59	–7	346	26	247	16	IAG

1999/08/04

T = 09-02-54
Lat. N = 35.57
Long. W = 5.17
Area: Western Alboran, 20 km W Tétouan (ALBW)
Z = 5.3
M = 4.4
Ref. = IAG

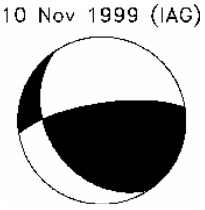


IAG (MT)

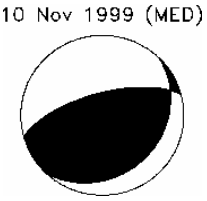
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
263	55	–88	81	35	–92	179	80	353	10	IAG

1999/11/10

T = 13-10-12
Lat. N = 35.68
Long. W = 4.7
Area: Alboran W, 70 km E Tetouan (ALBW)
Z = 111
M = 4.2
Ref. = IAG



IAG

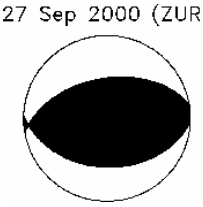


MED R111099A

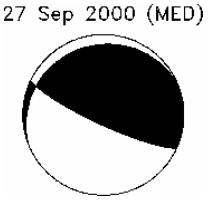
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
146	35	150	261	74	59	14	22	135	51	IAG
44	26	62	254	67	103	334	21	186	65	MED

2000/09/27

T = 03-07-45
Lat. N = 34.26
Long. W = 5.22
Area: 30 km NW Fès (PRIF)
Z = 10
M = 4.6
Ref. = ZUR



ZUR

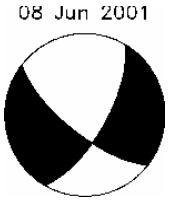


MED R092700A

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
260	50	82	90	40	99	355	00	156	82	ZUR
249	14	45	115	80	100	196	34	37	54	MED

2001/06/08

T = 13-47-33
Lat. N = 35.69
Long. W = 3.79
Area: Alboran, 40 km NNE Al Hoceima (ALBC)
Z = 3-8
M = 4.1
Ref. = IAG

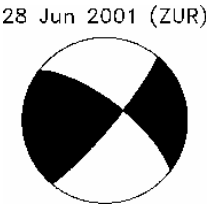


IAG (MT)

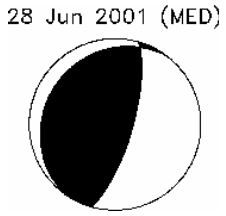
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
128	71	–157	30	68	–20	349	29	259	02	IAG

2001/06/28

T = 15-21-44
Lat. N = 34.33
Long. W = 6.49
Area: Kénitra (PRIF)
Z = 33
M = 4.3
Ref. = ZUR



ZUR



MED R062801A

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
40	82	19	307	71	172	172	08	265	19	ZUR
217	18	110	16	73	83	111	28	276	62	MED

2002/06/27

T = 13-29-50
Lat. N = 35.63
Long. W = 4.03
Area: Alboran, 35 km NNW Al Hoceima (ALBC)
Z = 14 km
Mw = 3.8
Ref. = IAG

IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
132	55	–143	19	61	–40	343	48	77	03	IAG

2002/07/06

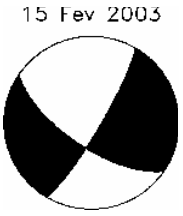
T = 17-24-19
Lat. N = 35.63
Long. W = 3.92
Area: Alboran, 30 km N Al Hoceima (ALBC)
Z = 18 km
Mw = 4.2
Ref. = IAG

IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
132	52	–135	11	57	–47	338	56	73	03	IAG

2003/02/15

T = 03-56-33
Lat. N = 35.58
Long. W = 3.83
Area: Alboran, 30 km N Al Hoceima (ALBC)
Z = 12 km
Mw = 4.0
Ref. = IAG

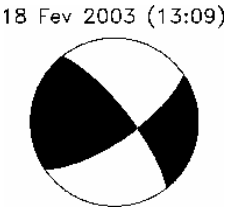


IAG

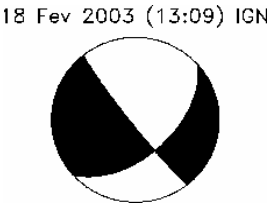
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
124	67	–171	30	81	–23	345	23	79	10	IAG

2003/02/18 (13:09)

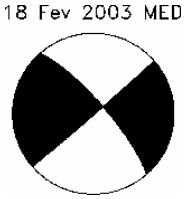
T = 13-09-35
Lat. N = 35.67
Long. W = 3.55
Area: Alboran, 50 km NE Al Hoceima (ALBC)
Z = 4 km
Mw = 4.8
Ref. = IAG



IAG



IGN

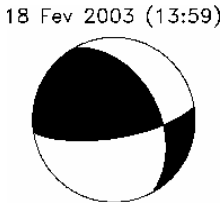


MED R021803A

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
56	72	15	321	76	161	09	03	278	23	IAG
48	54	–6	141	85	–143	11*	28*	269*	21*	IGN
49	89	12	319	78	179	183	07	275	09	MED

2003/02/18 (13:59)

T = 13-59-29
Lat. N = 35.67
Long. W = 3.61
Area : Alboran, 50 km NE Al Hoceima (ALBC)
Z = 2 km
Mw = 3.9
Ref. = IAG

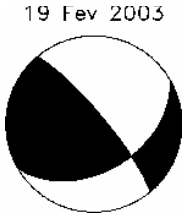


IAG

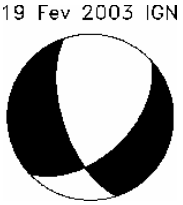
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
81	72	49	331	44	153	200	17	308	47	IAG

2003/02/19

T = 00-33-50
Lat. N = 35.73
Long. W = 3.49
Z = 4 km
Area: Alboran, 70 km NE Al Hoceima (ALBC)
Mw = 4
Ref. = IAG



IAG

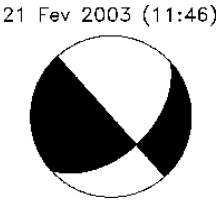


IGN 365473

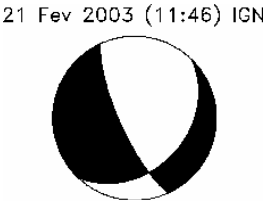
A			B			P		T		Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
60	45	14	320	80	134	18	22	269	39	IAG
47	51	–36	161	62	–135	20	50	282	07	IGN

2003/02/21 (11:46)

T = 11-46-40
Lat. N = 35.88
Long. W = 3.47
Area : Alboran, 60 km NE Al Hoceima (ALBC)
Z = 4
Mw = 4.2
Ref. = IAG



IAG

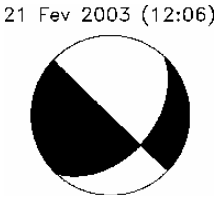


IGN 365990

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
48	51	0	138	90	–141	10	27	266	26	IAG
44	36	–26	156	75	–123	29*	49*	270*	23*	IGN

2003/02/21 (12:06)

T = 21-11-10
Lat. N = 35.69
Long. W = 3.60
Area: Alboran, 60 km NE Al Hoceima (ALBC)
Z = 4
Mw = 4,2
Ref. = IAG

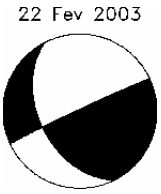


IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
43	46	–1	135	89	–136	8	30	260	28	IAG

2003/02/22

T = 11-07-45
Lat. N = 35.7
Long. W = 3.550
Area: Alboran, 60 km NE Al Hoceima (ALBC)
Z = 4
Mw = 3.7
Ref. = IAG



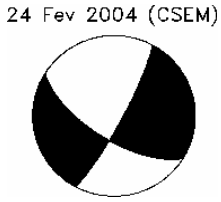
IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
245	88	44	153	46	177	10	28	118	31	IAG

2004/02/24 (2:27)

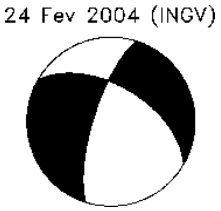
h	Lat. N	Long W	z	M	Ref
2-27-53	35.29	3.84		6.2	
2-27-46	35.142	3.997	6	6.2	IGN

A			B			P		T		NS	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
122	66	–171	28	81	–24	343	23	77	10		CSEM
113	61	–170	18	81	–29	331	27	68	14	MT	HRVD
111	89	–176	21	86	–1	336	03	246	02	MT	NEIC
300	55	–159	198	73	–37	154	37	253	12	MT	INGV
115	84	157	208	67	7	163	11	69	20	FM	ZUR
199	77	03	109	86	167	155	06	63	10	MT	ZUR
200	82	23	107	67	171	330	11	65	24	MT	IGN
106	74	–161	11	72	–17	329	24	238	1	MT	STI05
298	83	179	28	89	7	163	04	253	06	WA	BIG06



CSEM

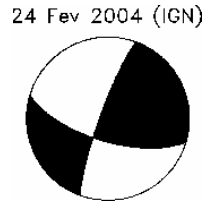
Harvard



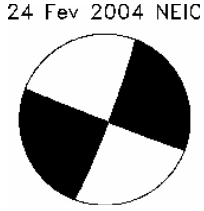
MED

ZUR FM

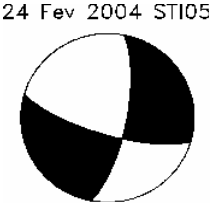
ZUR MT



IGN



NEIC

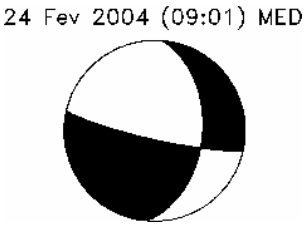


Stich *et al.* 2005

Biggs *et al.* 2006

2004/02/24 (09:01)

T = 09-01-53
Lat. N = 35.36
Long. W = 3.95
Area: S Al Hoceima (RIFC)
Z = 26 km
Mw = 4.5
Ref. = INGV

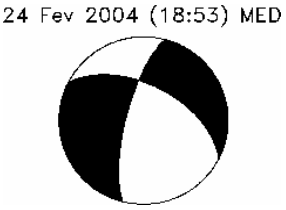


MED R022404F

A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
005	46	–11	102	82	–136	334	36	226	23	MED

2004/02/24 (18:53)

T = 18-53-05
Lat. N = 35.10
Long. W = 3.96
Area: S Al Hoceima (RIFC)
Z = 15 km (fixed)
Mw = 4.2
Ref. = MED

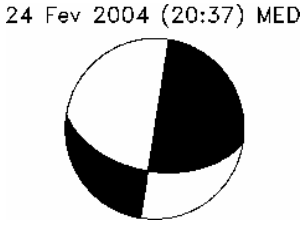


MED R022404G

A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
297	55	–159	194	73	–37	149	38	249	11	MED

2004/02/24 (20:37)

T = 20-37-01
Lat. N = 35.12
Long. W = 3.95
Area: S Al Hoceima (RIFC)
Z = 17 km
Mw = 4.2
Ref. = MED

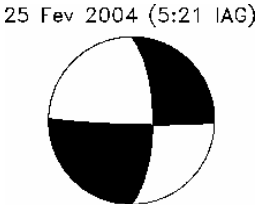


MED R022404H

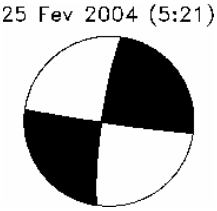
A			**B**			***P***		***T***		**Ref**
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
99	51	–180	009	90	–39	317	27	061	26	MED

2004/02/25 (5:21)

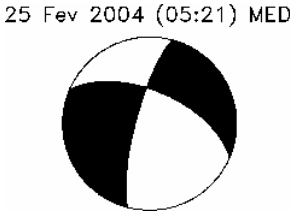
T = 05-21-14
Lat. N = 35.121
Long. W = 3.931
Area: Tamassint, 20 km S Al Hoceima (RIFC)
Z = 9
M = 4.5
Ref. = IGN



IAG



IGN 459 905

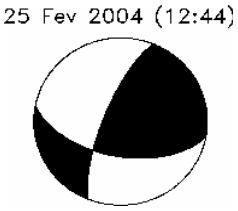


MED R022504A

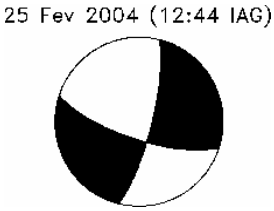
A			B			*P*		*T*		NS
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl	
98	88	176	188	86	02	322	02	52	08	IGN
0	69	–4	92	86	–158	318	18	224	12	IAG
293	59	–164	195	77	–32	150	32	247	12	MED

2004/02/25 (12:44)

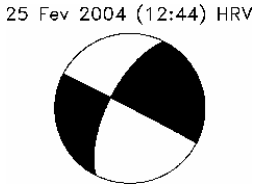
T = 12-44-54
Lat. N = 35.052
Long. W = 3.861
Area: 25 km SSE Al Hoceima (RIFC)
Z = 6
Mw = 5.2
Ref. = IGN



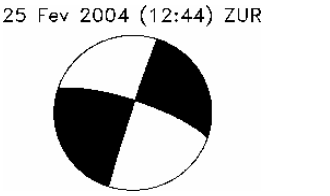
IGN 460 103



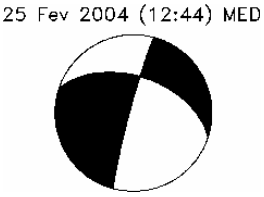
IAG



HRV



ZUR

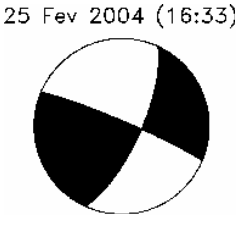


MED R022504B

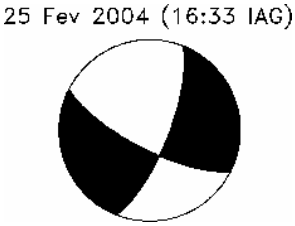
A			B			*P*		*T*		Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl	
202	74	036	101	56	161	327	13	68	37	IGN
108	73	–167	14	77	–016	330	21	61	3	IAG
207	66	–001	297	89	–156	165	17	69	16	HRV
198	88	–013	288	76	–178	152	10	244	07	ZUR
195	86	–39	288	52	–175	144	29	248	23	MED

2004/02/25 (16 :33)

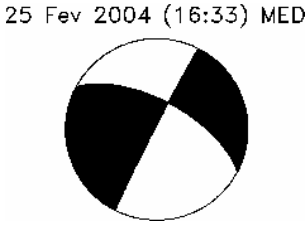
T = 16-33-28
Lat. N = 35.170
Long. W = 3.941
Area: Tamassint, 20 km S Al Hoceima (RIFC)
Z = 9
Mw = 4
Ref. = IGN



IGN (MT) 460255



IAG

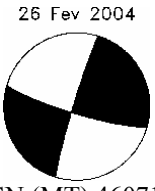


MED R022504C

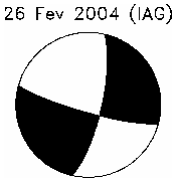
A			B			P		T		Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
293	85	162	25	72	05	339	07	246	14	IGN
117	73	–162	22	73	–16	339	24	249	0	IAG
298	64	–178	207	88	–26	159	20	255	17	MED

2004/02/26

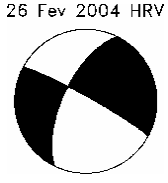
T = 12-07-03
Lat. N = 35.19
Long. W = 4.064
Area: 15 km W Al Hoceima (RIFC)
Z = 9
M = 4.8
Ref. = IGN



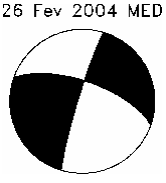
IGN (MT) 460715



IAG



HRV

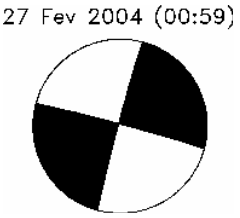


MED R022604B

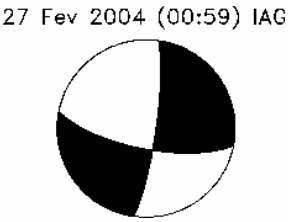
A			B			P		T		Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
197	86	08	107	82	176	330	00	62	10	IGN
13	75	–9	105	80	–165	330	17	239	3	IAG
206	64	–6	298	84	–154	165	22	69	14	HRV
197	85	–23	289	67	–175	151	19	245	12	MED

2004/02/27 (00:59)

T = 00-59-00
Lat. N = 35.139
Long. W = 3.990
Area: 15 km SW Al Hoceima (RIFC)
Z = 3 (IAG = 14)
M = 4.3
Ref. = IGN



IGN 461000

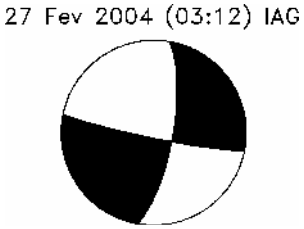


IAG

A			B			P		T		Ref.
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
285	88	–178	195	88	–02	150	02	60	00	IGN
102	71	–170	008	81	–19	324	20	56	07	IAG

2004/02/27 (03:12)

T = 03-12-36
Lat. N = 35.13
Long. W = 3.95
Area: S Al Hoceima (RIFC)
Z = 12 km
Mw = 4.3
Ref. = IAG

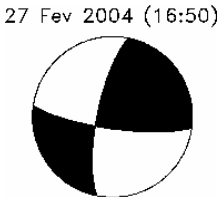


IAG

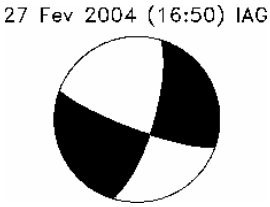
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
10	73	–5	102	84	–163	328	16	235	07	IAG

2004/02/27 (16:50)

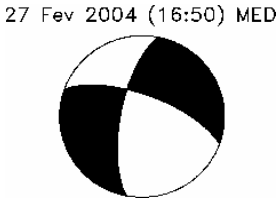
T = 16-50-42
Lat. N = 35.184
Long. W = 3.919
Area: S Al Hoceima (RIFC)
Z = 15
M = 4.5
Ref. = IGN



IGN (MT) 461386



IAG

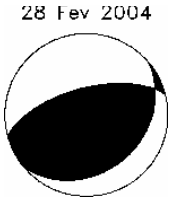


MED R022704A

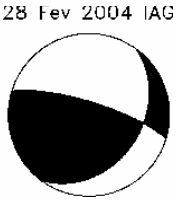
A			B			P		T		NS
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
098	78	164	191	75	013	145	04	55	22	IGN
110	80	–163	016	74	–010	334	19	242	04	IAG
290	68	–157	191	69	–24	150	31	241	01	MED

2004/02/28

T = 16-29-25
Lat. N = 35.023
Long. W = 4.013
Area: 30 km SW Al Hoceima (RIFC)
Z = 6 (IAG = 4 km)
M = 4.2
Ref. = IGN



IGN 461723



IAG

A			B			P		T		NS
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
255	63	102	50	29	68	334	17	190	70	IGN
287	77	123	36	35	23	351	25	231	48	IAG

2004/03/02

T = 20-36-26
Lat. N = 35.148
Long. W = 3.867
Area: 10 km S Al Hoceima (RIFC)
Z = 6 (IAG=12 km)
Mw = 4.4
Ref. = IGN

IGN 462848

IAG

MED R030204A

A			B			P		T		NS
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
198	89	29	108	61	179	328	19	68	20	IGN
013	79	–25	109	65	–167	328	26	63	09	IAG
190	47	–39	309	63	–130	169	54	66	09	MED

2004/03/04

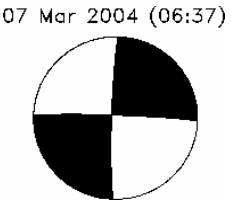
T = 11-44-14
Lat. N = 35.165
Long. W = 3.987
Area: SW Al Hoceima (RIFC)
Z = 12
M = 3.8
Ref. = IGN

IGN 463533

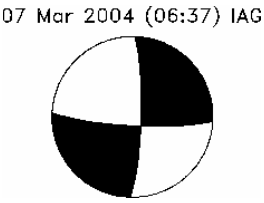
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
102	82	171	193	81	08	328	01	58	12	IAG

2004/03/07 (06:37)

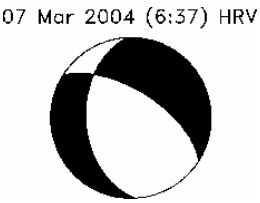
T = 06-37-52
Lat. N = 35.06
Long. W = 4.005
Area: SW Al Hoceima (RIFC)
Z = 12 (IAG=22) km
Mw = 5
Ref. = IGN



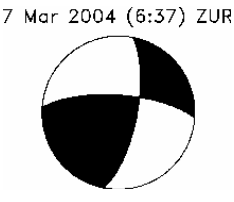
IGN 464446



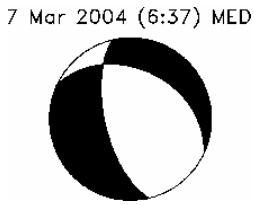
IAG



HRV



ZUR

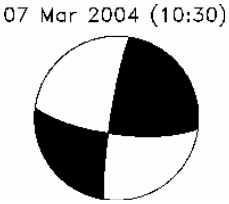


MED R030704A

A			B			*P*		*T*		Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl	
272	87	–176	182	86	–03	136	07	47	02	IGN
93	81	–171	002	81	–08	318	13	228	00	IAG
302	62	–124	178	43	–43	164	58	56	11	HRV
274	70	159	011	70	20	322	00	232	28	ZUR
295	38	–135	167	64	–61	121	60	237	14	MED

2004/03/07 (10:30)

T = 10-30-05
Lat. N = 35.115
Long. W = 3.893
Area: Tamassint, 15 km S Al Hoceima (RIFC)
Z = 33
M = 3.5
Ref. = IGN



IGN (MT) 464584

A			B			*P*		*T*		Ref
Φ	*δ*	*λ*	*Φ*	*δ*	*λ*	Az	Pl	Az	Pl	
189	84	16	98	74	174	320	06	54	16	IGN

2004/03/10

T = 04-22-18
Lat. N = 34.91
Long. W = 4.08
Area: Jbel Hammame, 35 km SW Al Hoceima (RIFC)
Z = 6 km
Mw = 4
Ref. = IAG

IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
354	68	–50	109	44	–188	309	51	57	14	IAG

2004/03/12

T = 17-21-51
Lat. N = 34.921
Long. W = 4.051
Area: Jbel Hammame, 35 km SW Al Hoceima (RIFC)
Z = 9 km (IAG = 6 km)
M = 4.8
Ref. = IGN

IGN 466339

IAG

ZUR

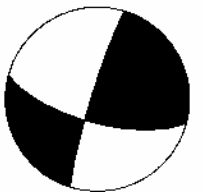
MED R031204A

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
345	48	–73	140	45	–108	325	77	64	00	IGN
352	49	–62	134	47	–118	331	70	63	01	IAG
186	48	–11	284	81	–137	154	35	48	21	ZUR
326	32	–106	165	59	–80	100	74	248	14	MED

2004/03/15

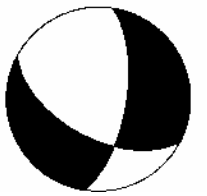
T = 12-39-13
Lat. N = 35.12
Long. W = 4.2
Area: Snada, 30 km SW Al Hoceima (RIFC)
Z = 12
Mw = 3.9
Ref. = IAG

15 Mar 2004 (IGN)



IGN 467085

15 Mar 2004 (IAG)



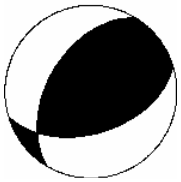
IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
105	69	174	198	84	21	329*	13*	064*	21*	IGN
119	54	–148	009	65	–39	329	46	066	06	IAG

2004/03/18

T = 11-45-31
Lat. N = 35.165
Long. W = 4.225
Area: 10 km W Rouadi (RIFC)
Z = 9
M = 3.9
Ref. = IGN

18 Mar 2004



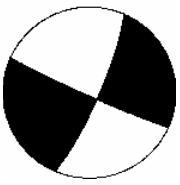
IGN 468390

A			B			P		T		Meth	Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl		
073	50	120	210	48	059	142	00	50	67	MT	IGN

2004/03/20

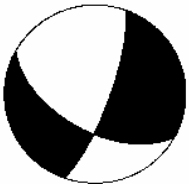
T = 09-37-26
Lat. N = 35.007
Long. W = 4.148
Area: 10 km SW Beni Hadifa (RIFC)
Z = 9
M = 4.5
Ref. = IGN

20 Mar 2004



IGN 469073

20 Mar 2004 (IAG)



IAG

A			B			P		T		NS
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
114	87	–171	024	81	–003	338	08	248	00	IGN
119	56	–164	202	77	–034	334	34	73	14	IAG

2004/04/01

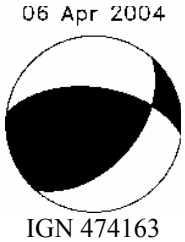
T = 00-25-35
Lat. N = 35.09
Long. W = 4.1
Area: Beni Hadifa, 25 km SW Al Hoceima (RIFC)
Z = 8 km
Mw = 4 km
Ref. = IAG

IAG

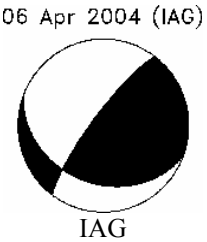
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
28	53	14	289	79	142	343	17	242	34	IAG

2004/04/06

T = 01-53-09
Lat. N = 35.06
Long. W = 4.11
Area: Beni Hadifa, 25 km SW Al Hoceima (RIFC)
Z = 6 km
Mw = 4.2
Ref. = IGN



IGN 474163



IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
277	56	129	041	50	046	340	04	244	58	IGN
110	33	160	216	79	059	331	28	94	46	IAG

2004/05/23

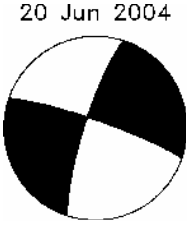
T = 00-29-45
Lat. N = 35.157
Long. W = 4.015
Area: 20 km SW Al Hoceima (RIFC)
Z = 24
M = 3.7
Ref. = IGN

IGN 487009

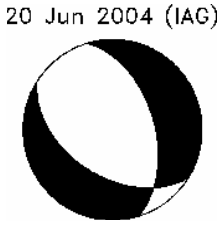
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
099	77	165	193	75	014	326	02	56	20	IGN

2004/06/20

T = 22-47-05
Lat. N = 34.936
Long. W = 3.875
Area: Larba de Taourirt , S Al Hoceima (RIFC)
Z = 24 (IAG=6) km
M = 4.3
Ref. = IGN



IGN (MT) 494264

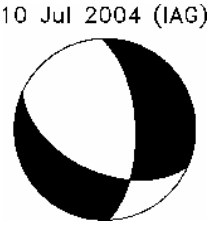


IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
289	83	–170	198	80	–008	155	14	65	02	IGN
122	47	–131	355	57	–54	321	61	60	5	IAG

2004/07/10

T = 17-57-16
Lat. N = 35.16
Long. W = 4.07
Area: Snada, 35 km SW Al Hoceima (RIFC)
Z = 6 km
Mw = 3.7
Ref. = IAG



IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
358	62	–46	115	50	–141	320	53	59	07	IAG

2004/08/14

T = 01-55-42
Lat. N = 34.87
Long. W = 3.89
Area: 10 km W Larba de Taourirt, 35 km S Al Hoceima (RIFC)
Z = 6 km
Mw = 3.8
Ref. = IAG

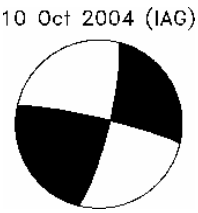
IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
129	60	–115	352	38	–53	353	65	237	12	IAG

2004/10/10

T = 08-13-58
Lat. N = 35.045
Long. W = 3.983
Area: Beni Hadifa, 30 km SW Al Hoceima (RIFC)
Z = 9 (IAG = 22 km)
M = 3.9
Ref. = IGN

IGN 515511

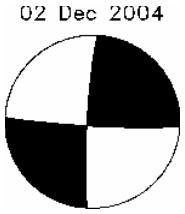


IAG

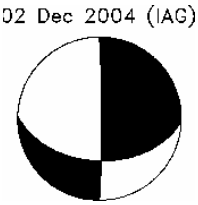
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
176	86	004	085	86	176	311	02	40	05	IGN
14	80	006	284	85	170	329	03	239	11	IAG

2004/12/02

T = 17-50-42
Lat. N = 34.952
Long. W = 2.96
Area: 20 km S Nador (RIFOR)
Z = 8
Mw = 4.9
Ref. = IAG



IGN MT



IAG

MED R120204A

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
93	86	175	183	85	4	139	01	48	06	IGN
92	47	183	000	88	–42	307	30	55	27	IAG
101	79	–156	006	66	–12	325	25	231	09	MED

2004/12/04

T = 10-30-00
Lat. N = 34.99
Long. W = 2.99
Area: Gareb, 20 km SW Nador (RIFOR)
Z = IGN=3; IAG=12
Mw = 5
Ref. = IGN

IGN 526 948

IAG

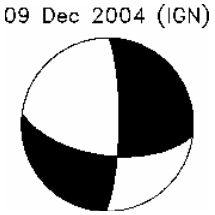
ZUR

MED R120404B

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
275	90	–176	185	86	00	140	3	49	01	IGN
93	61	189	359	82	–28	313	26	50	14	IAG
93	74	–160	358	70	–16	316	25	225	02	ZUR
101	60	–162	002	74	–31	318	33	54	09	MED

2004/12/09

T = 07-46-01
Lat. N = 34.96
Long. W =3.08
Area: Gareb, 20 km S Nador (RIFOR)
Z = 0 (IGN)
Mw = 5.02 IGN; 4.5 IAG
Ref. = IGN



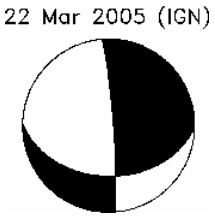
IGN 528 023

IAG

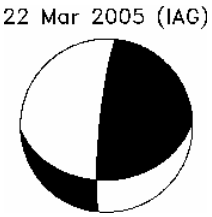
A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
001	79	–30	98	61	–167	315*	29*	52*	12*	IGN
359	77	–23	94	66	194	314	26	48	08	IAG

2005/03/22

T = 09-03-13
Lat. N = 34.93
Long. W = 2.98
Area: Gareb, 20 km SW Nador (RIFOR)
Z = IGN=; IAG=6
Mw = 4.4
Ref. = IAG



IGN 554988

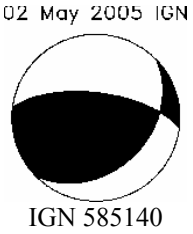


IAG

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
91	41	–173	356	86	–49	301	35	54	29	IGN
87	37	169	186	84	53	305	29	63	40	IAG

2005/05/02

T = 12-58-07
Lat. N = 35.72
Long. W =3.54
Area: Alboran, 60 km NE Al Hoceima (ALBC)
Z = 0
Mw = 4.1
Ref. = IGN

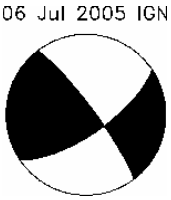


IGN 585140

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
277	66	117	46	36	45	347*	16*	277*	60*	IGN

2005/07/06

T = 07-27-05
Lat. N = 35.75
Long. W = 3.52
Area: Alboran, 60 km NE Al Hoceima (ALBC)
Z = 0
Mw = 3.9
Ref. = IGN

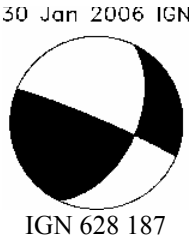


IGN 585 859

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
323	82	160	56	70	09	11*	08*	278*	20*	IGN

2006/01/30 (07:58)

T = 07-58-13
Lat. N = 35.06
Long. W = 4.01
Area: Beni Hadifa, 25 km SW Al Hoceima (RIFC)
Z = 0
Mw = 4.2
Ref. = IGN

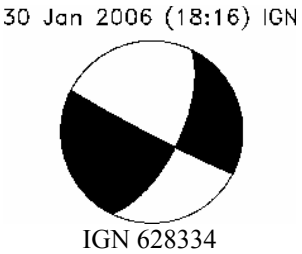


IGN 628 187

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
293	86	142	26	52	05	346*	23*	242*	29*	IGN

2006/01/30 (18:16)

T = 18-16-57
Lat. N = 35.0
Long. W = 3.98
Area: 10 km SW Tamassint (RIFC)
Z = 4.5
Mw = 4
Ref. = IGN

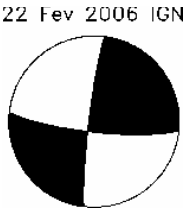


IGN 628334

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
117	87	–155	26	65	–3	344*	19*	249*	15*	IGN

2006/02/22

T = 01-01-12
Lat. N = 35.12
Long. W = 3.98
Area: Tamassint, 25 km S Al Hoceima (RIFC)
Z = 0
Mw = 3.7
Ref. = IGN

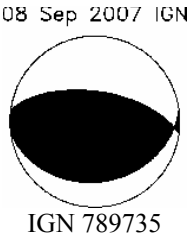


IGN 634691

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
187	85	10	097	80	175	322*	03*	53*	10*	IGN

2007/09/08

T = 16-41-30
Lat. N = 35.8
Long. W = 3.57
Area: Alboran, 70 km NE Al Hoceima (ALBC)
Z = 0
Mw = 4.4
Ref. = IGN



IGN 789735

A			B			P		T		Ref
Φ	δ	λ	Φ	δ	λ	Az	Pl	Az	Pl	
279	61	98	82	30	76	09*	17*	226*	69*	IGN