

## Odvození fokálního mechanismu – metoda prvních nasazení

- použijeme programy z programového balíku FOCAL

Pro vybrané seismické jevy vytvořte soubor s údaji o polaritě P-vlny, epicentrální vzdálenosti a azimutu od zdroje. Pomocí programu Pman.exe zobrazte data do grafu a zkuste určit možné fokální mechanismy.

a) 14 FEB 2008 ( 45)  
 ot = 10:09:23.43 +/- 0.19 SOUTHERN GREECE  
 lat = 36.646 +/- 4.1  
 lon = 21.833 +/- 3.2 MAGNITUDE 6.9 (GCMT)  
 dep = 29.0 (geophysicist)  
 mb = 6.3 (186) ML = 6.0 ( 3) mblg = 5.4 ( 30) md = 0.0 ( 0) MS = 6.6 (172)  

sta	phase	arrival	res	dist	azm	amp	per	mag	amp	per	mag	sta
CEL	iPnd	10:10:35.02	-1.4	5.0	291	d:6.8+2		6.7X	L:1.4+1	.85	6.0	CEL
TIR	iPnc	10:10:37.28	1.6	4.9	343	d:5.4+2		6.5X	L:2.6+1	.95	6.2	TIR
WDD	ePnd	10:10:45.78	-3.9X	6.0	265	d:5.1+2		6.9X	L:2.2+1	.35	6.4X	WDD
TIRR	iPnc	10:11:36.43	1.4X	9.3	31	d:5.7+2		8.3X	L:1.8+0	1.2	5.9X	TIRR
KIV	iPc	10:13:25.76	0.7	17.5	59	g:1.5+0	1.0	5.5	b:8.4+2	.70	6.0	KIV
TAM	iPd	10:13:49.01	-2.0	19.7	230	g:7.8-1	1.1	5.3	b:7.8+2	1.1	5.9	TAM
MTE	ePd	10:14:25.23	-3.1	23.2	288	g:5.9-1	1.2	5.3	b:5.9+2	1.2	6.0	MTE
KBL	iPc	10:16:40.08	-0.3	38.1	79	b:5.4+2	1.0	6.3				KBL
DBIC	iPd	10:16:40.41	-3.0	38.5	226	b:5.7+2	.96	6.3				DBIC
TLY	iPc	10:19:10.00	-0.2	57.6	47	b:9.3+2	1.6	6.6				TLY
RCBR	ePd	10:20:21.89	-1.2	68.5	245	b:2.2+2	1.3	6.1				RCBR
GAMB	ePc	10:21:25.27	-0.7	79.3	6	b:1.1+2	1.0	5.8				GAMB
SKAG	ePc	10:21:42.69	0.3X	82.4	348	b:1.7+2	1.1	6.0				SKAG

b) 28 OCT 2008 (302)  
 ot = 23:09:57.65 +/- 0.10 PAKISTAN  
 lat = 30.639 +/- 2.3  
 lon = 67.351 +/- 1.7 MAGNITUDE 6.4 (UCMT)  
 dep = 15.0 (geophysicist)  
 60 km (35 miles) NE of Quetta, Pakistan (pop 560,000)  
 190 km (120 miles) SE of Kandahar, Afghanistan  
 195 km (120 miles) NNE of Kalat, Pakistan  
 640 km (400 miles) WSW of ISLAMABAD, Pakistan  
 mb = 6.3 (215) ML = 0.0 ( 0) mblg = 5.7 ( 3) md = 0.0 ( 0) MS = 6.6 (188)  

sta	phase	arrival	res	dist	azm	amp	per	mag	amp	per	mag	sta
KBL	iPnd	23:11:03.45	2.8	4.1	20							KBL
AML	iPd	23:12:55.08	-0.9	12.5	22							AML
AAK	iPnd	23:13:04.81	-0.8	13.3	24							AAK
ABKAR	iPd	23:14:24.34	1.1	19.4	345							ABKA
MK31	ePd	23:14:26.40	-1.5	19.8	31							MK31
LSA	ePc	23:14:37.95	1.3	20.6	87	g:2.9+0	1.0	5.9	b:8.3+3	1.4	6.9	LSA
BRVK	iPd	23:14:56.56	0.1	22.5	5	g:1.8+0	1.2	5.7	b:1.8+3	1.2	6.4	BRVK
KIV	iPc	23:15:08.79	0.7	23.6	311	g:1.5+0	1.4	5.6X	b:1.5+3	1.4	6.3	KIV
ZAA0	ePd	23:15:33.35	-0.9	26.5	23							ZAA0
CSS	iPc	23:15:55.53	0.1	28.8	288	b:1.8+3	2.7	6.4				CSS
CHTO	iPc	23:16:13.41	-0.5	30.9	105	b:1.4+3	1.1	6.7				CHTO
KIEV	ePc	23:16:46.29	-0.2	34.7	316	b:3.4+2	1.0	6.2				KIEV
ULN	ePc	23:16:48.20	0.6	34.8	49	b:1.7+2	1.2	5.8				ULN
ENH	iPc	23:17:00.36	0.7	36.2	80	b:6.3+3	1.7	7.2				ENH
BUR08	ePc	23:17:01.17	0.3	36.3	310							BUR0
MSEY	ePc	23:17:06.32	0.3	36.9	200	b:4.7+2	1.4	6.1				MSEY
DGAR	ePd	23:17:17.93	1.5	38.1	172	b:1.1+3	1.8	6.3				DGAR
PSZ	ePc	23:17:31.98	1.0	39.9	309	b:4.5+2	.90	6.2				PSZ
BJT	ePc	23:17:36.65	0.9	40.5	63	b:2.1+2	.70	6.0				BJT
IPM	iPc	23:17:39.57	-0.4	41.0	123	b:1.4+3	1.5	6.4				IPM
MORC	ePc	23:17:46.23	0.5	41.7	312	b:2.7+2	1.1	5.9				MORC
KMBO	iPc	23:17:54.50	0.5	42.6	228	b:1.2+3	2.1	6.2				KMBO
KHC	ePc	23:18:05.84	-0.2	44.2	311	b:1.7+2	1.4	5.7				KHC
ARE0	ePd	23:18:17.00	0.7	45.5	341							ARE0
TUE	ePc	23:18:27.95	-0.4	47.0	307	b:6.1+2	1.5	6.4				TUE
SSLB	ePc	23:18:35.48	0.8	47.8	85	b:2.8+3	1.2	7.2				SSLB
WLF	ePc	23:18:44.85	0.8	49.1	311	b:2.5+2	1.0	6.2				WLF
MDJ	ePc	23:18:51.90	-0.1	50.1	55	b:1.4+3	1.9	6.6				MDJ
TAM	iPc	23:19:28.92	-1.3	55.2	278	b:5.4+2	2.2	6.2				TAM
ESLA	ePc	23:19:46.55	-0.7	57.6	300	b:1.2+2	1.4	5.7				ESLA
BILL	ePc	23:20:38.65	0.8	65.2	24	b:1.0+3	2.1	6.6				BILL
LIC	iPc	23:21:18.20	-1.3	71.7	266	b:5.8+2	1.3	6.5				LIC
COLA	ePc	23:22:11.44	0.5	80.9	14	b:1.3+2	1.0	5.9				COLA

WRAB ePc	23:22:14.78	-0.8	81.7	119	b:5.2+2	1.2	6.5		WRAB
DAWY ePc	23:22:23.97	0.5	83.3	11					DAWY
FORT ePd	23:22:27.02	-0.4	84.0	131	b:4.4+2	1.1	6.6		FORT
SEW ePc	23:22:30.28	-0.1	84.7	18	b:5.5+2	1.5	6.6		SEW
FFC ePc	23:23:17.05	-0.1	94.5	354	b:1.7+2	1.1	6.4		FFC

## c) 26 DEC 2007 (360)

ot =	22:04:56.30	+/-	0.42						FOX ISLANDS, ALEUTIAN ISLANDS			
lat =	52.586	+/-	2.9									
lon =	-168.204	+/-	1.9						MAGNITUDE 6.4 (GCMT)			
dep =	36.4	+/-	3.3									
mb =	5.9 (229)	ML =	0.0 (0)	mblg =	0.0 (0)	md =	0.0 (0)	MS =	6.2 (175)			
sta	phase	arrival	res	dist	azm	amp	per	mag	amp	per	mag	sta
GAMB	ePnc	22:07:39.28	3.3X	11.4	352	b:6.5+0	.52	5.0X				GAMB
COLA	ePnc	22:08:37.64	-2.1	16.1	32	b:3.4+2	.95	5.4				COLA
DAWY	ePnc	22:09:11.74	-1.3	18.8	41							DAWY
PET	iPd	22:09:25.10	0.2	19.9	285							PET
SEY	iPd	22:09:57.60	-0.4	23.0	312							SEY
TIXI	iPd	22:11:26.00	-0.6	32.9	329							TIXI
YAK	ePc	22:11:30.30	-2.0	33.6	311	b:1.7+1	.55	5.2				YAK
BW06	ePd	22:12:25.16	0.4	39.7	80	b:1.4+2	.55	5.9				BW06
MAJO	ePc	22:12:30.10	-0.7	40.4	269	b:2.7+2	.90	6.0				MAJO
CBKS	ePc	22:13:28.63	-2.6	48.0	78	b:2.9+2	1.1	6.2				CBKS
DAG	ePd	22:13:41.40	-0.7	49.5	9	b:9.3+1	.80	5.9				DAG
ULN	iPd	22:13:56.80	-0.8	51.4	301							ULN
ARU	iPd	22:15:29.90	-0.5	64.8	333							ARU
PUL	ePd	22:15:45.80	0.9	67.0	350							PUL
PVCC	iPc	22:16:46.50	0.3	77.2	358							PVCC
KIV	ePd	22:17:04.00	1.2	80.2	338							KIV
GNI	ePd	22:17:19.60	0.3	83.3	335							GNI
UPM	iPc	22:17:24.50	-0.3	84.4	355							UPM
ULC	iPc	22:17:30.40	-0.3	85.6	354							ULC
QUE	iPc	22:17:35.00	9.1X	84.6	315							QUE

## d) 22 FEB 2006 (53)

ot =	22:19:07.73	+/-	0.19						MOZAMBIQUE			
lat =	-21.259	+/-	4.7									
lon =	33.480	+/-	7.4						MAGNITUDE 7.0 (GS)			
dep =	11.0	(geophysicist)										
mb =	6.5 (72)	ML =	0.0 (0)	mblg =	5.9 (3)	md =	0.0 (0)	MS =	7.5 (145)			
sta	phase	arrival	res	dist	azm	amp	per	mag	amp	per	mag	sta
BOSA	ePnc	22:21:31.94	-5.8X	10.4	224	g:6.2+1	1.0	6.8	b:6.0+1	.70	6.1X	BOSA
TSUM	ePnc	22:22:33.13	-7.6X	15.1	275	b:2.9+3	.65	6.8				TSUM
SUR	ePnc	22:22:43.45	-7.1X	15.8	223	b:7.2+3	.85	6.9				SUR
KMBO	ePd	22:23:44.57	0.1	20.3	11	b:2.2+3	1.4	6.3				KMBO
DGAR	ePd	22:26:41.19	-2.2	40.1	76	b:1.4+3	1.1	6.5				DGAR
PALK	ePd	22:28:34.31	-0.4	54.3	64	b:1.9+3	1.7	6.8				PALK
SNAA	iPd	22:28:37.00	1.3	54.6	193							SNAA
GVD	ePd	22:28:49.69	-0.2	56.5	351	b:3.1+2	1.1	6.2				GVD
HYB	ePd	22:29:03.50	-1.3	58.6	52	b:7.9+2	1.0	6.8				HYB
APE	Pc	22:29:04.99	1.0	58.5	353							APE
BRTR	ePc	22:29:18.80	-0.2	60.7	0							BRTR
CASY	ePd	22:29:50.48	-0.4	65.5	154	b:6.8+2	1.3	6.7				CASY
VRI	Pd	22:30:02.77	1.7	67.1	355							VRI
BZS	Pd	22:30:05.50	2.3	67.4	351							BZS
VLC	ePd	22:30:07.92	-1.8	68.4	342	b:1.9+2	1.3	6.1				VLC
IAS	Pc	22:30:10.95	2.1	68.3	356							IAS
BURAR	Pd	22:30:13.98	1.1	68.9	354							BURA
QSPA	iPc	22:30:14.90	2.4	68.9	180	b:3.1+2	1.0	6.4				QSPA
VRAC	Pc	22:30:32.05	1.7	71.8	349							VRAC
BJT	ePd	22:32:43.37	-0.9	98.0	50	b:2.1+2	1.7	6.5				BJT

**obecný postup:**

- Sestavte vstupní soubor obsahující hlavičku (zem. šířka, zem. délka a hloubka hypocentra, počet stanic) a údaje o smyslu nasazení na jednotlivých stanicích (-1 = utržení dolů; 1 = utržení nahoru)
- Pomocí programu `azmtak.exe` vytvořte soubor obsahující pro každou stanicí hodnotu take-off úhlu a azimut ke zdroji
- Pomocí programu `pman.exe` vynesete údaje do grafu a proložte dvě nodální plochy fokálního mechanismu