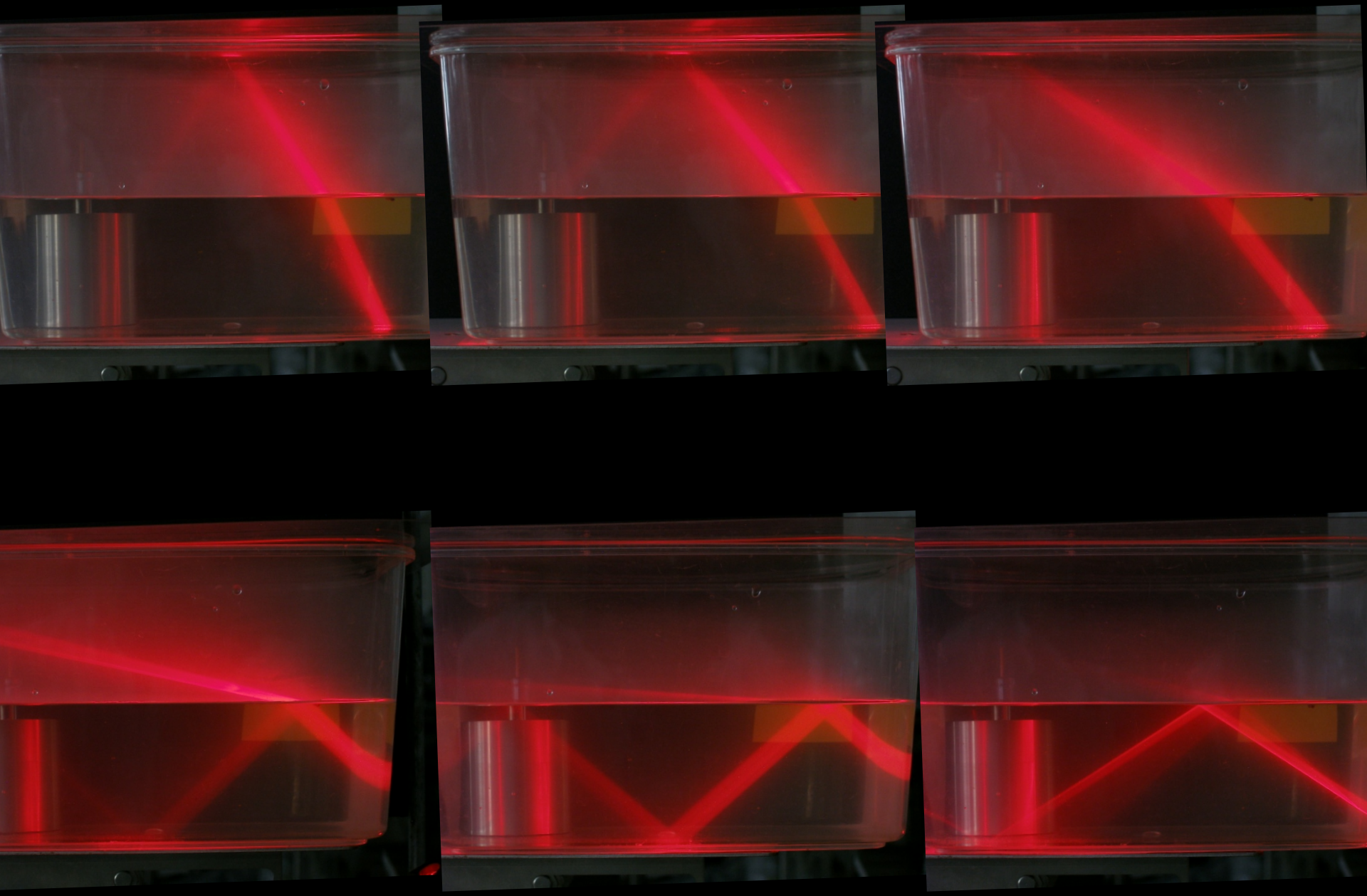
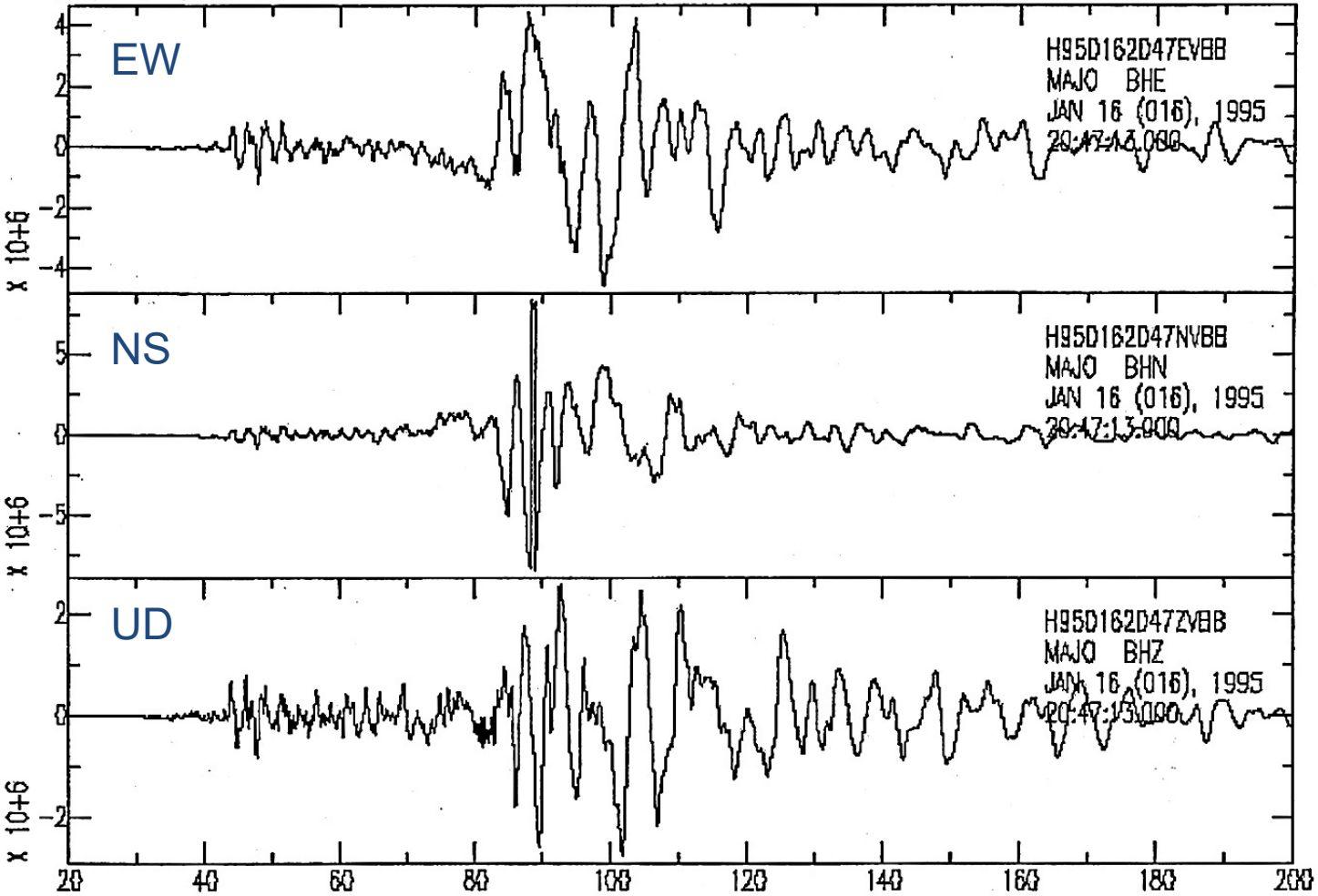
地球内部物理学

2019.12.23

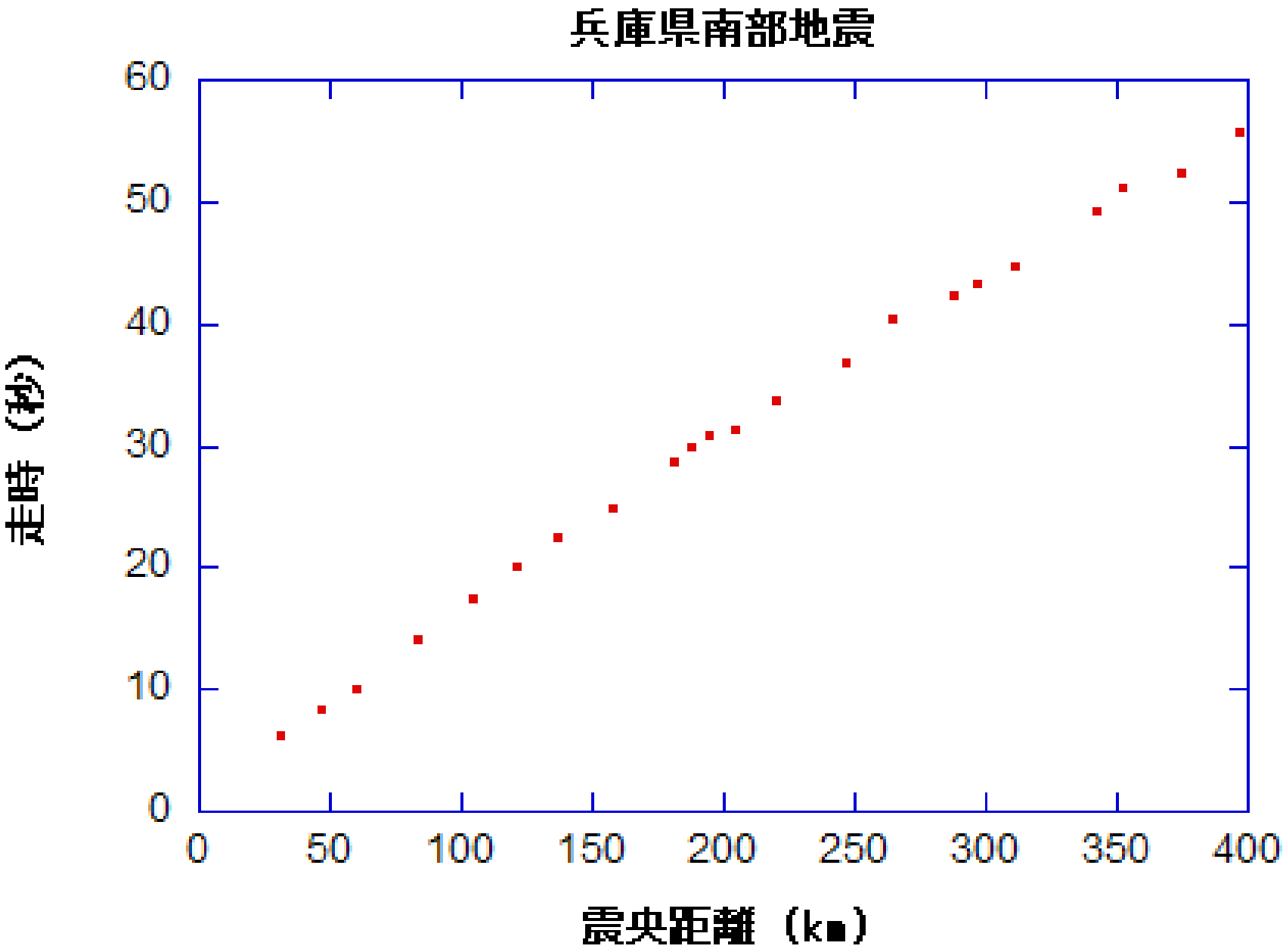


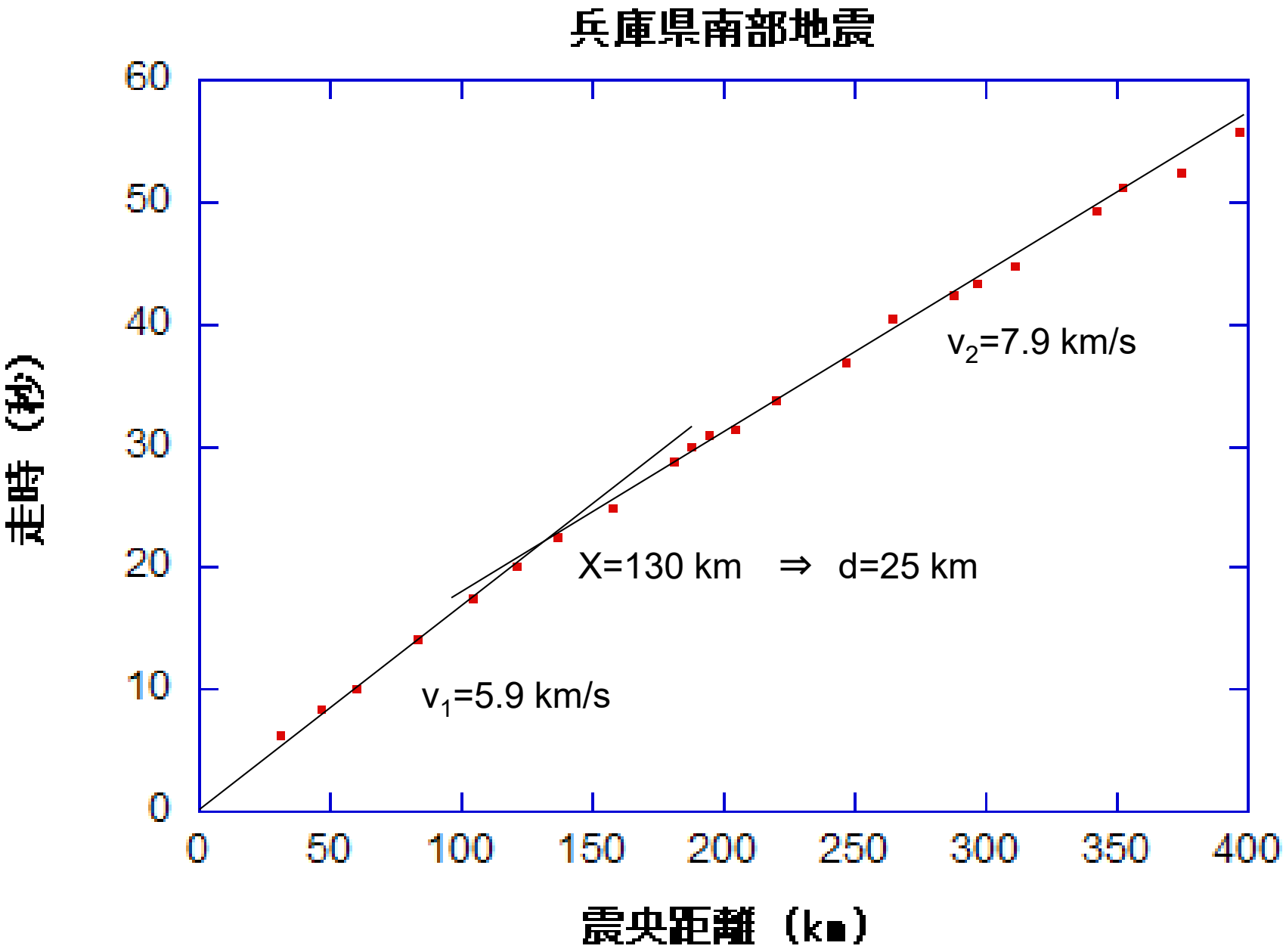
長野県松代における兵庫県南部地震の波形記録

1995 Jan 17
05:47:20.0 (JST)



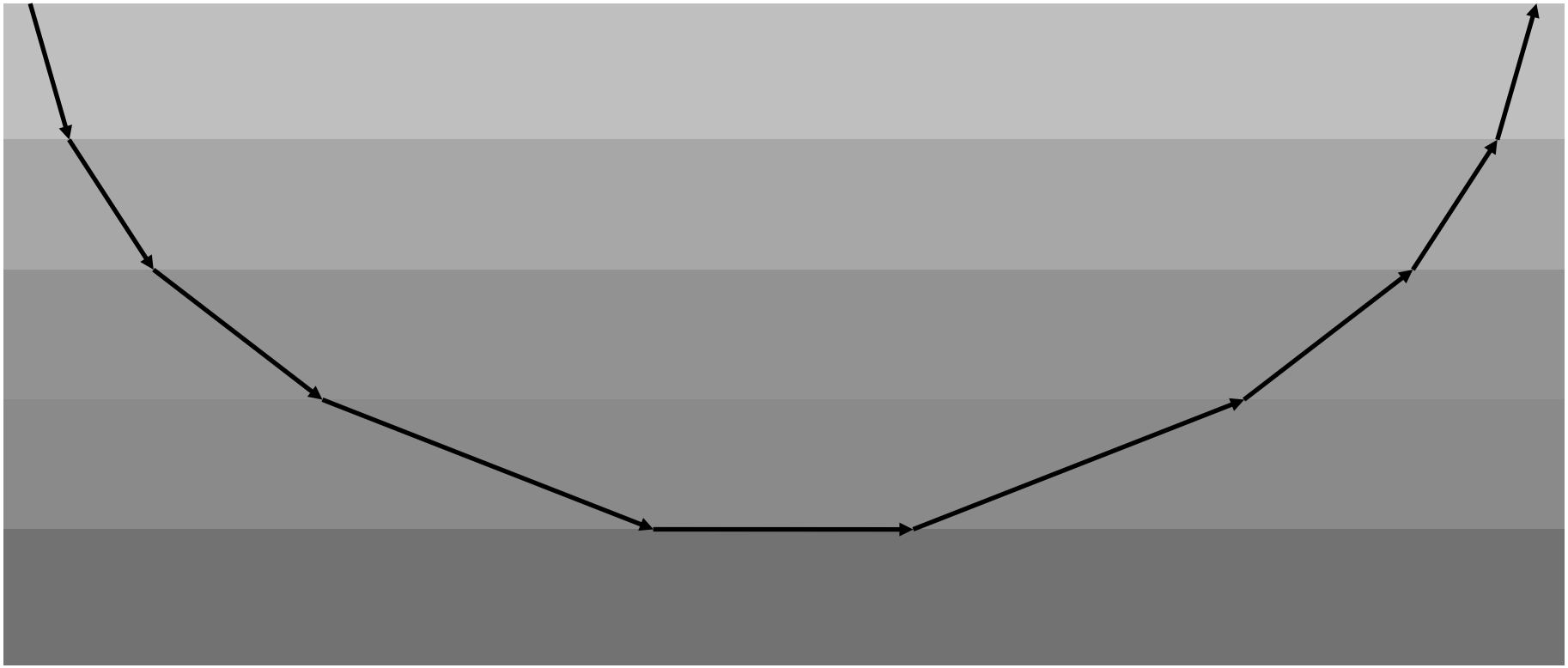
(sec.)

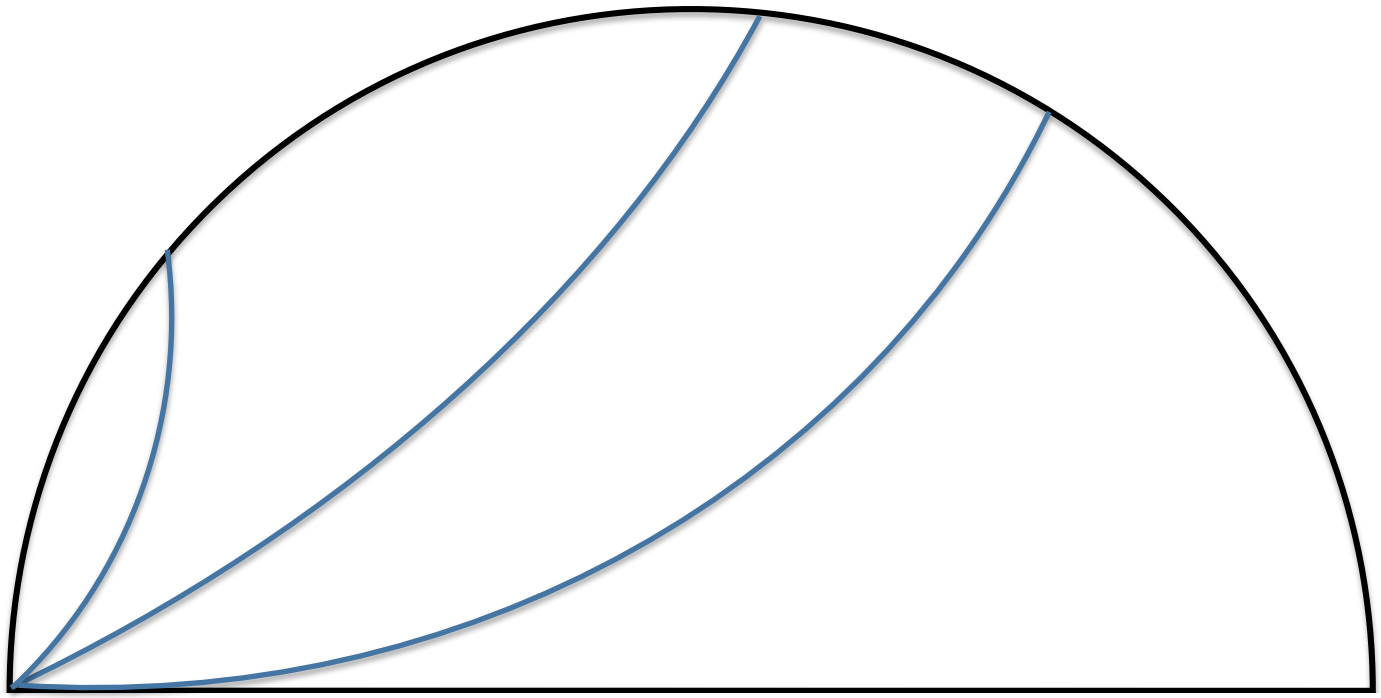

兵庫県南部地震
走時（秒）
震央距離（km）
0
10
20
30
40
50
60
0
50
100
150
200
250
300
350
400


兵庫県南部地震
走時（秒）
震央距離（km）
0
10
20
30
40
50
60
0
50
100
150
200
250
300
350
400
v1=5.9 km/s
v2=7.9 km/s
X=130 km ⇒ d=25 km

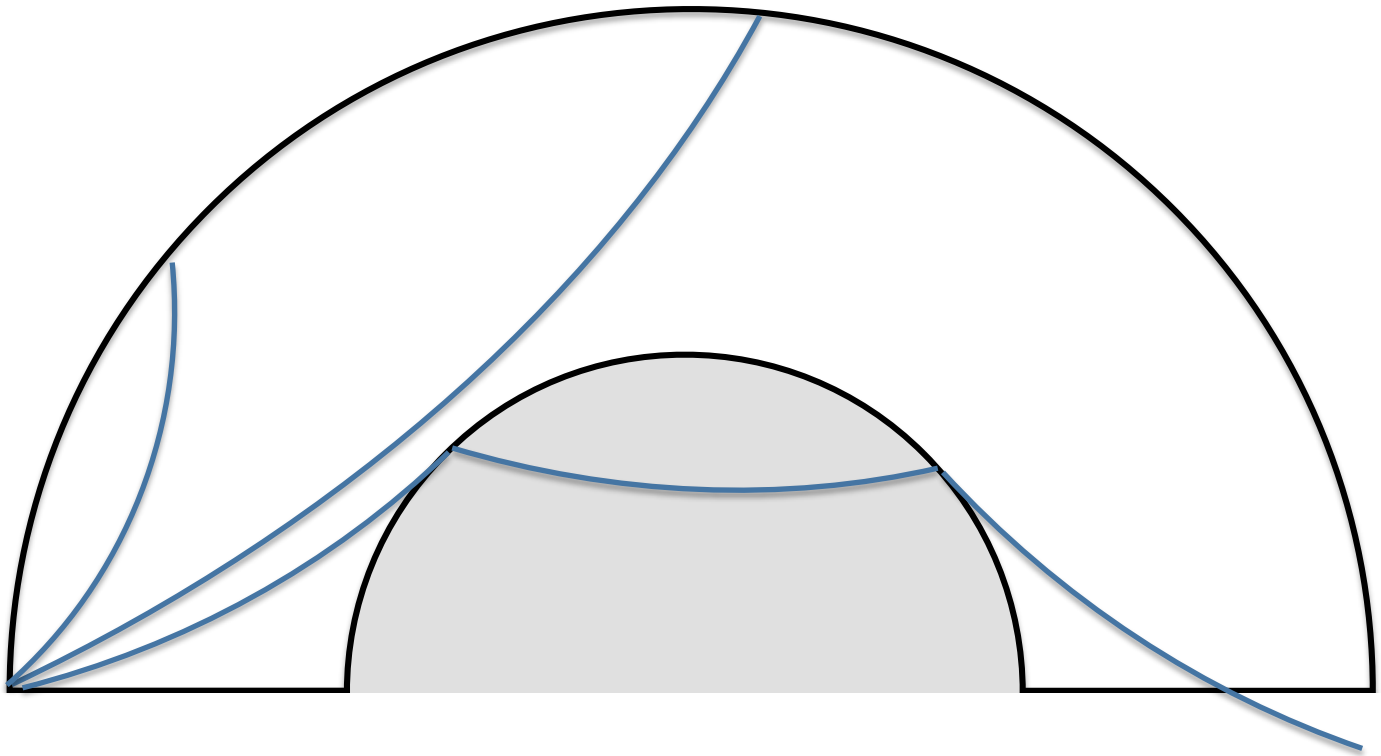
地震波の伝播

深いほど速度が速ければ，入射した波はいずれ戻ってくる

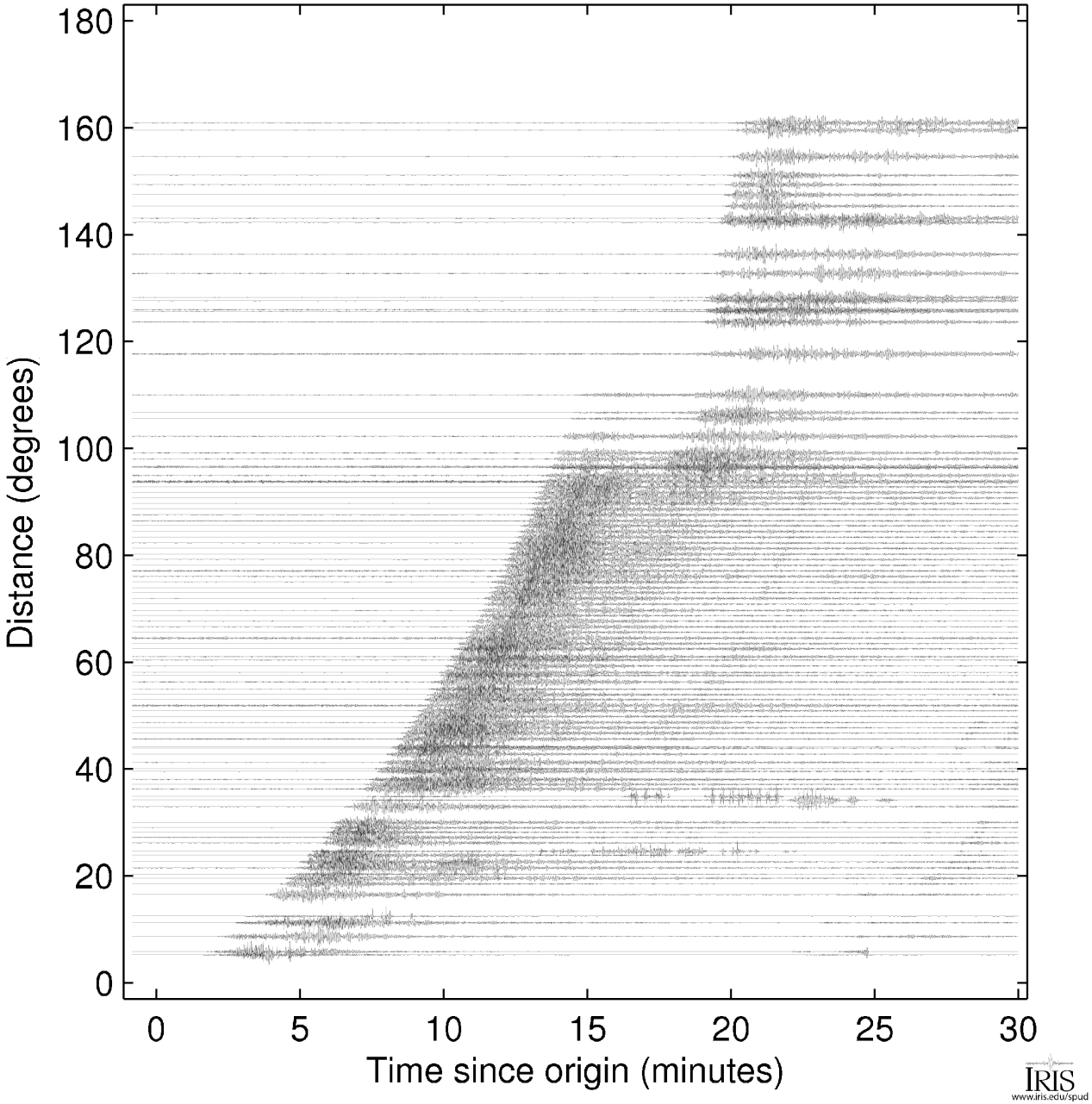




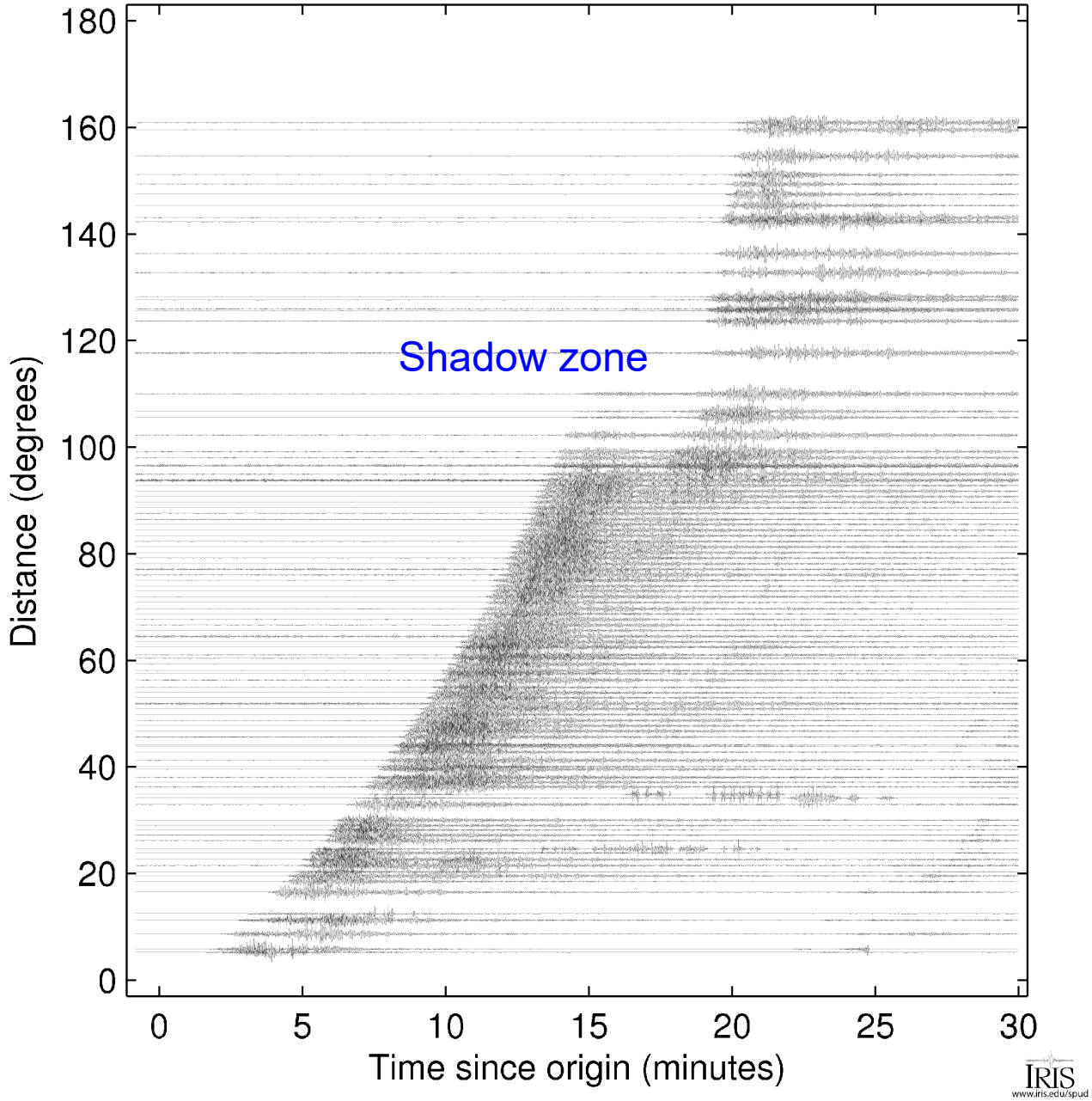
もし深い方が遅くなっていると



Combed and aligned on origin 0.3 – 1.0 Hz BHZ
NEAR EAST COAST OF HONSHU, JAPAN
2011/03/11 05:46:23 M8.9 Z=24.4km Lat=38.3215 Lon=142.3693

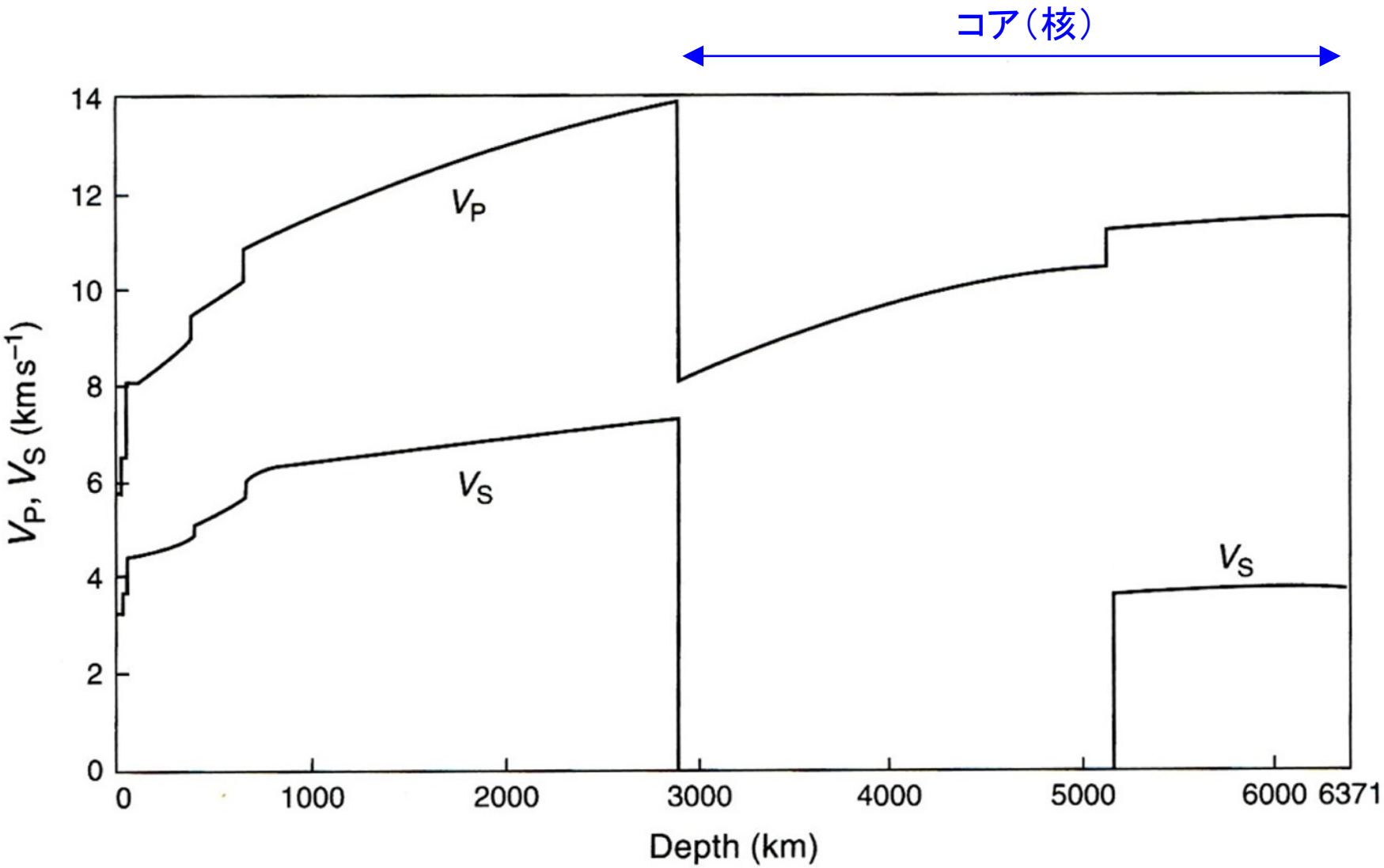


Combed and aligned on origin 0.3 – 1.0 Hz BHZ
NEAR EAST COAST OF HONSHU, JAPAN
2011/03/11 05:46:23 M8.9 Z=24.4km Lat=38.3215 Lon=142.3693



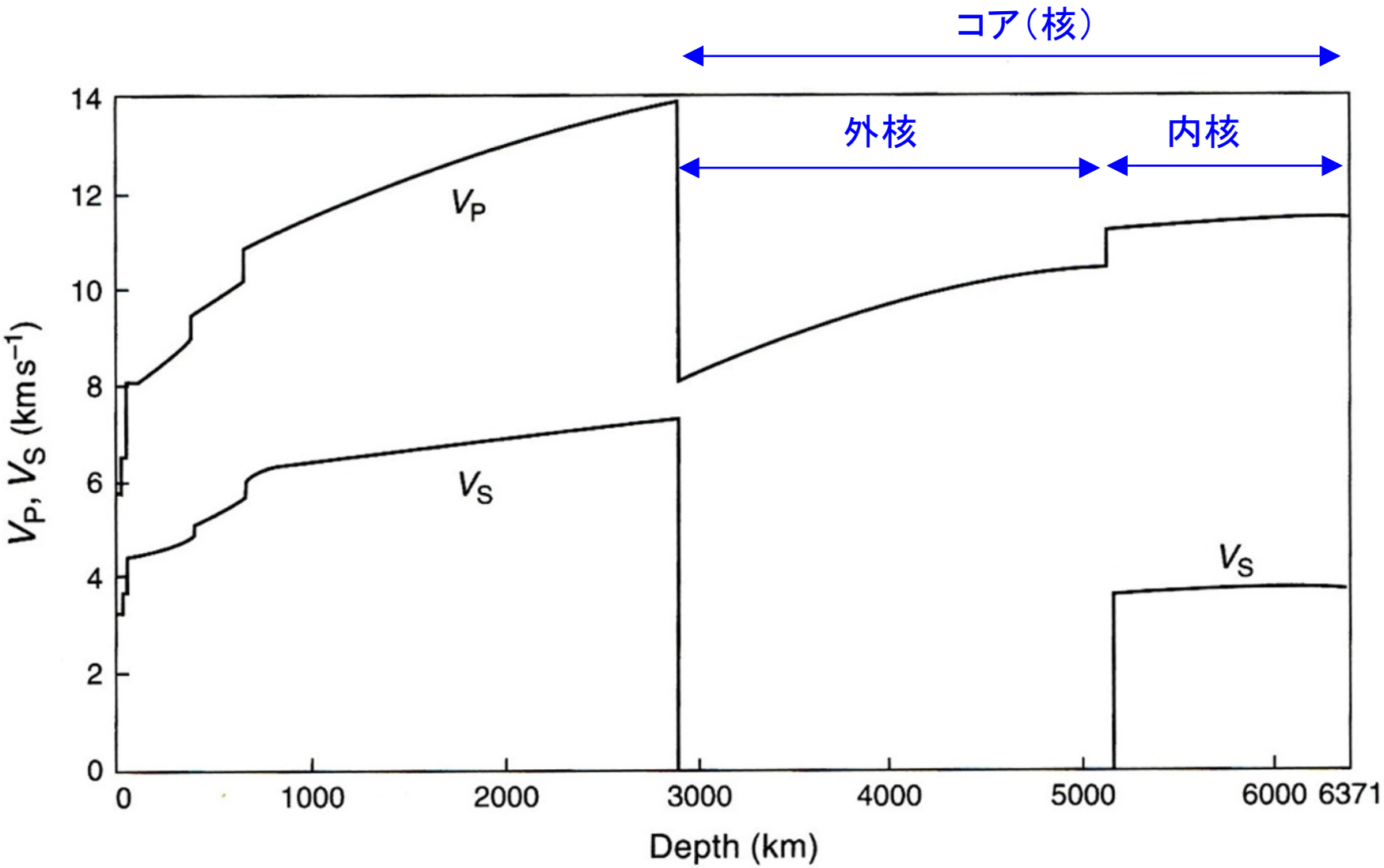
球対称地球モデル

IASP91



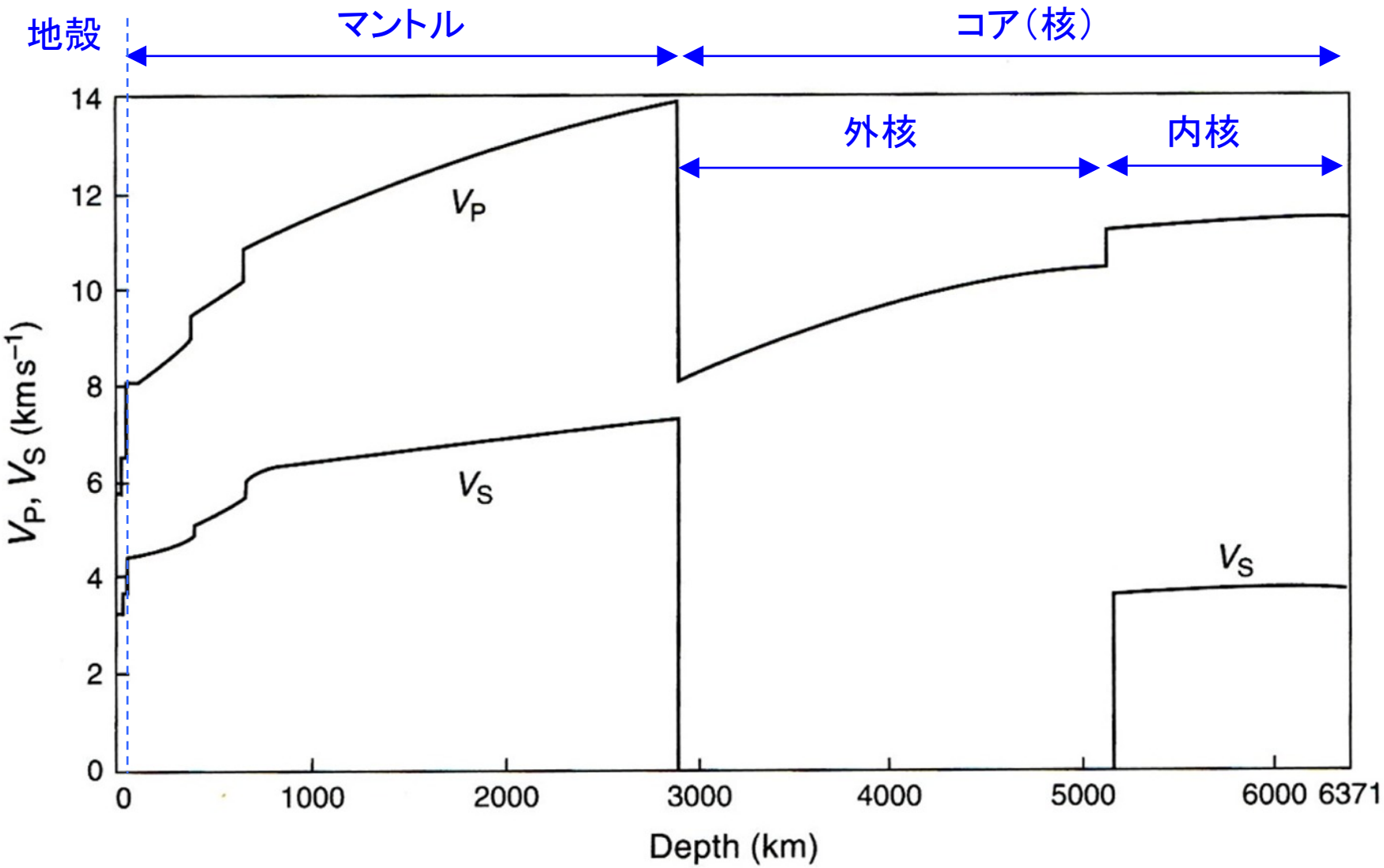
球対称地球モデル

IASP91



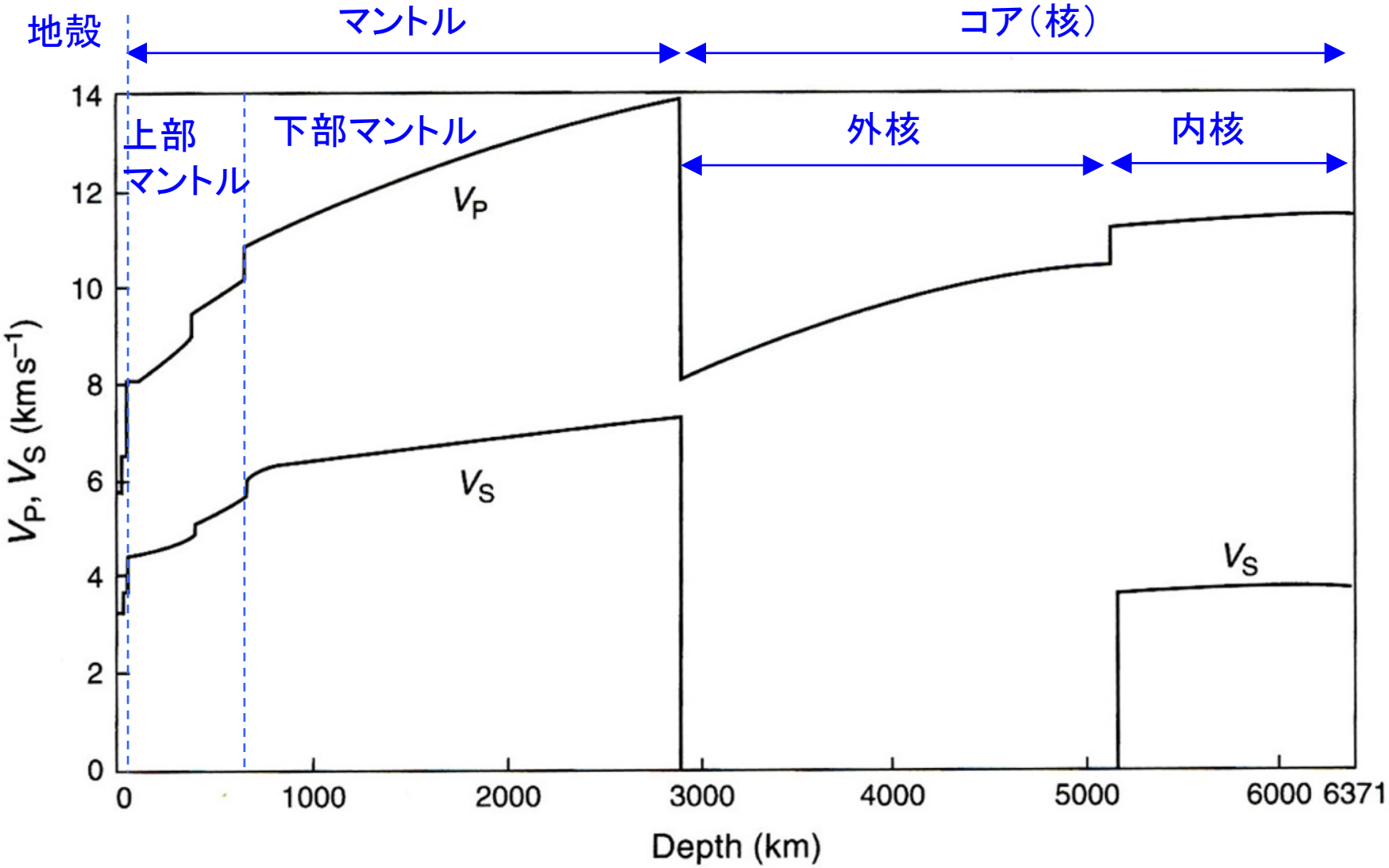
球対称地球モデル

IASP91



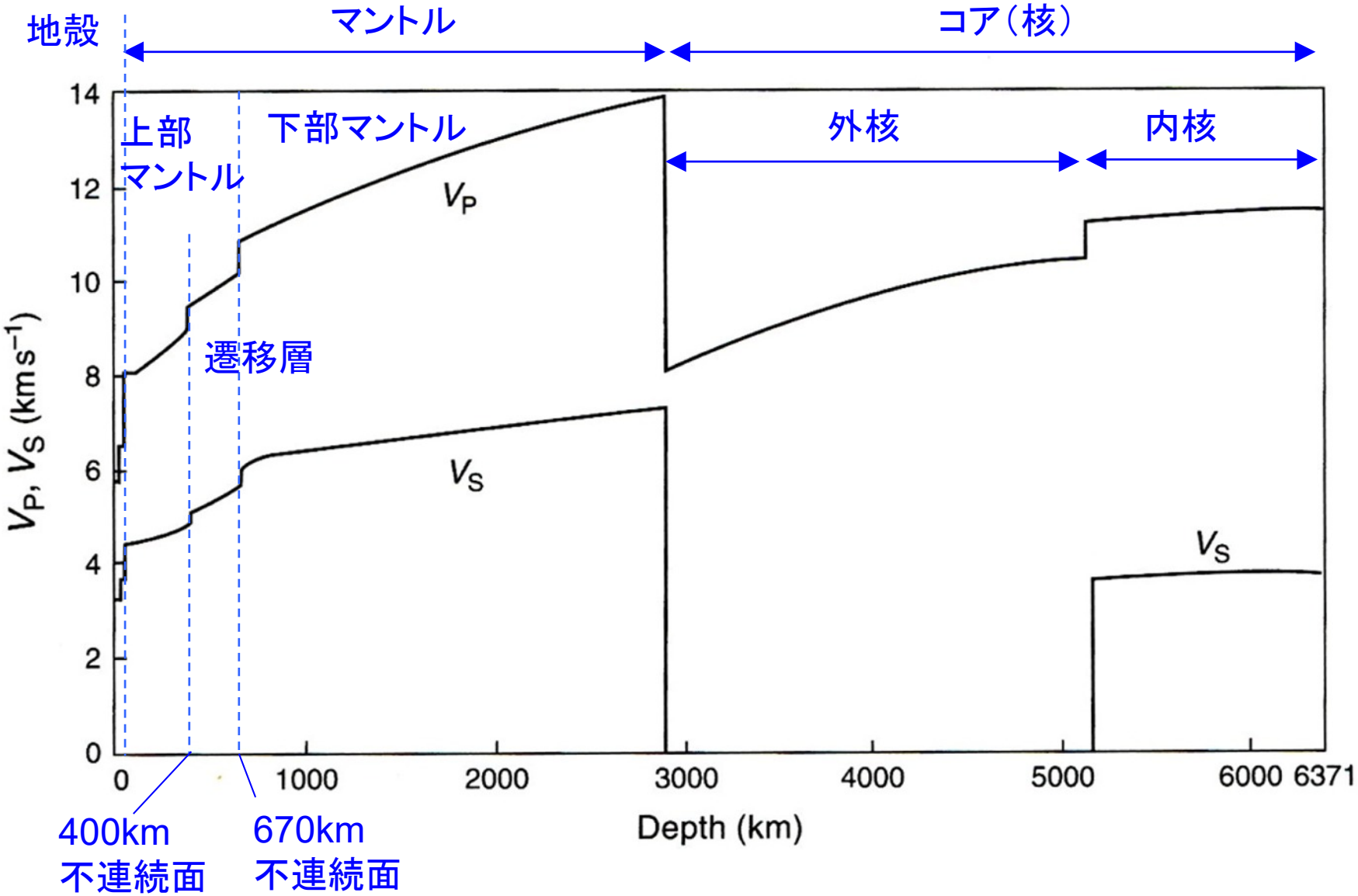
球対称地球モデル

IASP91



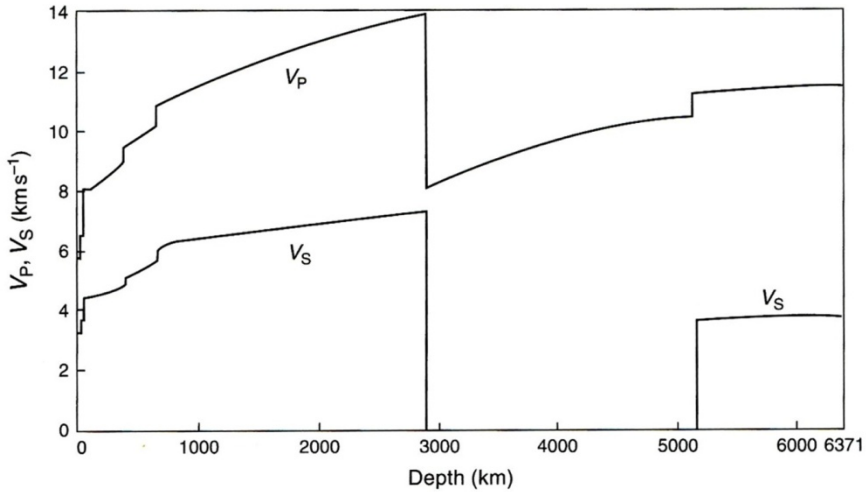
球対称地球モデル

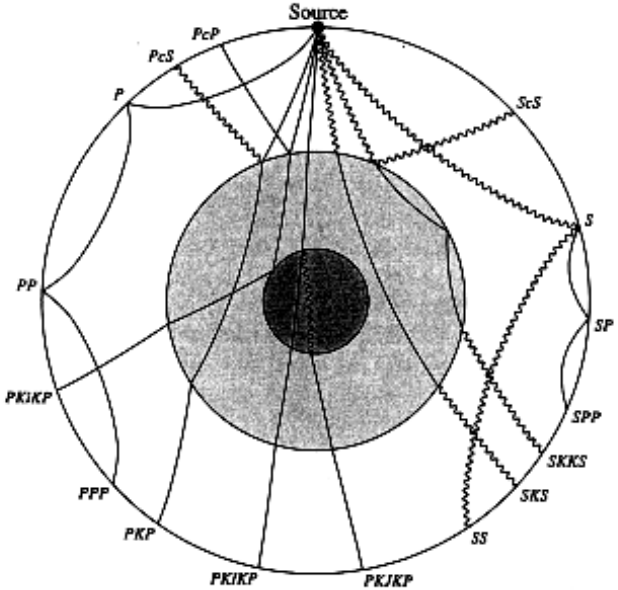
IASP91



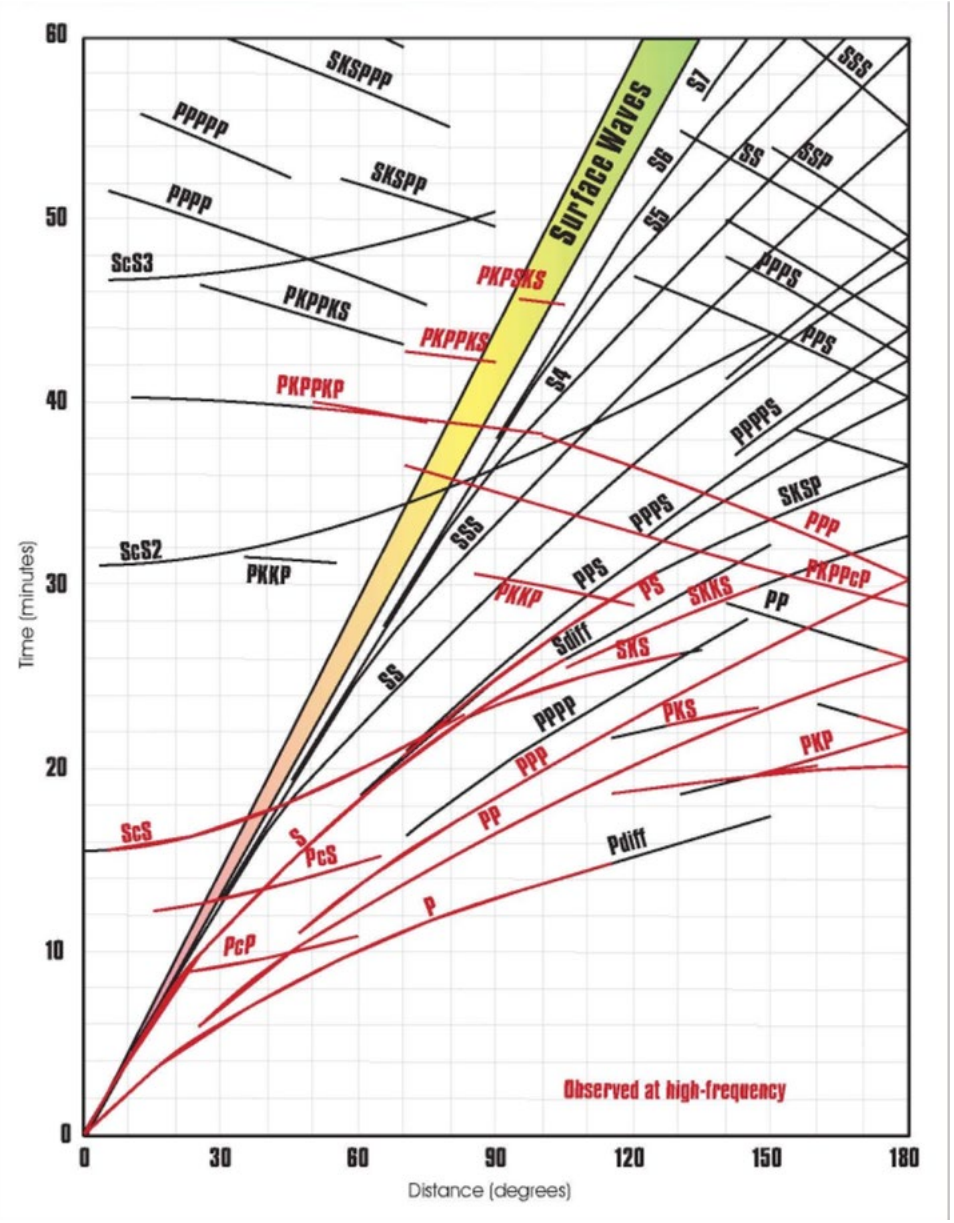
球対称地球モデル（地震波速度構造）

IASP91

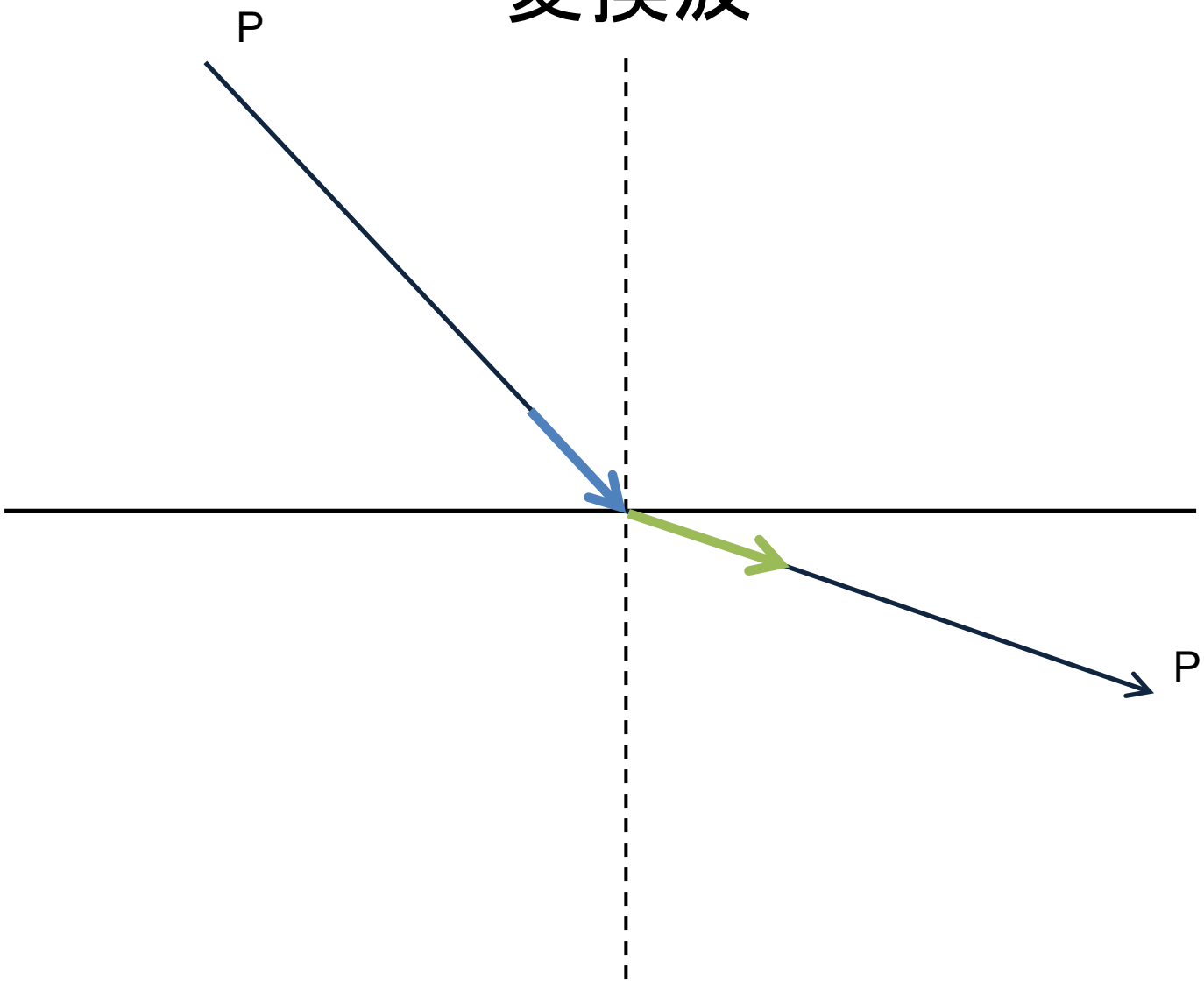




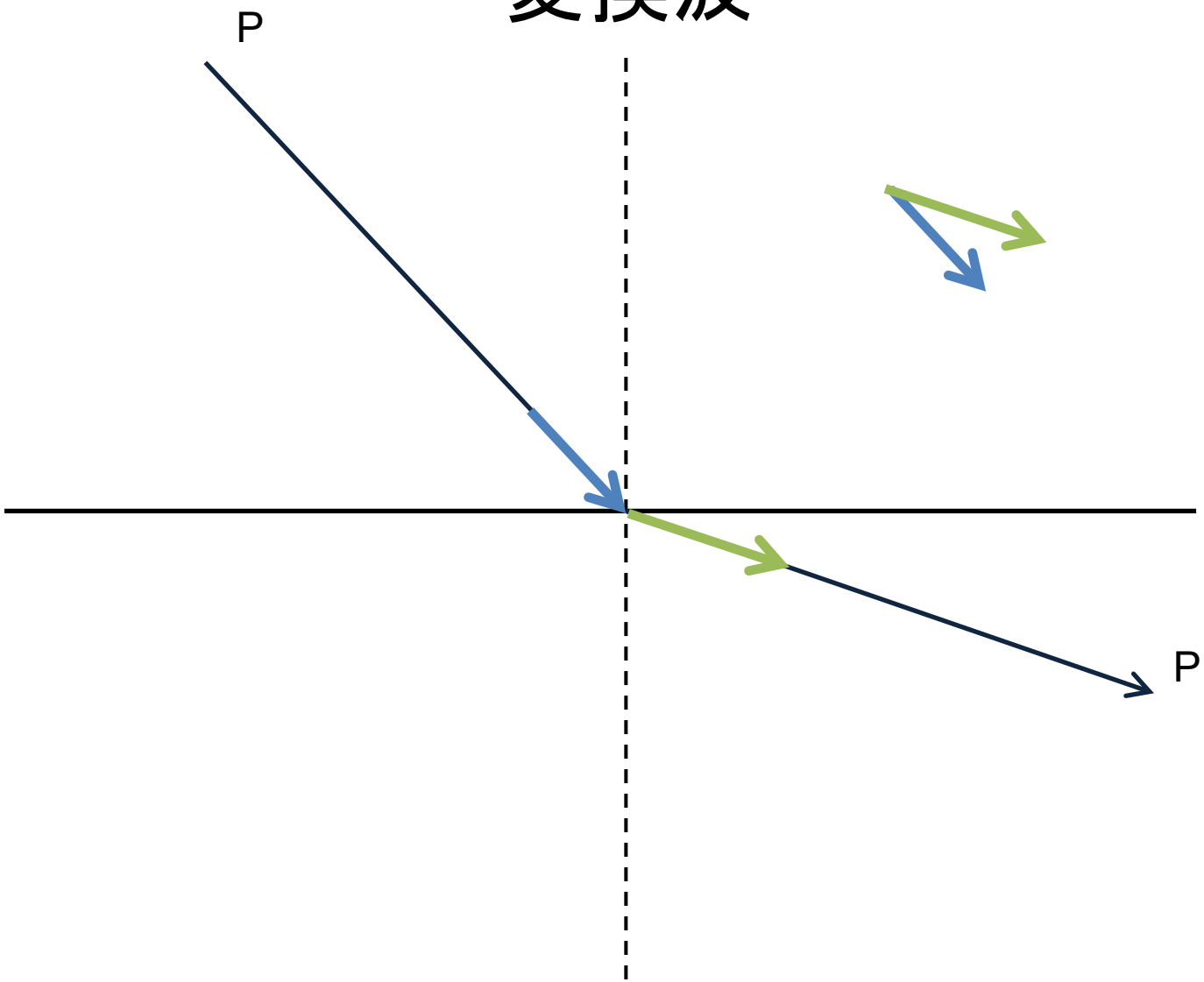
理論走時



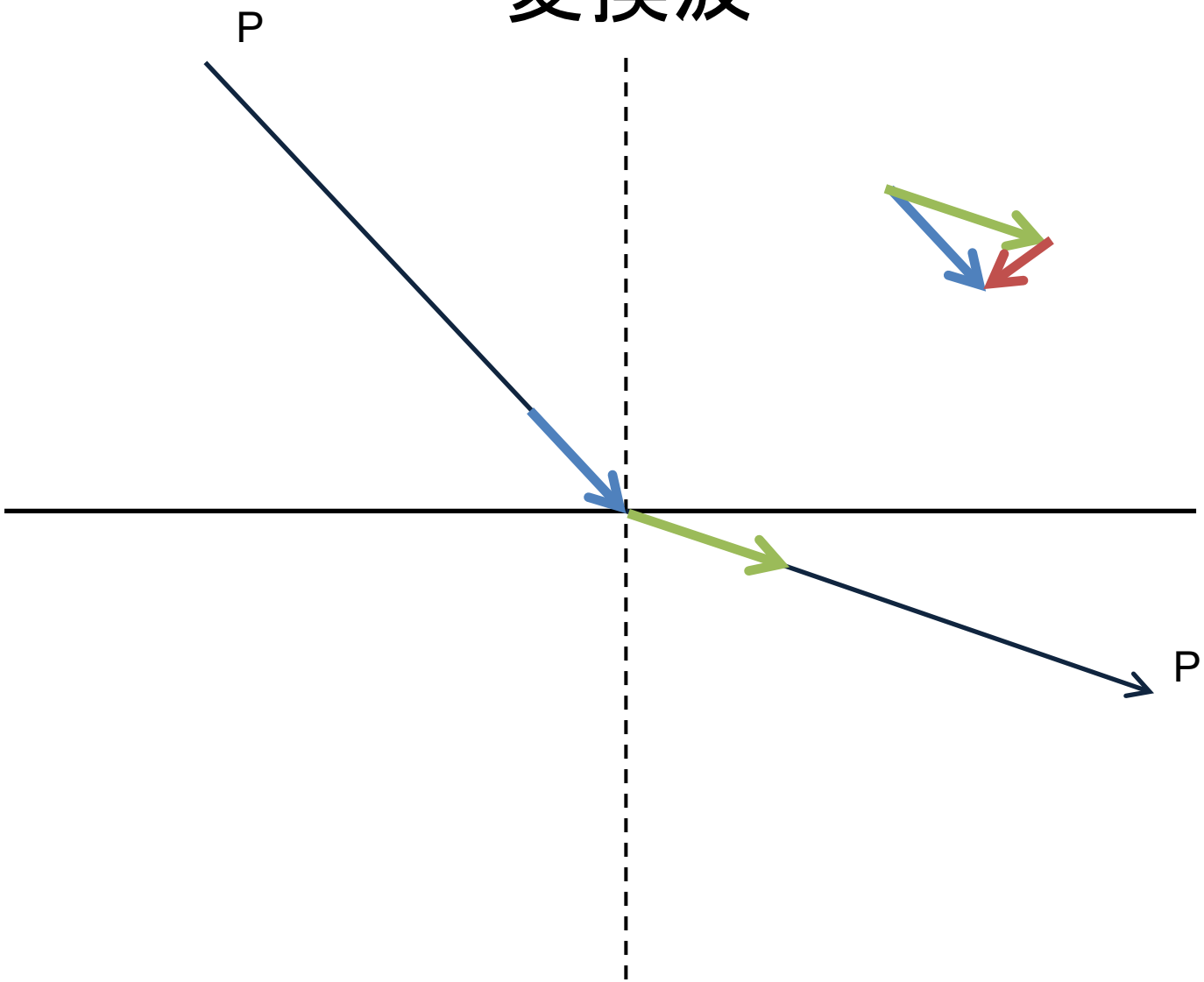
变换波



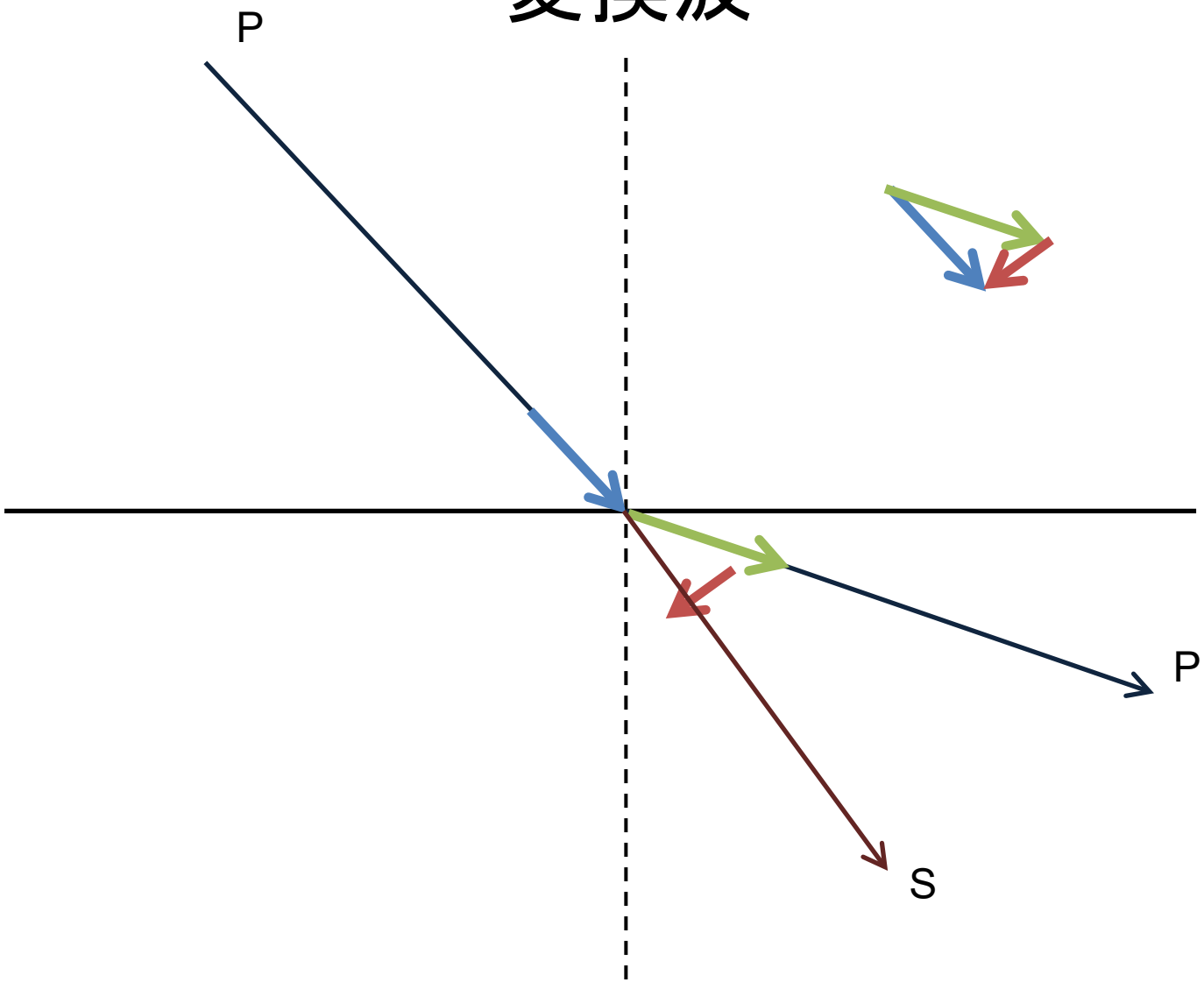
变换波



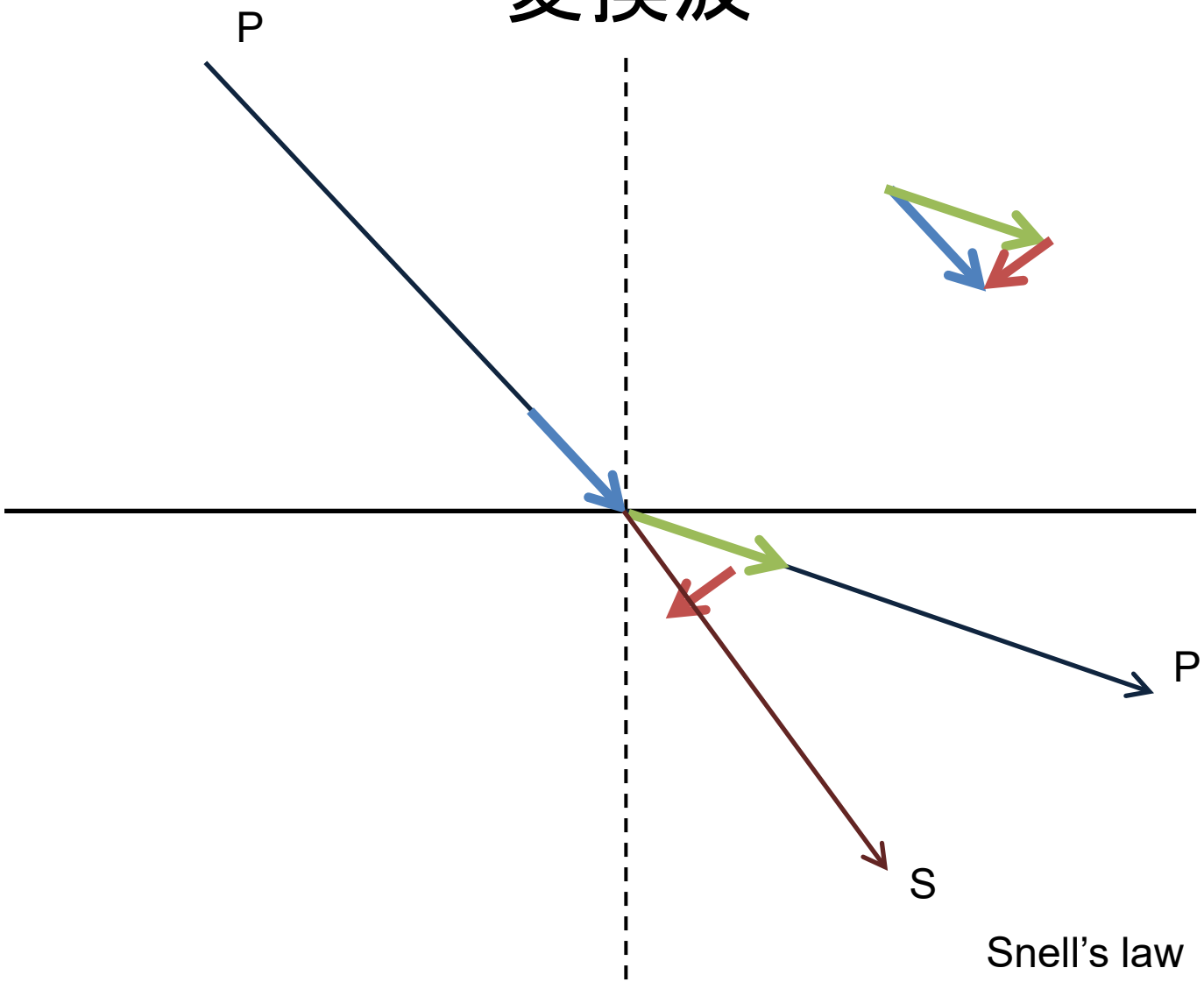
变换波



变换波



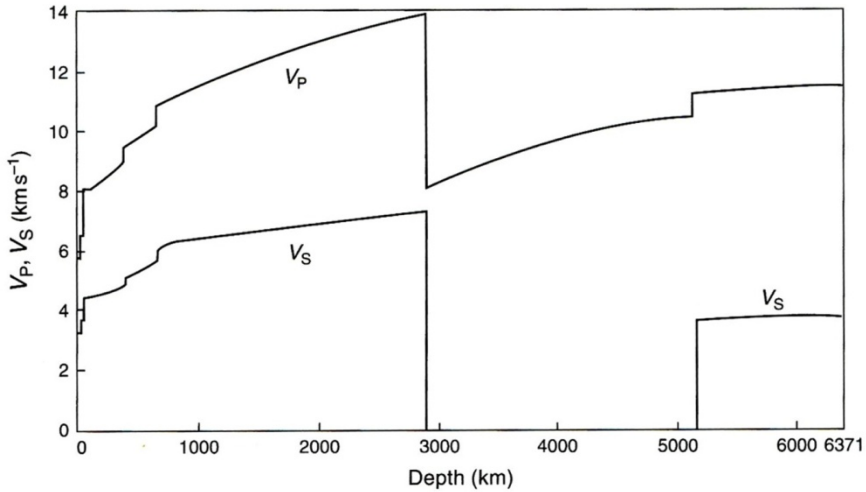
変換波

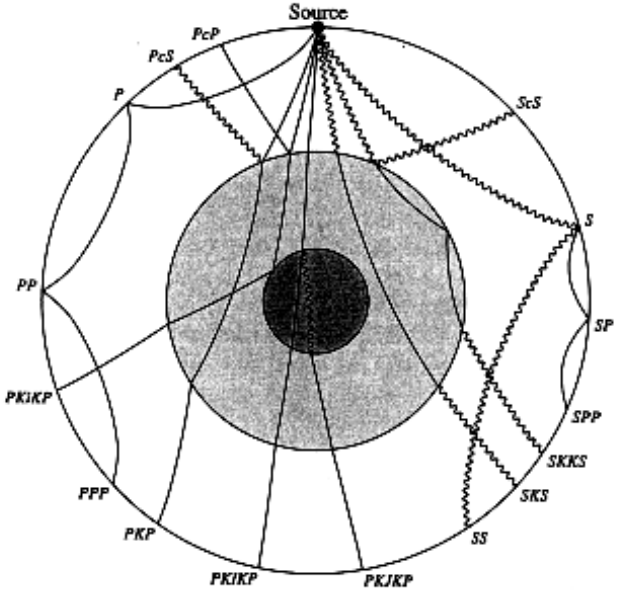


Snell’s law を満たす

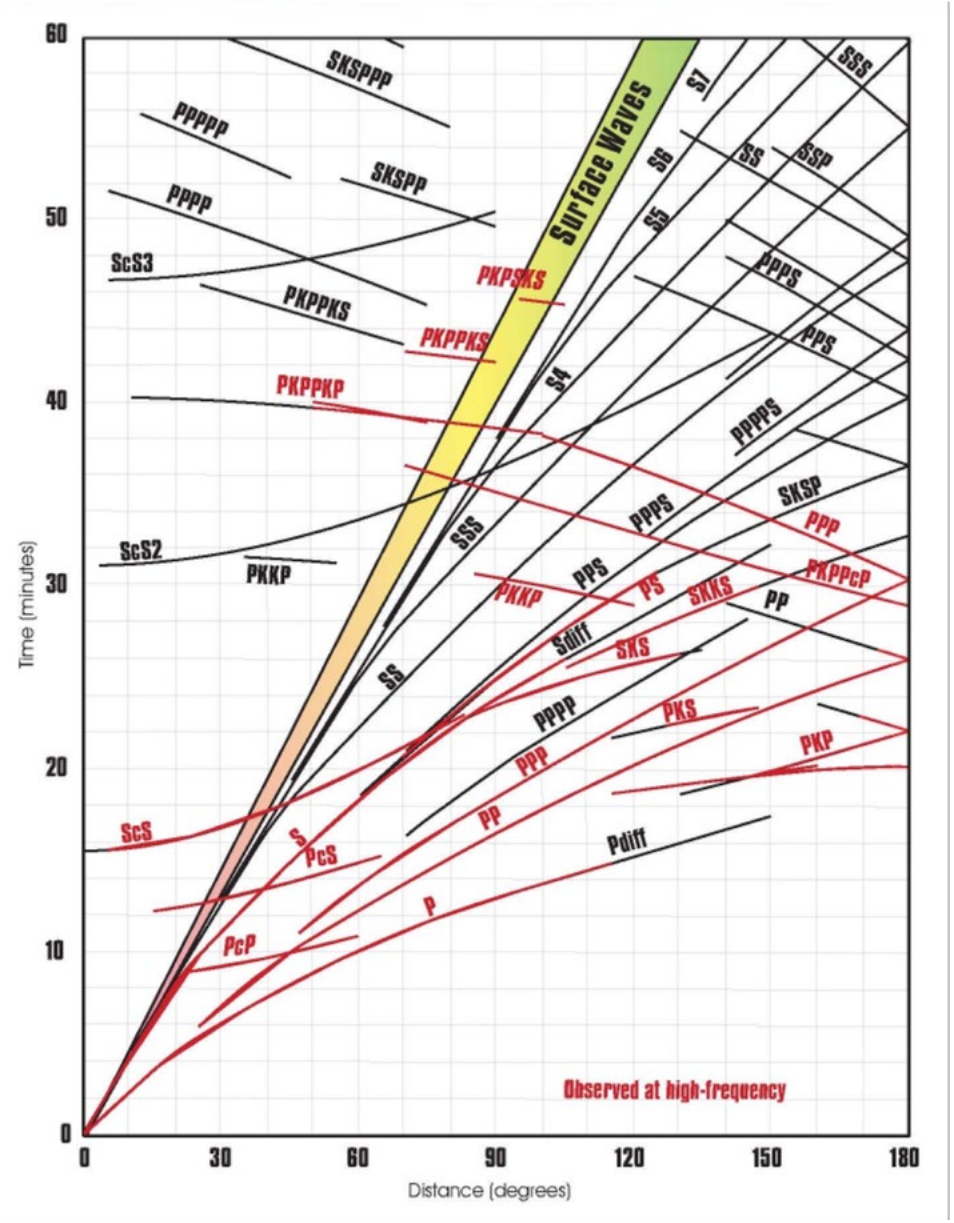
球対称地球モデル（地震波速度構造）

IASP91

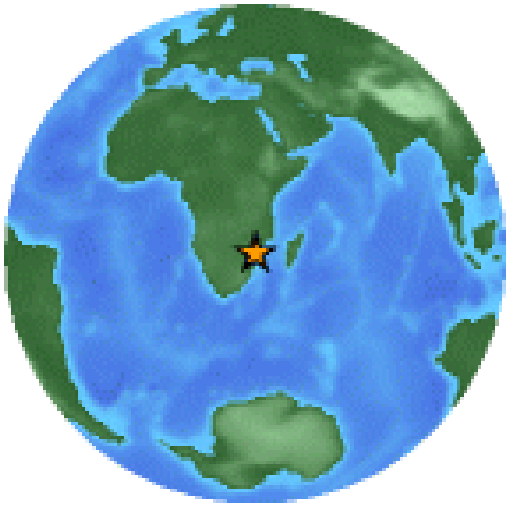




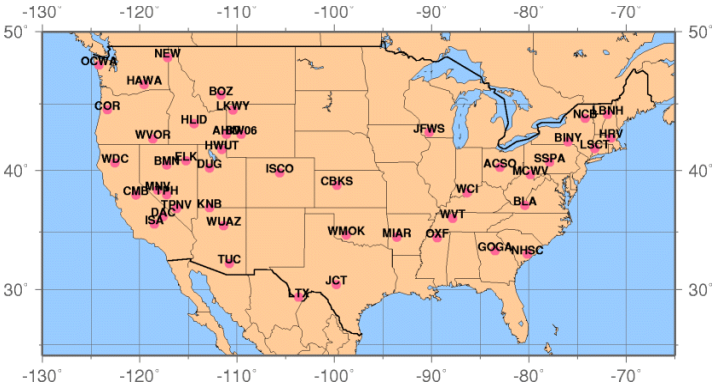
理論走時

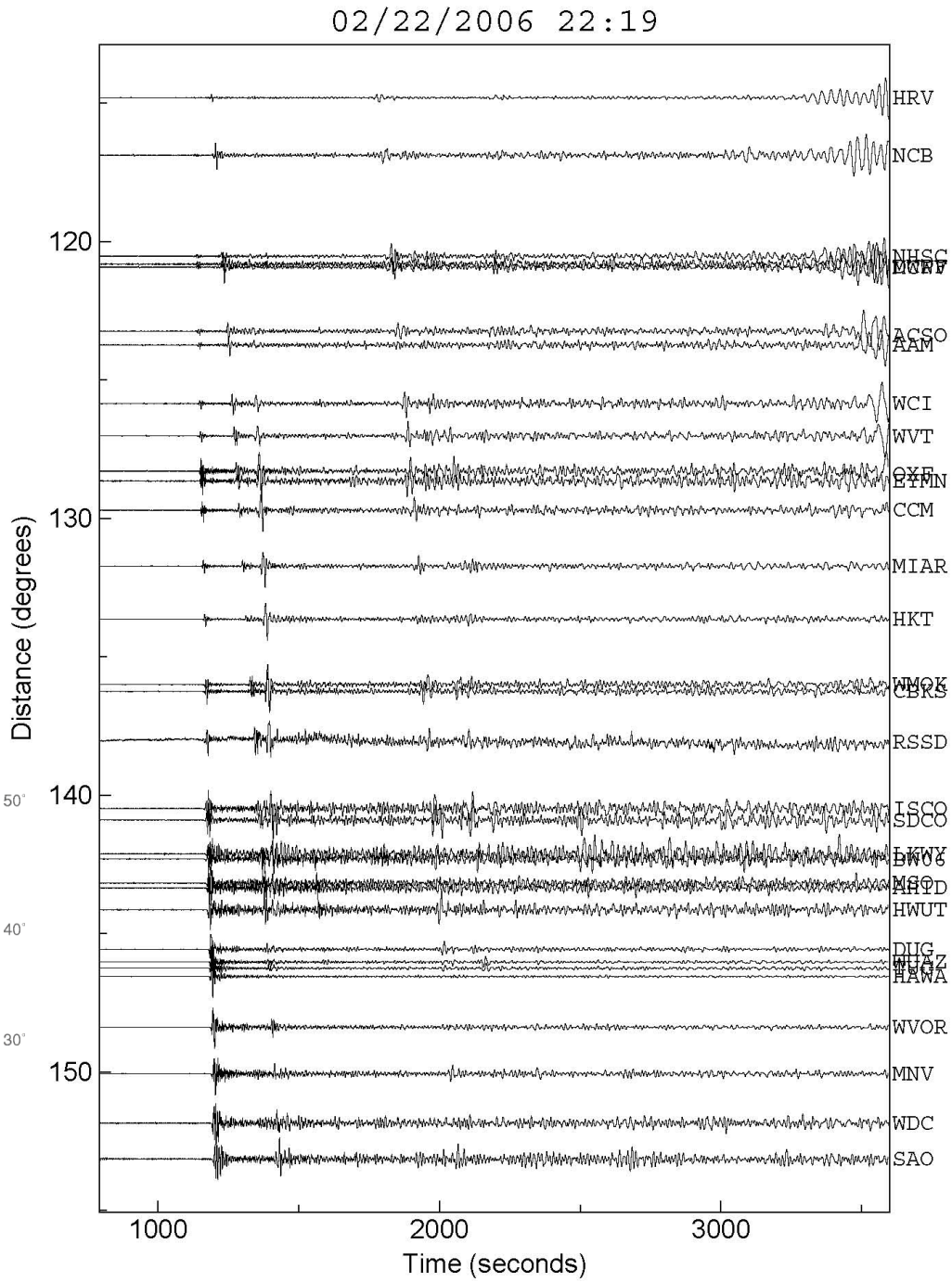


Mozanbique (M7.0)

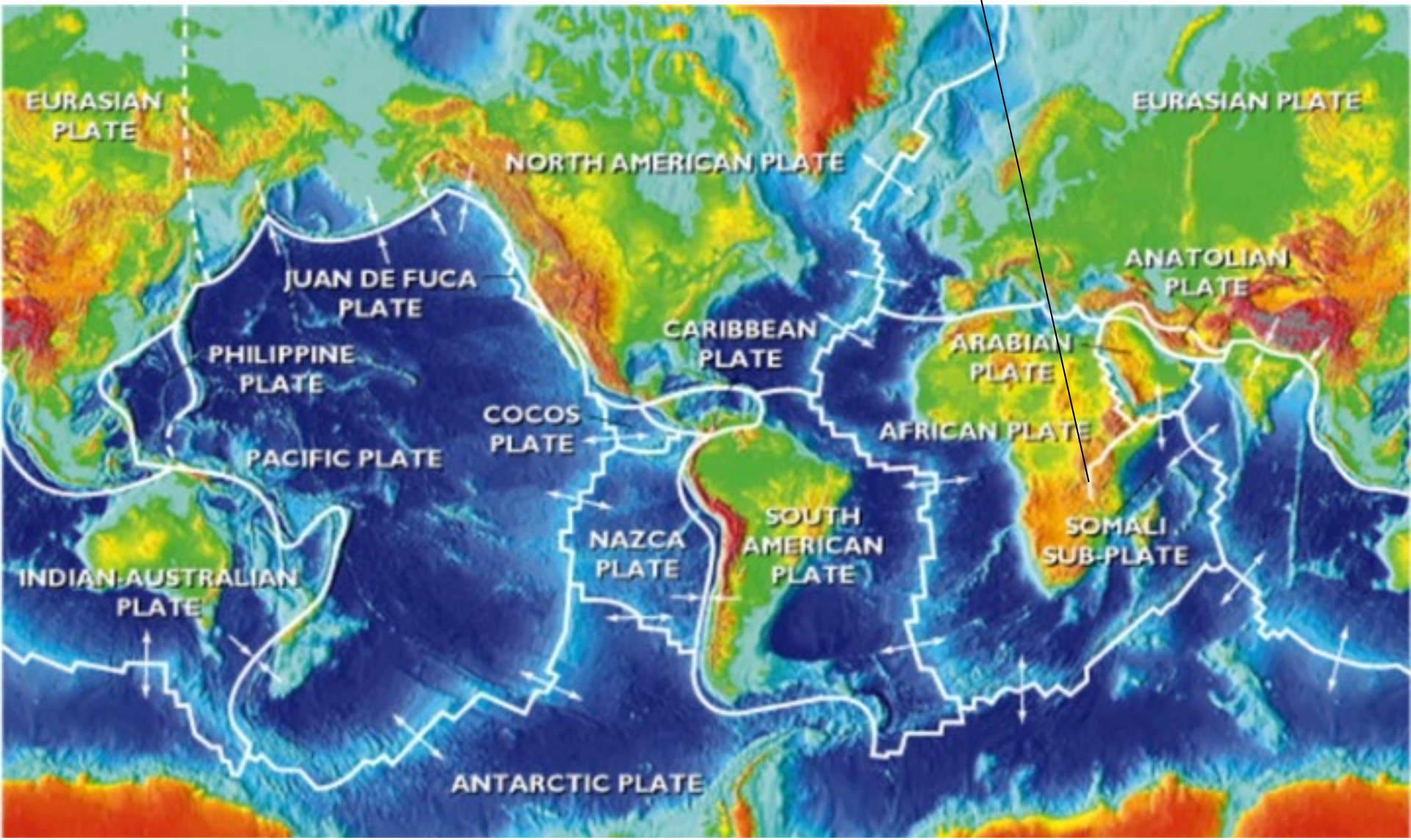


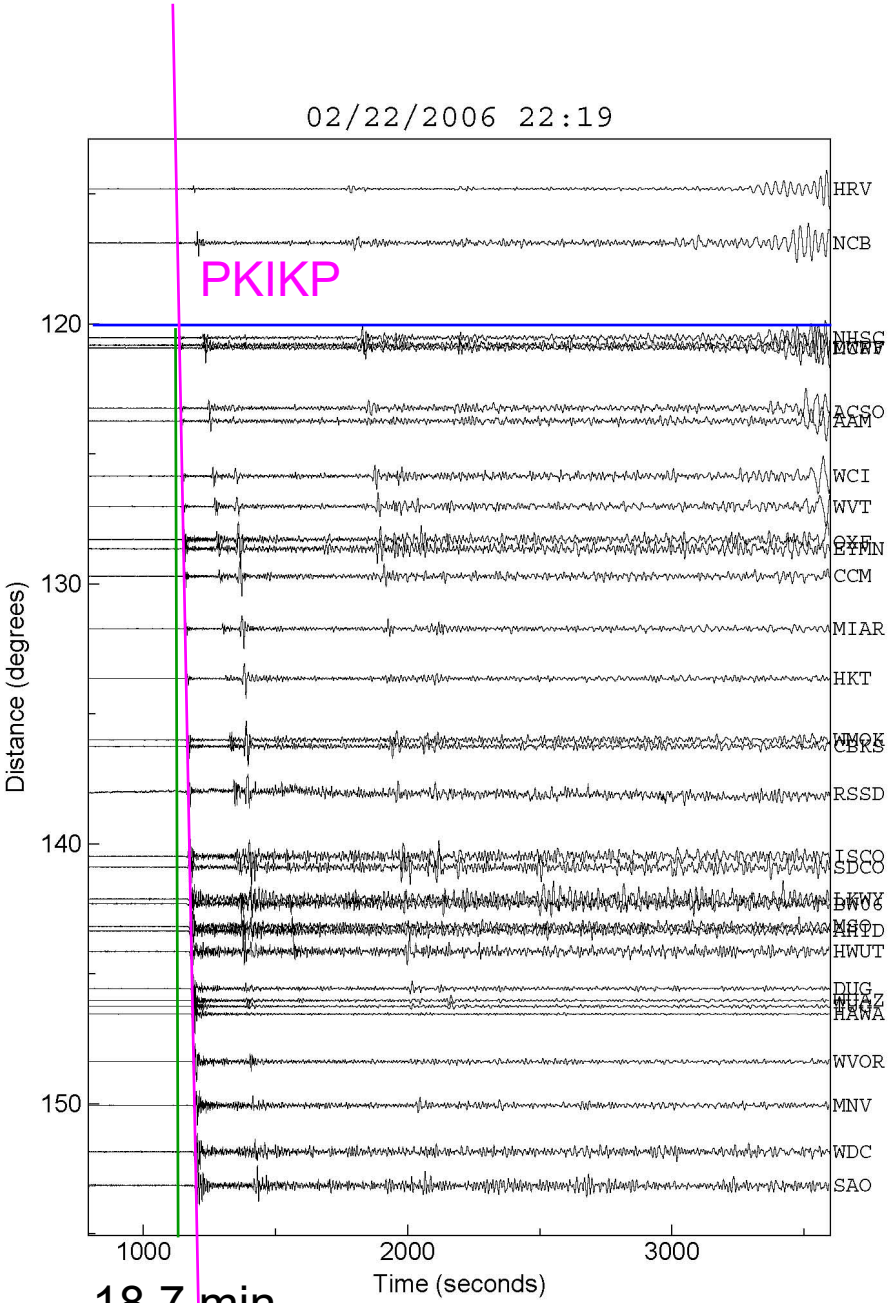
d=11km



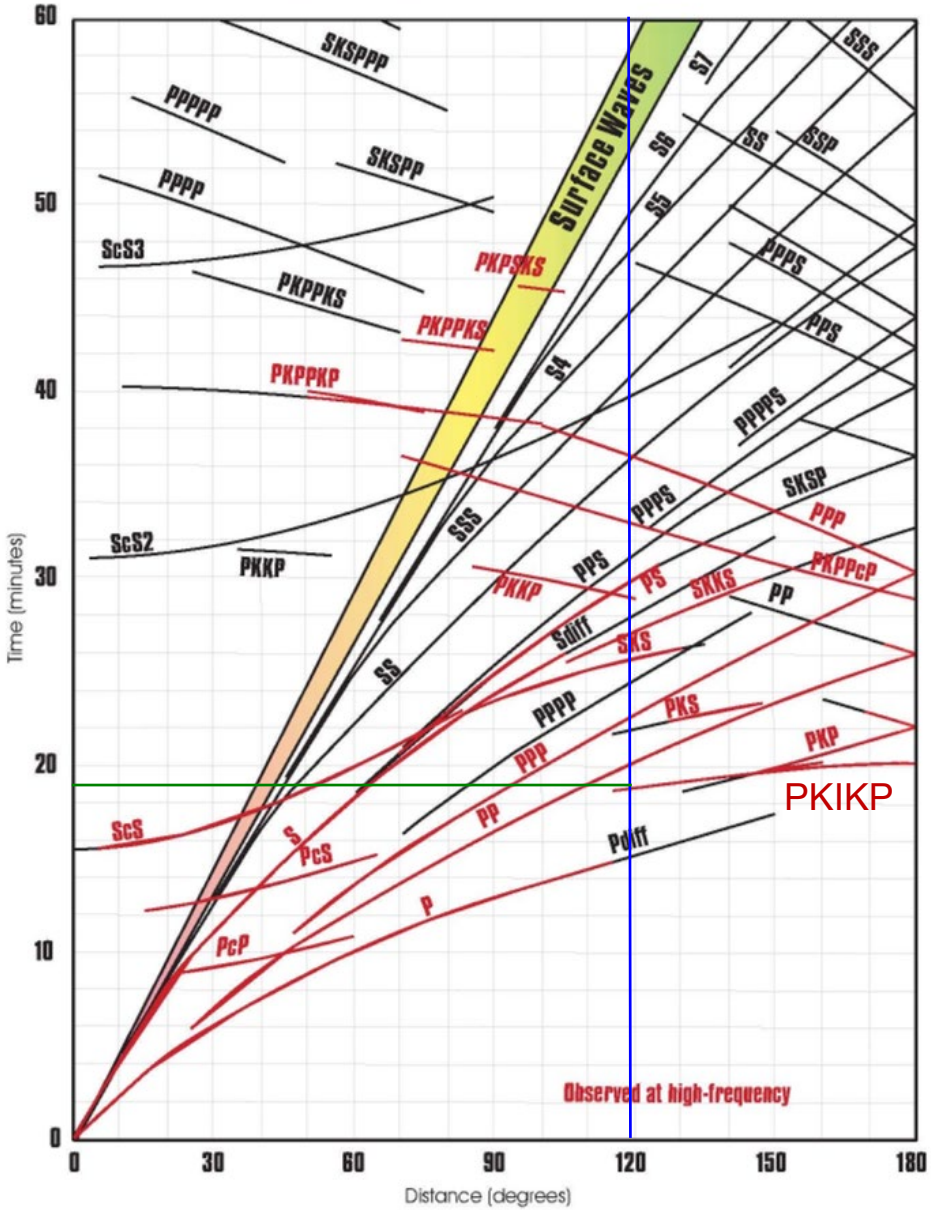


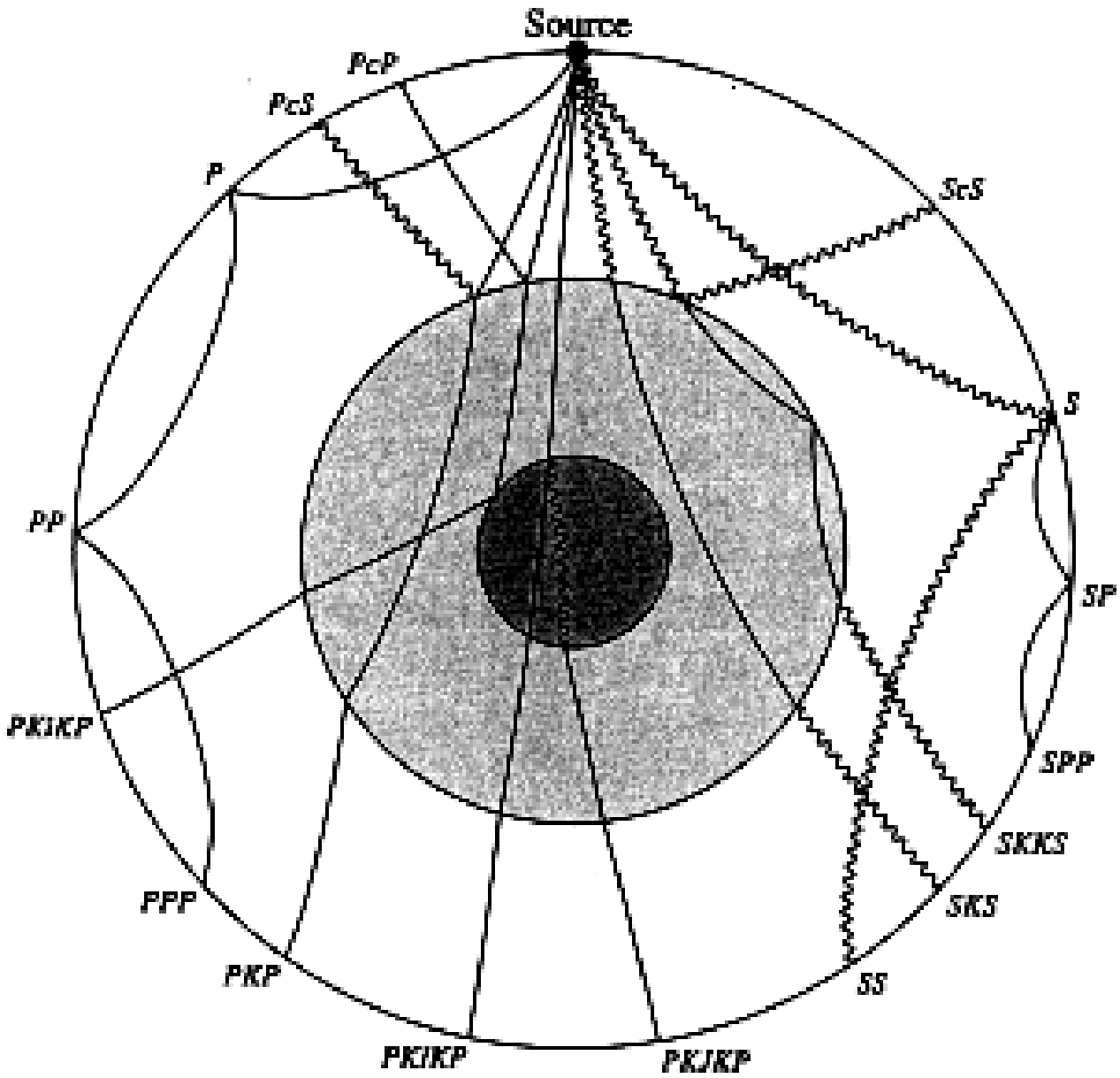
East African Rift

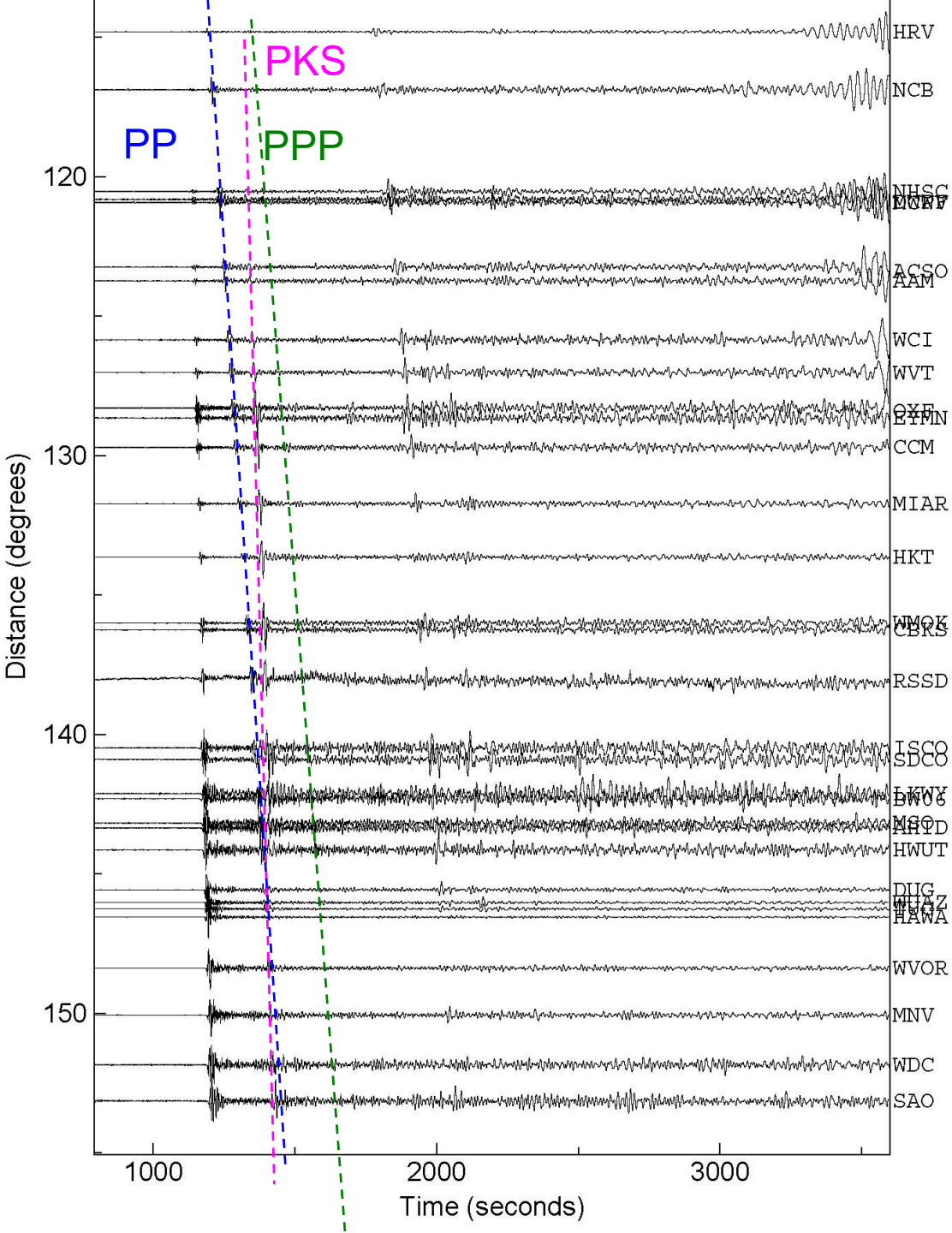


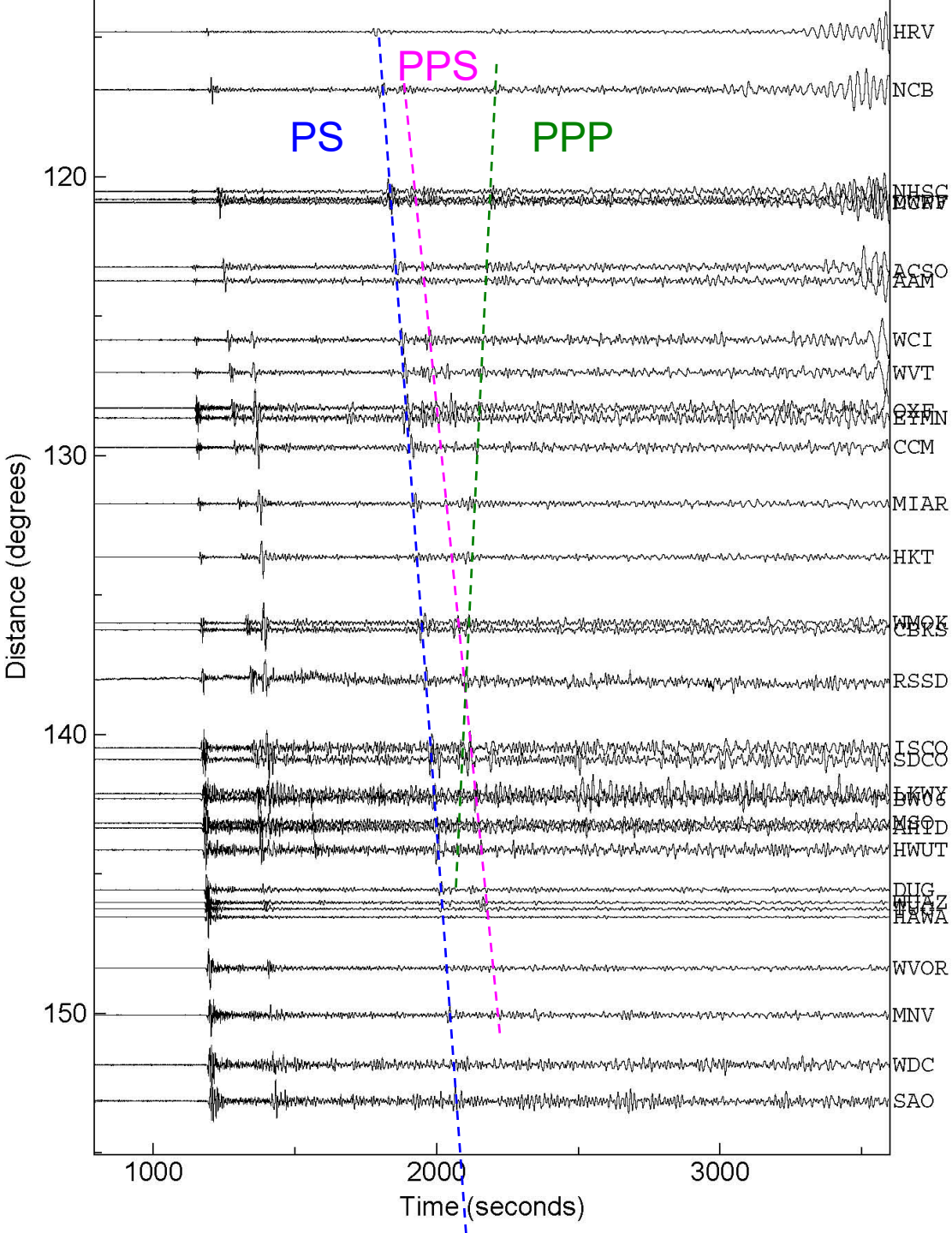

02/22/2006 22:19
PKIKP
HRV
NCB
NHSC
ACSO
WCI
WVT
CCM
MIAR
HKT
RSSD
ISCO
SDCO
HWUT
WVOR
MNV
WDC
SAO
120
130
140
150
Distance (degrees)
1000
2000
3000
Time (seconds)

18.7 min.


Surface Waves
SKSPPP
PPPPP
SKSPP
PPPP
ScS3
PKPPKS
PKPSKS
PKPPKS
PKPPKP
ScS2
PKKP
SSS
S7
S6
S5
S4
SS
SSP
PPPS
PPS
PPPPS
SKSP
PPP
PKPPcP
PP
PKKP
PPS
PS
SKKS
Sdiff
SKS
SS
PPPP
PKS
PKP
PPP
PP
Pdiff
ScS
S
PcS
P
PcP
PKIKP
Observed at high-frequency
Time (minutes)
Distance (degrees)
0
10
20
30
40
50
60
0
30
60
90
120
150
180

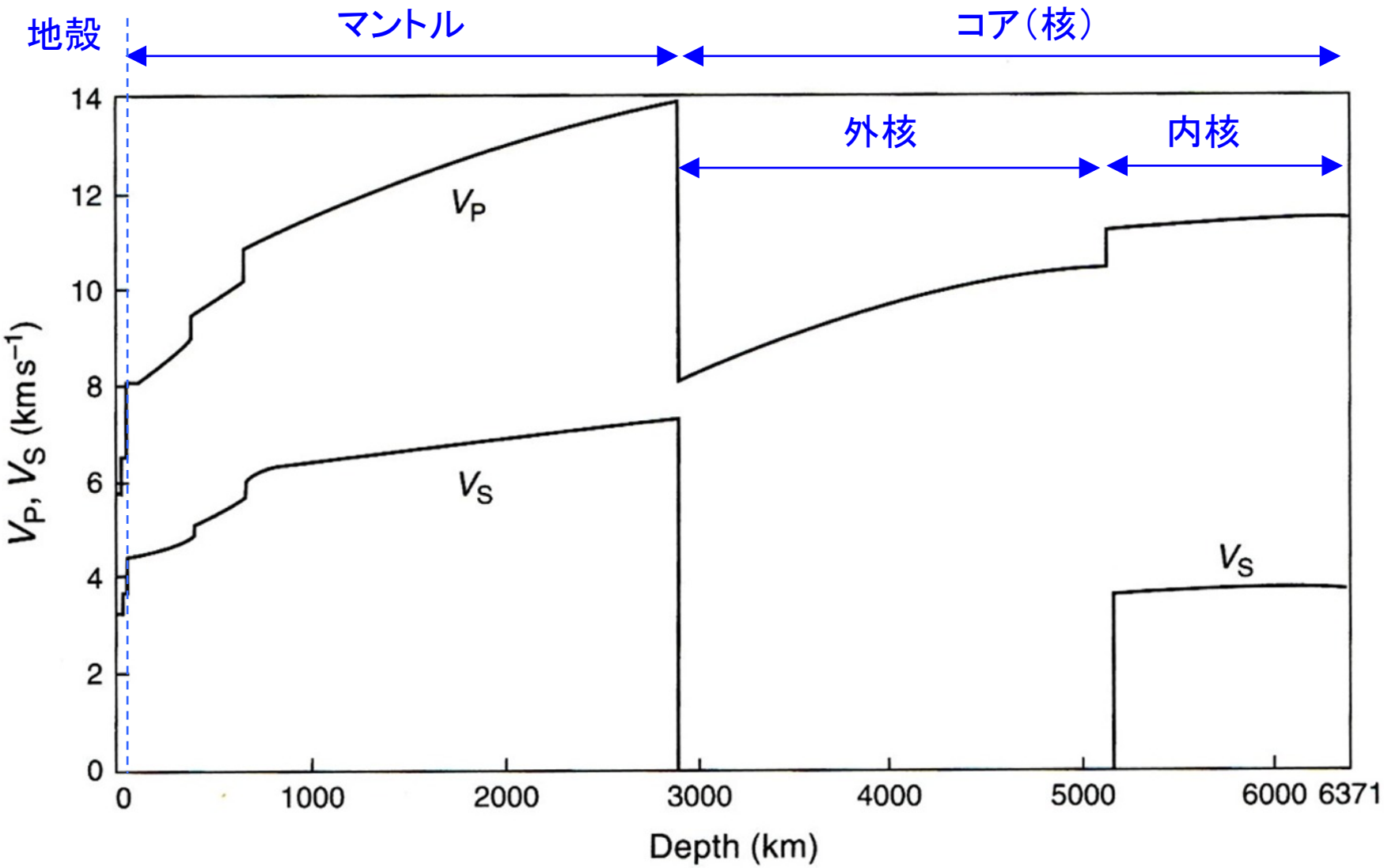

Source
PcP
PcS
P
ScS
S
PP
SP
PKIKP
SPP
SKKS
PPP
SKS
PKP
SS
PKIKP
PKJKP

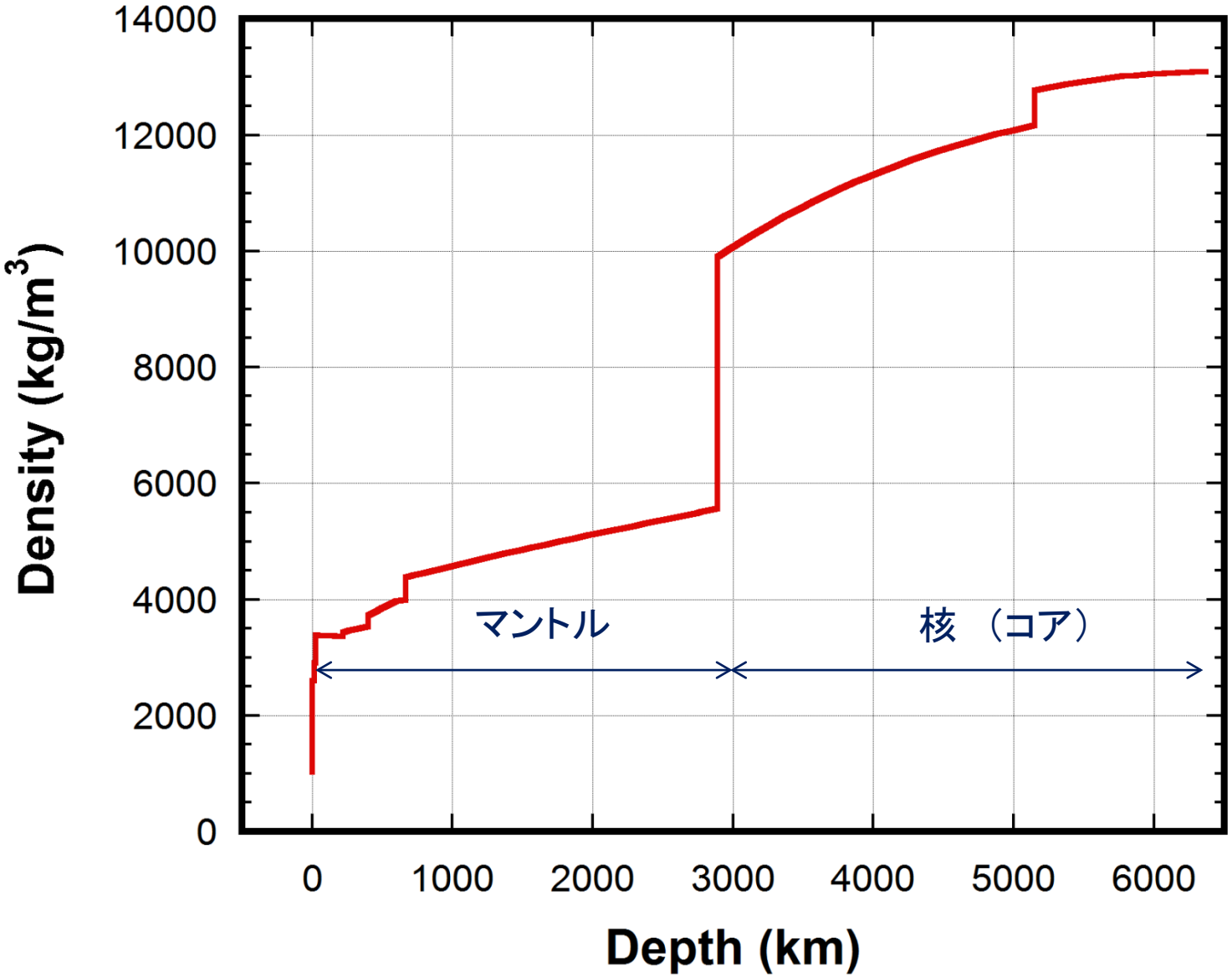

PKS
PP
PPP
HRV
NCB
NHSC
ACSO
AAM
WCI
WVT
CCM
MIAR
HKT
RSSD
ISCO
SDCO
HWUT
DUG
HAWA
WVOR
MNV
WDC
SAO
120
130
140
150
Distance (degrees)
1000
2000
3000
Time (seconds)


PS
PPS
PPP
HRV
NCB
NHSC
ACSO
AAM
WCI
WVT
CCM
MIAR
HKT
RSSD
ISCO
SDCO
HWUT
DUG
HAWA
WVOR
MNV
WDC
SAO
120
130
140
150
Distance (degrees)
1000
2000
3000
Time (seconds)

球対称地球モデル

IASP91




14000
12000
10000
8000
6000
4000
2000
0
Density (kg/m3)
0
1000
2000
3000
4000
5000
6000
Depth (km)
マントル
核 （コア）

Radius (km)	Depth (km)	Vp (km/s)	Vs (km/s)	
5701	670	10.727	5.9129	
5650	721	10.885	6.0612	
5600	771	11.04	6.2067	
5500	871	11.219	6.2768	
5400	971	11.39	6.3436	
5300	1071	11.552	6.4075	
5200	1171	11.707	6.4685	
5100	1271	11.856	6.527	
5000	1371	11.998	6.5831	
4900	1471	12.135	6.6371	
4800	1571	12.266	6.6891	
4700	1671	12.394	6.7394	
4600	1771	12.518	6.7882	
4500	1871	12.638	6.8357	
4400	1971	12.757	6.8822	
4300	2071	12.873	6.9277	
4200	2171	12.988	6.9726	
4100	2271	13.103	7.0171	
4000	2371	13.218	7.0614	
3900	2471	13.333	7.1056	
3800	2571	13.45	7.1501	
3700	2671	13.568	7.1949	
3630	2741	13.652	7.2267	