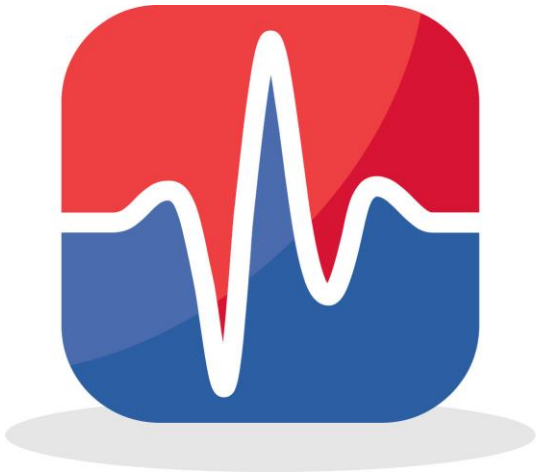
Analysis of school seismic data

Paul Denton



DentonSeismo

Seismic sales & services

Looking for previously requested data? View recent requests.

Maximum 2000 events mapped. Legend

Custom Query

Catalog - Auto -

Date 2020-01-28 - 2020-12-28

Magnitude 4 - 10

Depth 0.0 - 6371

Location

N 31.08

W 79.06 90.00 E

25.51 S

Get Events

17 events listed. Download events

Date (UTC)	Region	Magnitude	Latitude	Longitude	Depth
2020-02-08 01:01:49	Western Xizang-India Border Reg.	Mb 4.7	30.08°	79.99°	33.08 km
2020-03-15 15:00:17	Nepal	Mb 4.3	28.22°	83.59°	10 km
2020-03-20 01:33:15	Xizang	Mww 5.7	28.59°	87.32°	10 km
2020-03-24 23:39:29	Xizang	Mb 4	28.61°	87.22°	10 km
2020-05-12 18:08:38	Nepal	Mb 4.9	27.70°	86.04°	10 km
2020-05-30 15:51:39	Nepal-India Border Region	Mb 4.3	27.89°	84.88°	10 km
2020-07-24 19:46:04	Xizang	Mb 4.4	30.51°	87.43°	10 km
2020-07-29 20:54:30	Xizang	Mb 4	28.40°	88.33°	35 km
2020-08-23 17:07:43	Xizang	Mb 4.5	30.39°	87.50°	10 km
2020-08-25 15:24:34	Nepal-India Border Region	Mb 4.3	29.56°	80.93°	10 km
2020-09-11 03:45:52	Nepal	Mb 4.4	27.25°	87.77°	10 km
2020-09-15 23:34:03	Nepal	Mb 5.3	27.85°	85.88°	10 km

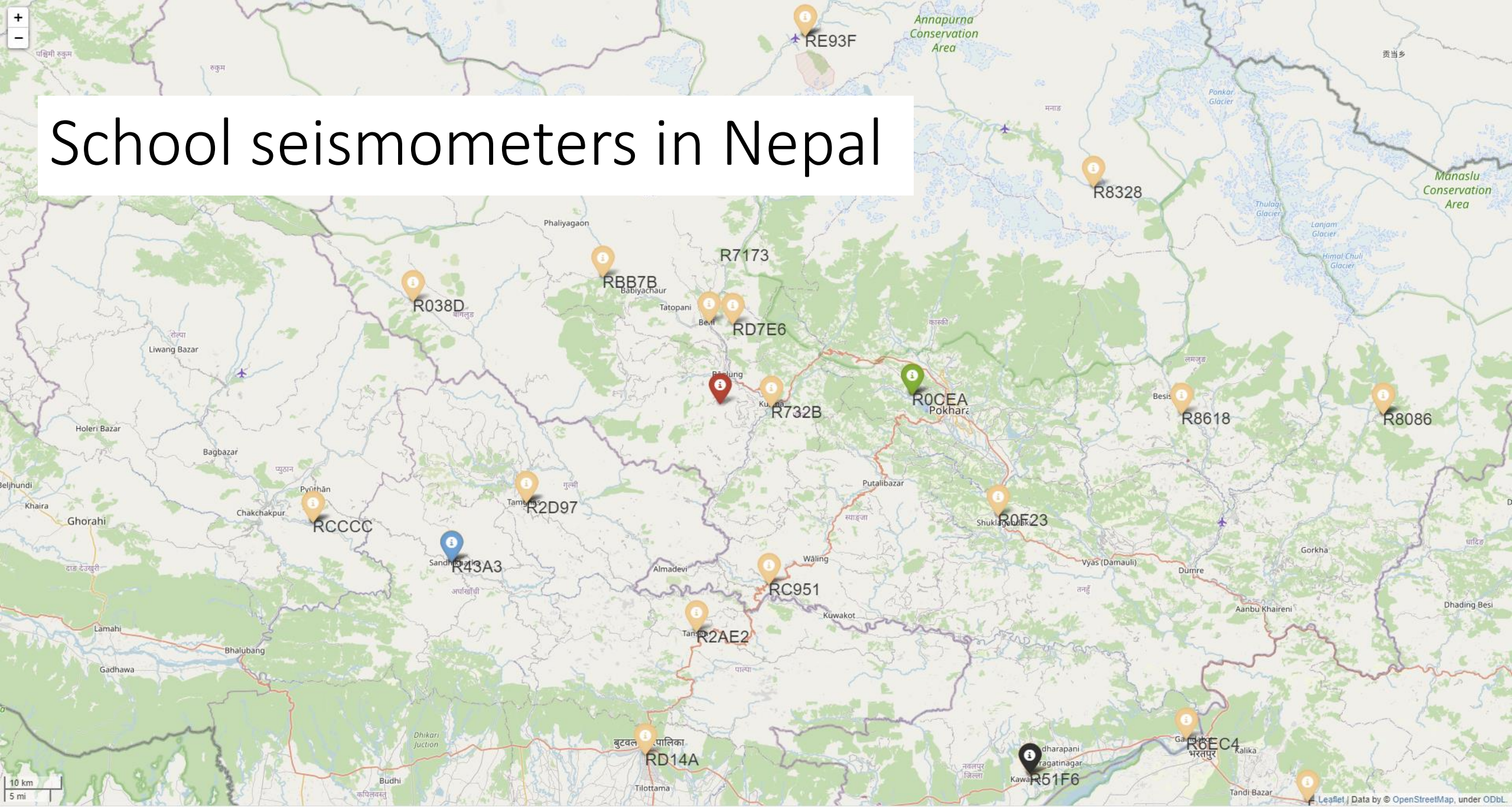
Search for earthquakes at website
https://ds.iris.edu/wilber3/

QUICK LINKS PROGRAMS EARTHSCOPE

query (1) Show all

Map
Satellite
Remove Selection Box
Mb 4.3 10km 2020-03-15 15:00:17
Pokhara
M4.3 earthquake 20km west of Pokhara 15th March 2020

School seismometers in Nepal

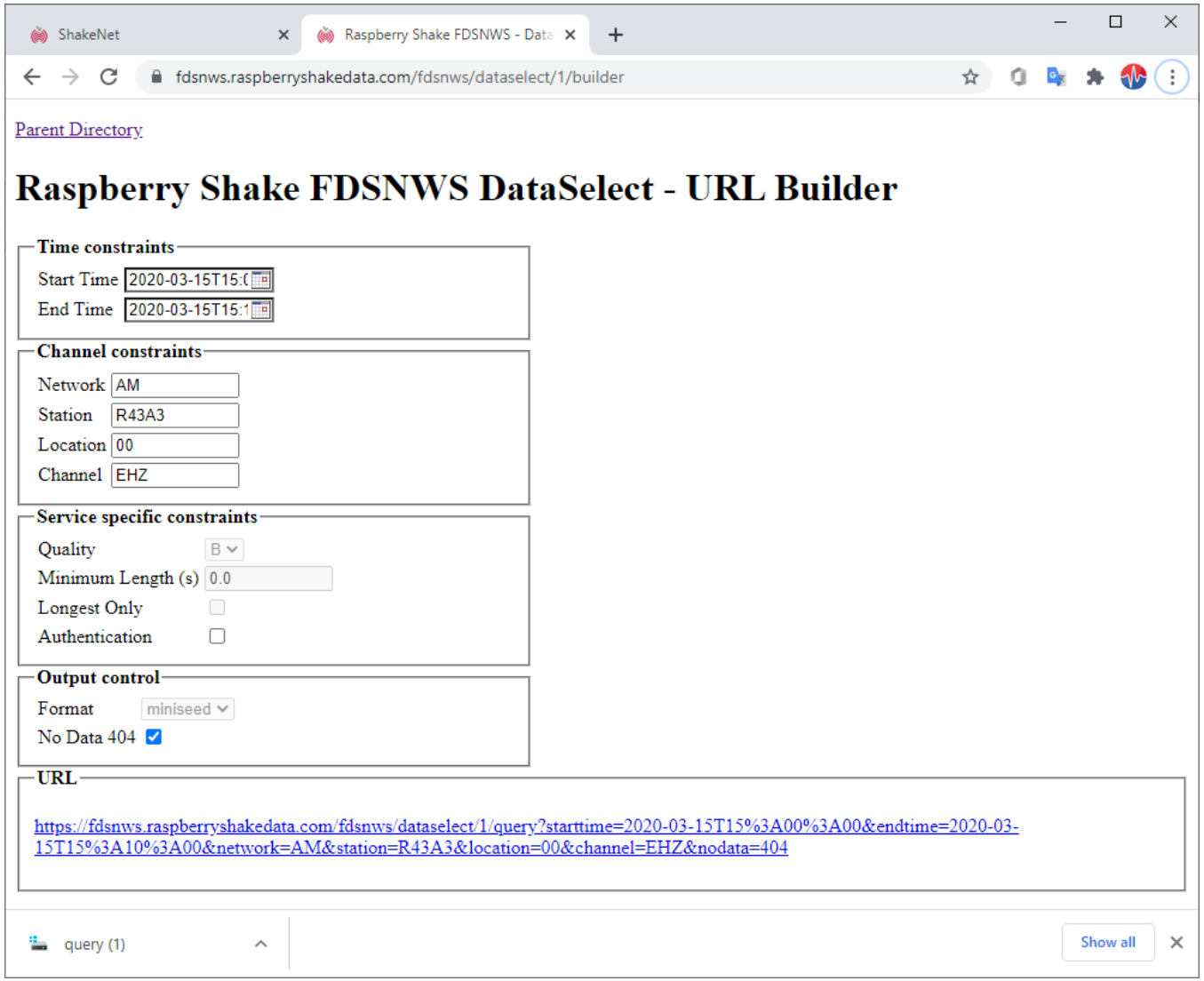


query (1)

Show all

Download data from these sites using webpage

https://fdsnws.raspberryshakedata.com/fdsnws/dataselect/1/builder

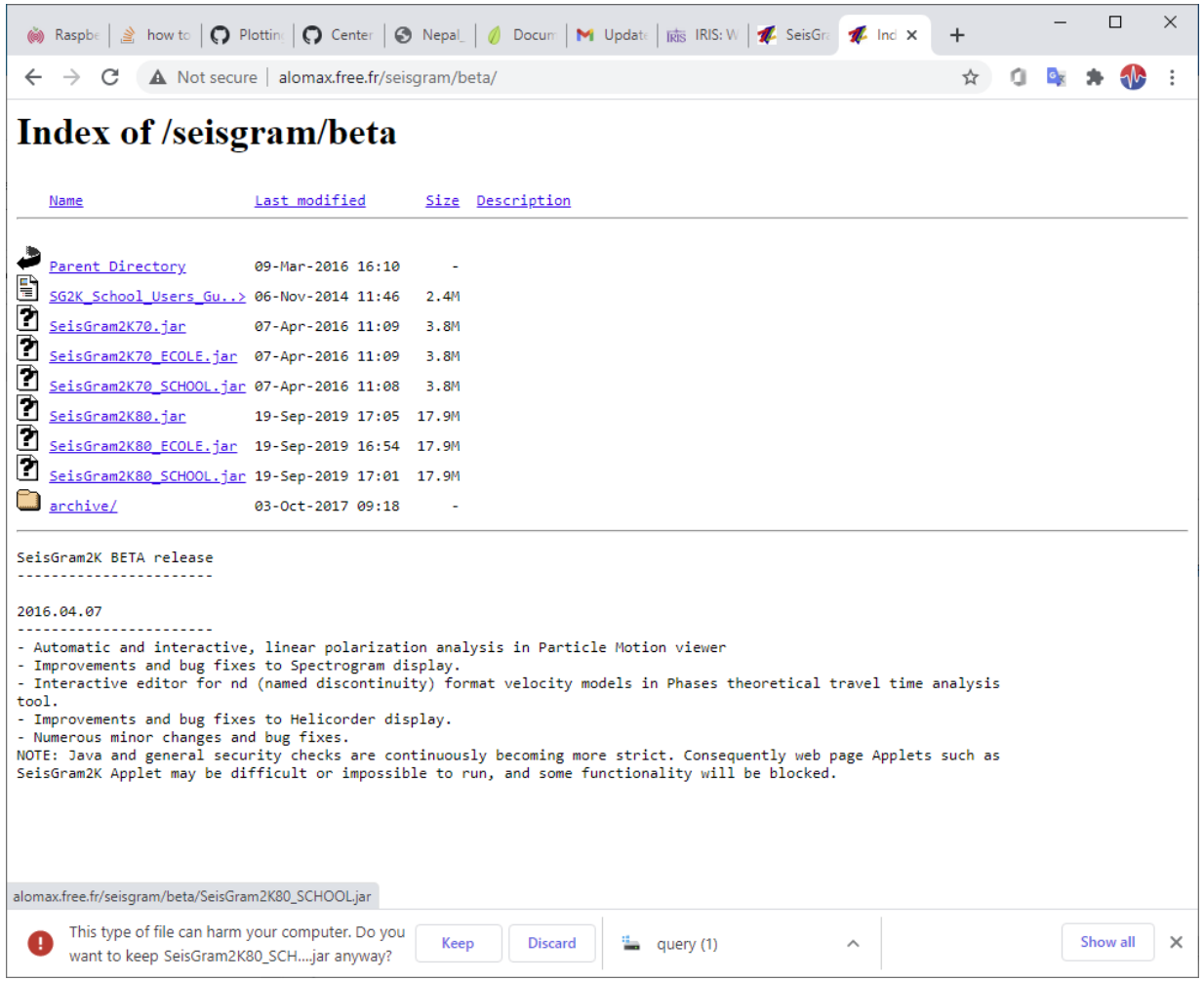


Select time of event and station name that you want

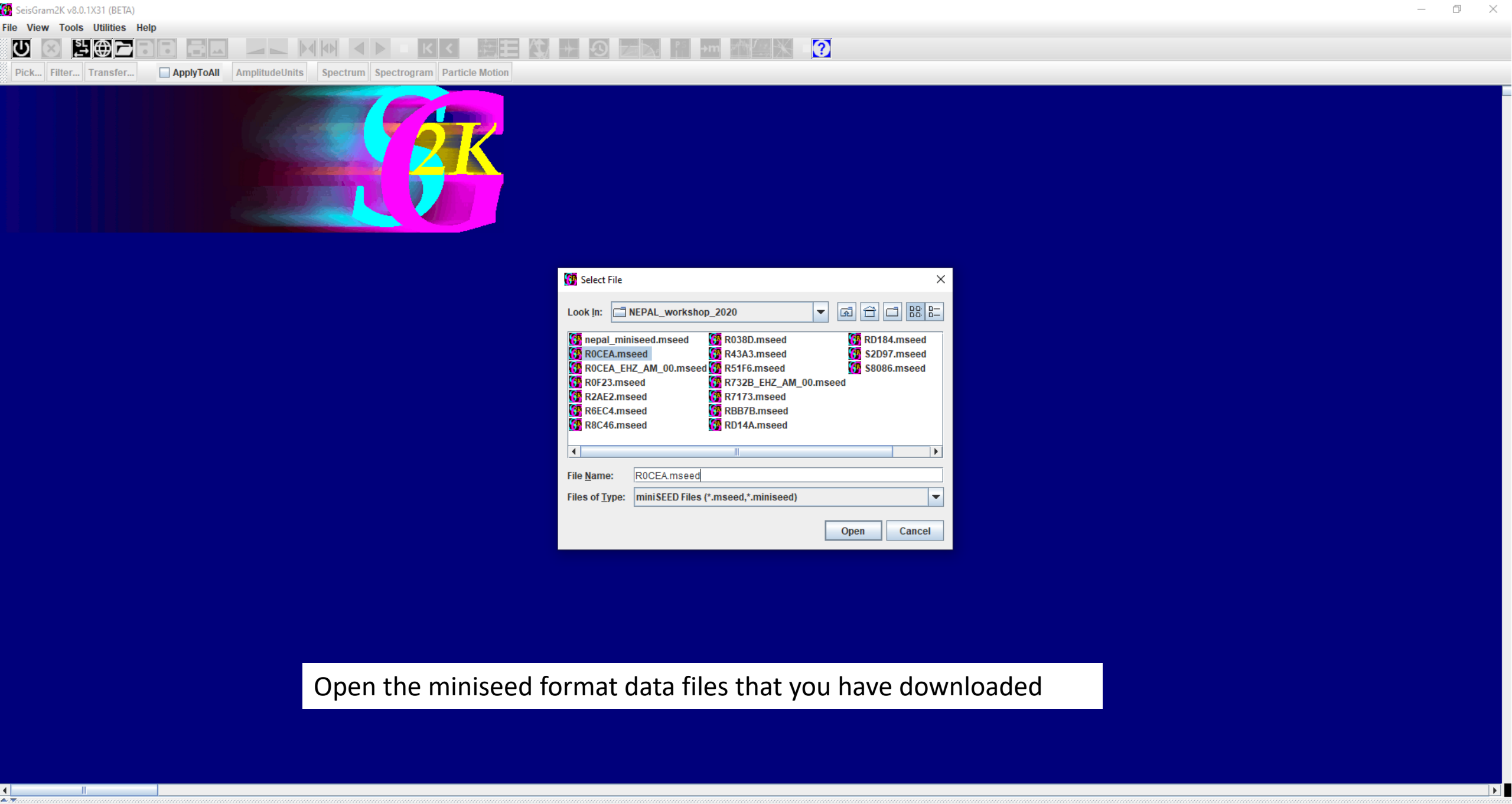
Click the link at the bottom to

Save the data as a file (in miniseed format)

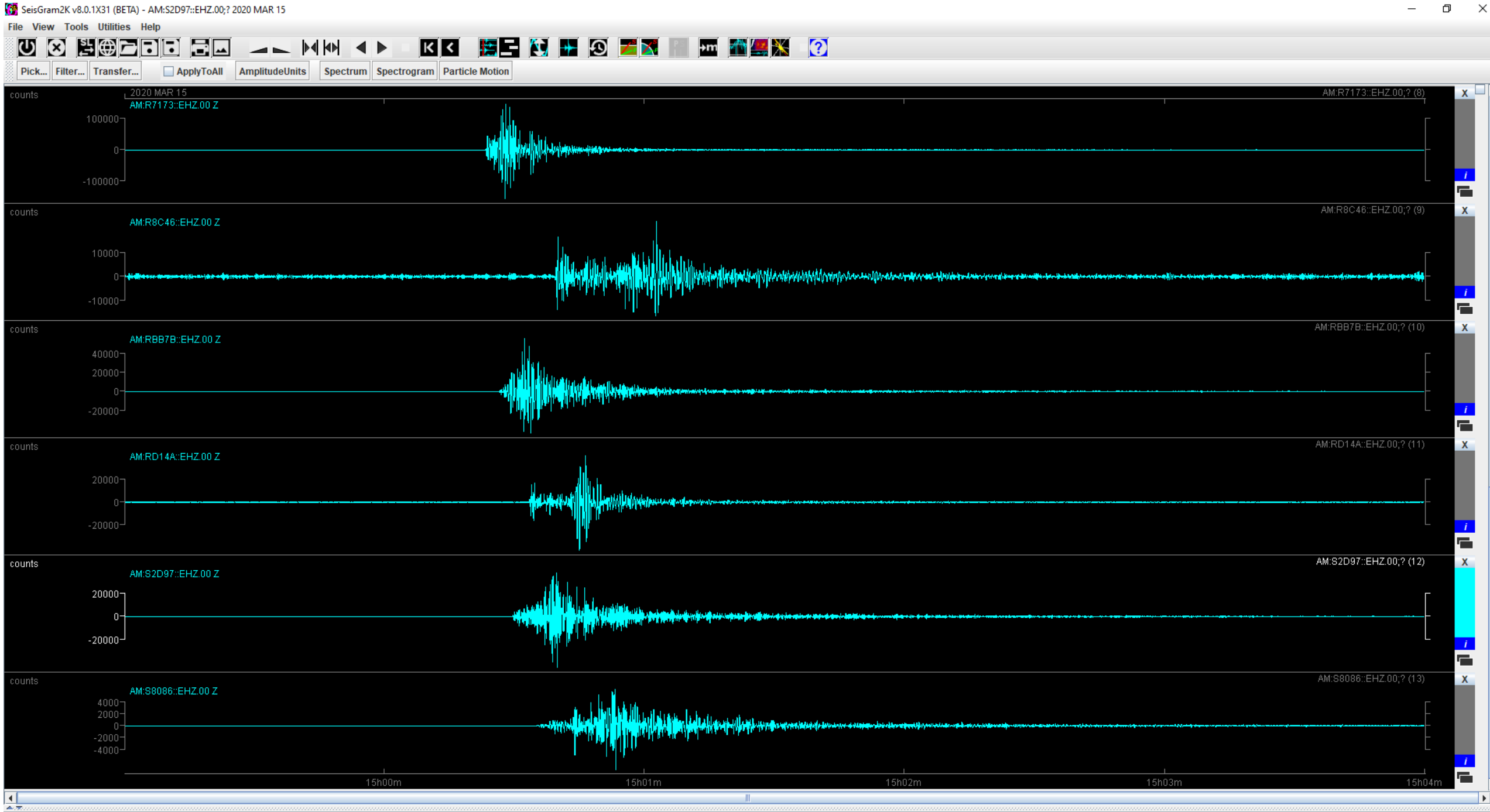
Free software for analysis http://alomax.free.fr/seisgram/beta/

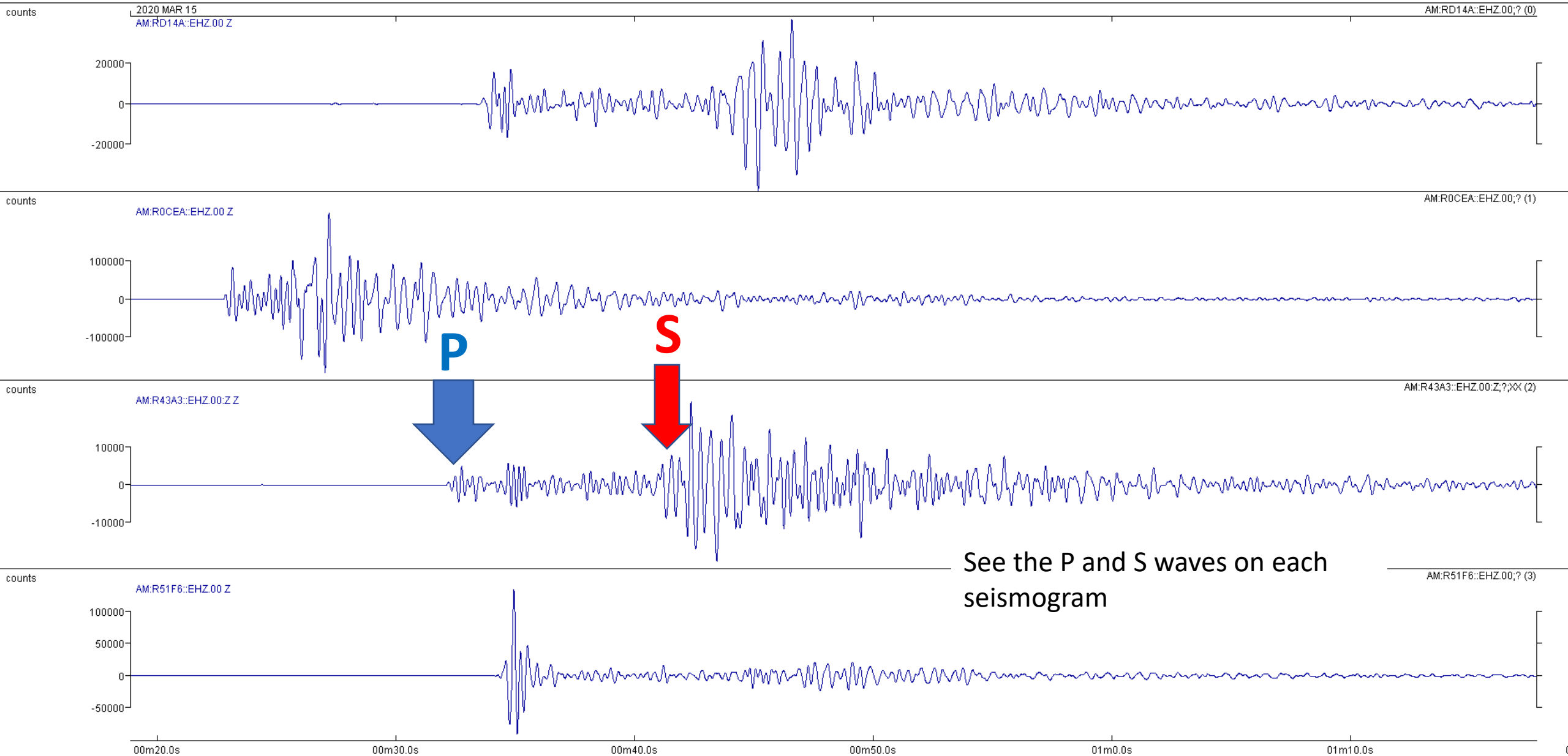


Java software SeisGram2K can be run on any computer and is a useful tool for dong simple analysis

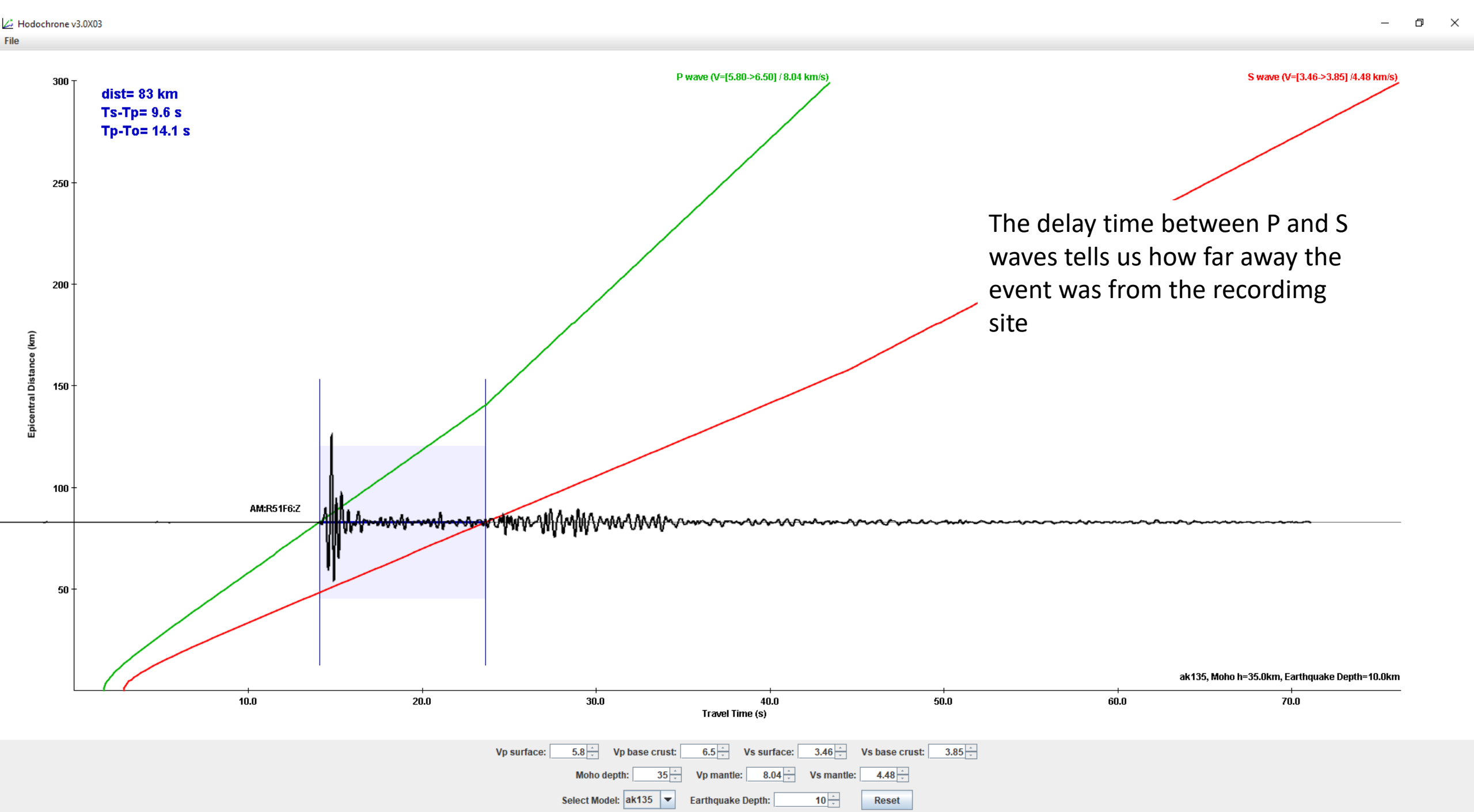


Open the miniseed format data files that you have downloaded


SeisGram2K v8.0.1X31 (BETA) - AM:S2D97::EHZ.00;? 2020 MAR 15
File View Tools Utilities Help
Pick... Filter... Transfer... ApplyToAll AmplitudeUnits Spectrum Spectrogram Particle Motion
counts
2020 MAR 15
AM:R7173::EHZ.00 Z
AM:R7173::EHZ.00;? (8)
100000
0
-100000
AM:R8C46::EHZ.00 Z
AM:R8C46::EHZ.00;? (9)
10000
-10000
AM:RBB7B::EHZ.00 Z
AM:RBB7B::EHZ.00;? (10)
40000
20000
-20000
AM:RD14A::EHZ.00 Z
AM:RD14A::EHZ.00;? (11)
AM:S2D97::EHZ.00 Z
AM:S2D97::EHZ.00;? (12)
AM:S8086::EHZ.00 Z
AM:S8086::EHZ.00;? (13)
4000
2000
-2000
-4000
15h00m
15h01m
15h02m
15h03m
15h04m



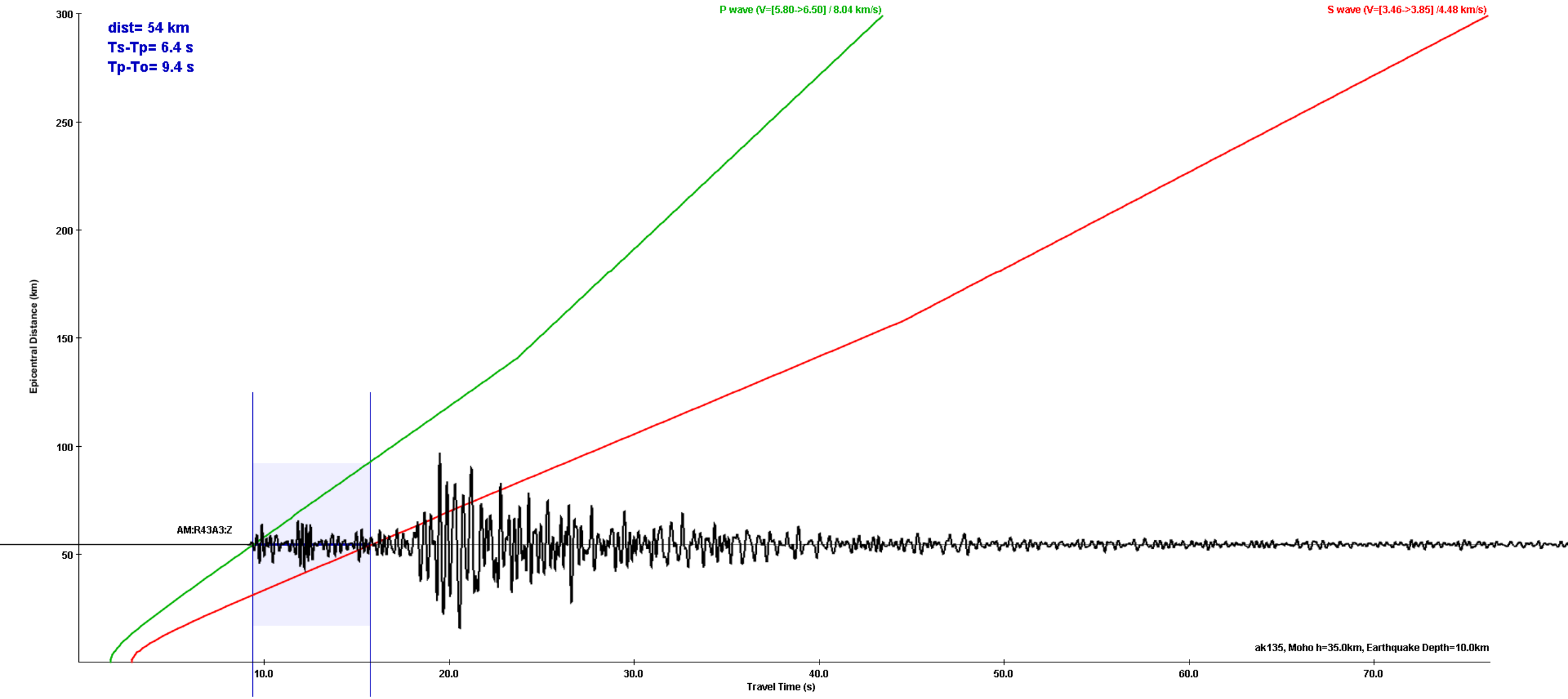
See the P and S waves on each seismogram


Hodochrone v3.0X03
File
dist= 83 km
Ts-Tp= 9.6 s
Tp-To= 14.1 s
P wave (V=[5.80->6.50] / 8.04 km/s)
S wave (V=[3.46->3.85] /4.48 km/s)
The delay time between P and S waves tells us how far away the event was from the recordimg site
AM:R51F6:Z
Epicentral Distance (km)
Travel Time (s)
ak135, Moho h=35.0km, Earthquake Depth=10.0km
Vp surface: 5.8
Vp base crust: 6.5
Vs surface: 3.46
Vs base crust: 3.85
Moho depth: 35
Vp mantle: 8.04
Vs mantle: 4.48
Select Model: ak135
Earthquake Depth: 10
Reset

Press F11 to exit full screen
Plot range as a circle around the recording site
Shey Phoksundo National Park
Jumla Bazar
Sanphebagar
Mangalsen
Lo Manthang
Annapurna Conservation Area
Narayan
Jajarkot
Musikot
Dhorpatan Hunting Reserve
Lamki Chuha
Birendranagar
Tikapur
Bardia National Park
Manaslu Conservation Area
Phaliyag
Babiyachaur
Beni
Liwang Bazar
Bansgadhi
Gulariya
Kohalpur
Holeri Bazar
Bagbazar
तुलसीपुर
Jaspur
घोराही उपमहानगरपालिका
Chakchakpur
Tamghas
Sandhikharka
Nepalgunj
Rupadiya
Nanpara
Lamahi
Bhalubang
Gadhawa
Bahraich
Bhinga
Sohelwa WLS
Budhi
Kapilavastu
Tulsipur
Barhni
Balrampur
Utraula
Mahmudabad
Fatehpur
Ramnagar
Gonda
Paraspur
Barabanki
Siddharth Nagar
Domariaganj
Naugarh
Brijmanganj
Anand Nagar
Mehdawal
Kolhui
Sohagibarwa WLS
Nichlaul
Maharajganj
Siswa Bazar
Bagaha
Ramnagar
Narkatiaganj
Mainatahr
Sikta
Kalaiya
Ramkola
Padrauna
Kachorwa
Tilottama
Siddhartanagar
Sunauli
Nautanwa
Parasi
Meghauli
Tandi Bazar
Chitwan National Park
Manahari
Valmiki National park
Valmiki WLS/Tiger Reserve
Putalibazar
Shuklagandaki
Vyas (Damauli)
Gorkha
Aanbu Khaireni
Dhading Besi
Kuwakot
Tansen
Almadeo
Wāling
Borang
Syabru Bensi
Dharka
Langtang National Park
Bidur
Budhanilkantha
Chautara
काठमाडौं
Suryabinayak
Dakshinkali
Dhulikhel
Bhimeshwar
Manthali
Ramechhap
Sindhulimadi
Harlaun Krisnachok
Lalbandi
Bardibas
Leaflet | Data by © OpenStreetMap, under ODbL.

Hodochrone v3.0X03

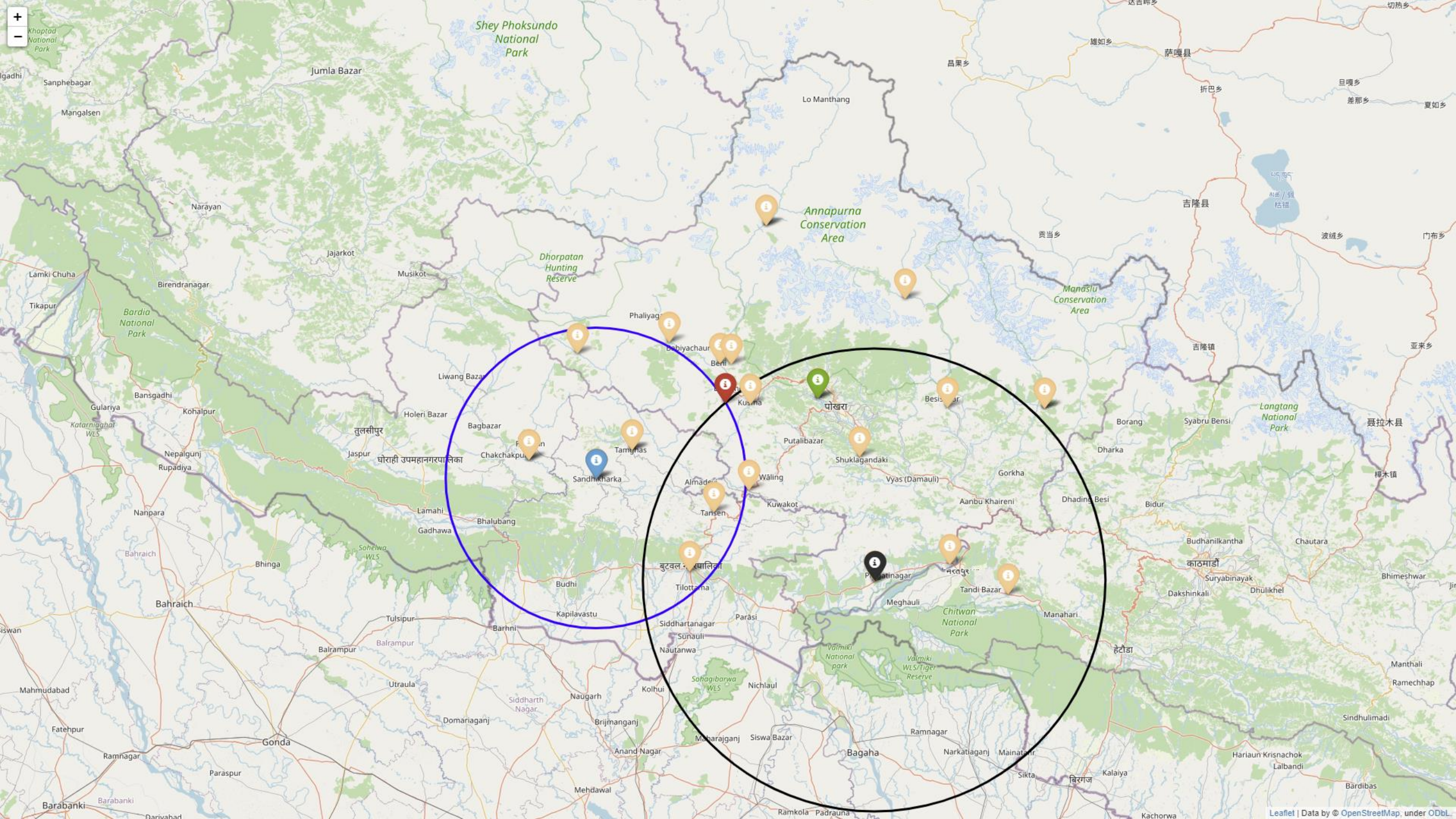
File



Vp surface: 5.8 Vp base crust: 6.5 Vs surface: 3.46 Vs base crust: 3.85

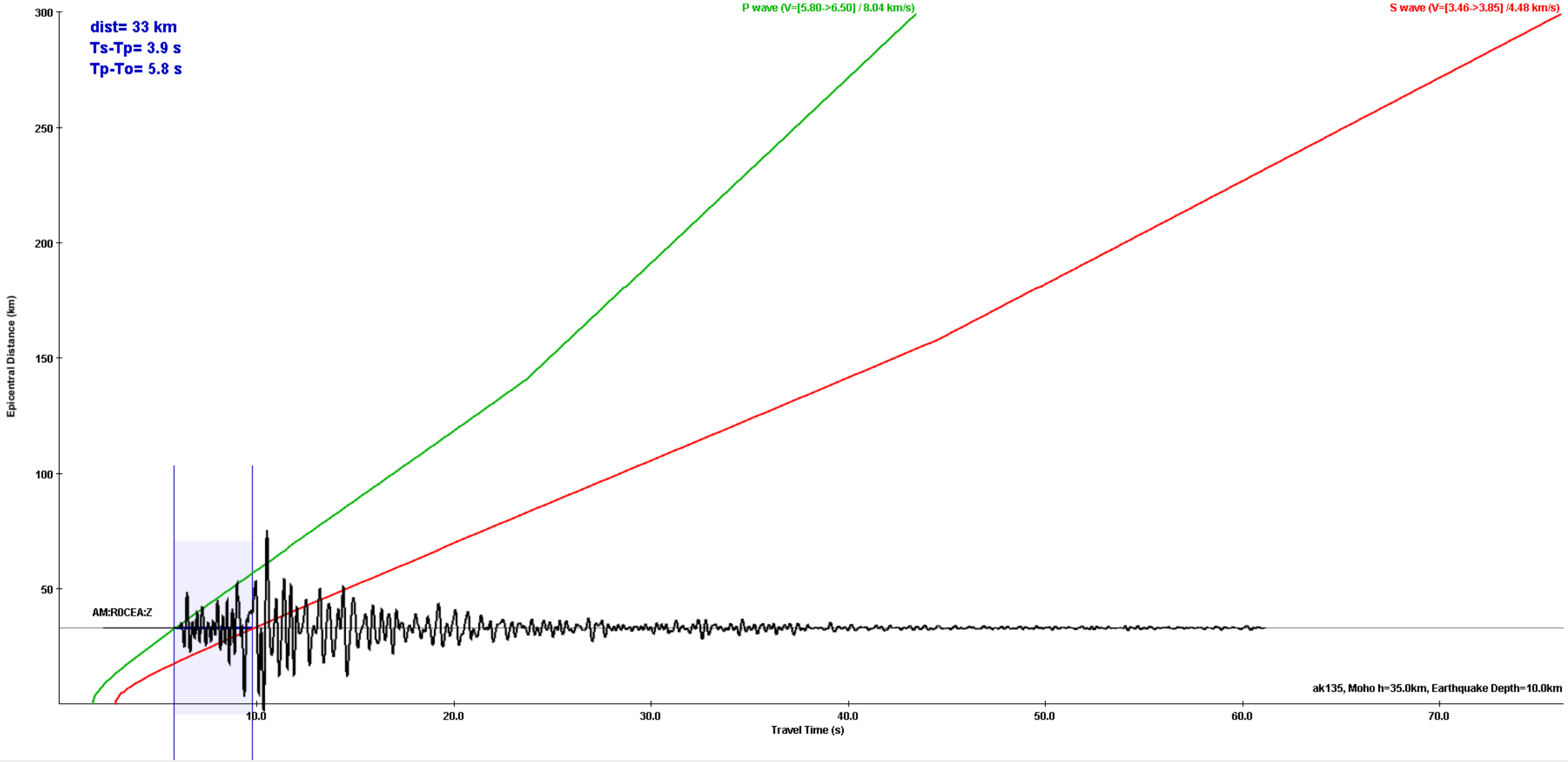
Moho depth: 35 Vp mantle: 8.04 Vs mantle: 4.48

Select Model: ak135 Earthquake Depth: 10 Reset


Shey Phoksundo National Park
Jumla Bazar
Sanphebagar
Mangalsen
Lo Manthang
Annapurna Conservation Area
Narayan
Jajarkot
Dhorpatan Hunting Reserve
Musikot
Lamki Chuha
Birendranagar
Tikapur
Bardia National Park
Manaslu Conservation Area
Phaliyag
Babiyachaur
Beni
Liwang Bazar
Kusma
पोखरा
Bansgadhi
Gulariya
Kohalpur
Holeri Bazar
Bagbazar
तुलसीपुर
Katarniaghat WLS
Nepalgunj
Rupadiya
Jaspur
घोराही उपमहानगरपालिका
Chakchakpur
Tamghas
Sandhikharka
Putalibazar
Shuklagandaki
Vyas (Damauli)
Wäling
Kuwakot
Tansen
Almade
Aanbu Khaireni
Gorkha
Dharka
Borang
Syabru Bensi
Langtang National Park
Dhading Besi
Bidur
Nanpara
Lamahi
Bhalubang
Gadhawa
Sohelwa WLS
Bahraich
Bhinga
Budhi
Tilottama
Pokhara
Tandi Bazar
Meghauli
Chitwan National Park
Manahari
Budhanilkantha
Chautara
काठमाडौं
Suryabinayak
Dakshinkali
Dhulikhel
Bhimeshwar
Kapilavastu
Siddhartanagar
Parasi
Sunauli
Nautanwa
Barhni
Tulsipur
Balrampur
Valmiki National park
Valmiki WLS/Tiger Reserve
हेटौडा
Manthali
Ramechhap
Sohagibarwa WLS
Nichlaul
Kolhui
Naugarh
Siddharth Nagar
Utraula
Mahmudabad
Fatehpur
Domariaganj
Brijmanganj
Maharajganj
Siswa Bazar
Ramnagar
Bagaha
Narkatiaganj
Sindhulimadi
Hariaun Krisnachok
Laibandi
Gonda
Ramnagar
Paraspur
Barabanki
Anand Nagar
Mehdawal
Ramkola
Padrauna
Kalaiya
बिरगंज
Sikta
Bardibas
Kachorwa
Leaflet | Data by © OpenStreetMap, under ODbL.

Hodochrone v3.0X03

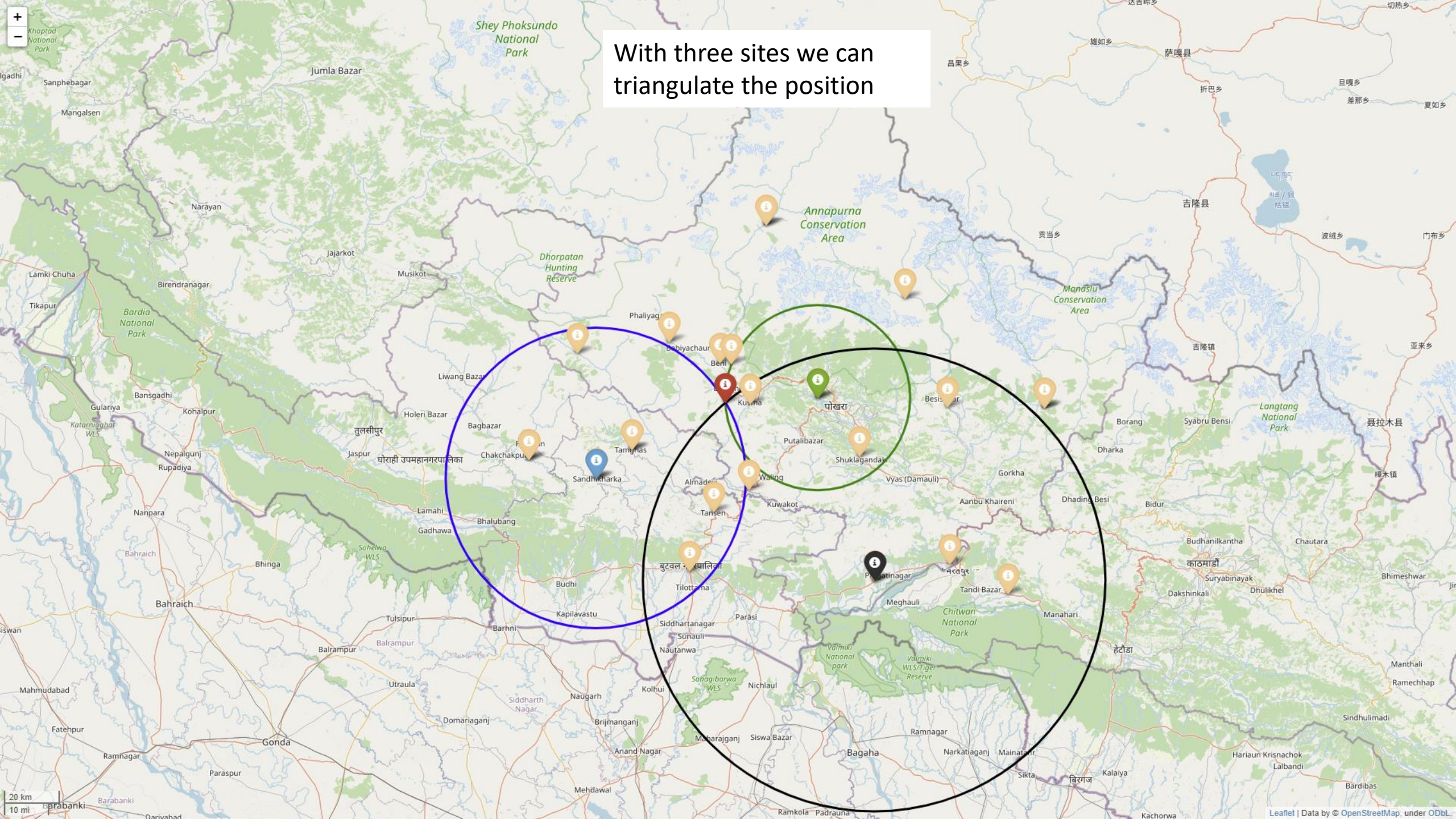
File



Vp surface: 5.8 Vp base crust: 6.5 Vs surface: 3.46 Vs base crust: 3.85

Moho depth: 35 Vp mantle: 8.04 Vs mantle: 4.48

Select Model: ak135 Earthquake Depth: 10 Reset


With three sites we can triangulate the position
Shey Phoksundo National Park
Annapurna Conservation Area
Dhorpatan Hunting Reserve
Manaslu Conservation Area
Bardia National Park
Langtang National Park
Chitwan National Park
Valmiki National park
Valmiki WLS/Tiger Reserve
Sohagibarwa WLS
Sohelwa WLS
Katarniaghat WLS
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Musikot
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Bahraich
Bhinga
Tulsipur
Balrampur
Mahmudabad
Fatehpur
Ramnagar
Gonda
Paraspur
Barabanki
Darivabad
Mehdawal
Siddharth Nagar
Domariaganj
Utraula
Naugarh
Brijmanganj
Anand Nagar
Maharajganj
Siswa Bazar
Ramkola
Padrauna
Kolhui
Nichlaul
Ramnagar
Bagaha
Narkatiaganj
Sikta
Kalaiya
बिरगंज
Kachorwa
Barhni
Kapilavastu
Siddhartanagar
Sunauli
Nautanwa
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Budhi
Tilottama
बुटवल उपमहानगरपालिका
Lamahi
Bhalubang
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Holeri Bazar
Bagbazar
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Babiyachaur
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Gorkha
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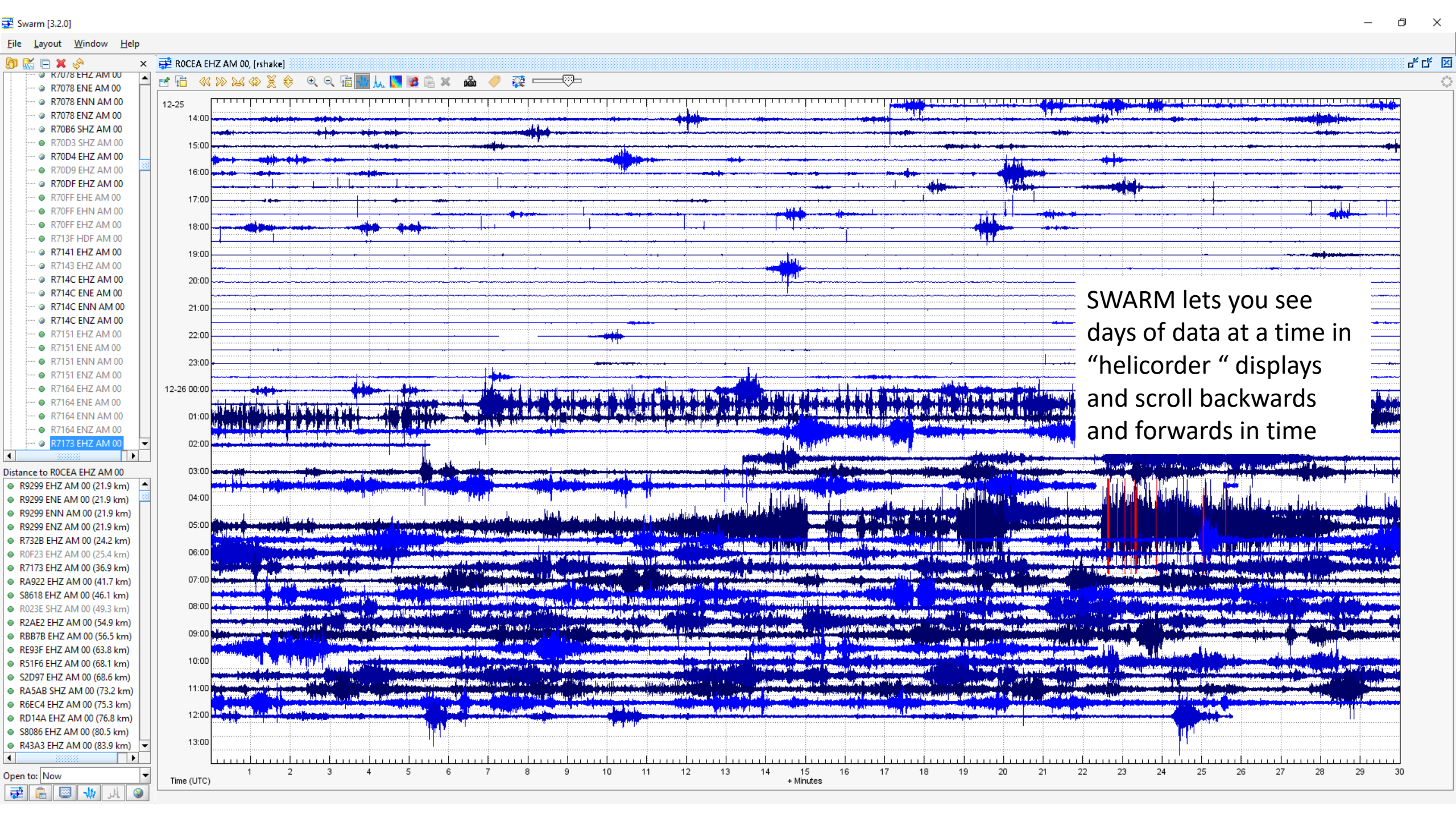
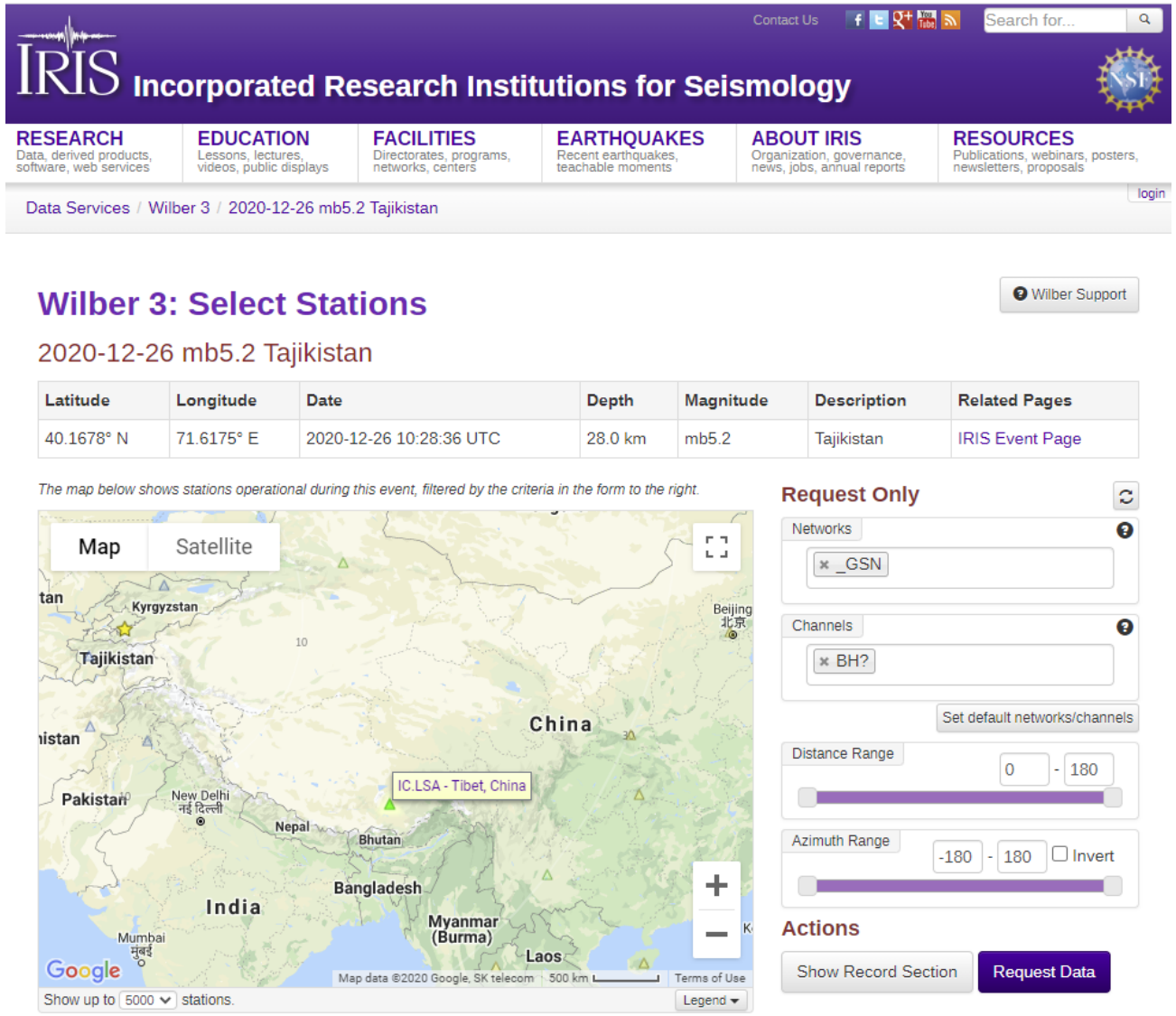
Borang
Syabru Bensi
Bidur
Budhanilkantha
काठमाडौं
Suryabinayak
Dakshinkali
Dhulikhel
Chautara
Bhimeshwar
Manthali
Ramechhap
Sindhulimadi
Hariaun Krisnachok
Laibandi
Bardibas
Tandi Bazar
Meghauli
Manahari
हेटौंडा
Pokhara
Putalibazar
Shuklagandaki
Tansen
Kuwakot
Waling
Vyas (Damauli)
Gorkha
Dharka
Tandi Bazar
Meghauli
Manahari
20 km
10 mi
Leaflet | Data by © OpenStreetMap, under ODbL.

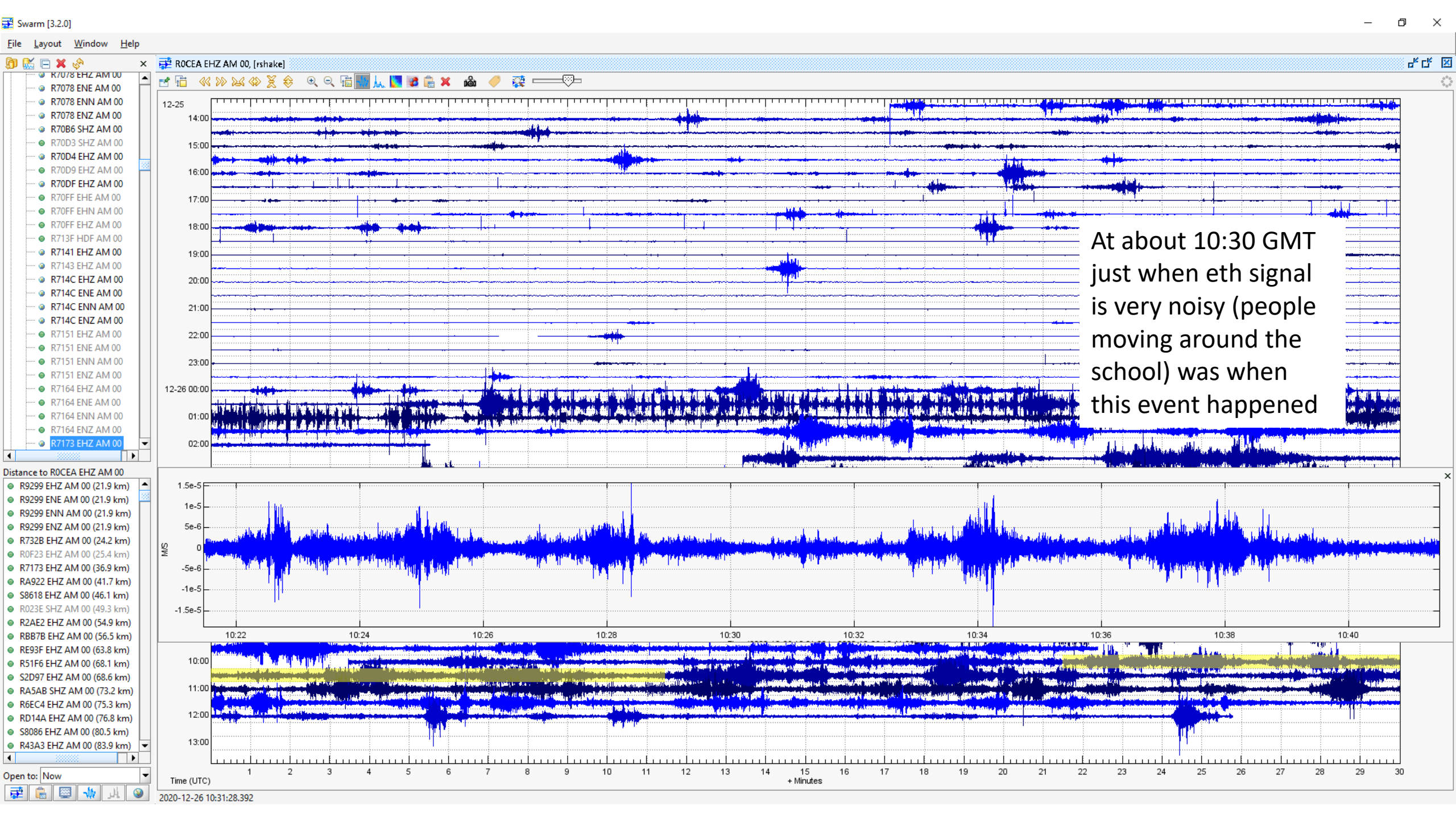
Another good free software tool for viewing lots of data is called SWARM

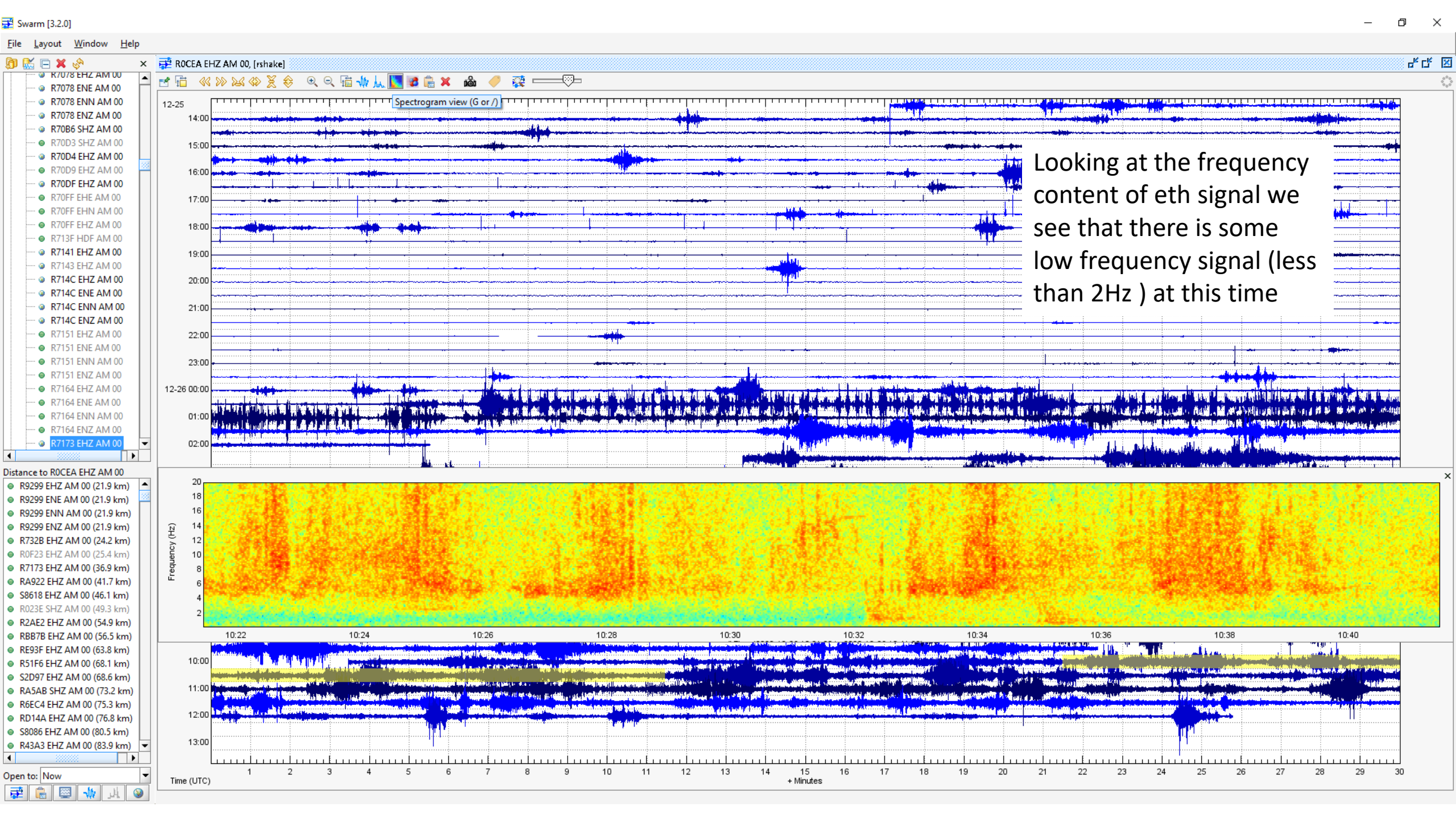
Download from https://volcanoes.usgs.gov/software/swarm

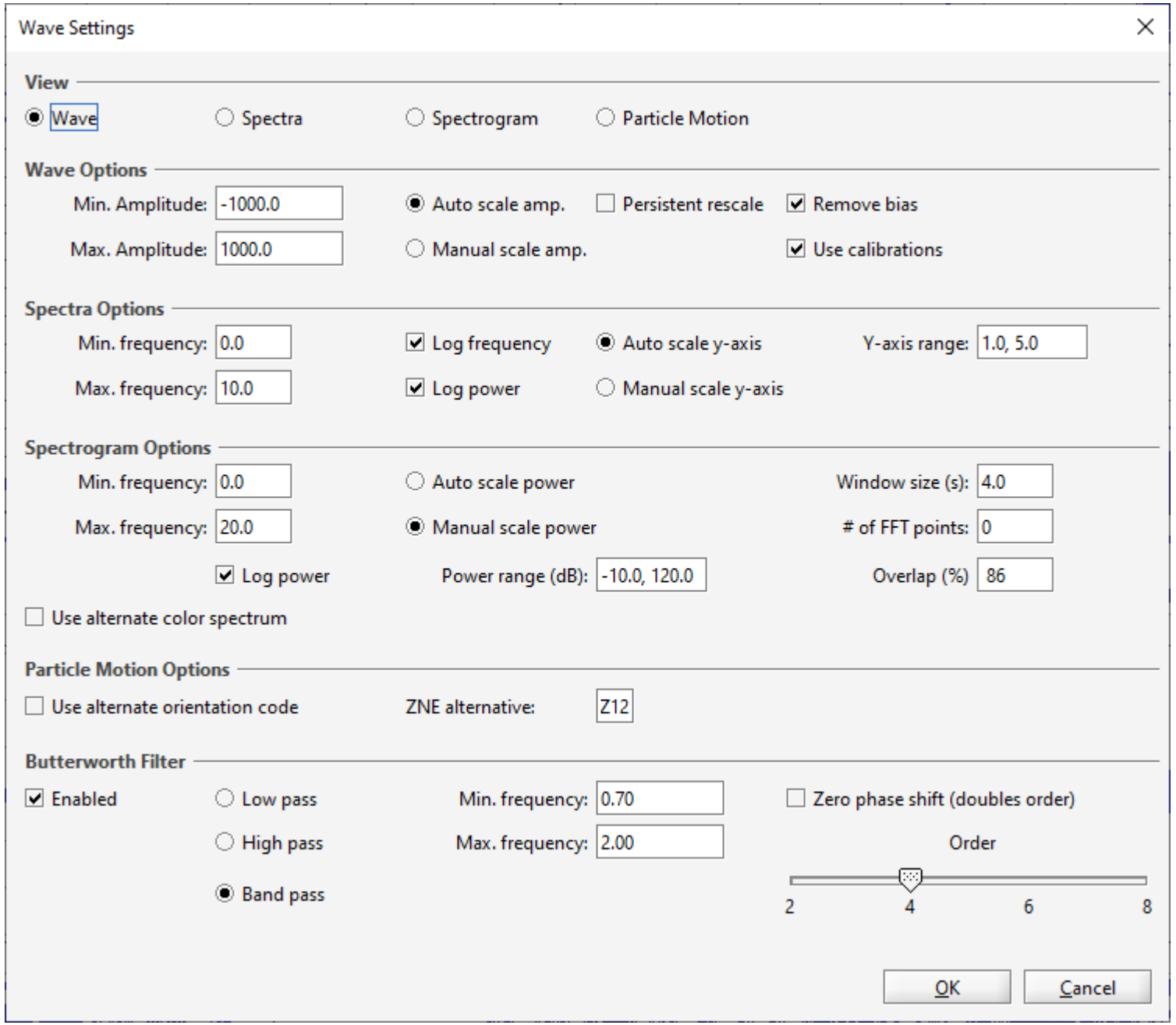

Swarm [3.2.0]
File
Layout
Window
Help
R0CEA EHZ AM 00, [rshake]
R7078 EHZ AM 00
R7078 ENE AM 00
R7078 ENN AM 00
R7078 ENZ AM 00
R70B6 SHZ AM 00
R70D3 SHZ AM 00
R70D4 EHZ AM 00
R70D9 EHZ AM 00
R70DF EHZ AM 00
R70FF EHE AM 00
R70FF EHN AM 00
R70FF EHZ AM 00
R713F HDF AM 00
R7141 EHZ AM 00
R7143 EHZ AM 00
R714C EHZ AM 00
R714C ENE AM 00
R714C ENN AM 00
R714C ENZ AM 00
R7151 EHZ AM 00
R7151 ENE AM 00
R7151 ENN AM 00
R7151 ENZ AM 00
R7164 EHZ AM 00
R7164 ENE AM 00
R7164 ENN AM 00
R7164 ENZ AM 00
R7173 EHZ AM 00
Distance to R0CEA EHZ AM 00
R9299 EHZ AM 00 (21.9 km)
R9299 ENE AM 00 (21.9 km)
R9299 ENN AM 00 (21.9 km)
R9299 ENZ AM 00 (21.9 km)
R732B EHZ AM 00 (24.2 km)
R0F23 EHZ AM 00 (25.4 km)
R7173 EHZ AM 00 (36.9 km)
RA922 EHZ AM 00 (41.7 km)
S8618 EHZ AM 00 (46.1 km)
R023E SHZ AM 00 (49.3 km)
R2AE2 EHZ AM 00 (54.9 km)
RBB7B EHZ AM 00 (56.5 km)
RE93F EHZ AM 00 (63.8 km)
R51F6 EHZ AM 00 (68.1 km)
S2D97 EHZ AM 00 (68.6 km)
RA5AB SHZ AM 00 (73.2 km)
R6EC4 EHZ AM 00 (75.3 km)
RD14A EHZ AM 00 (76.8 km)
S8086 EHZ AM 00 (80.5 km)
R43A3 EHZ AM 00 (83.9 km)
Open to: Now
12-25
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
12-26 00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
SWARM lets you see days of data at a time in “helicorder “ displays and scroll backwards and forwards in time
Time (UTC)
+ Minutes



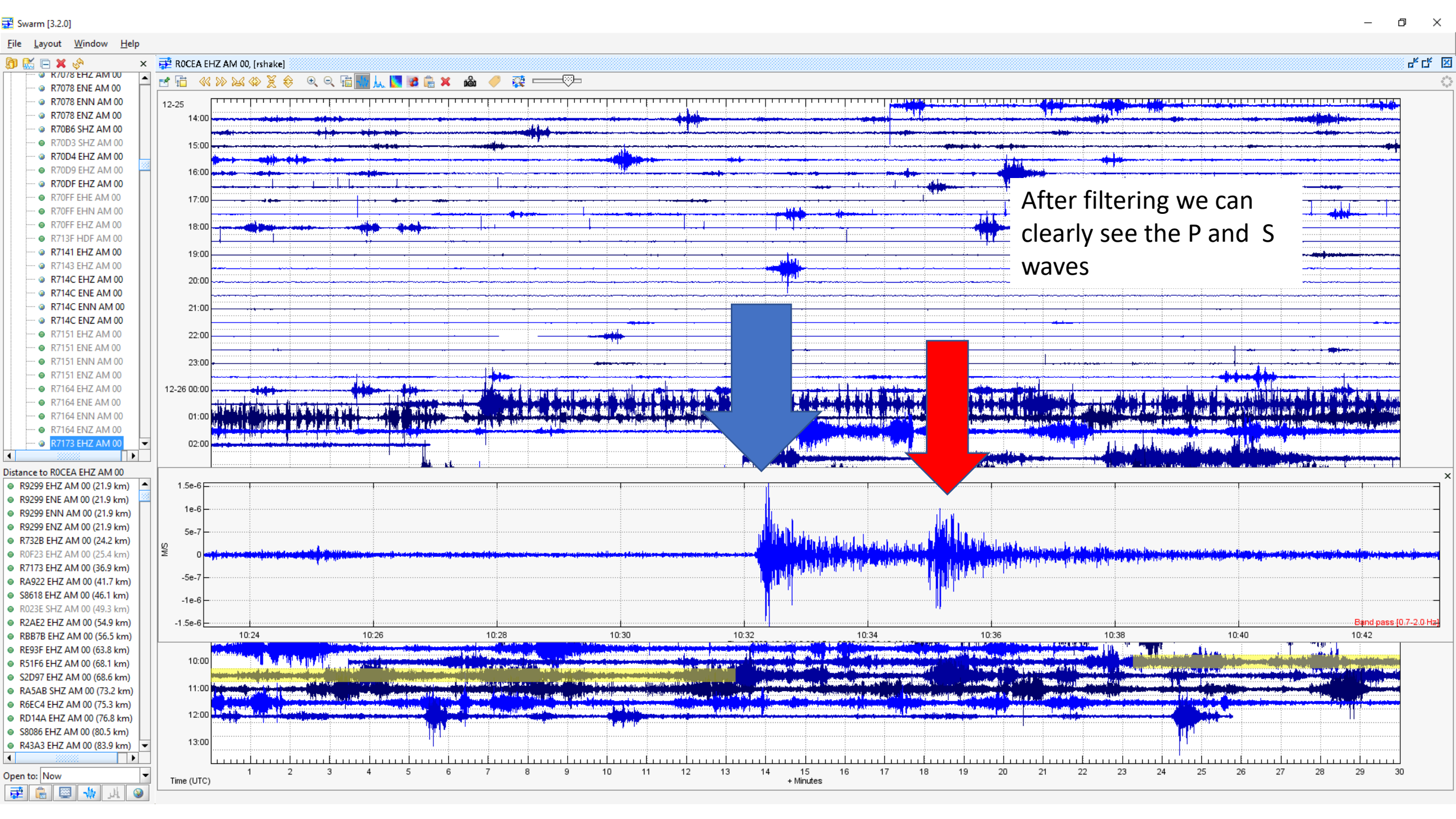
A medium sized event (M5.2) happened in Tajikistan (about 1500km away) on this day

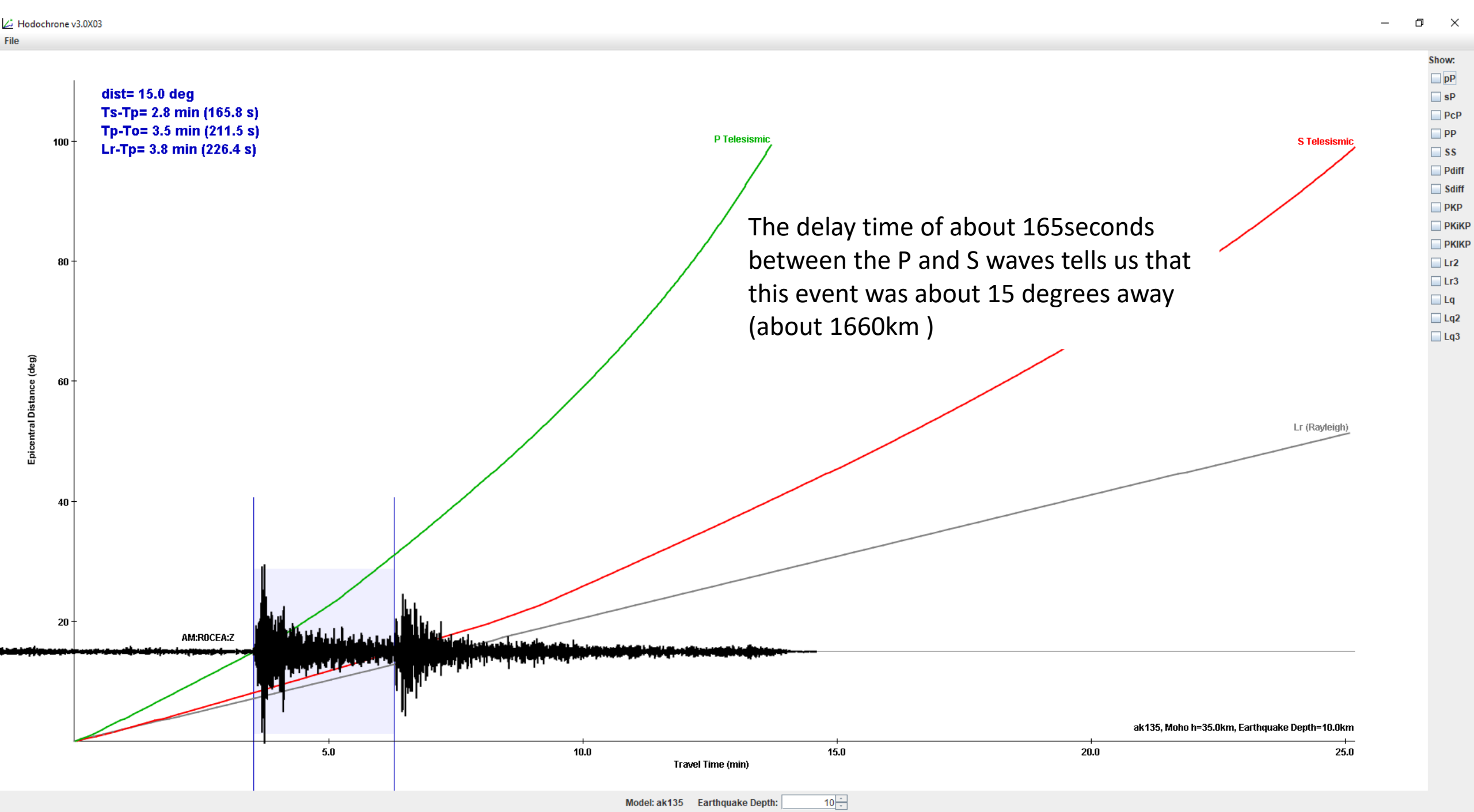

Swarm [3.2.0]
File
Layout
Window
Help
R0CEA EHZ AM 00, [rshake]
R7078 ENE AM 00
R7078 ENN AM 00
R7078 ENZ AM 00
R70B6 SHZ AM 00
R70D3 SHZ AM 00
R70D4 EHZ AM 00
R70D9 EHZ AM 00
R70DF EHZ AM 00
R70FF EHE AM 00
R70FF EHN AM 00
R70FF EHZ AM 00
R713F HDF AM 00
R7141 EHZ AM 00
R7143 EHZ AM 00
R714C EHZ AM 00
R714C ENE AM 00
R714C ENN AM 00
R714C ENZ AM 00
R7151 EHZ AM 00
R7151 ENE AM 00
R7151 ENN AM 00
R7151 ENZ AM 00
R7164 EHZ AM 00
R7164 ENE AM 00
R7164 ENN AM 00
R7164 ENZ AM 00
R7173 EHZ AM 00
12-25
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
12-26 00:00
01:00
02:00
At about 10:30 GMT just when eth signal is very noisy (people moving around the school) was when this event happened
Distance to R0CEA EHZ AM 00
R9299 EHZ AM 00 (21.9 km)
R9299 ENE AM 00 (21.9 km)
R9299 ENN AM 00 (21.9 km)
R9299 ENZ AM 00 (21.9 km)
R732B EHZ AM 00 (24.2 km)
R0F23 EHZ AM 00 (25.4 km)
R7173 EHZ AM 00 (36.9 km)
RA922 EHZ AM 00 (41.7 km)
S8618 EHZ AM 00 (46.1 km)
R023E SHZ AM 00 (49.3 km)
R2AE2 EHZ AM 00 (54.9 km)
RBB7B EHZ AM 00 (56.5 km)
RE93F EHZ AM 00 (63.8 km)
R51F6 EHZ AM 00 (68.1 km)
S2D97 EHZ AM 00 (68.6 km)
RA5AB SHZ AM 00 (73.2 km)
R6EC4 EHZ AM 00 (75.3 km)
RD14A EHZ AM 00 (76.8 km)
S8086 EHZ AM 00 (80.5 km)
R43A3 EHZ AM 00 (83.9 km)
1.5e-5
1e-5
5e-6
0
-5e-6
-1e-5
-1.5e-5
M/S
10:22
10:24
10:26
10:28
10:30
10:32
10:34
10:36
10:38
10:40
10:00
11:00
12:00
13:00
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Time (UTC)
+ Minutes
Open to:
Now
2020-12-26 10:31:28.392


Swarm [3.2.0]
File
Layout
Window
Help
R0CEA EHZ AM 00, [rshake]
Spectrogram view (G or /)
R7078 EHZ AM 00
R7078 ENE AM 00
R7078 ENN AM 00
R7078 ENZ AM 00
R70B6 SHZ AM 00
R70D3 SHZ AM 00
R70D4 EHZ AM 00
R70D9 EHZ AM 00
R70DF EHZ AM 00
R70FF EHE AM 00
R70FF EHN AM 00
R70FF EHZ AM 00
R713F HDF AM 00
R7141 EHZ AM 00
R7143 EHZ AM 00
R714C EHZ AM 00
R714C ENE AM 00
R714C ENN AM 00
R714C ENZ AM 00
R7151 EHZ AM 00
R7151 ENE AM 00
R7151 ENN AM 00
R7151 ENZ AM 00
R7164 EHZ AM 00
R7164 ENE AM 00
R7164 ENN AM 00
R7164 ENZ AM 00
R7173 EHZ AM 00
12-25
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
12-26 00:00
01:00
02:00
Looking at the frequency content of eth signal we see that there is some low frequency signal (less than 2Hz) at this time
Distance to R0CEA EHZ AM 00
R9299 EHZ AM 00 (21.9 km)
R9299 ENE AM 00 (21.9 km)
R9299 ENN AM 00 (21.9 km)
R9299 ENZ AM 00 (21.9 km)
R732B EHZ AM 00 (24.2 km)
R0F23 EHZ AM 00 (25.4 km)
R7173 EHZ AM 00 (36.9 km)
RA922 EHZ AM 00 (41.7 km)
S8618 EHZ AM 00 (46.1 km)
R023E SHZ AM 00 (49.3 km)
R2AE2 EHZ AM 00 (54.9 km)
RBB7B EHZ AM 00 (56.5 km)
RE93F EHZ AM 00 (63.8 km)
R51F6 EHZ AM 00 (68.1 km)
S2D97 EHZ AM 00 (68.6 km)
RA5AB SHZ AM 00 (73.2 km)
R6EC4 EHZ AM 00 (75.3 km)
RD14A EHZ AM 00 (76.8 km)
S8086 EHZ AM 00 (80.5 km)
R43A3 EHZ AM 00 (83.9 km)
Frequency (Hz)
20
18
16
14
12
10
8
6
4
2
10:22
10:24
10:26
10:28
10:30
10:32
10:34
10:36
10:38
10:40
10:00
11:00
12:00
13:00
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
Time (UTC)
+ Minutes
Open to:
Now



The software lets us selectively remove all of the noise that has frequency content above 2Hz


Swarm [3.2.0]
File
Layout
Window
Help
R0CEA EHZ AM 00, [rshake]
R7078 ENE AM 00
R7078 ENN AM 00
R7078 ENZ AM 00
R70B6 SHZ AM 00
R70D3 SHZ AM 00
R70D4 EHZ AM 00
R70D9 EHZ AM 00
R70DF EHZ AM 00
R70FF EHE AM 00
R70FF EHN AM 00
R70FF EHZ AM 00
R713F HDF AM 00
R7141 EHZ AM 00
R7143 EHZ AM 00
R714C EHZ AM 00
R714C ENE AM 00
R714C ENN AM 00
R714C ENZ AM 00
R7151 EHZ AM 00
R7151 ENE AM 00
R7151 ENN AM 00
R7151 ENZ AM 00
R7164 EHZ AM 00
R7164 ENE AM 00
R7164 ENN AM 00
R7164 ENZ AM 00
R7173 EHZ AM 00
Distance to R0CEA EHZ AM 00
R9299 EHZ AM 00 (21.9 km)
R9299 ENE AM 00 (21.9 km)
R9299 ENN AM 00 (21.9 km)
R9299 ENZ AM 00 (21.9 km)
R732B EHZ AM 00 (24.2 km)
R0F23 EHZ AM 00 (25.4 km)
R7173 EHZ AM 00 (36.9 km)
RA922 EHZ AM 00 (41.7 km)
S8618 EHZ AM 00 (46.1 km)
R023E SHZ AM 00 (49.3 km)
R2AE2 EHZ AM 00 (54.9 km)
RBB7B EHZ AM 00 (56.5 km)
RE93F EHZ AM 00 (63.8 km)
R51F6 EHZ AM 00 (68.1 km)
S2D97 EHZ AM 00 (68.6 km)
RA5AB SHZ AM 00 (73.2 km)
R6EC4 EHZ AM 00 (75.3 km)
RD14A EHZ AM 00 (76.8 km)
S8086 EHZ AM 00 (80.5 km)
R43A3 EHZ AM 00 (83.9 km)
Open to: Now
12-25
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
12-26 00:00
01:00
02:00
After filtering we can clearly see the P and S waves
M/S
1.5e-6
1e-6
5e-7
0
-5e-7
-1e-6
-1.5e-6
10:24
10:26
10:28
10:30
10:32
10:34
10:36
10:38
10:40
10:42
Band pass [0.7-2.0 Hz]
10:00
11:00
12:00
13:00
Time (UTC)
+ Minutes


Hodochrone v3.0X03
File
dist= 15.0 deg
Ts-Tp= 2.8 min (165.8 s)
Tp-To= 3.5 min (211.5 s)
Lr-Tp= 3.8 min (226.4 s)
P Telesismic
S Telesismic
Lr (Rayleigh)
The delay time of about 165seconds between the P and S waves tells us that this event was about 15 degrees away (about 1660km)
Epicentral Distance (deg)
100
80
60
40
20
AM:R0CEA:Z
5.0
10.0
15.0
20.0
25.0
Travel Time (min)
ak135, Moho h=35.0km, Earthquake Depth=10.0km
Show:
pP
sP
PcP
PP
SS
Pdiff
Sdiff
PKP
PKiKP
PKIKP
Lr2
Lr3
Lq
Lq2
Lq3
Model: ak135
Earthquake Depth:
10