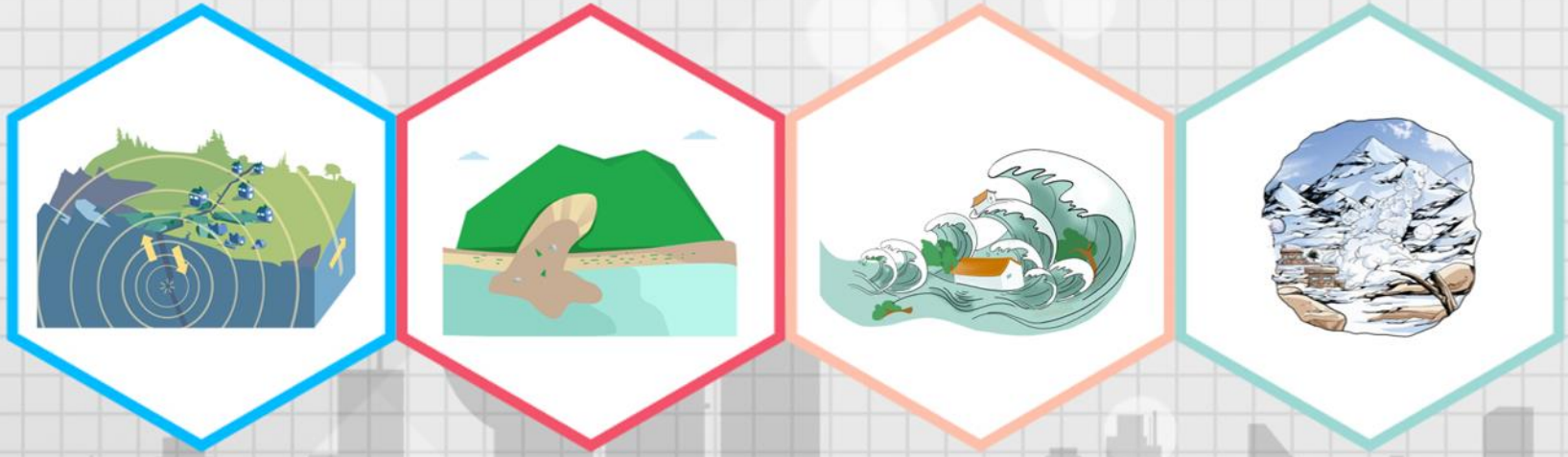
PROGRAM STUDI TEKNIK SIPIL
FAKULTAS TEKNIK
UNIVERSITAS MEDAN AREA

EARTHQUAKES SUMMARY



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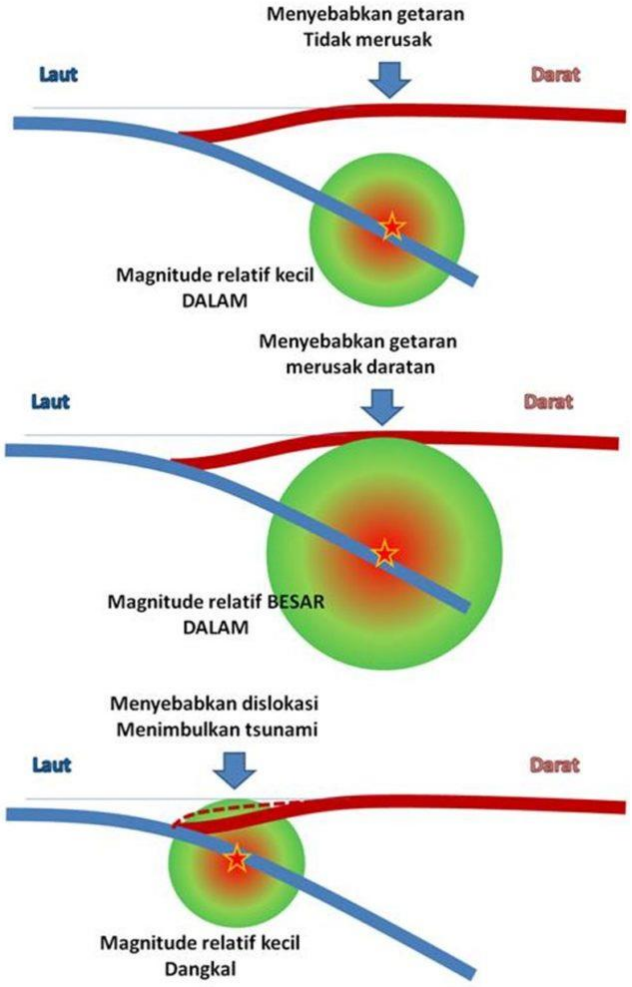
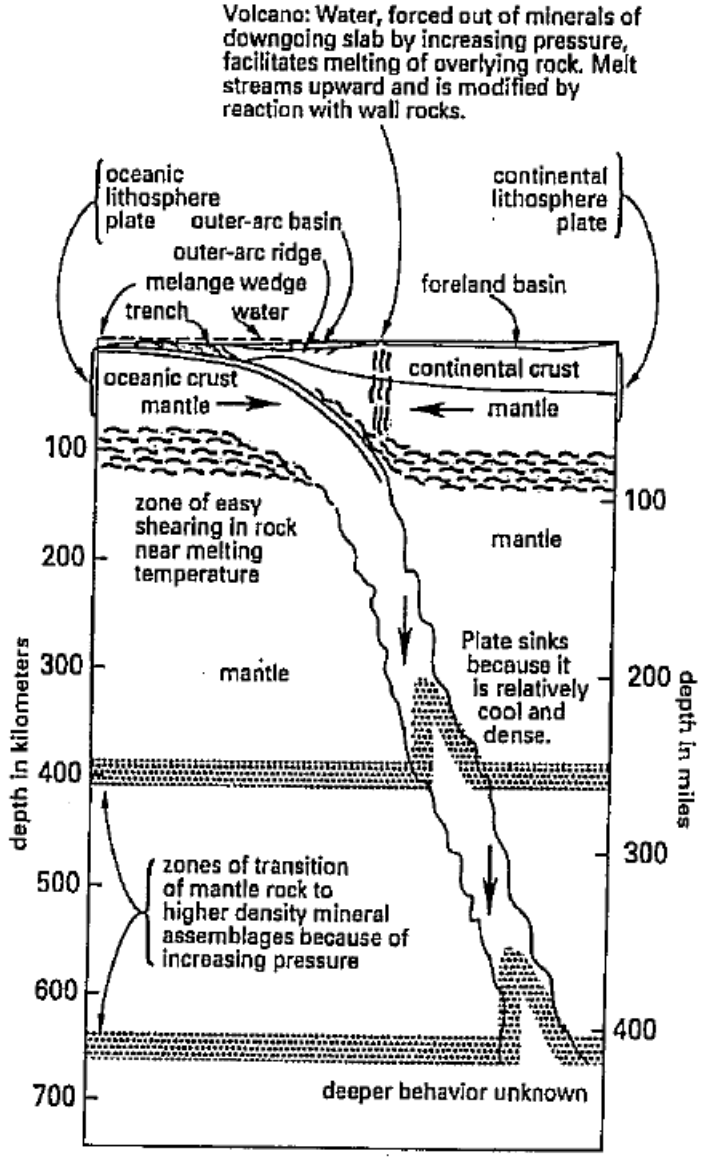
Email : Jeddah.yanti@staff.uma.ac.id

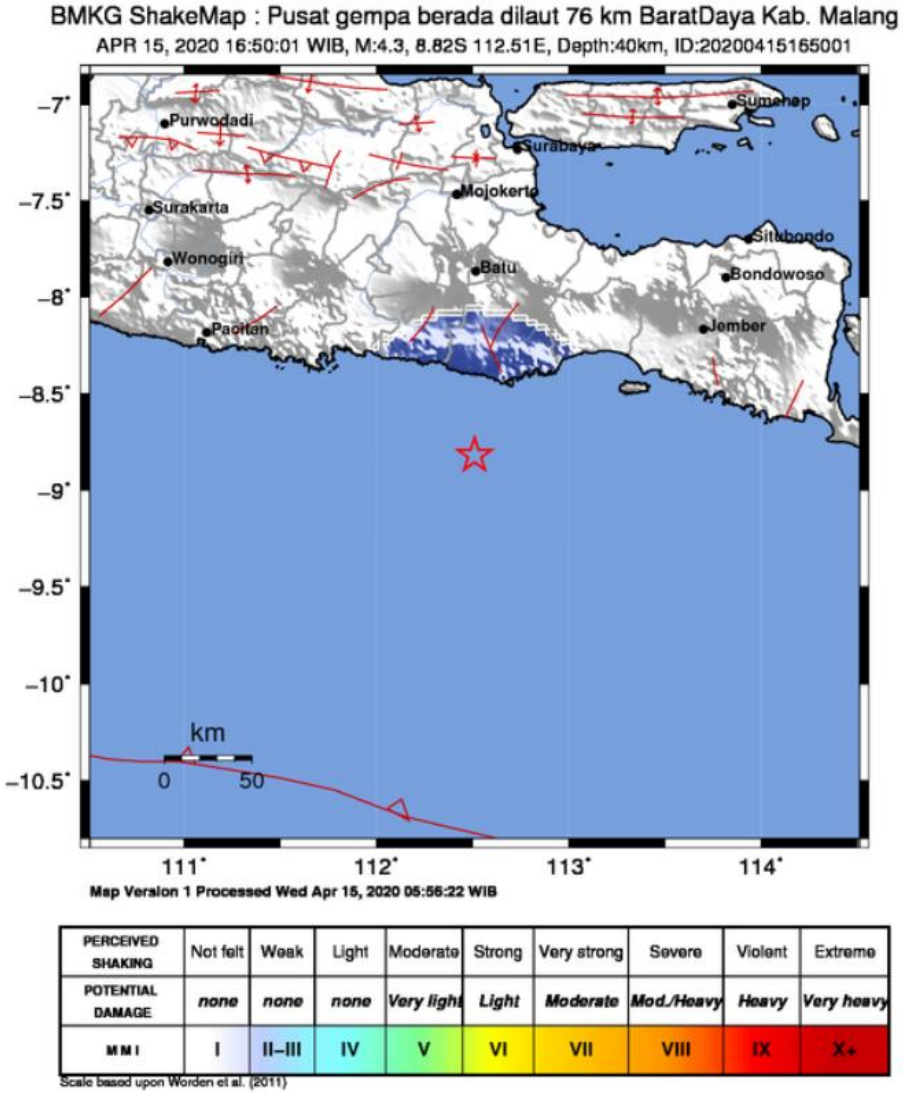
Causes of Earthquake

ENERGY





CONTOH CASE GEMPA DENGAN INFORMASI SKALA MAGNITUDO DAN INTENSITAS GEMPA



15 Apr 2020, 16:50:01 WIB

Magnitudo
4.3

Kedalaman
40 Km

Lokasi
8.82 LS 112.51 BT

Types of waves on seismograph data

Seismograph data is implementation of waves fungtion.

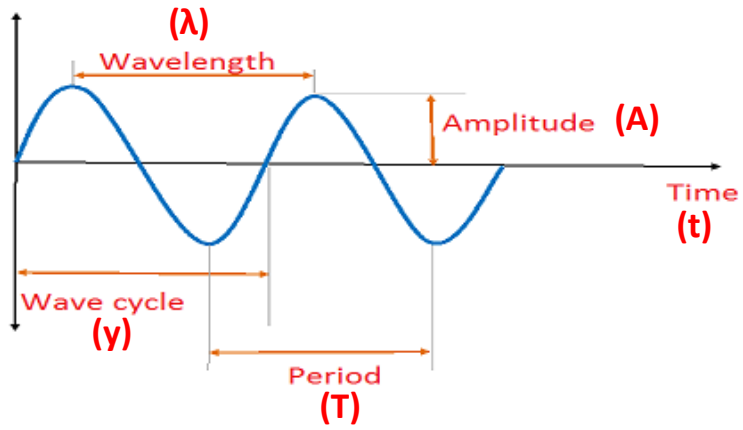


Figure 1. Waves function

P waves are the fastest seismic waves, they will usually be the first ones that your seismograph records. The next set of seismic waves on your seismogram will be the S waves. S waves means the shape waves that shows big effect of earthquake hazard.

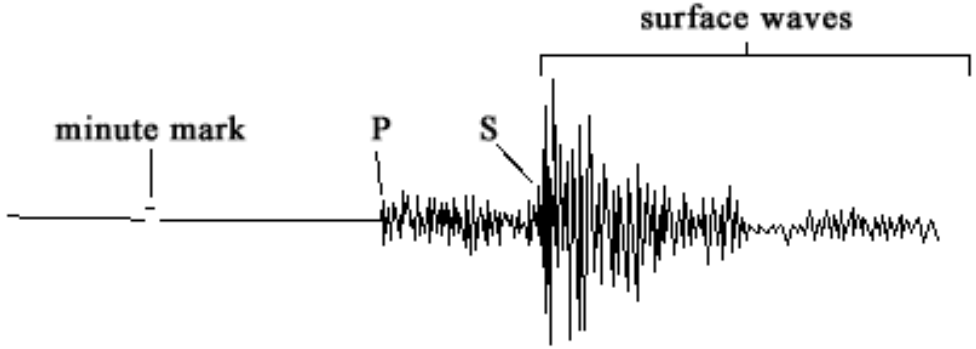
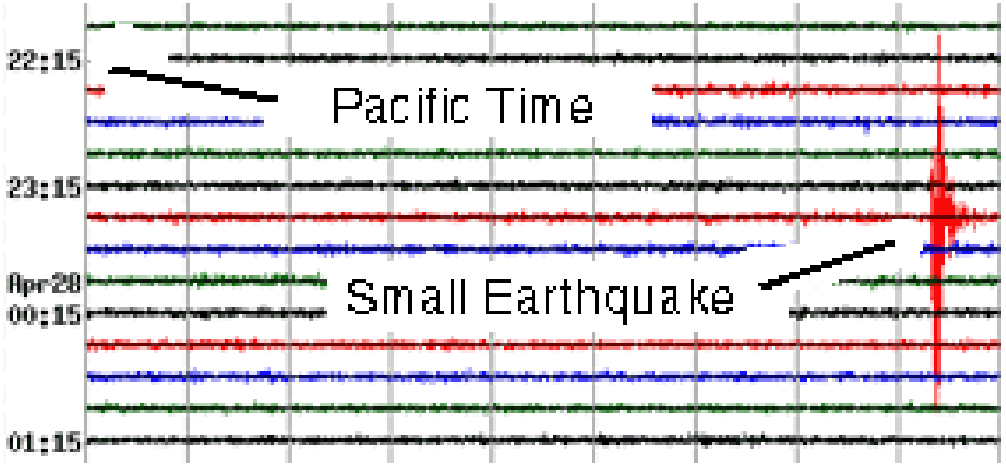
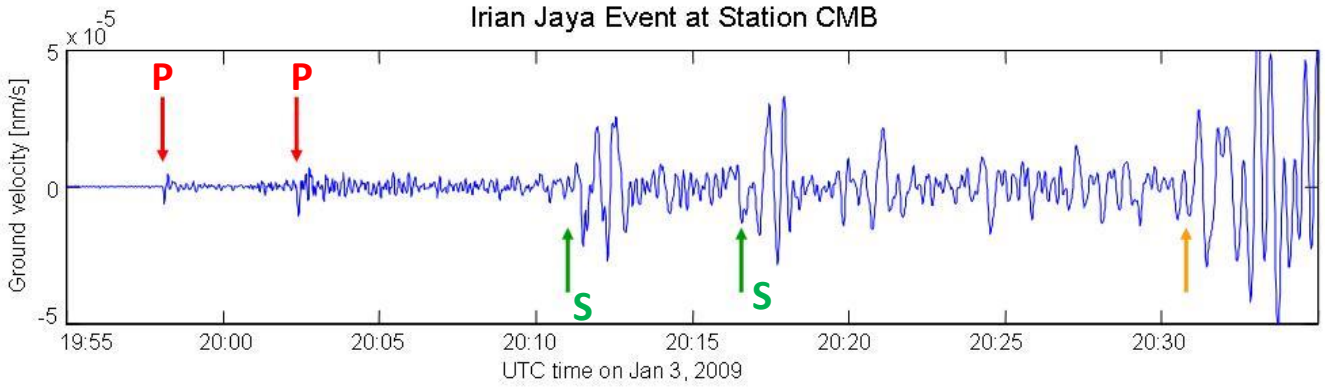
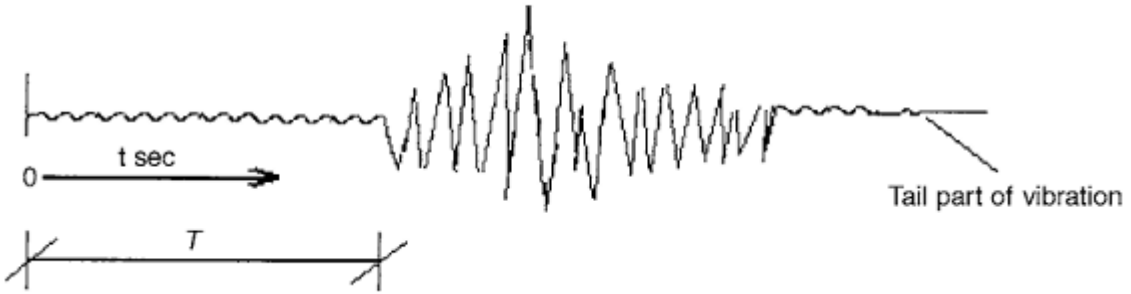


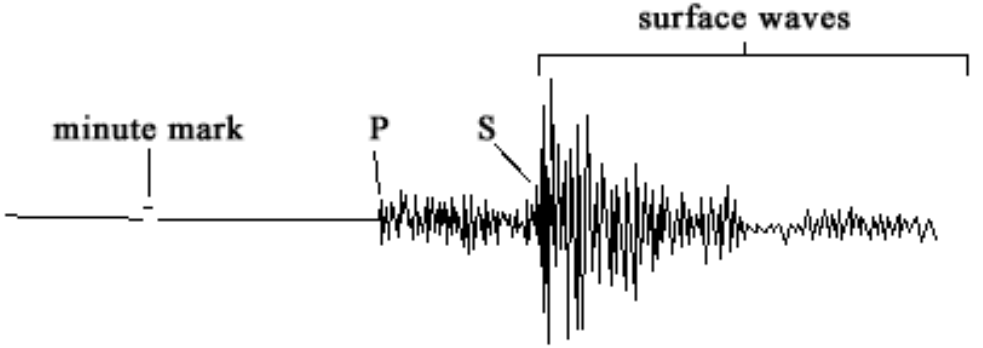
Figure 2. Types of waves on seismograph data

Example of seismograph data









- ✓ s is the distance from a given observation point to the hypocenter (km or miles)
- ✓ v_s is the propagation velocity of the transverse waves (m/s, nm/s, µm/s)
- ✓ v_p is The propagation velocity of the longitudinal (push waves) (m/s, nm/s, µm/s)
- ✓ T is the time difference between the arrival of p and s waves (s)

$$T = \frac{s}{v_s} - \frac{s}{v_p}$$

$$T = s\left(\frac{1}{v_s} - \frac{1}{v_p}\right)$$ Period eq

$$s = \frac{T}{\left(\frac{1}{v_s} - \frac{1}{v_p}\right)}$$ Distance eq

Task 2

1. Please draw how many P waves, S waves and Surface waves of your data.
2. Please count how many sequence of your seismograph data.
3. Please estimate the time of P waves, S waves and Surface waves of your data

Answer :

For example

1. In image

2. There are 3 P waves, 3 S waves, and 3 Surface waves.

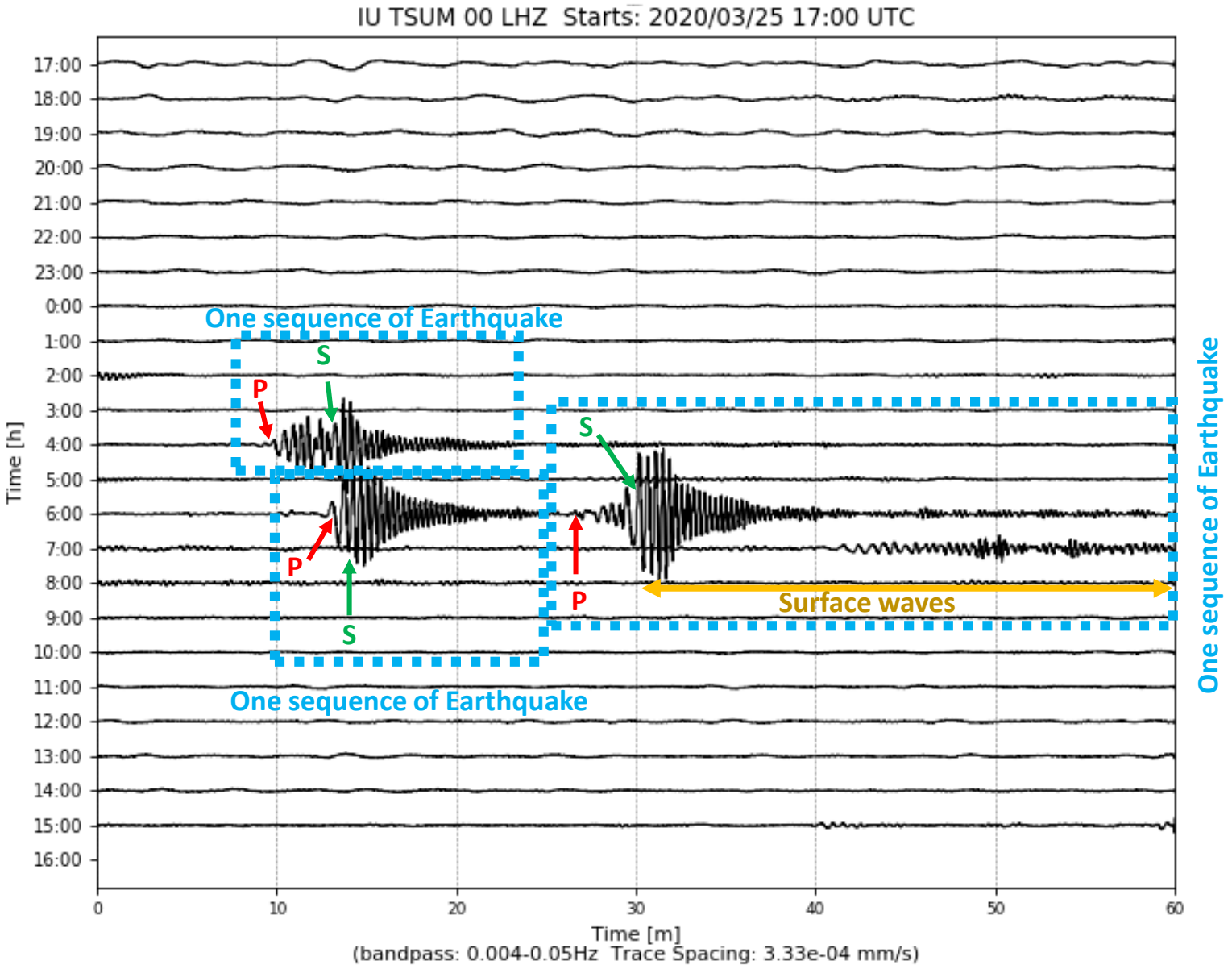
3. a. 1st P waves = ± 06:12
1st S waves = ± 06:14
1st Surface waves = ± 06:14 – 06:25
b. 2nd P waves = ± 06:27
2nd S waves = ± 06:31
2nd Surface waves = ± 06:31 – 06:59
c. 3rd P waves = ± 04:xx
3rd S waves = ± 04:xx
3rd Surface waves = ± 04:xx – 04:xx

- ✓ Your result can be .jpg, .doc, .pdf
- ✓ Send to jeddah.yanti@staff.uma.ac.id
- ✓ Filename

[Abcent no]_[Your name]_[Student ID]

Ex:

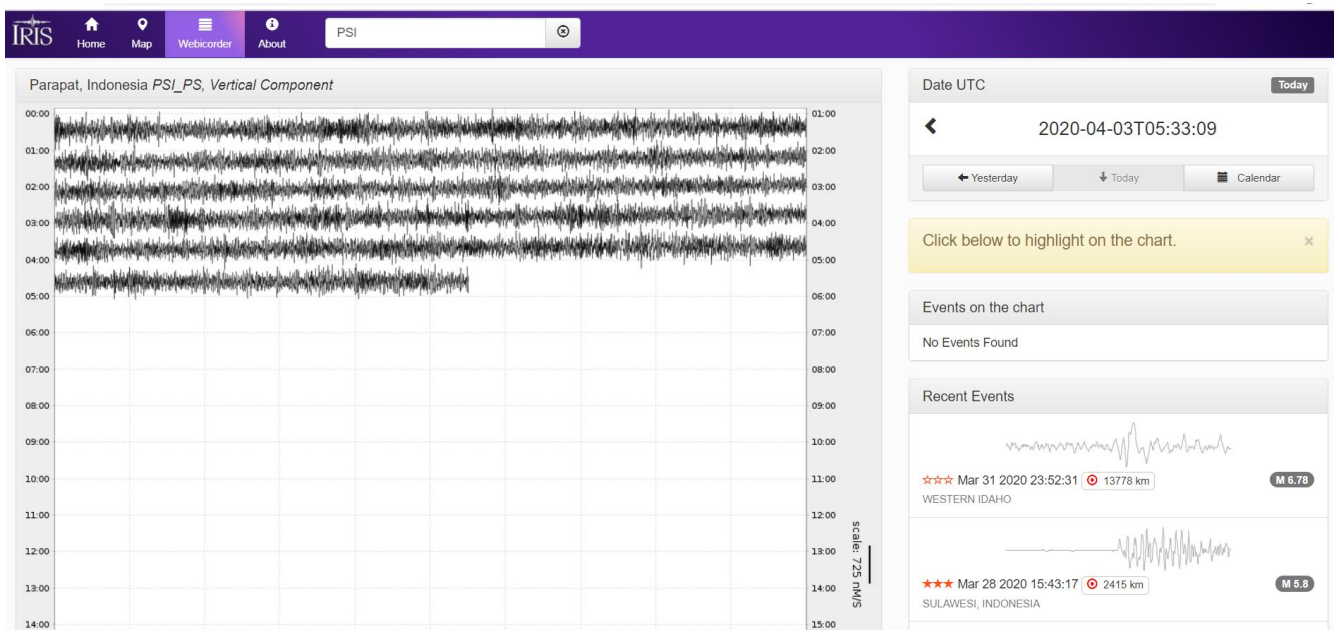
1_Lucinta gue kagak_14045



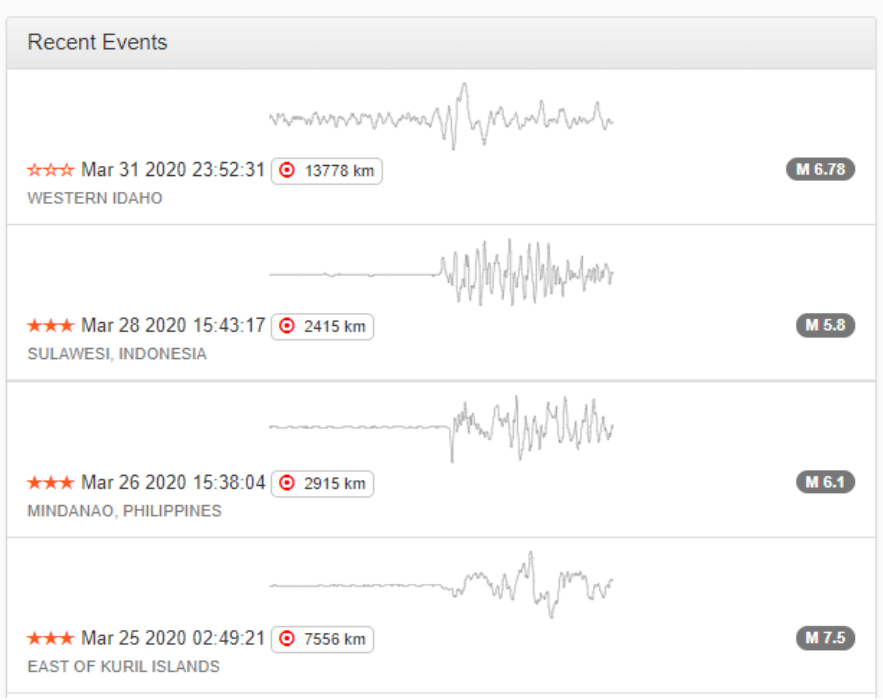
ONE OF APPLICATION FOR EARTHQUAKE OBERVATION

Langkah-langkah menggunakan station monitor apps atau website station monitor

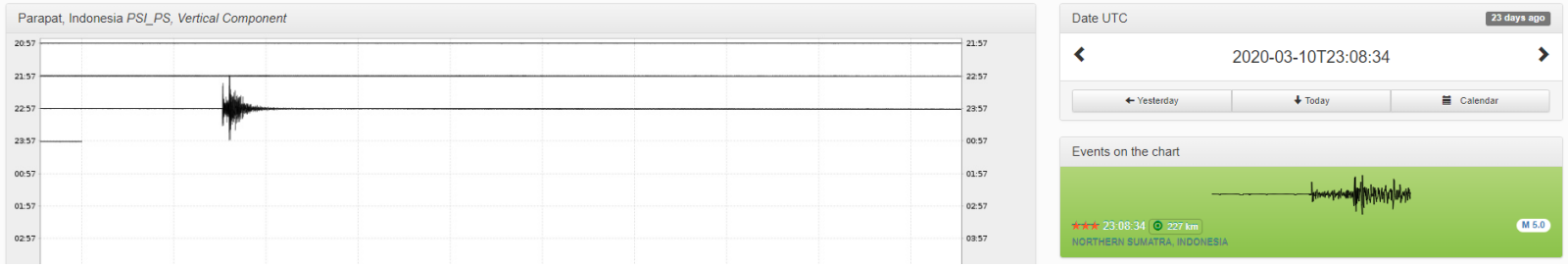
1. Buka apps station monitor atau website dibawah ini
   https://www.iris.edu/app/station_monitor/#Today/PS-PSI/webicorder/PS-PSI|11195893



2. Perhatikan coloum bar recent events, klik salah satu case gempa yang tampil pada recent events



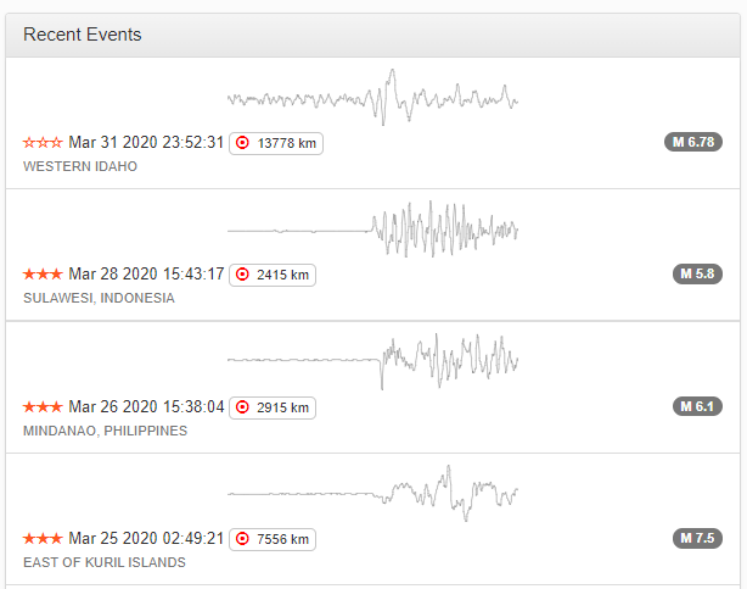
3. Sehingga akan tampil data seismograph seperti dibawah, tentukan p wave, s wave and surface wave

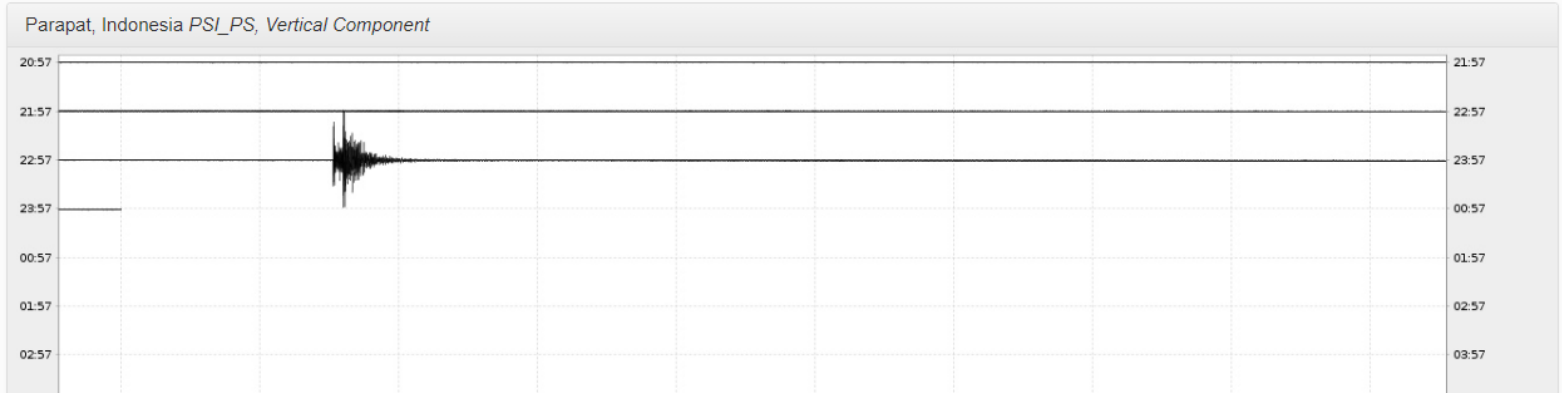


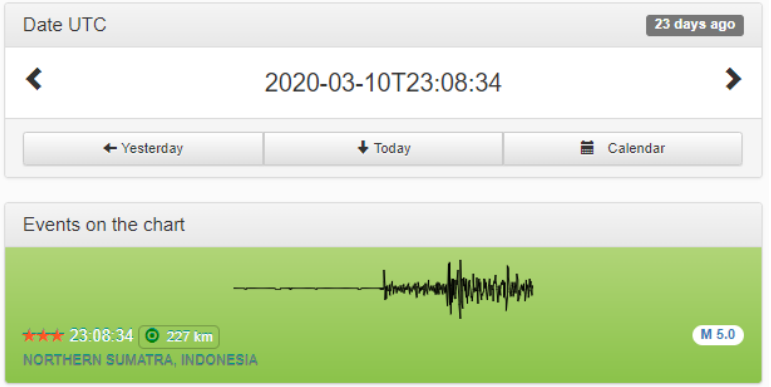
TASK 3

1. **Collect recent event of earthquake that consists of**
a) **Earthquake Location**
b) **Time of the Event UTC**
c) **Station - Event Distance**
d) **Depth**
e) **Magnitude**

2. **Determine**
a) **p waves and time arrival**
b) **s waves and time arrival**
c) **surface waves and time arrival**

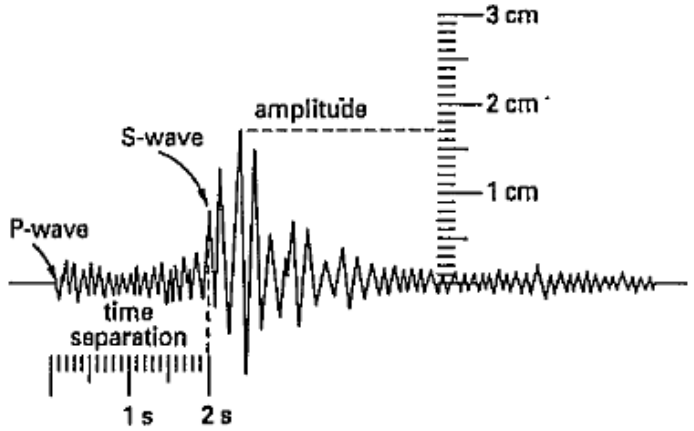


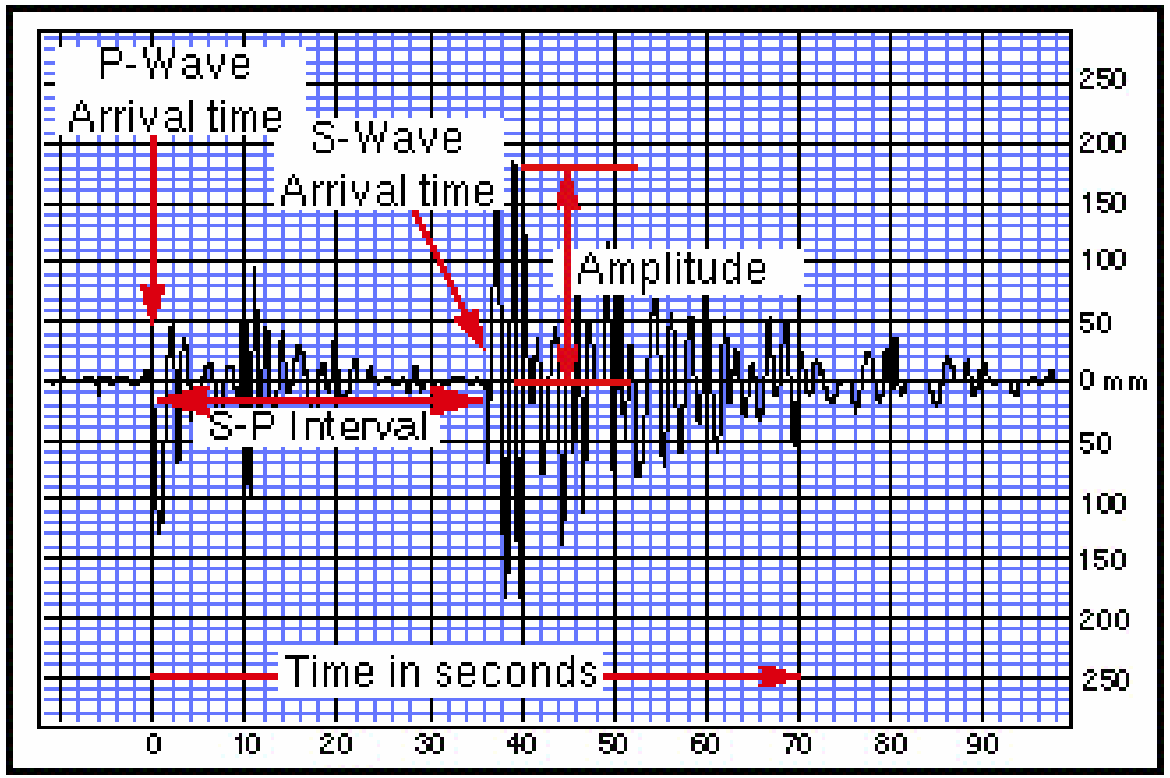


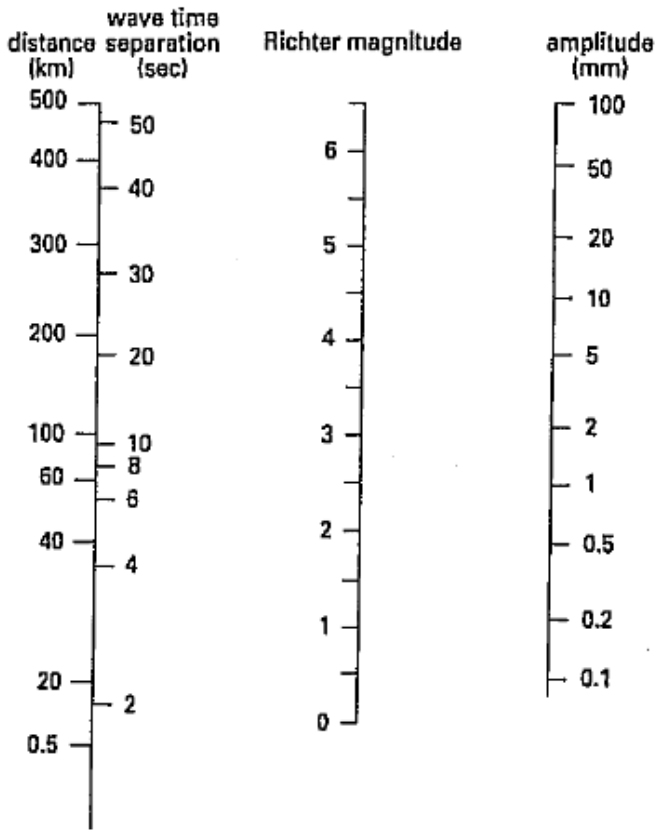


INFORMATION

Gambar berikut menjelaskan interval waktu dari p-wave ke s-wave hingga nilai amplitude



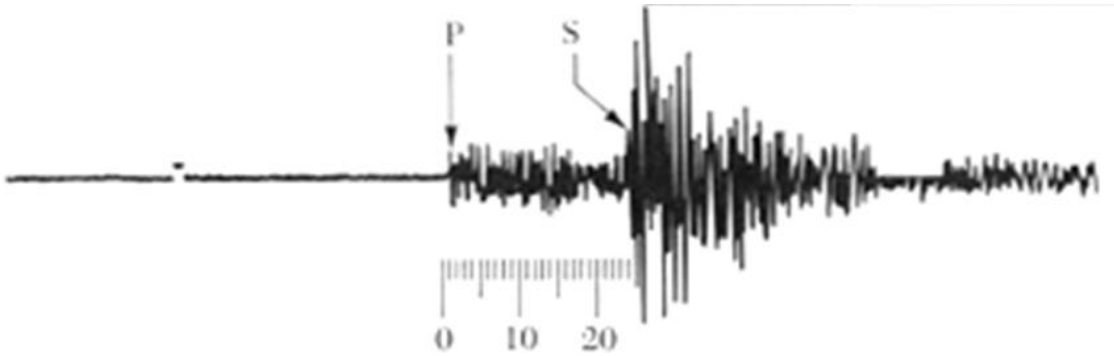




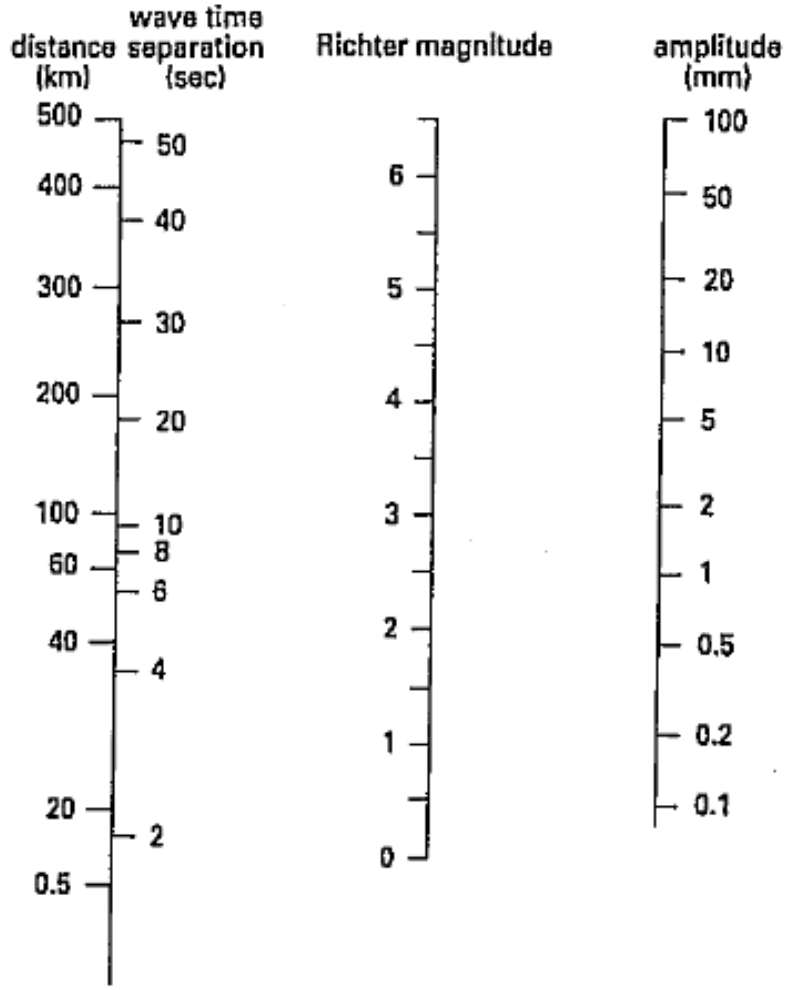
Gambar berikut menjelaskan hubungan antara epicenter distance – s-p time (wave time separation) – magnitude – nilai amplitude

THE PROCEDURE TO CALCULATE MAGNITUDE

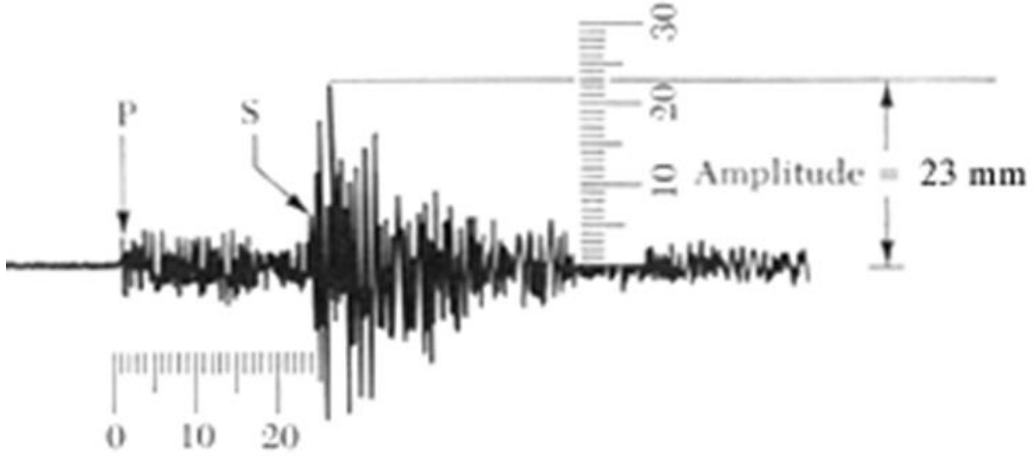
Step 1: Determine the time between the arrival of P- and S-waves. In this case, the first P and S waves are 24 seconds apart.



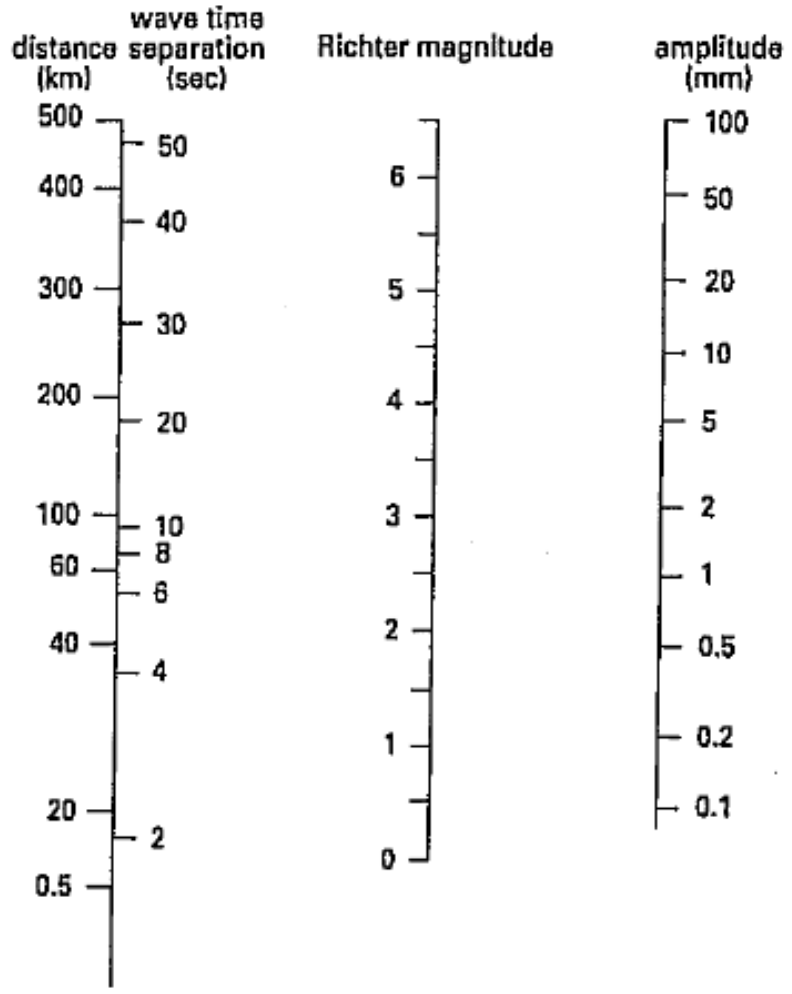
Step 2: Determine the correlation between S-P interval time (s) and distance. Make point to the illustration below.



Step 3: Determine the maximum amplitude of oscillation. In this case, maximum amplitude is 23 mm.



Step 4: Mark amplitude value as point in the illustration below



Step 5: Connect the arrival time difference on the left scale and the amplitude on the right scale with a straight line.

Step 6: Read the Magnitude on the center scale

Step 7: Read the distance separating the seismometer and epicenter from the left scale