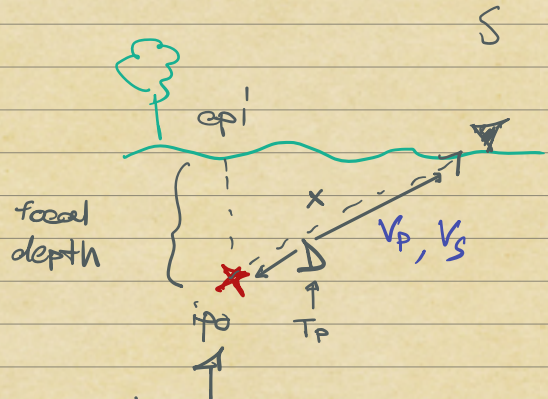
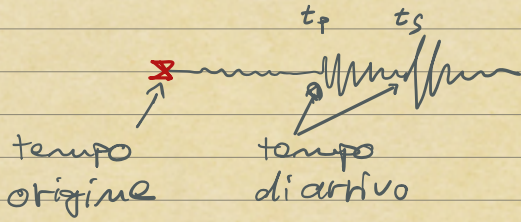


→ they have to install pyproj for the code

uniform description

ipocentro - epicentro



this is what  
we want to know

→  $V_p, V_s$  is the only informations I have to determine

- 1) lat, lon
- 2) focal depth
- 3) origin time

origin time

the information that I know is the arrival time of  $t_p$  &  $t_s$

$$t_p = t_0 + \frac{D}{V_F} \quad t_s = t_0 + \frac{D}{V_S}$$

however I can measure  $t_s - t_p$  from the seismogram

↳ this quantity varies with epicentral distance

$$t_S - t_P = \left( t_0 + \frac{D}{v_S} \right) - \left( t_0 + \frac{D}{v_P} \right)$$

$$= \cancel{t_0} + \frac{D}{v_S} - \cancel{t_0} - \frac{D}{v_P} \Rightarrow \frac{D}{v_S} - \frac{D}{v_P}$$

group by  $\frac{D}{v_p}$

$$t_s - t_p = \frac{D}{V_p} \left( \frac{V_p}{V_s} - 1 \right)$$

I can rewrite  $\frac{D}{V_p} = t_p - t_0$

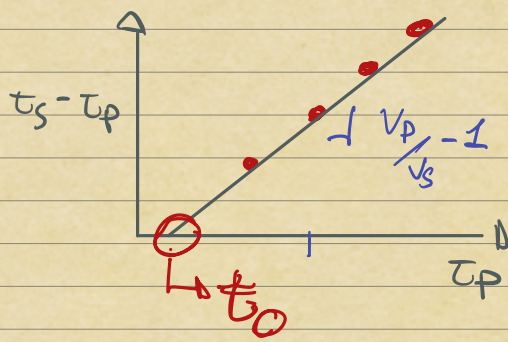
$$t_s - t_p = (t_p - t_o) \left( \frac{V_p}{V_s} - 1 \right)$$

$$t_s - t_p = t_p \left( \frac{V_p}{V_s} - 1 \right) - t_o \left( \frac{V_p}{V_s} - 1 \right)$$

$$Y = \hat{x} \cdot m - q$$



if we make a graph of this equation



• using different stations

## calcolo latitudine - longitudine

Now we know the origin time  $t_0$  so that we can calculate

$$T_p = t_p - t_0$$

which represents the travel time from the source to the station

If we assume a constant  $V_p$

$$D = V_p T_p = \frac{\text{km}}{\text{s}} \cdot \text{s}$$

this is the distance that the P-wave has traveled from the source to the receiver

$$D = V_p T_p = V_p (t_p - t_0)$$

Ma sono un  
attimo perso  
e devo prep  
cena

→ if we do not know  $t_0$ ?

$$D = V_p T_p = \frac{V_p}{\frac{V_p}{V_s} - 1} (t_s - t_p) = K (t_s - t_p)$$

assuming  $V_p = 6 \text{ km/s}$

$$V_p/V_s = \sqrt{3} = 1.3$$



/-----/ with an script

Stazioni - names

componenti - names

create arrays for

"staz.comp" : (array values)