

Geophysics Tübingen

Logistics

Date until which this should be done: Thursday sixth lecture. Useful resources: Telford or Clauser - https://doi.org/10.1007/978-3-662-55310-7_2 Background: https://www.geotech.hr/en/discovery-of-mohorovicics-moho-discontinuity/ Publication: https://hrcak.srce.hr/file/31518

1 Exercises for Refraction Seismics

1.1 Refraction seismics details

Assume a horizontal one layer case with $v_1 = 700 \text{ m s}^{-1}$ and $v_2 = 1500 \text{ m s}^{-1}$ and a depth to the sub-surface interface of about 4 meters.

- At which geophone distance does the headwave first appear? (Why does it not appear for smaller distances?)
- At which distance do you expect that the head wave overtakes the direct wave?

Consequently: At which distance would you place your shot, where would you place the geophones?

1.2 Discovery of the Mohorovičić's (Moho) Discontinuity

A damaging Earthquake near Zagreb in 1909 led to the discovery of the crust-mantle boundary by Andrija Mohorovičić. This was a first-order finding in Geosciences and relies on the principles of refraction seismics. The table below shows a subset of the picked first p-wave arrivals of synchronized seismographs (at the time, this was a big technical achievement). The data are also on Ilias and indicate a knickpoint at < 200 km from the epicenter. Derive the seismic velocities for a horizontal two layer model. You will need to use some software of your choice for this. At which depth do you suspect the crust mantle boundary?



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Figure 1: Sneak Peak of the data and regression lines that you should obtain in a similar way.