

Logistics

Date until which this should be done: Thursday eight lecture. Useful resources: Telford or Clauser - https://doi.org/10.1007/978-3-662-55310-7_2

1 Exercises for Reflection Seismics

1.1 Refraction seismics

You get a desperate Email from an all friend of yours:

My dearest friend,

I just got hired in a geophysical prospecting company and earn good money. Unfortunately, I never took a geophysics lecture and I can't handle quantitative things at all (which sort of makes me wonder why they hired me in the first place). My supervisor handed me some data (cf. Figs. 1& 2) of a test seismic survey. Apparantly some genious already filtered out the surface waves. They only did one explosion and wanted to estimate in this shot gather what the subsurface looks like, before collecting more data. I am supposed to give a presentation next week answering the following questions:

- Which seismic wave types are visible in the shot gather?
- Does the survey confirm our expectations from the geologic context that we have at least one horizontal boundary? Are there also signatures of deeper boundaries? (two sentences)
- Using principles of refraction seismics, what are the acoustic velocities in the top and the bottom layers? At which depth is the interface located?
- How can I differentiate between reflected and refracted signals in the shot record (one sentence)?
- How can I get the velocities and the depth of the shallowest reflection interface? Does it match with the inferences from the refraction analysis?
- How can I get the average velocity and the depth of the deepest reflection interface?
- Do you have an idea what the origin of the intermediate reflection hyperbola is? (apparently this one is tricky, don't feel obliged to do that one)

She send me two seismograms. They are both from the same shots, but in one of them the amplitudes are scaled so that I can pick the first arrivals better. To be honest, I don't even know what she is talking about. Could you please help me out and send me some drawings + calculations that I can use in the presentation? This will not be forgotton. I wish I had taken more rigorous lectures during my studies.

Regards, Your Friend







