

Report #1, Submitted on 14 Oct 2025, Referee #1: Samuel Zappalá

RC1: Dear authors and editor,

The manuscript has been largely reorganized according to reviewers' suggestions and now it reads much better and it is clearer and easier to follow for the reader. The scope of the manuscript has been better defined, updating the title and better clarifying in the introduction the focus points of the study. The included tables effectively schematize and summarize different aspects of the acquisition setup. With the new setting the focus of the manuscript is clearly on the acquisition setup and on how this setup can favorite both reflection seismology standard processing and FWI analysis from a single acquisition (even if considering separate sources). The details of processing are not deepened since not considered as scope of the study as well as the FWI analysis that will be focus of a specific following paper.

AC: We thank Samuel Zappalá for the second review of the manuscript and agree that the scope of the manuscript is focused in the revised version.

RC1: Specific comments

Line 202-203 – The paper Burschil et al. (2018) shows a quite different processing while Denhart et al. (2012) almost do not show any processing. Still, if you don't want to put more details it is fine, the processing steps are quite standard and do not need extra explanation. The only step I am curious is the S10, in the table you write 200% stretch mute for NMO correction, I assume it is because of the low velocity of S-waves but maybe you can write a phrase about it.

AC: To avoid confusion, we deleted the references.

It is true that the 200% stretch mute for NMO correction is due to the low S-wave velocities. We added a sentence.

RC1: Figure 7 – I am sorry, I know you said in your response that you checked the colors for the borehole, but I still cannot relate to them. The added edge better defines them and now it is easier to distinguish them and relate it with the general borehole added in figure 1c. I am perfectly fine with you keeping these colors but the colors that you use in the figure and that you refer to in the caption should match, in the caption you say that there is blue, green, orange and gray but in the figure I see orange, blue, green and yellow. And also write them from the shallower to the deeper so it is easier to follow.

AC: We adapted the generalized dominant lithology of Fig. 1c in the caption of Fig. 7.

RC1: Figure 8 – Just an observation, the S wave velocities in profile 2 are quite faster than the ones in profile 1. Can you explain that? Do you think it is related to any anisotropy in the area?

AC: We cannot explain the higher velocities with anisotropy in the area. It needs further analysis of the data.

RC1: Line 344 – The stacked section should contain data up to 170 Hz since you bandpass filtered it.

AC: We corrected the upper frequency of the stacked section.

RC1: Figure 9 – In the density plot (9e), why are you using a colorbar starting from 2000 kg/m³ if your first values seem to be from 2100? If there is not a particular reason I suggest to fix it for a better comparison with the velocity models.

AC: We changed the color scale of Fig. 9e.

RC1: Line 408 – Do you mean “a benefit with respect to”?

AC: We corrected the sentence.

RC1: Technical comments

Figure 1 – Nice figure, but in the current size the text is too small, especially the labels in the borehole and the legend are not readable.

AC: We enlarged the Fig. 1.

RC1: Table 1 – In the caption maybe you can state “vibrator (VP) and explosive (SP) shot points” since vibrator points are also a type of shot points.

AC: We adapted the phrase.

RC1: Table 1 – You may consider also to add the shot (5 and 4 m) and receiver (2.5 m) spacing in the table.

AC: We added the VP and RP spacings in the table.

RC1: Figure 4 – Showing one second of data works better and more details are now visible, but you forgot to move the arrows in figure b and maybe c.

AC: We corrected the positions of the arrows.

Report #2, Submitted on 27 Oct 2025, Anonymous referee #2

RC2: I thank the Authors for addressing most of my previous comments. The manuscript's structure and content have improved considerably. However, one more careful revision would further enhance the clarity, flow, and overall readability of the text.

AC: We thank reviewer 2 for the suggestions.

RC2: Please review the manuscript again to refine language, grammar, and transitions, especially in the Introduction (around line 48), where the flow remains uneven and some sentences need clarification.

Throughout the text—particularly in the Acquisition and Processing sections—many sentences are short and read as fragmented lists. Combine and smooth them for better narrative flow, and remove redundant parts.

AC: We edited the manuscript comprehensively and made the text smoother. A native speaker also edited the manuscript.

RC2: The Discussion section does not currently function as a true discussion but instead summarizes and justifies previously presented results, repeating content from the Conclusions. Please consider reflecting instead on what the findings imply for future combined HRSR–FWI surveys and how they can inform acquisition and processing design in future studies.

Conclude with concise, practical takeaways relevant to acquisition design for future studies, including those combining HRSR and FWI.

AC: We discussed our results with respect to other studies and give reasoning for the chosen approach. We revised the conclusion and give a take-home message.

RC2: Avoid unnecessary technical details (e.g., software version numbers) and maintain consistent past tense throughout, as both acquisition and processing have already been completed.

AC: We removed the version numbers of the software and revised the acquisition and processing section to past tense.

RC2: Minor comments:

- Lines 54–56: Repetition regarding the importance of the initial model.

AC: We rephrased the sentence.

RC2: • Line 51: Should refer to S-wave velocities from vertical component data, not P-wave data.

AC: Were, we emphasize the importance of both types of initial velocity models for FWI, not only the S-wave initial model.

RC2: • Line 48: “Fertilizes” is an awkward word choice; replace with improves, refines, or enhances.

AC: We changed the wording.

RC2: • Line 238: Replace “whose”.

AC: We rephrased the sentence.

RC2: Table 3: Consider integrating the table information into the text or clarifying its purpose.

AC: We added this table to give the acquired data more schematic organization, as supposed by the reviewer comments.

Associate editor decision: Publish subject to minor revisions (review by editor) (by [Christopher Juhlin](#)):

- CJ: Public justification (visible to the public if the article is accepted and published):
The authors present a nice case study using an acquisition procedure that allows for both reflection seismic processing and full waveform inversion to be applied to the data acquired over an overdeepened valley.
- AC: We thank Chris for handling the review process and included all comments of the reviewers.

Notification to the authors (by [Mario Ebel](#)):

- ME: 1) Please ensure that the colour schemes used in your maps and charts allow readers with colour vision deficiencies to correctly interpret your findings. Please check your figures using the Coblis – Color Blindness Simulator (<https://www.color-blindness.com/coblis-color-blindness-simulator/>) and revise the colour schemes accordingly. --> Fig. 5
- AC: We adapted Fig. 5.
- ME: 2) Your reference list includes works “submitted”. Such works can be cited upon submission if being available to the reviewers. They cannot be cited in the final, accepted manuscript, unless published, accepted for publication, or available as preprint with a DOI.
- AC: Since the manuscript is not published yet, we changed Firla et al. (submitted) to Firla et al. (2024).