

Dear Samuel,

Thank you very much for your positive feedback on the revised manuscript and for your additional comments.

Comments and responses below:

In section 3.3 you could add a phrase stating what you said in the response to my comment regarding the starting velocity model used for the tomography “The initial inversions were performed using basic models (1D) with smooth velocity gradients and without introducing lateral velocity variations. These early inversions were primarily aimed at assessing the quality of the picks and identifying potential errors in the acquisition geometry. Even these preliminary inversions yielded excellent convergence, with a significant reduction in misfit (i.e. one order of magnitude).

Based on the results of the initial inversions and supported by petrophysical data, smooth lateral velocity variations and variable velocity gradients with depth were introduced in the initial model to reflect trends observed in both datasets. The aim was not to use a highly detailed initial model, but rather to reflect these trends without compromising the independence of the inversion from the initial model. These updated models facilitated faster inversion processes, allowing us to reduce the size of the inversion grid, which resulted in an improvement in the resolution of the final velocity model.”. You can summarize it but I think it will be interesting and useful to have it in the text.

Response: Thank you for your suggestion. This has been added to the text (lines 173-183).

Line 186. You say that the total record length is 3000 ms, but you are recording a 16 s sweep. So, must likely your total record length is 19 s and 3000 ms after cross correlation with the sweep.

Response: We appreciate the reviewer’s observation. We have checked both the raw field data headers and the processing report, and in both sources the record length is specified as 3000 ms. As it is not explicitly stated whether this value refers to post-correlation data, we have retained the information as reported. We have removed “total” from the text (line 188).

Line 266. The added arrows in figure 6 are very useful, just add in the text “from fig.6” when you refer to them (i.e., arrow 1 in fig. 6).

Response: This has been modified in the text (lines 268-288).

Figure 10 in the caption you miss a space between “1 and 2”. “features identified in the section” is a bit general, I know you describe them properly in the text but the caption should be independent, try to be a bit more specific (i.e., identified features related to faults).

Response: This has been modified in the caption.

Line 426. I would suggest to replace “have identified a major south-dipping fault (F1) and a north-dipping fault (F2) to the south of Stonepark and Pallas Green.” with “have improved the delineation of a major south-dipping fault (F1) and a north-dipping fault (F2) to the south of Stonepark and Pallas Green increasing the confidence on their interpretation” or something similar, since some of these vertical structures (especially the northernmost one) can be inferred already from figure 9a (even if with lower confidence).

Response: We appreciate the reviewer’s suggestion. We understand that some of these vertical structures could be inferred from Figure 9a. However, given the significant conceptual geological uncertainty in the study area, the previous interpretations converged on the simplest interpretation

(Bond et al., 2007), which was that of a general dip in the strata. The consensus opinion in published literature and industry reports prior to our work was that the seismic image in Fig. 9a represented the limb of a major syncline (e.g. Fig. 6a in Blaney et al., 2023; Blaney and Redmond, 2015). We have changed ‘identified’ to ‘clearly resolved and delineated with confidence’ (line 428), to provide a balanced emphasis on the improved identification of faults with more confidence based on the integrated analysis, while acknowledging the shift in thinking associated with our study.

Bond, C.E., Gibbs, A.D., Shipton, Z.K. and Jones, S., 2007. What do you think this is? “Conceptual uncertainty” in geoscience interpretation. *GSA today*, 17(11), p.4.

Blaney, D. & Coffey, E. (2023). The volcano-stratigraphic setting of the Pallas Green Zn-Pb deposit, County Limerick. In: Andrew, C.J., Hitzman, M.W. & Stanley, G. ‘Irish-type Deposits around the world’, Irish Association for Economic Geology, Dublin. 285-308. DOI: <https://doi.org/10.61153/QHKU2937>

I am surprised that in the tomography model there are no low velocity zones corresponding to the identified faulted zones. Could it be because the faults do not reach shallow depth and are deeper than the computed model? Could you discuss it on a sentence?

Response: We appreciate the reviewer's comment. The tomography model shows velocity variations, including low-velocity zones, near the interpreted fault zone F1, close to drill hole TC-2638-088 in Fig. 6. However, the presence of volcanic rocks with variable velocities complicates the direct identification of fault-related velocity anomalies. The tomography model is now mentioned in the revised text (lines 443-444), but a detailed discussion was not included to avoid overinterpretation of these features.