

Review for manuscript egosphere-2024-4050 „High-resolution seismic reflection surveying to delineate shallow subsurface geological structures in the karst area of Shenzhen, China”

General comments

In their study, the authors aim to image the near subsurface in the urban area of Shenzhen with reflection seismic and boreholes in order to better understand the local karst features.

Overall, the manuscript is very interesting and fits to the scope of the journal. The manuscript has a good structure and is mostly well written in terms of language. Nonetheless, there are some points that should be revised/adjusted. Therefore, my recommendation is a publication of the manuscript after a minor revision.

In the following, I will give a chapter-by-chapter explanation for my decision, and I will try to give the authors helpful tips on how to improve the manuscript.

Abstract

General comment: I suggest that the authors should write a little bit more about the actual seismic results.

Page 1, lines 15-16: “The stacked images detail subsurface structures down to depths of 80-90 m, including a concave shaped reflection ...” → What are these concave shaped reflections? Give an interpretation.

Page 1, lines 17-18: “Our interpretations correlate well with borehole data and synthetic modeling.” → What kind of synthetic modelling?

Introduction

General comment: A well-written introduction.

Page 2, lines 61-62: “Our seismic results are correlated with borehole data, synthetic modeling and ground-penetrating radar data.” → What type of synthetic modelling?

Geological setting and physical properties

Page 3, line 65: “Shezhen” → Shenzhen

Page 3 line 72: “...and the development deep faults...” → development of deep faults

Page 3 line 75: “gristone” → gritstone

Page 6 line 100: “Compressional and shear velocity and density data collected in the neighborhood of study area...” → How was the data acquired? With which method? It is only mentioned in the table caption. Please also mention it in the text.

Page 6 line 102: “2.65 g/cm³” → Use same units in text and table. In the table you use kg/m³.

Figure 1:

The colours in the small overview map in the upper left corner seem to represent other geological units than in the large figure, although the colours are similar. Please change the colours in order to prevent confusion and add the explanation to the legend.

The abbreviations Dsh, DDh, Qh^{al}, Qh^{fp}, C_{1C1} and γK1 are not explained.

In the legend, the blank spaces between words are varying in width even in the same row.

Table 1: Maybe you can also add a column with the V_P/V_S ratio and discuss it later. This is also an interesting geotechnical parameter.

Data acquisition and geometry

Figure 3: In figure 3a, the names of the boreholes are barely visible. Please adjust it by maybe changing the colour of the font.

Figure 4: The labelling of the different wave types (F, S, R, A) is poorly visible in the figure. Maybe use a different font colour like red.

Data processing

Page 9, line 141: "...to remove different types of noise." → Specify that a little bit more.

Page 9, line 144: "Post-migration were applied..." → What type of post-migration?

Noise attenuation

Page 10, line 153: "...a band-pass filter with corner frequencies of 50-80-180-220 Hz was applied..." → Why did you choose this specific frequency range? Describe it.

Page 10, line 157: "...two sets of reflections are notable in Fig. 5c and marked with arrows." → The arrows are in figure 5d!

Figure 5:

In figure 5c, show also a power spectrum after spectral equalization.

In figure 5d, I can still see some remnants of the surface waves. This might impair the quality of the stacked section.

Synthetic modelling

Figure 7: The information about V_P , V_S , and density for the fourth unit in figure 7a is barely visible. Change the colour of the font.

Results and discussion

Page 14, line 205: "migrated" → migrated

General comment: The description of the result is okay, but a proper discussion is missing! You have to discuss your paper in the context of the field of research. You have to describe the meaning and relevance of your results. Furthermore, you have to compare your results with other regional studies, but, in the best case, also other studies carried out across the world. There are many other papers dealing with reflection seismic in the context of karst and also karst related to faults. Right now, you only cite and compare your results to only one paper. Besides that you should also discuss possible shortcomings of your research design, like the acquisition parameters and the processing scheme → critical analysis of the used methods.

I to separate the results and discussion chapter and to write an extra chapter only dealing the proper discussion of the results and the methods.