General comment:

This study presents the crust and upper mantle velocity structure extending from the North Qilian to the Beishan block and discusses the tectonic significance of the observed crustal deformation. The newly acquired dataset, a 460-km-long seismic wide-angle and refraction profile, appears to have been carefully collected and processed, and provides valuable insights into the deep lithospheric structure of the region. The manuscript would benefit from careful English editing to improve clarity and readability. In particular, some expressions are overly colloquial and should be revised to meet the conventions of scientific writing. I hope these comments are helpful and contribute to improving the overall quality of the manuscript.

General comments:

Q1: In lines 58–66 of the introduction, the text appears to summarize the main conclusions of the study. It may be more appropriate to move this content to the conclusion section

Q2: The manuscript states that the crustal-upper mantle structure remains ambiguous due to limited resolution. Could the authors clarify the actual resolution of the present data and indicate whether it is higher than in previous studies? Additionally, please specify which aspects remain unresolved and how this study's findings differ from prior work.

Q3: Please note that in scientific writing, en dashes (–) rather than hyphens (-) should be used to indicate numerical ranges (e.g., 0.3–1.0 km/s). Please pay attention to the use of definite articles (e.g., 'the') to improve grammatical accuracy. Additionally, check the capitalization of all proper nouns, including geographic names, tectonic units, and geological terms, and maintain consistency throughout the manuscript.

Q4: In the "Crustal Velocity Structure Implications" parts, how does this velocity value inform the structure implications? Providing explicit links between the velocity data and geological implications would strengthen this section.

Q5: "The crustal velocity structure proposes an unusual scenario where the deepest Moho is found in the central Jiuquan basin, rather than the North Qilian Shan with the highest elevation. Could you explain it in the manuscript?

Q6: The conclusion section currently shows formatting inconsistencies and incorrect numbering. A careful revision is recommended. Furthermore, restructuring the conclusions to more clearly highlight the key scientific findings would enhance the clarity and impact of this section.

Q7: It is suggested that the formatting of both in-text citations and the reference list be revised and standardized to ensure consistency with the journal's guidelines.

Detailed comments and corrections:

Line 21: "five strata" → "five layers"

Line 35: Before using the simplified CAOB, it's better to add it in Line 35 after the "Central Asian Orogenic Belt".

Line 42: Figure 1b → Fig. 1b

Line 61: Removing the excess space before "Notably".

Line 69: "In Cenozoic" → In the Cenozoic or during the Cenozoic.

Line 73: "of NE Tibet" → "of the NE Tibet"; please check and correct similar expressions throughout the manuscript.

Line 78: Removing the excess space.
Line 80: HUANG et al. 2014 → Huang et al. 2014
Line 82: a N-S-trending → an N-S-treading
Line 96: Delete “respectively”.
Line 99: Please clarify the meaning of “the final sealing position.”
Line100： North Beishan block → North Beishan Block; in middle-late Ordovician>> in the Middle to Late Ordovician
Line 131: What’s the meaning of “TNT”?
Line 147: the travetime of ZB1→ The travetime of ZB1
Line 159: Delete repeated parentheses.
Lines 168–172: P1–P4 are not shown in Fig. 5; please clarify or adjust the text accordingly.
Lines 239–244: Specify which figure corresponds to this phase.
Line 254: Text formatting is inconsistent; please revise.
Line 258: -1.1–-0.15 km/s → -1.1 – -0.15 km/s or “ranges from -1.1 to -0.15 km/s”
Line 281: The text formatting is not standard.
Line 310: Consider deleting the semicolon (“;”) and revising lines 310–313 for clarity and grammar.
Line 345: The abbreviation “Mts.” is informal; use “Mountains” instead. Line 347: The comma should be deleted.
Line 371: How is the decoupled crust inferred from the seismic profile in this study? Or is this based on previous studies? Please clarify.
Figure 5&6: Letters (a) and (b) are not shown on the figures. It is suggested to mark the north (N) and south (S) directions for clarity.