Dear Reviewer (se-2022-17),

We appreciate the time and effort you have spent in reviewing this manuscript. The comments have inspired us a lot. Our response to the comment is shown below.

Reviewer's comment: The article titled "Numerical Simulation of Present-day Kinematics at the Northeastern Margin of the Tibetan Plateau" focuses on the slip rates of active faults at the northeastern margin of the Tibetan Plateau. It is very important to understand the lateral expansion of the Tibetan Plateau and assess the seismic hazards in this region. By use of a three-dimensional geomechanics-numerical model, the authors obtained the horizontal and vertical crustal velocities and slip rates of active faults in the study area. The results are closely consistent with the observation in the area. The reviewer considers that this article is worth publishing on Solid Earth. The authors collected and researched previous relative works in this area and constructed a reasonable numerical model. The design for the geometric layering and block division, the rock properties, the boundary condition and other parameters are suitable. The results are reasonable and important for scientific research and seismic hazard analysis in this area. It is a pity that the authors have not paid attention to the important information given in Fig.11 during they discuss the "Fault slip rates and seismic hazards" in 4.2. Theoretically research and practical observations show that the isolated uplift area is the most dangerous place for earthquakes. So the review suggests that the authors pay attention to the result of the vertical velocity and slip rate of active faults in Fig. 11. The intersection location of areas with positive velocity value and the relative active fault is the most hazardous seismic location. The reviewer strongly suggests the authors reevaluate the earthquake risk regions by consideration of this factor combined with others. Another suggestion is that the authors can illustrate what finite element software is used in the modeling and the reason. Generally speaking, this is a very good article both in the modeling and in the research area.

Authors' reply:
Thanks for your constructive comments.
We have added a section to the revised manuscript to discuss the relationship between isolated uplift areas and earthquake occurrence, as follows.

4.2.4 Isolated uplift areas and earthquakes
As mentioned above, we considered that earthquakes are less likely to occur on the Laohushan, Liupanshan and Haiyuan faults in the short term from the perspective of the earthquake recurrence cycle and the elapsed from the previous earthquake. However, the Haiyuan, Liupanshan, Lajishan and Daotanghe-Linxia faults are all located near the isolated rapid uplift areas of Qilian block (Fig. 10a). Many studies have also found that low-velocity bodies are widely distributed in the middle-lower crust of the Qilian block (Bao et al., 2013; Wang et al., 2018; Ye et al., 2016). The spatial coupling of active faults, isolated uplift areas and low-velocity bodies is highly similar to the seismogenic conditions elaborated by the "seismic source cavity" model

recently proposed by Zeng et al. (2021). That is, during the rapid uplift of the isolated areas (Fig. 10a), the low-velocity bodies in the middle-lower crust easily intruded into the weak space of the crust under the action of differential pressure to form a "seismic source cavity". If the isolated uplift areas keep to rise, the "seismic source cavity" may rise to the shallow part of the crust to intersect with brittle faults, causing strong earthquakes (Yang et al.,2009; Zeng et al., 2021). Therefore, in addition to the Jinqianghe and Maomaoshan faults mentioned above, the Haiyuan fault, Liupanshan fault, Lajishan fault and the Daotanghe-Linxia fault also have favorable structural conditions for strong earthquakes although some areas have not experienced in history.

We also added a line to Section 2.5 describing the finite element software we used. The relevant text is as follows.

For the calculation, we used the finite-element software Abaqus^{TM} because its powerful nonlinear processing capabilities.