Solid Earth Discussions

Solid Earth Discuss., author comment AC2
https://doi.org/10.5194/se-2021-115-AC2, 2022


# Reply on CC1

Zhilin Ye et al.

Author comment on "Thermal equation of state of the main minerals of eclogite: Constraining the density evolution of eclogite during the delamination process in Tibet" by Zhilin Ye et al., Solid Earth Discuss., https://doi.org/10.5194/se-2021-115-AC2, 2022

***General comments***

***Ye et al. conducted high P-T XRD measurements on major minerals in eclogite materials, and derived thermal EoS for each mineral. With experimental results, they modeled density profile of eclogite along certain geotherm in Tibet. The modeled results were further applied to constrain delamination process in Tibet region. The experimental method is valid. Data look to be of high quality. The modeling is reasonable. The implication is sound. These new results should be published, and Solid Earth is an appropriate journal for it. I only have a few minor comments for authors to consider:***

Enclosed, please find our replies to the reviewer's comments in our revised manuscript entitled "Thermal equation of state of the main minerals of eclogite: Constraining the density evolution of eclogite during delamination process in Tibet".

We want to appreciate the reviewer for the thoughtful and thorough comments that have resulted in a substantially improved in the revised version of our manuscript. Point-by-point responses to the reviewer's comments are shown in detail below. We have also indicated our changes are marked in blue in the revised manuscript. We believe that we have addressed all the reviewer's concerns adequately.

In the following, the reviewer's comments are shown in boldface and are followed by our replies in normal text. References cited are provided at the end of the response letter.

**Specific comments:**

***1. Comment□'I suggest adding one figure in the main text to show representative XRD patterns at high P-T for each mineral: both single-crystal 2d raw pattern and integrated 1d pattern. These can help to tell the quality of the crystals and experimental data at high P-T."***

**Reply:** Thank you for your comment. The following figure is representative single-crystal 2d raw pattern and integrated 1d XRD patterns of wach mineral at 3.07 GPa and 600 K. We added this figure in our paper.

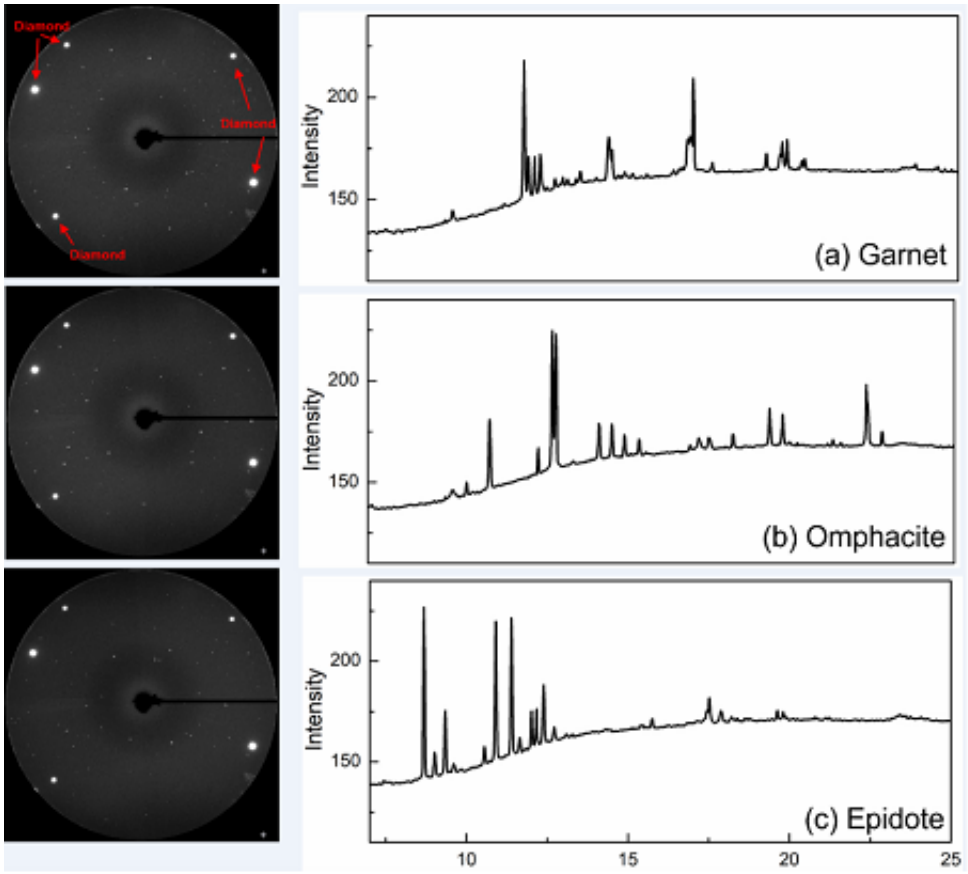


**Figure 1**. Representative single-crystal X-ray diffraction patterns of (a) garnet, (b) omphacite, (c) and epidote at 3.07 GPa and 600 K.

***2. Comment□'Figure 4 can be removed to supporting materials because all data sets are from literatures."***

**Reply:** Thank you for your comment. We removed Figure 4 to supporting information.

***3. Comment□'need to define abbreviations. e.g. line 149: UHPM"***

**Reply:** Thank you for your constructive comments. We revised our expressions in the revised manuscript at Line 151: "Natural garnet, omphacite, and epidote samples are collected from eclogite in the Dabie-Sulu ultra-high pressure metamorphic (UHPM) belt."

***4. Comment□'It is always necessary to provide uncertainties in the thermodynamic model. What are propagated/estimated standard deviations of high P-T densities for individual eclogite components and eclogite assemblages? They should provide error bars in Figures 5 to 7."***

**Reply:** Thank you for your comment. We added error bars in Figure 5 to 7 as shown below.

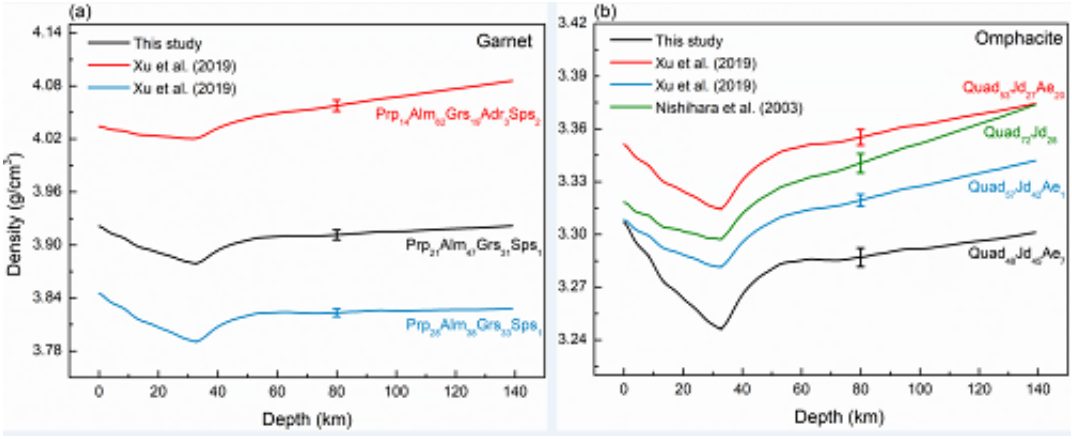


**Figure 5.** Density profiles of garnet (a) and omphacite (b) along with the cold Tibetan geothermal line.

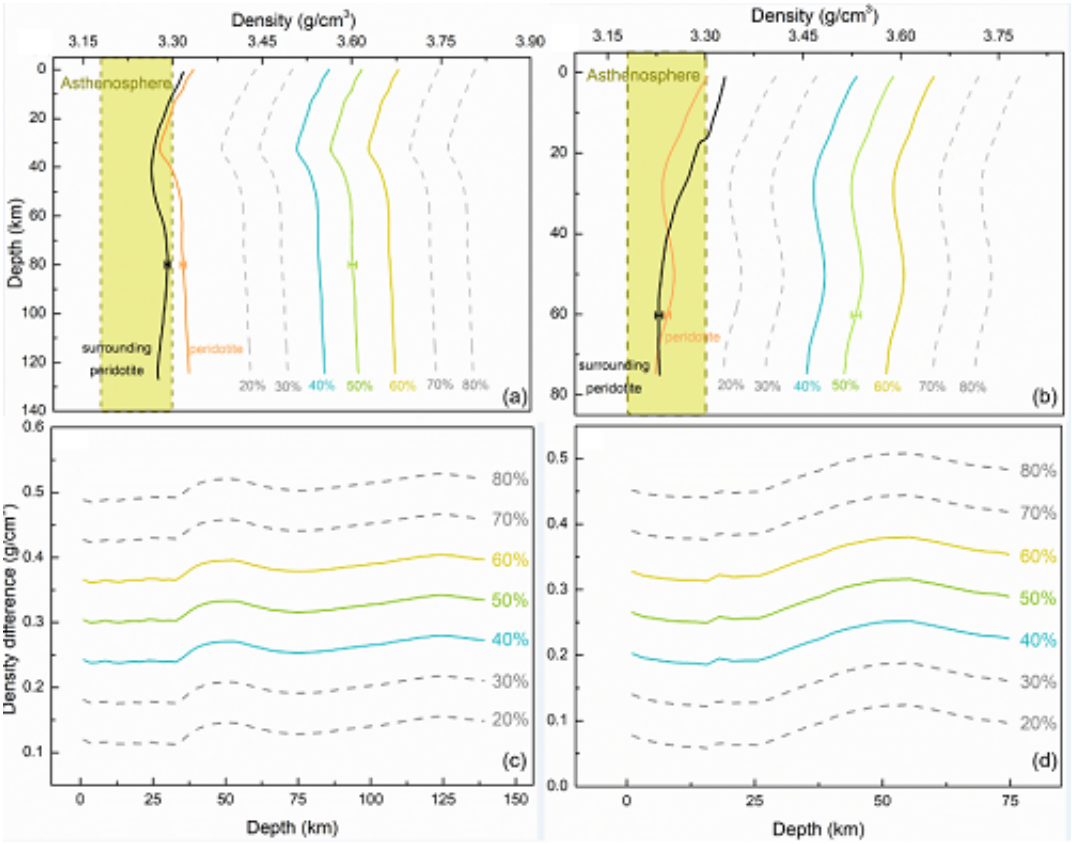


**Figure 6.** Density profiles of eclogite and peridotite assemblages ((a) and (b)) and density difference between eclogite and peridotite ((c) and (d)) in Tibet along the Paleozoic and Cenozoic geothermal lines under the conditions of Neo-Tethyan oceanic slab detachment (a) and subduction of the Indian continental margin beneath the Lhasa terrane (b).

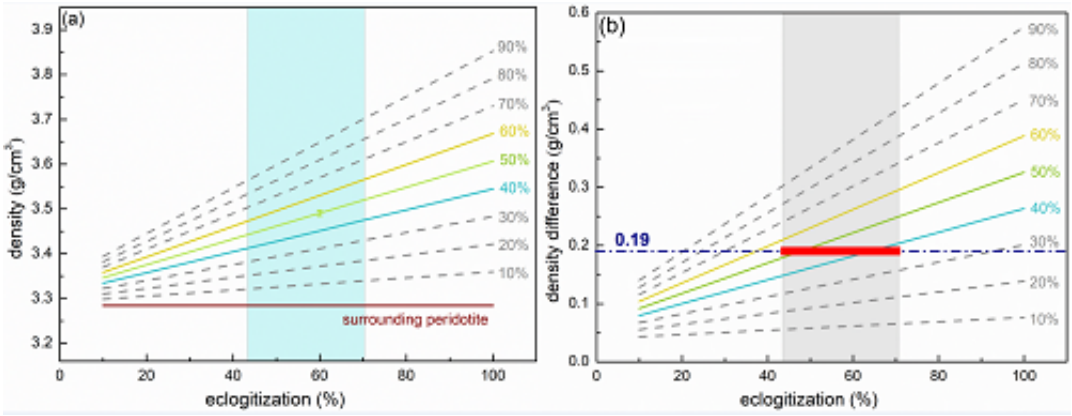


**Figure 7.** (a) The effect of eclogitization on the density of the subducted slab at ~80 km (2.6 GPa and 625 °C) along the Paleozoic geothermal line. (b) Density difference between eclogite with different degrees of eclogitization and surrounding peridotite.