Solid Earth Discussions

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Comment on se-2021-115

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Community 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-CC2, 2022

The Tibetan Plateau is one of the most prominent collisional orogens around the world. Understanding the evolution and dynamics of Tibet provides crucial insights into the crust-mantle interactions and subducted processes. In the present study, the authors have conducted simultaneously high pressure-temperature experiments to constrain the density profiles of major minerals of eclogite (garnet, omphacite and epidote), and quantitatively unraveled the effect of density contrast on delamination of Tibet. They concluded that eclogite with a high garnet content and a high iron content and a high proportion of eclogite in the lithospheric mantle promote delamination. The experimental data are of high quality and convincing. Here I highly recommend it for Solid Earth.

There are some comments as following.

- Please specify the error in measuring temperature by using thermocouples in Section 3. Please add this information in supplementary tables as well. I wonder if the error in temperature is taken into account when fitting P-V- data to derive thermoelastic parameters.
- In Section 4.1, the authors have first fitted the room-temperature data to obtain K_0 and K_0' at room temperature, and then used both room-temperature and high-temperature data to simultaneously derive K_0, K_0' and K_0. Why did the authors not fix the room-temperature K_0 and K_0' values to get the thermal expansion parameter? What is the difference between two fitting methods?
- In Section 4.2, the authors have discussed the compositional effect on the elasticity of major minerals of eclogite. One of the main conclusions is that the incorporation of iron would reduce the bulk modulus of omphacite. Do the ferrous iron and the ferric iron impose a comparable effect on the bulk modulus of omphacite?
- In Section 5, the authors have modeled the density of eclogite with varying amounts of garnet to explore the effect of mineral compositions on the density of eclogite. What are the partitioning behaviors of ferrous iron and ferric iron in coexisting garnet, omphacite and epidote? Do they alter as a function of pressure (or depth)? I notice that the iron component has distinct effects on the thermoelasticity of these minerals. Does the distribution of iron affect the delamination?
- In Section 5, "10% increase in garnet" should be "10 vol% increase in garnet".
- The references of this manuscript is over-cited. The references that are not closely

related to the present study could be removed.