This manuscript delivers a comprehensive review of the controlling factors and incorporation mechanism influencing water solubility in stishovite. Furthermore, building on published findings, it introduces a novel equation for estimating water solubility in Al-bearing stishovite. The manuscript is generally well-structured, and the presented results are robust. The discussion regarding the role of water in stishovite contributing to the presence of a water-rich transition zone appears sound. Therefore, I recommend its publication in Solid Earth after some revisions.

I have only the following minor concerns and suggestions on the presentation of results and interpretations.

Page 2, line 47. "Under average geothermal gradient". The average geothermal gradient mentioned here is often associated with specific geological settings. I assume the authors are referring to the temperature profile along the surface of oceanic subducting slab. It needs clarification, and the different types of subduction zones (cold subduction, hot subduction) should be labeled on Figure 3. Another simpler approach could be to mark the geotherms of 5 degrees Celsius/km, 10 degrees Celsius/km, and 15 degrees Celsius/km, respectively, on Figure 3.

Thanks very much for your suggestion. We plotted the subduction slab geotherms in Fig. 3 according to Zheng et al. (2016).

Page 3. Figure 2. The data source for the red geotherm curve needs to be indicated.

Thank you for pointing out this issue. The data source for the red geotherm curve is from Kaminsky (2012). We added the reference.

Page 3. Line 64. "only found". It may not be accurate. Yang J.S. et al. (2007, Geology, doi: 10.1130/G23766A.1) identified polycrystalline coesite as a potential pseudomorphic replacement of stishovite in Tibetan chromitites. Therefore, it is preferable to omit the word "only."

Thank you very much We removed the "only" and added Yang et al. (2007) following your suggestion.

Page 10. Figure 6. Here, the mantle transition zone is only associated with pressure. In reality, the temperature in the mantle transition zone may be around 1400-1600 degrees Celsius (Ito &Katsura, GRL, 1989), exceeding the temperature range calculated in the figure. If you want to correspond to the temperature and pressure of the subducting slabs in the mantle transition zone depths, it would be necessary to separately label the temperature and pressure ranges for different types (cold and hot) of subducting slabs.

We gratefully appreciate for your valuable suggestion. The temperature range in Fig. 6 is extended to 800-1600 °C for the calculation through Eq.2 in the revised text. As shown in Fig. 6, the water solubility in Al-bearing stishovite is slightly affected by temperature but strongly controlled by pressure, exhibiting a positive correlation below 22-32 GPa and a negative correlation above 22-32 GPa (Fig. 6b). No matter what types (cold and hot) the subducting slab is, a maximum water solubility is reached at the conditions around the bottom of mantle transition zone according to our calculation. Therefore, we just plotted the pressure and temperature dependence of water solubility in Al-bearing stishovite.

Page 10. Line 224. "along the geotherm". The term "geotherm" here needs clarification to specify what exactly is meant by "geotherm" (mantle geotherm or subduction zone geotherm).

Thank you for your comments. We clarified the geotherm as subduction slab geotherm in the revised text.

Page 11. Figure 7. In Zheng et al. (2016), four distinct geotherms (ultracold subduction, cold subduction, warm subduction, and hot subduction) are identified. It is essential to specify which geotherm was employed and provide a rationale for the choice. Considering the comprehensive coverage, it might be more beneficial to utilize the full range of geotherms to encompass variations.

Thank you for your rigorous consideration suggestion. The geothermal gradient we selected for the calculation in Fig. 7 is a cold subduction gradient from Litasov and Ohtani (2007). Moreover, the calculation result base on the hot subduction gradient from Litasov and Ohtani (2007) is shown in Table S2 in the Supplement and Fig. B1 in the Appendix.

The language expression in this paper is overall very good, but there are still some places that may need modification. I have made some annotated suggestions in the attached PDF file for the authors' reference.

Thank you very much. We merged your modification in the revised text and further polished the language in the revised text.

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