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eEarth Discussions

Interactive comment on "Characteristics of chlorites in seismogenic fault zones: the Taiwan Chelungpu Fault Drilling Project (TCDP) core sample" *by* Y. Hashimoto et al.

Y. Hashimoto et al.

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Response letter,

I am sorry for later reply. I could not understand the system of eEarth clearly. I thought author should respond after discussion was closed.

I thank the anonymous review to give us constructive suggestions to improve our manuscript at first. I will describe my concern about the reviewer?s comments and suggestions in the following.

General Comments:

The main issues in general comments are following 3 in my understandings. 1) The

reviewer pointed out that the manuscript does not provide evidences for the existence of the radical reaction sufficiently. 2) The reason why the temperature could not control the chlorite composition in this case should be discussed in more detail. 3) The reviewer also suggested that the comparison between TCDP Hole A and B must increase the interest of the reader.

The gouges must be made by grain crushing from the host rock because the fault zones are surely identified by the other many studies. Radical reaction is the reaction between the newly formed surface of grains by crushing and water. Therefore, I think the existence of the radical reaction along fault zone is easily expected. But the grain size distribution represented by Ma et al. (2006) gives a more clear evidence for the crushing origin of gouge as suggested by the reviewer. I would cite the paper to discuss the existence of the radical reaction along the fault zone. The Ma et al. (2006) describes from the Hole A examples. Therefore, to cite the paper for our manuscript, the description of similarities or differences between Hole A and B should be needed about the occurrences of the fault zone as suggested the reviewer. But because the length of manuscript is very limited, the description will be also limited. It is difficult to discuss about the reason why the temperature could not control the chlorite composition. It is fact that the iron content in the chlorite reduces in the fault zone where temperature rise is expected. According to Ohta and Yajima (1988), the iron content should increase at the zone. The reviewer introduced us the other studies on the chlorite compositional thermometer exampled from the Sambagawa high grade metamorphic zone in the specific comment section. I will discuss about it later as well.

Specific comment

1) The reviewer suggested that it is better to check the method estimating the iron content in this study using EPMA analysis of individual chlorite.

I agree with the suggestion. But it is difficult to do that soon because the limitation of the fault zone sample and difficulties for making a good polished thin section of the

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muddy fault gouge for EPMA. But I think it should be done in the near future. Please let me not to do that so far.

2) The reviewer pointed out that the Ohta and Yajima (1988) is not a good reference because it is not easy to find. Instead, new two papers are introduced for the discussion of the temperature control on the chlorite composition.

Although introduced papers is an example describing the chlorite composition related to the change in temperature, the example is from the regional metamorphic belt, Sambagawa Belt. Therefore, chlorite can be react with other minerals to change in their composition, which might be differ from the situation of fault zone where the temperature rise might occur in relatively short duration compare to the regional metamorphism. In addition to the difference, the pressure also differs between them. The pressure can control the reaction as well. Therefore, I think Ohta and Yajima (1988) is still the best reference to discuss about the chlorite characteristics in the fault zone example. Even though, the iron content little bit increases with temperature rise in the regional metamorphic rocks, which represents opposite trend to Ohta and Yajima (1988)?s result. Therefore, the clay components which can be reacted with the chlorite might be important as the reviewer pointed out even in the fault zone. Because the analysis of the clay components, however, is not my work but another researcher?s work, and the length of manuscript is limited, the discussion about the clay mineral components are not conducted in this paper. But, I would describe the possibilities in short.

3) The reviewer pointed out that the position of the fault zones in the TCDP Hole A and Hole B are not still settled yet.

Although it is not clear what the reviewer wants to say in this point, I think the suggestion is to compare with the occurrences of the fault zones between Hole A and Hole B. I agree with it. I will modify the manuscript as suggested.

4) The reviewer suggested that the semi-quantification of the clay content should be

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done and should compare with the former result about the semi-quantification of clay content of Hole A.

The semi-quantification of clay contents is now conducted by the other researchers in the Japanese research team. The result and comparison with the former result should be reported in another paper, not in my manuscript. In this manuscript, I only focus on the chlorite characteristics along fault zones so far. As described as above, the chlorite reaction can be controlled with co-existed minerals as well. Therefore, the semi-quantification of clay contents might be significant to understand the chlorite characteristics. I will describe about this point in the manuscript after modification shortly. But the detailed analysis and report about the semi-quantification of clay contents will be prepared as the other manuscript in near future.

Technical corrections

I will modify the manuscript on the basis of the suggestions in the technical corrections. The reviewer gave a question in this section how to determine the Fe-Mg chlorite only from the oriented samples. We conducted the XRD analysis for random oriented samples as well in the same intervals. I forgot to describe that. I will put the explanation about that.

Interactive comment on eEarth Discuss., 2, 85, 2007.