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Interactive comment on "Coseismic fluid–rock interactions in the Beichuan-Yingxiu surface rupture zone of the Mw 7.9 Wenchuan earthquake and its implication for the fault zone transformation" *by* Yangyang Wang et al.

Anonymous Referee #1

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The submitted manuscript reports on the mineralogical and geochemical characteristics of the surface rupture zone of the Mw7.9 Wenchuan earthquake. Based on the results, the authors discuss mineral reactions and mass transport processes along and or across the fault zone during coseismic as well as post-seismic periods. Generally, the manuscript is well written, and provides some important information about the evolution of this fault zone. While the methods and results of geochemical data and isocon analysis seem to be clearly shown, I have some concerns about the mineralogical data. The illitization in I/S and chloritization in the fault gouge are invoked as bases

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Discussion paper

for inference of coseismic heating (thermal pressurization). In my view, the authors should provide, not only the % values as summarized in Fig. 4, but also more information such as analytical procedures and raw XRD patterns. First of all, I'm confused about the sample preparation (Lines 147-153). In general, centrifugation is a process to separate the particles below 2μ size (clay separates), but why did the authors grind the samples below 2μ grain size before centrifugation? Regarding %S (or %I) in I/S mixed layer (Lines 147-153), the authors should provide details how to obtain the numbers, because there is often some difficulty in analyzing such property from XRD. Also, typical XRD patterns (at least in supporting information) would be helpful to prove the validity of the results. The authors discuss the reason for "extensive chloritization" in the fault zone (section 5.2.4 and conclusion 4), but the chlorite content in the host rock is highly variable, and one of the samples shows the higher (highest) value than in the fault zone. I'm wondering whether the chloritization is actually associated with faulting process. The additional information on the occurrence and chemical composition of chlorite in the host rock is necessary for this argument. It is also unclear why the LOI of the fault gouge shows the lower value than the others despite abundant clay minerals. In Line 141 the authors state "which suggests that the fault gouge has a relatively low water content and its fluid permeability is lower than that of the damage zone", does this mean the XRF was performed on wet samples? If so, the authors should describe how the samples were collected and stored to keep the wet states in 3. Sampling and experimental procedures section. Also, it may be better to check by calculation of frictional heating whether the temperature actually increases to the extent enough to trigger dehydration and clay transformation reactions under such shallow (i.e., low stress) and wide heating-zone ($\sim$40cm; Fig. 2) conditions.

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