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Solid Earth Discussions

Interactive comment on "The Piuquencillo Fault System: a long-lived, Andean-transverse fault system and its relationship with magmatic and hydrothermal activity" *by* Jose Piquer et al.

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Dear Dr. Giambiagi, First of all, we would like to thank you very much for you valuable inputs to our manuscript. They will help us a lot to improve its quality. Regarding the main points highlighted in your letter: 1) We will include a broader tectonic context in the introduction, as suggested 2) We will add a discussion and additional references, to explain why we think this fault system is of lithospheric scale 3) Regarding the use of the kinematic and dynamic analyzes, we preferred to do both to be able to compare the results of these two different approaches and, from that, provide a stronger support to our interpretations. We will add a discussion about the possible perturbations/rotations

of the stress tensor in the vicinity of a major fault. We followed the suggestion of exploring possible differences in the area of Piuquencillo Alto between structural stations located at or close to the main NW-striking faults, and those located further away. However, the results do not show major differences, in both cases indicating a strike-slip regime with ENE-trending shortening and NNW stretching (see figure attached). Furthermore, no major differences are observed in the orientation of the kinematic axes or the calculated paleo-stress tensor between Piuquencillo Alto and the Maipo sector, which is located further away from the main branches of the PFS. The results obtained are also consistent with regional calculations of the stress tensor during the Miocene, presented in previous publications (Piquer et al., 2016). All of this is consistent with the fact that none of the cropping-out branches of the PFS is individually a major fault; we interpret that they represent the manifestation at the present-day surface of a major fault in the Andean basement, but the strain associated to each of the individual faults we mapped in the field is of small magnitude. Therefore, we conclude that there are no major perturbations of the regional stress tensor related to the individual fault traces of the PFS 4) We will include a more detailed discussion about the timing of dikes and veins, and why we can assign them a middle to late Miocene age. However, this can only be done based on cross-cutting relationships and correlations; there are no radiometric ages of the dikes emplaced along the PFS or of the vein system. We only have U-Pb ages of major plutons, and there are previously-published K-Ar and U-Pb ages of volcanic rocks. We attempted to obtain U-Pb zircon ages from the dike swarms, however no zircons were found in any of the collected samples. Regarding the veins, we also attempted to obtain an Ar/Ar age from syn-tectonic hydrothermal actinolite in Piuquencillo Alto, however, the calculated ages are not geologically possible; they are several My older than the U-Pb ages of the intrusive unit which hosts the veins 5) We will add a clearer explanation of why we think ENE-striking faults were more favorably oriented for dilation than NW-striking faults. As explained in the text, we think both sets of faults are part of large-scale, pre-existing fault systems (the PFS and the Yeso Valley faults). These fault systems acted broadly as conjugate faults under the prevailing

Miocene stress tensor, but they were not originated as such; because of this, they are not oriented at the ideal angle with respect to $\sigma 1$ expected in intact rocks, and one of the fault sets is more parallel to $\sigma 1$ than the other. We will add a new figure showing the strike of faults with a sinistral and dextral component, and we will also add a table with all the data from our structural stations, as a supplementary file 6) We agree that "stress reversal" is probably not appropriate wording; we do not intend to say that an extensional stress regime is established regionally during co-seismic periods. Our point is that, as is also mentioned in your letter, co-seismic dilation cause a drop in the normal stress in faults broadly perpendicular to $\sigma 1$, which, particularly under high fluid pressures, can lead to fault activation with normal kinematics (as shown recently by the activation of the Pichilemu fault after the Maule earthquake) We will also look carefully at all the minor comments mentioned in the letter. Kind Regards and thank you again for your careful review

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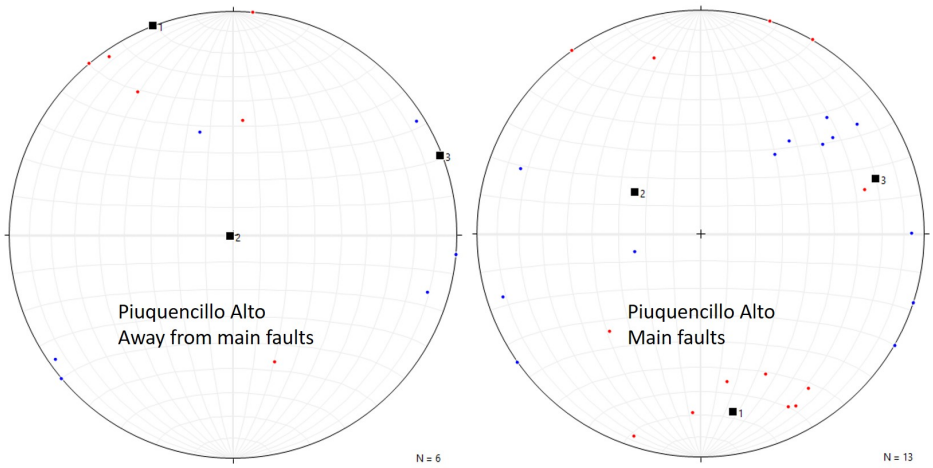

Fig. 1.