

Solid Earth Discuss., author comment AC3
<https://doi.org/10.5194/se-2021-6-AC3>, 2021
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Reply on RC2

Cedric Twardzik et al.

Author comment on "Very early identification of a bimodal frictional behavior during the post-seismic phase of the 2015 Mw8.3 Illapel, Chile, earthquake" by Cedric Twardzik et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-6-AC3>, 2021

Dear Mathilde Radiguet,

Thank you agreeing to review our manuscript se-2021-6 submitted to EGU Solid Earth. We are providing answers to your questions/comments below. We have attached as a .zip file an annotated pdf of the manuscript so that changes can be tracked as well as an updated version of the Supplementary Materials.

- It would be useful to add on Figure 3 the coseismic slip distribution estimated from previous studies (for example the one inferred by Melgar et al. 2016).

Done as the shaded blue region in Figure 3

- Of course uncertainties exist on this slip distribution based on the data, inversion scheme and fault geometry used by previous authors, but the authors could show several models if needed.

Done in the Supplementary Material S6

- The authors could also perform their own inversion of the co-seismic slip (using only GNSS data). Even if this inversion would be constrained only by geodetic data, it would be interesting because fully consistent with the post-seismic study in terms of fault geometry, Green's function and data with the post-seismic study. it could be added to the supplementary material.

We do not think that it would be relevant to the study to add our own co-seismic slip model based on the data that we have. There are already plenty of co-seismic models from other groups, that we show in Supplementary Material S6, and which already illustrates the variability of the region of co-seismic slip. To the first order, our model will very likely match the ones displayed and thus it will not change anything to the discussion.

- l. 104: "We search for the spatial distribution of slip amplitude and rake angle independently for each time step": the slip amplitudes obtained are shown but not the rake angles. Do they vary from one time step to another ? The optimal rake for each time step should be given in the supplementary materials.

We have included that information in Supplementary Material S4

- You do not want to add that you invert the rake in a $\pm 15^\circ$ of the convergence direction in the main text or the legend of the figure S4.17

We have included that information in the main text (line 119-121 in the revised manuscript).

- l.181 "a seismic moment of 9.5×10^{19} Nm." what is the region considered for the calculation ? Is it the same as the one shown in Fig. S6.2 ?

We have done a better description of the area considered to obtain this estimate (line 208-214 in the revised manuscript)/

- l. 189-190: same question, what is the area considered ?

We have highlighted the regions that we are referring to on Figure 3 in the revised manuscript so that the reader can clearly see the location of what we refer as the southern patch and the northern patch. We have also added that into the text (see line 143 and line 149 in the revised manuscript).

- In Fig. S7, the cumulative slip could be converted to seismic moment so that one can see where the values given in the text for the seismic/aseismic rations come from. The time series from Fig.7 could also be included in the main text, as they are really relevant for the discussion of the paper.

We have made that change by including a new figure in the revised manuscript (Figure 6).

- On Figure S7.2: what is happening between 6h and 7h (strong increase in cumulative moment): is there a large aftershock at this time ?

We think that this comment comes from the fact that the curves were normalized giving the false impression of a very large increase of seismic moment. With the new figure 6, we believe that it clarifies that the increase is in fact very small.

- "yellow circles" should be "pink stars »

Done

- Several problems with figure/table numbers (they appear with "??"): Line 85, 136, 165...

Fixed

Please also note the supplement to this comment:

<https://se.copernicus.org/preprints/se-2021-6/se-2021-6-AC3-supplement.zip>