Solid Earth Discuss., 4, C223–C225, 2012
www.solid-earth-discuss.net/4/C223/2012/

Solid Earth Discussions

Interactive comment on "Seismicity at the Rwenzori Mountains, East African Rift: earthquake distribution, magnitudes and source mechanisms" *by* M. Lindenfeld et al.

Anonymous Referee #2

Received and published: 5 June 2012

The manuscript reports the analysis of the microseismic activity recorded within the Rwenzori Mountains in the western branch of the East African Rift System by a temporary network of 29 seismic stations during the period February 2006-September 2007. The dataset is very impressive in terms of the data quantity (14.000 earthquakes) and the recording quality. Hence, it allowed obtaining high quality locations sufficient to provide a coherent analysis of relatively short spatial focal depth variation and also evaluating fault-plane solutions that are necessary to discuss the origin of the earthquake activity. The manuscript is clearly written.

For these reasons, I strongly support its publication in SE. Nevertheless, the quality

of the paper could be improved by adding some information on the dataset and developing some methodological aspects concerning the earthquake magnitude frequency distribution and fault-plane solutions.

I will do my comments by following the paper structure.

The title (1) The title should include the period during which the seismicity has been analyzed: "Seismicity from February 2006 to September 2007 at the Rwenzori Mountains, East African Rift: earthquake distribution, magnitudes and source mechanisms.

Dataset (2) Presenting a diagram reporting the statistics of the number of earthquakes [by magnitude range] recorded in function of the number of seismic stations [and, or measured P- and S-waves] could help the reader to have a better idea of the global dataset quality and importance. (3) The authors mentioned the occurrence of a ML=5.1 earthquake. It should be clearly identified on figures 2, 8 and 10.

Magnitude distribution (4) The magnitude frequency distribution is used by the authors to formulate a hypothesis on the cause of the seismic activity. The computed b-value [1.1] is very close to the one for typical tectonic earthquakes. Therefore, I found the argument for "magmatic processes" very weak. First, the authors should provide a good analysis on the b-value uncertainty. Secondly, I 'am not against formulating the hypothesis "magmatic processes", but it should be discussed more carefully and in parallel with other scientific evidence(s) if possible.

Source mechanisms (5) I 'am not convinces that "the combination of P-polarities with SV/P ratios enables to derive more reliable fault plane solutions". The addition of a more continuous probability density function will allow defining a minimum of the "misfit" function, but the reliability of the solutions will be given by the extension of the fiducial regions on the diagram. Therefore, for this issue, I also follow the comment of reviewer 1 on the necessity to be careful to use this kind of information. I recommend computing the mechanisms only with the SV/P ratios and P-first motions for the stations for which the ratio is available. If parts of the minimums of the misfit function are coherent with

the one considering only the whole P-waves first motion dataset, the combined solution will have some sense. If it is not the case, the combined solution has no real sense. The authors mentioned that they were able to determine a focal mechanism for 40% of the selected earthquakes with P-wave first motions. They should give some examples, including the mechanism of the recorded ML=5.1 earthquake.

Interactive comment on Solid Earth Discuss., 4, 565, 2012.