In the paper "Earthquake hazard characterization by using entropy: application to northern Chilean earthquakes" the authors discuss a statistical physics approach for the characterization of seismicity evolution and dynamics in Northern Chile. To this end, the authors use the relationship between the Gutenberg-Richter scaling relation and the Shannon entropy to demonstrate variations in entropy associated with the occurrence of strong earthquakes in this region. The manuscript is generally well-written and organized, the methodology is sound, and the results present some interest for the scientific community. Therefore, I recommend its publication after some minor revisions listed below.

First, we would like to thank referee number 2 for his/her valuable and constructive comments.

1) In Equation 6 and so on, the upper limit of the integral, representing the interval of earthquake magnitudes, is infinity. However, there is a maximum magnitude up to which earthquakes occur. I would suggest substituting the infinity symbol with Mmax.

Thank you very much for this suggestion. Of course, it has been done.

2) In Page 4, the annotation given first to the parameter n is "the number of earthquakes with magnitude M", whereas later on "the cumulative number of earthquakes with a magnitude equal to or larger than M". The annotation given to particular parameters should be consistent throughout the text.

You have right and we have corrected this mistake to have coherence in the whole text.

3) Equation 17 has also been derived by De Santis et al. (2011). Provide the appropriate references and/or discussion.

Done. Of course, we have added De Santis et al. (2011).

4) The authors use the MAXC method to estimate the magnitude of completeness (Mc) of their catalog. Woessner and Wiemer (BSSA, 2005) suggested that Mc calculated with this method should be corrected to +0.2 units of magnitude to give more robust estimation of the b-value. Did the authors consider this correction?

Referee #2 is right in his/her appreciation: it is well known that MAXC method generally underestimated M_C value. In their paper, Woessner and Wiemer (2005) state that:" *The application of the EMR and MAXC approaches to the 1992 Landers aftershock sequence shows that Mc was slightly underestimated by 0.2 in Wiemer and Katsumata (1999)*". And, finally, their conclusions indicated: *"…for a fast analysis of Mc, we recommend using the MAXC approach in combination with the bootstrap and add a correction value (e.g.,* $M_C = M_C(MAXC) + 0.2$ *Mc)*".

However, when the number of earthquakes to be considered is important from a statistical point of view, the best option is the MAXC technique. Thus, e.g. De Santis *et al.* (2011) stated that: "*The choice for this value of* M_0 *1.4 was made by inspecting the magnitude frequency and cumulative distributions*

over the period of concern to check the catalogue completeness. We recognize that this choice of M_0 is a little lower than the value given for the same region by a recent evaluation of the spatio-temporal behaviour of M_0 of the same catalogue over Italy. (…) The dense distribution of the more recent seismic network (…) and the careful check by the personnel dedicated to the operations of seismic event detection support the value here proposed for M_0. In addition, our choice of M_0 1.4 allows us to use a greater number of events than those eventually obtained considering a greater magnitude threshold, thus improving the statistics of our analysis". (M_0 in their paper refer to M_C).

As in the case of the De Santis et al. (2011) work, the IPOC catalogue used recordings from the IPOC seismic network (GFZ & CNRS-INSU) as well as auxiliary permanent or temporary stations that were deployed in the years 2007–2014; moreover, permanent stations from the CSN (Centro Sismológico Nacional) and GEOFON (GEOFON Data Center, 1993), WestFissure network operated by the Free University of Berlin, and the MINAS and IQ networks operated by GFZ Potsdam were used. On the other hand, scientific personnel working on the IPOC network include the GFZ German Research Centre for Geosciences, Potsdam Germany; the Centre National de la Récherche Scientifíque Paris (C.N.R.S.), France; the Centro Sismológico Nacional, Chile; the Ecole Normale Supérieure, Paris, France; the Freie Universität Berlin, Germany; the GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany; the Institut de Physique du Globe Paris (IPGP), France; the Pontificia Universidad Católica de Chile, Santiago, Chile; the Universidad Católica del Norte, Antofagasta, Chile and finally the Universidad de Chile, Santiago, Chile.

Although the correction of MC(MAX) + 0.2 is correct, our interest in selecting the maximum possible number of earthquakes (and their high quality), led us to slightly underestimate the value of MC.

5) As the authors discuss in Figure 9, the threshold magnitude (Mc in my previous comment) varies with depth. However, in their analysis of the entire catalog, they use a common threshold magnitude for all depth ranges. In addition, it is possible that Mc also varies with time, and it should be estimated in the temporal windows. The proper estimation of Mc (or M_0) is crucial for the determination of the b-value (see Eq. 18).

In spite of the possible depth and time variations of the GR parameters we have preferred to do just one consolidated analysis with richer statistics, representing an average behaviour of the distribution of the > 100,000 earthquakes included in this study.

6) In Figure 1 show the position of the second largest region on the globe.

Done

7) The authors mention the Gutenberg-Richter scaling relation in Fig.4, as well as in other figures (Fig.9). However, in these figures only the cumulative and discrete frequency-magnitude distribution is shown. Show also the Gutenberg-Richter relation and the associated a and b parameters.

Done

8) What do the colors indicate in Fig.6?

Usually, but it is not universal in all countries, the earthquake hazard colour code set up that "cool" colours, such as green or blue, are related with not dangerous earthquakes, whereas "hot" colour, such as orange or red, are related with earthquakes which higher magnitudes and then, the potential seismic danger is associated to them. Nevertheless, referee #2 is right and the colour could confuse the reader; therefore, we remove colour scale and now, the graph is black. For coherence, figure 3 is also redrawn in black colour.