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Interactive comment on "Geosystemics and Earthquakes" *by* Angelo De Santis et al.

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We thank the anonymous referee for the criticisms that give us the chance to underline once more (see below), despite his/her negativity, the high level of contribution of this investigation to the worldwide scientific debate and efforts in understanding the earthquake preparation phase in order to arm the scientific community and stakeholders against the natural disasters. By the way, we now stress this concept also in the conclusions of the revised manuscript.

As a general reply to the referee, we would like to highlight the following: When he/she says: "Last but not least, this manuscript is certainly not a review of what the authors call Geosystemics but rather an advertisment for the 'earthquake-prediction' community and the lead author (14 references point to papers of the lead author)." In contrast with referee's point of view, we believe that our paper is a good source of information

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regarding the geosystemics and its possible application to earthquakes: in particular, it provides 117 references about the subject. In addition, please note, that less than 12% of references dedicated to papers of the lead author is not a great portion of all quoted references (14 out of the total 117). Our own references were useful in order not to repeat what made with more detail in that specific cited literature.

Regarding the various points as deduced from CSEP that we list at pag.6, we reply as follow:

First, all CSEP points are sequential, i.e. any precursor must sequentially satisfy those points. If a precursor is at an initial stage of research, it satisfies not all points but only some of the first, and this is the case of the most recent found precursors we presented (e.g. entropy). Generally speaking we would appreciate the possibility to describe single case studies where some anomaly appear before the occurrence of earthquakes, giving to the scientific community the possibility for future deeper investigations.

Now we pass to examine each of the CSEP points, about which this Referee says we did not consider at all.

1. This point concerns the presentation of a physical model for the precursor phenomena. Although the reviewer admits that we "introduced" several precursory phenomena, he says that we did it without any physical reasoning. This is not true. Section 10 is completely dedicated to LAIC (pag.20-28) and particular attention to physical models in pages 26-28.

2. About the definition of the anomaly. The reviewer says that we do not define any of the anomalies in a testable way, and present as "particularly outstanding examples of such anomalies" those in Figures 10 and 11. Probably the reviewer did not read carefully the paper when we define it, very generally: "we intend here for an "event" as an anomalous behaviour of the system evolution, e.g. when its signal level is larger than a certain number of standard deviation, σ, e.g. 2.5 σ" (lines 17-19, pag.11) and, then, more clearly: "An anomaly of the physical quantity of concern is defined as a

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value that exceeds the mean (or median) by two times the standard deviation, and persists for at least two days (see also Piscini et al., 2017)." (lines 7-9, pag.29). In the lines above we also define the set of data over which estimate mean (or median) and standard deviation: "In each case study, we will consider the SST in the epicentral region about two months around the EQ occurrence, and then we will compare the temperatures with those measured in the same day, at the same time (06:00UT) in the time interval 1979-2008 (2011) for L'Aquila (Emilia) EQ." (lines 5-7, pag.29). By the way, the latter two sentences were made for explaining Figures 10 and 11.

3. and 5. although are not met in the paper, we refer a paper that copes clearly with these points (Piscini et al., 2017), by means of a confusion matrix of the overall results.

4. As this referee says: "This is the gold standard for seismic precursor studies". This is the most difficult part of the all points, where a prediction is performed on the basis of future results. It would require probably years before a precursor can be properly and fully tested, so it cannot performed for a precursor study at its early stage.

For the above considerations, we added a paragraph in our manuscript just after the mentioning of the 5 points of CSEP.

Please also note the supplement to this comment:
https://www.solid-earth-discuss.net/se-2017-120/se-2017-120-AC2-supplement.pdf

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