

Interactive comment on “Preliminary results from the total lightning detector-cum-mini weather station installed at the Calcutta University” by Subrata Kumar Midya et al.

Anonymous Referee #3

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The paper is basically interesting, when one assumes that the area has never been examined in terms of lightning activity (please provide references on local lightning in the area, if existing). Apparently, the authors have received a set of lightning data and analysed the stroke occurrence in various ways. However, the impression is given that all that emerges from a single sensor. In fact, a large network has been used, but this system is not described and the functional working of the sensors remains in the dark. Most important, signals from a huge frequency range are claimed to enter into the analysis, performed by an unknown party, while it remains completely unresolved how the basically different signals from the various physical sources are treated and put together, or whatever else has been done.

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The data handling procedures must be described, otherwise the reader cannot assess the significance, or compare with other systems. Substantial rewriting is required.

Some comments are given in detail:

1. Abstract, p. 1, line 1: notes a “preliminary” report. Does it mean that the data is not yet fully correct or presently too limited to attribute significance to the results?
2. Abstract, p.1, line 1: notes that the authors present lightning data results from a single sensor placed in Calcutta. This is highly misleading, because it is not a “stand-alone” that could deliver lightning data. It is also noted that this sensor is part of a network; thus, the lightning data comes from this network, not from a Calcutta sensor. This should be clearly clarified.
3. Introduction: it should be mentioned what kind of lightning data examination has been performed for the relevant area in the past.
4. P. 3, Line 27: the measuring system is not described adequately. For example, it is not said, what kind of discharge events are identified. For any other network the manufacturer or user describe that CG strokes or IC strokes (centered around 10 kHz), or source points (or leader steps) in the VHF range are measured. Leader steps are always present when a channel forms in flashes that may remain in the clouds or contact ground. Thus, a VHF ‘signal’ cannot be attributed to either a cloud or a CG flash. The noted ref. “Heckmann et al. 2014” does not present any explanation along these lines. As a result, the reader does not know what is really measured and how it is interpreted.
5. P. 2, lines 2-3, P. 3, Line 27: the authors claim that the system uses signals down to 1 Hz. This is not credible and sounds quite absurd. Even Schuman resonances start at higher frequencies, and it is totally clear the simple rod (fig. 1) is not suited to detect Schuman resonances; even though, handling and evaluation of ELF requires quite different methods than those that seem to be used by the present sensor data

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analysis.

6. P. 3, line 31: the authors state that the 'signals', presumably including the VHF signals, are processed in order to give current, multiplicity and lightning type. This needs more explanations. First, the quoted parameters are not relevant for VHF signals; a source point (leader step signal) may have any strength and is basically not associated with the peak current of a return stroke or an IC-stroke in the VLF/LF range. A VLF/LF stroke may be CG or IC; the procedure to distinguish needs to be explained, because different methods are in use in other networks and it is known to be quite difficult and often ambiguous.

7. P. 4, line 1: the sensor signals are used to locate 'sources'. What is meant by 'sources'? Traditionally, sources are VHF events; do the authors mean VHF or VLF/LF events?

8. P. 4, line 2: it is correct that discharges may produce strokes, either CG or IC strokes. However, these strokes are exclusively VLF/LF events and can not be determined by VHF signals. Thus, VHF signals should be excluded in this consideration. When strokes are grouped into a flash, as described, only CG strokes can be taken, because IC discharges extend quite often over more than 10 km horizontal distance and last longer than 700 ms. But when VHF is excluded here, where are these VHF data handled and shown? This treatment of the measured signals remains totally unexplained. Thus, this part of the "detector description" (as the section is headed) needs substantial rewriting.

9. P. 3, Chapter 2: the "description of the detector" is insufficient. The chapter must include an understandable description of the handling of the data from the various frequency ranges. Naturally, the network configuration must also be described, the number of used sensors and the relevant baselines should be given.

10. It remains unclear from where the lightning data comes. The signals from the Calcutta station are insufficient. It should be explained that – as I assume - the network

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owner provides processed data to the authors, i.e. stroke or event listing. Insofar, also the acknowledgement is misleading. 11. Fig. 2: it is claimed that strokes, grouped to flashes, are shown. Again, the question arises how VHF signals are taken into account. The reader can not understand what the authors have really plotted.

12. P. 4, line 7: in extension of the previous points, the term "total lightning" needs an explanation. Presumably, it is not just the combination of CG and IC strokes in the VLF/LF range, because VHF signal somehow contribute in a totally unexplained manner. Finally, the question arises, how 1 Hz signals, or ELF signals contribute. In the opinion of this referee, ELF does not matter at all, but it is the authors obligation to communicate in full the used techniques and procedures, and to remove misleading or unnecessary parts.

13. P. 6, line 1: it does not make much sense to add all peak currents of all CG strokes in a storm, because the strokes occur independent of each other at very different locations and the size of the cells may largely vary. It suffices to characterize storm severity by the number of strokes per time and per area.

14. P. 6, line 13 and Fig. 5: the multiplicity needs a word on the lower threshold of currents that are determined. The authors should show an additional graph with the distribution of currents for the storm.

15. P. 11, line 1, chapter 5, Conclusion: again, it is not acceptable to claim that installation of one single station allows for monitoring total lightning. In fact, a large number of stations is required and the shown results could also be obtained without the Calcutta station. In total, the paper needs substantial rewriting, because the used instruments, analysis specifications and data handling are not described, preventing the reader from understanding what has been done.

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