We thank the reviewers for their minute scrutiny of the manuscript. We believe that their valuable comments and suggestions will be helpful for further improvements of the quality and credibility of the paper. We have revised the manuscript considering their suggestions. Answers are given below in red. Changes in the revised version of the paper are in bold black font.

Reviewer 3:

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

Ans: We clearly mentioned that the thunderstorm events in the area under investigation have never been examined with respect to **total lightning** (i.e., considering CG and IC at a time), at least we did not find any material in existing literature. We have added references from previous research reports on lightning activity in the area mentioning the data used in the analysis. We have revised the manuscript thoroughly to remove the misconception that the total lightning data emerges from a single sensor. We have also changed the title of the manuscript to avoid this misunderstanding. The Earth Networks total lightning network (ENTLN) is actually working with many more receivers in the area and lightning location and other parameters are determined at the central processor from the waveforms data sent by these sensors. The ENTLN is unique compared to other existing sensor technologies as they claim (Heckman and Liu, 2010 and other reports from Earth Networks). The sensor is a wideband system with detection frequency ranging from 1HZ to 12MHZ. ENTLN claims that this wide frequency range enables the sensor to not only detect strong CG strokes, but to also detect weak IC pulses beyond the line of sight. The primary focus of the ENTLN appears to maximize the detection efficiency for cloud flashes.
We have included this description in the revised manuscript and also presented the raw measurements from the sensor at Kolkata. These waveforms in raw digitizer units are converted to electric field unit (V/m) based on sensor calibration data and used to determine the location using the well known time of arrival (TOA) method. Waveforms data from minimum four sensors give the lightning location and other parameters. We have analysed the total lightning data set obtained from the ENTLN for the area under investigation bounded by the geographic area 87.65^0 E–89.52^0E and 22.13^0 N–22.92^0 N.
We hope the revised version will have no misconception about the data and methodology.

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?

Ans: Here the “preliminary” report means only initial report not necessarily contains detail analysis using large data set. The word “preliminary” has nothing to do with data quality or the results in the paper. In literature there are many research papers which include the phrase “preliminary results/ preliminary report/ preliminary study” etc. even in title.

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 "standalone" 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.

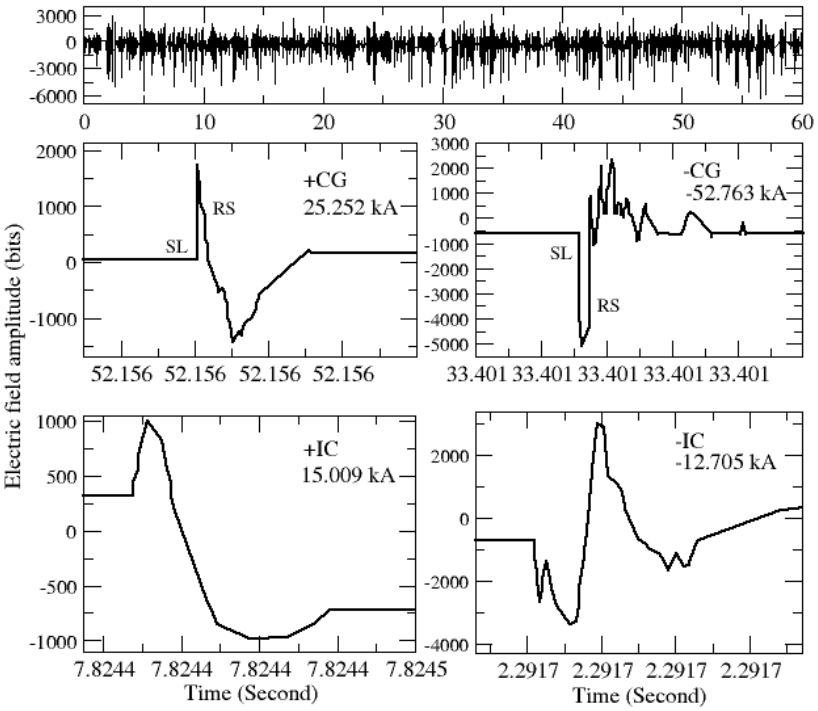
Ans: We have revised the abstract (and also the title) to avoid any misconception or misunderstanding about total lightning data. Truly the lightning sensor is not standalone, only the weather station is standalone. We clearly mention this in revised manuscript and also in the abstract.

3. Introduction: it should be mentioned what kind of lightning data examination has been performed for the relevant area in the past.

Ans: We have added references from previous research reports on lightning activity in the area as available in the literature. We also mention the data used in their analysis.

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.

Ans: The ENTLN is unique compared to other existing sensor technologies as they claim (Heckman and Liu, 2010 and other reports from Earth Networks). The sensor is a wideband system with detection frequency ranging from 1HZ to 12MHZ. Primary focus of the ENTLN appears to maximize the detection efficiency for cloud flashes. The ENTLN claims to detect weaker pulses at longer distances than other VLF/LF systems with similar baselines by extending the frequency range of detection into the MF and HF spectrums. Thus ENTLN measures both IC and CG strokes. The strokes are grouped into a flash if they occur within 700 ms and 10 km of the first stroke detected by the sensors. A flash is further classified as a CG flash if it contains at least a return stroke, otherwise it is classified as IC flash. This is mentioned in the manuscript and we have analysed the lightning flashes which are classified as either +/-IC or +/- CG in the manuscript. We have not analysed the individual strokes which can be done with electric field waveforms data from the sensors.
We have added extra description of the total lightning sensor and also added raw electric field waveform data as recorded at Kolkata station identifying four types of lightning discharge events with distances from the sensor.
"Heckman, 2014: ENTLN Status Update, XV International Conference on Atmospheric Electricity, 15-20 June 2014, Norman, Oklahoma, U.S.A." clarifies in some extent the lightning location technique.



Top panel shows the raw measurements of electric field amplitude data for 1 minute time interval after 14:15 UT of 17th April, 2018. Electric field amplitude here is in raw digitizer units. Other four panels show the variation of electric field waveform corresponding to four types of lightning discharge as identified by ENTLN. Distances from the lightning location to the receiving station corresponding to the four discharges are 50.50 km (for +CG), 43.80 km (for -CG), 43.89 km (for +IC) and 7.80 km (for -IC) respectively. Note the presence of stepped leader (SL) and return stroke (RS) in case of CG lightning discharge.

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 analysis.

Ans: Well in that case we wish to refer the Earth Network lightning location principle, their manuals and research papers that used ENTLN data.
By extending the frequency ranges in both low and high frequency domain, ENTLN claims to detect and report weaker pulses at longer distances and achieve greater efficiency. But this is yet under-presented in the literature.

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.

Ans: This is also mentioned in the previous comment that the ENTLN is unique compared to other

existing sensor technologies as they claim (Heckman and Liu, 2010 and other reports from Earth Networks). The sensor is a wideband system with detection frequency ranging from 1HZ to 12MHZ. primary focus of the ENTLN appears to maximize the detection efficiency for cloud flashes. The ENTLN claims to detect weaker pulses at longer distances than other VLF/LF systems with similar baselines by extending the frequency range of detection into the MF and HF spectrums. Thus ENTLN measures both IC and CG strokes. The strokes are grouped into a flash if they occur within 700 ms and 10 km of the first stroke detected by the sensors. A flash is further classified as a CG flash if it contains at least a return stroke, otherwise it is classified as IC flash. This is mentioned in the manuscript and we have analysed the lightning flashes which are classified as either +/-IC or +/- CG in the manuscript.

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?

Ans: Here the source does not mean exactly the whole lightning channel, because the purpose of the network is not to image the lightning channel itself but to overall determine the location usually interpreted as some approximation to the ground strike point. The best electromagnetic channel imaging methods at VHF and the best ground strike-point locating techniques at VLF and LF have accuracies (actually location errors or uncertainties) of the order of a hundred meters. ENTLN uses a wide frequency range for their purpose.

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 un-explained. Thus, this part of the "detector description" (as the section is headed) needs substantial rewriting.

Ans: This is not correct. The signals produced by most cloud flashes become comparable to those produced by ground flashes only at higher frequencies. The ENTLN just extends the operating range to the high frequency bands to add improved detection of cloud flashes to the system's ability to detect ground flashes. Generally areas with low sensor density favor CG lightning detection (Liu and Heckman, 2010; Thompson et al., 2014). And in our analysis we analysed the IC and CG flashes as determined by the ENTLN using the whole frequency bands.

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.

Ans: The actual number of sensors in the Earth Networks, operating in the area under investigation is not known to us. The network uses many sensors for their purpose. In the Gangetic West Bengal region, locations of four sensors including Kolkata station are known to us. There could be more sensors. Actually the lightning location is determined using many sensors, but we do not know the locations of all sensors. We are focusing only to use ENTLN data for our research purpose. Therefore, the description of network configuration in this region is beyond the scope of this paper. We have changed the Section name from "Description of the detector" to "Observational data" to describe the data set we used.

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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 owner provides processed

data to the authors, i.e. stroke or event listing. Insofar, also the acknowledgement is misleading.

Ans: As we mentioned earlier also, normally we get the processed data i.e., list of all lightning flashes in the region of study (87.65◦ E–89.52◦ E, 22.13◦ N–22.92◦ N) which includes parameters like location, peak current, multiplicity etc. Here in the revised version, we have added, just to get an idea of what the lightning sensor is actually measuring, the raw data of electric field waveform for 1 minute time interval and identified the four types of flashes in that data from our station. We also revised the acknowledgement section.

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.

Ans: We have actually plotted the total lightning count per day (Figure 2 of previous version, Figure 3 in the revised manuscript) which includes both IC and CG counts for the month of April, 2018 over the geographic area under investigation.

For VHF signals, we have also mentioned in earlier answers that by extending the frequency range of detection into the MF and HF spectrums, the ENTLN aims to detect and report weaker pulses at longer distances than other VLF/LF systems with similar baselines, since the primary focus of the ENTLN is to maximizing the detection efficiency for cloud flashes.

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.

Ans: Total lightning is the sum of IC and CG flash count as mentioned in the manuscript, identified by the ENTLN using the whole electric waveforms data from various sensors using the methodology described earlier or in the manuscript. We are not using individual strokes in our analysis. There is no ambiguity and we are using the lightning flash data as processed by the ENTLN.
As we mentioned in earlier that, we wish to refer the Earth Network lightning location principle, their manuals and research papers that used ENTLN data. We cannot comment on their sensor technology which uses wide frequency range from ELF to HF range since this is not available or under-presented in the literature.

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.

Ans: We agree with the referee in this point. But still we want to keep this figure in the manuscript to show the difference between amounts of charge transferred involved in the two storms. The numbers of CG flashes are roughly the same for both the storms, but this figures shows the difference between the storms with respect to peak current.
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.

Ans: Number of strokes per flash is termed as multiplicity. The ENTLN uses the thresholds of maximum temporal separation of 700 ms and maximum lateral distance of 10 km radius between successive strokes for converting stroke data into flashes.
We do not have the current data for the storms.

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.

Ans: We have revised the manuscript considering this point and removed the sentences which could lead to misconception or misunderstanding of getting total lightning data from a single station. Keeping this in mind, we have also revised the manuscript title slightly as following:

"A preliminary study on thunderstorms and monsoon using total lightning and weather data over Gangetic West Bengal"