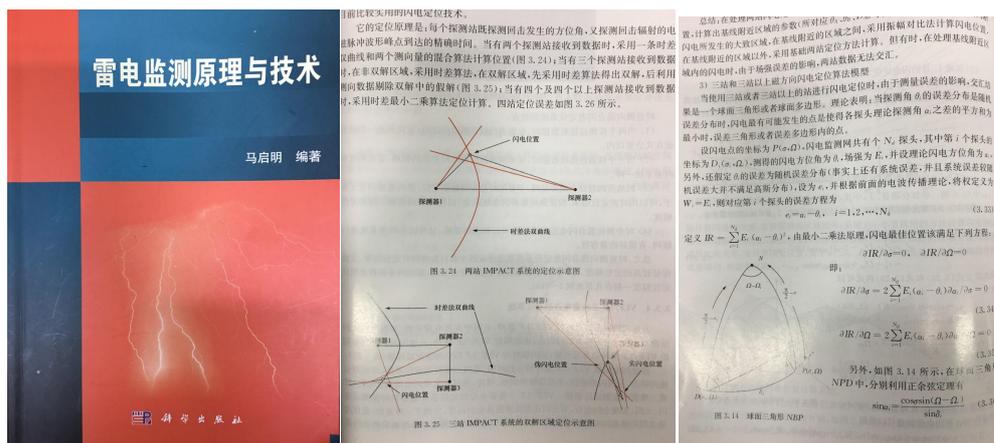


First of all, thank you very much for the comments of the reviewer. To sum up, reviewer mainly have 3 questions and suggestions, as following, authors answer one by one.

Q1. reviewer recommend adding detailed descriptions of lightning location and intensity algorithms in the manuscript.

PS: Four lightning location algorithms and lightning intensity algorithms discussed in this paper have been published in detail in the literature "principles and techniques of lightning detection (Ma. 2015)". Furthermore, there are too many content descriptions and formulas in the algorithm, which is not suitable for detailed description in this article. If you are interested, you can refer to the literature (Ma.2015). Below we will provide some reference content, see Figure 1-3).

The main purpose of this paper is to analyze the application of these algorithms in the National Lightning network and the application of lightning data. In order to evaluate the improvement of operation capability of lightning network. The algorithm itself is not the focus of this article.



(Lightning location and current algorithms reference book and some algorithms extract examples)

Q2: reviewer wondered what's purposes and scientific reasons for analysis and comparison of lightning location algorithms 'using frequency' in this manuscripts

PS: This is a good question.

As we all know, the quality of the lightning detection network depends on the efficiency and accuracy of the lightning location. However, it is very difficult to confirm the efficiency and accuracy of lightning location. However, it is generally accepted that both the hybrid method and the multi-station method are better than the two-station method, the magnetic direction method and the amplitude method in the positioning efficiency and accuracy.

Due to the geographical conditions, the number of base stations and network layout, CMA lightning network can not be all unified use multi-station positioning algorithm.

Our strategy is to automatically select the location algorithm in the business software based on the number of detectors detected by one of the lightning signals. From the point of view of spatial distribution, where the higher the frequency of multi-station method is, the more reasonable the base station is, the higher the quality of lightning data. From the point of view of time variation, the higher frequency is selected by the multi-station method, the higher the detection ability of the whole lightning network, and the higher the quality of the lightning data, **and vice versa**.

The above is the scientific reason and purpose of analyzing and comparing the frequency of using the lightning location algorithm in this paper. This also is a method to evaluate the performance of CMA lightning detection network in this paper.

Q3: Reviewer recommend more analysis of lightning, especially the evidence that lightning is more likely to occur in winter, and suggest an analysis of the relationship between lightning and some climatic information.

QS: That's a very good suggestion.

Study on Lightning climatology, scholars including China scholars, has done a lot of analysis, including the relationship between lightning and ground temperature, water vapor, aerosol concentration, weather system and geographical conditions, also reveals the characteristics and causes of lightning climate change. According to the suggestion of reviewers, we will add analysis on the correlation between China's lightning changes and air temperature, atmospheric tropospheric layer height and atmospheric water content, and to reveals the reasons for its abnormal climatology. Thank you for your expert guidance. Specific content is added to this manuscript or another research paper.

Thanks again for the reviewers' comments and suggestion.