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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Lightning risk assessment at a high spatial resolution using the resident sub-district scale: A case study in Beijing metropolitan areas" *by* Hai Bo Hu and Jing Xiao Li

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Lightning risk assessment . . . by Hu and Li

The paper presents interesting arguments concerning risks from lightning strokes in areas of varying terrain features. After some revisions it can be published. The parts that relate to technical risks and the corresponding quantitative considerations are sound and will not be criticized. However, the handling of lightning needs substantial changes as is explained below. 1. The paper deals with CG strokes. It is not explained why IC strokes are not present, or how they are eliminated. That can disturb the CG density estimate. The strange procedure to declare that CG+ are in fact IC+ is not sufficient or satisfactory. 2. The authors mention multiple contacts of strokes that occur within one flash. However, there are also multiple strokes that contact ground at the same point.

When one deals with strokes densities (Ng), this point becomes crucial. 3. A location accuracy of 1 km is claimed. This is much too optimistic when 1/3 of the locatings are performed with only 2 or 3 sensors. DF is known to produce errors of many km. 4. On p.5 line 8 the authors claim that 90% of the flash DE can be validated. This statement is not understandable and needs a clear explanation. 5. On p.5 line 7 it is claimed that the sensor range is 300 or 600 km. This is not correct, because the detection depends on the current of the stroke. A weak current of 4 kA will not be detected at all, while a 100 kA stroke can be seen as far as 1000 km. 6. It is absolutely necessary to show a current distribution of the used strokes. 7. It is not understandable how the authors "calculate" or estimate the true DE of the system (result in Fig. 1). The true occurrence of strokes is not known; in particular, the true current distribution is unknown. Thus, there is no way to determine the absolute DE. The peak of the current distribution is the only parameter that allows estimate of relative DE with respect to other networks. It may be suspected that the CMA network exhibits the peak above 10 kA; then, the DE would be quite low because strokes with current around 5 kA are very prominent, as can be seen from highly sensitive networks elsewhere. All together, the DE scaling is not convincing and could be replaced by a mere guess. 8. On p. 7 line 13 the authors speculate that the stroke signals can be absorbed by terrain effects such that the stroke density decreases. This is not in accordance with solid observations that propagation is very well approximated by 1/D (distance D). 9. It is understandable that technical structures (different buildings) give rise to different stroke risks. Insofar, a small grid size is meaningful, although 5 m is much too small. For lightning risks, however, a grid size of 5x5 m is totally unacceptable. The authors should consult the international norm for determining flash densities (IEC 62858). Both the rare occurrence (in 5x5 m^2 the stroke chance is 1 stroke every 10,000 years), and the large location error of the network prohibit such a procedure.

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