



## ***Interactive comment on “Identification of traffic accident risk-prone areas under low lighting conditions” by K. Ivan et al.***

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This is an interesting and promising paper. The paper is generally well written and easy to follow; however, there are some minor technical issues that I think need to be fixed in the final version. These include preparing better maps (with geographic information, coordinates etc), overview maps, and, where the Authors use locality names, these should be shown in the figures and as citations in the text. For instance not everyone knows where Cluj is. Beside these technical issues, I think there are some more significant issues that the Authors at least need to address in a discussion section. While I think the paper presents a solid statistical solution to support the link between lighting conditions and traffic accidents, in order to make a sensible conclusion in nat-

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ural environments, where multiple parameters are commonly “translated” into a single (“common”) parameter a solid discussion is needed. Below I try to explain my points and provide some ideas on what I would like to see in an article like this. 1) The Authors do not state by which conditions an “accident” is defined. Is it by fatality, damage, damage to what, how much damage etc.? I also think the sample “pool” needs to be better described to make the reader see clearly how and under what basis an “event” was defined. It would also be interesting to consider how the study would develop if individual events were weighted by some pre-defined parameter (e.g. the seriousness of the accidents; how could we compare 10 light accidents against two major ones with high damage to property and humans). I think that a further paragraph, or even section, in the dataset description would be very beneficial for the clarity of the paper. 2) Following the previous point, I also think that in the discussion several important points need to be addressed. For instance, while the study identified that the main accident-prone regions are – not surprisingly – located along the main artery road network of the City, it is also quite an expected result as there is more traffic (car and human) along those roads. However, this made me wonder what correlations there would be to accident numbers if the type of traffic were examined (e.g. expressing in a formula the number of heavy vehicles, total number of vehicles, common traffic directions and position in relevance to landmarks and natural obstacles etc.). This type of information could be captured in a GIS based “overlayer” method, which the Authors could then analyse. 3) Another important aspect of the study that I would recommend addressing in a discussion section is the human factor, which has been completely overlooked from the calculations. For instance, it would be interesting to see the ratio of non-local versus local drivers along various roads. My natural instinct would be that in regions where more local drivers use the road network, the accident number would be lower than along the main artery roads, where transit traffic is commonly loaded with heavy trucks. This may be a more important factor than the driving conditions in specific time period. 4) The link between the number of events and the time of the day, the day of the week etc. needs to be explored, beyond just thinking about the lighting conditions. 5) I

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also think that it is important for the Authors to demonstrate that the lighting has been treated as an independent controlling parameter. For instance, no data are presented on what the main rush-hour is in general in town, and what the common time is (during a day and during the week, month, year) when transit traffic is expected to be heavier. 6) I would recommend that the Authors address some of the human sociology, human behaviour or psychological issues of “driving” that could contribute significantly to accidents. For instance, while it is general common sense that in low-light conditions, we see less and therefore we may cause accidents, I do not think that this is a linear correlation. Many human behaviour studies have demonstrated that under certain levels of stress, concentration levels in fact increase, hence potential accident-triggering actions are reduced until a threshold value. This issue is certainly worthwhile addressing in the paper. In a similar way, I would have liked to have seen some analysis on other factors that may influence the distribution of accidents. For instance, are there periods of the day / days of the week when alcohol or lack of sleep could be significant factors in causing accidents? 7) Finally, from a more natural hazard perspective, the paper completely lacked any tests of the event distribution against meteorological events, such as rain fall, strong winds, fog etc. This issue is similar to other time-series tests I think should have been applied to the data set. There are inconsistencies in the data where I would have imagined that the weather conditions could have played major part. For example, in late Fall or Winter, the darkness may not be the main cause of accidents, rather it could be the poor weather conditions. With a good meteorological data set from the National Meteorological Survey, this issue could be solved.

Overall I think this is a good pilot project and worthy of publication in NHESS. However, I would expect the Authors carry out a robust self-evaluation of the validity of their statements (even if it is just a largely text-expressed discussion). A stronger introduction to the data set they used for the analysis and an expanded discussion, addressing the points listed above, would make the paper a much more interesting piece of work that would be worthwhile for city planners and other end users to read. At the end of the discussions, some statements about potential future work would also be a good

addition to the paper.

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