

A new method for calculating average visibility: from the relationship between extinction coefficient and visibility

Zhang et al. address the question of the calculation and interpretation of the average visibility and its relationship to the extinction coefficient. While the equation relating visibility and extinction is straightforward, the use of a simple arithmetic average of visibility can be misleading, producing a statistic that is disconnected from the underlying physical cause of visibility reduction, namely, atmospheric extinction. Researchers therefore need to be aware of these considerations if they use visibility datasets to investigate underlying trends in the atmospheric extinction.

This is a revised manuscript that addresses many of the deficiencies of the earlier submission. There are some weaknesses in the manuscript that should be addressed to improve its clarity. Some of these are minor textual changes while others require greater clarification. These are addressed below.

L1.: Omit colon in title

L18: "On the ONE hand"

L32: Rephrase "which greatly support many research." Unclear.

L34: Preferable: "Methodological issues in calculating the average visibility..." or similar

L43: Given that the paper focuses on different average statistics, these should be specified explicitly.... "The second method first calculates the arithmetic average of the extinction coefficient,". And likewise elsewhere in the manuscript.

L61: The sentence "The answer seems clear, but not yet convincing." adds little to the argument and should be dropped.

L65: Better: "been overlooked in the past."

L68: "If the difference...is also reliable". The authors have already pointed out that arithmetically the two methods are not the same, while "reliability" relates to the purpose that the data is being used for and the accuracy and precision needed. Some clarification is needed here.

L74: It seems what the authors are doing is not developing an "intuitive understanding", but rather demonstration the divergence of the two approaches with a given dataset.

Fig. 1: It is difficult to compare the short term effects and the two different methods for calculating the average visibility since they are on separate graphs. It would be helpful to have plots (e.g., monthly, yearly) on the same figure to improve comparison.

L104: Correct "period CHOSEN to"

L143: I presume "extensive" property is what is meant?

L146: "the summation of visibility has no real physical meaning". That might be so, yet it could still be a useful statistic.

L147: "3.2 Physical meaning of arithmetic average visibility and harmonic average visibility" is a clearer and shorter section title.

L154/5: This section is confusing as M_j here relates to the average mass extinction of the SAMPLE, not individual SUBSTANCES composing the sample, which is the meaning for the same symbol in Table 1. This should be clarified in the text and the properties and symbols distinguished from one another.

L158: Change "substances" to "sample" as in the above.

L183: Perhaps “property” is better than “process”.

L197: I think this is a statistical rather than a “mathematical” problem.