

Interactive comment on “How rainfall event characteristics affect the applicability of I_{30} as an index of intense or erosive rainfall: a brief review with proposed new rainfall index” by David L. Dunkerley et al.

Anonymous Referee #2

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Dunkerley criticises I_{max30} as climatic parameter and intends to replace it by a new parameter called EDf5. In order to show the superiority of EDf5 he analyses tipping-bucket rain-gauge measurements of two contrasting stations in Australia for some years. The manuscript is based on (i) a wrong concept of I_{max30} , (ii) major errors in the procedures and (iii) a data base that is insufficient for the intended task.

Wrong concept: I_{max30} is an event parameter while the manuscript tries to find a climatic parameter. There is hardly any larger contrast in meteorology than between events and climate but the manuscript somehow confuses both concepts. Of course, a

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climate parameter could be derived from I_{max30} but this would not be I_{max30} anymore and any critique regarding the climate parameter has not implications for the event parameter I_{max30} . I could think of quite interesting climate parameters based on I_{max30} (e.g.: how often does I_{max30} exceed its threshold, how often are rains exclusively erosive due their high intensity because I_{max30} exceeds its threshold while rain amount does not exceed the threshold of an erosive event) but I see no justification in using the mean I_{max30} , which is analysed in the manuscript. Dunkerley also gives no justification for his choice. The mean is presumably the most inadequate climate parameter to characterize I_{max30} , because I_{max30} has to be multiplied with kinetic energy to calculate erosivity. Hence if something like a mean is looked for, it must be a weighted mean to become meaningful.

Errors in procedures: Dunkerley criticises that I_{max30} cannot be calculated for rains shorter than 30 min. In fact, the opposite is true. It is especially easy to calculate I_{max30} for shorter rains as I_{max30} then becomes twice the total rain amount. The argument by Dunkerley lets me speculate that he may have wrongly flagged zero-rain data as missing values. Otherwise I see no reason why a calculation should not be possible. Contrastingly, the new index $EDf5$ fails for short rains (opposite to what Dunkerley seems to expect). For a 15 min rainstorm, the 5% interval would be 45 s. There are hardly data available at this resolution and even tipping-bucket data are unreliable at this resolution because of the non-continuous tipping. Because of the fact that zero-rain periods can be included in the calculation of I_{max30} , events have to be defined. Otherwise only one I_{max30} would result, which would be the maximum I_{max30} of the entire measuring period. In the context of the R factor, erosive rain events are defined by three criteria, namely a 6-h rain break, a threshold for I_{max30} and a threshold for rain amount between two 6-h breaks. Dunkerley uses the 6-h criterion but ignores the other two criteria. In consequence, what he called I_{max30} is not identical to the variable I_{max30} that is used in the calculation of the R factor. This causes confusion in many arguments put forward in the manuscript and it will likely also confuse many readers.

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Insufficient data base: In meteorology a 30-yr period ('normal period') is usually required for calculating climatic site properties. Dunkerley uses a much shorter data set. More important, he uses only two stations. Both stations produce a similar mean I_{max30} (if we accept all errors in the calculation as it was done like ignoring thresholds, ignoring weighting, ignoring short rains). From this Dunkerley follows that mean I_{max30} fails as a climate parameter. Why he draws this conclusion is not clear. Mean annual temperature MAT, a widely accepted indicator, also produces identical values for many sites that differ in other climatic parameters like mean annual precipitation MAP. This does not imply that MAT is inadequate but only that these sites are similar regarding MAT. The same argument holds true for any climatic parameter derived from I_{max30} . There will be many sites with identical I_{max30} climate parameter that differ in other climate parameters. If this would not be the case, the I_{max30} climate parameter would provide no additional characteristic and could be waived. This does, however, in no case imply that the event parameter I_{max30} could be waived.

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