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A flexible method for determining decorrelation ranges in rainfall applied to Ghana

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The spatial structure of rainfall events over west Africa is not very well understood, and a major limitation for improving this understanding is the generally sparse rain gauge network. This lack of spatial knowledge makes it difficult to describe the state between the rain gauges, something that is important if one wants to determine which locations are likely to have received rainfall and not. Earlier work on estimating correlation structures has been limited by the long distances between rain gauges, which often has been longer than the actual correlation range.

In this talk, we will describe a simple and easily adapted method developed for calculating the decorrelation range in daily rainfall. Thanks to a new, dense daily rain gauge data set from Ghana Met agency, the spatial structure of rainfall for the different phases of the West African monsoon has been investigated. Previous studies have only considered a general decorrelation range, ignoring rainfall intensity as a factor when determining the rainfall extent. For the results presented in this talk, the decorrelation range has been estimated for 4 different rainfall intensities to explore the difference between low and high intensity events. This is analysed separately for each month at a fine spatial scale. Results on the anisotropic, i.e correlation changing with direction, pattern at the subweekly and local scale for several aggregation periods will also be presented.

It is found that the spatial correlation structure of rainfall vary greatly with the intensity of the rainfall event and the phase of the monsoon. In particular, it was determined that the intensity rather than the time of the year had the largest influence at the local scale. The westward propagation of convective systems, a well known phenomena over weekly to monthly time scales, was detected even at short aggregation periods.