Calculation of total runoff and sediment yield from aliquot sampling in rainfall experiments

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The quality of rainfall simulations depends on many different aspects, for example simulator quality, operator experience, water quality, and a lot more. One important aspect, which is often not very well described in literature, is the calculation of total runoff and sediment yield from aliquot sampling of discharged material. More specifically, neither the sampling interval nor the interpolation method is clearly specified in many papers on rainfall simulations. As a result, an independent quality control of the published data is often impossible. Obviously, it would be best to collect everything that comes off the plot in the shortest possible interval. However, high rainfall amounts often coincide with limited transport and analysis capacities. It is, therefore, in most cases necessary to find a good compromise between sampling frequency, interpolation method, and available analysis capacities. In this study we compared different methods to calculate total sediment yield based on aliquot sampling intervals. The methods tested were (1) simple extrapolation of one sample until next sample was collected; (2) averaging between two successive samples; (3) extrapolation of the sediment concentration; (4) extrapolation using a regression function. The results indicate that all methods deliver more or less acceptable results, but errors between 10-25% would have to be taken into account for interpretation of the gained data. The first measurement interval causes highest deviations in almost all tested samples and methods. It is, therefore, essential to capture the initial flush of sediment from the plot most accurately, to be able to calculate reliable total values.