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Event based statistics from high spatial and temporal resolution gauge and radar data

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Studies of extreme precipitation is often focused on daily resolution and for point measurements, i.e. gauge data. A main problem with this coarse temporal resolution is the strong averaging effect on short events. Here we present a study based on high temporal resolution (five minutes) data from radar (1x1 km horizontal resolution) and a high spatial density gauge data set over southwestern Germany. For the gauge data, an event is defined as a sequence of consecutive precipitation measurements above the measurement threshold, while for radar data the events are defined as continuous horizontal regions with above measurement limit intensities. With samples from about two years of data for the radar and from about 90 gauges each with 8 years of data, we get solid statistics for different aspects of the event distributions. A strong relationship between the temporal and spatial definitions of events is found. Additional use of synoptic observations allow the distinction of convective and stratiform precipitation types. The two types show largely different intensity distributions and characteristics for both spatial and temporal statistics. With probability and intensity distributions of the events, it is possible to calculate statistics of the precipitation yield from different duration (or size) events. We found that the yield from stratiform events decrease in a near power-law manner, while convective precipitation shows a concave dependence an a log-log scale, with the largest yields for events of around 20 minutes duration or 30 km^2 area. The results emphasise the utility of high temporal resolution data of less than one hour, which allows proper resolution of convective showers and additionally to derive event statistics, which are important for impact assessments.