High precipitation analysis in a resolution of 500m for Berlin

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For the year 2002 paper strips of Hellmann precipitation gauges from 57 stations of the "Berliner Wasserbetriebe" were digitised in a resulting resolution of minutes. Besides that, 5 minute rainfall data of 7 stations from the "Berliner Stadtmessnetz" and 7 stations of DWD network, based on automatic precipitation registration, were used. In addition 75 stations measuring daily precipitation amounts are also available. The spatial interpolation of the precipitation data is used for data checking, comparison and calculation of the gridded precipitation sum. For the interpolation a procedure introduced by Döös and Cressmann (Döös, 1969; Cressman, 1959) is used with a horizontal grid resolution of 500 m in correction modus. Then the differences between observations and grid field is determined by the linear interpolation. These differences are interpolated with reciprocal square of the distance and added to the absolute grid. If the maximal differences are smaller than a given threshold, the calculation is stopped and if not, the procedure is repeated and interpolated by weights with reciprocal third order and so on. The numerical grid is orthogonal to the resulting geographical field with 131 x 131 grid points. The interpolation regarding to the observational data is a bilinear one. The so prepared precipitation data for daily rain total and 5 minute sums are compared and corrected among themselves with a comparison in space and time. This method of interpolation is transferable to each other region and can be used for the forecoming precipitation analysis. As an example the 500 m grid Berlin precipitation analysis for the year 2002 will be discussed for different temporal and spatial resolutions (five minutes up to one 1hour). Two singular severe convective cells in the evening of the 28th of August 2002, between 17-19 UTC, two singular severe convective cells caused extreme precipitation amounts up to 105 mm per hour.

The cells, which were located in the southwest part of Berlin, developed under nearly stationary conditions without significant movement. This fact is one reason for the observed heavy rainfall in the southwest part of Berlin. The investigation of the LM-analysis data revealed that this precipitation event was not resolved in the 7 km grid of the COSMO-DE. The question arises how the small scale variability of convective events determine the process of accumulation at different scales.