Plinius Conference Abstracts
Vol. 13, Plinius13-67, 2011
13th Plinius Conference on Mediterranean Storms

High-resolution rainfall sampling: the scales of interest

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Uncertainties in rainfall sampling affect number of applications in hydrology and meteorology. Whatever the measuring process, sampling uncertainties are strongly linked to the space and time scales of measurements relatively to the rainfall variability. Many studies dealt with rainfall variability and showed that it is strongly dependent on environmental parameters. Our goal is to characterize rainfall parameters in between the foothill and the mountain ridge of a Mediterranean region. Thus, since October 2010, a dense network of rain instruments (HPicoNet) has been deployed in a subregion of the HyMEx target area in southern France, the Cévennes target area. It includes 8 measurement stations in a 25km2 area. Each measurement station is equipped with power supply, data storage and backup facilities over the web. Among the recorded parameters are the rainfall intensity (tipping-bucket raingauges), the DSD, and the electrical charge of raindrops.

DSD measurements are provided thanks to the network of disdrometers from EPFL. It consists in 8 optical disdrometers (Parsivel) that have been set up at 7 stations, with 2 collocated disdrometers at one place to get information about the sampling uncertainty in the disdrometer measurements. These 8 disdrometers are divided in 2 groups of 4, each composed of 1 master station and 3 associated slave stations. The master station queries data (every 30 s) from each slave and then sends the data in real-time using GPRS (mobile phone service) to a web server for storage and back up.

Analyses of the data collected during these first 9 months of operations show the reliability of the network.
The rainfall variability is studied in terms of DSD, intermittency and intrinsic intensity. For specific rainfall events ground-based measurements are compared to radar data. The rain-measurement network usefulness is assessed for different types of applications and perspectives are given concerning its future extensions.