

## 2.10 WEATHER RADAR DERIVED RAIN CELL SIZE STATISTICS FOR LOWER AUSTRIA

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Knowledge about the dimensions of intense rain cells and their frequency of occurrence in a region can be of relevance to several areas of research. Besides meteorological fields of study, such statistics can be interesting for hydrological purposes e.g. urban hydrology. At the same time such information is useful to model tropospheric effects in satellite communications links, especially for site diversity considerations, where signal fading due to an intense rain cell along the signal path to one ground station is compensated by one or more ground stations that are located a sufficient distance apart.

Rain cell size statistics can be based on in-situ measurements like rain gauges or remote sensing systems. Apart from a few exceptions, most rain gauge networks are too coarse to properly capture the spatial variability of rain cells. Thus, rain cell size studies are usually based on weather radar measurements. The three-dimensional data provide additional information on the vertical structure of the rain cells. But due to the working principle and effects like clutter and shielding, the radar exhibits also limitations. Thus, caution is advised when using radar data to deduce rain cell statistics, especially when comparing data from radar stations that differ in frequency and in the applied attenuation and clutter correction procedure.

That is why the Study Group on Wave Propagation of the International Telecommunication Union (ITU) provided with the objective of establishing a global rain cell size database recommendations on the methods to be used when extracting rain cell characteristics from weather radar data for modelling the attenuation of radio waves propagating through the troposphere.

The present study is an extension of a former investigation that addressed the question of automatically generated rain cell size statistics deduced by weather radar data. Starting in 2009, several precipitation periods during the summer seasons in the surrounding areas of Vienna, Austria were included. The measurements of the C-Band weather radar from Rauchenwarth were analysed. The data are available in a Cartesian format as volume elements (voxels) with a grid size of 1 km 1 km 1 km. Based on the applied definition of the rain cell as a contiguous volume in which the radar reflectivity is throughout equal to or higher than a specified threshold (minimum 34.2 dBZ), a MATLAB program identifies connected voxels in the clutter filtered archive data and derives the dimensions.

So far thousands of cells were identified. Besides the horizontal extent of the rain cells in different altitude levels, also the vertical spread and the height of the cell center was collected. It was observed that intense rain cells with vertical and horizontal dimensions higher than 5 km are rare.

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