Developing a low cost C-band FMCW microwave areal rain gauge – MARG

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In 2013 a project proposal was granted in the 7th European Framework Program (FP7 – SME section) to develop a low cost C band microwave areal rain gauge sensor for reliable rainfall estimations up to short-ranges in rural and urban environments. The aim was to develop an instrument combining the latest technological solutions and long time proved radar precipitation algorithms to achieve reliable operation and accurate measurements at very low cost comparing to existing X band MINI radar solutions.

In the MARG project a full solid-state precipitation radar sensor will be developed that uses frequency modulated continuous wave (FMCW) operation with Doppler signal processing. To achieve the required isolation between the transmitter and receiver modules two parabolic antenna will be used with additional isolation circuits. The radar front end operates in the C-band at 5.6 GHz with a continues RF output power of 20 W. The measurement range planned to be 30 km for 0.2 mm/h rainfall intensity. The Doppler filters will be used for clutter elimination.

The reflectivity – rainfall conversion is performed with adjustable parameters of M-P equation. QPE precipitation algorithms including rainfall type (stratiform – convective classification), mean bias correction and kriging interpolation with existing rain gauge networks and disdrometer calibration are foreseen to be used. Measurements from one or several MARG sensors are organized and stored in the MARG user centre module. Within this module the precipitation data are further processed and combined with geographic background information. Precipitation data and derived products, e.g. rainfall accumulation maps, are provided to the users by web services of MARG user-centre module.

Accordinly to the project plan the MARG sensor will be ready for testing by June of 2014. The authors will be present the project achievements and the first results of the MARG test periods.