



Verification of surface precipitation type determined from weather radars, meteorological satellites, and numerical weather prediction model

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The determination of the surface precipitation type (SPT) is very important for research studies and many practical uses. However, the spatial and temporal patterns of precipitation events are not captured well by simulations of the current numerical weather prediction (NWP) models neither by the relatively sparse rain gauge networks. The highest resolution can be obtained from weather radar measurements. Besides these data combined with telemetric rain gauge and satellite data (RainGRS hereafter), NWP model forecast results and pure radar data will be used to determine SPT. RainGRS is part of precipitation estimation and nowcasting system at Institute of Meteorology and Water Management – National Research Institute (IMGW-PIB). Radar data comes from Polish Data Network System (POLRAD) which is supplemented with radar data from neighbouring countries. NWP model is the model developed by Consortium for Small-scale Modelling (COSMO). The COSMO model works in horizontal resolution of 2.8 km.

The SPT determination is based on surface temperature and freezing level which represents the altitude in which the temperature is at 0 Celsius degrees. The results have been validated on selected dates against human surface weather observations (SYNOP and METAR reports) reported every hour. Fisher's Exact and chi-square tests for overall distribution have been performed and Fisher's Exact mid-P method has been applied for individual SPT. P values are presented to qualify statistical significance as function of model lead time. Radar based prediction of snow show better correlation with SPT obtained from COSMO model. The opposite behaviour is seen for warm rain and mixed precipitation is weakly predicted by all kind of data considered in this research.