



Real-time recognition of surface precipitation type (SPT) for high resolution precipitation data

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The surface precipitation type (SPT) algorithms are developed at IMGW-PIB for the needs of operational SEiNO system (System of Precipitation Estimation and Nowcasting). The main requirements for the algorithms are very high spatial (1 km x 1km) and temporal (10 min) resolutions and moreover a short delay time of products, not longer than a few minutes. Two groups of the algorithms have been developed: (i) for recognition of four precipitation classes: snow, sleet, freezing rain, and rain, (ii) for detection of hail.

The snow/rain algorithms are based on 3D temperatures from numerical weather prediction model COSMO (2.8 km). The temperatures are integrated into the five values: integrals of both positive and negative values up to 200 and 500 m a.g.l., and integral of positive values the whole column of the atmosphere. The integrals are applied in fuzzy logic scheme to determine the precipitation type for each wet pixel.

The hail detection is based mainly on weather radar data: maximum reflectivity value in column, vertically integrated liquid water, echo top of 4 and 40 dBZ radar reflectivity, and horizontal cut at 4 km a.s.l. (so called CAPPI). Moreover altitude of 0°C isotherm provided by COSMO is used. Fuzzy logic scheme, which employs the abovementioned parameters, has been designed to detect hail occurrence.

All the algorithms have been calibrated and verified on data from synoptic stations where precipitation type is determined every hour by manual observations.