

A neural-network approach for quantitative precipitation estimation using an operational polarimetric C-band radar in complex terrain scenarios

Gianfranco Vulpiani
Department of Civil Protection, Italy

E-mail: gianfranco.vulpiani@protezionecivile.it

Precipitation amount measurements provided by raingauge, despite considered as accurate, generally fail to represent small-scale meteorological variability due to their ineherent point-like essence. This limitation is accentuated in complex topography conditions characterized by small catchments with short response time. In this contest, weather radar observations provide complimentary information that, however, are accompanied by uncertainty. In this work, most of the error sources affecting the estimation process are dealt taking advantage by the dual-polarization capability of the considered operational C-band system belonging to the Italian radar network. A special focus is dedicated to the development and testing of a new neural-network technique employing reflectivity (Z) and specific differential phase (Kdp). The comparative performance analysis, accomplished on a dozen of rainfall events occurred in central Italy, highlights the flexibility and efficiency of the suggested methodology. The arcane, often accompanying neural networks, is unraveled providing details for the operational implementation of the proposed technique.