Precipitation Estimation from Radar Data Using Artificial Neural Network Systems

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In the last years, the artificial neural networks (ANN) have proved an attractive approach to non-linear regression problems arising in environmental modeling, such as short-term forecasting of atmospheric pollutant concentrations, rainfall run-off modeling and precipitation nowcasting using radar, satellite or meteorological data. The term nowcasting reflects the need of timely and accurate predictions of risks situations related to the development of severe meteorological events. The objective of this work is the very short term prediction of the rainfall field from radar data based on feed forward neural network approach. The radar dates used in this study were measured by the WSR-98D Doppler radar from north-east of the Romania territory. The reflectivity data sets extend over April to September 2008 period. The ANN system with reflectivity values as input variables was trained to predict the rain rate on the ground. The output vector consists of one variable namely the rain rate measured by a rain gauge on ground level. The two available rain gauges provided the rain rate in millimeters every one hour. Data-preprocessing or the selection of input variables was performed when necessary. The efficiency of ANN network in the estimation of the rain rate on the ground in comparison with that supplied by the weather radar is evaluated.