



An ANN forecasting system for convective storms: the legacy of the LAMPO project

Giovanna Venuti¹, Ehsan Mehdipour², Eugenio Realini³, Valerio Guglieri¹, Matteo Sangiorgio¹, Giorgio Guariso¹, Stefano Barindelli², Enrico Solazzo⁴, Riccardo Biondi⁵, and Matteo Cislaghi⁶

¹Politecnico di Milano, Italy (giovanna.venuti@polimi.it)

²Alfred Wegener Institute, Germany

³GReD srl, Italy

⁴ARPA Liguria, Italy

⁵Università di Padova, Italy

⁶ARPA Lombardia, Italy

Localized and rapidly developing convective storms are still a challenge for meteorological predictions. These events can seriously impact our lives, especially in areas prone to flash floods. The possibility to monitor rapid increases of atmospheric water vapor, a key ingredients of convective storms development, was the starting point for the LAMPO (Lombardy bases Advanced Meteorological Predictions and Observations) research project, financed by the CARIPLO foundation and carried on by Politecnico di Milano and ARPA Lombardia. Aiming at the mitigation of hydrogeological risks in the metropolitan area of Milano, the project explored the possibility to enhance the forecasting of convective storms in the Seveso River catchment, responsible for river floods and producing huge damages to the city. By exploiting standard meteorological data from the ARPA network, radar derived information on convective cell position from MeteoSwiss and innovative GNSS-derived water vapor products from the POLIMI spinoff GReD, the project allowed for the definition of a prototypal forecasting system based on a neural network model. Trained on a decade of properly selected and pre-processed data, the system forecasts the occurrence of convective storms one hour in advance with more than 80% accuracy.

The innovative aspects of the LAMPO project, including the experimental activities related to the low-cost GNSS network ad hoc installed for meteorological purposes, will be presented together with envisaged future perspectives.