Geophysical Research Abstracts
Vol. 20, EGU2018-4257, 2018
EGU General Assembly 2018

Set up a neural network for operational PM prediction in Pescara urban area (Central Italy)

Valentina Colaiuda (1), Marco Verdecchia (2), Annalina Lombardi (1), and Barbara Tomassetti (1)

(1) CETEMPS Center of Excellence, University of L'Aquila, L'Aquila, Italy, (2) Dept. of Physical and Chemical Sciences, University of L'Aquila, L'Aqula, Italy

A 8-year PM10 and PM2.5 daily concentration time series have been used to set up and test different artificial Neural Networks over three samplig stations settled in the Municipality of Pescara, Central Italy. All the proposed NNs have been trained with 6-years data using a combination of different inputs, such as observed meteorological data only and observed meteorological data and one-day-before PM concentrations. Moreover, the occurrence of working/holiday days and traffic ban periods have been taken into account during the training phase. Meteorological parameters measurements were available in one of the three sampling sites, however, in order to evaluate the generality degree of the NNs, the validation has been carried out by using a different meteorological data set, referred to a different weather station, installed within a range of 2 km from the three PM sampling sites.
Since the problem of PM concentration in urban areas is connected with the traffic conditions and human activities schedule and management, it is straightforward to use the neural network to predict future concentration of PM, using prognostic meteorological variables derived by operational simulations of Limited Area Models. For this reason, a further investigation about the neural network performance has been carried out using a meteorological model output and evaluating the impact on the NN simulations for introducing LAM intrinsic prognostic error.
The NN performance for the daily PM10 prediction has been assessed in terms of EU daily concentration legal limit excess detection, while the PM2.5 predictability has been investigated by comparing simulated and observed 2-years daily concentration time series. Preliminary results show a general good agreement between observed and simulated concnetration by using measured meteorological parameters as input. Preliminary results shows that the prediction is generally improved when infomration about PM concentration on the previous day is given, suggesting that setting up a real time air quality data flow to input the NN can really improve the prediction to 1-3 days. The overall probability of detection vary from 0.65 to 0.90, depending on the geographical position of the station and its exposure to the sea breeze. The prediction correct ratio is more than 0.9 in all cases. When operationl LAM models are used, the BIAS values are incremented, causing both an increase of the hit ratio and false alarm rate.