

## **Development and application of Artificial Neural Networks in the forecast of maximum daily precipitation at Athens, Greece**

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Extreme daily precipitation events are involved in significant environmental damages, because of causing adverse impacts, such as flash floods, in urban and even in rural areas. Thus, long-term forecast of such events is of great importance, in order the local authorities be prepared to confront and mitigate the adverse consequences.

The objective of this study is the possibility to forecast the maximum daily precipitation for the next coming year. For this reason, appropriate prognostic models, such as Artificial Neural Networks (ANN) were developed and applied. The data used for the analysis concern daily precipitation totals, which have been recorded at National Observatory of Athens (NOA), during the period 1891-2009. To evaluate the potential of precipitation prediction by the trained ANNs, a different period was used than the one used for the training for each station. The datasets of the period 1891-1980 were used as training datasets, while the datasets of the period 1981-2009 were used as validation datasets. Appropriate statistical indexes, such as the coefficient of determination ( $R^2$ ), the index of agreement (IA) and the root mean square error (RMSE), were applied to test the reliability of the predictive models.

The findings of the analysis showed that, the forecasted maximum daily precipitation totals for the next coming year compared to the respective original ones indicated a quite satisfactory relationship, at the statistically significant level  $p < 0.01$ .