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A statistical study of the weather impact on punctuality at European airports

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A hybrid regression/time series model was used to relate daily punctuality/delays at European airports to weather and airport system state parameters plus traffic. The selected modelling approach is applied to annual and multi-annual time series. Reduction of the initial input variables dimension is achieved through the application of various statistical tools. The predicted punctuality is corrected for autocorrelations in the residuals using autoregressive (AR) models. The portion of the variability that can be explained by the model (R^2) is between 50 and 70%, depending on the airport and the amount of available information. For the multi-annual time series a slight year-to-year variability in the number of statistically significant model parameters is found. Multi-annual time series also allow for a comparison of model-forecasted and observed punctualities/delays. It is shown that the deviation between the observed and the forecasted values is considerably small implying that a general punctuality forecast using numerical weather prediction (NWP) models and airport-system state variables is worth further investigation.