

Prediction and forecast of daily PM_{10} concentrations in Brno and Graz

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Abstract

For several sites in the two cities we establish forecasts of daily PM_{10} concentrations in the cold season (October to March) based on multiple linear regression and generalized linear models. The models utilize both measured covariates of the present day and meteorological forecasts of the next day. In our study we especially concentrate on an appropriate selection of the covariates which should also be easily available in operational mode.

The comparisons according different quality measures demonstrate the usefulness of both model approaches yielding results of similar quality. For Graz-Mitte located in a traffic area near to the pedestrian zone in the center, and for Graz-Süd positioned near to a commercial and industrial area it has to be expected that 85% of the daily forecasts are at least satisfactory if forecasts delivered by the meteorologists (operational mode).

In Brno the most precise forecasts can be obtained for the less exposed station Arboretum with 98% of acceptable forecasts. For the site Bohunice located in a residential area we achieved around 88% of acceptable forecasts. However, for the two most exposed traffic spots Židenice and Zvonarka this quality measure decreases to 74% mainly caused by less reliable forecasts of high PM_{10} concentrations $\geq 50\mu g/m^3$.

Keywords: Prediction and forecast of PM_{10} , Multiple linear regression, Generalized linear model, Meteorology

Literature

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