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The influence of surface cover characterisation on meteorological model results for an urban area

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The adequate representation of surface exchange processes is important to reproduce the boundary layer in a numerical model. The surface fluxes depend highly on the characteristics of the underlying surface cover and therefore an adequate determination of the surface cover parameters is necessary. This is particularly true for heterogeneous terrain such as urban areas.

In order to represent the surface properties, material properties of the surface is required (rather than land use data). For urban areas the surface properties are often derived individually from local authority data. Therefore, they may be inconsistent between different domains and vary in quality. Available data can also have rights restrictions that prevent making them available to other model users. To avoid this we have combined high-resolution and lower resolution surface cover data to characterise surface cover classes consistently in an unrestricted data set. These data are provided for end users of the meso-scale scale numerical model METRAS-PCL.

METRAS-PCL employs flux averaging for the representation of sub-grid scale processes. It is commonly applied in environmental assessments for air quality and also for urban climate applications. In order to allow consistent application of such a model across different domains an unrestricted data set of land cover characteristics was required. To achieve this, the level of detail had to be limited and is representative for average surface types.

Independently derived data sets have previously been prepared for selected domains. In comparison to such local data the occurrence of some surface cover classes differs significantly. This contribution quantifies the impact of the use of both rival data sets on meteorological model results for the metropolitan area of Hamburg.