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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Modelling the urban heat island of Hamburg considering anthropogenic heat release

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Urban structures as well as human activity leads to the development of a distinct urban climate within urban areas with well documented effects such as the urban heat island. Buildings, sealed surfaces and other urban structures affect the meteorological processes in the obstacle layer, leading to differences of heat storage, water availability, radiation, and wind and turbulence fields compared to rural surroundings which ultimately alter the air temperature. Besides these indirect effects on urban temperatures. human activity can also have a direct effect on temperatures in the urban area through the release of waste energy which leads to an anthropogenic heat flux.

The anthropogenic heat flux has been parameterised for the urban area of Hamburg in a high spatial and temporal resolution based on the total energy consumption and patterns of human activity. Spatial patterns have been derived from high resolution urban land use data while temporal development is based on diurnal, weekly and annual time functions per energy consumption sector.

In this case study, the parameterised anthropogenic heat flux is incorporated in the mesoscale meteorology model METRAS in order to quantify the impact on the urban heat island of the urban area of Hamburg. The methodology and results of the numerical model will be presented.