

TEB : an urban canopy model for meteorological applications and weather forecasting

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Abstract

The Town Energy Balance (TEB, Masson 2000) is an urban canopy model that has been developed at Meteo France in order to improve the representation of cities in the meteorological models with spatial resolutions from a few tens of kilometers to a few hundreds of meters.

The built-up covers are represented by using a simplified 3D geometry based on the concept of urban canyon from Oke (1987). A set of mean geometric parameters describes the urban arrangement, and radiative and thermal properties are associated with roof, road, and wall materials.

The radiation and energy balances are resolved independently for roads, roofs and walls. They take into account the shadow effects, as well as the radiation trapping, inside the canyons that are key processes for the urban micro-climate modeling (more specifically, the urban heat island). The model also computes a mean profile of temperature, humidity, and wind within the canyons.

TEB has been implemented in the AROME forecast model from Meteo France, as well as in the GEM Canadian model. It currently runs operationally over France with AROME at 2.5 km of resolution. It is also used in recent works for studying the impact of the climate change on the urban micro-climate, and proposing mitigation and adaptation strategies.

