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The Land Surface Temperature from MODIS imagery to estimate the Urban Heat Island (UHI) over the metropolitan area of Milan

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The importance of the acquisition of temperature in hydrological and climatological analysis has been well established. Usually this variable is collected from Automatic Weather Stations (AWS) but the sparse distribution of these measurements represent a limitation. The Urban Heat Island (UHI) over well populated areas has been observed since a lot of years. The UHI has been generally observed using the data of meteorological stations, but the result of the analysis is limited by the distribution of the measurements.

In this context, remote sensing can offer a key contribution allowing to perform an analysis that is global and impartial, since it regularly provides spatially distributed and repeatable information over large areas.

Also in the study of UHI, satellite images can help to well observe and understand the phenomenon.

In this study, we have collected a considerable number of nightly and daily MODIS images (the product MOD10) to obtain the Land Surface Temperature (LST) over the metropolitan area of Milan.

The remotely sensed temperature has been compared to the temperature of meteorological station as validation and then it has been used to operate a spatialization. The AWS temperature and the LST has to be treated in a different way because they refer to different values. To relate the two temperature the land cover of the area is a key

parameter in the discrimination. In particular, if it isn't available the land use of the studied area, it is possible to compute the NDVI index that allows to distinguish areas with or without vegetation. In fact, vegetation (with also evapotranspiration of bare soils) influences the temperature of the surface.

A directional (N-S-W-E) analysis has been performed to find the relationship between UHI and distribution of the town in different directions. Then, an area test of about 3000 km^2 has been selected around the downtown of Milan. It has been possible to discriminate some concentric zones at different temperature.

The analysis allow to demonstrate a direct correlation between urbanisation and temperature over the analysed area.