Analysis of urban heat island effect with classification trees

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The Po Valley is an aerological basin surrounded by reliefs, characterized by weak winds and densely urbanized. In this region, urban air quality assessment and heat wave forecast require a good knowledge of the urban meteorological features. Therefore, the local meteorological network has been integrated two years ago with nine urban stations.

The aim of this work is to answer to the following questions: what is the intensity of the urban heat island (UHI) in these nine cities? what are the differencies between cities? in what season is the UHI larger? at what time in the day? And finally: what are the meteorological conditions which are in favour to the development of the UHI?

Temperature and relative humidity data, collected by the nine urban stations, have been analized and compared with data of rural stations. It was found that, during the night, urban areas are often warmer and dryer than the surrounding rural areas. The nocturnal UHI intensity often exceeds +5K. During the day the differences are smaller and can become even negative in spring and in summer. This result is in agreement with the tipical features of the UHI.

Classification trees have been used to identify meteorological conditions in favour of the development of the UHI. Some daily averaged meteorological variables have been tested as predictor variables: cumulated precipitation, wind speed, computed clear sky direct solar radiation and measured incoming solar radiation normalized with the computed clear sky direct solar radiation. First results show that the last, which is dependent on the cloud cover, is the most relevant predictor.