



Analysis of local climate areas in Bilbao with on-site measurements

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It is well known that urban development changes regional climate. However depending on the characteristics of the development (building height, built surface fraction, sky view factor, ...), urban climate variables can change even inside the same metropolitan area. Thus, local climate areas have to be considered.

To evaluate these local climate areas that differ from each other, the more reliable method is to carry out on-site measurements.

Three type of local climate measurement campaigns have been developed in the last two years in Bilbao municipality with the aim of characterizing local climate areas:

1. Mobile measurements along a transverse profile of the city,
2. Microclimatological mobile measurements in four specific areas,
3. Daily evolution of climatic variables at fixed locations.

In the case of mobile measurement an easy carriage was considered including devices to measure the following variables: temperature, relative humidity, pressure, wind speed and direction and globe temperature. These include all the variables to evaluate thermal comfort and so the PET Index (Physiological Environmental temperature) was derived.

In the case of fixed measurement two types of techniques were used. On one hand, the same devices mentioned in the previous paragraph were used in two locations during two months. On the other hand, USB temperature and relative humidity data loggers were located in specific areas of the city in periods of several days. These measurements have allowed the evaluation of the evolution of climatic variables along the day.

The results show the existence of different climate areas inside the city of Bilbao. The results are partially influenced by the location of the city in the proximity of the Cantabrian sea but also by the channelling of the air flow and sea breezes due to the mountain ranges at each side of the urban area. So, together with the type of urban development, topographic aspects and sea breezes appear to have significant influence in local urban climate.

The measurement techniques used are simple and reliable for the aim of evaluating specific climate areas. Both mobile and fixed daily measurements should be carried out together to cover spatial variations as well as temporal evolution along the day. Of course, this information is very important and will be used in developing the urban climate map of Bilbao.