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Extreme daily records of urban heat island effect over Barcelona city (NE Spain) and their linkages with synoptic conditions

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Differences between series of minimum temperatures recorded for the 2008-2014 period at two stations located in Barcelona city centre (Raval) and at Barcelona Airport (El Prat de Llobregat), in the metropolitan area, are analysed with the aim of establishing the day-by-day behaviour of the UHI phenomenon. This study is particularly focused on extreme minimum temperature differences between Raval and El Prat series. For this purpose, 1% of the highest differences have been selected, these discrepancies ranging from 5.2 to 6.7 ºC. It is worth mentioning that all these extreme differences correspond to 29 days belonging to the cold seasons of the year, from November to March. In particular, 14 out of 29 days correspond to January. NCEP reanalyses show that 15 out of 29 cases are clearly related to N or NE advections; 7 out of 29 are linked to anticyclonic persistence, and only 4 can be clearly related to western advection. It is also worth mentioning that, whereas for some of these selected days negative minimum temperatures are recorded at El Prat, Barcelona city centre (Raval) exhibits relatively warm minimum temperatures, ranging from 3.3 to 14.0 ºC.