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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The diurnal evolution of the urban heat island of Paris: a model-based case study during Summer 2006" *by* H. Wouters et al.

Anonymous Referee #2

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The manuscript seems essentially correct in its technical part and it addresses soundly and with a good rationale its scientific aims. It manages to quantify the extension and strength of the Paris Urban heat Island and provides hypotheses explaining it. The methodology is interesting and the findings relevant. Its reading conducts me to some questions:

a) why the ground heat flux (G) is not even mentioned in the subsection of the surface energy budget. The authors should clarify why they do this. In the nighttime this flux can be important. The surface scheme that they describe computes G but here nothing is said. This should be put in perspective and justified. Can you neglect G in the city center or do you put it inside the anthropogenic flux? If so, why?

b) Comparison of computed and observed profiles at Trappes (rural?) seems to indicate that the model tends to produce too stable layers in some of the nocturnal profiles. A bias around 1 K is mentioned in the text for the urban areas and 1.5 for the rural ones. Default is attributed to deficiencies in the turbulence scheme but it could be also that other regional structures, such as low-level circulations induced by the topography or the urban heat island itself, generate mixing by shear and that these are not well captured by the model. Almost no vertical information on the wind is given, so nothing can be concluded on this issue: were there low-level jets observed? and modelled? if so, could they be relevant?

c) In section 3.4.1. the nocturnal radiation cooling is discarded readily just mentioning a reference. This important decision should be more sustained since, for very stable nights with weak turbulence, radiation may be even dominant. If you decide to neglect it, it must be because turbulence is large enough, logical over the city, but less clear for the rural scenario case. You take a wind of 3.5 m/s for the advected air, but this can easily lead to very low values of wind in the surface layer and decouple it from above, making radiation relevant there.

d) is the wind from the east a synoptic feature? One would say that, for weak synoptic pressure gradients, the wind would blow from the west, downslope. Then there would be no uplift due to topography. How would that change the picture?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 25941, 2012.