

**The diurnal evolution of the urban heat island of Paris: a model-based case study during Summer 2006**

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acpd-12-25941-2012

**Review**

This article presents numerical simulations of the 2006 heat wave over Paris region performed with ARPS, as well as a theoretical analysis based on an idealized advection model that aims at identifying and quantifying the processes that drive the nocturnal urban heat island.

This case study is interesting and gives rise to new and relevant results. The authors have a clear and rigorous approach. Finally, the form of the paper is neat, whether for the text or the figures. However, English could be improved and figure captions could be sometimes simplified. Whatever, I accept this paper with minor revisions.

I have very few comments (mainly typing corrections):

P25943, L2

“characteristics” (instead “characterstics”)

P25943, L4

“...favoured by high solar irradiation...” not clear (during the previous daytime period)

P25943, L9-L28

This part of the introduction does not add much. Authors should instead focus on the state of the art on the understanding of the processes (which is the subject of this article).

P25944, L16

“known” instead “know”

P25944, L18

“...mixed-layer height ~~during the day~~ is at least ...”

P25944, L19

...than ~~the~~ during the day and ...”

P25944, L16

“...Therefore. An ~~an~~ idealized advection model...”

P25945, L1

...little is known about orographic...”

P25945, L10

“... for an in-depth analysis of the evolution...”

P25945, L19

References must be in alphabetical order or in the order of year of publication (check all)

P25945, L23

“...using Ridder’s (1979)...”: reference is missing

P25946, L3

“... Rodell et al. (see 2004) ...”

P25947, L1-L2

“... with values reaching...” : this has been already specified earlier in the text

P25947, L16

“... at horizontal resolution of 16, 4, 1km.”

P25948, L8

“...(Jain, 1989) are applied subsequently...”

P25949, Eq(2)

Mistake in the sign of equation

P25949, L18

“...can be integrated from Eq. (2):”

P25951, L25

“.. have a daily mean of ...”

P25951, L26

“... or 19% which starts to increase too early...”

P25953, 1<sup>st</sup> / 2<sup>nd</sup> paragraphs

These paragraphs are not clear. For instance, “The reduction in latent heat is the most important urban heating mechanism ...” is a bit confusing.

P25956, L6-L9

It would be more appropriate to remove this sentence. It is repeated in the conclusion of the section and in the conclusion of the paper.

P25956, L22

How the fit has been done? (It does not seem to be the best for the run SCEN?)

P25958, L12

“decreases” instead “increases” ??

P25958, L17

You could also mention that the vertical extent of the UHI is different.

P25959, L9

“... is not sophisticated, the UHI...”

P25966

Ref “Makar et al. 2006” is missing

Figures

General comment: the captions are sometimes very long and should be simplified.

Fig.2 and Fig.3

These diagrams are not very clear. You should specify which curve is for  $\theta(t)$  and which one is for  $\theta(t+dt)$  and clarify the values on x-axis and y-axis. The dotted line for the  $\theta(t)$  vertical profile is not clear and confusing with the dotted lines used to show  $dh$ .

Fig.9

You should add the star that indicates the Paris city centre (like for Fig.10).