ICUC9 - 9th International Conference on Urban Climate jointly with 12th Symposium on the Urban Environment

The project is co-financed by the European Union

Urban climate monitoring system suitability for intra-urban thermal comfort observations in Novi Sad (Serbia) – with 2014 examples

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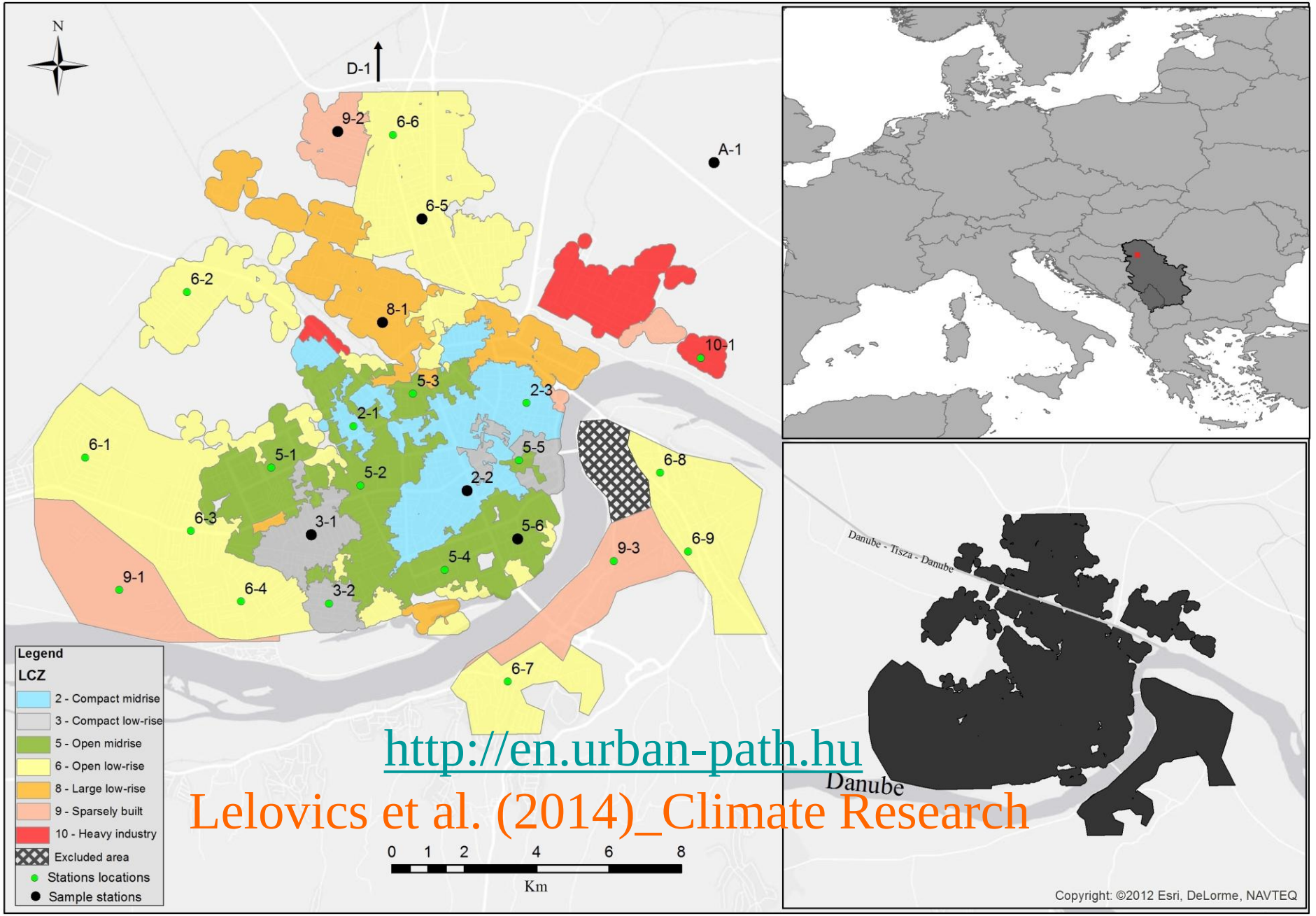
23/07/2015

Introduction

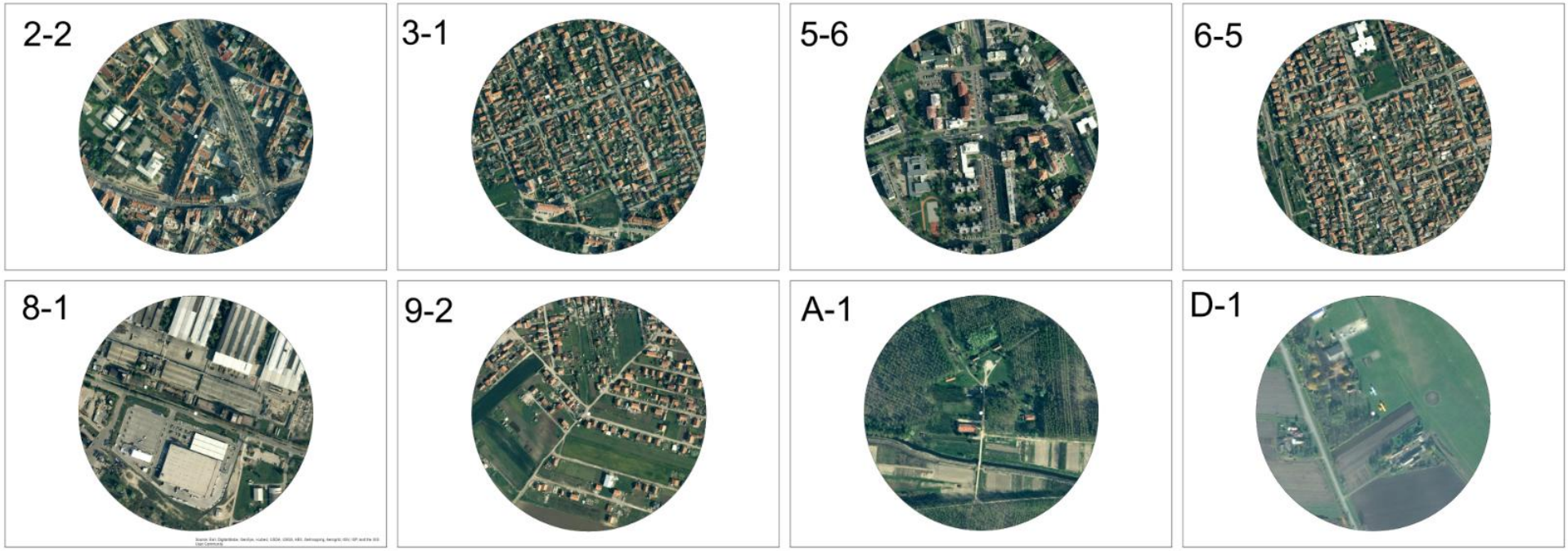


http://en.urban-path.hu

Lelovics et al. (2014)_Climate Research

Materials and methods

•Eight stations in different LCZ's

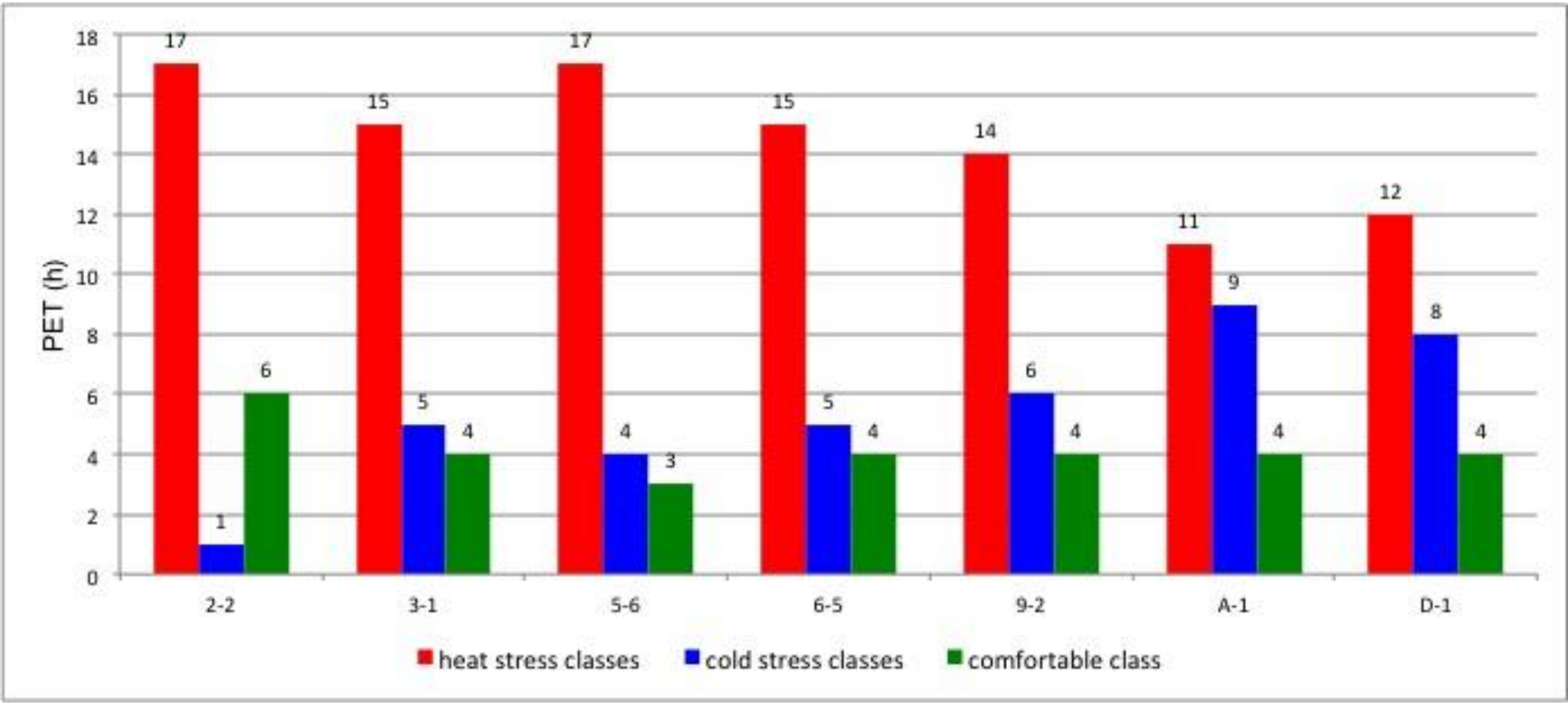


•RayMan model (Matzarakis et al. 2007): modeling of urban environment around stations and hourly PET (Höppe 1999) calculation

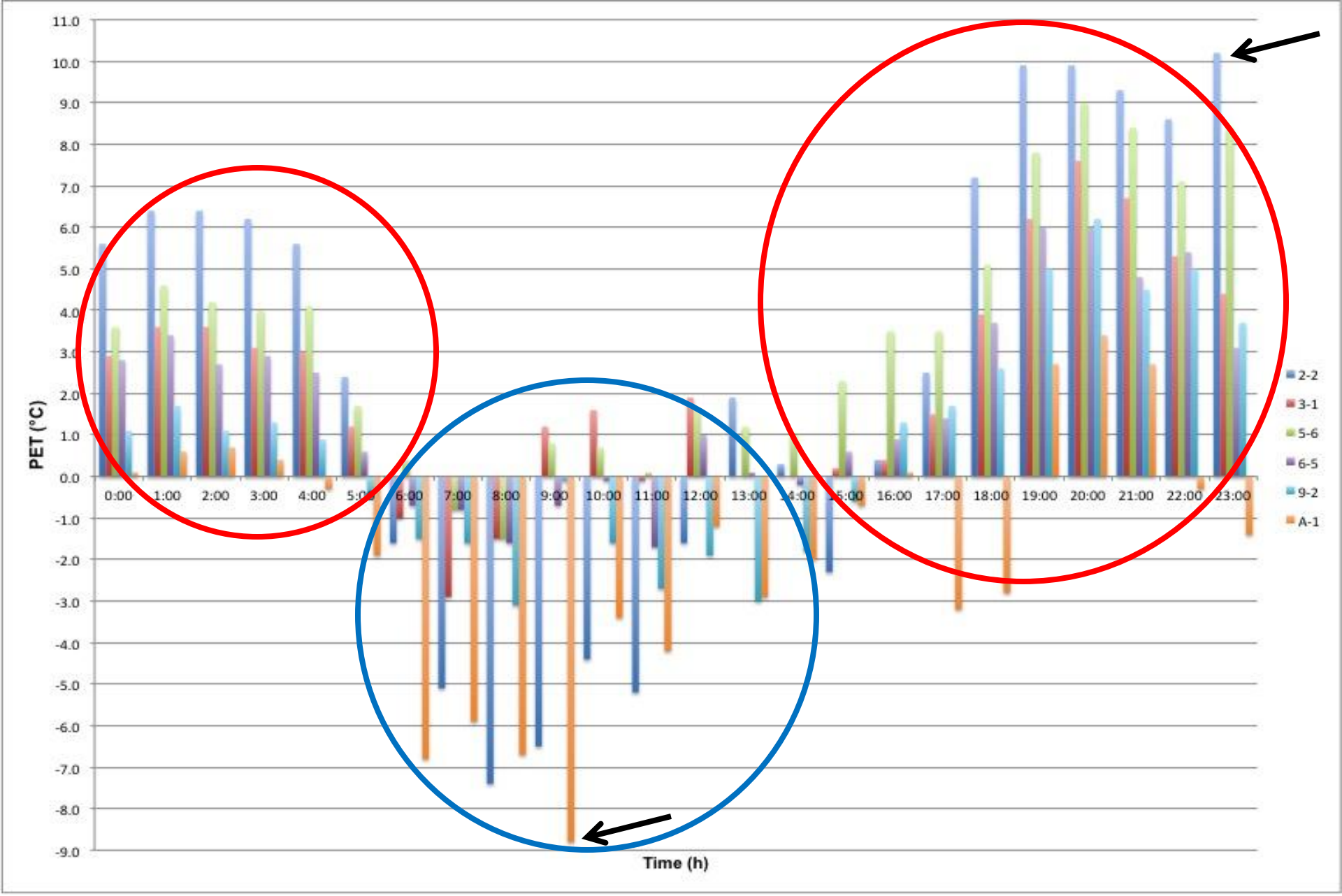
•Selected extreme temperature days:
August 13th 2014 (tropical day) and December 31st 2014 (icy day)

Results

1. Thermal comfort during tropical day (August 13th, 2014)



Distribution of PET classes (in hours) for different grades of thermal perception by human beings

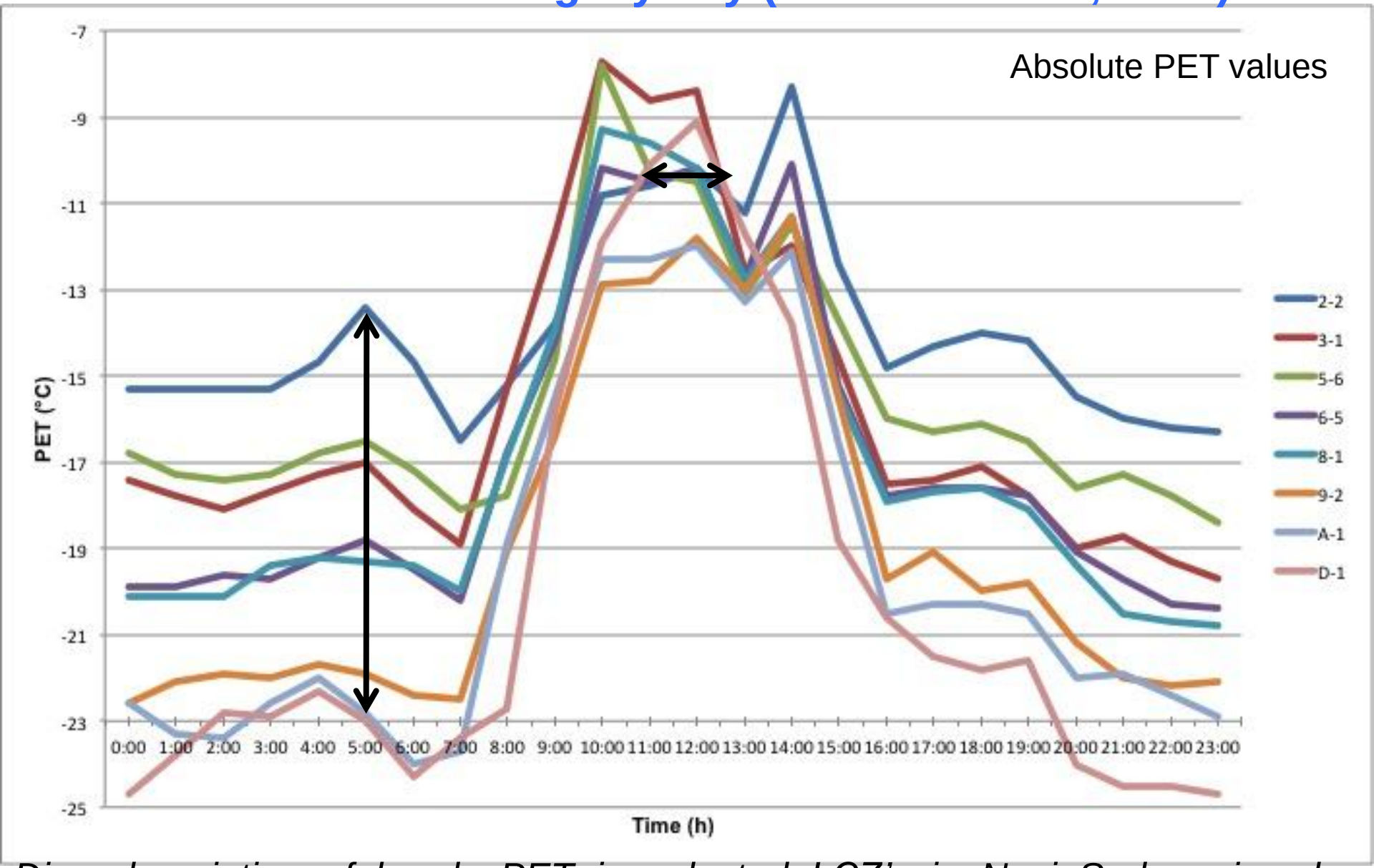


Hourly PET differences between selected LCZ's and LCZ D ($\Delta PET_{LCZx\text{-}D}$) in Novi Sad during the tropical day (August 13th, 2014)

Tab 1. Average difference between pairs of LCZ types $\Delta PET_{LCZx\text{-}y}$ for August 13th, 2014 in Novi Sad. Differences are presented as the LCZ type in column minus the LCZ type in row.

Stations	**2-2**	**3-1**	**5-6**	**6-5**	**9-2**	**A-1**	**D-1**
2-2	-	-0.2	0.9	-0.7	-1.7	-4.2	-2.4
3-1	0.2	-	1.2	-0.4	-1.5	-3.9	-2.2
5-6	-0.9	-1.2	-	-1.6	-2.6	-5.1	-3.4
6-5	0.7	0.4	1.6	-	-1.0	-3.5	-1.8
9-2	1.7	1.5	2.6	1.0	-	-2.5	-0.7
A-1	4.2	3.9	5.1	3.5	2.5	-	1.7
D-1	2.4	2.2	3.4	1.8	0.7	-1.7	-

2. Thermal comfort during icy day (December 31st, 2014)



Diurnal variation of hourly PET in selected LCZ's in Novi Sad on icy day (December 31st, 2014)

Tab 2. Average difference between pairs of LCZ types $\Delta PET_{LCZx\text{-}y}$ for December 31st, 2014 in Novi Sad. Differences are presented as the LCZ type in column minus the LCZ type in row.

Stations	**2-2**	**3-1**	**5-6**	**6-5**	**8-1**	**9-2**	**A-1**	**D-1**
2-2	-	-1.9	-1.6	-3.0	-3.1	-5.1	-5.6	-6.3
3-1	1.9	-	0.3	-1.1	-1.3	-3.2	-3.7	-4.4
5-6	1.6	-0.3	-	-1.4	-1.5	-3.5	-4.0	-4.7
6-5	3.0	1.1	1.4	-	-0.1	-2.0	-2.5	-3.2
8-1	3.1	1.3	1.5	0.1	-	-2.0	-2.4	-3.1
9-2	5.1	3.2	3.5	2.0	2.0	-	-0.5	-1.2
A-1	5.6	3.7	4.0	2.5	2.4	0.5	-	-0.7
D-1	6.3	4.4	4.7	3.2	3.1	1.2	0.7	-

Conclusions

•PET differences between similar LCZ's are less than 2.0 ° C and up to 6.3 ° C between dissimilar LCZ's.

•Urban climate monitoring system showed to be **suitable** for intra-urban thermal comfort observations in Novi Sad.

•**Further long-term** UHI and human thermal comfort **investigations** are needed in order to evaluate and improve the proposed LCZ scheme.

•**Long-term studies** of human thermal comfort from urban climate networks based on LCZ division could **locate** heat stress, comfortable and cold **stress areas in the cities**.

This would be a **valuable contribution for urban planning strategies** in order to counterattack the adverse effects of urban climate and climate change.

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Hungary-Serbia
IPA Cross-border Co-operation Programme

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Thank you for your attention!

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