

## ***Interactive comment on “A new approach for highly resolved air temperature measurements in urban areas” by M. Buttstädt et al.***

**M. Buttstädt et al.**

buttstaedt@humtec.rwth-aachen.de

Received and published: 20 June 2011

Dear Referee,

Many thanks for your considerations. We extracted paragraphs from your comments in order to make our replies easier to follow.

“[...] neither really new methodology of studies on urban climate nor remarkable results.”

The presented measurement technique allows a sampling of air temperature data in cities with a high representation in time and space. The special characteristic of this methodological approach is mainly the combination of a high spatial resolution that is adjusted to typical urban structures and a very high quantity of data. This provides the

C898

basis for comprehensive statistical analyses in relation with local-scale urban structure data. First samples are presented in order to show the applicability of the data. Data records obtained from the continuing data collection are processed in a subsequent investigation that deals with an estimation of local air temperature modification by various urban structures. Furthermore, the advantages of our approach are the set up of a data collection system with a manageable temperature and GPS data logger - which permits a permanent control of the driving status - and the usage of a reliable long-term carrier system. In this respect, especially the long-term carrier system is of great importance. Until now, data from approximately 40 days are available. About 80,000 temperature values have been measured so far at 256 points along four bus routes with a temporal resolution of mostly less than two hours in all seasons. Such an extensive data set cannot be achieved by traditional mobile data acquisition. Only tram-based systems may reach a similar data quantity. However, since trams usually operate along major roads or on separate traces, analyses of small-scale differences between spatially proximate urban quarters - or even between single street sections - are subject to restrictions. Using bicycles or single automobiles would massively reduce spatial representation compared to simultaneous recording along four different bus routes as well as a measuring duration of about 20 hours daily - comprising usually more than ten bus rides along each traverse. We are not aware of any other published study that combines a public bus transport system with GPS-controlled automated temperature probes. Therefore and despite your statement, we indeed consider our contribution as novel and substantial.

“[...] motivating for other studies [...]”

Thank you also for your comment on the motivational aspect for other studies. Indeed, our approach has already been adopted from colleagues of the University of Hamburg in order to complement temperature measurements at permanent stations and to detect inner-city temperature differences for a selected area of the city of Hamburg. Due to the greater urban area of Hamburg, 15 public buses will be equipped with similar

C899

instruments. Our approach can easily be transferred to other urban areas regardless of the city size. The only precondition is the availability of a local bus system.

“[...] urban contrasts collected in the “cooling phase” as an example is not very accurate.” Consideration of “[...] well developed UHI at midnight.”

This first example of an analysis of urban contrasts in different periods of the day is based on values averaged over five hours as the amount of available data for an analysis of shorter periods was not sufficient at that time. With ongoing data collection and increasing data quantity we will be able to analyze hourly variations. Presently, we aim for analyzing the temperature behavior throughout the whole day. Since there is no data for the late nighttime available at the moment, we will add nocturnal temperature measurements in future by common approaches to detect temperature hot spots during well developed nighttime UHI.

“On the other hand author stress that results can be useful in many practical applications [...]. Such applications need the information on extremely well developed UHI (its spatial distribution and relation to meteorological conditions) rather than estimations of average UHI. Such information can be hardly get with the aid of presented measurement system.”

Our approach primarily assesses the spatial distribution of air temperature within urban areas. Later, this knowledge can be combined with data from few semi-permanent stations in order to provide data on temporal aspects and absolute amplitudes of the UHI. Combining both, hot spots of vulnerability in terms heat load with the city can very well be identified. Therefore, we still think that our above cited statement is valid.

---

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 1001, 2011.