



## Experimental Urban Heat Island Research of Four Biggest Polar Cities in Northern Hemisphere

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Urban Heat Island (UHI) effect is well-known in modern climatology due to its influence on different economic features and urban air quality (Oke, 1987). Also UHI characteristics differs in different climate zones, for example in summer in Mediterranean and subtropical monsoon climate types it leads to growing energy consumption due to AC systems using (Ohashi et al, 2007). But there is only a few papers about UHI (Magee et al, 1999) in high latitudes, for the cities over the Polar Circle and especially about behavior of the heat islands during the polar night, while anthropogenic heat is the main source of thermal energy. The main goal of this study is to mitigate this lack of information about climatology of UHI formation in big cities (with population exceeding 50 000) of Arctic zone.

In this paper, we consider the results of experimental research of the UHI of 4 biggest Arctic Cities (Murmansk, Norilsk, Apatity and Vorkuta), which were obtained during the expedition of Russian Geographic Society in 2013-2014. During the project we used a different measurements techniques:

1. Installation of two automatic weather stations (AWS) in rural zone and city center
2. Installation of small temperature sensors (iButton) network in the city and suburbs
3. Regular car-based temperature sounding of the city with AWS.
4. Using MTP-5 microwave temperature profiler.

This investigations allowed to collect unique data about UHI in high latitudes. Analysis of the collected data showed the existence of UHI with the difference between city center and surrounding landscape up to few degrees Celcius. UHI characteristics in view of synoptic conditions was analyzed for several typical situations, for some cities (Norilsk) the negative correlation of the UHI power with air temperature was determined.

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