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Urban Heat Island's intensity research of Arctic city during winter (Apatity case-study) and its influence on inhabitants' thermal comfort

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The heat island for cities in tropical and temperate latitudes by now has been studied quite well. (Oke, 1987, etc.). However, the formation of heat islands in the polar cities is scarcely explored. For the polar regions, such work was carried out only in towns in Alaska (Magee et.al., 1999).
At the same time, features of UHI in the largest Arctic towns remained unknown. So far, the question of the principal possibility of formation of heat islands in the polar night is still open. According to (Oke, 1987; Ryu, Baik, 2012), one of the major reasons for its occurrence is considered to be more effective absorption and accumulation of solar heat in the town.
In this study, we consider the results of the experimental research of the UHI of Apatity town with population about 57 000 inhabitants (the fifth among the biggest cities, located to the north from the Arctic circle), located in Murmansk region of Russia. Also the data of first constant measurements of UHI's intensity by automatic weather stations during winter 2015-2016 are analysed as well as its physical basis (e.g. orography etc).
Analysis of the collected data showed the existence of significant UHI with the difference between city center and surrounding landscape up to 5-8ºC and amplitude inconsistencies of several biometeorological indices, particularly PET (physiological equivalent temperature), WBGT and wind chill.

References:

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