Geophysical Research Abstracts
Vol. 12, EGU2010-7262, 2010
EGU General Assembly 2010

Anthropogenic heat fluxes over Moscow agglomeration and other Russian and world cities

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Urbanization, particularly with respect to its sustainability, remains to be a great challenge in all regions of the world. Urbanization has an influence on soils, hydrology, and climate, these changes have effect on global climate, pollution, increase of anthropogenic greenhouse gases in the earth's atmosphere and human health.

Thus anthropogenic heat flux is an important factor for estimation of development of global climate. The simple formula for anthropogenic heat fluxes (AHF) was proposed in the EGU General Assembly 2008 presentation [1]

$$AHF = k \times PD \times EC,$$

were PD is urban population density and EC is total energy consumption per capita. It was estimated that two of the world megacities – Seoul and Moscow – have the highest AHF values – 83 and 56 W/m^2 correspondently.

In presented paper it was studied the reasons of such high anthropogenic heat fluxes within Moscow region as well as AHF over the major Russian cities. It was shown that main reason of this circumstance is the administrative divisions in Moscow region. Moscow is ringed by Moscow circle motor road. Accordingly the city has sharply defined boundaries and densely populated residential suburbs are cut off and don't included in Moscow city administrative area.

It was constructed the special graph to illuminate why Moscow city has such a high anthropogenic heat factor and how much Moscow agglomeration AHF could be if consider not only Moscow city itself but also the nearest suburb towns.

Using the data from World Bank [2] and Russian governmental statistic agency [3] anthropogenic heat fluxes for Russian cities with population more than 500 000 were estimated. Energy consumption data for different Russian regions were calculated by special routine using in the Web-atlas [4].

This research is supported by RAS Fundamental Research Project "Influence of anthropogenic heat fluxes and aerosol pollution on heat balance and climate of urbanized areas". Other results of this project is presented in paper [5].

References:

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