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Urban wind fields: Phenomena in transformation

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ABSTRACT

This article shows how undisturbed wind streams undergo complex transformations in speed and direction as they interact with different features in various areas of Krasnoyarsk City. Fifteen years of data from urban monitoring stations were collected, averaged and analyzed, and these data show how buildings' layout determines the number of possible wind speeds and directions at specific monitoring points.

Wind speeds at some monitoring stations can increase up to 40% as compared to the undisturbed wind flow speed at the meteorological station. But some urban points have 300% more calm periods than at the station outside the city.

This paper shows the complete transformation of the undisturbed wind flow caused by non-uniform relief and building arrangements. These results can be used to verify numerical simulation models of air pollution dispersion and to use this information to better parametrize a wide range of problems of wind flows in urban areas.

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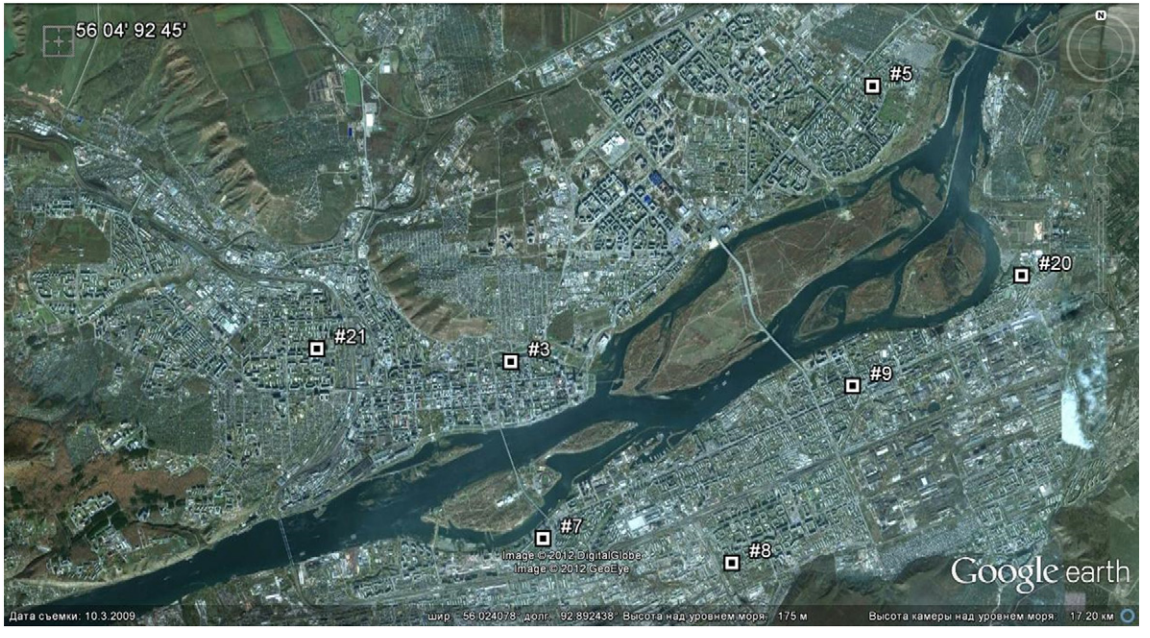

Fig. 1. At the top left corner is the Krasnoyarsk meteorological station (Index WMO 29570) and the numbered points are the city weather and air pollution monitoring stations in Krasnoyarsk City.