

District scale thermal environment simulations and observations

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The understanding of these air-thermal and wind conditions in the streets of the well-matured district gets more important because the conditions get worse especially in summer. The reasons for the uncomfortable wind are the complex shape of the building in the districts. The others in the thermal conditions are mainly by the heat-island effects and the global warming in climate change. Indeed, the average temperature in Yokohama-City increases more than that of the global warming. The temperature increase, for example, tends to increase the frequency of a thermal attack to people in the street. The local government officers now try to improve the environment to reduce / decline some kinds of the thermal attacks, then, they demand the information about these thermal and wind conditions.

Here we have performed detailed numerical simulations and observations in order to understand these thermal and wind condition in the streets. The site is Minato-Mirai 21 district (MM21) in Yokohama bay area. The resolutions are 5 meter in space, below 1 second in time. The heat emissions from these air-conditioners, factories, plants, cars, and so on. The land use conditions are also spatially resolved in the calculations. The results are compared with observation results to understand what kinds of the physical processes work there. The pseudo-particle analysis is also performed, then it is frequently observed that the cool air parcels are penetrated into the center of MM21.

These results could bring very useful information to both the local government officers and the stakeholders to improve and design the street environments.

Keywords: Heat environment simulation, particle analysis