

## A study on the thermal environment of "Yato" area in hilly city -Analyzing air temperature and wind distribution by observation and numerical calculation-

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In recent years, the thermal environment in urbanized areas is becoming increasingly inhospitable for residents because of urban heat island effect and global warming. These phenomena are collectively regarded as urban warming. Consequently, some problems, such as loss of inhabitant's comfortable life, increasing of the energy consumption for cooling, extreme weather event and health hazard will occur. Such effects by urban warming is caused in Yokohama city, Kanagawa prefecture that is a target place of this study, and countermeasures to urban warming are demanded. Yokohama city faced Tokyo bay and Sagami bay is located southwest of this city. Therefore, air temperature reduction effect by sea breeze is expected during daytime and utilizing its effect is important as one of the way to mitigate urban warming effect in this area. However, Yokohama city is hilly city and a lot of small valleys called "Yato" is existing around Yokohama city. Yato is original landscape and it was base of natural environment in Yokohama city. Most of such natural area was urbanized by urban sprawl during high economic growth period. Generally, such valley area seems to be bad ventilation and heat tends to accumulate because of its topographical characteristics. Therefore, thermal environment in urbanized Yato tends to become more severe than other urbanized area. On the other hand, cold air drainage from slope green in Yato may be possible to improve thermal environment during nighttime. So, considering land use of Yato adequately is important to mitigate urban warming effect in Yokohama city. From these background, understanding thermal and wind environment and analyzing benefits and problems in Yato are important for sustainable urban environment in Yokohama city. In this study, authors conducted two observations. First one is conducted by using Stevenson screens located at elementary schools in Yokohama city and differences of air temperature distribution patterns between inside and outside of Yato. Second one is thermal and wind environment observation at typical Yato in Bukkou-cho, Hodogaya ward, Yokohama city and air temperature distribution tendency and high air temperature zone in this area are detected. For analyzing in detail, thermal and wind environment around Bukkou-cho area are calculated by Multi-Scale Simulator for the Geoenvironment (MSSG). By using these results, thermal and wind environment are analyzed especially from the perspective of wind ventilation during daytime and cold air drainage with slope green during nighttime. In addition, future planning of Yato such as landuse patterns are discussed by utilizing these results.

Keywords: Thermal environment, Yato, Cold air drainage, Air temperature observation