

ANALYSIS OF SENSIBLE HEAT, LATENT HEAT AND MEAN KINETIC ENERGY
BALANCE OF MOVING CONTROL VOLUME ALONG SEA BREEZE BASED ON
MESOSCALE CLIMATE SIMULATION

To clarify the interaction between sea breeze and urban climate, it is effective to analyze heat and kinetic energy balance of sea breeze itself. The authors had proposed the model to calculate heat and kinetic energy balance of urban atmosphere in the previous study. In the model, an arbitrary domain fixed a certain region is regarded as the Control Volume. In this paper, a new concept “moving Control Volume” along the sea breeze was proposed. Moreover, the sea breeze over the Kanto Plain in Japan was simulated using a mesoscale meteorological model incorporating with an urban canopy model, and heat and mean kinetic energy balances of the sea breeze was analyzed.

From the results, it was clarified that the resistance and turbulence caused by buildings interrupted the inland penetration of sea breeze in Tokyo 23 Ward, and adverse pressure gradients interrupted in the internal region. The above interruption effect by buildings is increased in accordance with the height of urban structures. In addition, raising height of buildings changes the temperature, absolute humidity, and penetrating speed of sea breeze. These reasons were explained quantitatively with respect to the sensible heat, latent heat and kinetic energy of the sea breeze.