

Research objective

Background

- ❑ Changes in the occurrence structure of air pollution
- ❑ Poor ventilation performance of outdoor space in cities
- ❑ Local air pollutions in cities
- ❑ Increase in the concentration of photochemical oxidant produced in the atmosphere
- ❑ Significant improvement in computing power

Research objective

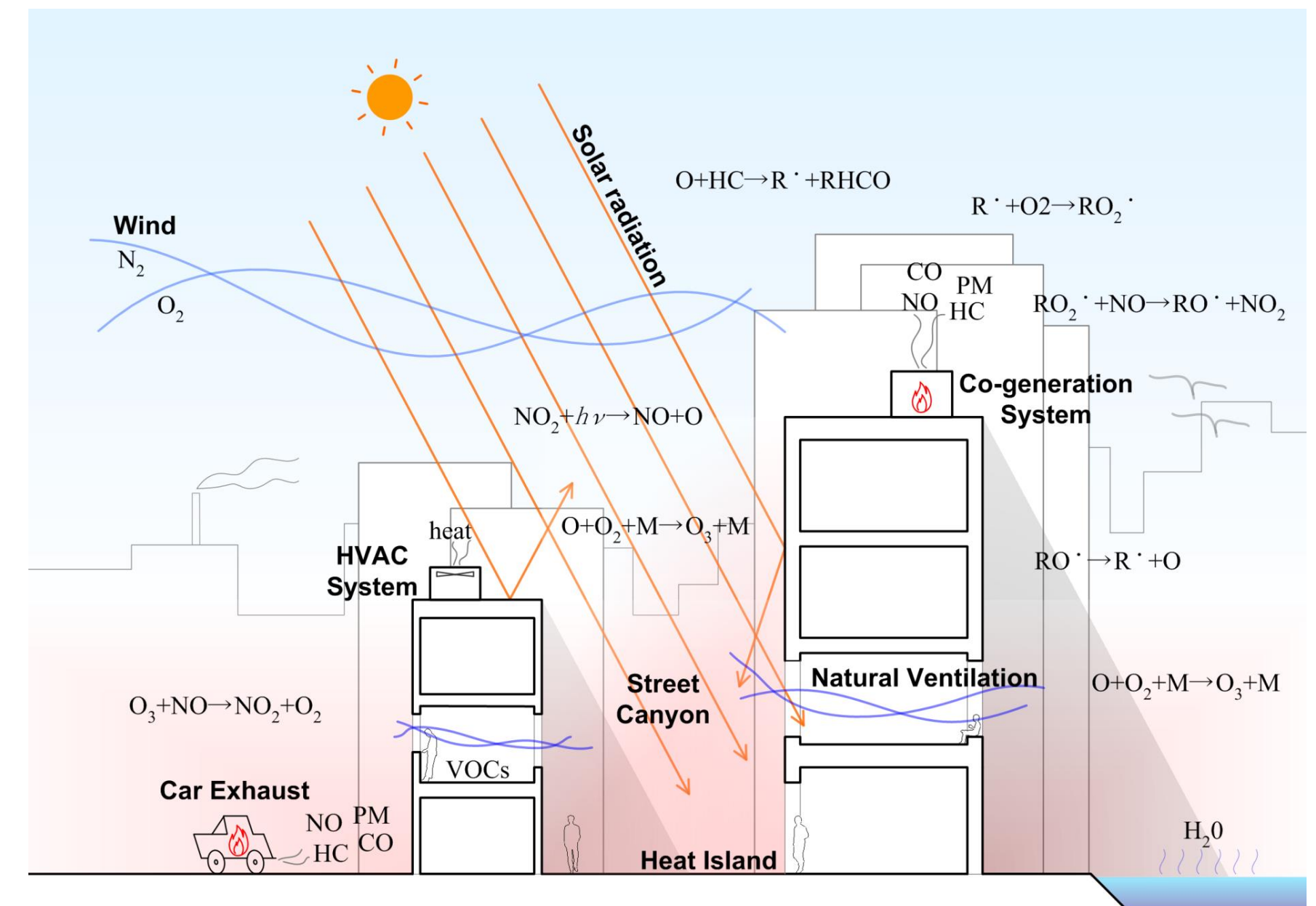
- ❑ Development of prediction model of air pollution in urban area
- ❑ Numerical simulation of complex turbulence field by three-dimensional computational fluid dynamics (CFD)
 - > Large-eddy simulation (LES)
- ❑ Simulation of chemical reaction process during diffusion of pollutants



Industry-induced
air pollution
SO_x, CO, ...



Urbanization-induced
air pollution
O_x, NO_x, PM, ...

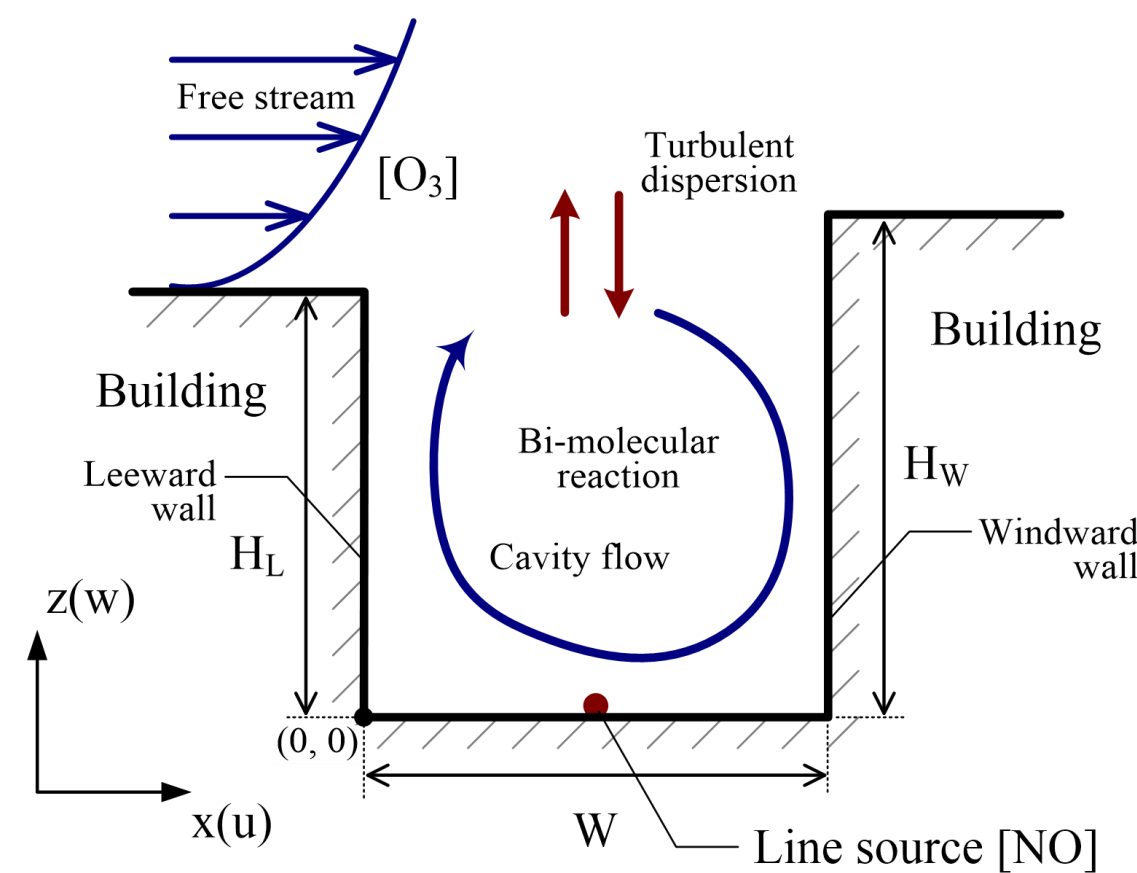


Conceptual drawing of urban air pollution

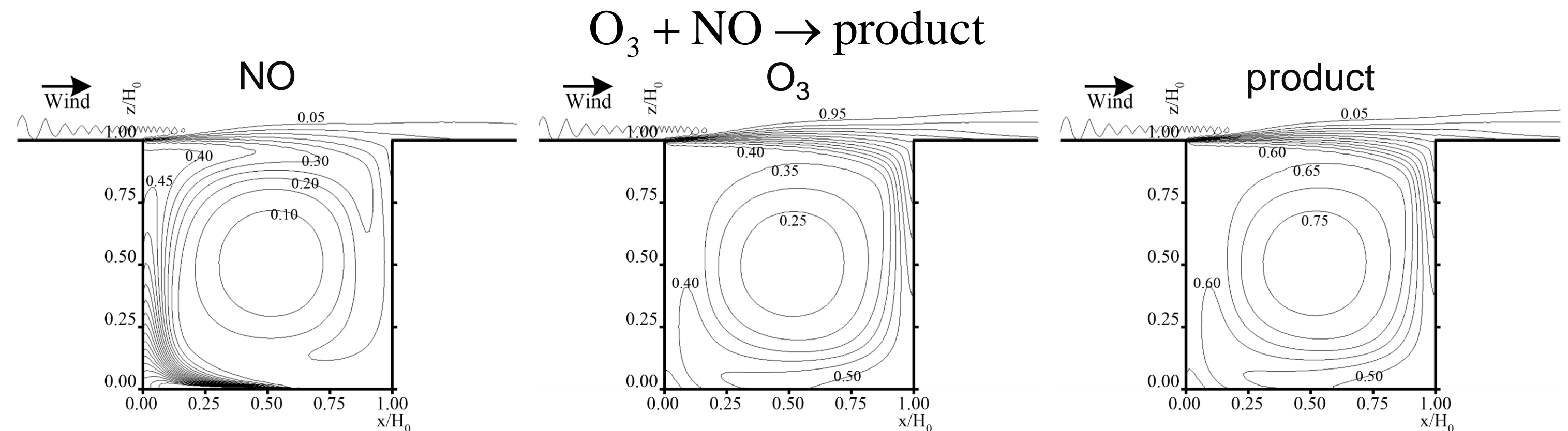
Development of numerical prediction models of atmospheric pollutant dispersion

Research content

- We conducted LES on diffusion and bimolecular chemical reaction in urban canyon in order to understand basic characteristics of pollutant diffusion with chemical reaction in urban space.
- We revealed the relationship between city block form (urban ventilation efficiency) and the influence of reaction.
- Diffusion experiments and LES in the experimental chamber simulating urban space were carried out to evaluate the prediction accuracy of LES on pollutant diffusion.

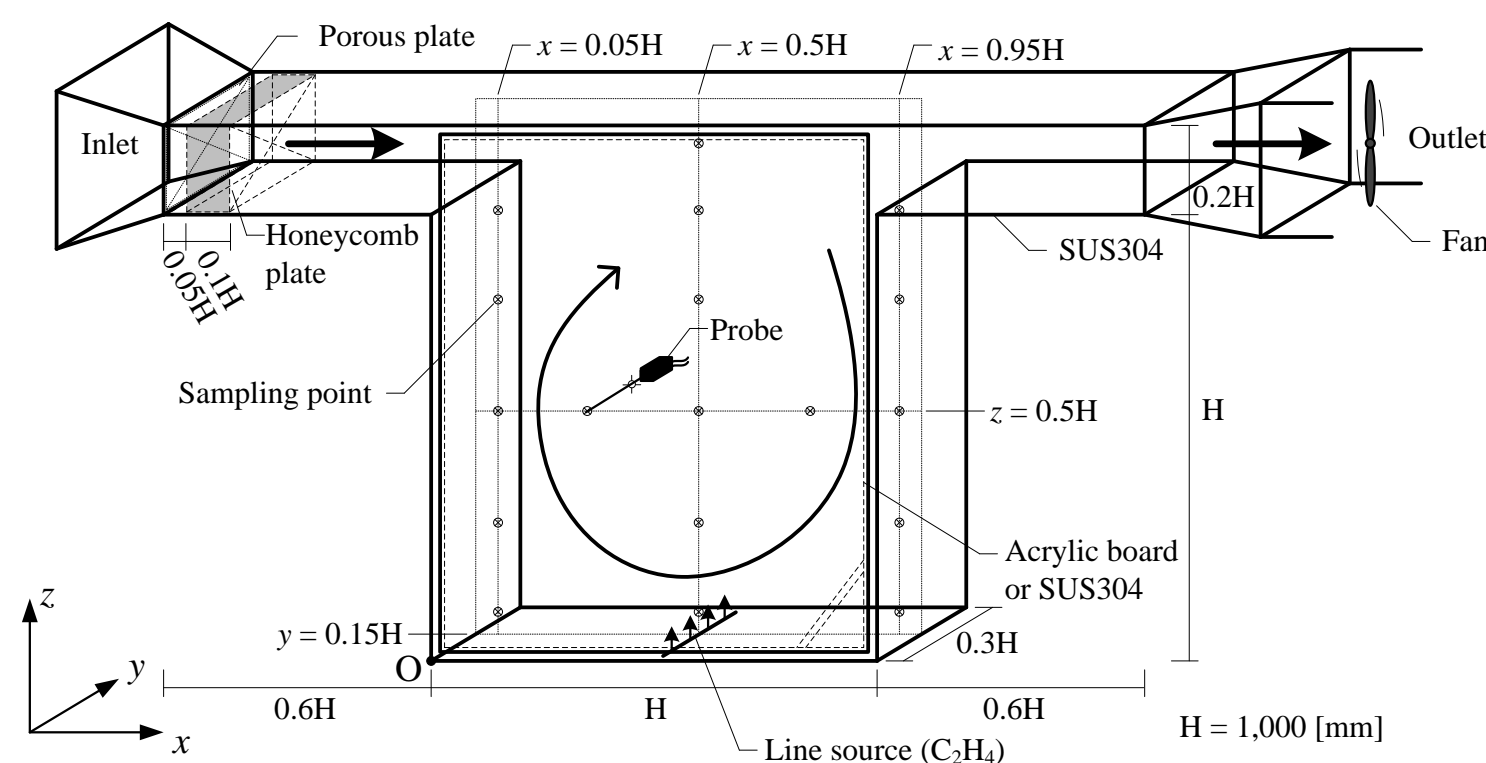


Model of urban canyon

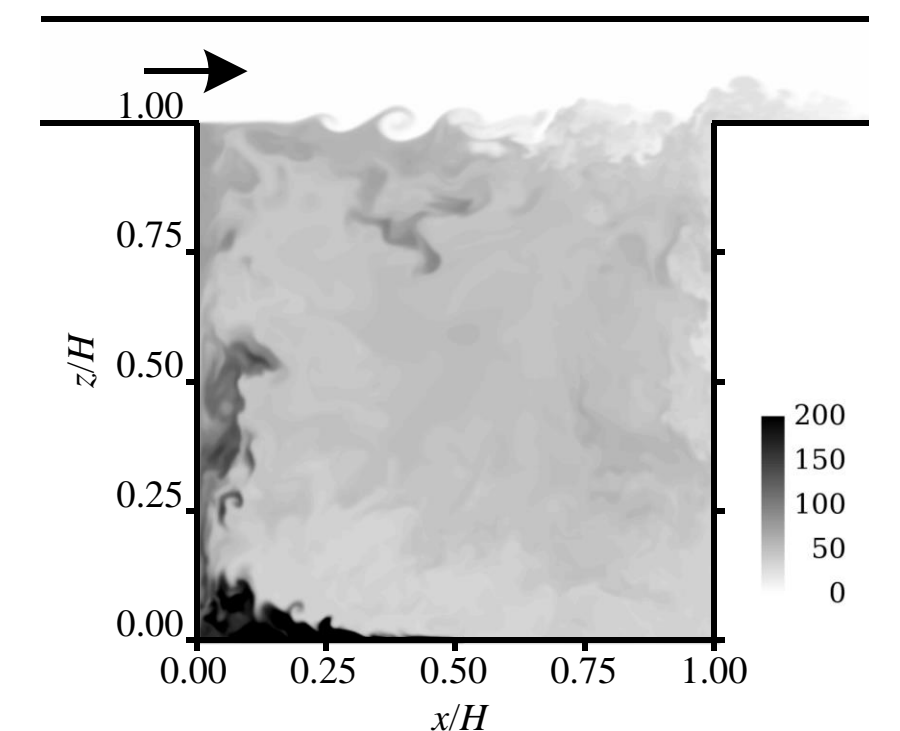


Distribution of mean concentration

Results of LES; Normalized by concentration of 0.04 ppm



Experimental chamber of urban canyon



Instantaneous distribution of concentration (LES)