KIKUMOTO LAB.

[Modeling of Wind and Environment in Cities]

Department of Human and Social Systems
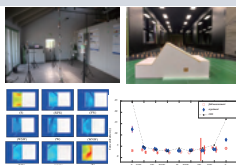
Control Engineering of Complex Environmental System

Department of Architecture, Graduate School of Engineering   http://venus.iis.u-tokyo.ac.jp/

The current research seeks to understand, predict and control the built environment. The main interests are the wind, air and thermal environments. We have been developing monitoring and simulation technologies for each environmental element and researching about control technologies that integrate measurement and prediction techniques by use of mathematical/statistical methods and artificial neural networks.

Fluid phenomena in the built environment

We are analyzing the air flow formed in cities and around buildings using observational methods, wind tunnel experiments, computational fluid dynamics (CFD) and artificial neural networks.
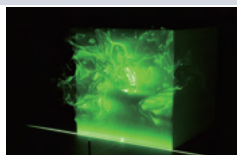
Experimental house natural ventilation prediction using 3 methods (field measurement, wind tunnel experiment, CFD simulation)
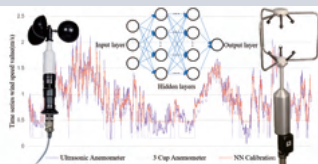
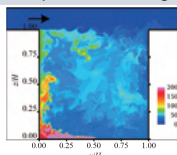Anemometer error measurement and calibration using an artificial neural network

Dispersion modeling of air pollutants

We are developing analysis technologies for the dispersion phenomenon of air pollutants in urban environments using wind tunnel experiments and turbulence models.

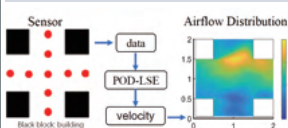Visualization of pollutant dispersion in wind tunnel

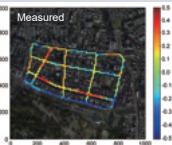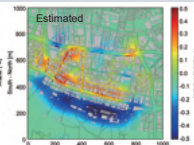Computational prediction of pollutant concentration using turbulence model
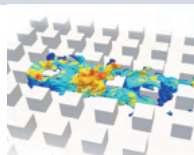
Computational prediction of pollutant dispersion in block-arrayed urban model

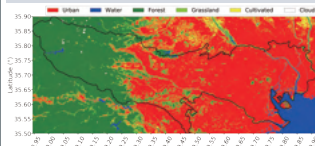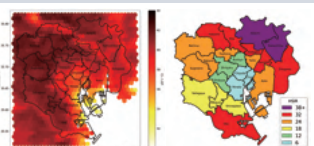## Monitoring of the urban environment

We are studying resolution enhancement combining statistical models with measured data. We are also investigating urban atmospheric environments adopting coupled proper orthogonal decomposition (POD) and linear stochastic estimation (LSE) techniques.

Estimation of Airflow in an urban area with limited observation information by POD-LSE

Monitoring of air temperature distribution in a city

Investigating connections between urbanization, land surface temperatures and heat stroke

We are spatially and temporally investigating the relationship between land types and land surface temperatures (LST). With the aim of understanding the effects that urban areas and urban growth have on temperatures in cities and heat stroke incident rates (HSIR).

Tokyo Prefecture land types

Tokyo 23 ward land surface temperature and HSIR Rates

Institute of Industrial Science, The University of Tokyo