Speaker: Dr. Daisuke Murakami

Talk Title: Spatiotemporal analysis of urban heatwaves using Turkey g-and-h random

fields models

Talk Abstract:

The statistical quantification of temperature processes for the analysis of urban heat island (UHI) effects and local heat-waves is an increasingly important application domain in smart city dynamic modelling. Frameworks for active monitoring and quantification of such heat transfer processes are critical for government policy decision making. This leads to the increased importance of real-time heatwave risk management on a fine-grained scale spatially. This study attempts to analyze and develop new methods for modelling the spatio-temporal behavior of ground temperatures. The methods developed extend beyond the modelling of second order process information, typical of many existing spatial and temporal temperature studies. The developed models also consider higher order stochastic spatial properties such as skewness and kurtosis, which are key components for understanding and describing local temperature fluctuations and UHIs. The developed models are applied to the greater Tokyo metropolitan area in a case study. The analysis also demonstrates how to statistically incorporate a variety of real datasets. This includes remotely sensed imagery and a variety of ground-based monitoring site data to build models linking city and urban covariates to air temperature. The air temperature models are then used to capture high resolution spatial emulator outputs for ground surface temperature modelling. The main class of processes studied include the Tukey g-and-h processes for capturing spatial and temporal aspects of heat processes in urban environments.

Speaker Bio:

DAISUKE MURAKAMI received his Ph.D. degree in engineering from University of Tsukuba in 2014. From 2014 to July 2017, he was a research associate of the National Institute for Environmental Studies, Japan. After August 2017, he is an assistant professor in the Institute of Statistical Mathematics. His research interests include spatial and temporal statistics, quantitative geography, urban analysis, etc.